

MEMORANDUM OF AGREEMENT
BETWEEN
THE ALAMEDA COUNTY FLOOD CONTROL AND WATER
CONSERVATION DISTRICT - ZONE 7
CITY & COUNTY OF SAN FRANCISCO PUBLIC UTILITIES COMMISSION
CONTRA COSTA WATER DISTRICT
EAST BAY MUNICIPAL UTILITY DISTRICT
AND
SANTA CLARA VALLEY WATER DISTRICT
TO

CONDUCT SITE-SPECIFIC ANALYSIS OF THE
BAY AREA REGIONAL DESALINATION PROJECT

THIS MEMORANDUM OF AGREEMENT (“Agreement”), made in the State of California on this 3~~rd~~ day of October, 2011, is by and between the Alameda County Flood Control and Water Conservation District - Zone 7 (“Zone 7 Water Agency” or “Zone 7”), a local public agency of the State of California governed by its Board of Directors, City & County of San Francisco, a municipal corporation, acting by and through the Public Utilities Commission (“SFPUC”), Contra Costa Water District (“CCWD”) a local public agency of the State of California governed by its Board of Directors, East Bay Municipal Utility District (“EBMUD”), a local public agency of the State of California governed by its Board of Directors, and Santa Clara Valley Water District (“SCVWD”) a local public agency of the State of California governed by its Board of Directors, referred collectively herein as the “Parties” and singularly as a “Party”.

This AGREEMENT sets forth the respective roles and responsibilities of CCWD, EBMUD, SCVWD, SFPUC and Zone 7 in regard to the Bay Area Regional Desalination Project (hereinafter referred to as Project) and its associated Site-specific Analysis.

RECITALS

1. WHEREAS, CCWD owns and operates a water supply system which includes facilities to provide untreated and potable water to wholesale and retail customers in portions of Contra Costa County; and
2. WHEREAS, EBMUD owns and operates a water supply system which includes facilities to provide potable water to retail customers in portions of Alameda and Contra Costa Counties; and
3. WHEREAS, SCVWD is the Santa Clara County groundwater management agency and also owns and operates a public water supply system which includes facilities to provide wholesale potable water to retailers in Santa Clara County; and

4. WHEREAS, SFPUC owns and operates a water supply system which includes facilities to provide potable water to retail and wholesale customers in San Francisco and portions of San Mateo, Santa Clara and Alameda Counties; and
5. WHEREAS, Zone 7 owns and operates a water supply system which includes facilities to provide potable water to primarily wholesale customers in Alameda County and a portion of Contra Costa County; and
6. WHEREAS, EBMUD, SFPUC, and SCVWD entered into a Memorandum of Understanding on June 4, 2003, later amended on October 10, 2003 to include CCWD, pursuant to which they each agreed to share the costs of exploring the pre-feasibility of constructing a regional desalination facility or facilities; and
7. WHEREAS, the pre-feasibility study concluded that the Project could provide a reliable water supply source during extended droughts, emergencies, periods when major facilities are taken out of service for maintenance or repairs, and contract delivery reductions; and
8. WHEREAS, the Project received a grant in the amount of Two Hundred Forty-Nine Thousand Seven Hundred Fifty-Six and 00/100 Dollars (\$249,756.00) from the State of California, Department of Water Resources (“DWR”) to conduct a Feasibility Study for the Project (“Feasibility Study”); and
9. WHEREAS, CCWD, EBMUD, SFPUC, and SCVWD entered into an Amended Memorandum of Understanding on June 29, 2005 to complete the Feasibility Study; and
10. WHEREAS, the Feasibility Study for the Project was completed in 2007; and
11. WHEREAS, the Project received a grant in the amount of Nine Hundred Forty-Nine Thousand Three Hundred and 00/100 Dollars (\$949,300) from DWR, which represents 50 % of the costs estimated to design, construct and operate a Pilot Facility at CCWD’s Mallard Slough Pump Station Site in eastern Contra Costa County (“Pilot Project”); and
12. WHEREAS, CCWD, EBMUD, SCVWD and SFPUC entered into an Amended Memorandum of Understanding on May 22, 2007 to complete the Pilot Project; and
13. WHEREAS, the Pilot Project was completed in 2010 and established the technical feasibility of a Project in eastern Contra Costa County; and
14. WHEREAS, Zone 7 joined the Project by a letter agreement on May 19, 2010 as the fifth partner; and

15. WHEREAS, based on the conclusion of the Pilot Project the Parties have jointly explored the Institutional Feasibility Analysis in 2010 and provided additional details on cost and benefit sharing scenarios and preliminary cost estimates of water production and wheeling options; and
16. WHEREAS, the Institutional Feasibility Analysis was completed in 2010, identifying eastern Contra Costa County as the preferred location for the Project, and recommending additional site-specific analyses; and
17. WHEREAS, tasks associated with the Site-specific Analysis may include, but not be limited to, hydraulic modeling, wheeling cost estimate refinement, regulatory and stakeholder (including the general public) engagement, modeling of project impacts on the Sacramento-San Joaquin River Delta, greenhouse gas reduction analysis; and
18. WHEREAS, EBMUD had acted in the lead role in administering the Feasibility Study and Pilot Project and will continue to do so for the Site-specific Analysis; and
19. WHEREAS, EBMUD is currently taking the lead on soliciting Federal and State funding and will continue to do so; and
20. WHEREAS, the Parties desire to conduct the Site-specific Analysis and share the costs of the Site-specific Analysis equally; and
21. WHEREAS, the Parties desire to explore further possibilities for State and/or Federal funding for the Project; and
22. WHEREAS, the Parties desire to ensure that the Project is consistent with existing and proposed policies and regulations that will or may apply to the Project; and
23. WHEREAS, the Parties agree to work collaboratively and cooperatively to develop and advance the Project in a manner that is mutually beneficial;

NOW, THEREFORE, in consideration of the recitals and mutual obligations of the Parties herein expressed, the Parties agree as follows:

1. DEFINITIONS

“Additional Work”: Work and/or services to be completed that are not specifically identified in this Agreement, but which are necessary to complete the Site-specific Analysis and further develop the Project. Additional Work will be developed by consensus and require written approval from all Parties.

“Consensus Agreement”: Parties may develop subsequent agreements for hiring consultants, incurring costs that are not specifically described in this Agreement and require reimbursements from other Parties, accessing contingency funds or approving significant changes in scope of work up to the limit established in this Agreement. Such agreements shall be designated as "Consensus Agreements." Consensus Agreements require the approval of all Parties and shall be documented through email, approval of meeting notes, or letters.

“Consultant”: Any contractor or contractors such as consulting, engineering, construction, outreach or mediation firms retained to provide services for the Site-specific Analysis and Additional Work.

"Contract": Contract between any Party and a consultant or any Party and an agency providing funding or grants that will be utilized for performing Site-specific Analysis or Additional Work.

"Institutional Feasibility Analysis": Assessment of institutional issues associated with the Project carried out by the Parties in 2010 including water rights, site characteristics, wheeling options and development of preliminary unit costs. During this phase, the Parties updated demand projections and identified additional site-specific analysis that would be needed for the continued development of a Regional Desalination Facility located in eastern Contra Costa County.

“Pilot Project”: All tasks completed under the Memorandum of Agreement between SFPUC, CCWD, EBMUD, and SCVWD to Pursue the Environmental Review, Regulatory Permitting, Design Services and Construction of Pilot Facility for the Bay Area Regional Desalination Project , as amended on May 22, 2007.

“Project Implementation”: Next phase of the Project which may include environmental analysis, permitting, pre-design, design, and construction. These tasks may be addressed in phases under future institutional agreements.

“Project Staff Time”: Includes staff and management time from each Party that is necessary for conducting the general project management and other duties including the responsibilities outlined in Section 6 below. This does not include Technical Services that requires specialized expertise.

“Regional Desalination Facility or Facilities” or "Project": One or more regional desalination facilities used to meet the needs of the Parties for supplemental water during extended droughts, emergencies and/or periods when major facilities are taken out of service for maintenance or repairs, and contract delivery reductions.

"Site-specific Analysis": The scope of this Agreement identified through the Institutional Feasibility, including hydraulic modeling of EBMUD's system as it pertains to wheeling water to the Parties, modeling of the impacts to the Sacramento-San Joaquin River Delta

(Delta), an analysis of the greenhouse gas reduction strategies of the project, and a plan to engage stakeholders.

“Technical Services”: Critical tasks that are necessary for completing Site-specific Analysis identified in this Agreement and will be conducted by qualified staff from any one of the Parties. Technical Services may include tasks completed by staff (including “Project Staff” under special situations) who are specialized in certain fields and is needed for the benefit of the Project.

“Third-party Costs”: Costs incurred by a Party (such as consultant costs, permit costs or other miscellaneous direct costs) for benefiting the Project that is outlined in the Agreement. Third-party Costs shall only be reimbursed to a Party pursuant to a Consensus Agreement.

2. PURPOSE

The purpose of this Agreement is to:

- i) Define the roles and responsibilities of each Party for conducting Site-specific Analysis and Additional Work. All work associated with Site-specific Analysis and Additional Work is to be conducted in accordance with the Agreement;
- ii) Establish the guidelines and principles for cost sharing between the partners;
- iii) Establishes procedures for incurring costs such as conducting Technical Services, contracting consultants, payment of consultants;
- iv) Outline the procedure for seeking reimbursement from the other Parties of costs incurred by a Party for conducting Technical Services, contracting consultants, or payment of consultants.

3. PROJECT DESCRIPTION

As a result of the 2010 Institutional Feasibility Analysis, the Parties jointly developed a description of the Project, including the proposed location and capacity. The Project under consideration would use water from the Delta withdrawn at CCWD’s Mallard Slough Pump Station, located in eastern Contra Costa County to produce 20 mgd desalinated water for delivery to the Parties. Water produced by the Project could be blended with supplies from CCWD, EBMUD (Mokelumne Aqueduct), or both. Other Parties would receive Project water through transfers or wheeling. Zone 7 and the SFPUC would receive Project water wheeled through EBMUD through interties (one future and one existing, respectively), and SCVWD could receive water either as a Delta transfer/exchange with CCWD or wheeled through SFPUC and delivered through an intertie at Milpitas. The water from the Project could be fully treated (two-pass Reverse Osmosis (RO)) or require further treatment (one-pass RO) depending on delivery point into either the CCWD or EBMUD system. The proposed project would operate

continuously in all year-types, with the possibility of storing water (including by exchange or transfer) in CCWD's Los Vaqueros Reservoir when demand from the Parties is less than plant capacity. Storage in Los Vaqueros Reservoir could provide flexibility to optimize the Project yield. The intake of the desalination plant would rely on a combination of new or modified water rights (i.e., water rights from CCWD and/or other nearby municipalities), based on availability. One of the options for disposal of the desalination plant brine include blending with discharges from wastewater treatment plants located in the vicinity of the desalination plant, including the Central Contra Costa Sanitary District and the Delta Diablo Sanitation District. Power to the desalination plant could be provided by Pacific Gas and Electric, the current power supplier at Mallard Slough Pump Station or nearby power plants; the Parties are continuing to investigate alternative renewable energy applications for the Project (as described in one of the site-specific studies to be conducted under this Agreement).

4. DESCRIPTION OF THE SITE-SPECIFIC ANALYSIS

The work to be conducted as part of the Site-specific Analysis in the form of Technical Services is summarized below. The detailed scopes of work and budget estimates are provided in Appendices A through D.

- i. Hydraulic Analysis for Wheeling Water: Desalinated water produced at an eastern Contra Costa County site may be wheeled through the EBMUD's supply and distribution system to Zone 7, SFPUC or SCVWD. A preliminary evaluation of EBMUD's water wheeling capacity has been conducted based on EBMUD's Projected 2020 demand. An evaluation is necessary based on EBMUD's Projected 2040 demand and planned system expansion to evaluate whether EBMUD would have the capacity—and if so, at what rates—to wheel water to Zone 7, SFPUC, or SCVWD. EBMUD staff will conduct this analysis as Technical Services. If needed, a Consultant may be procured for conducting parts of the work or Additional Work, so long as the procurement of a Consultant to perform such work is specified in a Consensus Agreement.
- ii. Cost Estimation of Wheeling Water: Based on the results of the Hydraulic Analysis for Wheeling Water, EBMUD will develop cost estimates for wheeling the water through its system. The cost estimates will be based on facilities that are used to allow wheeling the water. Water loss may be addressed in the cost estimation. EBMUD staff will conduct this analysis as Technical Services.
- iii. Delta Modeling: CCWD will provide technical services to evaluate the Project's impacts to the Delta water quality and supply conditions. The modeling will analyze the potential effects of drawing up to 25 MGD (39 cubic feet per second [cfs]) source water from CCWD's Mallard Slough Pump Station and the disposal of the brine at two possible locations: Central Contra Costa Sanitary District (CCCSD) and Delta Diablo Sanitation District (DDSD). CCWD staff will conduct this analysis as Technical Services.

- iv. Fisheries Modeling: CCWD will provide technical services to evaluate the Project's impacts to sensitive fish species found in the vicinity of CCWD's Mallard Slough Pump Station intake located in the Delta.
- v. Storage Optimization: CCWD will analyze how storage in CCWD's Los Vaqueros Reservoir can be incorporated to maximize water delivery to the Parties.
- vi. Greenhouse Gas Reduction Analysis: Through Consensus Agreement Zone 7 will hire a Consultant to estimate the Project's potential greenhouse gas (GHG) emissions and identify and evaluate potential alternatives to minimize GHG emissions, including the use of state-of-the-art energy-efficient desalination technologies.
- vii. Outreach Strategy: The SFPUC will take the lead in conducting the public outreach during this phase of work. Three (3) public outreach meetings will be conducted in the East Bay (EBMUD/CCWD/Zone 7) and West Bay (SFPUC/SCVWD) service areas, respectively. The meetings will be held at the beginning of the proposed work period and then once preliminary findings are available (approximately 12 months from start) and once final analysis has been completed (approximately 18 months from start). Information presented at the East and West Bay locations will be the same. Comments from the public meetings will be compiled and collated and maintained as part of the Project record. In addition to the public meetings, 6-10 meetings with regulatory agencies are anticipated during this phase.
- viii. Delta Modeling Technical Advisory Committee: Zone 7 will take the lead in coordinating the Delta Modeling Technical Advisory Committee (TAC) which will include representatives from the Parties, with the objective of reviewing and making recommendations on the proposed CCWD Delta Modeling of water quality, water supply, and fisheries impacts.

Other work that is needed to advance the Project will be continued by Project Staff. Examples of these efforts include State and Federal grant applications, website updates, and outreach (e.g., conference attendance, statewide meetings, and education), as further defined in Section 5, Responsibilities of the Parties.

If the need arises and a Consensus Agreement is reached, a Party may hire, manage, and retain a Consultant for conducting portions of the Site-specific Analysis on behalf of the Parties. The decision to share the costs of the consultant will be reached through Consensus Agreement.

5. GOALS AND OBJECTIVES

The Parties share the goal of further developing and implementing a Project that will provide a new, safe, reliable water supply source that can be used to meet needs of the Parties. The goal of the Site-specific Analysis is to provide information necessary to support the next phase of the Project, i.e., Project Implementation. Specifically, the Site-specific Analysis intends to answer the following questions:

- i. How much water can be produced, stored and delivered to each Party?
- ii. How will the produced water be shared amongst the Parties?
- iii. How much water can be wheeled through EBMUD system for SCVWD, SFPUC and Zone 7 during different seasons?
- iv. What is the estimated full cost of the water delivered to each Party?
- v. How can the Project's environmental impacts, such as energy consumption and others that may be identified, be minimized cost-effectively?
- vi. What are the Project's potential impacts to the Delta water supply, water quality and fisheries?
- vii. How will the Project comply with all existing regulations that will apply?
- viii. How will the Project coordinate and ensure consistency with the planned Desalination and Brine Disposal Policy proposed by the State Water Resources Control Board?
- ix. How can water storage opportunities be incorporated cost-effectively to maximize water supply output from the Project?
- x. What are the proposed alternatives for review under the California Environmental Quality Act (CEQA)?
- xi. What is public opinion about the proposed Project approach and scope?
- xii. What is the public opinion about the proposed Project?
- xiii. What input do regulatory agencies have in developing the Project?
- xiv. How will the costs and benefits be shared by the Parties?
- xv. What are the next steps for implementing the Project?
- xvi. What is the time required to implement the Project?

The Parties hereby acknowledge that any development of a Regional Desalination Facility or Facilities beyond the work described herein for Site-specific Analysis and Additional Work shall be subject to a separate agreement and further environmental analysis.

6. RESPONSIBILITIES OF THE PARTIES

The Parties shall have the responsibilities identified below, and will provide Technical Services and cost reimbursements in the amounts shown in Section 7.

