

# Attachment 1

## MEMORANDUM



**To:** Richard Svindland, California American Water

**From:** Paul Findley, RBF Consulting

**Date:** January 7, 2013

**Subject:** Recommended Capacity for the Monterey Peninsula Water Supply Project (MPWSP) Desalination Plant

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### INTRODUCTION

The purpose of this memorandum is to develop the recommended design capacity for the desalination plant for the Monterey Peninsula Water Supply Project (MPWSP). This desalination plant will become the principal supply for CAW's system, replacing a major portion of the supply which comes from the Carmel River, and also a portion of the supply which is currently pumped from the Seaside Groundwater Basin (SGWB). The desalinated water supply will be supplemented by the ASR system, Sand City desalination plant, and reduced amounts from the Carmel River and SGWB. A Groundwater Replenishment (GWR) Project, which could deliver up to 3,500 AFY of replenishment water to the SGWB, could also be integrated into the MPWSP as an additional supply source. This analysis determines the capacity of the desalination plant that would be required both with and without the GWR Project.

### APPROACH

The desalination plant, in combination with other sources, must provide a reliable source of supply to meet demand such that CAW can reduce its diversions of Carmel River Water, and its pumping of the SGWB, to legal limits. The capacity of the plant must be sufficient to allow CAW to meet demand under all conditions. For example, the determination of plant capacity must consider:

- Requirements to return a portion of the desalinated water to Salinas Valley users;
- Variability and reliability of water available from the ASR system and SGWB;
- Reductions in plant production capacity caused by aging membranes;
- Variability of plant output caused by changes in feedwater temperature and salinity;
- The percentage of second pass needed to meet treated water quality objectives;
- Modular design of the RO process; and
- Standby capacity.

As a matter of practice, the rated capacity of a desalination plant is always stated in reference to the output (product water) of the plant, not the input (feedwater) to the plant. Also, the daily

rated capacity (the capacity of the plant in MGD) of the desalination plant typically does not include production modules that are installed as standby capacity. Standby capacity units are typically required to maintain production at rated capacity when production units are taken out of service for maintenance. In practice, these standby units provide a margin of safety for reliably meeting annual production targets, but they are not included in the determination of reliable capacity of the plant to meet peak day requirements. This memorandum assumes that one module of RO capacity will be provided as standby capacity, and this assumption was carried forward to the cost estimating technical memorandum prepared by RBF.

## HISTORICAL AND EXPECTED DEMAND

The Coastal Water Project FEIR addresses the supply and demand issue in Chapter 2, pages 2-9 and 2-10, as follows:

*As part of its analysis of existing demand, MPWMD reviewed actual monthly water use for water years 1996 to 2006, based on CalAm monthly production reports for its Carmel River and Seaside Basin Coastal Subarea sources, to determine the annual average quantity of water currently used by CalAm customers within MPWMD boundaries. Given the regular occurrence of drought periods on the Monterey Peninsula and the effect of weather on water demand, MPWMD also evaluated weather conditions during the years reviewed, which on average were wetter than normal, and developed demand estimates adjusted to reflect normal, dry, and critically dry conditions. The average annual unadjusted demand and weather-adjusted demand for the years reviewed are as follows (MPWMD, 2006a):*

- *Unadjusted Demand: 14,710 AF*
- *Normal-year demand: 15,095 AF*
- *Dry-year demand: 15,474 AF*
- *Critically-dry-year demand: 15,858 AF*

*MPWMD considers the critically-dry year values to provide a worst-case basis for assessing the effect of weather on water production during the analysis period and that the demand values adjusted to reflect critically dry conditions – rather than the unadjusted values, which do not account for the wetter-than-normal conditions during the period of analysis – should be used for water supply planning (MPWMD, 2006a). Table 2-3 shows the breakdown of unadjusted average annual demand and adjusted (by 7.8 percent) critically-dry year demand for the Carmel River system and Seaside Basin Coastal subarea. As shown, the unadjusted average annual production over this period is 14,710 afy, and adjusted critically dry year demand is 15,858. From these totals, MPWMD deducted the quantity of Seaside Basin and Carmel River water to which CalAm has an existing legal right based on the Seaside Basin adjudication and Order 95-10 (4,870 afy) to determine the replacement water supply needed to meet demand under the conditions reflected in the unadjusted and critically dry year scenarios. According to Order 95-10's determination of CalAm's legal right to Carmel River system water and MPWMD's calculation of CalAm's eventual legal right to Seaside Basin groundwater, Cal Am's combined rights from these sources would be 4,870 afy. As shown in Table 2-3, assuming critically-dry year demand for the two areas minus this estimate of CalAm's combined recognized water rights, MPWMD calculated that approximately 10,988 AF of replacement water would be needed to meet current demand in the areas served by these sources. More recently, the Seaside Basin Watermaster calculated*

