

**BAY AREA REGIONAL DESALINATION PROJECT
 INSTITUTIONAL TASK TECHNICAL MEMORANDUM #2
 ANALYSIS OF FEASIBLE SCENARIOS
 September 29, 2011**

I. INTRODUCTION

On March 26, 2010, the Bay Area Regional Desalination Project (project) partners at that time (CCWD, EBMUD, SFPUC, and SCVWD) discussed site alternatives and demands as part of the first task in the development of an Institutional Framework for the project. While Zone 7 formally joined the project by letter in May of 2010, preliminary demands for Zone 7 were included in the initial review of capacity requirements, which are contained in Technical Memorandum (TM) #1 (March 22, 2010).

As this continues to be an iterative process, agency-specific demands continue to be modified as more information becomes available. Demand reductions over the past two years across agencies and projections of potential future supply shortfall in SFPUC’s service area are among the changing conditions. As agencies update their Urban Water Management Plans and evaluate future water supply options and their rationing criteria, needs are also re-evaluated. Since the preparation of TM #1, some agency demands have been modified, as shown in Table 1 below.

Table 1. Projected Desalination Water Demand for Partner Agencies

	Potential Water Demand from BARDP (mgd)	Demand Frequency (years)
EBMUD	9	1 in 5
CCWD	13	1 in 10 (2030+)
SFPUC	9	every year
SCVWD	10	1 in 5
Zone 7*	5	wet and normal year or every year if water is available
TOTAL	14 (every year) – 46 (max)	

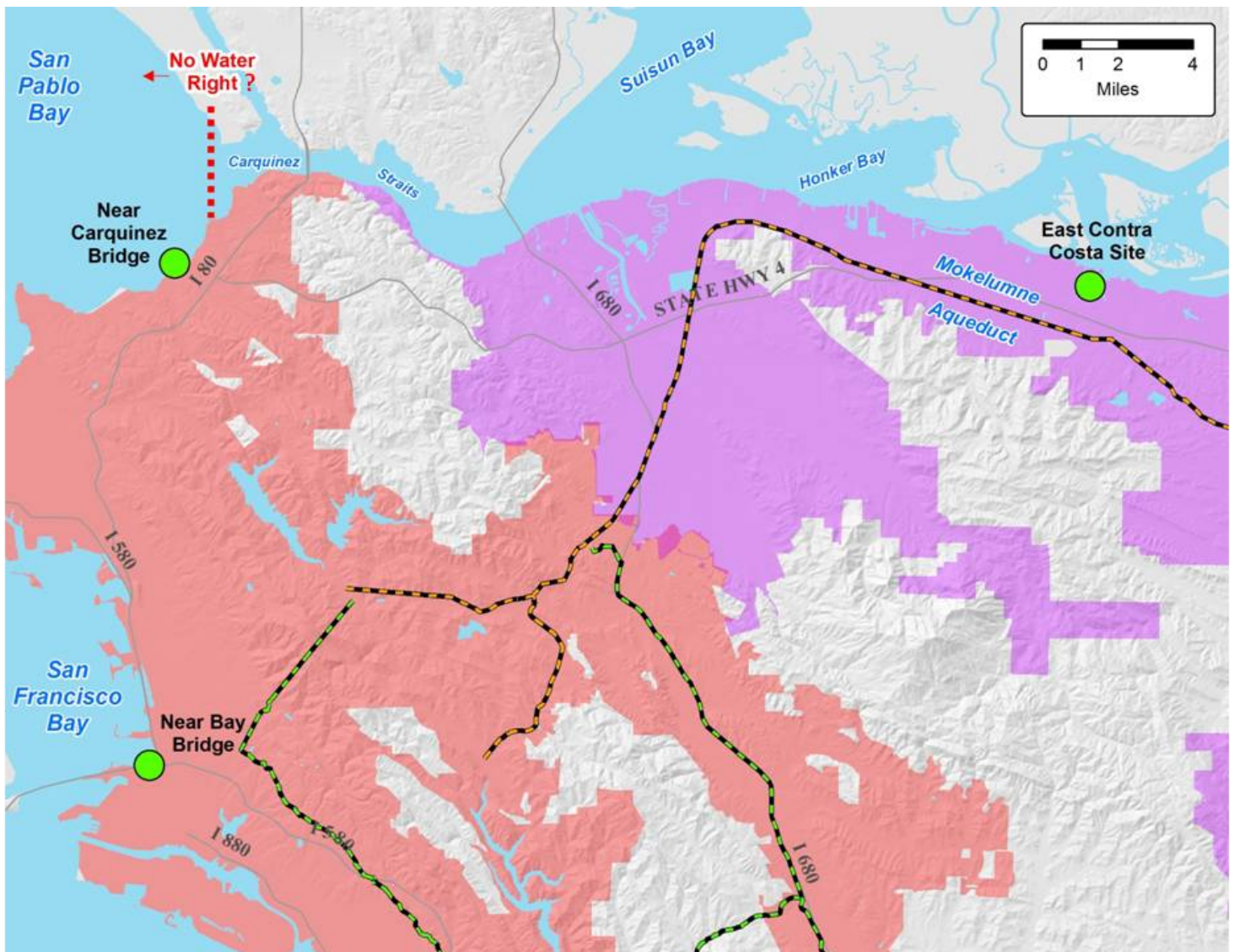
As documented in subsequent sections of this TM, the partners have completed additional analyses including a review of site alternatives, water rights, capacity constraints, and other key issues that affect the feasibility of water deliveries since the preparation of TM #1. As a result, five scenarios

have been identified and unit costs have been developed for each. While additional modeling is recommended for the project that will provide further cost details, this TM presents a comprehensive discussion on institutional feasibility and relative unit costs, which together with agency needs can be used as a basis for key decisions on the proposed facility site and size requirements.

II. REVIEW OF SITE ALTERNATIVES

The project partners reviewed three potential site locations: (1) East Contra Costa, (2) Near Bay Bridge, and (3) Near Carquinez Bridge. The Near Carquinez Bridge option was evaluated because it was identified as a location close to existing EBMUD facilities, and west of where a water right may be required from the State Water Resources Control Board. Figure 1 illustrates the location of the sites reviewed; each is discussed in more detail below.

Figure 1. Approximate Location of Site Alternatives



IIA. East Contra Costa

The East Contra Costa site refers to a site located between the Mallard Slough Pump Station to the west and the City of Antioch to the east. The exact location will depend on the water rights (CCWD and / or Antioch) and existing infrastructure (pipelines and outfall) available for project use.

The site is generally referred to as East Contra Costa because the water deliveries to the partners would not vary based on the specific location. However, different conditions such as the need for storage, the quantity of water needed from the project, the conditions and costs of the license/permit that could be used, and the distance to critical infrastructure will impact how a specific location is selected. Given the possible variations of a project at this site, Section IV includes three different scenarios in East Contra Costa. Once the partners prioritize project features, location-specific costs can be developed in greater detail. Preliminary unit costs for the East Contra Costa scenarios are included in Section V.

For an East Contra Costa site, desalinated water could be blended with the water supplies of CCWD, EBMUD (Mokelumne Aqueduct) or both. Other partners would receive water transfers; Zone 7 and the SFPUC would receive transfers from EBMUD through interties, and SCVWD could get water either as a Delta transfer with CCWD or via an intertie with the SFPUC at Milpitas. The water from the project could be fully treated (two-pass RO) or require further treatment (one-pass RO) depending on delivery point into either the CCWD or EBMUD system. With Total Dissolved Solids (TDS) of less than 12,000 milligrams per liter (mg/L), the treatment costs of desalting water at this site would be the lowest of any site considered. An additional advantage of this site is the proximity of CCWD's Los Vaqueros Reservoir, which could be used for storage by the partners that do not have demands during normal years, and the proximity of other existing facilities such as intake structures and outfalls.

Issues

The East Contra Costa site relies on Suisun Bay for its source water. There are sensitive fish species in the project area, and the project would require appropriate mitigation to protect these species and their habitat. While contingencies have been assumed, no specific mitigation costs have been identified at this time.

Based on a Biological Opinion under which CCWD currently operates, there have historically been no diversions at the Mallard Slough Pump Station in April (currently being changed to March). The assumed project capacity of scenarios that utilize CCWD's license take the 11-month diversion into account; however, this condition could affect the operation of a project at this site, particularly at the Mallard Slough Pump Station location. Although this requirement may be revisited if a project is developed at this site, for planning purposes, the partners assumed that this requirement would remain in place. In addition to CCWD's licensed water rights, CCWD has a water right permit and the City of Antioch also has water rights that may be used at this site. However, additional constraints to the use of these water rights may exist. These water rights are described in detail in Section III. Finally, opportunities for future expansion of the project at this site are constrained by the need to obtain new water rights in the Delta.

IIB. Near Bay Bridge

Near Bay Bridge refers to a site at the foot of the Bay Bridge in Oakland, in the vicinity of EBMUD's Wastewater Treatment Plant. From this site, desalinated water from the project would be blended within EBMUD's treated water distribution network, and the SFPUC and SCVWD would receive water transfers via the EBMUD-SFPUC intertie at Hayward. No water rights, as issued by the California State Water Resources Control Board (SWRCB), would likely be needed at this site. Brine discharge would be available through EBMUD's wastewater outfall, which flows into the San Francisco Bay. The average annual flow in the outfall is currently 66 mgd, with a maximum flow for secondary treated water of 168 mgd; therefore, there is a large amount of available capacity.

Issues

The cost of a pipeline that feeds desalinated water from a desalination facility at Near Bay Bridge directly into EBMUD's treated water distribution system will be high. Treatment costs will also be higher than at an East Contra Costa site because the source water will have a TDS concentration of more than 26,000 mg/L, which would cost significantly more to treat. Although water rights are not likely needed from the SWRCB, the project would require a Bay Conservation and Development Commission (BCDC) Permit. Because of the site location in the vicinity of EBMUD's distribution network, CCWD and Zone 7 would not receive transfer water from EBMUD. Furthermore, because the water from the desalination facility would feed directly into EBMUD's distribution system, additional public outreach would likely be required.

II.C. Near Carquinez Bridge

In addition to the top two sites recommended for consideration in the project Feasibility Study (2007), the partners agreed to identify at least one site west of the East Contra Costa site where water rights may not be needed. Following a discussion with the SWRCB on June 17, 2010, the Near Carquinez Bridge site was identified and reviewed for inclusion. This site would be located immediately to the west of the Carquinez Bridge. At this site, a BCDC Permit would be required and the treatment costs would be higher than East Contra Costa and potentially lower than Near Bay Bridge because of an expected TDS range of 12,000-25,000 mg/L. Furthermore, a pipeline in excess of 15 miles would be required to convey water to partner agencies.

Issues

Water deliveries from a Near Carquinez Bridge site would be similar to those envisioned from an East Contra Costa site. The relative benefit would be locating the project in an area where water rights and sensitive fish species issues could be minimized. On the other hand, a pipeline in excess of 15 miles would be required to connect the Near Carquinez Bridge site to EBMUD's transmission and distribution system, which would significantly increase capital costs. Furthermore, the long pipeline would have more construction impacts than the other sites considered.

A comparative table outlining the issues associated with each of the sites is shown below.

Table 2. Comparison of Site Alternatives

<i>Issue</i>	<i>Site Alternatives</i>		
	<i>East Contra Costa</i>	<i>Near Bay Bridge</i>	<i>Near Carquinez Bridge</i>
Capacity Limits	10-15 mgd, likely ¹	20-40 mgd ²	20-65 mgd, depending on demand ²
Available Outfall	DDSD and/or CCCSD	EBMUD	CCCSD
Infrastructure Needs (in addition to plant)	Potential for additional species protection	None	Pipeline to EBMUD Aqueduct
Storage Availability	Los Vaqueros (Optional)	N/A	N/A
Permit Requirements	Water Rights (Petitions)	BCDC Permit	BCDC Permit
Biological Resources	Sensitive Fish Habitat	No known sensitive resources	None known, but more construction impacts
Raw Water Quality	12,000-25,000 mg/L TDS	25,000 – 30,000 mg/L TDS	12,000 – 25,000 mg/L TDS
Water Deliveries a) through EBMUD b) from CCWD	a) EBMUD Aqueduct, direct to CCWD, transfers to other partners b) CVP, SWP transfers to partners	a) EBMUD distribution, transfers to CCWD and Zone 7 unlikely b) N/A	a) EBMUD Aqueduct, transfers b) N/A

III. WATER RIGHTS

III.A. CCWD

CCWD maintains both a license and permit with the SWRCB for its intake at the Mallard Slough Pump Station. Conditions of each are described below. Additionally, although not a condition of either the license or permit, CCWD operates the Mallard Slough Pump Station under a requirement put forth by the U.S. Fish and Wildlife Service (USFWS) of not diverting any water for thirty (30) days per year. The No-diversion period has typically been observed in April but may be altered at the request of the fisheries agencies (currently being changed to March). This operational constraint is accounted for in the analysis by assuming an 11-month diversion period.

License

License 10514 was issued to CCWD on June 13, 1928 and remains in good standing with the SWRCB, (all required reports have been filed by CCWD). The license stipulates that a maximum of 14,880 acre-feet (13.3 mgd) can be taken from the source annually (year-round), and 13,690 acre-feet (12.2 mgd) can be put to beneficial use. In other words, if the project were to take in the maximum allowable raw water for beneficial use, and assuming that brine discharge counts towards beneficial use, the project could produce an average quantity of approximately 10.6 mgd (80% of 13,690 acre-feet) spread over 11 months. The remaining 20% of the source water would be diverted from the desalination treatment process as brine. Alternatively, if the water diverted to the brine discharge is not considered a beneficial use of the water, up to 14,880 acre-feet of water would be available to

¹ Based on existing CCWD and City of Antioch water rights and the assumption that a portion of those water rights would be available to the project; if all water rights are available (unlikely), the total could be up to 38 mgd

² Based on demands and capacity of available interties

use for desalination under license 10514. At an average recovery rate of 80%, the project yield in this scenario would be 11.6 mgd (80% of 14,880 acre-feet spread over 11 months). Factoring in some loss in production and conveyance, the CCWD license alone would result in a maximum project capacity of approximately 10 mgd over a 12-month period. The license is specifically for use in CCWD's service area.

Although the maximum diversions allowed under the license are as described above, CCWD has been limited in what it has been able to divert historically at Mallard Slough by poor water quality conditions. CCWD's average annual diversion from 1968-2009 was 5,016 acre-feet (4.9 mgd over 11 months) and the average diversion over the past ten years of record was 1,724 acre-feet (1.7 mgd over 11 months). CCWD has not diverted the full face value amount allowed by this license since 1983. Since 1967, CCWD has been receiving some compensation by the California Department of Water Resources (DWR) in recognition for the decrease in water availability resulting from the development of the State Water Project (SWP).

Permit

CCWD obtained Permit 19856 on September 28, 1983. The permit allows for a diversion of 11,900 acre-feet between August 1 and December 31 each year within CCWD's service area, or 25.3 mgd over five months. At a constant recovery rate of 80%, the project yield from this permit would be 9,520 acre-feet or 20.2 mgd over 5 months. Given water quality conditions, CCWD's maximum use under this permit was 653 acre-feet (1.4 mgd over five months) in 1998. The permit expired on December 1, 2000. At a minimum, CCWD would likely have to petition for an Extension of Time to use the permit capacity. For the purposes of the analysis contained in this TM, it is assumed that the permit capacity is not available for use by the project in two of the three scenarios developed. However, it is recommended that an Extension of Time petition be filed with the SWRCB to pursue its potential use.

III.B. ANTIOCH

The City of Antioch has two pre-1914 water rights to take raw water directly from the San Joaquin River when the quality is suitable for municipal use (chlorides <250 mg/L). The first water right is represented by a Statement of Water Diversion and Use No. 9352 and has been in use since the 1850s, with the statement filed on July 29, 1977. This right allows for a year-round diversion of 4,600 gallons per minute (6.6 mgd) for municipal use within the City of Antioch. The second Statement of Water Diversion and Use (No. 15304) has been in use since the late 1800s and was filed on June 14, 2000. This right allows for a diversion of 11,100 gallons per minute (15.9 mgd) year-round for municipal use in the City of Antioch.

The City of Antioch's water use is approximately 16 mgd. Despite more than sufficient capacity available through its water rights, water quality has been such that even under the most favorable conditions the majority of the City of Antioch's raw water supply comes from CCWD.