All Parties shall consult with, inform, and seek advice from their respective general managers and chief executives on activities related to external funding strategies related to this Project. Each Party will keep each other Party informed about each Party's internal priority ranking of this Project as compared to other water supply options, and whether it is pursuing funding opportunities from the same funding source for other water supply options that may compete with this Project.

General responsibilities of all Parties are as follows:

- a. Continue working cooperatively to develop the Project.

- b. Work with staff from other Parties in conducting the Site-specific Analysis and Additional Work for the development of the Project.
- c. Share relevant engineering, permitting, regulatory and operational information regarding its own facilities and permits with other Parties for the benefit of the Project.
- d. Provide access to facilities and operational data that may be needed for Site-specific Analysis (such as Mallard Slough Pump Station, aqueducts and pumping plants, interties, etc.). If needed, conduct necessary analysis of its own facilities, permits, operational data, procedures or requirements, or any other data that are needed by the Site-specific Analysis and share the information with other Parties. Access to facilities will be consistent with, and will follow, the facility owner's standard safety and notification requirements.
- e. Provide engineering oversight and review of Site-specific Analysis and Additional Work products.
- f. Compile and share information on Technical Services, Third-party Costs, and cash (if any) contributions expended by each of the Parties to seek reimbursements.
- g. Parties performing Technical Services will submit to EBMUD on a quarterly basis a summary of costs incurred to perform the Technical Services.
- h. Conduct general work that is needed to advance the Project. These efforts may include State and Federal grant applications, website update, and outreach.
- i. If needed and upon approval of Parties, through a Consensus Agreement, contract with Consultant(s) to assist the Parties in conducting the Site-specific Analysis and any Additional Work.
- j. If a Consultant is hired by a Party, then the responsible Party shall conduct all consultant management duties including receiving and verifying Consultant invoices. Invoices received from the Consultant will be sent to other Parties for approval. Consultants will be paid in accordance with the responsible Party's process after the invoices are approved by other Parties. Approval of the invoice will be assumed if no comments or disputes are received within five (5) working days of receipt of the invoices. If there are disputes, the responsible Party will take necessary actions that are developed through Consensus Agreement to resolve them with the Consultant. If the disputes cannot be resolved within a reasonable time, and the responsible Party is obligated to pay the Consultant charges, the costs will be shared equally by the Parties.
- k. Consultants shall indemnify all Parties and name all Parties as insured in the contract with the responsible Party.
- l. Invoice other Parties in a timely manner for Technical Services, Third-party Costs, and other approved contributions, as defined in Section 6. Invoices will include details of hours worked and tasks completed.
- m. Promptly review invoices for approval upon receipt of information from other Parties. Report disputes to the responsible Party within five (5) working days of receipt of the invoices. Cooperate with other Parties in resolving disputes.

- n. All Parties will cooperate to resolve any payment/cost-sharing/accounting issues.
- o. Participate in the exploration, analysis and effort to obtain outside funding from Federal, state or private sources consistent with the approach agreed upon by the Parties and the federal funding lead.

Each Party has additional and unique responsibilities. Specific responsibilities of individual Parties are mentioned below.

In addition to the general responsibilities, EBMUD has the following responsibilities:

- a. Assume the lead in project management duties of implementing this Agreement and help implement the scope of work and requirements of the Agreement .
- b. Assume the lead and conduct the work required for Hydraulic Analysis and Cost Estimation as Technical Services;
- c. Continue to take the lead in soliciting State and Federal funds for the Project.
- d. Serve as the primary grant applicant on behalf of the other Parties. If successful, be the responsible agency for administering the grant.
- e. Collect and compile information and data (including financial information) from other Parties and prepare and distribute progress reports on a quarterly basis.

In addition to the general responsibilities, CCWD has the following responsibilities:

- a. Assume the lead and conduct the work required for Delta Modeling, Fisheries Modeling, and Storage Optimization as Technical Services.

In addition to the general responsibilities, SCVWD has the following responsibilities:

- a. Serve as co-lead to the Greenhouse Gas Reduction Analysis and provide the necessary staff time.
- b. Update the website with current information.

In addition to the general responsibilities, SFPUC has the following responsibilities:

- a. Assume the lead and conduct the work required for outreach to public, other agencies, regulatory agencies, elected officials, environmental groups and other interested groups.
- b. Develop any outreach materials necessary to implement the communication plan, as described in Appendix D.
- c. Assume the lead and work with other Parties in developing any agreements for the next phases of the Project.

In addition to the general responsibilities, Zone 7 has the following responsibilities:

- a. Assume the lead and conduct the work required for Greenhouse Gas Reduction Analysis. SCVWD will act as a co-lead on this task.
- b. Procure a Consultant through Consensus Agreement and a joint selection process to perform the Greenhouse Gas Reduction Analysis. The Consultant shall be hired under Third-party costs.
- c. Assume the lead and coordinate the Delta Modeling Technical Advisory Committee, as described in Appendix B.

7. COST SHARING AND PAYMENT

The Parties shall each pay an equal share of the total Site-specific Analysis costs, in amounts described in Table 1 below.

Table 1. Cost-Sharing Contributions by Agency

<i>Breakdown of Agencies' Contributions</i>			CCWD	EBMUD	SCVWD	SFPUC	Zone 7	Total
Technical Services:	Lead Agency	Technical Services Cost						
i. Hydraulic Analysis & Cost Estimate for Wheeling Water	EBMUD	\$470,000	\$94,000	\$94,000	\$94,000	\$94,000	\$94,000	\$470,000
ii. Delta-Fisheries Modeling and Storage Optimization	CCWD	\$380,000	\$76,000	\$76,000	\$76,000	\$76,000	\$76,000	\$380,000
iii. Greenhouse Gas Emission Reduction Analysis	Zone-7 - SCVWD	\$60,000	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	\$60,000
iv. Outreach*	SFPUC	In-Kind	In-Kind	In-Kind	In-Kind	In-Kind	In-Kind	In-Kind
Agencies' Contributions Towards Technical Services/Third-Party Costs		\$910,000	\$182,000	\$182,000	\$182,000	\$182,000	\$182,000	\$910,000
Contingency		\$90,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$90,000
Total Contribution Toward All Costs			\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$1,000,000
Percent Contribution by each Partner			20.00%	20.00%	20.00%	20.00%	20.00%	100.00%

*Note: 'In-Kind' refers to staff time, public noticing and meeting materials. Cost of staff time and materials needed to develop or execute public meetings is not reflected as a shared cost of the Project.

Cost Reimbursement Plan:

The cost reimbursement plan is based on the following principles:

- a. Parties incurring cost for providing Technical Services will be reimbursed by other Parties.
- b. EBMUD will conduct the Project Management duties and will receive payments from and send out payments to other Parties. EBMUD will track all costs related to the Site-specific Analysis and will provide a summary to the Partners. All costs will be based on fully loaded rates as presented in the Appendices and will not exceed the amounts mentioned in Table 1 above, unless agreed upon by all Parties.
- c. Within 45 days of execution of this Agreement, SCVWD, SFPUC, and Zone 7 will pay EBMUD the full amounts indicated in Table 2.

d. Parties performing Technical Services will submit to EBMUD on a quarterly basis a summary of costs incurred to perform the Technical Services identified in Table 1.

e. The Table 1 cost estimate includes a contingency of \$90,000 (contingency funds). Parties must develop a Consensus Agreement before being able to access the contingency funds. Contingency funds may be used to pay for cost-overruns for tasks identified in Table 1 or for funding Additional Work (Section 7.0).

f. Within ninety days following the completion of all work described in this Agreement, a cost true-up will be completed by EBMUD to determine the actual cost for the Site-specific Analysis. If the actual costs add up to less than that estimated in Table 1, Parties would be either refunded or the unused funds used for Additional Work as agreed upon by Parties, through a Consensus Agreement.

Table 2 summarizes the payment schedule for each Party based on the estimated costs for conducting Site-specific Analysis presented in Table 1.

Table 2. Payment Schedule

Party	Full Contribution	Direct Contribution (Technical Services)	Payment to Project Administrator (EBMUD)	Reimbursement from Project Administrator (EBMUD)
CCWD	\$200,000	\$380,000	\$0	\$180,000
EBMUD	\$200,000	\$470,000	\$0	\$270,000
SCVWD	\$200,000	\$0	\$200,000	\$0
SFPUC	\$200,000	\$0	\$200,000	\$0
Zone 7	\$200,000	\$60,000	\$140,000	\$0

Note:

Contingency funds of \$90,000 require Consensus Agreement prior to allocation or spending.
Zone 7 costs are Consultant costs.

In the event there is a shortfall in funds required for payment of Technical Services or Third-Party direct costs such as Consultant services, equipment, or fees beyond the limits described herein, each Party will share the shortfall equally unless a different allocation of percentages is specified in a Consensus Agreement between the Parties.

All Federal or State funds received by the Parties for the development of the Project, will be used to equally offset each Party's contribution under this Agreement.

No work on the Site-specific Analysis shall commence until the Agreement has been executed by all Parties. If the Parties mutually agree to immediately suspend the work on the Site-specific Analysis, then the Parties will share equally in the costs expended through the date of suspension. If some of the Parties decide to continue with the Project they can agree to enter into negotiations to establish a new cost-sharing Agreement for

the remaining work. If a single Party chooses to terminate their participation under the terms of this Agreement they will remain financially responsible for their contribution.

8. ADDITIONAL WORK

The Parties recognize that completion of the Site-specific Analysis may require Additional Work. Prior to authorizing and/or awarding a contract for Additional Work, each Party must provide, for written approval, the scope of the Additional Work, and its anticipated schedule and cost. The Parties shall apportion the costs for Additional Work based on Consensus Agreement at such time as the Additional Work is defined. The Parties will designate a Project Manager and Contract Manager for Additional Work.

9. LIABILITY, INDEMNITY AND HOLD HARMLESS

CCWD, EBMUD, SCVWD, SFPUC, and Zone 7 each agrees to mutually indemnify, defend at its own expense, including attorneys' fees, and hold the other harmless from and against all claims, costs, penalties, causes of action, demands, losses and liability of any nature whatsoever, including but not limited to liability for bodily injury, sickness, disease or death, property damage (including loss of use) or violation of law, caused by or arising out of or related to any negligent act, error or omission, or willful misconduct of itself, its officers or employees, or any other of its individual agents acting pursuant to this Agreement.

Notwithstanding the preceding sentence, where more than one Party is named in a suit, or made subject to a claim or penalty, the Parties shall coordinate and undertake a joint defense, utilizing a joint defense Agreement to the extent possible, subject to the approval of the Parties. Each Party to this Agreement agrees that, to the greatest extent practicable, it shall cooperate in such defense and execute any waivers and/or tolling Agreements that may be necessary in order to provide for a single joint defense of such a suit, claim, or imposition of penalty. Any communications between and/or among the Parties and any of their respective consultants and attorneys engaged in the joint defense shall be privileged as joint defense communications. Work performed during the joint defense by Consultants or attorneys, to the extent allowed by law, shall be considered attorney work product. Nothing in this paragraph is intended to require a joint defense under circumstances where it would be legally impermissible or under circumstances where it is wholly impractical.

In the event of any loss, liability, claim, cost, or damage giving rise to a claim or suit brought by one or more persons not a Party to this Agreement (third Party claim or suit), each Party agrees that it shall execute any waivers and/or tolling Agreements which may be required to defer any and all claims, rights to indemnity or contribution, or defenses it may be able to assert against any other Party to this Agreement until final settlement or other resolution of such claim or suit, or until such time as the Parties agree that the Joint Defense will not be compromised by assertion of such claims, rights, or defenses. All

rights to such claims, rights or defense are fully reserved and shall not be lost or diminished by any waiver or tolling Agreement.

10. MAINTENANCE AND INSPECTION OF BOOKS, RECORDS, AND REPORTS

All Parties will, upon reasonable advance written notice, make available for inspection to the other Parties all records, books and other documents directly relating to the Site-specific Analysis and the Bay Area Regional Desalination Project as well as any other work related to water supply institutional arrangements and Agreements that are required for conducting the Site-specific Analysis. Prior to release of information other than in response to a Public Records Act request, a subpoena, or court order, all draft information has to be approved by all Parties for finalization and release.

11. ASSIGNMENT

No Party shall assign, sublet, or transfer this Agreement or any of the rights or interests in this Agreement without the written consent of the other Parties.

12. NOTICES

Unless otherwise specified in this Agreement, all notices shall be deemed to have been given if delivered personally or if enclosed in a properly addressed and stamped envelope and deposited with the US Postal Service for delivery by registered or certified mail. Unless and until noticed otherwise, in writing, all notices except as otherwise specified in this Agreement shall be delivered to the Parties at their addresses below:

Contra Costa Water District
Jerry Brown, General Manager
1331 Concord Avenue
P. O. Box. H20
Concord, CA 94524
(925) 688-8034

East Bay Municipal Utility District
Alexander R. Coate, General Manager
P. O. Box 24055 MS804
Oakland, CA 94623-1055
(510) 287-0101

Santa Clara Valley Water District
Beau Goldie, Chief Executive Officer
5750 Almaden Expressway
San Jose, CA 95118

(408) 265-2600

San Francisco Public Utilities Commission
Ed Harrington, General Manager
1155 Market Street, 11th Floor
San Francisco, CA 94103
(415) 554-3160

Zone 7 Water Agency
Jill Duerig, General Manager
100 North Canyons Parkway
Livermore, CA 94551
(925) 454-5016

13. COMPLIANCE WITH LAWS

In exercising its rights under this Agreement, each Party shall be responsible for complying with all applicable Federal, state and county laws, regulations and ordinances.

14. GOVERNING LAW

This Agreement will be deemed a contract under the laws of the State of California and for all purposes shall be interpreted in accordance with such laws.

15. DISPUTES

In the event of a dispute between Parties over the meaning of this Agreement, the Parties shall first meet to attempt to resolve the matter at the staff level for the least expense practicable.

16. AMENDMENT AND WAIVER

Except as provided herein, no alteration, amendment, variation, or waiver of the terms of this Agreement shall be valid unless made in writing and signed by all Parties. Waiver by any Party of the default, breach or condition precedent, shall not be constructed as a waiver of any other default, breach or condition precedent, or any right hereunder.

17. SUCCESSORS

This Agreement shall bind the successors of the Parties, subject to Section 13, in the same manner as if they were expressly named.

18. TIME

Time is of the essence of this Agreement. The Site-specific Analysis is scheduled to be completed in Fiscal Year 2013. Schedule for Additional Work will be developed when appropriate.

19. INTERPRETATION

This Agreement shall be deemed to have been prepared equally by all Parties, and its individual provisions shall not be construed or interpreted more favorably for one Party on the basis that the other Parties prepared it.

20. INTEGRATION

This Agreement represents the entire understanding of the Parties as those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered hereunder.

21. SEVERABILITY

Should any part of this Agreement be declared by a final decision by a court or tribunal of competent jurisdiction to be unconstitutional, invalid or beyond the authority of any Party to enter into or carry out, such decision shall not affect the validity of the remainder of this Agreement, which shall continue in full force and effect, provided that the remainder of this Agreement can be interpreted to give effect to the intentions of the Parties.


22. SIGNATURES

This Agreement may be executed in counterpart.


IN WITNESS WHEREOF, the Parties hereto have executed the Agreement to be effective on the date first above written.