*CalAm's rights to Seaside Basin groundwater for the basin as a whole (rather than by subbasin, as MPWMD had done) and determined that CalAm's eventual right to basin groundwater was 1,474 afy, a slight decrease from MPWMD's estimate of 1,494 afy. Based on this revised calculation, replacement water supply needed to meet critically dry year demand for the Carmel River System and Seaside Basin Coastal Subarea is 11,008 afy, as shown in Table 2-3.*

**TABLE 2-3  
SUMMARY OF AVERAGE ANNUAL PRODUCTION, WATER YEARS 1996-2006  
CARMEL RIVER AND SEASIDE BASIN COASTAL SUBAREA  
ADJUSTED FOR WEATHER CONDITIONS (afy<sup>a</sup>)**

	Unadjusted demand (average water year)	Critically-Dry-Year Demand
Carmel River System Demand	11,015	11,874
Seaside Basin Coastal Subarea Demand	3, 695	3,983
<b>Subtotal</b>	<b>14,710</b>	<b>15,858</b>
Minus Legal Water Rights to Carmel River System and Seaside Basin Water	4,870 <u>4,850</u>	4,870 <u>4,850</u>
<b>Total Replacement Water Needed</b>	<b>9,840 <u>9,860</u></b>	<b><del>10,988</del> <u>11,008</u></b>

NOTE: Numbers may not sum due to rounding.

<sup>a</sup> afy = acre-feet per year.

SOURCE: MPWMD, 2006a.

*According to information provided in a technical memorandum prepared subsequent to the CWP Draft EIR on changes to the DEIR Phase 1 Project (Appendix Q), CalAm's annual normal weather demand is approximately 15,270 afy. This estimate is similar to MPWMD's estimate shown above (between the estimates of normal and dry weather demand)."*

The FEIR's analysis was based on water demand data up through the year 2006; Table 1 shows total annual demand in CAW's Monterey system over the 5-year period from 2007 to 2011. Annual demand during this time period ranged from 11,989 AF to 14,644 AF, and averaged 13,291 AF. The maximum annual demand during this time period (14,644 AF in 2007) occurred before the economic downturn and before implementation of additional water conservation measures which were implemented in response to the Cease and Desist Order.

**Table 1  
CAW System Water Demand**

Year (Jan-Dec)	Total Annual Demand (AF)
2007	14,644
2008	14,460
2009	13,192
2010	12,171
2011	11,989
<b>5-Year Average</b>	<b>13,291</b>



Pebble Beach Development Company has invested in wastewater reclamation and switched the irrigation demand to reclaimed water system. The reclaimed water use for irrigation allowed Pebble Beach to conserve approximately 380 AF of potable water on an annual basis. Pebble Beach has exercised approximately 55 AF thus far and once CAW implements the desalination plant, Pebble Beach would exercise the remaining 325 AF for developing property. Therefore the full 325 AF is expected to be added to the CAW system demand. The Pebble Beach demand would follow a similar pattern to the existing system demand throughout the year.

Recent discussions in the region indicate that once the economy turns around and the water supply is available the tourism demand will increase approximately 500 AF. This demand is evenly distributed (100 AF/month) to a 5 month period from May through September.

The total water rights allocated to existing lots-of-record (LOR) in the CAW system is approximately 1,180 AF. Once the desalination plant is implemented, LOR demand would be exercised and increase the system demand by 1,180 AF. The LOR demand would follow a similar pattern to the existing system demand throughout the year.