Similar to CCWD, Antioch maintains an agreement with DWR for compensation when water is unavailable for use. In its agreement, Antioch is guaranteed 208 days per year of diversion. Within its 208 days per year of historically available water, when water quality is above 250 mg/L chlorides (approximately 1000 μ S/cm electrical conductivity) DWR pays one-third of the cost of replacement raw water supplied by CCWD. Table 3 summarizes historical water quality data in the San Joaquin River at Antioch, approximating the number of days when water is available for the City of Antioch's use.

Table 3: Number of days with EC < 1000 μ S/cm in the San Joaquin River at Antioch

Source of the data is <http://iep.water.ca.gov/dss/>

Time period	Average days per year with daily average EC < 1000 μ S/cm
WY 1965-1969	275
WY 1970-1974	279
WY 1975-1979	158
WY 1980-1984	277
WY 1985-1989	114
WY 1990-1994	71
WY 1995-1999	236
WY 2000-2004	167

In a meeting between the project partners and the City of Antioch on August 26, 2010, the City of Antioch indicated its willingness to explore opportunities to utilize its water right for the benefit of the project. As its water right is currently underutilized due to water quality constraints, a mutually beneficial scenario may be pursued further.

Based on initial review by the partners, the City of Antioch may have approximately 11,500 acre-feet (10.3 mgd), which it cannot put to beneficial use. If this amount is diverted for the project, the additional product yield (at an average 80% recovery rate), would be 9,200 acre-feet or approximately 8 mgd to the project. The use of this water right would require the appropriate legal proceedings for Point of Diversion and Place of Use changes, as described in Section IV.C for a pre-1914 water right.

III.C. CHANGES TO EXISTING RIGHTS

There are three types of changes that can be initiated to augment water rights for the project:

- a) petition for an extension of time,
- b) a petition for a change in the place of use, purpose of use, or point of diversion, or
- c) application for a new water right.

Any of these changes would require SWRCB review and approval, and would potentially subject the underlying permit or license to public scrutiny and protest during a standard 45-day notice period. Each type of change, presented in order of complexity from least to greatest, is described briefly below.

Petition for Extension of Time

If the date by which water authorized for use under a permit was to have been put to full beneficial use has passed, the permit holder can seek additional time to make full beneficial use of the water. The SWRCB has to make certain findings, including that the permittee has diligently pursued the development of the project named in the permit or that circumstances existed beyond the permittee's control that prevented the permittee from completing the project before the extension is approved. CCWD may petition for an Extension of Time for the use of its Permit 19856. Based on the Water Rights report by Wagner & Bonsignore (W&B Report, Appendix A), this process could take up to 5 years. However, because the Permit expired 10 years ago and has not historically been used to its full extent, it is unlikely that an extension would be granted for its full future use. Therefore, in two of three scenarios involving an East Contra Costa site, it is assumed that the permit capacity is not available for use by the project. One scenario includes an additional capacity of 20 mgd, predicated on the full usability of CCWD's permit.

Place of Use Change

Both CCWD's and the City of Antioch's water rights limit the beneficial use of water to within the respective service area. The use of water outside of the designated place of use would require an Order by the SWRCB issued pursuant to the filing of a Petition for Change in Place of Use. If the water produced by the project is not put to beneficial use in its intended service area, but is produced for the benefit for one or more of the other partners (EBMUD, SFPUC, SCVWD or Zone 7), the benefiting agency would have to be named in the petition for a Change in the Place of Use. The W&B Report states that this process could take 5-10 years, depending on the extent and nature of protests that may occur. Changing the place of use on the water rights would allow any of the project partners to take delivery of any product water produced from the project.

Additional Point of Diversion

This option would add the existing CCWD intake at the Mallard Slough Pump Station as a point of diversion for partner agencies with State Water Project (SWP) and Central Valley Project (CVP) contracts. This option creates an alternative route for partner agencies to receive state and federal water, specifically Zone 7 and SCVWD, away from the potentially limited capacity of the southern Delta export pumps. A SWP and/or CVP point of diversion in the western Delta could create a new supply of water to supplement or replace partner agency's annual water supply allocations. The additional point of diversion could permit diversion of surplus flows to meet partner demands during wet years or when the Delta is in 'surplus' conditions. Adding a CVP and/or SWP point of diversion at Mallard Slough could increase the instantaneous diversion rate and water supply yield of the proposed project.

Under this option, the existing CCWD intake at the Mallard Slough Pump Station would potentially be added as a point of diversion for partner agencies (CCWD, Zone 7, SCVWD) with State Water Project (SWP) and Central Valley Project (CVP) contracts. The benefit of this option would be to create an alternative route for partner agencies to receive SWP and CVP water. However, modeling studies would be required to determine whether this option would result in additional yield beyond partner agencies' annual SWP and CVP water supply allocations. Furthermore, this option would require the agreement of the Department of Water Resources, Bureau of Reclamation, and

potentially other stakeholders; and approval by the State Water Resources Control Board. At this time, Zone 7 and SCVWD believe that it is premature to pursue this option.

New Water Right

As currently identified, the project is subject to CCWD's license limitations (10.6 mgd product water over 11 months), CCWD's permit limitations (up to 20 mgd of product water over 5 months), and Antioch's water rights limitations (up to 8 mgd over 12 months), or a sum of the three (10-38 mgd of product water, with 20 mgd of that being available only 5 months of the year) at the East Contra Costa site. If greater capacity is needed to meet the future needs of the partners, a new water right would be required. This process could take over 10 years. For planning purposes, the partners assume that obtaining a new water right in East Contra Costa is unlikely and future expansion beyond existing water rights would not occur. It is further assumed that the full water rights potential between CCWD and the City of Antioch (38 mgd) would not likely be available to the project.

IV. SCENARIOS

The five scenarios described in this section were developed based on the feasibility of site alternatives, availability of water rights, and opportunities for water transfers described in the preceding sections. Although these scenarios are described as feasible for the project, they do not all necessarily achieve the stated goals of each partner. One of the goals of this TM is to help partners assess which of the following scenarios best meets their needs and which, if any, do not meet their needs at all (and would therefore not be feasible for that partner).

All scenarios were developed based on the principle that every *participating* partner can be made whole by the benefiting partner(s). For example, if a partner receives raw water and gives up treated water to another agency, the transferring agency should be duly compensated for treatment. Similarly, if a partner receives 5 mgd from the project, it must either use or transfer the full 5 mgd less any normal system losses. It should be noted that Scenario IV.E at the Near Bay Bridge site assumes that CCWD and Zone 7 would not participate because there is no water transfer opportunity from EBMUD.

Storage Potential

Under Scenarios IV.A through IV.D (all except Near Bay Bridge), dedicated storage may be purchased at CCWD's Los Vaqueros Reservoir for the project. Each of these scenarios envisions a desalination facility in East Contra Costa with the possibility of idle capacity for extended periods. During these periods when the cumulative demand is less than the production capacity of the project, water could be stored or 'banked' for use in subsequent years when demand from the partners exceeds plant capacity.

To illustrate how the storage would be utilized, we can take a hypothetical example. A 10-mgd facility is built in East Contra Costa. Zone 7 has an all-year demand of 5 mgd. The remaining 5 mgd is used only during dry years or emergencies (assume 1 in 3 years). Rather than having an idle capacity of 5 mgd 2 of every 3 years (equivalent to a total of 11,200 AF), the project partners would purchase 11,200 AF of storage at Los Vaqueros. In a given normal year, the desalination plant would operate at 100% capacity. It would divert 5 mgd through the Mokelumne Aqueduct to meet Zone 7's need through a water transfer with EBMUD. The remaining 5 mgd would be pumped into CCWD's treated

water distribution system. In exchange, CCWD would transfer Central Valley Project (CVP) water to dedicated storage within the Los Vaqueros Reservoir. This would occur in 2 of every 3 years. In Year 3, when the cumulative demand from the partners exceeds the production capacity of 10 mgd, an additional 10 mgd (11,200 AF over 1 year) would be available through Los Vaqueros Reservoir storage. It could be released and transferred to the Mokelumne Aqueduct.

An exchange with Byron Bethany Irrigation District (BBID) is another potential option for transferring storage water from CCWD to the South Bay Aqueduct. BBID diverts water south of the Clifton Court Forebay, from the Banks Intake Channel, before water enters the SWP Banks export pumps. From the Banks Intake Channel, BBID water flows in an unlined canal north (Byron Division) and south (Bethany Division) of the Banks Intake Channel. The northern canal section intersects CCWD's Old River pipeline. This intersection could be the location of a new intertie, connecting BBID and CCWD and allowing CCWD to transfer water to BBID, leaving water available in the Banks Intake Channel to transfer to Zone 7 and SCVWD along the South Bay Aqueduct. At this time, Zone 7 and SCVWD are not interested in pursuing this option. This option further increases Zone 7's and SCVWD's reliance on the South Bay Aqueduct/Delta system, and does not result in any increase of water supply reliability and improvement of the existing water quality from the Delta system.

Appendix B summarizes an analysis of a combined regional desalination and storage project.

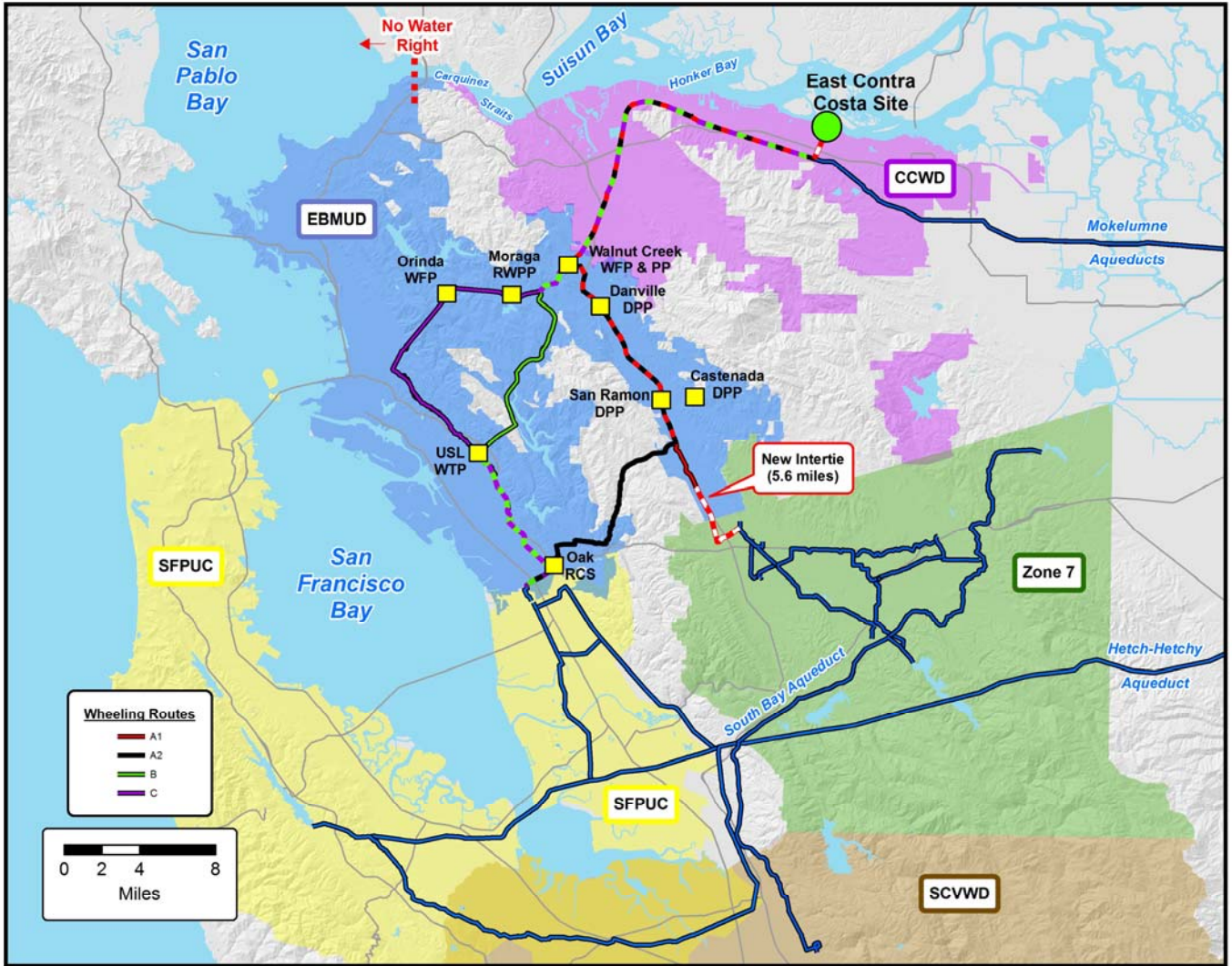
IV.A. EAST CONTRA COSTA (Place of Use Change)

This scenario assumes that an intake in the vicinity of the Mallard Slough Pump Station can fully leverage CCWD's licensed water right, which would allow for an average production capacity of 10 mgd (already accounts for brine losses and 11 months of operation). Any CCWD demand could be fulfilled directly from the plant to CCWD's pipelines.

With a petition for the Place of Use Change from the SWRCB, this scenario allows project water to be taken in through the Mokelumne Aqueduct to enable water transfers from EBMUD to Zone 7 through a new intertie, as well as SFPUC and SCVWD via the EMBUD-SFPUC intertie at Hayward. One or more of the Routes C, B, and A2 as shown in Figure 2 would be available to deliver water to the SFPUC and SCVWD through the EBMUD-SFPUC Intertie at Hayward, with the limiting factor being the available capacity in that intertie (approximately 19 mgd). SCVWD would also have the option of receiving a Delta transfer with CCWD.

The intake in this scenario would be the existing structure at the Mallard Slough Pump Station, which has permitted 3/32" fish screens, although modifications may be required depending on the size and scope of the project. The available outfalls for brine discharge would be either the Delta Diablo Sanitation District (DDSD) (up to 5 mgd available capacity in the near term) or the Central Contra Costa Sanitary District (CCCSD), which also has available capacity to serve the project.

Figure 2. Water Wheeling Routes for Partner Agencies



Notes: RCS – Rate Control Station; RWPP – Raw water pumping plant; DPP – Distribution pumping plant, WTP – Water treatment plant

Considerations

This scenario will require a petition to the SWRCB for a Place of Use Change, which can take 5-10 years to realize, depending on backlog and protests, if any. The petition will subject CCWD’s license to full review. In this analysis, the partners assume that although CCWD has not fully utilized its license capacity, it would be available for use by the project because of the historical water quality at this location and CCWD’s inability to fully utilize its license. However, there remains some risk of a change in the amount of water available for use by the project.

With the changing physical and regulatory environment throughout the Delta, there is the possibility of new regulatory requirements that could affect the project development over the next 5-10 years in which a Place of Use change is obtained. The ability to plan for future phases or significant expansion of the project, beyond 10 mgd of product water, therefore, is limited.

IV.B. EAST CONTRA COSTA (with no place-of-use change)

At an East Contra Costa site, any water that is used outside of the designated service area would require a petition for a change in place of use for the respective water rights. However, if the water produced by the project (using CCWD's license and/or permit) were to be used entirely in CCWD's service area, staff considered how other project partners could still benefit by water transfers. EBMUD, SCVWD, and CCWD are CVP customers and could exercise transfers under the existing allotments under the respective CVP contracts. Zone 7 could do an exchange with SCVWD using State Water Project (SWP) to receive water from the project. Alternatively, Zone 7 could acquire a transfer directly with the CVP. Although the SFPUC is not a CVP or SWP contractor, the SFPUC has turnouts on the South Bay Aqueduct (at San Antonio and Sunol) from which it would be feasible to receive transfer water, although additional institutional and operational changes would be required.

Considerations

In the absence of a Place of Use change, transfers of CVP and SWP water would be required for deliveries to the partners. At a minimum, institutional changes would be required for the SFPUC to take water from the project. Other partners may also require modifications to existing agreements to receive additional allocations of CVP or SWP transfers. This option does not have the benefit of providing additional reliability to Zone 7 and SCVWD, who already rely on the SWP and/or CVP and who are seeking alternative sources of water.