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

APPROVED AS TO FORM:



DONN FURMAN
Deputy City Attorney
City and County of San Francisco

 10/17/11

ED HARRINGTON
General Manager
San Francisco Public Utilities Commission

CONTRA COSTA WATER DISTRICT

APPROVED AS TO FORM:

CARL NELSON
District Legal Counsel

JERRY BROWN
General Manager

SANTA CLARA VALLEY WATER DISTRICT

APPROVED AS TO FORM:

ANTHONY T. FULCHER
Assistant District Counsel

BEAU GOLDIE
Chief Executive Office

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CONTRA COSTA WATER DISTRICT

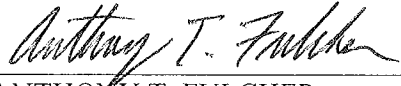
APPROVED AS TO FORM:

CARL NELSON
District Legal Counsel

JERRY BROWN
General Manager

SANTA CLARA VALLEY WATER DISTRICT

APPROVED AS TO FORM:



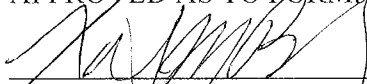
ANTHONY T. FULCHER
Assistant District Counsel



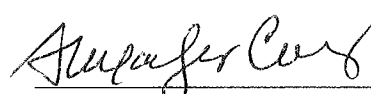
BEAU GOLDIE
Chief Executive Office

EAST BAY MUNICIPAL UTILITY DISTRICT

APPROVED AS TO FORM:



XANTHE BERRY
Office of the General Counsel



ALEXANDER R. COATE
General Manager

**ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION
DISTRICT - ZONE 7**

APPROVED AS TO FORM:

G.F. DUERIG
General Manager

EAST BAY MUNICIPAL UTILITY DISTRICT

APPROVED AS TO FORM:

XANTHE BERRY
Office of the General Counsel

ALEXANDER R. COATE
General Manager

**ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION
DISTRICT - ZONE 7**



G.F. DUERIG
General Manager

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City and County of San Francisco

ED HARRINGTON
General Manager
San Francisco Public Utilities Commission

CONTRA COSTA WATER DISTRICT

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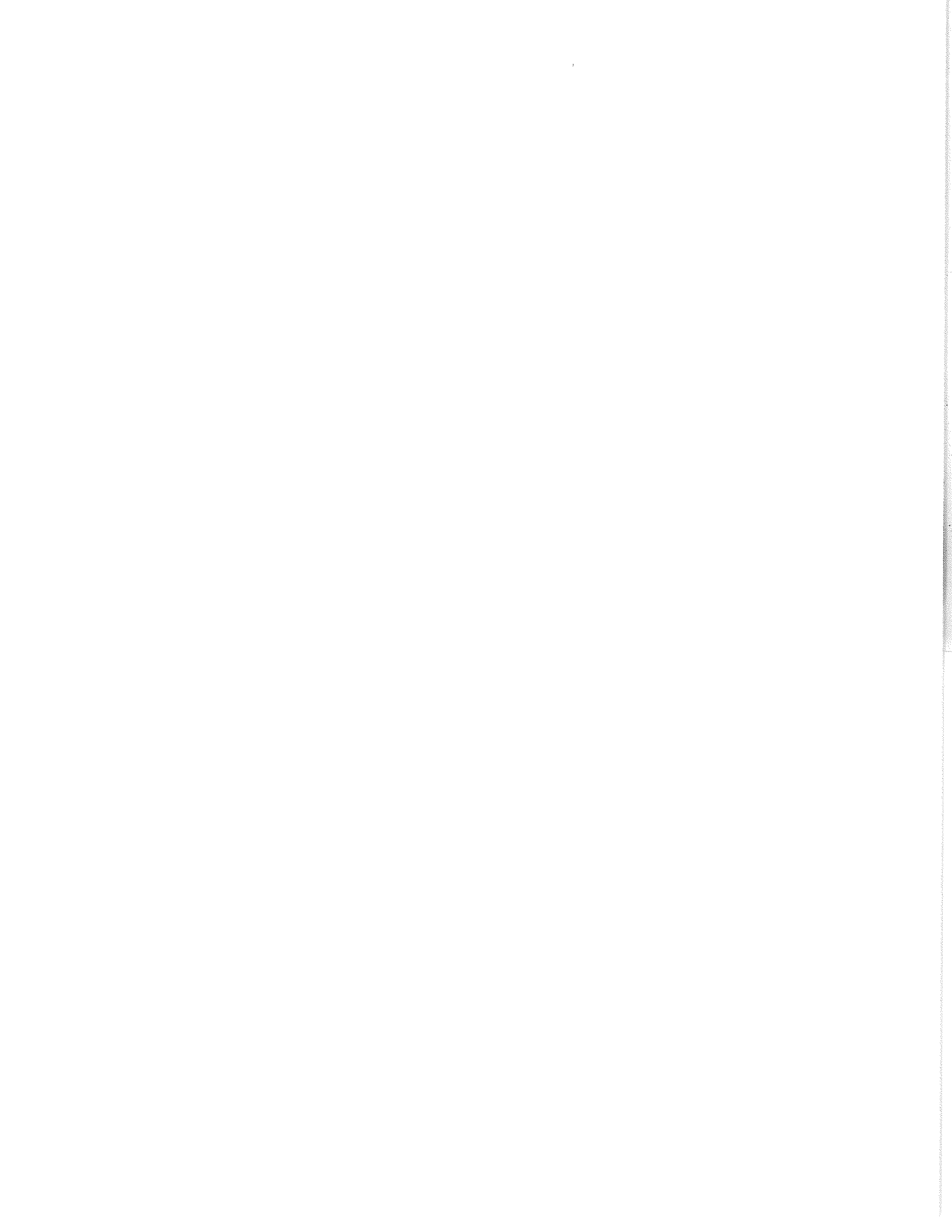
ANTHONY T. FULCHER
Assistant District Counsel

BEAU GOLDIE
Chief Executive Office

APPENDIX A

**Hydraulic Modeling
Wheeling Cost Estimation**

October 2011



EAST BAY MUNICIPAL UTILITY DISTRICT

DATE: February 24, 2011

MEMO TO: Michael T. Tognolini, Manager of Water Supply Improvements Division

FROM: Clifford C. Chan, Manager of Water Treatment and Distribution Division *CCC*
William R. Kirkpatrick, Manager of Water Distribution Planning Division

SUBJECT: Regional Desalination Modeling Study Cost Estimate

*Rev Memo for WRK
2/24/11*

SUMMARY

This memo is an update to the October 14, 2010 modeling study cost estimate memo and includes changes to the scope of work agreed upon between the Water Operations Department, Water Supply Improvements Division (WSID) and Water Distribution Planning Division (WDPD). The cost estimate is based on a reduced scope of work focused on estimating the wheeling capacity to the Zone 7 Water Agency and San Francisco Public Utilities Commission/Santa Clara Valley Water District (SFPUC/SCVWD) interties as part of the Bay Area Regional Desalination Project.

Staff met on January 24, February 3, 7, and 9, 2011 to discuss and agree on the revised scope of work for the study. Attached is the detailed scope of work and cost estimate for the study.

DISCUSSION

As part of the Bay Area Regional Desalination Project, WSID met with Operations and Engineering staff to discuss the feasibility of wheeling water to Zone 7 via a new intertie and to the SFPUC/SCVWD via the existing Hayward Intertie. The original cost estimate to study the feasibility of this project was summarized in an October 14, 2010 memo to you with an estimated cost of \$673,000. There were two optional tasks as part of this study for an additional \$132,600.

Early this year, WSID met with the Water Operations Department and WDPD to reduce the scope of work. The revised scope of work will evaluate the maximum seasonal flow capacity to each intertie, and will include a more detailed fixed cost analysis and a review of the previously completed variable cost analysis. The studies will consider both normal year and dry year operations for EBMUD based on the 2040 demand scenario with planned system improvements, and assumes that the Zone 7 delivery rate is 10 million gallons per day (MGD), the SFPUC/SCVWD delivery rate up to 30 MGD, and that these delivery rates represent the maximum rate of delivery and not an average daily rate.

Regional Desalination Modeling Study Cost Estimate
February 24, 2011
Page 2

The estimated full cost for this study, including a 15 percent contingency, is \$553,000. A detailed breakdown of the costs is attached.

WRK:CCC:prb:sb

sb11_036.doc

Attachments:

Water Distribution System Wheeling Operation Study Scope of Work and Cost Estimate
Distribution Engineering Scope of Work and Cost Estimate
Water Supply Engineering Scope of Work and Cost Estimate

cc: E. White
J. Hurlburt
D. Beyer
J. Young
B. Maggiore

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

**BAY AREA REGIONAL DESALINATION PROJECT
WATER DISTRIBUTION SYSTEM WHEELING
OPERATIONS STUDY
FEBRUARY 2011**

SCOPE OF WORK

PROJECT DESCRIPTION

The Bay Area Regional Desalination Project (BARDP) Water Distribution System Wheeling Operations Study (study) is needed to confirm the potable water wheeling routes, available wheeling rates up to target amounts, estimated wheeling costs, and distribution and raw water system limitations for meeting the BARDP wheeling objectives without significant improvements to the District's raw water and distribution systems. The goal of the study will be to determine how much of the requested wheeling targets can be supplied through EBMUD's distribution system to BARDP agencies under a range of 2040 demand scenarios.

The wheeling objectives were developed to support a Bay Area Regional Desalination Project, currently planned for Mallard Slough in the California Delta. In such a project, EBMUD would accept up to 10 million gallons per day (mgd) average annual supply and wheel up to 30 mgd average annual supply through EBMUD's Mokelumne Aqueducts, raw water system, water treatment plants, and distribution system to interties with other agencies. The existing Hayward Intertie would be used to supply San Francisco Public Utilities Commission (SFPUC) and Santa Clara Valley Water District (SCVWD) at a maximum rate of 20 mgd. A new intertie with Zone 7 Water Agency (Zone 7) would need to be constructed to supply Zone 7 at a maximum rate of 10 mgd. The wheeling objectives for each of the agency partners are summarized in Table 1.

**TABLE 1
Wheeling Objectives**

Source/Supply	Connection to Desalination System	Requested Dry Year Delivery (mgd)	Requested Normal Year Delivery (mgd)
Hayward Intertie to SFPUC and SVWD	EBMUD's raw water system (Mokelumne Aqueducts)	20	13
New Intertie to Zone 7	EBMUD's raw water system (Mokelumne Aqueducts)	5	10
EBMUD	EBMUD's raw water system (Mokelumne Aqueducts)	10	0
Cumulative		35	23

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

PROJECT BACKGROUND

The Bay Area's largest water agencies are working together to develop a regional desalination project to serve the needs of over 5.6 million residents and businesses in the region. The Zone 7, CCWD, EBMUD, SFPUC, and SCVWD collaborated since 2003. The Bay Area Regional Desalination Project would consist of one or more desalination facility, with an estimated capacity range of 10 to 50 mgd.

The Project goals and benefits are to

- Provide a reliable, supplemental water supply source during extended droughts and emergencies such as earthquakes or levee failures.
- Allow other major facilities such as treatment plants, water pipelines, and pump stations, to be taken out of service for maintenance or repairs.
- Minimize the potential for adverse environmental impacts.
- Leverage existing and contiguous infrastructure to meet needs and minimize costs.

Technical studies conducted in 2005 identified three locations in the Bay Area where a regional desalination facility could be located. A six-month pilot test was completed in April 2009 at CCWD's Mallard Slough Pump Station that confirmed the technical viability of the project.

In 2010, a Fatal Flaw Analysis was conducted by EBMUD's Water Distribution Planning Division (WDPD) and Water Operations Department (WOD) to evaluate the feasibility and preliminary costs of wheeling the desalination water through EBMUD to the Bay Area Regional Desalination Project partners. The Fatal Flaw Analysis was based on mass balance analyses of the East of Hills and West of Hills Systems, existing pumping plant capacities, and historical operating data for rate control stations. The results of the mass balance indicate that by operating the Danville-San Ramon Cascade pumping plants up to 20 hours per day¹ and operating the Upper San Leandro Water Treatment Plant year round, an average of 10 mgd can be wheeled to Zone 7 and an average of 19 mgd can be wheeled through the Hayward Intertie (with summer month limitations), substantially meeting the wheeling objectives. WOD staff used the results of the mass balance to prepare an operating cost estimate to wheel water.

Water Supply Improvements Division (WSID) subsequently summarized the results of the Fatal Flaw Analysis and the estimated wheeling costs in a July 22, 2010 meeting with the Bay Area Regional Desalination Project partners. At the conclusion of the meeting,

¹ Although this would violate current EBMUD ESP 492.2 sizing requirement for 1.5 X MDD pumping, the assumption is that desalination member agencies will pay any additional pumping costs including pumping through time of use if the hydraulic modeling demonstrates it will not significantly affect level of service to EBMUD customers.

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

the agencies understood the delivery routes and order of magnitude costs. Based on the delivered water cost, each agency decided to proceed and fund a detailed study involving hydraulic modeling using projected 2040 demands (*BARDP Water Distribution System Wheeling Operations Study*).

PROJECT APPROACH

Conventional hydraulic modeling using the District's East of Hills and West of Hills models will be used to analyze the impact of wheeling water to other agencies under 5 demand scenarios. Target wheeling rates (Hayward Intertie at 30 MGD and Zone 7 Water Agency at 10 MGD) have been preliminarily defined. These rates will be superimposed upon the Districted projected 2040 demands and reduced in order to satisfy the District's distribution system performance criteria to determine the available wheeling rate. The path the wheeled water will take will be provided to Water Operations for calculation of variable and fixed costs for the facilities used. The available wheeling rates for the 5 demand scenarios are needed before partner agencies decide to pursue the desalination project.

PROJECT TASKS

Project tasks are as follows:

200 Background Review and Development of Model Assumptions

Unless otherwise noted, all background review tasks will be completed by EBMUD staff. Task elements are:

- 201. Initial Assumptions and Approach Meeting.** Meeting with WDPD, Water Operations, and WSID to understand and agree upon the operation study assumptions. Assumptions for future improvements, system demands, and system constraints will be reviewed and discussed. The following assumptions will be confirmed prior to modeling:
 - Maximum target rate to the Hayward Intertie is 30 MGD (capacity of Skywest PP) and maximum target rate for the Zone 7 Intertie is 10 MGD.
 - Planned Almond RCS operating strategy is to supply the Almond Cascade when supply is available (limits available capacity on Southern Loop Pipeline).
 - Planned WTTIP and West of Hills Study projects that will be implemented into the hydraulic model.
 - Agree the demand information for four EBMUD scenarios: 50 percentile maximum day², average summer, fall/spring, average winter, and drought average winter.

² The 50 percentile maximum day demand has a one in two year occurrence and represents the maximum day that can be reasonably expected in any given year. This is consistent with the approach used in Central, San Pablo Clearwell, and North Reservoir outage plans. This is higher than the 1 in 20 year maximum day demand that is used for major facility sizing.

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

- EBMUD system performance constraints for pressure, gradients, and reservoir turnover based on the West of Hills Study system performance constraints.
- Restrictions to operation of pumping plants to 16 hours/day.
- Restrictions in using the Southern Loop to supply the Hayward Intertie.
- Affect of projected future recycled water and conservation on each of the demand scenarios.
- Maximum WTP rates and pattern for each WTP rate

Attendees: WSID, WDPD, Operations staff and managers

- 202. Review other study results.** Review *West of Hills Study (2010)*, *Water Treatment and Transmission Master Plan EIR (WTTIP, June 2006)*, *Wheeling Fatal Flaw Analysis (2010)*, *Hayward Intertie Operating Plan* to understand the EBMUD system performance constraints, planned improvements, and limitations.
- 203. Site visits to Intertie locations.** Review existing drawings and visit Skywest PP and proposed Zone 7 Intertie location (including new Zone 7 pipeline alignment identified in the fatal flaw analysis).
- 204. Obtain and review constraints from partner agencies.** Contact partner agencies for their known system constraints including maximum daily rate that can be delivered into their systems, ability to take greater quantities in the winter, and gradient conditions at the intertie connection points.
- 205. Download and review historical distribution and treatment facility operations data.** Download, organize, and review historical OP/NET data (demand, production, levels, flowrates, and gradients) from OSCII for key facilities as needed to understand system capacities and limitations.
- 206. Calculate East of Hills and West of Hills Demands for 2005 level of development.** Calculate 2005 East of Hills and West of Hills Demands for each of the five demand scenarios and compare graphically to historical daily demands. The purpose of this graphic is to convey to agencies and internal stakeholders how the selected demand scenarios compare to years of daily EBMUD demands so that they understand the frequency with which these demands occur.
- 207. Calculate East of Hills and West of Hills Demands for 2040 level of development.** Calculate 2040 East of Hills and West of Hills Demands for each of the five demand scenarios and compare graphically to the seasonal indices average, 3 percentile and 97 percentile demands for the purpose of conveying how the selected demand scenarios compare to day to day demands. Estimated reductions caused by 2040 planned conservation will be estimated and incorporated for the average winter, spring/fall, and average summer demand scenarios. Conservation will not be considered for the maximum day

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

scenario because of the uncertainty of the effect of future conservation during a maximum demand day. The affect of planned future recycled water is speculative and will not be considered unless and until a project is authorized for implementation.

Deliverables: Modeling assumptions document including list of system constraints, assumptions for target wheeling rates, limitations on the Hayward Intertie Skywest PP, location and hydraulic limitations for the new proposed the Zone 7 Intertie, assumptions for Almond RCS operation, assumptions for future improvements, and proposed demand scenarios (compared to statistical demands) including assumptions for conservation and recycled water.

300 Hydraulic Model Preparation

The combined Central and Aqueduct PZ (WOH Model) hydraulic model, prepared for the 2011 Central Reservoir Outage Plan will be used for the Hayward Intertie modeling. The combined Leland, Danville, San Ramon (EOH Model) hydraulic model, prepared for the 2010 Alamo Reservoir Outage Plan will be updated to include Amador PZ and used for the Southern Loop and Zone 7 modeling.