CAW and Seaside Groundwater Basin Water Master has recently reached an agreement on the replenishment of the Seaside Basin water level. The agreement dictates CAW to reduce extraction from the SGWB by 700 AF of water annually on a 5-year average basis. The reduced annual extraction volume from SGWB would be 774 AF. This will not be treated as a “demand” in this technical memorandum. Instead, it will be treated as a reduction in supply.

The additional demands are summarized in the following table.

Table 2  
Total MPSWP Demand

Component	Annual Demand (AF)
System Demand	13,291
Pebble Beach	325
Tourism Bounce-Back	500
Lots-of-Record	1,180
Total	15,296

As it can be seen from Table 2, the total demand in the CAW system by adding all above-mentioned additional demands would be 15,296 AF on an annual basis.

**DESALINATION PLANT CAPACITY**

Utilizing 15,296 AFY as the expected demand, the desalination plant would be sized for a delivery capacity of 9,747 AFY (to CAW), as calculated below:

	15,296 AFY Demand
Less	3,376 AFY from Carmel River wells
Less	774 AFY from SGWB
Less	1,300 AFY Long-term average ASR capacity
Less	<u>94 AFY Firm-yield to CAW from Sand City Desalination Plant</u>
Total	9,752 AFY required from desalination plant

The desalination plant would also need to be sized to deliver an additional 875 AFY (approximately 8 percent of the total desalination plant production) of desalinated water to Salinas Valley users to offset the small amount of fresh water in the feedwater from the desalination plant's slanted coastal intake wells. In theory, the total of 10,627 AFY could be delivered by a desalination plant operating at an annual average of 9.5 MGD. However, RBF is recommending that the plant be designed for a rated capacity of 9.6 mgd for several practical reasons:

- The rated capacity of the plant will be set by the design engineer according to a certain set of assumed feedwater temperature and salinity conditions, and an assumed second pass percentage. The actual day-to-day and year-to-year production of the desalination plant will vary according to actual conditions. Furthermore, it is difficult to operate any facility, much less a desalination plant, at its full rated capacity 100 percent of the time. Any shortfalls in production that result from operations at less than annual average capacity must be matched by production from periods that the plant operates at more than the annual average rate. This will be addressed by the design engineer; however, some of these factors will not be known prior to construction of the plant, and the design assumptions that will be made will be conservative and approximate.
- The recommended module size for a 9.6 MGD desalination plant is 1.6 MGD (six 1.6 MGD duty modules plus one 1.6 MGD standby module). If GWR is implemented (see following discussion), the recommended capacity of the desalination plant is 6.4 MGD capacity, which can be achieved with four 1.6 MGD duty modules plus one 1.6 MGD standby module. Due to the timing of the decision on implementation of GWR, the current plan for design of the desalination plant is to prepare a design that can be bid as both capacities (6.4 MGD or 9.6 MGD), and then to delay the decision on which capacity to construct as long as possible to allow the GWR Project to be developed. Using the same size module for both desalination plant capacities would greatly facilitate implementation of this plan.
- The desalination plant needs to operate in conjunction with the other sources, including the ASR system. This conjunctive use strategy may require the desalination plant to

operate at a rate that is slightly higher than the average annual rate, particularly during late summer months as the SGWB supply approaches its annual limit.

If the GWR Project is implemented, CAW would receive 3,500 AFY of GWR water that would be injected in the GWR wells in the SGWB, and then extracted by new ASR wells. If this 3,500 AFY is also subtracted from the 15,291 AFY project delivery requirement (along with the assumed delivery of 6,244 AFY from the Carmel River ASR water, Carmel River direct delivery, SGWB, and Sand City Desalination Plant sources), the resulting required desalination plant delivery capacity (to CAW) would be approximately 6,300 AFY. However, it was assumed this desalination plant would also need to produce an additional 550 AFY (8 percent of plant production) to return to Salinas Valley users. This increases the total required annual production of the desalination plant to 6,850 AFY, which is an average of 6.1 MGD. As mentioned above, the rated capacity of the desalination plant with GWR would be 6.4 MGD, which would provide an additional 5% capacity, which would allow some flexibility if dry years occur in the early years of Project operation and if it is not possible to deliver 1,300 AFY of Carmel River ASR water.