IV.C. EAST CONTRA COSTA (both CCWD and ANTIOCH Water Rights)

This scenario incorporates use of the City of Antioch's water right, in combination with CCWD's Mallard Slough water rights (license and permit). This scenario assumes that only the unused, unreimbursed portion of the City of Antioch's existing water right (approximately 10 mgd or 11,500 acre-feet) could be transferred to the project through a Place of Use petition with the SWRCB. The City of Antioch would continue to take water from its intake when the water quality was suitable and continue to purchase raw water from CCWD at other times. In addition to the City of Antioch's right, the project could utilize both CCWD's license in the amount of 13,690 acre-feet or 13.3 mgd over 11 months (available through a Place of Use petition) and permit capacity of 11,900 acre-feet or 25.3 mgd over 5 months (available through an Extension of Time petition). The total project capacity in this scenario would be up to 38 mgd (product water), if all available rights could be transferred for project use, assuming an average recovery rate of 80%.

Considerations

Using a valuation method to derive the unit cost of the City of Antioch's water right similar to that used in the W&B Report for CCWD's water right, the partners estimate that the cost of reimbursing the City of Antioch for water use is estimated to be between \$95 - \$540 per acre-foot (see Appendix C). Both the availability and cost of the water rights are subject to further discussion with the City of Antioch. Furthermore, use of both CCWD and the City of Antioch's water rights will require petitions to the SWRCB that are assumed to take between 5-10 years from the time of application.

IV.D. NEAR CARQUINEZ BRIDGE

The Near Carquinez Bridge site is west of the Delta. From this site, a conveyance pipeline extending approximately 15 miles east (along Highway 4) would be required to connect to the EBMUD's Mokelumne Aqueduct. If the desalination plant is built in the vicinity of the connection to the Mokelumne Aqueduct, the nearest outfall would be the Central Contra Costa Sanitary District (CCCSD) facility in Contra Costa County. As in Scenario IV.A, desalination product water would be blended with raw water in EBMUD's Mokelumne Aqueduct water and treated further. Partners would receive transfer water from EBMUD, similar to all deliveries envisioned under the East Contra Costa scenarios.

Considerations

The length of the proposed conveyance pipeline in this scenario will have both capital cost and construction-related environmental implications.

IV.E. NEAR BAY BRIDGE

The Near Bay Bridge site is in EBMUD's service area in close proximity to EBMUD's western distribution network. From this site, water would go directly into EBMUD's distribution system. Therefore, further treatment would not be required. Because of its location, delivery to Zone 7 would not be possible. Deliveries to the SFPUC and SCVWD would be subject to the same limitations as other scenarios, with a maximum combined supply of 19 mgd through 2020 and potentially less in subsequent years.

Considerations

The difference in source water quality between a Near Bay Bridge site and an East Contra Costa site and the associated higher cost of treatment at a Near Bay Bridge site is the most significant cost difference between the sites. Other qualitative differences include the fact that desalinated water would be delivered directly into EBMUD's distribution system and the proximity of the intake to the outfall. The proximity of the intake to the outfall at this site may raise concerns of perception. While water rights are not an issue at this site, other permitting requirements such as a BCDC Permit would be required. Delivery to Zone 7 and CCWD is not feasible under this scenario as EBMUD cannot move water west to east, nor use other sources to supply Zone 7 or CCWD.

V. UNIT COSTS

Table 4 presents a summary of the unit cost for each of the four project scenarios. Background information for the cost estimate to wheel water to partner agencies is summarized in Appendix D. Capital and Operation and Maintenance (O&M) costs were developed with reference to data collected through the Marin Municipal Water District desalination pilot plant³ and data summarized in the Mallard Slough Pilot Plant Engineering Report⁴.

Table 4. Unit Cost Estimate Summary

Scenario	Cost Estimate ⁵
Scenario 1: East Contra Costa, CCWD License Only with POU Change (10 mgd Plant Capacity)	
Capital Costs (\$ mil)	\$95M
Amortized Annual Capital Cost (\$/AF)	\$550
Annual O&M Costs (\$/AF)	\$475
Water Rights Costs (\$/AF)	\$45
Total Production Cost (\$/AF) <i>(not including cost and time associated with petition for water rights)</i>	\$1,070
Wheeling Cost to Zone 7 (\$/AF)	\$585
Zone 7 Intertie Costs (\$/AF)	\$160
Total Delivered Water Cost to Zone 7 (\$/AF)	\$1,815
Wheeling Cost to Hayward Intertie (\$/AF)	\$725
Total Delivered Water Cost to SFPUC and SCVWD (\$/AF)	\$1,795
Scenario 2: East Contra Costa, CCWD License with No POU Change (10 mgd Plant Capacity)	
Total Production Cost	\$1,070
Wheeling Cost to Zone 7 (\$/AF)	\$585
Zone 7 Intertie Costs (\$/AF)	\$160
Total Delivered Water Cost to Zone 7 (\$/AF)	\$1,815
Wheeling Cost to Hayward Intertie (\$/AF)	\$725
Total Delivered Water Cost to SFPUC and SCVWD (\$/AF)	1,795
Scenario 3: East Contra Costa, Antioch Water Right (POU and Point of Diversion Change) (up to 38 mgd Capacity) (not including cost and time associated with petition for water rights)	
Amortized Annual Capital Cost (\$/AF)	\$450
Annual O&M Costs (\$/AF)	\$475
Cost of Replacement Water/Water Rights Costs (\$/AF)	\$45
Total Production Cost	\$970
Wheeling Cost to Zone 7 (\$/AF)	\$585
Zone 7 Intertie Costs (\$/AF)	\$160
Total Delivered Water Cost to Zone 7 (\$/AF)	\$1,715
Wheeling Cost to Hayward Intertie (\$/AF)	\$725
Total Delivered Water Cost to SFPUC and SCVWD (\$/AF)	\$1,695

³ Marin Municipal Water District, Engineering Report, Seawater Desalination Pilot Program, January 2007

⁴ BARDP Pilot Testing at Mallard Slough, Pilot Plant Engineering Report, June 2010

⁵ Cost estimates in 2010 dollars.

Table 4. Unit Cost Estimate Summary, continued

Scenario	Cost Estimate ⁶
Scenario 4: Near Carquinez Bridge(20-40 MGD Plant Capacity)	
Capital Costs (\$ mil)	\$320 to \$611M
Amortized Annual Capital Cost (\$/AF)	\$890 to \$930
Annual O&M Costs (\$/AF)	\$600
Total Production Cost (Use \$900/AF as average capital cost)	\$1,500
Wheeling Cost to Zone 7 (\$/AF)	\$585
Zone 7 Intertie Costs (\$/AF)	\$160
Total Delivered Water Cost to Zone 7 (\$/AF)	\$2,245
Wheeling Cost to Hayward Intertie (\$/AF)	\$725
Total Delivered Water Cost to SFPUC and SCVWD (\$/AF)	\$2,225
Scenario 5: Near Bay Bridge(20-40 mgd Plant Capacity)	
Capital Costs (\$ mil) ⁷	\$212 to \$394M
Amortized Annual Capital Cost (\$/AF)	\$575 to \$615
Annual O&M Costs (\$/AF)	\$600
Total Production Cost (Use \$600/AF as an average capital cost)	\$1,200
<i>No water delivered to Zone 7 or CCWD under this scenario.</i>	
Wheeling Cost to Hayward Intertie (\$/AF)	\$725
Total Delivered Water Cost to SFPUC and SCVWD (\$/AF)	\$1,925

VI. NEXT STEPS

As stated at the outset, the analysis contained in this TM was prepared to assist the partners in better defining the project (facility size, location and needs) and enabling the partners to commit to the next phase(s).

Based on the information contained herein, and based on internal reviews of comparative water supplies and needs, the immediate action before **each partner** is to determine the following:

- Demand from the project (either direct, if applicable, or as a transfer)
- Frequency of demand (all-year water or 1 in 3 years, for example)

Based on the information gathered from the partners, additional scope, including the tasks described below, are proposed for the project. This next phase of work would be completed in approximately 18 months.

Tasks include:

- 1) Hydraulic modeling of EBMUD system and Los Vaqueros storage to identify rates of delivery, available capacity and associated costs;
- 2) Delta modeling incorporating sea level rise (CCWD Staff with review and coordination from an independent Technical Advisory Committee);
- 3) Carbon footprint analysis and integration of technological advances in desalination technology (SCVWD and Zone 7);

⁶ Cost estimates in 2010 dollars.

⁷ Includes cost for construction of a 15-mile pipeline.

- 4) Outreach to the public (3 meetings each in SF/South Bay and in the East Bay), 6-10 meetings with permitting agencies (SFPUC to lead).

To complete the tasks described above, the partners would enter into a Memorandum of Agreement (MOA) for this phase of work. Costs would be shared equally between the benefiting agencies. Assuming that all five partners continue to participate in the development of the project and that each partner intends to receive product water from the project, the cost to each partner for the proposed tasks would be \$200,000 plus in-kind contributions of legal counsel and staff participation.

The tasks outlined here would be precursors to a decision from each partner on whether or not to pursue the development of the full-scale project.

Given the long lead times for many of the tasks described above, and given the interdependence of the partners, the critical path item for the project is to determine the level of commitment from each partner before entering into the next phase (2011-2012).

Appendix A

Wagner and Bonsignore Water Rights Report

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TECHNICAL MEMORANDUM

**BRACKISH WATER VALUATION:
BAY AREA REGIONAL DESALINATION PROJECT**

October 28, 2010

Wagner&Bonsignore

Consulting Civil Engineers, A Corporation

2151 River Plaza Drive, Suite 100

Sacramento, CA 95833

(916) 441-6850

(916) 448-3866 fax

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TECHNICAL MEMORANDUM

**BRACKISH WATER VALUATION:
BAY AREA REGIONAL DESALINATION PROJECT**

I. INTRODUCTION

A. Project Scope

Pursuant to our work agreement executed on June 29, 2010, this Technical Memorandum identifies issues associated with obtaining a legal claim of right to a water source in eastern Contra Costa County to supply the proposed Bay Area Regional Desalination Project (BARDP). Wagner & Bonsignore Engineers' (WBE) work included identification of alternatives for securing a water supply, valuation methodologies and estimated costs associated with each alternative. We have relied on information obtained from the following sources for the preparation of this report.

- Bay Area Regional Desalination Project Partners
Information gathered during conference calls with and materials provided by representatives from the Bay Area Regional Desalination Project Partners (Partners) consisting of:
Contra Costa Water District (CCWD)
East Bay Municipal Utilities District (EBMUD)
San Francisco Public Utilities Commission (SFPUC)
Santa Clara Valley Water District (SCVWD)
Zone 7 Water Agency (Zone 7)
- Meeting with State Water Resources Control Board's Deputy Director and staff on June 17, 2010
- State Water Resources Control Board's electronic database system of appropriative water rights and claims of right http://www.waterboards.ca.gov/water_issues/programs/ewrims/
- Contra Costa Water District License 10514 and Permit 19856 (Applications 5941 and 27893, respectively)
- California Water Code and California Code of Regulations

B. California Appropriative Water Rights¹

California Water Code (CWC) Sections 1200-1201 states that surface water and subterranean streams flowing in known and definite channels are subject to the jurisdiction of the State Water Resources Control Board (SWRCB).

1200. Whenever the terms stream, lake or other body of water, or water occurs in relation to applications to appropriate water or permits or licenses issued pursuant to such applications, such term refers only to surface water, and to subterranean streams flowing through known and definite channels.

1201. All water flowing in any natural channel, excepting so far as it has been or is being applied to useful and beneficial purposes upon, or in so far as it is or may be reasonably needed for useful and beneficial purposes upon lands riparian thereto, or otherwise appropriated, is hereby declared to be public water of the State and subject to appropriation in accordance with the provisions of this code.

Since December 19, 1914, the appropriation of water in surface streams, the underflow of surface streams, and subterranean water flowing through known and definite channels have been governed by statutes enacted pursuant to the California Water Commission Act. The diversion of such water directly onto lands that are not riparian to the source, or for storage in a reservoir, requires an appropriative water right permit from the SWRCB. An appropriative water right Permit and License carries a priority in relation to other appropriative Permits and Licenses. The appropriator who is “first in time” is “first in right”. This means the senior user is entitled to the full amount of water specified under the right before junior appropriators may exercise their rights.

The SWRCB does not regulate pre-1914 rights (appropriative rights initiated prior to the enactment of the California Water Commission Act) or riparian rights. The only requirement imposed by the SWRCB for pre-1914 or riparian rights is that the diverter files a Statement of Water Diversion and Use with the SWRCB in accordance with CWC Sections 5100-5108.

¹ California has a dual system of surface water rights: appropriative and riparian. A riparian right may attach to land bordering a stream, lake, or pond, and has a higher priority than most appropriative rights. Riparian owners may use the natural flow of the stream directly for beneficial purposes on ‘riparian land’ without a water right permit. Based on the doctrine of riparian rights as historically defined by the courts, lands within municipalities generally do not meet all of the criteria for ‘riparian land’.

II. REVIEW OF EXISTING MATERIALS

A. State Water Resources Control Board's Electronic Database

The SWRCB maintains a database containing information on all water rights and claims of right on file. We reviewed the database to identify all existing rights filed on watercourses and estuaries in the region of the proposed BARDP including Carquinez Strait, San Francisco, San Pablo and Suisun Bays, and the Sacramento-San Joaquin Delta channels immediately east of the Suisun Bay. There are very few water rights on file in this area, likely due to the brackish nature of the water supply. CCWD holds a water right License and Permit for diversion from Mallard Slough near West Pittsburg. Below is a summary of those CCWD rights.

Contra Costa Water District - License 10514 (Application 5941)

Priority Date: June 13, 1928

Source: Mallard Slough

Amount: 39.3 cubic feet per second by direct diversion
3,780 acre-feet by storage

Season: January 1 through December 31

Limit: A maximum of 14,880 acre-feet can be taken from the source annually
A maximum of 13,690 acre-feet can be used for beneficial purposes annually

Place of Use: Within the ultimate water service area of Contra Costa Water District

Purpose: Municipal and industrial uses

Status: The License is in good standing with the SWRCB as all required Reports of Licensee have been timely filed. CCWD is diverting water under this right as water quality conditions allow. The annual amount of water diverted at Mallard Slough historically is shown in **Table II-1**. CCWD has not diverted the full face value amount allowed by this License since 1983.

Contra Costa Water District - Permit 19856 (Application 27893)

Priority Date: September 28, 1983 (*Permit Expired on December 1, 2000*)

Source: Mallard Slough

Amount: 39.3 cubic feet per second by direct diversion

Season: August 1 through December 31 (subject to certain seasonal limitations pursuant to Term 91 as discussed in Section IV.B. herein)

Limit: A maximum of 11,900 acre-feet can be taken from the source annually

Place of Use: Within the water service area of Contra Costa Water District

Purpose: Municipal and industrial uses

Status: Permit 19856 contains a term requiring that application of the water for the authorized uses shall be completed by December 1, 2000. The Permit is still valid until such time that the SWRCB inspects the project and requires that the Permittee either file a Petition for Extension of Time or accept a License for the amount of water that has been put to beneficial use as of December 1, 2000. Licensing of all or part of the right could result in a limitation being imposed on the amount of water that can ultimately be diverted under the right. The Permit

will remain in good standing with the SWRCB provided the Permittee continues to abide by all other Permit terms and conditions, continues to put water to beneficial use, pays all required SWRCB fees, and timely files the required Progress Reports by Permittee. CCWD is diverting water under this right as water quality conditions allow. The maximum use under this Permit for the past 23 years was 653 acre-feet in 1998 as stated in the Progress Report by Permittee on file.

East of Mallard Slough, there are a few other water rights and claims of right on file for diversions from the San Joaquin and Sacramento River channels. The locations of these other diversions are shown on **Figure 1** and are summarized below.