- 301. Modeling Scenarios.** The purpose of the meeting is to brief internal stakeholders (WDPD, Water Operations, and WSID) as well as external stakeholders (BARPD agencies) on assumptions before preparing model simulations. WDPD will present the proposed model demand scenarios, system constraints, planned improvements, and target wheeling rates. Presentation materials will include graphics and information that clearly describe how the proposed demand scenarios fall into the estimated statistical variation of the projected 2040 demands.

Attendees: WSID, WDPD, Operations staff and managers, BARPD representatives

- 302. Merge Amador PZ model and Leland/Danville/San Ramon/Diablo PZ model.** The Amador PZ will need to be added to the existing multi-pressure zone model to properly incorporate the affect of future demands on Bollinger and Alcosta RCS flows to evaluate supply paths for the new Zone 7 Intertie. This merged, updated model will be called "the East of Hills Model."
- 303. Update the East of Hills Model.** The model will be converted from NAD27 to NAD83 coordinate system to match the new GIS mapping database. The Leland/Danville/San Ramon/ Diablo PZ model was created in May 2008 and the Amador PZ model was created in November 2002. To capture recent changes to the distribution system, the GIS mapping database will be queried to update pipelines installed since the model was created. In addition, planned WTTIP improvements to Leland PZ will need to be added to the model.

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

- 304. Determine PZ distribution of demands.** An Excel spreadsheet of demands by pressure zone for each of the demand scenarios will be calculated. The pressure zone demands will be calculated according to the specific pressure zone seasonal characteristics developed for the peaking factor study (maximum day demand, average winter day demand, and average annual day demand). The existing 2040 Demand Study (Feb. 2009) will be the basis.
- 305. Update Demand Scenarios in the Models.** The nodal demands in the East of Hills and West of Hills models will be updated to include the updated pressure zone demands.
- 306. Incorporate Pumping Patterns into Model** The East of Hills and West of Hills models will include time of use based nodal pumping patterns (one for each demand scenario) for each pumping plant supplying other pressures zones not included in the merged model (i.e. upper cascades). This data will be developed by spreadsheet.

Deliverables: Table of demands for each demand scenario by pressure zone. Table of pumping plant requirements for pressure zone not represented in the model for each demand scenario. Merged and updated East of Hills Model and West of Hills Model with demands and pumping patterns.

400 Hydraulic Analysis

Up to five demand scenarios will be analyzed to identify the maximum wheeling rates through each Intertie (combined and independently), up to the assumed maximum target rates (30 MGD through the Hayward Intertie and 10 MGD through the Zone 7 Intertie). Monthly wheeling rates will be interpolated between these five demand scenarios if necessary. For each model scenario, a 5-day extended period simulation will be performed to ensure there are no impacts to reservoir storage. Although the study will look at projected 2040 demands; the projected 2020 demands without future conservation and recycled water are tabulated below to demonstrate approximately the range of demands that will be analyzed:

	West of Hills and East of Hills Projected 2020 Demands	
	No Rationing	15% Rationing
50 Percentile Maximum Day	240 MGD (WOH)/ 130 MGD (EOH)	N/A
Average Summer Day	210 MGD (WOH)/ 110 MGD (EOH)	N/A
Average Spring/Fall Day	180 MGD (WOH)/ 70 MGD (EOH)	N/A
Average Winter Day	150 MGD (WOH)/ 40 MGD (EOH)	130 MGD (WOH)/ 35 MGD (EOH)

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

In the event the wheeling objectives are satisfied at higher demand levels; then lower demand levels may not be necessary or analyzed.

- 401. Create and run model scenarios.** This task includes creating the model scenarios, entering all controls, patterns, and boundary conditions. Running any system improvements scenarios requires changing controls, patterns, and, in some cases, adding facilities until finding a solution where in both flow mass balance and multi-day system storage recovery is achieved.
- 402. Download and summarize model results.** The results (e.g., tank and clearwell levels, gradients/pressures at critical nodes) from the modeled scenarios will be downloaded into Microsoft Excel and summarized in tables and/or charts. Input data (e.g., RCS flow rates) will also be summarized in tables and/or charts, as necessary.
- 403. Hold technical meetings.** As necessary, the project team will meet to review technical issues related to the modeling.
- 404. Check model and results.** The model and results will be checked for accuracy.
- 405. Prepare written model summary for the project file.** A summary of modeled conditions and results will be prepared by the Project Engineer for the project file. This will summarize all model assumptions and background information, results, and conclusions.
- 406. Results Meeting: Maximum Day, Average Summer Day, and Average Fall/Spring Day.** The purpose of this meeting is for WDPD to present the initial results of the hydraulic analysis, including flow paths, available wheeling rate and operational requirements for all critical facilities. Key gradient, flow and reservoir information will be described. Based on the results of the meeting BARPD agencies will have the opportunity to increase their target wheeling rates during the winter day scenarios if deemed feasible based on modeling results.

Attendees: WSID, WDPD, Operations staff and managers, BARPD representatives

- 407. Results Meeting: Average Winter Day.** The purpose of this meeting is for WDPD to present the initial results of the hydraulic analysis, including flow paths, available wheeling rate and operational changes. Key gradient, flow and reservoir information will be described.

Attendees: WSID, WDPD, Operations staff and managers, BARPD representatives

- 408. Results Meeting: Average Winter Day with 15% Rationing.** The purpose of this meeting is for WDPD to present the initial results of the hydraulic analysis,

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

including flow paths, available wheeling rate and operational changes. Key gradient, flow and reservoir information will be described.

Attendees: WSID, WDPD, Operations staff and managers, BARPD representatives

Deliverables: Hydraulic modeling results presented graphically (maps, tables, and plots) for each demand scenario (baseline and wheeling) for the EBMUD system with no improvements. Results will include: wheeling rates; operation of key facilities; identification of system limitations that prevent meeting full wheeling objectives; and key gradient, reservoir level, and pressure results.

500 Hydraulic Analysis – Impacts to Fire Flow

Not used

600 Hydraulic Analysis – Surge Analysis

Not used

700 Optional Task

Not used

800 Operational Study Report and Approval

WDPD staff will prepare a report. The report will include the results of the hydraulic modeling above along with the estimated unmetered water loss for each supply route.

Task elements include:

801. Prepare and review draft report. WDPD will prepare the draft Report and circulate it for review. The outage plan report will include the following:

- Introduction and background information
- Operating guidelines for treatment and distribution facilities, including alternative operating scenarios
- Available monthly average wheeling rates
- Mitigations and/or capital improvements analyzed and their cost estimates
- Possible monthly water treatment plant dispatch under each operating scenario for input to the water supply analysis.

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

802. Final Meeting. After the operations study is distributed and reviewed, a final meeting will be held if there are any significant questions or clarifications that are needed for the study to be approved.

Attendees: TBD

803. Finalize Report. After addressing comments and edits to the draft report, the WDPD will finalize the Report and publish.

Deliverables: A report summarizing the results of the study.

900 Project Management

Unless otherwise noted, project management duties will be completed by the Project Manager. Task elements include:

- 901. Complete project administrative tasks.** Project administrative tasks include requesting a Capital Project ID, activating Activity Codes, PA revision, and requesting closure to job numbers.
- 902. Create project task list.** Develop a list of sequential project tasks. The list will include a brief task description, name of person assigned to the task, task due date, and task completion date. The project task list will be provided electronically to all assigned persons and their supervisors.
- 903. Create planned cost curve in WebPM.** The project task list, budget, and schedule will be combined in WebPM to create the planned cost curve in WebPM.
- 904. Track task progress, and update task list and schedule.** Task progress will be reviewed in weekly communication between the PM and key personnel assigned to tasks. The project task list and schedule will be updated weekly to indicate percent completion of each task.
- 905. Track project charges.** Project charges will be reviewed and tracked each pay period (bi-weekly) using WebPM. Unusually high project charges or charges by staff not expected to be working on project will be investigated, and corrections will be recommended, if necessary.
- 906. Update and report project progress and expenditures.** Overall project progress will be calculated monthly in WebPM based on tasks that are completed. Tasks will not be included in the project "percent complete" estimate until they are finished - a task is either complete (100%), or not complete (0%). Project progress and expenditures will be reported in the WDPD Monthly Status Report.

Scope of Work for The BARDP Water Distribution System Wheeling Operations Study

- 907. Hold monthly project management meetings.** Brief (30 minute) project management meetings will be held monthly between the PM, Project Engineer, PZP Supervisor, and WDPD Manager. Any other key personnel will be invited to the meetings, as needed. The purpose of the project management meetings will be to brief the WDPD Manager on project progress and to gain approval on significant revisions to the project work plan (task list/scope, schedule and budget).
- 908. Assess and revise project work plan.** As necessary, the project work plan will be revised based on real project progress and charges. Significant changes to the work plan will be reported in PM meetings, or within one week of any actions taken that contain significant changes to the work plan. Significant changes include an impact to the schedule of reported milestones or if the amount spent is 5% more than the planned budget.
- 909. Coordinate Distribution Hydraulic Modeling with Water Supply Modeling.** Review all modeling approaches, assumptions, results, and cost estimates and provide feedback. Ensure that the model assumptions are understood by all stakeholders and consistent. Exchange initial and interim work products between work units as necessary.
- 910. Other Direct Costs.**
BART, parking, mileage, posters, etc

BAY AREA REGIONAL DESALINATION PROJECT

Prepared by: Bill Maggiore

Date: 2/22/11

Line	Task No.	Description	Resource	Cost Basis	Direct Cost	Direct Cost w/ 15% Contingency	Full Cost w/ 15% Contingency
1	100	Not Used					
2	200	Background Review and Development of Model Assumptions	Assoc Engineer, Org 524	2 persons X 100h @ \$105/hr	\$ 21,000	\$ 24,150	\$ 41,159
3	300	Hydraulic Model Preparation	Assoc Engineer, Org 524	2 persons X 160h @ \$105/hr	\$ 33,600	\$ 38,640	\$ 65,854
4	400	Hydraulic Analysis	Assoc Engineer, Org 524	2 persons X 440h @ \$105/hr	\$ 92,400	\$ 106,260	\$ 181,099
5	500	Not Used					\$ -
6	600	Not Used					\$ -
7	700	Not Used					\$ -
8	800	Operational Study Report and Approval	Assoc Engineer, Org 524	2 persons X 80h @ \$105/hr	\$ 16,800	\$ 19,320	\$ 32,927
9	100-800	WDPD Mgmt review/attend meetings	WDPD Manager, Org 520	4% of Engr cost	\$ 6,552	\$ 7,535	\$ 12,842
10	100-800	Sr. Civil Engr check/review/attend meetings	Sr. Civil Engineer, Org 524	13% of Engr cost	\$ 21,294	\$ 24,488	\$ 41,735
11	300-700	Assoc. Civil Engr check/technical assistance	Assoc. Civil Engineer, Org 524	3% of Engr cost	\$ 3,780	\$ 4,347	\$ 7,409
12	100-800	Water Operations Sr. Engr review/attend meetings	Sr. Civil Engineer	5% of Engr cost	\$ 8,190	\$ 9,419	\$ 16,052
13	100-800	Water Operations Mgrm Review review/attend meetings	Manager	4% of Engr cost	\$ 6,552	\$ 7,535	\$ 12,842
14	100, 800	E&C Dir review/attend meetings	Director of E&C, Org 502	Est. 8h @ \$190/hr	\$ 1,520	\$ 1,748	\$ 2,979
16	800	Admin assistance with copying, editing, document prep, etc	Sr. Clerk or Secretary, Org 520	Est. 60h @ \$65/hr	\$ 3,900	\$ 4,485	\$ 7,644
17	900	Other Direct Costs			\$ 2,000	\$ 2,300	\$ 3,920
18	900	Project Management and Review of All Documents	Assoc. Civil Engineer, Org 524	8% of total cost	\$ 17,247	\$ 19,834	\$ 33,803
Subtotal					\$ 234,835	\$ 270,060	\$ 460,264

Notes:

1. Hours and costs from the following outage plans were used for comparison: Claremont Tunnel OP, Danville Res OP, South Res OP. If it was not straightforward to breakdown the tasks in these outage plans, they were not used for comparison.

BAY AREA REGIONAL DESALINATION PROJECT

Variable and fixed cost to wheel desalination through the EBMUD treatment & Distribution System

Prepared By: D. Beyer
February, 2011

Task No.	Description	SCOPE	Resource (HRs)			Direct Cost	Direct Cost + 15% Contingency	Full Cost
			MGR	SR CE	Assoc Engr			
100	Meetings with Stakeholders (inc prep)	O&M Staff will attend all the same meetings as WDPD, MGR and Sr Engineer time included in WDPD cost estimate			8	\$904	1,040	\$ 1,435
	Water Distribution Planning Division					\$0	0	\$ -
100- 800	Water Operations review/attend meetings w/ WDPD	meetings with WDPD to discuss results, MGR and Sr Engineer time included in WDPD cost estimate			20	\$2,260	2,599	\$ 3,587
						\$0	0	\$ -
1000	Water Supply Modeling							
1011	Develop monthly WTP dispatch rates	Work with Water Supply and WDPD to develop monthly WTP dispatch rates to be used in Water Supply modeling	1	2	2	\$657	756	\$ 1,043
2000	Variable Costs							
2001	Update treatment variable costs	Update operations cost of the WTP's (electricity, chemical sludge and labor costs)	2	6	12	\$2,480	2,852	\$ 3,936
2003	Develop distribution pumping costs	Update distribution pumping electric cost	2	8	15	\$3,081	3,543	\$ 4,890
2004	Develop raw water pumping costs	Assist Water Supply in developing raw water pumping costs		4	8	\$1,428	1,642	\$ 2,266
3000	Fixed Costs							
3001	Develop Facility Maintenance Costs	Develop the fixed cost (labor and matls) associated with maintaining the thirteen major facilities used to deliver water to Zone 7 & and the HI. Determine the share of these cost to be allocated to Zone 7 and HI deliveries based on WDPD modeling results. The same general model used in determining the fixed maintenance cost of the FSCC facilities will be used here	3	10	60	\$8,597	9,887	\$ 13,643
3002	Develop pipeline maintenance costs	Develop fixed cost (labor & matl) to maintain pipelines used to "wheel" desalination water from the desalination plant to zone 7 and HI and determine Zone 7 & HI's share of these costs	2	8	25	\$4,211	4,843	\$ 6,683
4000	Rehabilitation Costs							
4001	Determine useful life of each facility	Establish useful life for the major facilities used to wheel desalination water through EBMUD's system, facilities include WC WTP, Orinda WTP, USL WTP, Walnut Creek PP, Briones PP, Moraga PP, Danville PP, Castenada PP, San Ramon PP, Norris RCV, Castro Valley RCV, Mattox RCV, 82nd Ave RCV,	1	2	8	\$1,335	1,535	\$ 2,119
4002	Cost estimate for rehab of facilities	Determine cost to rehab or rebuild each of the thirteen major facilities	2	10	40	\$6,168	7,093	\$ 9,789
4003	Develop shared costs		1	2	8	\$1,335	1,535	\$ 2,119
TOTALS			14	52	206	\$32,456	37,324	\$ 51,508