## **ANALYSIS OF SUPPLY SOURCES**

Once the annual desalination plant production requirement was determined, an analysis was performed to check the adequacy of the desalination plant on a month-by-month basis. This detailed analysis, including all CAW supply sources and their average condition operations, is presented in Tables 2 and 3, and is described in this section in further detail.

### ***Demand***

The total demand used for the purposes is 15,296 AFY, as previously described. The percentage of annual demand that occurs in each month was developed based on analysis of recent CAW system demand data. These percentages were then applied against the assumed annual demand of 15,296 FY to develop the monthly demands that were used in the analysis.

### ***Carmel River***

It was assumed that the Carmel River production will be a long term annual average of 4,676 AFY. For purposes of analysis this total amount has been distributed over the 12-month period, and this distribution is very similar for the 9.6 MGD desalination plant scenario and the 6.4 MGD desalination scenario. It should be recognized that in the early years of project operation, the amount of Carmel River water available may be only 3,376 AFY, and the amount of Carmel River water that is delivered through the ASR may be significantly less than 1,300 AFY. In these years, additional supplies may be available from the SGWB and the Sand City Desalination Plant.

**Table 2 Monthly Analysis of 5.4 mgd Desalination Plant with GWR Project**

	Monthly Average Flow in MGD												Acre-feet
	D	J	F	M	A	M	J	J	A	S	O	N	Total for Year
<b>System Demand</b>	9.28	9.24	9.44	10.23	11.49	12.99	13.94	14.57	14.39	14.12	11.99	10.64	13,290
<b>Pebble Beach</b>	0.27	0.26	0.27	0.29	0.33	0.37	0.40	0.42	0.41	0.40	0.34	0.30	325
<b>Lots-of-Record</b>	0.78	0.78	0.80	0.86	0.97	1.09	1.17	1.23	1.21	1.19	1.01	0.90	1180
<b>Tourism</b>	0.00	0.00	0.00	0.00	0.00	1.07	1.07	1.07	1.07	1.07	0.00	0.00	500
<b>Desalination to Salinas Valley</b>	0.00	0.00	0.00	0.00	0.00	0.90	1.15	1.13	1.11	1.11	0.44	0.00	550
<b>Total Demand</b>	<b>10.32</b>	<b>10.28</b>	<b>10.50</b>	<b>11.39</b>	<b>12.79</b>	<b>16.42</b>	<b>17.73</b>	<b>18.41</b>	<b>18.19</b>	<b>17.89</b>	<b>13.78</b>	<b>11.84</b>	<b>15,840</b>
<b>System Supply:</b>													
Carmel River to System	2.39	2.34	2.57	1.77	0.63	2.18	1.00	1.00	1.00	1.00	1.00	1.00	1,671
Seaside Wells to System	0.00	0.00	0.00	0.00	1.00	1.10	1.10	1.10	1.10	1.10	1.10	0.64	774
Sand City to System	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	95
ASR Extraction to System	3.75	3.75	3.75	5.45	6.56	7.00	9.45	10.13	9.90	9.60	6.90	5.86	7,700
Desalination to System	4.10	4.10	4.10	4.08	4.51	5.17	4.95	4.97	4.99	4.99	4.26	4.26	5,100
<b>Total Supply to CAW System</b>	<b>10.33</b>	<b>10.28</b>	<b>10.51</b>	<b>11.39</b>	<b>12.79</b>	<b>15.54</b>	<b>16.59</b>	<b>17.29</b>	<b>17.08</b>	<b>16.78</b>	<b>13.35</b>	<b>11.85</b>	<b>15,300</b>
<b>Desalination Plant:</b>													
Desalination to System	4.10	4.10	4.10	4.08	4.51	5.17	4.95	4.97	4.99	4.99	4.26	4.26	5,101
Desalination to ASR	2.00	2.00	2.00	2.00	1.58	0.00	0.00	0.00	0.00	0.00	1.40	1.84	1,194
Desalination to Salinas Valley	0.00	0.00	0.00	0.00	0.00	0.90	1.15	1.13	1.11	1.11	0.44	0.00	550
<b>Total Desalination</b>	<b>6.10</b>	<b>6.10</b>	<b>6.10</b>	<b>6.08</b>	<b>6.09</b>	<b>6.07</b>	<b>6.10</b>	<b>6.10</b>	<b>6.10</b>	<b>6.10</b>	<b>6.10</b>	<b>6.10</b>	<b>6,845</b>
<b>Injection (to SGWB):</b>													
GWR	5.00	5.00	5.00	4.40	4.40	0.00	0.00	0.00	0.00	4.40	4.40	5.00	3,500
Carmel River	7.72	7.17	5.95	6.83	4.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3,008
Desalination	2.00	2.00	2.00	2.00	1.58	0.00	0.00	0.00	0.00	0.00	1.40	1.84	1,194
<b>Total Injection</b>													<b>7,700</b>