City of Antioch – Statement of Water Diversion and Use No. 9352

Year of First Use: 1850's (Statement filed on July 29, 1977)

Source: San Joaquin River *Amount:* 4,600 gallons per minute by direct diversion

Season: January 1 through December 31

Place of Use: City of Antioch *Purpose:* Municipal use

City of Antioch – Statement of Water Diversion and Use No. 15304

Year of First Use: Late 1800's (Statement filed on June 14, 2000)

Source: San Joaquin River *Amount:* 11,100 gallons per minute by direct diversion

Season: January 1 through December 31

Place of Use: City of Antioch *Purpose:* Municipal use

E.I. DuPont de Nemours & Company - License 674 (Application 3436)

Priority Date: May 23, 1923

Source: Suisun Bay *Amount:* 1.94 cubic feet per second by direct diversion

Season: March 1 through October 1

Limit: A maximum of 11,900 acre-feet can be taken from the source annually

Place of Use: 155 acres *Purpose:* Irrigation use

Forestar U.S.A. Real Estate Group, Inc. – Permit 19418 (Application 17001)

Priority Date: April 12, 1956

Source: San Joaquin River *Amount:* 38.68 cubic feet per second by direct diversion

Season: January 1 through December 31

Limit: A maximum of 28,000 acre-feet can be taken from the source annually

Purpose: Industrial use

Jersey Island Reclamation District 830 - License 1310 (Application 3768)

Priority Date: December 22, 1923

Source: Dutch, Taylor and Piper Sloughs, Dredger Cut, False and San Joaquin Rivers

Amount: 40.22 cubic feet per second by direct diversion

Season: March 1 through November 1

Limit: 19,625 acre-feet annually

Place of Use: 3,568 acres within Jersey Island RD 830 *Purpose:* Agricultural use

B. Meeting with State Water Resources Control Board's Staff

On June 17, 2010, representatives from several of the BARDP partners and WBE met with staff from the State Water Resources Control Board (SWRCB) to discuss water right permitting requirements associated with various proposed locations of the BARDP and to inquire as to what findings must be made by SWRCB for granting a Petition for Extension of Time on Permit 19856. Attending the meeting were the following people:

SWRCB: Deputy Director of Water Rights Victoria Whitney, Permitting Manager Steve Herrera and Permitting Supervisor Mathew McCarthy²
CCWD: Leah Orloff and Emily Corwin
SFPUC: Hasan Abdullah
Zone 7: Brad Ledesma
WBE: Nicholas Bonsignore and Paula Whealen

The question was posed as to what point the water in the region between the San Francisco Bay and the Delta would be considered subject to the SWRCB's permitting authority. Steve Herrera stated that the SWRCB has jurisdiction over water flowing in a natural channel and the issue of permitting jurisdiction would need to be addressed by their legal staff as there is no clear answer as to where permitting authority begins and ends in this region. Mr. Herrera stated that he believed the Carquinez Strait was potentially a natural channel for permitting purposes. He concurred that there were no diversions of record in their files for appropriations west of the CCWD Mallard Slough rights. He is aware there are actual water diversions being made west of this area, but surmised that they could be un-reported pre-1914 diversions or riparian claims of right.

Victoria Whitney agreed that the decision of permitting authority jurisdiction would be made by the SWRCB's legal department and added that at some point could be subject to a judicial decision. Ms. Whitney speculated that in her opinion anything west of the outlet from the Carquinez Strait to San Pablo Bay would likely not require a water right permit. A question was raised as to whether the quality of the water would have some bearing on the requirement for a water right permit. Steve Herrera said that water quality was not a factor as their authority is based strictly on channelized flow.

Ms. Orloff also asked about requirements to obtain approval for an extension of time on the expired CCWD water right Permit 19856. Ms. Whitney said that a petition for extension of time must demonstrate 'good cause' as to why water was not put to full beneficial use within the given time period. Good cause generally applies to conditions that have occurred prior to permit expiration and where the additional time would be needed to perfect water use for the project named in the original permit.³ However, Ms. Whitney provided some examples of recent

² Since the date of this meeting, Victoria Whitney has been re-assigned as Deputy Director of the Division of Water Quality and Steve Herrera has retired from the SWRCB.

³ A water right is considered 'perfected' when water has been diverted for the stated beneficial use and the use has been documented to the satisfaction of the SWRCB.

petitions being considered to accommodate a change to the originally proposed project. She offered that approval of these petitions might hinge on the fact that they were determined to be beneficial to the environment, such as conjunctive use programs.

The SWRCB currently has over 560 water right petitions and over 430 applications pending approval. The majority of the petitions and applications currently pending were filed more than five years ago. For fiscal year 2009-2010 (July 2009 through June 2010), only 2 time extension orders, 48 change orders, and 15 permits were granted as of the end of May 2010. Ms. Whitney stated that the time for processing water right actions depends on the adequacy of the information provided by the project proponent.

Ms. Whitney suggested that a letter be sent to her identifying the potential proposed project locations to request an opinion on whether a diversion at those locations would require an appropriative water right permit. It was suggested that any supporting documentation showing the regional topographic contours of the proposed locations be included in the request. The BARDP partners indicated that they would send such letter to Ms. Whitney.

III. STATE WATER RESOURCES CONTROL BOARD PROCESSES

Changes of certain Permit and License attributes can be made pursuant to the SWRCB petition process. Following is a discussion of the SWRCB process for approving petitions for modification of existing water right Licenses and Permits, and for approving an application for a new water right permit.

A. SWRCB Petition Process for Modification of Existing Rights

1) Petitions for Change on Existing Licenses and Permits

Certain attributes of an existing water right License or Permit can be modified pursuant to the SWRCB Petition process. Changes in the allowed place of use, purpose of use and, in some circumstances, point of diversion, can be made through the petition process. The petitioner must establish that the change would not initiate a new right nor injure any other legal user(s) of water.⁴

The petition process is initiated by filing a petition form, accompanying environmental information form and a map showing the location of the proposed change in place of use or point of diversion, if necessary. Upon acceptance of the Petition, the SWRCB will issue a public notice. During the 45-day notice period, the SWRCB will accept protests from anyone who believes that the proposed change would have an adverse affect on their prior vested rights, or that the proposed change is not within the SWRCB's jurisdiction, would not best conserve the

⁴ California Code of Regulations, Article 15, Section 791

public interest or public trust, would have an adverse environmental impact, or would be contrary to law.

2) Petitions for Extension of Time

As stated herein, when permits are granted they contain a term stating the date in which full beneficial use of water has to be made. If that date has passed and the project is not yet fully developed, a permit holder can file a petition to seek additional time in which to make full beneficial use of water. There are additional findings that must be made for approval of petitions for extension of time. California Code of Regulations (CCR) Title 23 Chapter 2 Article 20 requires a permittee to diligently pursue the development of the water project named in the permit. The SWRCB must make certain findings before an extension of time can be granted. CCR Section 844 provides specific guidance on the basis for granting an extension of time:

844. An extension of time within which to complete an application, to commence or complete construction work or apply water to full beneficial use will be granted only upon such conditions as the board determines to be in the public interest and upon a showing to the board's satisfaction that due diligence has been exercised, that failure to comply with previous time requirements has been occasioned by obstacles which could not reasonably be avoided, and that satisfactory progress will be made if an extension of time is granted. Lack of finances, occupation with other work, physical disability, and other conditions incident to the person and not to the enterprise will not generally be accepted as good cause for delay. The board may, in its discretion, require a hearing upon notice to the permittee and such other parties as the board may prescribe.

Projects that seek a petition for extension of time generally will involve an analysis of water availability similar to that which would be required to support a new application to appropriate water. CWC 1375(d) states the following as one of the prerequisites to the issuance of a water right permit:

1375. As prerequisite to the issuance of a permit to appropriate water the following facts must exist:

(d) There must be unappropriated water available to supply the applicant.

In recent years the SWRCB staff has interpreted CWC 1375(d) as being applicable to the unperfected amount of a permit for which a time extension has been requested, i.e. the action is considered a “reauthorization” of the unused portion of the right.

3) Environmental Review

The filing of a petition for change is generally considered a ‘project’ under the California Environmental Quality Act (CEQA). The responsibility for preparation of the environmental document is borne by the lead agency. Lead agency, public agency, and trustee agency are defined in the Public Resources Code (PRC) Sections 21067, 21063, and 21070, respectively, as follows:

21067: “Lead agency” means the public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect upon the environment.

21063: “Public agency” includes any state agency, board, or commission, any county, city and county, city, regional agency, public district, redevelopment agency, or other political subdivision.

21067: “Trustee agency” means a state agency that has jurisdiction by law over natural resources affected by a project, that are held in trust for the people of the State of California.

For water right petitions, the CEQA document primarily focuses on the potential impacts associated with the proposed change. However, depending upon the nature of protests received the scope of the CEQA review could be expanded to consider other aspects of the original project. The SWRCB will be a trustee agency for CEQA and will need to determine that the CEQA document is adequate for purposes of approving the water right petition.

4) Protests

State statutes require that a petitioner and protestant make a “good faith effort” to resolve a protest.⁵ In the event that a protest cannot be resolved by mutual agreement, and the petitioner and protestant have provided information requested by the SWRCB, the California Water Code allows for a hearing process by which to resolve the protest. The petitioner can request a hearing if they believe that further negotiations with the protestor would not be fruitful. There is no statutory time frame as to when a hearing can be scheduled as it is determined by the availability of a SWRCB hearing officer and their current calendar of scheduled hearings.

When CEQA review has been completed and all protests have been resolved, the SWRCB will issue an Order allowing the change under the License or Permit. The Order could include additional terms and conditions that were developed as part of the protest resolution process or that were necessary to avoid or mitigate any adverse impacts resulting from the change.

5) Timeline for Petition Processing

The California Water Code and applicable regulations provide few mandates and allow the SWRCB broad discretion with regard to the timeline for the processing of petitions and other water right actions. As discussed in our meeting with Ms. Whitney, the SWRCB presently has significant constraints on staff availability for processing petitions. Petitioners can aid the expeditious processing by providing information requested by the SWRCB in a timely manner. The process can also be expedited by requesting the SWRCB’s input early in the CEQA process and addressing the SWRCB concerns in the CEQA document. Depending on the time required for protest resolution (including a potential SWRCB hearing) and completion of CEQA review, the approval process for granting of a petition can range from *two to ten years*.

⁵ California Water Code Section 1703.4.

B. SWRCB Process for Granting a New Water Right Permit

1) Permit Process

The permit process is similar to the petition process and is initiated by submitting an application form, accompanying environmental information form, and map showing the proposed point of diversion and place of use. Upon acceptance of the application, the SWRCB will issue a public notice, commencing the 60-day period during which protests can be filed against the project described in the application.

2) Environmental Review

Filing of a new water right application is CEQA-actionable. The discussion in Section III. A. regarding environmental review for petitions is applicable to applications for a new water right permit.

3) Protest Resolution and Issuance of Permit

The discussion in Section III.A.4 for resolution of protests is also applicable to acquiring a new water right permit, the difference being when CEQA review has been completed and all protests have been resolved, the SWRCB will issue an Order allowing the issuance of a new Permit. The new Permit will include all terms and conditions that were developed as part of the protest resolution and/or that were necessary to avoid or mitigate any adverse impacts resulting from the change.

4) Timeline for Issuance of New Permit

As with the processing of petitions, the SWRCB has broad discretion with regard to the processing of applications. The approval process for granting of a permit can range from ***two to ten years***. As with the petition process, the application process may be aided by obtaining SWRCB's input early in the CEQA process.

IV. KEY ISSUES ASSOCIATED WITH ALTERNATIVES

We have identified the following four alternatives for securing a legal claim of right for the BARDP:

Alternative A - Modify CCWD's water right License for diversion from Mallard Slough

Alternative B - Modify CCWD's water right Permit for diversion from Mallard Slough

Alternative C - Acquire new water right permit for diversion of water

Alternative D - Utilize CCWD's water right License for use in CCWD's service area and serve BARDP via exchange through treated or untreated water interties and/or Delta

Alternatives A and B involve modification of CCWD's existing water right License and Permit and would require the SWRCB to issue an order approving the changes. Alternative C would require the SWRCB to issue a new water right permit. Alternative D would not require any changes to the existing CCWD License.

A fifth alternative would be to locate the proposed project intake at a location that would divert water not subject to the SWRCB's permitting authority. As discussed above, Ms. Whitney believes that any location west of the transition between the Carquinez Strait and San Pablo Bay would likely not require a water right permit (see **Figure 1**).

A. Alternative A – Petition CCWD's License 10514 for Change in Place of Use

As presently configured CCWD's License 10514 allows water diverted at Mallard Slough to be used for municipal and industrial purposes "Within the ultimate water service area of Contra Costa Water District as shown on map filed with the State Water Resources Control Board." The use of water outside of the place of use described in the license would require an Order by the SWRCB issued pursuant to the filing of a Petition for Change in Place of Use. Filing fees associated with a Petition for Change on this License are estimated to total about \$6,300.

1) Potential Protests Against Petition

It appears unlikely that protests would be filed against the change in place of use petition based on impacts to prior vested rights as there are no other water right-holders of record downstream of the Mallard Slough point of diversion. It is considered more likely that protests could be received on the basis of public interest/public trust/environmental impact concerns, as follows:

- Environmental impacts associated with infrastructure development necessary to divert and treat brackish water, and to convey and distribute potable water to the new place of use.

- Impacts to water quality and biological resources in the estuary due to increased diversion amounts relative to historic conditions.
- Impacts on the ability of the CVP/SWP to meet water quality standards in the estuary due to increased diversions relative to historic conditions.
- Growth inducing impacts due to increased diversion over historic conditions.

2) Potential Nonuse Issues

License 10514 allows for the diversion of up to 14,880 acre-feet and beneficial use of up to 13,690 acre-feet annually. However, CCWD has not diverted the maximum amount allowed in any one year since 1983.⁶ Since 1983, CCWD has pumped on average about 3,275 (see **Table II-1**) acre-feet at Mallard Slough and over the last five years (2005-09) has pumped an average of about 1,456 acre-feet. California law allows for the possible loss of a water right for non-use over a period of five years. California Water Code (CWC) 1240 and 1241 state the following in this regard:

1240. The appropriation must be for some useful or beneficial purpose, and when the appropriator or his successor in interest ceases to use it for such a purpose the right ceases.

1241. When the person entitled to the use of water fails to use beneficially all or any part of the water claimed by him, for which a right of use has vested, for the purpose for which it was appropriated or adjudicated, for a period of five years, such unused water may revert to the public and shall, if reverted, be regarded as unappropriated public water. Such reversion shall occur upon a finding by the board following notice to the permittee and a public hearing if requested by the permittee.

We understand that reduction in use in recent years has been due to water quality conditions, a series of dry years and pump station rehabilitation. While CCWD diversions during the past five years have been well below the Licensed amount, CCWD has indicated in the past ten years of its Reports of Licensee that it has saved water through conservation efforts and used recycled water in lieu of surface water. The amounts stated were not attributed solely to the Mallard Slough License, but to all of CCWD's appropriative rights. CWC Sections 1010 and 1011 allow an appropriative right to be maintained when recycled water is used in lieu of surface water or water is saved through conservation provided those amounts have been included in the Reports of Licensee. The pertinent portions of CWC Sections 1010 and 1011 state the following:

1010. (a) (1) The cessation of, or reduction in, the use of water under any existing right regardless of the basis of right, as the result of the use of recycled water, desalinated water, or water polluted by waste to a degree which unreasonably affects the water for other beneficial uses, is deemed equivalent to, and for purposes of maintaining any right shall be construed to constitute, a reasonable beneficial use of water to the extent and in the amount that the recycled,

⁶ Per monthly record of Mallard Slough Pumping Station provided by CCWD and 1996-98 Report of Licensee for License 10514 filed with the SWRCB.

desalinated, or polluted water is being used not exceeding, however, the amount of such reduction.

1010. (a) (5) The board may require any user of water who seeks the benefit of this section to file periodic reports describing the extent and amount of the use of recycled, desalinated, or polluted water. To the maximum extent possible, the reports shall be made a part of other reports required by the board relating to the use of water.

1011. (a) When any person entitled to the use of water under an appropriative right fails to use all or any part of the water because of water conservation efforts, any cessation or reduction in the use of the appropriated water shall be deemed equivalent to a reasonable beneficial use of water to the extent of the cessation or reduction in use. No forfeiture of the appropriative right to the water conserved shall occur upon the lapse of the forfeiture period applicable to water appropriated pursuant to the Water Commission Act or this code or the forfeiture period applicable to water appropriated prior to December 19, 1914. The board may require that any user of water who seeks the benefit of this section file periodic reports describing the extent and amount of the reduction in water use due to water conservation efforts. To the maximum extent possible, the reports shall be made a part of other reports required by the board relating to the use of water. Failure to file the reports shall deprive the user of water of the benefits of this section.

Because CCWD has reported conservation and recycled water use for all its water rights in the aggregate, it is uncertain whether full diversion and beneficial use under License 10514 could be justified absent an accounting of CCWD's operations under all of its water rights.

It is uncertain whether any potential protestors would raise the issue of non-use in support of a protest. It is also uncertain whether the SWRCB, in the absence of a protest asserting non-use, would on its own assert a reduction in the amount allowed under License 10514 in the course of processing a petition for change. In either case, as stated in CWC 1241 a reversion of water can only be made following a public hearing on the matter if so requested by the appropriator.