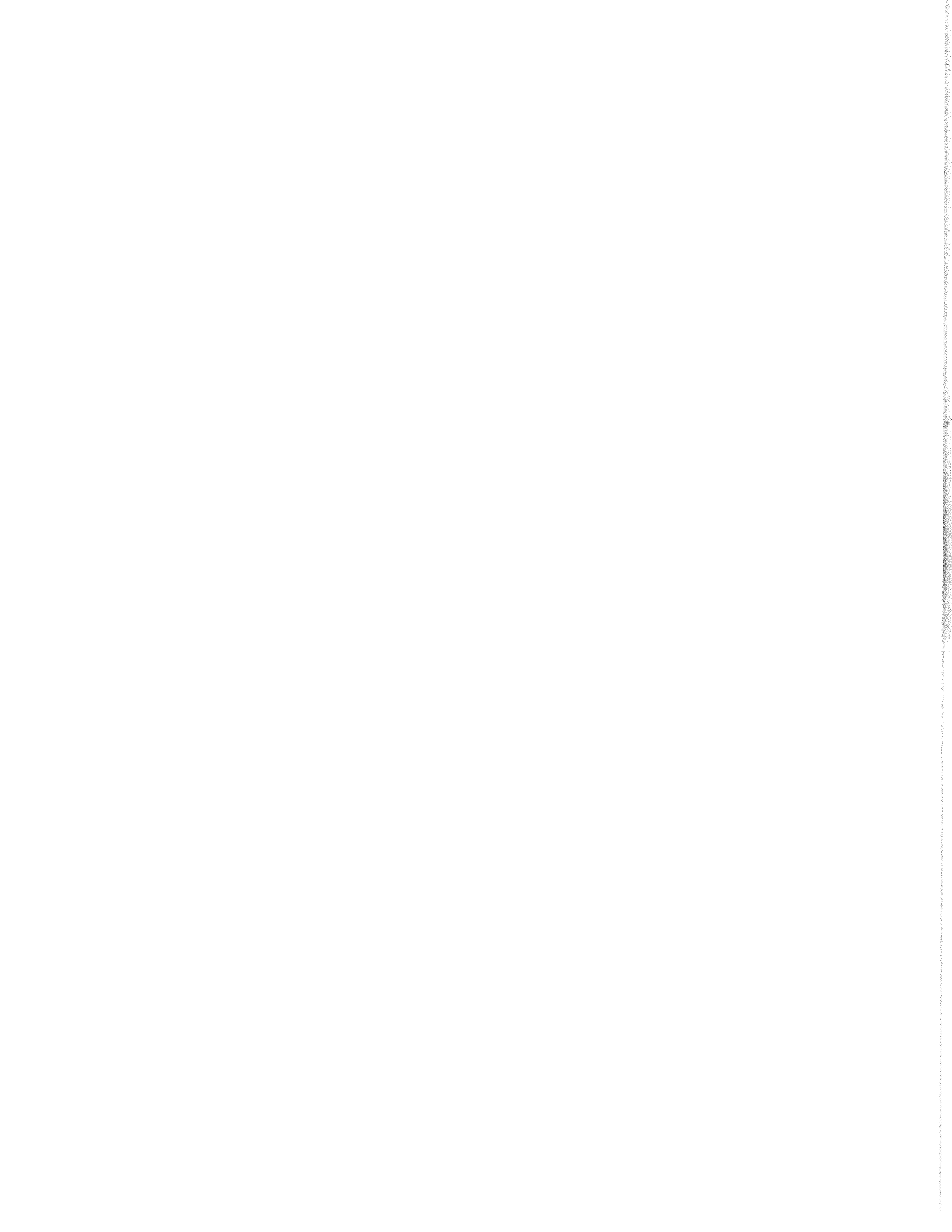
Notes:

Ave Winter model runs represent November - March operations
Ave fall/spring model runs represent April- May & Oct operations
Ave Summer model runs represent June - September operations
50% max summer Day model runs represent the peak days

Almond RCV Operation: Almond PZ cascade to be served from OR WTP via Fontain PP and Almond PP until the USL WTP is in operation. Then the cascade to be served from the Southern Loop

Desal Wheeling Study Scope and Cost Estimate

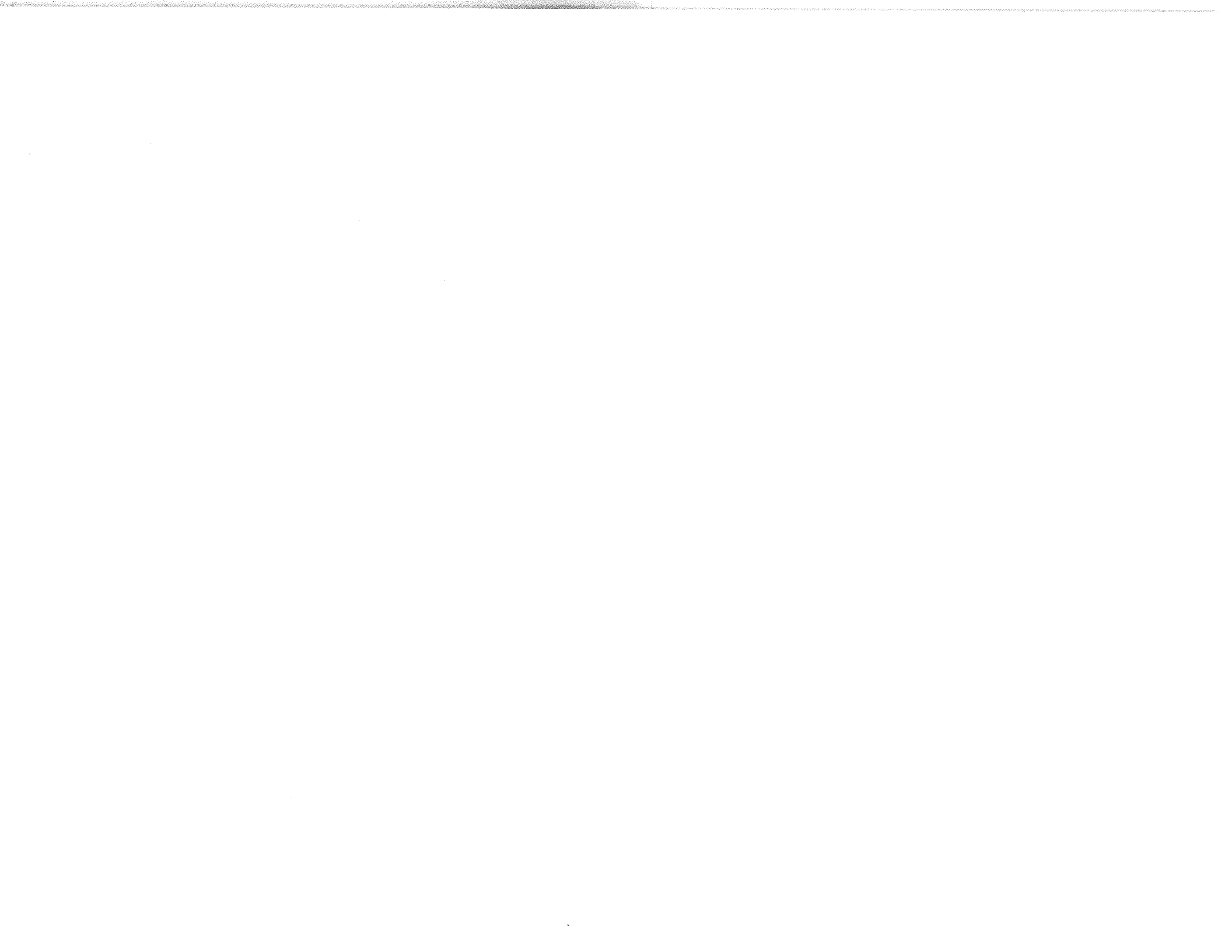
<u>Task</u>	<u>Title</u>	<u>Scope for Water Supply Operations</u>	<u>Hr ACE</u>	<u>Hr SCE</u>	<u>Mgr</u>
100	Meetings with Stakholders				
101	Kickoff Meeting	Attend 2 hr meeting	2	2	2
102	Initial Assumpitons & Approach meeting	Attend 2 hr meeting, meeting prep and review	4	4	
103	Modeling Scenarios	Attend 2 hr meeting, meeting prep and review	4	2	
104	Intial Results	Attend 2 hr meeting, meeting prep and review	6	4	
105	Final Results	Attend 2 hr meeting, meeting prep and review	4	2	2
106	Final meeting	Attend 2 hr meeting	2	2	
200	Background Review				
204	Historical data	Support WDPD	2		2
205	Dry year demand reduction	Support WDPD	2		
300	Hydraulic Analysis Modeling				
400	Hydraulic Analysis Modelig Scenarios				
406	Technical meetings	Meet with WDPD review and comment	2	2	
Sub Total Hours			28	18	6
1000	Conduct Water Supply Modeling				
1001	Update water supply model for 2030 demands and infrastructure	Update water supply model to include 2030 normal and dry year demand scenarios, water treatment plant capacities and water treatment plant dispatch patterns	24	4	
1002	Update water supply model cost tables	Update water supply model cost tables to include current costs for energy, water treatment chemicals, sludge and labor - may requirre new algorithm to handle labor	8	4	
1003	Develop 2030 base cases	Develop base case 2030 water supply operation plan for normal and dry year runoff/demand scenarios (Two cases: 1. normal demand and normal runoff, 2. rationcd demand and dry runoff with Freepport in service)	24	8	2
1004	Update model for Desal wheeling	Update model to include 2030 normal and dry year demand plus Desal wheeling demand. (two cases)	8	2	
1005	Develop wheeling water supply operation plans	Develop 2030 water supply operation plan for normal and dry year scenarios with wheeling demand with maximum use of USL (two cases) and with maximum use of Southern loop (two cases)	32	8	2
1006	Develop transmission costs	Develop transmission costs for four scenarios	16	8	
1007	Summarize resultant	Summarize resultant costs in tabular format with appropriate footnote.	8	4	2
Sub Total Hours			120	38	6
Total Hours			148	56	12
15% Contingency			22	8	2
Grand Total Hours			170	64	14
Hourly Direct Cost			\$113	\$131	\$169
Total Direct Cost			\$19,210	\$8,384	\$2,366
Full Cost at 138%			\$26,510	\$11,570	\$3,265
Grand Total Cost			\$41,345		



APPENDIX B

**Delta Modeling
Fisheries Modeling
Storage Optimization**

October 2011



**Bay Area Regional Desalination Project
Water Quality and Water Supply Modeling Study
August 2011**

Scope of Work – Part I

Background

On behalf of the Bay Area Regional Desalination Project (project) the Contra Costa Water District (CCWD) has prepared this proposal to provide technical services to evaluate the proposed project's impacts to the Sacramento-San Joaquin River Delta (Delta) water quality and supply conditions. The desalination plant considered in the proposed modeling study would draw its source water from CCWD's Mallard Slough Pump Station with a maximum pumping capacity of 25 million gallons per day (MGD) or 39 cubic feet per second (cfs). The regional desalination workgroup has identified two possible locations to dispose of the brine originating from the desalination treatment process: Central Contra Costa Sanitary District (CCCSD) and Delta Diablo Sanitation District (DDSD). Figure 1 shows the location of the proposed desalination plant source water and the potential brine disposal sites.



Figure 1 Map showing proposed desalination plant at Mallard Slough Intake and two possible brine disposal sites, Central Contra Costa Sanitary District (CCCSD) and Delta Diablo Sanitation District (DDSD).

Water quality objectives have been promulgated by the State Water Resources Control Board's Decision 1641 to protect municipal and industrial water supplies, and environmental and agriculture uses in the Delta. Water quality standards have been established at several locations and the governing standards can vary with time of year to protect beneficial uses. Appendix B1 provides the location and the metrics at each of the compliance locations. Salinity, measured as

either electrical conductivity (EC) or chlorides (Cl), is the dominant indicator used to evaluate water quality standards. The Central Valley Project and the State Water Project adjust operations to ensure these water quality standards are met; changes to diversions and salinity in the Delta can affect water quality and in turn affect releases made from upstream reservoirs.

Objectives

The proposed modeling study is intended to answer the following questions:

- 1) Given the existing conditions, how will the increased pumping (assumed to be a constant withdrawal of 39 cfs) at the desalination plant affect Delta salinity, standards compliance and water supply?
- 2) Given the existing conditions, how will brine disposal affect Delta salinity, standard compliance and water supply?
 - Will brine discharge to the Delta be acceptable in terms of impacts to salinity and water supply or will another disposal method be needed to minimize impacts?
 - How does the difference in location of brine disposal affect salinity, water quality standards and water supply?
- 3) Given future conditions, how will the answers to questions 1 and 2 above change?
Future conditions will include climate change (sea level rise and changes to hydrology).

Study Description

At least eight model scenarios will be run to quantify potential changes to water quality and water supply caused by the proposed desalination plant and the brine disposal. Existing and future hydrologic conditions will be assessed. For each of those conditions, model runs will be completed to assess the effect of the desalination plant without any brine disposal, with two different runs assessing the effects with brine disposal at different locations. Table 1 lists the model runs needed to meet the objectives and Appendix B2 contains the detailed task list and associated costs.

Table 1 Proposed model runs to quantify effects of desalination plant and brine disposal

Hydrologic Condition	Model Run	Description
Existing Conditions	E1	Current hydrology, 2009 Operations Criteria and Plan (OCAP), no withdrawals for the desalination plant, no brine disposal, Wanger decisions as available
	E2	E1 conditions plus 39 cfs constant withdrawal from the Mallard Slough Pump Station, no brine disposal, Wanger decisions as available
	E3	E1 conditions plus the 39 cfs constant withdrawal from the Mallard Slough Pump Station and brine disposal at CCCSD, Wanger decisions as available
	E4	E1 conditions plus the 39 cfs constant withdrawal from the Mallard Slough Pump Station and brine disposal at DDS, Wanger decisions as available
Future Conditions	F1	Climate Change: Shift in hydrology, sea level rise, 2009 OCAP, no withdrawals for the desalination plant, no brine disposal, Wanger decisions as available
	F2	F1 conditions plus 39 cfs constant withdrawal from the Mallard Slough Pump Station, no brine disposal, Wanger decisions as available
	F3	F1 conditions plus the 39 cfs constant withdrawal from the Mallard Slough Pump Station and brine disposal at CCCSD, Wanger decisions as available
	F4	F1 conditions plus the 39 cfs constant withdrawal from the Mallard Slough Pump Station and brine disposal at DDS, Wanger decisions as available

To quantify the impacts that the proposed desalination plant and the brine disposal would have under existing conditions, model run E1 will be compared to the three other existing condition runs. Similarly for the future conditions, model run F1 will be compared to the three other future runs. Changes in salinity at the water quality standard locations summarized in Appendix B1, any changes in standard compliance at those locations, and changes in water released from upstream reservoirs required to meet the standards will be quantified for each comparative study.

If the proposed brine disposal modeling results (E3, E4, F3, F4) indicate there could be water supply impacts or standard violations, the group will consider another set of brine disposal runs where brine is disposed of only on the ebb tide through a dedicated brine disposal line.

If models containing the future Bay Delta Conservation Plan (BDCP) facilities and operations become publicly available, those conditions should be analyzed. At this time, there are no publicly available models that include the BDCP. If such models do become publicly available during the period of this study, CCWD would notify the workgroup to discuss options of incorporating BDCP models in this analysis.

An additional component of the proposed modeling is near-field modeling of the brine disposal to estimate spatial and temporal dispersion of the brine. The Carlsbad desalination plant included extensive near-field modeling in their final environmental impact report to estimate the spatial and temporal effects of brine disposal on biological beneficial uses (<http://www.carlsbad-desal.com/EIR.asp>). Near-field modeling results can be compared to salinity tolerances as a first step to estimate biological impacts of brine disposal. Suisun Marsh Habitat Restoration Project is immediately north of the proposed desalination plant and the proposed disposal sites (Figure 1). Suisun Bay and Marsh are designated as critical habitat for many special status species including Delta smelt and salmon. Different life stages of fish necessitate different salinity conditions. Appendix B3 provides known salinity tolerances for different species at different life stages.

A Delta Modeling Technical Advisory Committee (TAC) will be formed to review the CCWD modeling assumptions and results for the water quality, water supply and fisheries impact analyses. Each Party can choose to nominate a representative to the TAC, either an employee or consultant hired by the Party, to review materials on their behalf. The Zone 7 Water Agency is responsible for coordinating activities of the TAC, which will meet in-person up to four times over the duration of the study to discuss assumptions and findings, and make recommendations to the CCWD modeling team. CCWD will provide the TAC with pertinent modeling assumptions, files (e.g. input/output spreadsheets) and result summaries as available. It is expected that these materials can be made available to, and input received from, the TAC via email exchanges as necessary and appropriate.

Outcomes

The proposed model runs and analysis will answer the questions identified in the objectives section. The work proposed will provide an understanding of potential salinity increases associated with a desalination plant with or without instream brine disposal. Any increases in salinity may affect water quality standard compliance and therefore affect upstream reservoir releases. Any changes to upstream reservoirs will be of interest to the Central Valley Project and the State Water Project. The work proposed will also indicate if one of the proposed brine disposal sites is preferable or if an alternative method of brine disposal will need to be considered. The results and recommendations will be presented in a series of meetings and reports as outlined in the following timeline.

Timeline

2011

October	Build modeling scenarios
November	Develop post processing tools to analyze model results

2012

February	Meet with workgroup to discuss preliminary results (model runs E1, E2, F1, F2)
April	Meet to discuss modeling comments from workgroup
June	Meet with workgroup to discuss updated results (model runs E3, E4, F3, F4)

July	Provide draft report with results to workgroup for review
August	Call or meet to discuss comments on report and edits
September	Circulate final report

Budget

Total cost for the proposed scope of work is \$209,756. Appendix B2 includes a complete description of proposed tasks and costs.