**Table 3 Monthly Analysis of 9.0 mgd Desalination Plant without GWR Project**

	Monthly Average Flow in MGD												Acre-feet
	D	J	F	M	A	M	J	J	A	S	O	N	Total for Year
<b>System Demand</b>	9.28	9.24	9.44	10.23	11.49	12.99	13.94	14.57	14.39	14.12	11.99	10.64	13,290
<b>Pebble Beach</b>	0.27	0.26	0.27	0.29	0.33	0.37	0.40	0.42	0.41	0.40	0.34	0.30	325
<b>Lots-of-Record</b>	0.78	0.78	0.80	0.86	0.97	1.09	1.17	1.23	1.21	1.19	1.01	0.90	1180
<b>Tourism</b>	0.00	0.00	0.00	0.00	0.00	1.07	1.07	1.07	1.07	1.07	0.00	0.00	500
<b>Desalination to Salinas Valley</b>	0.00	0.00	0.00	0.00	0.00	2.40	1.40	1.40	1.40	1.40	1.30	0.00	875
<b>Total Demand</b>	<b>10.32</b>	<b>10.28</b>	<b>10.50</b>	<b>11.39</b>	<b>12.79</b>	<b>17.92</b>	<b>17.98</b>	<b>18.68</b>	<b>18.48</b>	<b>18.18</b>	<b>14.64</b>	<b>11.84</b>	<b>16,170</b>
<b>System Supply:</b>													
Carmel River to System	6.01	5.93	5.22	5.73	5.12	2.18	1.00	1.00	1.00	1.00	1.00	1.00	3,376
Seaside Wells to System	0.00	0.00	0.00	0.00	0.95	1.13	1.13	1.13	1.13	1.13	1.13	0.50	774
Sand City to System	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	95
ASR Extraction to System	0.00	0.00	0.00	0.00	0.00	5.03	6.27	6.97	6.76	6.46	2.93	1.77	3,407
Desalination to System	4.23	4.26	5.20	5.57	6.63	7.10	8.10	8.10	8.10	8.10	8.20	8.49	7,685
<b>Total Supply to CAW System</b>	<b>10.33</b>	<b>10.28</b>	<b>10.51</b>	<b>11.39</b>	<b>12.79</b>	<b>15.53</b>	<b>16.59</b>	<b>17.29</b>	<b>17.08</b>	<b>16.78</b>	<b>13.35</b>	<b>11.85</b>	<b>15,337</b>
<b>Desalination Plant:</b>													
Desalination to System	4.23	4.26	5.20	5.57	6.63	7.10	8.10	8.10	8.10	8.10	8.20	8.49	7,685
Desalination to ASR	5.27	5.24	4.30	3.93	2.87	0.00	0.00	0.00	0.00	0.00	0.00	1.01	2,106
Desalination to Salinas Valley	0.0	0.0	0.0	0.0	0.00	2.40	1.40	1.40	1.40	1.40	1.30	0.00	880
<b>Total Desalination</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>9.50</b>	<b>10,671</b>
<b>Injection (to SGWB):</b>													
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Carmel River	4.10	3.78	3.30	2.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,300
Desalination	5.27	5.24	4.30	3.93	2.87	0.00	0.00	0.00	0.00	0.00	0.00	1.01	2,106
<b>Total Injection</b>													<b>3,406</b>

The analysis assumes that the 9.6 MGD and 6.4 MGD desalination options would use the 4,676 AF of Carmel River production differently. In the 9.6 MGD desalination plant project, 3,376 AF of Carmel River water would be diverted directly to the customers and the remaining 1,300 AF would be diverted to ASR injection. The river diversions are mostly concentrated during the winter months, December through May. A minimum maintenance diversion of 1.0 MGD has been assumed through BIRP in June through November.