3) CEQA Compliance

As stated in Section III.A. herein, the filing of a petition for change is CEQA-actionable. We would expect that the CEQA document for the change petition would principally focus on potential impacts of infrastructure development necessary for the diversion, treatment, conveyance and distribution of water. It is also possible that CEQA review could be expanded to include issues raised in protests, i.e. potential water quality and terrestrial impacts to the estuary, impacts to the CVP/SWP in meeting water quality objectives, and growth inducing impacts associated with increased diversion relative to historical conditions.

4) Protest Resolution

Given that any protests filed against the proposed petition for change would likely be based on environmental concerns, the CEQA document potentially provides information that can lead to resolution of such protests. However, as stated in Section III.A., if protest resolution is not accomplished through negotiations, the Petitioner can request that the SWRCB hold a hearing to decide the matter.

5) Estimated Timeline for Approval of Petition

The time required for petition processing is highly variable due to the uncertainties associated with protest resolution and CEQA review, and completion of an SWRCB hearing, if necessary. Under a best-case scenario, issuance of a SWRCB Order could occur within two years of acceptance of a Petition. Meeting this timeline would require the petitioner to aid processing by coordinating the CEQA review with the SWRCB early in the process, working to resolve protests outside of a hearing, and providing all necessary information in a timely manner. However, as noted previously, many petitions presently before the SWRCB have been pending much longer than two years. In practice, problematic protests, required environmental studies, changes to the project during the course of CEQA review, and a formal hearing before the SWRCB can greatly impact the water right processing timeline. Further, legal challenges can be made against the SWRCB's Order following completion of the administrative process. Accordingly, it is recommended that for planning purposes a time period of up to 5 years should be assumed for completion of the petition process under Alternative A.

6) Estimated Cost for Petition Approval

In addition to filing fees mentioned in Section IV.A. above, the petitioner will necessarily incur costs associated with general interaction with the SWRCB staff throughout the course of the process, communications and negotiations with protestors for resolution of protests, coordination of CEQA with the water right petition process, and preparation for and participation in a hearing before the SWRCB (if necessary). The level of effort and associated expense is greatly dependent upon the number and nature of protests accepted by the SWRCB and the ability to negotiate resolution of protests to avoid a hearing. The actual cost is also dependent upon the extent of outside technical and legal services the petitioner retains to aid in the effort. Based on our recent contacts with other clients who have gone through similar petition processes, the cost to process a petition for Alternative A is estimated to range from about \$250,000 to \$300,000 (see **Table V-2**). Including required filing fees the total cost to process the petition is estimated to range from about \$256,000 to \$306,000, noting that this amount allows for a formal hearing before the SWRCB (if necessary), but is exclusive of any project planning and design activities, preparation of a CEQA document and any related environmental studies, and defense against any legal challenges that could be filed after conclusion of the administrative process.

B. Alternative B – Alternative A plus Petition CCWD’s Permit 19586 for Change in Place of Use and Extension of Time

This alternative proposes additional water supply by filing necessary petitions on Permit 19586 concurrent with the petition for Change in Place of Use for License 10514 as described in the Section IV.A.

Similar to License 10514, CCWD’s Permit 19586 allows water diverted at Mallard Slough to be used for municipal and industrial purposes “Within the water service area of Contra Costa Water District as shown on map filed with the State Water Resources Control Board.” The use of water outside of the place of use described in the permit would require the filing of a Petition for Change in Place of Use with the SWRCB and the issuance of a SWRCB Order allowing the change. In addition, because the period allowed for maximum diversion and beneficial use of water under Permit 19586 elapsed on December 1, 2000, and because very little water has been diverted and used under this permit historically (further discussion below), reliance on Permit 19586 to provide additional water supply would require the filing of a Petition for Extension of Time with the SWRCB and that an Order be issued granting the time extension. Filing fees associated with the various petitions for the License and Permit are estimated to total about \$12,700.

1) Petition for Extension of Time on Permit 19586

Permit 19586 allows for the direct diversion of 39.3 cfs at CCWD’s Mallard Slough intake during the period of August 1 to December 31 of each year. The maximum amount that may be diverted under Permit 19586 is 11,900 acre-feet. This rate and amount are additive to those under the License, thus in combination the two rights allow, subject to seasonal restrictions on Permit 19586, for the direct diversion of up to 78.6 cfs, diversion of up to 26,780 acre-feet annually, and beneficial use of up to 25,590 acre-feet annually.

Permit 19586 also contains SWRCB standard Term 91, which prohibits the diversion of water under the Permit when the Central Valley Project (CVP) or the State Water Project is required to release stored or foreign water to satisfy in-basin entitlements, including water quality objectives in the Delta. The SWRCB adds Term 91 to all new permits and to permits and licenses approved in the 1960’s or later when (1) the authorized diversion is for 1 cfs or more, or for 100 acre-feet (or more) per annum of storage within the Sacramento, Cosumnes, Mokelumne, Calaveras, or San Joaquin River Basins or the Sacramento-San Joaquin Delta, and (2) hydraulic continuity with the Delta exists, or is likely to exist, during the diversion season. Term 91 requires rightholders to forego diverting natural flow needed to meet the water quality objectives. During the periods of curtailment, right-holders must have an alternate supply of water.⁷ Typically curtailments occur during the months of June through September. Since 1984, there have only been four years (1995, 1998, 2005 and 2006) in which rights were not curtailed during

⁷ Alternate water supplies include contractual water, water diverted under claim of riparian rights or pre-1914 rights, or under permits or licenses not containing Term 91, or groundwater, provided that there is unappropriated water available.

the summer months. **Attachment 1** is a summary of the historical Water Diversion Curtailment periods under Term 91.

Based on information provided by CCWD, the diversion and use of water under Permit 19586 has been limited historically. CCWD indicated that water quality limitations were one of the reasons it reported diversions under Permit 19586 in only 3 months since 1987:

Year	Month	Amount (af)
1995	August	347
1998	August	214
1998	December	439

While CCWD has reported no diversion of surface water under Permit 19586 since December, 1998, the Progress Reports by Permittee filed for the years 2004-2009 indicate that water had been conserved and recycled water used in lieu of surface water. Section IV.A. of this report discusses the potential loss of a water right after five years of nonuse, and the parameters under which that right can be maintained through conservation efforts and the use of recycled water. The amounts stated on the Progress Reports By Permittee for conservation and recycled water use are not allocated solely to Permit 19586, but are stated as being under all of CCWD's appropriate rights.

Additionally, California Code of Regulations Title 23 Chapter 2 Article 20 sets forth provisions for diligence required in pursuing development of a water project allowed by a permit and requirements for granting extensions of time when the diversion and use of water allowed by a permit has not been completed by the beneficial use date. As noted in Section III.A.2 herein, CCR Section 844 provides specific guidance on the basis by which the SWRCB will grant an extension of time.

Based on our meeting with SWRCB staff on June 17, 2010, possible circumstances that may justify good cause for granting an extension of time could include aggressive conservation measures that caused demand to increase slower than what was originally contemplated when the permit was issued, and the population growth rate being slower than originally expected. Typically the project for which the time extension is proposed must conform to the project originally described in the application and permit, however, the State Water Board has granted exceptions to this policy in instances where the project proposed in the extension has overriding merits.⁸ It is uncertain whether the SWRCB would accept a petition for extension of time on Permit 19586. If not, then we expect that the SWRCB would inspect the project and grant a license for the maximum amount of water diverted in any one year during the most recent permit period. This means that the right would be capped at that maximum annual amount. Permit

⁸ A recent example is the SWRCB's consideration of petitions for extension of time on three permits held by the U.S. Bureau of Reclamation on the Santa Margarita River in San Diego County. The subject permits were originally granted in 1951, 1958, and 1965, respectively, and were for the construction of two large on-stream dams. Numerous time extensions have been granted over the years, but no facilities have been constructed and no water has been diverted. In late 2009 the Board voted to accept petitions for time extension for an alternative project involving conjunctive use of the Santa Margarita River groundwater basin. Those petitions were publically noticed in June 2010 and are currently being processed by the SWRCB.

19586 was issued in 1986 and the beneficial use date elapsed on December 1, 2000. Based on Progress Reports by Permittee filed by CCWD, the maximum amount of water used in any one year under this permit during that period was 653 acre-feet in 1998. It should be noted, however, that in the months in 1998 that CCWD reported diversions under Permit 19586 (August and December), CCWD reported no diversion under its more senior water right (License 10514). In general, the SWRCB accounts for diversion amounts in order of priority, that is, no diversion is counted under a junior right until the senior right has been fully satisfied. Accordingly, unless CCWD could justify conservation and/or in-lieu recycled water use for full diversion under License 10514 in August and December 1998, the amount reported for these months under Permit 19586 could be reallocated to the License, in which case no water would be considered to have been diverted under the Permit in 1998. The same holds true for the only other month that CCWD reports diversion under Permit 10586, August 1995.

If the SWRCB does accept a petition for extension of time, then we expect that processing will involve an analysis of water availability similar to that which would be required to support a new application to appropriate water (as described in Section III.A(2)).

If the SWRCB considers the action a “reauthorization” of the unused portion of the right, the amount of the reauthorization would range from 11,247 acre-feet to 11,900 acre-feet, depending upon whether the SWRCB would consider the maximum annual amount of water diverted under this permit (in 1998) to have been vested. Accordingly, we expect that a detailed hydrologic analysis will be required and that the analysis would be coordinated with the CEQA process as a means to evaluate potential environmental impacts and other public interests/public trust issues that might be raised by protests against the petition.

2) Notice of Petition and Bases of Protests

Certain protest issues could be “higher profile” for Alternative B due to the likelihood that the proposed project would involve diverting a much greater amount of water annually than has been diverted under both CCWD rights in recent years.

3) CEQA Compliance

Because Alternative B also involves a petition for extension of time on a permit that would be considered a reauthorization of all or most of the right, we expect that there would be heightened concerns over potential environmental impacts to the estuary than for Alternative A, which would require a more detailed evaluation of hydrologic and biological impacts in the CEQA document. Since Alternative B could be perceived as developing a new water supply, addressing concerns over potential growth-inducing impacts could also require a higher level of analysis and documentation.

4) Protest Resolution

As stated in Section IV.A., if protests are not resolved by negotiation between the parties, the petitioner can request a SWRCB hearing to resolve the matter.

5) Estimated Timeline for Approval of Petitions

The petition processing sequence for Alternative B would be similar to that for Alternative A, however, it is expected that additional time would be required to address potential issues raised by protestants (or by the SWRCB) with regard to water availability, and evaluation of environmental impacts would be more complex than for Alternative A. Accordingly, while it's possible that a petition could be processed in a shorter period of time, for planning purposes we recommend that a time frame of up to 10 years be assumed to account for the additional potential complexities associated with Alternative B.

6) Estimated Cost for Approval of Petitions

Due to the potential additional protest and environmental concerns associated with increased diversions under Alternative B, the estimated costs for petition processing would likely be greater than for Alternative A, and are estimated to be in the range of about \$300,000 to \$400,000 if the SWRCB accepts a petition for time extension for the full face value of Permit 19586 (see **Table V-2**). Including required filing fees the estimated total cost ranges from about \$313,000 to \$413,000. As with Alternative A, this value includes filing fees and allows for a formal hearing before the SWRCB (if necessary), but excludes project planning and design activities, preparation of a CEQA document and any related environmental studies, and post-administrative legal costs.

C. Alternative C – Acquire a New Water Right Permit

This Alternative involves the acquisition of a new appropriative water right permit for the BARDP. Possible reasons why a new permit might be necessary include:

- The Mallard Slough rights are limited to a combined rate of diversion of 78.6 cfs and maximum annual diversion amount of 26,780 acre-feet and maximum beneficial use amount of 25,590 acre-feet. Because none of these elements can be increased by petition, a project involving a higher rate of diversion or annual amount would require a new permit.
- While CCWD's License 10514 allows for a year-round diversion season, Permit 19586 is limited to a season of diversion of August 1 to December 31. A project requiring diversions outside of this season that are greater than that allowed under License 10514 would require a new permit.

- Assuming that the SWRCB considers the Carquinez Strait and Suisun Bay to be subject to its permitting authority, a project intake located anywhere within these water bodies other than the existing Mallard Slough intake could be considered the initiation of new right and hence require a new permit.

Based on discussions with BARDP partners, it was assumed that Alternative C would involve a new stand-alone permit for 40 MGD, equivalent to an annual amount of about 44,800 acre-feet. Filing fees for an application of this amount would total about \$456,000.⁹

1) Notice of Application and Bases of Protests

As with the filing of petitions in Alternatives A and B, a new application will be publicly noticed by the SWRCB following acceptance. It appears unlikely that protests would be filed based on impacts to prior vested rights as there are no other water right-holders of record downstream of the Mallard Slough point of diversion. It is considered more likely that protests could be received on the basis of public interest/public trust/environmental impact concerns. Potential bases for protests include the following:

- Environmental impacts associated with infrastructure development necessary to divert and treat brackish water, and to convey and distribute potable water to the new place of use.
- Impacts to water quality and biological resources in the estuary due to increased diversion amounts relative to historic conditions.
- Impacts on the ability of the CVP/SWP to meet water quality standards in the estuary due to increased diversions relative to historic conditions.
- Growth inducing impacts due to increased diversion over historic conditions.

2) Water Availability Analysis

As discussed in Section IV.B. above, the applicant will need to prepare a detailed hydrological analysis to show that there is water available to supply the project.

3) CEQA Compliance

The filing of a new water right application is CEQA-actionable. Our expectation is that the CEQA document for Alternative C would focus on the potential impacts of infrastructure. However, because Alternative C involves a new water diversion from the estuary, concerns over potential environmental impacts to the estuary could be relatively high profile and would likely require a detailed evaluation of potential hydrologic and biological impacts.

⁹ The filing fee for a new application is based on the SWRCB's fiscal year 2009-10 fee schedule and the following formula: Application fee = \$1,000 + \$15 per acre-foot greater than 10 acre-feet, or \$454,960, whichever is greater. An additional fee of \$850 to the Department of Fish & Game is due at the time the application is submitted.

4) Hearing and Issuance of Permit

The SWRCB will not issue a permit approving the proposed new diversion until CEQA has been completed and all protests have been resolved. The petitioner can request that the SWRCB hold a hearing to resolve any remaining protests.

5) Estimated Timeline for Approval of Application

The processing sequence for a new application is similar to that presented previously herein for petition processing for Alternative B, and we expect that concerns over water availability for Alternative C would be similar to, or perhaps greater than, that for Alternative B. Accordingly, while it is possible that a new application could be processed to permit in a shorter period of time, for planning purposes it is recommended that a time period of up to 10 years be allowed for Alternative C.

6) Estimated Cost for Application Processing

Due to the potential additional protest and environmental concerns associated with the increased supply proposed by a new application for appropriation, the estimated cost for processing an application to permit would likely be greater than for Alternatives A and B, and is estimated to be in the range of \$400,000 to \$500,000. Including required filing fees the estimated total cost associated with processing a new application under Alternative C is estimated to range from about \$856,000 to \$956,000. As with Alternatives A and B, this value includes filing fees and allows for a formal hearing before the SWRCB (if necessary), but excludes project planning and design activities, preparation of a CEQA document and any related environmental studies, and any post-administrative legal costs.

D. Alternative D – Utilize CCWD’s water right License for use in CCWD’s service area and serve BARDP via exchange through treated or untreated water interties and/or Delta

This alternative proposes the use of the CCWD License at Mallard Slough for use within CCWD’s service area only. In exchange, CCWD would provide the BARDP with treated or untreated water diverted pursuant to intertie agreements and/or from diversions from the Delta. Potential benefits / issues associated with this alternative are as follows:

Benefits:

- Would not require changes to any existing water rights or approval from SWRCB¹⁰
- Would allow for continued beneficial use under CCWD’s License

¹⁰ CCWD’s License 10514 was issued in 1975 and references a “map on file” for describing the licensed place of use. If the current place of use differs from the map then the filing of a petition for change in place of use with the SWRCB might be required. This requirement applies regardless of whether Alternative D is pursued.