**Bay Area Regional Desalination Project
Delta Modeling Addendum
April 2011**

Scope of Work – Part II

Background

On behalf of the Bay Area Regional Desalination Project (project) the Contra Costa Water District (CCWD) has prepared this proposal to provide technical services to evaluate the proposed project's impacts to the Sacramento-San Joaquin River Delta (Delta) fisheries and to quantify the incremental project yield of incorporating Los Vaqueros Reservoir operations with the proposed desalination plant operations. The desalination plant considered in the proposed modeling study would draw its source water from CCWD's Mallard Slough Pump Station with a maximum pumping capacity of 25 million gallons per day (MGD) or 39 cubic feet per second (cfs).

Fisheries Impacts

The Mallard Slough Pump Station (MSPS) is the proposed source water for the desalination project. This site is located within the Delta and Suisun Marsh area, and supports a wide array of species including endangered species such as Delta smelt, longfin smelt, green sturgeon, and anadromous fish such as steelhead and salmon. CCWD currently operates at MSPS with permits that contain provisions to protect endangered species. Any changes in operations at MSPS would likely necessitate permit modifications and require new measures to minimize and mitigate impacts to fisheries. CCWD proposes to use a particle tracking modeling to estimate the potential entrainment of fish and larvae associated with the Project operations. Comparing the potential entrainment impacts of the Project to the existing conditions will provide a basis to estimate the incremental impacts of the proposed operational changes.

Los Vaqueros Storage

Each of the agencies participating in the Project has identified a potential need for new water supplies to meet future or existing demand. The maximum water supply yield would be achieved through continuous diversion at the maximum plant capacity; however, the demand may not always be present at the same time or at the same level of project diversions. As an option to increase yield from the project, CCWD will analyze the use of Los Vaqueros Reservoir to store water in excess of demands that at a later time can be released to satisfy partner agency demands.

Objectives

Part I: Fisheries

1. Summarize existing fish screen criteria, and fishery related operation constraints on pumping at CCWD's Mallard Slough Pump Station (MSPS).
2. Using existing data, identify aquatic organisms in the vicinity of MSPS, and evaluate data for seasonal and spatial trends. Emphasis will be given to endangered species.
3. Evaluate incremental increase in potential entrainment resulting from MSPS operation (constant 39 cfs) to support a regional desalination facility.

4. Present a suite of strategies that could minimize fishery impacts, including changes in screen and intake design, changes in operations, temporary or permanent larval nets, and mitigation.

Part II: Storage

5. Model project yield when diversions and operations are based on demand (Project is not operating when there is no demand).
6. Model project yield when diversions are continuous and any Project yield not immediately meeting demand would be stored for later use.
7. Quantify the incremental yield benefit from incorporating storage, include cost estimate for amount of storage required to achieve the full benefit.

Modeling Description

Part I: Fisheries

CCWD will run DSM2 with the particle tracking module (PTM) to estimate potential entrainment of fish and larvae at MSPS with and without the Project. Table 1 describes the model runs proposed. The DSM2/PTM modeling process includes releasing ‘fish/larvae’ particles at different locations in the Delta, running the model for 120 days, and quantifying how many of those particles were entrained at the facility for the two operating scenarios. The location of release points and number of particles released is determined by historical fish survey records. CCWD used this method to estimate potential entrainment caused by the Los Vaqueros Expansion Project in the Final Environmental Impact Report released in 2009. The DSM2/PTM modeling process is time and computationally intensive, depending on the number of release points used. To optimize the effort spent on this task, CCWD proposes releasing particles at points in Suisun Marsh and the Western Delta. We assume that the Project operations will not change flow patterns and fish distributions further into the Delta.

Table 1 Proposed Model Runs to Estimate Potential Fish/Larvae Entrainment of Desalination Operations at Mallard Slough Pump Station.

Model Run	Description
PTM No Project	DSM2 + Particle Tracking, Existing CCWD Operations (with all permit constraints), Current hydrology
PTM With Project	DSM2 + Particle Tracking, Constant 39 cfs diversion, Current Hydrology

Part II: Incorporating Los Vaqueros Reservoir with Project Operations

CCWD’s CALSIM II model, a supply and operations based model, will be updated to include the proposed desalination plant at MSPS and operated in conjunction with Los Vaqueros Reservoir. One of the most important tasks in this modeling exercise will be developing a time series of partner agency demands to input into the model. CCWD assumes that partner agencies will develop their own demand time series based on a template provided by CCWD. The

compiled demands will be input into the model and will determine operations. Based on the demand, the water diverted through the MSPS will either go directly to meet demand at the time of diversion or will be stored in Los Vaqueros to meet the future demand of partner agencies. CCWD will not include wheeling or infrastructure limitations of delivering water to partner agencies; the model will assume that demand will be met if there is sufficient supply available through storage and MSPS diversions. Results from this combination desalination and storage CALSIM II modeling will be compared to a spreadsheet model of the desalination plant operated without the use of Los Vaqueros Reservoir. For the spreadsheet model, the desalination plant would divert up to 20 mgd to meet demand, and would not operate when there is no demand. Table 2 contains a description of the comparative modeling runs proposed.

Table 2 Model Runs Proposed to Quantify Incremental Supply Yielded by Incorporating Los Vaqueros Reservoir with Project Operations

Model Run	Description
Desal No Storage	Spreadsheet model to calculate project yield without storage. Plant capacity of 25 mgd available to meet demand.
Desal With Storage	CCWD Daily Operations Los Vaqueros Model (CALSIM II) updated to include desalination plant. Plant capacity plus stored water determine supply available to meet demand.

Outcomes

Part I: Fisheries

Summaries of the MSPS permit terms and biological surveys will be developed to describe existing conditions at MSPS. The biological summary will also provide the foundation for the DSM2/PTM particle release locations, density of particles released and the seasonal presence of species of concern. The results from the DSM2/PTM modeling will indicate the potential timing and magnitude of impacts that the Project operations could have on endangered species. Based on the modeling results and historical experience, a suite of conceptual minimization strategies will be presented. For example, minimizing impacts to fisheries might include seasonal changes to operations to avoid sensitive fish when they are likely present in the vicinity of MSPS, or alternative fish screen placement and designs. Although the suite of measures presented will be aimed at minimizing fisheries impacts, there may be remaining impacts after implementing the minimization measures and those remaining impacts would require mitigation. CCWD will present a summary of recent mitigation requirements for CCWD projects and if possible summaries of mitigation requirements for other similar projects in the vicinity of MSPS (e.g. Genon Power Plant, Conoco Phillips). This mitigation summary would only provide background information to introduce the concept and potential cost of mitigation. The mitigation summary would not necessarily reflect mitigation that could be required by permitting agencies for the Project.

Part II: Storage

Comparison of the desalination plant operations with and without Los Vaqueros Reservoir will demonstrate the incremental yield from incorporating storage. Seasonal trends and benefit by water year type will also be presented. As noted above, CCWD will not include wheeling or infrastructure limitations of delivering water to partner agencies; the model will assume that demand will be met if there is sufficient supply available through storage and MSPS diversions.

A Delta Modeling Technical Advisory Committee (TAC) will be formed to review the CCWD modeling assumptions and results for the water quality, water supply and fisheries impact analyses. Each Party can choose to nominate a representative to the TAC, either an employee or consultant hired by the Party, to review materials on their behalf. The Zone 7 Water Agency is responsible for coordinating activities of the TAC, which will meet in-person up to four times over the duration of the study to discuss assumptions and findings, and make recommendations to the CCWD modeling team. CCWD will provide the TAC with pertinent modeling assumptions, files (e.g. input/output spreadsheets) and result summaries as available. It is expected that these materials can be made available to, and input received from, the TAC via email exchanges as necessary and appropriate.

Timeline

To be determined based on workload projections and funding.

Budget

Total cost of the proposed work is \$170,580. Please see Appendix B4 for details.

Appendix B1

D-1641 Water Quality Standards


D1641 WATER QUALITY OBJECTIVES - SUMMARY

Consult D1641 for details & exceptions

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Rock Slough max mean daily chl <=150 mg/l	155 - 240 days per year											
Rock Slough max mean daily chl	250											
Emmaton max 14 average EC												
Jersey Point max 14 day average EC												
Vernalis, Brandt Bridge, OR near MR, OR at Tracy max 30 day average EC												
NDOI min monthly average												
NDOI or Collinsville EC:3 day NDO or daily or 14 day EC												
NDOI min 7 day average												
Exports max 3 day (VAMP) - may be varied												
E/I Ratio												
Delta Cross Channel max days closed												

D1641 WATER QUALITY OBJECTIVES

Municipal & Industrial Beneficial Uses	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Cl <=150 mg/l							155					
# days per year of max mean daily Cl <= 150 at CCC PP#1 OR Antioch Water Works intake in intervals >= 2 weeks							165					
							175					
							190					
							240					
Cl							250					
max mean daily Cl							250					
at CCC PP#1 and CCF and DMC and NBA and Cache Slough							250					
							250					
							250					
Agricultural Beneficial Uses	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Emmerton EC									2.78			
max 14 average EC							0.45		1.67			
							0.45 (to 6/20)		1.14			
							0.45		0.63			
							0.45					
Jersey Point EC									2.20			
max 14 day average EC							0.45		1.35			
							0.45 (to 6/20)		0.74			
							0.45					
							0.45					
Terminus EC									0.54			
max 14 day average EC at Terminus on the Mokulemne							0.45					
							0.45					
							0.45					
							0.45					
San Andreas EC									0.87			
max 14 day average EC at San Andreas Landing on the San Joaquin							0.45 (to 6/25)		0.58			
							0.45					
							0.45					
							0.45					
Vernalis EC				1.0					0.7			1.0
max 30 day average EC at Vernalis on the San Joaquin (applies to Brandt Bridge on the San Joaquin, Old River near Middle River, & Old River at Tracy Rd. Bridge after 4/1/05. Standard is 1.0 all year at these sites until then.)									0.7			1.0
									0.7			1.0
									0.7			1.0
									0.7			1.0
									0.7			1.0
Clifton Court and DMC EC							1.0					
max monthly average of mean daily EC												

Key

critical year
dry year
below normal year
above normal year
wet year

D1641 WATER QUALITY OBJECTIVES

Fish & Wildlife Beneficial Uses	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
San Joaquin Salinity max 14 day average EC at Jersey Point & Prisoners Point (In May, only applies if Sac. River Index >8.1 MAF at 90% exceedence level.)								0.44				
								0.44				
								0.44				
								0.44				
Eastern Suisun Marsh Salinity max monthly average of both daily high tide ECs or demonstrate that equivalent protection is provided at Collinsville, Montezuma Slough at National Steel and Montezuma Slough near Beldon Landing	19.0	15.5	12.5		8.0			11.0				
	19.0	15.5	12.5		8.0			11.0				
	19.0	15.5	12.5		8.0			11.0				
	19.0	15.5	12.5		8.0			11.0				
	19.0	15.5	12.5		8.0			11.0				
Western Suisun Marsh Salinity - Normal Period max monthly average of both daily high tide ECs or demonstrate that equivalent protection is provided at Chadbourne Slough at Sunrise Duck Club and Suisun Slough 300 ft south of Valenti Slough	19.0	16.5	15.5	12.5		8.0		11.0				
	19.0	16.5	15.5	12.5		8.0		11.0				
	19.0	16.5	15.5	12.5		8.0		11.0				
	19.0	16.5	15.5	12.5		8.0		11.0				
	19.0	16.5	15.5	12.5		8.0		11.0				
Western Suisun Marsh Salinity - Deficiency Period EC and locations as in normal period, above Deficiency period = 2nd consecutive dry year after critica year or dry year after year w. Sac River Index<11.35 MAF or critical year after dry or critical year	19.0	16.5		15.6			14.0	12.5				
	19.0	16.5		15.6			14.0	12.5				
	19.0	16.5		15.6			14.0	12.5				
	19.0	16.5		15.6			14.0	12.5				
	19.0	16.5		15.6			14.0	12.5				
NDOI min monthly average Jan. min monthly average=6000 if Dec. 8RI>800 TAF	3000	3500	4500							4000	3000	3000
	4000	4500	4500							5000	3500	3000
	4000	4500	4500							6500	4000	3000
	4000	4500	4500							8000	4000	3000
	4000	4500	4500							8000	4000	3000
NDOI or Collinsville EC 3 day average NDO or daily or 14 day average EC (See Footnote 10, p. 185 for relaxation of standard in Feb if Jan 8RI<900; in Mar if Feb 8RI<500; in May & June if May Sac. RI <8.1 MAF at 90% exceedence)							7100, 2.64					
							7100, 2.64					
							7100, 2.64					
							7100, 2.64					
							7100, 2.64					
NDOI min 7 day average Jan. min 7 day average=5000 if Dec. 8RI>800 TAF Standard can be met with daily or 14 day average Collinsville EC >2.64 in Feb-Jun.	2000	2500	3500							3000	2000	2000
	3000	3500	3500							4000	2500	2000
	3000	3500	3500							5200	3000	2000
	3000	3500	3500							6400	3000	2000
	3000	3500	3500							6400	3000	2000
Sacramento Monthly Flow min monthly average at Rio Vista	3000	3500										3000
	4000	4500										3000
	4000	4500										3000
	4000	4500										3000
	4000	4500										3000
Sacramento 7 Day Flow min 7 day average at Rio Vista	2000	2500										2000
	3000	3500										2000
	3000	3500										2000
	3000	3500										2000
	3000	3500										2000
San Joaquin Monthly Flow, no X2 minimum monthly average at Vernalis when X2 at or west of Chipps not required per Table 4 * may be varied based on real time monitoring ** from 5/16	1000				710 (to 4/14)		3110*	710**				
	1000				1420 (to 4/14)		4020*	1420**				
	1000				1420 (to 4/14)		4620*	1420**				
	1000				2130 (to 4/14)		5730*	2130**				
	1000				2130 (to 4/14)		7330*	2130**				
San Joaquin 7 Day Flow, no X2 minimum 7 day average at Vernalis when X2 at or west of Chipps not required per Table 4 * may be varied based on real time monitoring ** from 5/16	800				568 (to 4/14)			568**				
	800				1136 (to 4/14)			1136**				
	800				1136 (to 4/14)			1136**				
	800				1704 (to 4/14)			1704**				
	800				1704 (to 4/14)			1704**				
San Joaquin Monthly Flow, with X2 minimum monthly average at Vernalis when X2 at or west of Chipps not required per Table 4 * may be varied based on real time monitoring ** from 5/16	1000				1140 (to 4/14)		3540*	1140**				
	1000				2280 (to 4/14)		4880*	2280**				
	1000				2280 (to 4/14)		5480*	2280**				
	1000				3420 (to 4/14)		7020*	3420**				
	1000				3420 (to 4/14)		8620*	3420**				
San Joaquin 7 DayFlow, with X2 minimum 7 day average at Vernalis when X2 at or west of Chipps not required per Table 4	800				912 (to 4/14)			912**				
	800				1824 (to 4/14)			1824**				
	800				1824 (to 4/14)			1824**				
	800				2736(to 4/14)			2736**				
	800				2736(to 4/14)			2736**				
Exports max 3 day running average from Clifton Court and Tracy less Byron-Bethany diversions *period may be varied based on monitoring; limit may be varied; limit is max of 1500, 3 day average Vernalis flow							1500*					
							1500*					
							1500*					
							1500*					
E/I Ratio for variations see footnote 20, p. 187; footnote 21, p.187			65%				35%				65%	
			65%				35%				65%	
			65%				35%				65%	
			65%				35%				65%	
			65%				35%				65%	
Delta Cross Channel Gate Closure max total number of days closed * from 5/21			45					14*				
			45					14*				
			45					14*				
			45					14*				
			45					14*				