In the 6.4 MGD desalination plant project, only 1,671 AFY would be diverted directly to customers, with 3,005 AF being injected at the GWR injection wells along with the GWR Project water. This injected water could be counted as dilution water if necessary for regulatory purposes; however, even if it is not necessary for regulatory purposes, the assumption is that it will be injected at the GWR injection wells in order to allow the ASR wells to operate throughout the year in the extraction mode. Similar to the 9.6 MGD desalination plant project, 1.0 MGD of Carmel River water would be produced during June through November in order to maintain BIRP operations throughout the year.

### ***Seaside Wells***

The capacity analysis has been performed for the year 2021. In year 2021, the SWGB adjudication would be in full effect and the extraction from the Seaside wells would be limited to 1,474 AF. However, as explained above, CAW recently agreed to leave 700 AF annually in the ground for replenishing Seaside groundwater levels and the total extraction has been reduced to 747 AF annually. For purposes of analysis, it was assumed that the Seaside wells are operated only during the months of April through November for both the 9.6 MGD and 6.4 MGD desalination plant alternative.

### ***Sand City Desalination Plant***

The Sand City desalination plant is assumed to operate at a constant 0.09 MGD throughout the year, totaling 94 AFY for both the 9.6 MGD and 6.4 MGD desalination plant projects.

### ***GWR Injection***

For the 6.4 MGD desalination plant project, 3,500 AFY of GWR Project water would be injected into GWR injection wells. The location and the configuration of the injection wells are yet to be determined, but do not affect the analysis. As previously discussed, it has also been assumed that 3,500 AFY of Carmel River water would be injected at the same GWR injection wells or at nearby new injection wells, even if this is not required to meet regulatory dilution requirements. It has been assumed that GWR water would be available for injection only during the 8-month period of September through April.

***ASR Extraction***

For the 9.6 MGD desalination plant project, the ASR extraction would be equal to the injected Carmel River water amount (1,300 AFY) plus the injected desalination water (which is 2,106 AFY in the analysis). The stored water would be extracted during the dry season, peaking in June, July and August.

For the 6.4 MGD desalination plant project, the ASR wells would be operated in extraction mode throughout the year to extract the injected GWR water along with the stored Carmel River water. The total volume of water extracted from the ASR wells would be equal to the sum of the injected GWR water (3,500 AFY) and the injected water from the Carmel River (3,000 AFY) plus the injected desalination water (1,194 AFY), totaling approximately 7,700 AF.

***Desalination Plant***

In the analysis, the average daily production of desalinated water for the CAW system for each month was determined by subtracting the total average daily production from the other sources from the average daily demand. The desalination plant production requirement was then increased to account for the annual amount of water to be returned to Salinas Valley during the 7-month irrigation season. The resulting average total desalinated water production requirements, shown in Tables 2 and 3, confirm the adequacy of the 6.4 MGD and 9.6 MGD size desalination plant sizes that were determined in the previously discussed annual analysis.

**RECOMMENDATION**

















































Based on the above analysis of annual and monthly delivery requirements, RBF recommends a rated capacity of 9.6 MGD for the MPWSP desalination plant. If the GWR project is implemented, with a delivery capacity of 3,500 AFY, RBF recommends a reduction of the rated capacity of the plant to 6.4 MGD. At either capacity, RBF recommends that the RO process at the plant be designed with 1.6 MGD modules, in order to accommodate development and integration of the GWR Project into the MPWSP, to preserve Project schedule, and to minimize design and construction costs for associated changes to the Project.

The Design Engineer for the plant will make the final recommendations regarding standby capacity; however, for the purposes of preparing Project capital cost estimates, RBF has assumed that one full 1.6 MGD RO module will be provided as standby capacity.