- Shortened timeline for project implementation if only local approvals required for infrastructure development

Issues:

- Would require CEQA review of impacts resulting from changes in infrastructure
- CEQA review may require addressing potential growth inducing impacts associated with increased diversions under License.
- Challenge for non-use under CCWD License could be raised
- Would require water use agreements between CCWD and other BARDP partners

V. Valuation of Water Right Alternatives

A. Water Right Acquisition Expenses and Annual Water Right Fees

Direct costs associated with obtaining an Order to change an existing water right (Alternatives A and B) or acquiring a new water right Permit (Alternative C) are comprised of the following:

- Processing expenses generally consisting of technical and legal services (both in-house and outside) associated with preparing the application package, water availability analysis, coordination with SWRCB staff and the CEQA consultant, negotiation with protestants, and participation in a Hearing (if necessary).
- Filing fees.

Estimated initial expenses for each Alternative were discussed in the previous sections. **Table V-2** summarizes these expenses under the heading “Initial Direct Costs”.

Based on the SWRCB’s 2009-10 fiscal year fee schedule, the annual fee for permits and licenses is \$100 plus \$0.023 per each acre-foot greater than 10 acre-feet, based on the face value of the right. Annual fees for each Alternative are listed in **Table V-2**.

B. Value of Existing CCWD Rights

1) Value based on Past Utilization of License 10514

Alternative A involves the utilization of CCWD’s License 10514 by the BARDP. The utilization of this right would mean that a source of water supply that CCWD has relied upon in the past would no longer be available, and CCWD would need to obtain a replacement supply at some cost. Over the last 10 years (2000 to 2009) CCWD diverted on average 1,724 acre-feet at

Mallard Slough under License 10514 (see **Table II-1**); no water was diverted under Permit 19586 during this period. CCWD reports that its cost in 2009 to acquire replacement water from the CVP and associated energy costs for pumping and conveyance via the Contra Costa Canal was about \$50 per acre-foot.¹¹ Accordingly, CCWD would incur on average an annual cost of about \$86,200 to replace its Mallard Slough supply.

In addition, CCWD presently receives reimbursement from the California Department of Water Resources (DWR) to compensate for a decrease in water availability at Mallard Slough resulting from the development of the State Water Project (SWP) pursuant to water rights junior to License 10514. The basis for the reimbursement is set forth in a 1967 agreement between CCWD and DWR and is identified therein as the “water deficiency entitlement”.

The agreement indicates that absent the SWP there are on average 142 days during the water year when water quality (salinity) at CCWD’s Mallard Slough intake would be suitable for treatment to potable water standards. The median period of availability is indicated in the agreement to be from January 15 to June 6. The agreement states that salinity at the Mallard Slough intake will increase and the availability of usable water to CCWD will decrease with the development of the SWP, and CCWD will need to rely on alternative sources of water to meet future needs when salinity at Mallard Slough is too high. The decrease in water availability attributable to the SWP is the water deficiency entitlement (*E*), and the agreement provides the following formula for quantifying *E* on an annual basis:

$$E = ((142 - D)/3) \times ((R + P)/142)$$

where:

E = water deficiency entitlement in acre-feet;

D = number of days during year that usable river water is available at Mallard Slough;

R = total quantity of water in acre-feet diverted at Mallard Slough from 8:00 a.m. on January 15 to 8:00 a.m. on June 6;

P = total quantity of water in acre-feet purchased by CCWD and introduced into its facilities in the vicinity of Chenery Reservoir from 8:00 a.m. on January 15 to 8:00 a.m. on June 6.

Over the past 10 years (2000 to 2009), the water deficiency entitlement has averaged about 3,000 acre-feet per year.¹²

Reimbursement for the water supply deficiency is based on the following formula from the agreement:

$$M = E \times (C_w + C_e - \$4.90)$$

¹¹ Per personal communication with Jeff Quimby, CCWD.

¹² Personal communication with Jeff Quimby, CCWD.

where:

M = the amount in dollars to be paid by the State;

E = water deficiency entitlement in acre-feet;

C_w = the amount per acre-foot paid by CCWD for substitute water delivered to CCWD as stated in Section 5 of the agreement;

C_e = the average amount (if any) per acre-foot paid by CCWD for electric energy to transport substitute water from the point of delivery thereof to CCWD's facilities in the vicinity of Chenery reservoir.

In 2009, the reimbursement was about \$82 per acre-foot.¹³ Assuming this value is constant from year to year CCWD receives on average a reimbursement of about \$246,000 annually from DWR.

Based on the foregoing, the value of CCWD's License 10514 could be quantified as the sum of the additional expense incurred by CCWD to replace its current Mallard Slough supply, plus the DWR reimbursement that CCWD would potentially lose upon utilization of License 10514 by the BARDP. With reference to **Table V-3**, over the last 10 years (2000 to 2009) the annual combined amount ranges from about \$246,000 to about \$514,000, and averages about \$332,000.

2) Value of Unused Portion of License 10514

CCWD last diverted the full amount of License 10514 in 1983. The 5-year running average amount diverted from Mallard Slough has generally been on a downward trend since 1992 (see **Figure 2**), and CCWD has indicated that starting in 2006 it reduced pumping from Mallard Slough due to energy costs. Per **Table V-3**, the "unused" portion of CCWD's License 10514 during the 10-year period of 2000 to 2009 ranged from 6,529 to 11,880 acre-feet, and averaged 10,156 acre-feet.¹⁴ Because CCWD has exercised significantly less than its full entitlement under License 10514 for the past 26 years, the value of the unused portion of the right to CCWD is arguably zero. That said, the unused portion of the License would have some intrinsic value if the SWRCB were to approve a petition for change in place of use for the BARDP for the full face value of the right, or if CCWD planned to build a desalination facility at this site in the future. The value of this right to the BARDP could be quantified in several ways:

Method 1 - If CCWD's cost of \$50 per acre-foot for an alternative water supply is commensurate with the cost of an alternative water supply for BARDP partners, the value of the unused portion of the License could be quantified as \$50 times the annual unused portion of the License in acre-feet. Per **Table V-3**, over the past 10 years, the value would range from about \$326,000 to \$594,000, and average about \$508,000.

¹³ Letter dated March 11, 2010 from CCWD to California Department of Water Resources.

¹⁴ The "unused" portion of License is assumed to be the face value of the License minus the sum of the amount actually diverted plus the average DWR water supply deficiency of 3,000 acre-feet.

Method 2 - If CCWD's unit cost of \$50 per acre-foot for an alternative supply is not applicable to the BARDP, the value of this right could be quantified as total cost of the next least-costly alternative minus the total cost associated with development of the BARDP to utilize the unused portion of the License. In order for Method 2 to be useful, the Alternative A project and the next least costly alternative must be defined in sufficient detail to allow a realistic comparison of total cost.

3) Range of Value of License 10514 per Method 1

The potential value of License 10514 is bounded on the low end based on the replacement cost of CCWD's average diversion over the last 10 years (2000 – 2009), plus the water supply deficiency reimbursement from DWR, and assuming no value to the unused portion of the License. Together with amortization of initial costs associated with a petition for change and annual water right fees, total annual cost for a face value of 14,880 acre-feet is estimated to be about \$349,000, equivalent to a unit an annual unit cost of about \$23.50 per acre-foot (see **Table V-2**).

The potential value of CCWD's License 10514 is bounded on the upper end by the assumption that, in addition to the foregoing value of water used and reimbursed, the unused portion of the licensed is valued at a unit cost of \$50 per acre-foot. On that basis the annual cost is about \$862,000, which for a face value of 14,880 acre-feet equates to an annual unit cost of about \$58 per acre-foot (see **Table V-2**).

4) Value of Permit 19586

Alternative B involves the utilization of CCWD's License 10514 and Permit 19586 by the BARDP. As stated previously, CCWD has not reported any diversions under Permit 19586 since December 1998. With reference to Sections III and IV of this report, there is a possibility that the SWRCB could refuse to accept a petition for extension of time for Permit 19586, in which case this right would likely be licensed for the maximum amount of water diverted under the permit during the permit period (653 acre-feet in 1998). Based on CCWD's reported cost of \$50 per acre-foot for replacement water, the value to CCWD of this permit would be about \$33,000 annually. For valuation purposes this scenario is identified as **Alternative B1** in **Table V-2**. Together with amortization of initial costs associated with a petitions for change and extension of time, and annual water right fees, the total annual cost is estimated to range from about \$382,000 to \$ 895,000, depending upon how the unused portion of License 10514 is valued (see previous section). For a face value of 15,533 acre-feet the annual unit cost ranges from about \$25 to \$58 per acre-foot (see **Table V-2**).

If the SWRCB accepts a petition for time extension on Permit 19586 and issues an Order granting the extension for the full face value of 11,900 acre-feet, the value of this right would be enhanced, however, the extent of the enhancement is a matter of perspective. Because CCWD has not diverted significant amounts of water under this right historically and presently does not rely on this right for water supply, its value to CCWD is arguably zero. That said, Permit 19586

would have some intrinsic value if the SWRCB were to approve petitions for change in place of use and extension of time for the BARDP, or if CCWD planned to build a desalination facility at this site in the future. The value of this right to the BARDP could be quantified based on Method 1 or Method 2 discussed in the preceding Section V.B.2), as follows:

Method 1 - If CCWD's cost of \$50 per acre-foot for an alternative water supply is commensurate with the cost of an alternative water supply for BARDP partners, the value of the unperfected portion of Permit 19586 could be quantified as $\$50/\text{af} \times (11,900 \text{ af} - 653 \text{ af}) = \$562,000$ annually. For valuation purpose this scenario is identified as **Alternative B2** in **Table V-2**. As shown, together with amortization of initial costs and annual water right fees, Alternative B2 has an estimated annual cost range of about \$948,000 to \$1,465,000 depending upon how the unused portion of License 10514 is valued. For a face value diversion amount of 26,780 acre-feet. The estimated annual unit cost for Alternative B2 ranges from about \$35 to \$55 per acre-foot.

Method 2 – Similar to the discussion above for valuing the unused portion of License 10514, the value of Alternative B2 using Method 2 would require that the project and the next least costly alternative be defined in sufficient detail to allow a realistic comparison of total cost.

C. Value of New Water Right Permit

Estimated initial and annual costs associated with obtaining a new water right permit (Alternative C) are included **Table V-2**. Alternative C, which has a face value diversion amount of about 44,800 acre-feet, has an estimated initial cost ranging from about \$856,000 to \$956,000, and an estimated total annual cost ranging from about \$56,000 to \$70,000. The estimated annual unit cost ranges from \$1.26 to \$1.56 per acre-foot. This estimated unit cost range is only about 4 to 6 percent of the estimated unit costs for Alternatives A and B, however, the relative value of Alternative C should not be compared to Alternatives A and B absent consideration of all costs associated with implementation of each alternative, including infrastructure, and operation and maintenance costs.

IV. SUMMARY

This Technical Memorandum evaluated alternatives for utilizing existing water rights held by Contra Costa Water District (CCWD) for diversions from Mallard Slough for a proposed regional desalination project known as the Bay Area Regional Desalination Project (BARDP). The BARDP could include participation by any or all of the following water agencies in addition to CCWD: East Bay Municipal Utilities District (EBMUD), San Francisco Public Utilities Commission (SFPUC), Santa Clara Valley Water District (SCVWD), and Zone 7 Water Agency (Zone 7).

CCWD's License 10514 allows for the diversion of up to 14,880 acre-feet and the beneficial use of up to 13,690 acre-feet annually, subject to terms. CCWD's Permit 19586

allows for the seasonal diversion of up to 11,900 acre-feet, subject to terms. Four alternatives were considered for utilizing either or both rights for the BARDP:

Alternative	Face Value of Water Right (af)	Timeline Estimate	Estimated Initial Direct Cost
A: Petition Place of Use Change of CCWD License (to partners or JPA)	14,880	2-5 years	\$260,000 -\$310,000
B: Petition Place of Use Change of CCWD License and Permit, Plus Time Extension on CCWD Permit	15,333 to 26780	2-10 years	\$315,000 -\$415,000
C: New Water Right Permit	44,800	2-10 years	\$860,000 -\$960,000
D: CCWD Sole Utilization of Desalinated Water, Other BARDP Partners Served by Exchange or Intertie	14,880	Not Estimated	Not Estimated

All of the Alternatives include certain unknowns that are the basis for the rather wide range of timeline estimates and the ranges of estimated initial direct costs. These unknowns include:

- Uncertainties with regard to how recent non-use of water under License 10514 and Permit 19586 will be viewed by the SWRCB or others in the course of processing petitions for change in place of use and, in the case of Permit 19586, a petition for extension of time (Alternatives A and B)
- Evaluation of water availability under a new water right Application (Alternative C);
- The nature of any protest that might be received upon public notice of petitions or new application by the SWRCB (Alternatives A, B and C); and
- The nature of comments that might be received upon circulation of a draft CEQA document by the lead agency (all Alternatives).

For Alternatives A and B, the evaluation of the annual cost of water rights, exclusive of all other project-related expenses, considered amortization of initial direct costs for petition/application processing, annual water right fees, and compensation to CCWD for utilization of its licensed and permitted rights for the BARDP. The evaluation resulted in an estimated range in annual unit cost of \$23 to \$58 per acre-foot, dependent upon the face value of the amount of water utilized (between 14,880 and 26,780 acre-feet annually) and how CCWD's License and Permit are valued.

For Alternative C, the annualized cost of processing a new water right application having a face value of 44,800 acre-feet (and exclusive of all other project-related expenses) was estimated to range from about \$56,000 to \$70,000, with the range in estimated cost attributable to uncertainties in processing expenses. These values equate to a unit annual cost of \$1.26 to \$1.56 per acre-foot of right.

* * * * *

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Bay Area Regional Desalination Project

TABLE II-1

**Historical Diversions from Mallard Slough by CCWD, Calendar Years 1969 - 2009
(all values in acre-feet)**

Calendar Year	Amount
1968	264 (part. year)
1969	11,789
1970	7,776
1971	12,624
1972	7,540
1973	10,720
1974	17,183
1975	13,778
1976	0
1977	0
1978	7,512
1979	4,633
1980	9,339
1981	4,184
1982	14,893
1983	18,871
1984	7,537
1985	157
1986	5,772
1987	68
1988	0
1989	1,437
1990	0
1991	537
1992	491
1993	6,292
1994	0
1995	9,044
1996	6,580
1997	2,479
1998	9,360
1999	2,570
2000	2,332
2001	499
2002	0
2003	5,351
2004	1,777
2005	5,033
2006	1,788
2007	0
2008	0
2009	458
Average 1969 -2009	5,132
Average 1983-2009	3,275
Average 2000- 2009	1,724
Average 2005 -2009	1,456

Source: CCWD, July 14, 2010

Bay Area Regional Desalination Project - Brackish Water Valuation
TABLE V-1 - Summary of Key Issues and Considerations

Alternative	Description	Face Value of Water Right	Key Issues and Considerations				
			Potential Obstacles	Timeline ¹	Filing Fees ²	Estimated Water Right Processing Costs ³	
A	Petition for Change in Place of Use for CCWD's License 10514 (Application 5941)	Max taken from source = 14,880 af	Potential reduction in licensed based on historical use.	2 to 5 years	SWRCB fee	\$ 5,461	\$250,000 to \$300,000
		Max beneficial use = 13,690 af	Protests alleging public interest/public trust/environmental concerns and growth inducing impacts.		DFG fee	850	
					Total	\$ 6,311	
B	Alternative A plus Petition for Change in Place and Petition for Extension of Time for CCWD's Permit 19586 (Application 27893)	11,900 acre-feet	Reduction in permitted amount due to nonuse.	2 to 10 years	License Change	\$ 6,311	\$300,000 to \$400,000
		In combination with License 10514:	Water availability analysis required.		Permit Change	4,567	
		Max taken from source = 26,780 af	Subject to Term 91		Permit Extension	1,000	
		Max beneficial use = 25,590 af	Protests alleging public interest/public trust/environmental concerns and growth inducing impacts; higher level of CEQA documentation than for Alternative A.		DFG fee	850	
				Total	\$ 12,728		
C	File New Water Right Application	40 MGD = 44,800 af/year ⁴	Permit will be subject to Term 91	2 to 10 years	SWRCB fee	\$ 454,960	\$400,000 to \$500,000
			Water availability analysis required.		DFG fee	850	
			Protests alleging public interest/public trust/environmental concerns and growth inducing impacts. Protest resolution likely to be more problematic than for Alternatives A and B due to perceived development of new water supply.		Total	\$ 455,810	

Notes:

1. Timeline is for actions specific to water right petition or application processing, and is highly sensitive to the number and nature of protests received, CEQA documentation, and the possible need for a State Water Board Hearing.
2. SWRCB filing fees based on Fiscal Year 2009-10 Fee Schedule.
3. Estimated water right processing costs are exclusive of any project planning and design activities, and exclusive of preparation of a CEQA document and any related environmental studies.
4. Face Value for Alternative C is assumed.