Key

- critical year
- dry year
- below normal year
- above normal year
- wet year

Appendix B2

Budget

Appendix B2 - Budget
Water Quality and Supply Modeling Study

Tasks	Description	Staff	Hours	Direct Rate (Taxes and Benefits)	Full Rate (with Overhead)	Full Cost	Subtotal
Water Quality Modeling DSM2	Obtain and verify most current CALSIM model	Associate Water Resource Specialist	16	\$79	\$110	\$1,767	
	Process CALSIM output for DSM 2 input	Specialist	20	\$79	\$110	\$2,209	
	Update DSM2 to include sewage outflows	Specialist	20	\$79	\$110	\$2,209	
		Senior Water Resource Specialist	8	\$87	\$121	\$971	
	Run future and existing condition (model runs E1 & F1)	Associate Water Resource Specialist	24	\$79	\$110	\$2,650	
	Run future and existing condition with 39 cfs withdrawal at Mallard Slough Pump Station (model runs E2 & F2)	Associate Water Resource Specialist	40	\$79	\$110	\$4,417	
	Run future and existing condition with brine disposal locations (model runs E3, E4, F3 & F4)						
	Define relationship between influent water quality and brine effluent quality	Associate Water Resource Specialist	48	\$79	\$110	\$5,301	
		Senior Water Resource Specialist	10	\$87	\$121	\$1,214	
	Add disposal at CCCSD, run existing and future	Associate Water Resource Specialist	48	\$79	\$110	\$5,301	
Add disposal at DDSD, run existing and future	Associate Water Resource Specialist	48	\$79	\$110	\$5,301	\$31,339	
Analysis of Modeling Results	Post-process model results to determine Delta status	Associate Water Resource Specialist	150	\$79	\$110	\$16,565	
		Senior Water Resource Specialist	24	\$87	\$121	\$2,913	
		Water Resource Manager	10	\$102	\$143	\$1,435	
	Develop method and script for quantifying additional releases required	Associate Water Resource Specialist	150	\$79	\$110	\$16,565	
		Senior Water Resource Specialist	60	\$87	\$121	\$7,283	
		Water Resource Manager	10	\$102	\$143	\$1,435	
	MBK Engineers	Consultant	20	\$106	\$148	\$2,967	
	Analyze salinity changes at drinking water intakes	Associate Water Resource Specialist	56	\$79	\$110	\$6,184	
Update existing matlab tools to assess standards violations	Associate Water Resource Specialist	56	\$79	\$110	\$6,184		
Summarize results in tables and graphs	Specialist	120	\$79	\$110	\$13,252	\$74,783	
Reports	Draft report write-up	Specialist	120	\$79	\$110	\$13,252	
	Review report	Assistant General Manager	12	\$129	\$181	\$2,169	
		Water Resource Manager	12	\$102	\$143	\$1,722	
		Principal Engineer	12	\$96	\$134	\$1,612	
		Senior Water Resource Specialist	12	\$87	\$121	\$1,457	
	Respond to questions from partners	Specialist	32	\$79	\$110	\$3,534	
	Final report write-up	Specialist	120	\$79	\$110	\$13,252	
	Review report	Assistant General Manager	12	\$129	\$181	\$2,169	
		Water Resource Manager	12	\$102	\$143	\$1,722	
		Principal Engineer	12	\$96	\$134	\$1,612	
	Senior Water Resource Specialist	12	\$87	\$121	\$1,457	\$43,956	
Meetings	Prepare Preliminary Results Presentation	Specialist	32	\$79	\$110	\$3,534	
	Meeting Preflights	Assistant General Manager	4	\$129	\$181	\$723	
		Water Resource Manager	4	\$102	\$143	\$574	
		Senior Water Resource Specialist	4	\$87	\$121	\$486	
		Principal Engineer	4	\$96	\$134	\$537	
		Assistant Engineer	4	\$68	\$95	\$381	
	Workgroup Preliminary Results Presentation	Associate Water Resource Specialist	16	\$79	\$110	\$1,767	
		Assistant Engineer	16	\$68	\$95	\$1,525	
		Water Resource Manager	16	\$102	\$143	\$2,296	
	Prepare Final Results Presentation	Specialist	32	\$79	\$110	\$3,534	
	Meeting Preflights	Assistant General Manager	4	\$129	\$181	\$723	
		Water Resource Manager	4	\$102	\$143	\$574	
		Senior Water Resource Specialist	4	\$87	\$121	\$486	
		Principal Engineer	4	\$96	\$134	\$537	
		Assistant Engineer	4	\$68	\$95	\$381	
	Workgroup Final Results Presentation	Specialist	16	\$79	\$110	\$1,767	
	Water Resource Manager	16	\$102	\$143	\$2,296		
	Assistant Engineer	16	\$68	\$95	\$1,525	\$23,645	
Modeling Sub- Tasks	Ebb tide brine disposal (if initial modeling results show brine disposal impacts)	Associate Water Resource Specialist	40	\$79	\$110	\$4,417	
		Senior Water Resource Specialist	10	\$87	\$121	\$1,214	\$5,631
	BDCP (pending model availability)	Specialist	120	\$79	\$110	\$13,252	
		Senior Water Resource Specialist	10	\$87	\$121	\$1,214	\$14,466
	Near-field salinity modeling (needed for Carlsbad EIR)	Associate Water Resource Specialist	40	\$79	\$110	\$4,417	
		Senior Water Resource Specialist	80	\$87	\$121	\$9,711	
	Assistant General Manager	10	\$129	\$181	\$1,808	\$15,936	
TOTAL							\$209,756

CALSIM = A generalized water resources simulation model for evaluating operational alternatives of large, complex river basins. (<http://modeling.water.ca.gov/hydro/model/description.html>)

DSM2 = The Delta Simulation Model II (DSM2) is a one-dimensional mathematical model for dynamic simulation of one-dimensional hydrodynamics, water quality and particle tracking in a network of riverine or estuarine channels. (<http://baydeltaoffice.water.ca.gov/modeling/delta/modeling/models/dsm2/dsm2.cfm#overview>)

Appendix B3

Salinity Tolerances of Special Status Fish Species in Suisun Marsh

This information was taken directly from Table.1-5 in the Suisun Marsh Habitat Management, Preservation, and Restoration Plan Draft EIS/EIR 2010 (http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=781). The original source for most of the information is the Suisun Ecological Workgroup Final Report to the State Water Resources Control Board November 2001 (http://www.iep.ca.gov/suisun_eco_workgroup/final_report/SEWFinalReport.pdf). There is limited information regarding salinity tolerances of the benthic community.

Table 1 Salinity Tolerance of Special Status Fish Species in Suisun Marsh

Species	Salinity
Longfin Smelt	Tolerance range: 0 to pure seawater Spawning: 0 to 0.5ppt Egg: 0 to 0.5 ppt Larvae: ≥ 0 ppt Juveniles: ≥ 0.5 ppt Adult: ≥ 0 ppt Larvae and early juveniles: 1.1 to 18.5 ppt
Delta Smelt	Tolerance range: 0 to 18 ppt; 19 ppt lethal limit Spawning: 0 to 0.5ppt Egg: 0 to 5 ppt Larvae: 0 to 5 ppt Juveniles: 0.5 to 10 ppt Adult: 0.5 to 10 ppt Larvae and early juveniles: 0.3 to 1.8 ppt
Chinook Salmon	Tolerance range: 0 to 32 ppt Spawning: 0 to 0.5 ppt Egg: 0 to 0.5 ppt Larvae: 0 to 0.5 ppt Juveniles: ≥ 0 ppt Adult: ≥ 0 ppt
Steelhead	Tolerance range: 0 to 32 ppt Spawning: 0 to 0.5ppt Egg: 0 to 0.5 ppt Larvae: 0 to 0.5 ppt Juveniles: ≥ 0 ppt Adult: ≥ 0 ppt
Sacramento Splittail	Tolerance range: 0 to 28 ppt; 22 to 27 ppt lethal limit (depends on size) Spawning: 0 to 5 ppt Egg: 0 to 5 ppt Larvae: 0 to 5 ppt Juveniles: 0 to 5 ppt Adult: 0 to 5 ppt Larvae and early juveniles: 0–8 ppt
Green Sturgeon	Tolerance range: 0 to 32 ppt Spawning: 0 to 0.5 ppt Egg: 0 to 0.5 ppt Larvae: 0 to 0.5 ppt

Tasks	Description	Staff	Hours	Direct Rate (Taxes and Benefits)	Full Rate (with Overhead)	Full Cost	Subtotal	
Summarize Existing Mallard Slough Permit Terms	Summarize operating constraints at Mallard Slough and other CCWD facilities (Los Vaqueros)	Associate Water Resource Specialist	10	\$79	\$110	\$1,104	\$1,104	
Summarize Existing Fisheries Data	Sources of fisheries data include CCWD monitoring data, annual dfg survey data, migrant powerplant data, monitoring in done for other EIRs (Suisun Marsh, maybe others), peer-reviewed journals	Associate Water Resource Specialist	80	\$79	\$110	\$8,835	\$8,835	
Potential Entrainment Modeling / Fisheries Impact	Develop release points & densities based on existing data v8	Associate Water Resource Specialist	20	\$79	\$110	\$2,209		
		Associate Water Resource Specialist	20	\$79	\$110	\$2,209		
	Run PTM/DSM2 with Current CCWD Operations	Associate Water Resource Specialist	20	\$79	\$110	\$2,209		
		Senior Water Resource Specialist	10	\$87	\$121	\$1,214		
	Run PTM/DSM2 with Proposed Desal Operations	Associate Water Resource Specialist	24	\$79	\$110	\$2,650		
		Senior Water Resource Specialist	10	\$87	\$121	\$1,214		
	Post Process PTM/DSM2 Results	Associate Water Resource Specialist	100	\$79	\$110	\$11,043		
		Senior Water Resource Specialist	40	\$87	\$121	\$4,856		
Water Resource Manager		10	\$102	\$143	\$1,435	\$29,038		
Incorporating Storage with Desal Operations	Update existing Los Vaqueros monthly operations model to include desal MBK Engineers	Consultant	80	\$106	\$148	\$11,868		
		Senior Water Resource Specialist	40	\$87	\$121	\$4,856		
		Associate Water Resource Specialist	16	\$79	\$110	\$1,767		
	Develop monthly partner demand input	Assistant Engineer	80	\$68	\$95	\$7,624		
		Associate Water Resource Specialist	20	\$79	\$110	\$2,209		
	Develop spreadsheet model for operations without storage	Associate Water Resource Specialist	8	\$79	\$110	\$883		
		Associate Water Resource Specialist	60	\$79	\$110	\$6,626		
		Senior Water Resource Specialist	20	\$87	\$121	\$2,428		
Run Daily Ops Model with Desal Plant	Water Resource Manager	10	\$102	\$143	\$1,435	\$39,695		
Fishery Impact Minimization Strategies	Intake location, screen design, seasonal operations, and monitoring alternatives will be developed Tenera	Associate Water Resource Specialist	60	\$79	\$110	\$6,626		
		Consultant	40	\$106	\$148	\$5,934		
		Senior Water Resource Specialist	20	\$87	\$121	\$2,428		
		Water Resource Manager	20	\$102	\$143	\$2,870		
		Principal Engineer	20	\$96	\$134	\$2,686		
		Principal Planner	20	\$95	\$134	\$2,673		
		Assistant General Manager	10	\$129	\$181	\$1,808		
		Assistant Engineer	40	\$68	\$95	\$3,812		
								\$28,837
		Reports	Draft report write-up	Associate Water Resource Specialist	120	\$79	\$110	\$13,252
Assistant General Manager	8			\$129	\$181	\$1,446		
Review report Tenera	Consultant		20	\$106	\$148	\$2,967		
	Water Resource Manager		8	\$102	\$143	\$1,148		
	Principal Engineer		8	\$96	\$134	\$1,074		
	Senior Water Resource Specialist		8	\$87	\$121	\$971		
	Assistant Engineer		32	\$68	\$95	\$3,050		
	Associate Water Resource Specialist		40	\$79	\$110	\$4,417		
	Associate Water Resource Specialist		40	\$79	\$110	\$4,417		
Respond to questions from partners	Assistant Engineer		40	\$68	\$95	\$3,812		
	Water Resource Manager		8	\$102	\$143	\$1,148		
	Principal Engineer		8	\$96	\$134	\$1,074		
Final report write-up	Assistant General Manager		8	\$129	\$181	\$1,446		
	Senior Water Resource Specialist		8	\$87	\$121	\$971		
						\$41,194		
Meetings	Prepare Preliminary Results Presentation	Associate Water Resource Specialist	32	\$79	\$110	\$3,534		
		Assistant General Manager	4	\$129	\$181	\$723		
	Meeting Preflights	Water Resource Manager	4	\$102	\$143	\$574		
		Senior Water Resource Specialist	4	\$87	\$121	\$486		
		Principal Engineer	4	\$96	\$134	\$537		
		Assistant Engineer	4	\$68	\$95	\$381		
	Workgroup Preliminary Results Presentation	Assistant Engineer	16	\$68	\$95	\$1,525		
		Water Resource Manager	16	\$102	\$143	\$2,296		
		Associate Water Resource Specialist	32	\$79	\$110	\$3,534		
	Prepare Final Results Presentation Meeting Preflights	Assistant General Manager	4	\$129	\$181	\$723		
		Water Resource Manager	4	\$102	\$143	\$574		
		Senior Water Resource Specialist	4	\$87	\$121	\$486		
		Principal Engineer	4	\$96	\$134	\$537		
		Assistant Engineer	4	\$68	\$95	\$381		
	Workgroup Final Results Presentation	Associate Water Resource Specialist	16	\$79	\$110	\$1,767		
		Water Resource Manager	16	\$102	\$143	\$2,296		
		Assistant Engineer	16	\$68	\$95	\$1,525		
							\$21,878	
Total							\$170,580	

DSM2 = The Delta Simulation Model II (DSM2) is a one-dimensional mathematical model for dynamic simulation of one-dimensional hydrodynamics, water quality and particle tracking in a network of riverine or estuarine channels. (<http://baydeltaoffice.water.ca.gov/modeling/delta modeling/models/dsm2/dsm2.cfm#overview>)

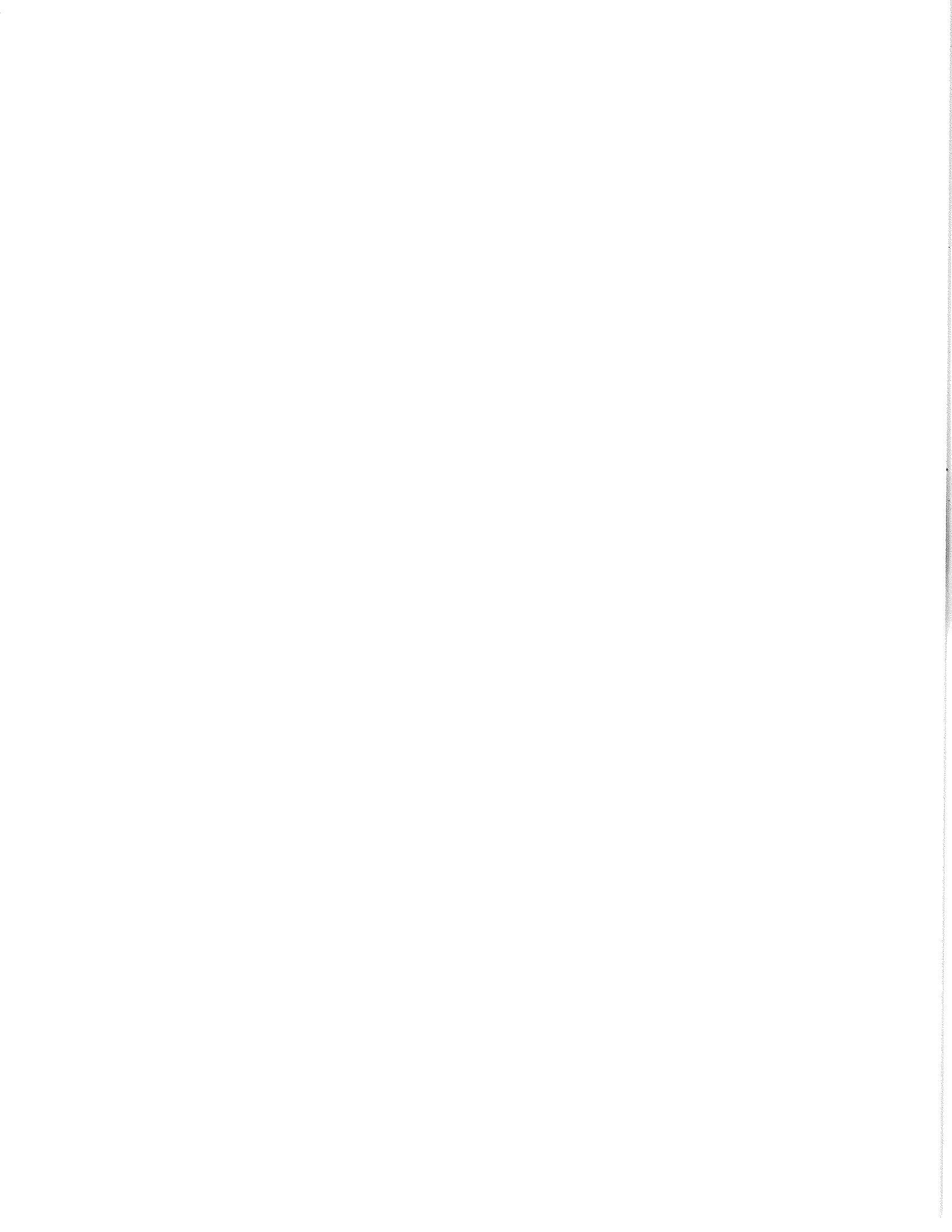
CALSIM = A generalized water resources simulation model for evaluating operational alternatives of the CVP and SWP water supply storage and conveyance systems. (<http://modeling.water.ca.gov/hydro/model/description.html>)

PTM = Particle Tracking Module

APPENDIX C

Greenhouse Gas Reduction Analysis

October 2011



Bay Area Regional Desalination Project

Proposed Scope of Work

for

Greenhouse Gas Reduction Analysis

Background

At the November 15, 2010 Managers' Meeting of the Bay Area Regional Desalination Project (BARDP), one of the next steps identified was the evaluation of potential alternatives to minimize the BARDP's carbon footprint (greenhouse gas [GHG] emissions), including the use of state-of-the-art energy-efficient desalination technologies. This effort is in line with the BARDP partners' environmental stewardship principles, and can provide information that will ultimately be useful for the preliminary design process and the preparation of environmental impact assessment reports. Furthermore, minimizing the BARDP's carbon footprint may potentially lead to lower energy consumption and lower overall costs.