# Attachment 2



Revised Schedule for MPWSP

ID		Task Name	Duration	Start	Finish	2012 2013 2014 2015 2016 2017																							
						Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
1		CAW Project	1469 days?	Mon 4/23/12	Thu 12/7/17																								
2		File with CPUC	0 days	Mon 4/23/12	Mon 4/23/12																								
3		Permitting	709 days?	Mon 4/23/12	Thu 1/8/15																								
4		CPUC Approval	450 days	Mon 4/23/12	Fri 1/10/14																								
5		Pre-Application Activities	180 days?	Mon 4/23/12	Fri 12/28/12																								
6		Application Preparation and Submittal	173 days?	Mon 12/31/12	Wed 8/28/13																								
7		Permit Processing	300 days	Fri 11/15/13	Thu 1/8/15																								
8		Feedwater Test Well	669 days	Mon 4/23/12	Thu 11/13/14																								
9		Permitting	300 days	Mon 4/23/12	Fri 6/14/13																								
10		Site Acquisition	240 days	Mon 4/23/12	Fri 3/22/13																								
11		Design	90 days	Mon 3/25/13	Fri 7/26/13																								
12		Driller Procurement	30 days	Mon 7/29/13	Fri 9/6/13																								
13		Construction	90 days	Fri 11/1/13	Thu 3/6/14																								
14		Operation	180 days	Fri 3/7/14	Thu 11/13/14																								
15		DB Delivered Items	1224 days	Mon 4/1/13	Thu 12/7/17																								
16		DB Contract Procurement	154 days	Mon 4/1/13	Thu 10/31/13																								
17		Design / Construction / Startup	760 days	Fri 1/9/15	Thu 12/7/17																								
18		DBB Delivered Items	1191 days?	Mon 12/31/12	Mon 7/24/17																								
19		Design Contract Procurement	215 days?	Mon 12/31/12	Fri 10/25/13																								
20		Design	391 days?	Mon 1/13/14	Mon 7/13/15																								
21		Bid	30 days	Tue 7/14/15	Mon 8/24/15																								
22		Construction / Startup	500 days	Tue 8/25/15	Mon 7/24/17																								
23		Decision on GWR	0 days	Thu 10/1/15	Thu 10/1/15																								
24																													
25																													
26		GWR Project	1044 days	Fri 3/1/13	Wed 3/1/17																								
27		Environmental Permitting	320 days	Fri 3/1/13	Thu 5/22/14																								
28		Pilot Plant Testing & Develop Final Design	395 days	Mon 7/1/13	Fri 1/2/15																								
29		Final Design	340 days	Mon 3/3/14	Fri 6/19/15																								
30		Construction	523 days	Mon 3/2/15	Wed 3/1/17																								

Project: MPWSP Project High Level pe  
Date: Thu 1/10/13

Task



Milestone



External Tasks



Split



Summary



External Milestone



Progress



Project Summary



Deadline



# Attachment 3

## MEMORANDUM

**To:** Richard Svindland, California American Water

**From:** Paul Findley, RBF Consulting

**Date:** January 9, 2013

**Subject:** Monterey Peninsula Water Supply Project (MPWSP) Capital and O&M Cost

Estimate Update



### OBJECTIVE

The objective of this technical memorandum (TM) is to update the capital cost estimates for California American Water's (CAW) Monterey Peninsula Water Supply Project's (MPWSP, or Project) northern facilities and the operation and maintenance (O&M) cost estimates for the entire Project. The northern facilities of the MPWSP are the facilities formerly described as the Regional Facilities of the Monterey Bay Regional Desalination Project. Two possible sizes of desalination plant are discussed in this memorandum; a 6.4 MGD desalination plant that takes in to account a 3,500 AFY Groundwater Recharge (GWR) element provided by Monterey Regional Water Pollution Control Authority (MRWPCA); and a 9.6 MGD desalination plant, which would be implemented if the GWR element is not implemented. Project facilities are summarized here and described in more detail in the Project Description TM dated January 3, 2013, prepared by RBF Consulting.