Bay Area Regional Desalination Project - Brackish Water Valuation
TABLE V-2 - Annual Cost Comparison for Alternatives

Alternative	Face Value of Water Right (af)	Initial Direct Costs					Annual Cost								
		Filing fees	Processing Expense		Total Expense		Amortized Cost (per year) ¹		SWRCB fee ²	Value of CCWD Rights ³		Total Cost		Unit Cost (\$/af face value)	
			Low	High	Low	High	Low	High		Low	High	Low	High	Low	High
A	14,880	\$ 6,311	\$ 250,000	\$ 300,000	\$ 256,311	\$ 306,311	\$ (16,511)	\$ (22,038)	\$ 442	\$ 332,181	\$ 840,000	\$ 349,134	\$ 862,480	\$ 23.46	\$ 57.96
B1⁴	15,533	\$ 6,311	\$ 250,000	\$ 300,000	\$ 256,311	\$ 306,311	\$ (16,511)	\$ (22,038)	\$ 457	\$ 364,831	\$ 872,650	\$ 381,799	\$ 895,145	\$ 24.58	\$ 57.63
B2⁴	26,780	\$ 12,728	\$ 300,000	\$ 400,000	\$ 312,728	\$ 412,728	\$ (20,145)	\$ (29,694)	\$ 716	\$ 927,181	\$ 1,435,000	\$ 948,042	\$ 1,465,410	\$ 35.40	\$ 54.72
C	44,800	\$ 455,810	\$ 400,000	\$ 500,000	\$ 855,810	\$ 955,810	\$ (55,130)	\$ (68,767)	\$ 1,130	NA	NA	\$ 56,260	\$ 69,897	\$ 1.26	\$ 1.56

Notes:

1. Amortized cost assumptions:

Interest rate = 5.0%

Term = 30 years

Amortization period = monthly

2. Annual SWRCB fee based on 2009-10 fiscal year fee schedule. Annual fee = \$100 + \$0.023 per acre-foot face value greater than 10 acre-feet.

3. "Low" value based on 10-year valuation of CCWD's actual diversion under License 10514 and water supply deficiency reimbursement from DWR; "High" value adds unused portion of License 10514 at an assumed unit cost of \$50/acre-foot (see Table V-3). Value of CCWD's licensed right (Alternative A) based on 10-year valuation (2000-2009) - see Table V-3. Value of CCWD's licensed and permitted rights (Alternative B) based on Alternative A values plus an assumed value of \$50 per acre-foot for permitted amount of 653 af (Alternative B1) or 11,900 af (Alternative B2).

4. Alternative B1 assumes that SWRCB rejects the petition for extension of time for Permit 19586 and issues a license for 653 acre-feet. Alternative B2 assumes SWRCB grants an extension of time for the full face value of Permit 19586.

Bay Area Regional Desalination Project - Brackish Water Valuation
Table V-3 - Value of CCWD License 10514 based on 10-year Period, 2000-2009

Calendar Year	Mallard Slough Pumping		Water Deficiency Entitlement (WDE)		Subtotal Value	Subunit Value MS Pump + WDE (per af)	Unused License		Combined Total Value	Combined Unit Value
	Amount (af)	Replacement Cost ¹	Amount ² (af)	Cost ³			Amount (af)	Value ¹		
2000	2,331	\$ 116,539	3,000	\$ 246,000	\$ 362,539	\$ 68.0	9,549	\$ 477,461	\$ 840,000	\$ 56.5
2001	499	24,934	3,000	246,000	270,934	77.4	11,381	569,066	840,000	56.5
2002	0	-	3,000	246,000	246,000	82.0	11,880	594,000	840,000	56.5
2003	5,351	267,552	3,000	246,000	513,552	61.5	6,529	326,448	840,000	56.5
2004	1,777	88,836	3,000	246,000	334,836	70.1	10,103	505,164	840,000	56.5
2005	5,033	251,650	3,000	246,000	497,650	62.0	6,847	342,350	840,000	56.5
2006	1,788	89,400	3,000	246,000	335,400	70.1	10,092	504,600	840,000	56.5
2007	0	-	3,000	246,000	246,000	82.0	11,880	594,000	840,000	56.5
2008	0	-	3,000	246,000	246,000	82.0	11,880	594,000	840,000	56.5
2009	458	22,900	3,000	246,000	268,900	77.8	11,422	571,100	840,000	56.5
Average	1,724	\$ 86,181	3,000	\$ 246,000	\$ 332,181	\$ 73.3	10,156	\$ 507,819	\$ 840,000	\$ 56.5
Max	5,351	\$ 267,552	3,000	\$ 246,000	\$ 513,552	\$ 82.0	11,880	\$ 594,000	\$ 840,000	\$ 56.5
Min	0	\$ -	3,000	\$ 246,000	\$ 246,000	\$ 61.5	6,529	\$ 326,448	\$ 840,000	\$ 56.5

Notes:

1. Replacement Cost for Mallard Slough Pumping = \$50/acre-foot per CCWD.
2. Average Water Deficiency Entitlement from 2000 to 2009 = 3,000 acre-feet per CCWD.
3. DWR reimbursement for water deficiency entitlement = \$82/acre-foot per CCWD.

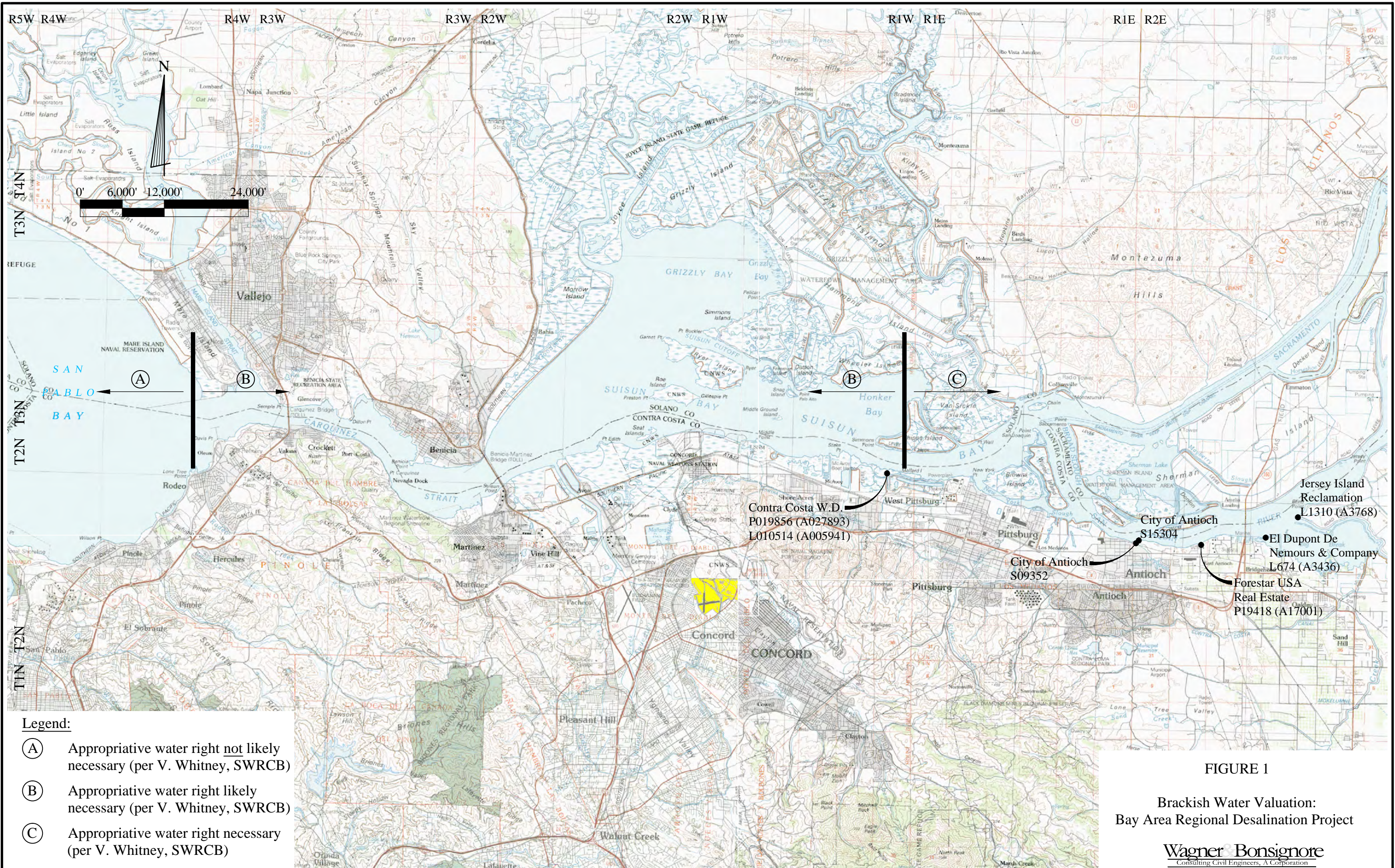


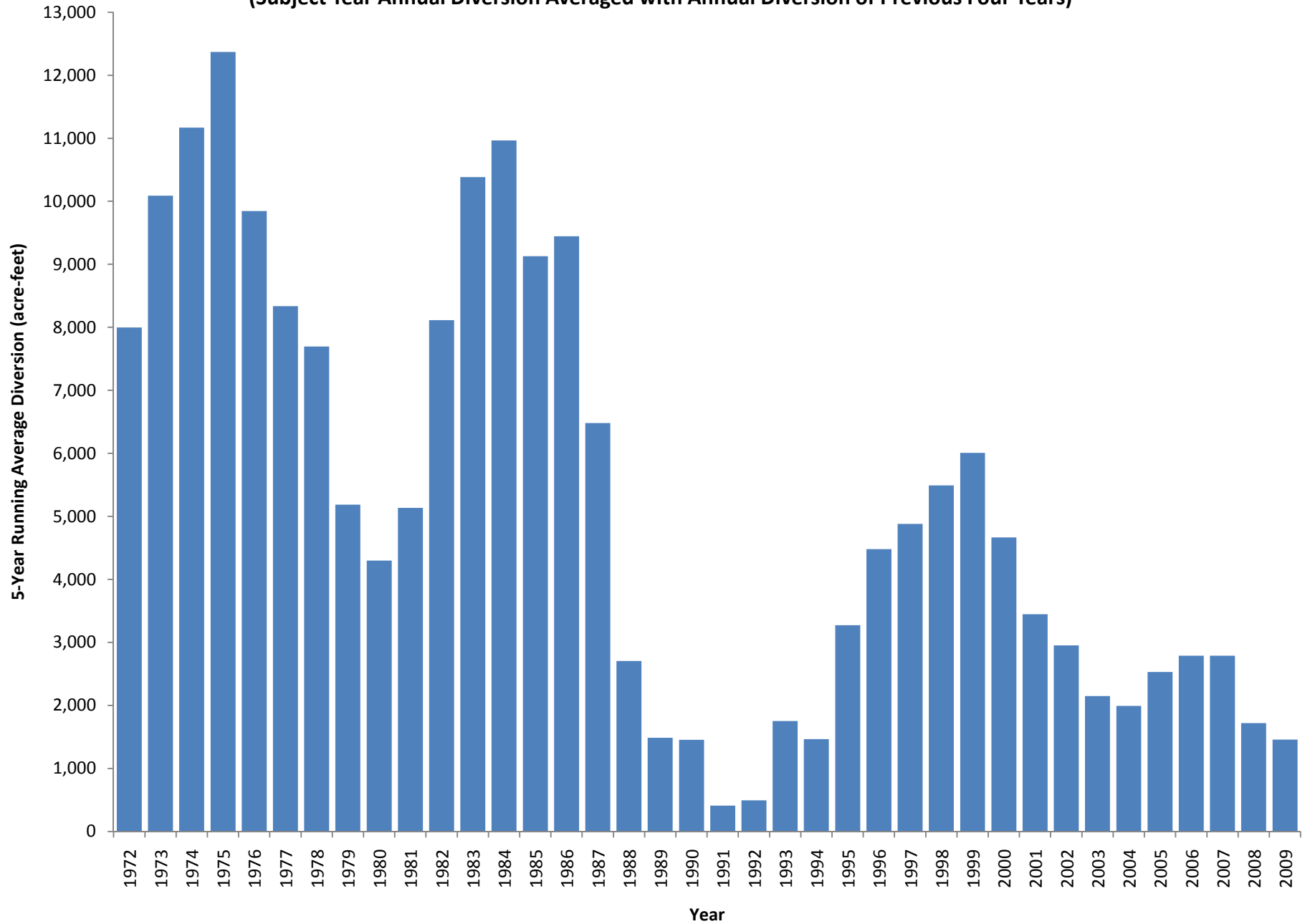
FIGURE 1

Brackish Water Valuation:
Bay Area Regional Desalination Project

Wagner Bonsignore
Consulting Civil Engineers, A Corporation

FIGURE 2 - Mallard Slough Annual Diversion 5-Year Running Average

(Subject Year Annual Diversion Averaged with Annual Diversion of Previous Four Years)



SUMMARY

Updated: June 10, 2009

**WATER DIVERSION CURTAILMENT DATES
SACRAMENTO-SAN JOAQUIN DELTA WATERSHED**

Year	Term 91	Term 93	Sacramento-San Joaquin Delta		Mokelumne River (also subject to Sacramento-San Joaquin Delta curtailments)	
			Appropriative	Riparian	Appropriative	Riparian
1984	6/22 - 8/31					
1985	5/17 - 8/31					
1986	7/2 - 8/6					
1987	5/12 - 8/31					
1988	6/21 - 8/31 (9/7)	4/5 - 8/31 (9/7)	7/7 - 9/7		7/7 - Unspecified	8/1 - Unspecified
1989	6/21 - 8/31					
1990	5/14 - 8/31	3/22 - 8/31	7/1 - 8/31		7/1 - 9/30	8/15 - 9/30
1991	6/10 - 8/31	7/10 - 8/31	7/1 - 8/31		7/1 - 8/31	
1992	5/21 - 11/15		6/1 - 8/31		6/1 - 8/31	
1993	7/27 - 8/31					
1994	6/15 - 8/31		7/1 - 8/31		7/1 - 8/31	
1995	None					
1996	7/22 - 8/20					
1997	6/18 - 8/24					
1998	None					
1999	6/29 - 8/18					
2000	6/28 - 8/17					
2001	6/4 - 8/31					
2002	6/17 - 8/31 & 10/10 - 11/15					
2003	7/3 - 8/31					
2004	5/29 - 8/31	6/15 - 8/31				
2005	None					
2006	None					
2007	5/15 - 8/31					
2008	6/2 - 8/31 & 9/1-11/15					
2009	6/11 - 8/31					

Notes: See Reverse

1. In 1988, the Term 91 and Term 93 water diversion curtailment notices specified an August 31, 1988 end-date. A subsequent water diversion curtailment notice dated July 7, 1988 to all appropriative right holders (including all Term 91 and 93 diverters) in the Sacramento-San Joaquin Delta watershed established a water diversion curtailment period that eventually extended to September 7, 1988 (except in the Mokelumne River watershed where the water diversion curtailment period was further extended to an unspecified date).
2. In 1988 and 1990, the Mokelumne River appropriative right holders (including a few Term 91 and 93 diverters) had their water diversion curtailment periods extended for an even longer period than appropriative right holders in other portions of the Sacramento-San Joaquin Delta watershed. In 1988, the curtailment end-date was not specified, so the water diversion curtailment likely continued through the irrigation season until normal rainfall resumed (mid-November?). In 1990, the end-date was September 30, 1990 in the Mokelumne River watershed while the end-date was August 31, 1990 throughout the rest of the Sacramento-San Joaquin Delta watershed.
3. Start dates shown are either: (1) the Notice Date or (2) the date established in the Notice, whichever is later. For example, in 1990, the Mokelumne River riparian diverters were informed by Notice dated August 15, 1990 that the diversion curtailment period started two weeks earlier on August 1, 1990. Therefore, the date of the Notice, August 15, 1990, is displayed above.