Water supply is a major consumer of energy in California; according to the Association of California Water Agencies, 19% of all electricity consumed in California is related to water use (8% for water/wastewater and 11% by end users). Desalination, in particular, is an energy-intensive process. It is therefore critical to address the potential climate change impacts of the BARDP.

The Climate Registry (TCR) suggests four strategies for reduction of GHG emissions: measure, reduce, renew (invest in renewable energy), and offset (purchase carbon credits). Measuring GHG emissions requires: 1) determining the boundaries to include (geographic and control [operational, financial, equity share]); 2) identifying emission sources and collecting the data; and 3) calculating the associated emissions using methodologies recommended by TCR and other such agencies.

As described in Task 1, for this scope of work, the analysis will be based primarily on the alternative scenarios presented in the report "*Pilot Testing at Mallard Slough: Pilot Plant Engineering Report*" (Pilot Plant Report) prepared by MWH in June 2010. For this preliminary work, the analysis will be limited to the desalination plant (wheeling may be considered at a later time as data becomes available) and to the equipment included in the energy consumption calculation in the Pilot Plant Report. TCR suggests measuring three "scopes" of emissions: 1) direct – fuel combustion and company owned vehicles (on-site and commuting to site), for construction as well as ongoing operations & maintenance; 2) indirect – purchased electricity for use; and 3) indirect (optional) – production of purchased materials, product use, outsourced activities, contractor owned vehicles, waste disposal and employee business travel. Indirect emissions from operations are expected to be the main source of emissions, and will be the basis for the analysis. Reduction strategies, including investment in renewable energy sources and carbon credits are covered under Task 2.

Proposed Scope of Work

Task 1 Estimate the BARDP's potential gross GHG emissions

The first task is to estimate the BARDP's potential gross GHG emissions. The baseline scenario will be based on the conceptual plant design alternatives presented in the report "*Pilot Testing at Mallard Slough: Pilot Plant Engineering Report*" (Pilot Plant Report) prepared by MWH in June 2010. For the BARDP,

indirect emissions from the off-site electricity provider are expected to be the only major source of GHG. Based on the location, the two likely candidates for supplying power to the East Contra Costa site are Pacific Gas and Electric (PG&E) and Mirant. The Pilot Plant Report contains electrical consumption estimates for two alternative processes: 1) a two-stage brackish and seawater desalination system and 2) two parallel single-stage reverse-osmosis systems consisting of nanofiltration and seawater membranes.

Task 2 Identify and evaluate potential GHG emission reduction strategies and actions.

Under this task, potential GHG emission reduction strategies and specific actions are identified and evaluated. Strategies to be evaluated will include, at a minimum, implementation of energy-efficient equipment and facilities, use of alternative energy sources not derived from fossil fuels, GHG capture, and carbon offsets. Examples of specific actions to consider include:

- optimization of system design and performance, evaluating flux rates, membrane fouling, and other system features to increase overall recovery rate
- installation of state-of-the-art desalination energy recovery technologies (note that the conceptual plant design in the Pilot Plant Report includes energy recovery components—these should be compared against any recent technological advances),
- use of high-efficiency/premium-efficiency motors and variable frequency drives (VFDs),
- green building design based on principles of the Leadership in Energy and Environmental Design (LEED) program,
- installation of wind turbines and/or solar panels for on-site power generation to displace a portion of the BARDP's energy demands from the off-site power supplier,
- purchase of carbon dioxide from carbon dioxide recovery plants,
- restoration and enhancement of wetlands to act as a carbon sink, and
- purchase of carbon credits.

The potential reductions in GHG emissions that can be accomplished through each action should be estimated, along with the implementation costs.

Task 3 Identify and estimate sources of avoided emissions.

The BARDP may result in avoided emissions from actions that are no longer necessary due to the BARDP's implementation. For example, if the water produced by the BARDP is used to displace water that would otherwise be imported and pumped over 100 miles, the associated GHG emissions for this import would be avoided. Under this task, sources of avoided emissions will be identified and estimated to the extent possible based on information provided by the BARDP partners. It is recognized that this analysis may be limited by the availability of the required data for the alternative water sources; if a quantitative analysis is not possible, then such sources of avoided emissions will be qualitatively described.

Task 4 Review completed and ongoing desalination research.

Task 2 focuses on strategies and actions that can be implemented in the near future because there is strong evidence to support their value and technical feasibility. This task focuses on existing and ongoing research efforts that point to promising processes or technologies for improving the overall resource efficiency of desalination systems.

The BARDP partners have participated in a variety of research projects over the years, including:

- Offshore seawater desalination environmental impacts and energy needs – WateReuse Foundation
- Co-location of desalination with industrial facilities – Kennedy Jenks/WateReuse Foundation

The results of these research projects will be reviewed for findings that are applicable to the optimization of the BARDP design and performance and GHG reduction objectives. There are a number of other ongoing national and international research projects that may provide similar value to the BARDP, such as research on:

- nanotechnology application to desalination (e.g., by Paul Westerhoff at Arizona State University and Eric Hoek at UCLA)
- low-grade heat source application to desalination (e.g., by Nirmala Khandan at New Mexico State University)

A summary review of desalination research will be developed under this task, highlighting areas of opportunity.

Task 5 Prepare a technical memorandum.

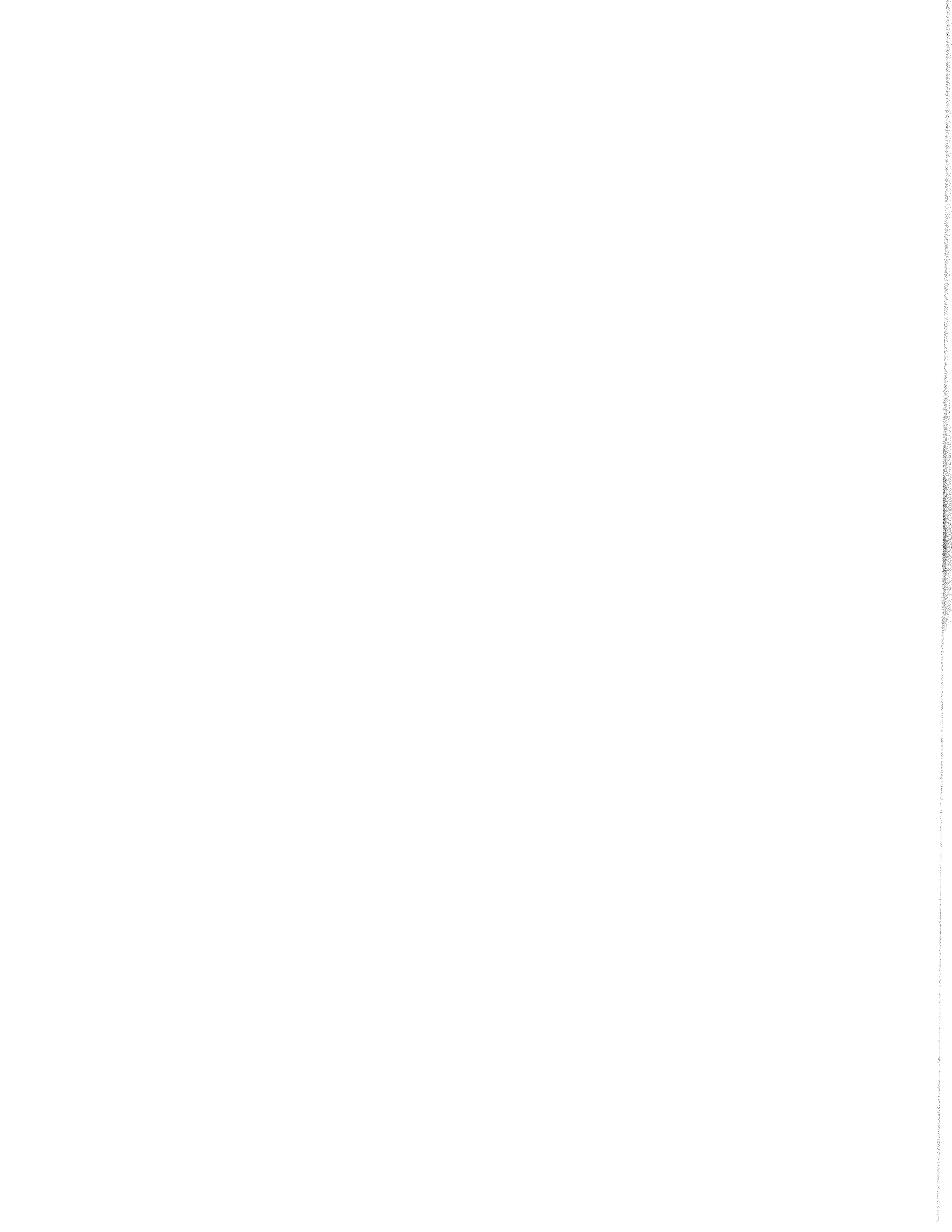
The findings from Tasks 1 to 4 will be summarized and presented in a draft technical memorandum (TM). The draft TM will be finalized based on inputs from the BARDP partners. The TM will also include recommendations for greenhouse gas reduction strategies and actions to consider in more detail and next steps.

Budget

The project is estimated to cost approximately \$60,000.

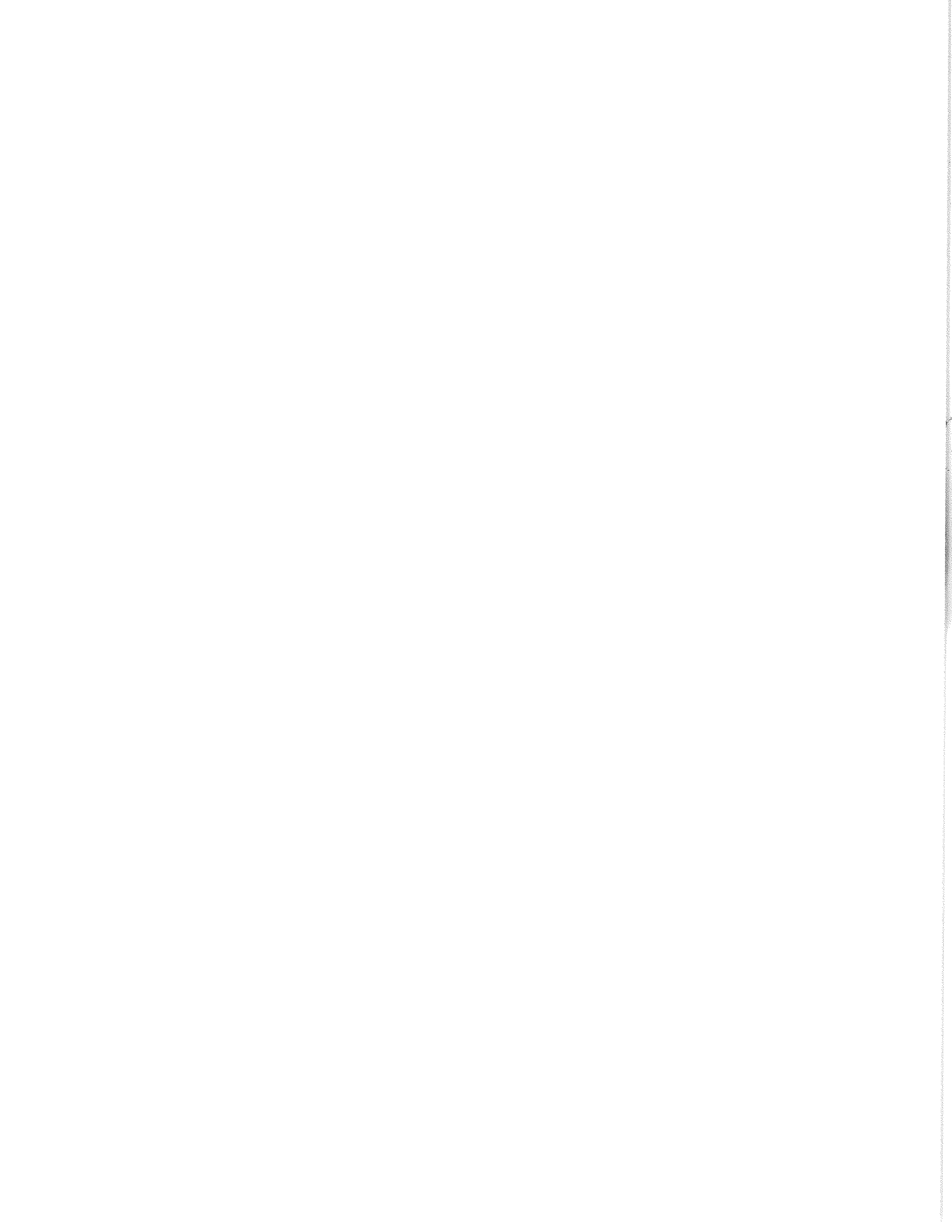
Schedule

The project is expected to be completed over a six-month period.



APPENDIX D
Public Outreach

October 2011



APPENDIX D

Public Outreach

Engaging Stakeholders for the Regional Desalination Project

Together, five of the Bay Area's largest water purveyors: Contra Costa Water District (CCWD), the East Bay Municipal Utility District (EBMUD), the San Francisco Public Utilities Commission (SFPUC), Santa Clara Valley Water District (SCVWD) and the Alameda County Flood Control and Water Conservation District - Zone 7 (Zone 7) serve over 5.6 million businesses and residents in the San Francisco Bay Area. These five agencies have partnered to develop the Bay Area Regional Desalination Project (Project), a proposed seawater reverse osmosis treatment facility that would produce approximately 20 million gallons of water per day in eastern Contra Costa County to meet needs during emergencies and supply shortages. Water produced by the project would be blended directly with adjacent EBMUD and/or CCWD transmission networks, or stored for future use. Demands from the other partner agencies would be met through water transfers with EBMUD and/or CCWD.

The proposed project would leverage existing interties, pipelines and facilities that connect each of the partner agencies, to the extent possible. Only one new intertie between EBMUD and Zone 7 would be required. A shared regional facility is intended to provide increased water supply reliability in the region, particularly during emergencies and periods of water supply shortfalls, while minimizing the overall carbon footprint and environmental impact of a desalination project. Nevertheless, the proposed project could be the largest desalination plant in the largely urban northern California and is not without impact to a large number of diverse stakeholders. Therefore, engaging the public, permitting agencies, nearby water users, and environmental groups early and often is critical to the development of the Project. By soliciting input early, the partner agencies hope to inform project design and ensure a comprehensive review of environmentally sound alternatives as the project continues to develop.

In order to most effectively engage project stakeholders, the following tasks are proposed:

1. Hold Public Meetings

Three (3) public meetings are proposed during the Site-specific Analysis phase of the Project in each East Bay and West Bay locations, for a total of six (6) public meetings during the course of the proposed phase of work. Each agency will reach out to its own constituency and list of stakeholders, providing noticing for each of the meetings in the nearest location.

The first public meeting will occur within the first 3 months of the start of the Site-specific Analysis. The first meeting will be to provide an overview of the project developments to date and the rationale and approach for the proposed scope. Public comments will be noted and incorporated into the project record. This meeting will present an opportunity to provide general project information and details about the proposed objectives.

A second meeting will be held once preliminary findings from the hydraulic modeling, water quality modeling and greenhouse gas emissions study are available, approximately 12

months from the start of the analysis. This meeting will provide a venue to report preliminary results to the public and stakeholder groups.

A third meeting will be held when final results of the proposed analysis have been developed, approximately 18 months from the start of the analysis. This meeting will provide an opportunity to the public and stakeholder groups to provide input in the evaluation of the data prior to staff recommendations being developed for further action on the project. Public comments will be recorded and collated.

2. *Meet with Regulatory Agencies*

The agencies will identify key regulatory bodies that would have permitting authority for the project and initiate one-on-one meetings to discuss the project and solicit input. Between 6-10 meetings with regulatory agencies are anticipated during this phase of work.