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Appendix B

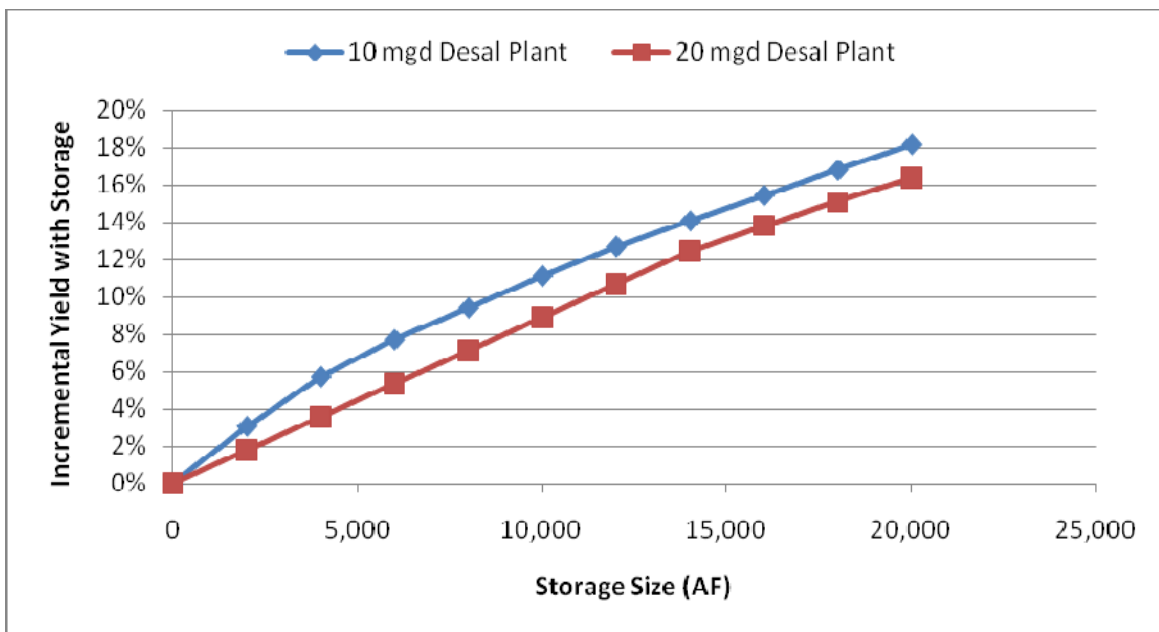
Projected Desalination Water Demand for Partner Agencies

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Including a storage component with the proposed desalination facility can potentially increase the yield of water from the project. The partners have identified available storage capacity within individual agency facilities, or alternatively the project could purchase shared storage in a facility such as CCWD’s expanded Los Vaqueros Reservoir. A spreadsheet analysis, using the combined demands from each agency was developed to estimate the potential increased yield from a desalination project created by including a storage component. The basis of this analysis is the historical demand for each of the five agencies as predicted for the period from 1922 to 2003, as presented in TM #1.

Figure B1 shows the predicted increased yield for a 10 or 20 mgd desalination facility with storage capacity of 2,000 to 20,000 acre-feet. For example, for a 10 mgd facility an additional 10,000 acre-feet of storage increases plant yield by approximately 11%.

Figure B1. Projected Desalination Water Demand for Partner Agencies



Other considerations to evaluate further include the potential reimbursement of treatment costs from CCWD to the partners, and triggering potentially higher water treatment requirements for EBMUD as CVP water is transferred into the Mokelumne Aqueduct. For this latter point, the transferring of CVP water to EBMUD’s Mokelumne Aqueduct will likely occur only in dry years, when EBMUD is receiving Freeport water with higher treatment requirements.

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APPENDIX C

Estimated cost for the use of the City of Antioch Water Rights for the Project

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Using a similar approach as applied in the Wagner and Bonsignore Water Rights report (Appendix A) to value CCWD's water rights at Mallard Slough, the partners estimated the cost to the City of Antioch (City) for reimbursement of water rights that could be used for the project. Key information for this analysis assumed the following:

- The 10-year average of City diversions from the San Joaquin River is approximately 6,500 AF/year;
- The City receives reimbursement for approximately 2,000AF/year through its settlement agreement with DWR;
- The cost for replacement water to the City is approximately \$537/AF, the cost of CCWD untreated water;
- The City's annual demand totals approximately 18,000 AF/year.

Given these assumptions, a range of approximate water right costs was developed. On the high end, a desalination project could use the entire 18,000 AF available to the City and receive \$537/AF for reimbursement of that entire water supply. That is, if the project used all of the City's supply, the City would need to buy replacement water from CCWD at a cost of \$537/AF. On the low end, the City could retain use of its current river supply of 6,500 AF/year and provide the remaining 11,500 AF/year to a desalination project. In exchange the partners could reimburse the City for the money lost through the settlement agreement with DWR, approximately \$1,074,000 (2,000 AF multiplied by the cost of replacement water, \$537/AF). This translates to \$93/AF for 11,500 AF of water. For planning purposes the estimate of reimbursement to the City for use of their water is between these high and low reimbursement scenarios \$95/AF to \$540/AF.

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APPENDIX D

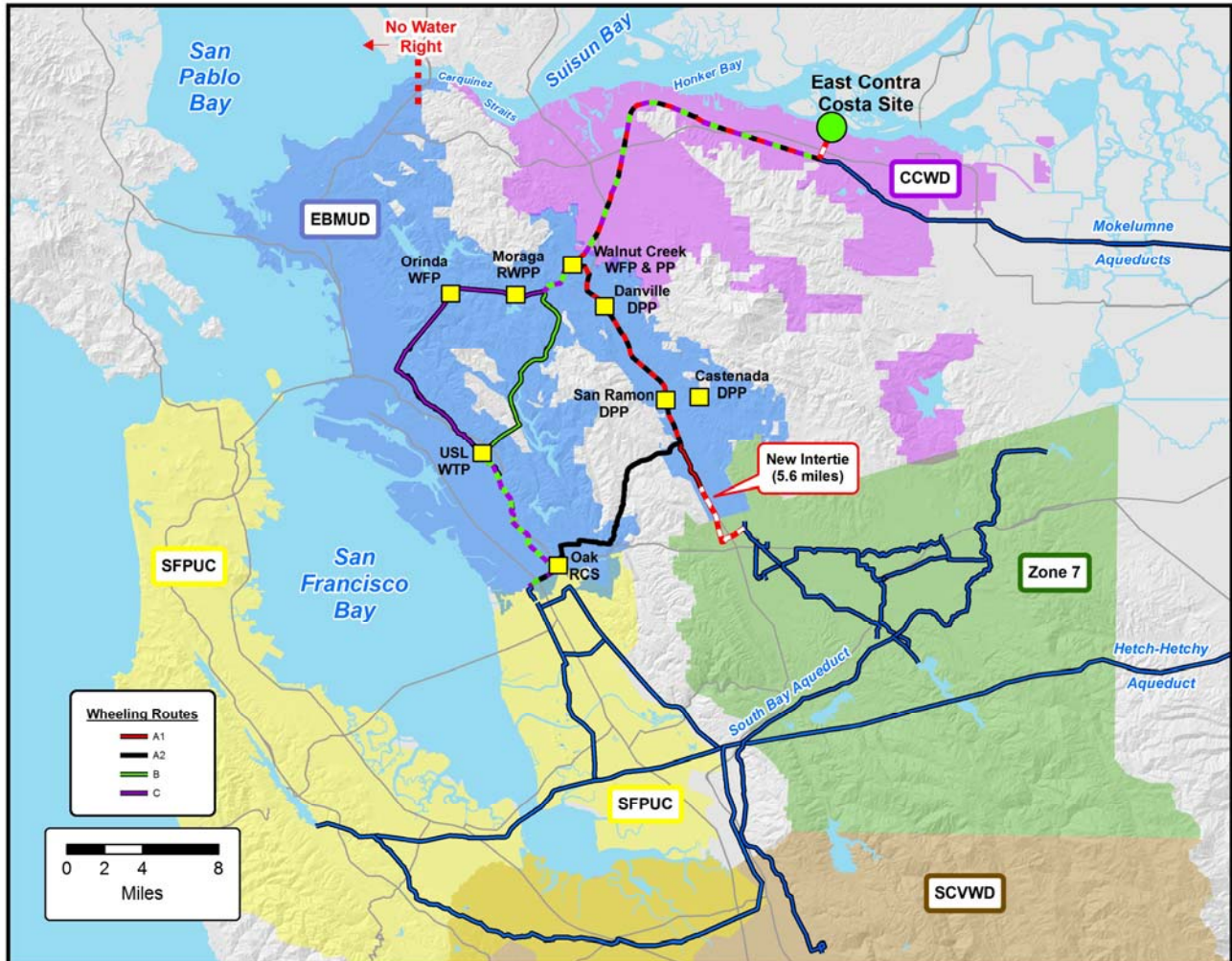
WATER WHEELING COST AND WATER LOSS ESTIMATE

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Wheeling Scenarios Using EBMUD System

Desalinated water produced in East Contra Costa County will need to be wheeled through the EBMUD water transmission and distribution system to convey it to EBMUD, Zone 7, SFPUC, and SCVWD. Figure A-1 shows the potential water wheeling routes.

Figure A-1: Water Wheeling Scenarios



Notes: RCS – Rate Control Station; RWPP – Raw water pumping plant; DPP – Distribution pumping plant, WTP – Water treatment plant

EBMUD staff conducted a preliminary evaluation using its system for wheeling desalinated water to the partner agencies. The preliminary evaluation is based on the following assumptions and limitations:

Variable O&M costs estimates are based on energy, chemicals, sludge disposal, Water Treatment and Distribution Division [WTD] labor).

- Fixed O&M costs are based on Table A-1. In the future, additional analysis or estimates based on other negotiated principles may be required.
- Capital recovery estimates for existing and new facilities are not included.

- Estimates are based on preliminary (spreadsheet mass balance type) analysis. Detailed analysis is needed to confirm and plan for future phases.
- Analysis is based on projected 2020 demands and current level of facilities.
All water supplied from Upper San Leandro water treatment plant is pumped through Moraga pumping plant (Route B) during summer. Water pumped through Routes A1 & A2 or C will result in different cost estimate (potentially lower since these routes do not include Moraga raw water pumping or conventional and more expensive treatment).

Table A-1: Variable O&M Cost Estimate for Wheeling Water

Agency/Intertie	Avg. Annual Capacity (MGD)	Route	Estimate Costs (per AF)	Total Costs (per AF)
Zone 7: Newly installed intertie in San Ramon	10	Route A1	Raw Water Pumping - \$55 Treatment - \$25 Treated Water Pumping - \$90 WTD Labor - \$72 Overhead Costs - \$36	\$275
SCVWD/SFPUC: Hayward Intertie (HI)	19	Combination of Routes A2, B and C	Raw Water Pumping - \$140 Treatment - \$60 Treated Water Pumping - \$35 Hayward Intertie Cost - \$55 WTD Labor - \$72 Overhead Costs - \$54	\$415

EBMUD has not routinely wheeled water for other agencies and is in the process of developing principles for wheeling cost reimbursements. Table A-2 below provides a summary of fixed cost reimbursements.

- Three operating divisions under Operation and Maintenance Department (OMD) Facilities Maintenance and Construction (FMC), Distribution Maintenance and Construction (DMC) operating costs and Aqueduct Section are directly involved in water wheeling. The Annual Operating Budget of these division minus the variable costs (WTD Division Labor, Energy, Chemical and Sludge costs, already accounted for in Table A-1) were divided by the annual water (acre-feet) supplied by EBMUD to estimate the fixed unit costs. EBMUD overhead (in the range of 15%) was then added to the unit costs.

An alternate option of developing a more focused fixed unit cost estimate based on labor, operation, repair and maintenance cost estimates of individual facilities for water wheeling can be used. This cost estimating option will require additional EBMUD resources which are not currently available. This estimate may be conducted during the first part of 2011.

Table A-2: Fixed Costs Estimates for Wheeling Water

Note: Includes 15% overhead surcharge.

Agency/Intertie	Avg. Annual Capacity (MGD)	Estimate Costs (per AF)
Zone 7: Newly installed intertie in San Ramon	10	\$310
SCVWD/SFPUC: Hayward Intertie	19	\$310

Currently, Zone 7 and EBMUD do not have an adequately sized (10 mgd) capacity intertie. A new intertie would need to be constructed to wheel water. Based on preliminary analysis, a new intertie of 24-inch diameter pipeline (5.6 miles in length) with no pumping plant would cost approximately \$35M. On a per acre-foot basis, it is estimated that the amortized capital cost of the intertie would be approximately \$160/AF.

Table A-3: Total Costs Estimates for Wheeling Water (Does not include the Desalination Plant)

Agency/Intertie	Unit Costs (per AF)	Total Costs (per AF)
Zone 7: Newly installed intertie in San Ramon	Variable cost - \$275 Fixed costs - \$310 Intertie Costs - \$160	\$745
SCVWD/SFPUC: Hayward Intertie	Variable cost - \$415 Fixed costs - \$310	\$725

Based on 2020 EBMUD demands, preliminary analysis indicated that it is feasible to wheel 10 MGD to Zone 7 during average demands. Using 97th percentile demand (highest demand day of the month), there may be restrictions in the month of July. Additional modeling is necessary to project beyond 2020 and evaluate the restrictions during July in detail. The preliminary analysis indicates that the EBMUD-SFPUC Intertie has a maximum available capacity of 19 mgd to serve any downstream needs (SFPUC, SCVWD or other).

Further hydraulic modeling is required to better understand conveyance limitations through EBMUD's system, conveyance through the EBMUD-SFPUC Intertie, and requirements for conveying water to Zone 7 through a new intertie. After 2020, this capacity may be further limited by increasing demands in EBMUD's service area. If capacity is insufficient, significant modifications to the existing infrastructure may be required. None have been anticipated at this time.

Principles of Estimating Wheeling Costs based on detailed hydraulic modeling

The wheeling cost estimates may be refined further based on the detailed hydraulic modeling. Cost estimates may be based on certain principles as follows:

- An agency incurring costs (capital improvements, variable and fixed O&M costs) for the benefit of another agency (such as wheeling water) will be fully reimbursed;
- The costs will be estimated based on all costs associated with the facilities used for wheeling the water. These costs may include required capital improvements costs for the benefit of wheeling water, proportionate variable and fixed O&M costs, proportionate facilities rehabilitation costs;
- Wheel water for regional desalination partner agencies using EBMUD facilities when capacity is available;
- Wheel water in an efficient manner to minimize costs and disruption of normal operations while maintaining operational flexibility;
- Track and recover all appropriate costs incurred by EBMUD for wheeling of water;
- A capital cost component would be assessed, based on negotiations with the partner agencies, to reflect the cost of buy-in to the existing EBMUD system;
- The agency to whom water is being wheeled will pay for the cost of system improvements needed solely to wheel the water; and
- The agency to whom water is being wheeled will pay a proportionate share of relevant future system improvements and upkeep of facilities that are used for wheeling water.

Water Loss Estimate

Water losses occur as the desalination water is wheeled through the EBMUD system. The tables below estimate the required desalination plant production to provide 10 MGD to Zone 7 and 19 MGD to SFPUC/SCVWD (via the Hayward Intertie [HI]), assuming that water must be wheeled through every pipe in EBMUD's system. Additional modeling of EBMUD's system is required to further refine distribution losses, especially for new interties that connect to major transmission lines and by-pass the distribution system.

The tables below estimate the required desalination plant production to provide 10 MGD to Zone 7 and 19 MGD to SFPUC/SCVWD (via the Hayward IT).

**Table A-3: Water Loss Estimate Summary
Zone 7 (w/Zone 7 & HI Operation)**

Zone 7 (MGD)	Evaporation (1% @ USL) (MGD)	Aqueduct (0.04%) (MGD)	Treatment (0.15%) (MGD)	Distribution (9%) (MGD)	Est. Desal Production (MGD)
10	N/A	0.004	0.016	0.99	11

SFPUC/SCVWD (w/Zone 7 and HI Operation)

EAST OF HILLS					
SFPUC/SCVWD (MGD)	Evaporation (1% @ USL) (MGD)	Aqueduct (0.04%) (MGD)	Treatment (0.15%) (MGD)	Distribution (9%) (MGD)	Est. Desal Production (MGD)
8	N/A	0.004	0.013	0.79	8.8
WEST OF HILLS					
	Evaporation (1% @ USL)	Aqueduct (0.04%) (MGD)	Treatment (1%) (MGD)	Distribution (13%) (MGD)	Est. Desal Production (MGD)
11	0.13	0.005	0.13	1.69	13
19					21.8

* Assumes 8 MGD delivered from EOH & 11 MGD delivered from WOH