These updated cost estimates are referenced in testimony provided by Richard Svindland of California American Water in the matter of the amended application of California American Water Company for a Certificate of Public Convenience and Necessity from California Public Utilities Commission.

### BACKGROUND

Previous capital cost estimating work by CAW on the Coastal Water Project includes a technical memorandum prepared by RBF Consulting (RBF) entitled *Updated Capital Cost Estimate for the Coastal Water Project, May 20, 2009*; which was appended to Mark Schubert's May 22, 2009 testimony. That report provided estimates for a 10 MGD desalination project located at Moss Landing, and an 11 MGD desalination plant located in North Marina.

A cost estimate was prepared by RMC Water for the Monterey Bay Regional Desalination Project (Regional Project), which included a 10 MGD desalination plant located in North Marina. This cost estimate was set forth in a table titled *Monterey Bay Regional Water Supply Project, Project Cost Comparison-(With Escalation to October 2012)*. From that reference, it is clear that the estimate is based on an assumption that all of the supply wells for the regional desalination plant are slant wells, and that the

costs are in October 2012 dollars. The capital costs for MCWD and MCWRA were also shown in Exhibit C of the Regional Project's Water Purchase Agreement, as follows:

Project Facilities Estimated Base Construction Costs	\$140,100,000
Implementation, Start-up and Acceptance Costs	\$ 29,600,000
Initial Capital Outfall Expenses	\$ 3,000,000
MCWD and MCWRA Real Property Acquisition Costs	\$ 2,000,000
Mitigation Costs	\$ 2,000,000
Pre-Effective Date Costs and Expenses	\$ 14,000,000
Project Administration and Oversight Expenses	<u>\$ 3,000,000</u>
<b>Subtotal – Estimated Project Facilities Cost</b>	<b>\$193,700,000</b>
Project Contingency	<u>\$ 46,700,000</u>
<b>Subtotal - Estimated Project Facilities Cost</b>	<b>\$240,400,000</b>
High-end Allowance (for Accuracy)	<u>\$ 42,070,000</u>
<b>Total Overall Estimated Project Facilities Cost</b>	<b>\$282,470,000</b>
Reserve Fund Payments Account	\$ 6,000,000
Costs of Obtaining Indebtedness	<u>\$ 9,000,000</u>
<b>Total</b>	<b>\$297,470,000</b>

RMC's cost comparison table also included an estimate for CAW's regional project facilities (aka CAW-Only facilities), in October 2012 dollars, as follows:

Base Construction Cost	\$ 53,300,000
Post-Effective Implementation Costs	\$ 14,500,000
ROW Easements and Land Acquisition	\$ 3,400,000
Mitigation	<u>\$ 1,000,000</u>
<b>Capital Costs (Excluding Contingency)</b>	<b>\$ 72,200,000</b>
Project Contingency	<u>\$ 22,700,000</u>
<b>Most Probable Capital Cost with Contingency</b>	<b>\$ 94,900,000</b>
High End of Accuracy Range (+25%)	\$118,600,000
Low End of Accuracy Range (-15%)	\$ 80,700,000
Pre-Effective Date Costs and Expenses	\$ 36,900,000

From the Settlement Agreement and the CPCN, it is clear that the cost cap of \$106.875 million (i.e., approximately \$107 million) for CAW facilities (but without CAW's pre-effective costs) was set at the mid-point between a most probable cost estimate of \$94.9 million and the high end of the accuracy range at \$118.6 million.

An estimate of \$404 million for the capital cost of all facilities in the Regional Project was the sum of the estimate of \$297 million for MCWD/MCWRA facilities and the estimate of \$107 million for CAW facilities.. The consolidated capital cost estimate for the Regional Project is shown in Table 1.

**Table 1**  
**Regional Project Capital Cost**

Capital Cost Categories	Estimated Cost (Oct 2012 \$)
<b>MCWD/MCWRA</b>	
Raw Water & Brine Facilities	\$56,600,000
Treatment Facility	\$174,200,000
Conveyance Facilities	\$37,200,000
<b>Total MCWD/MCWRA Facilities</b>	<b>\$268,000,000</b>
Pre-Effective Date Costs	\$14,000,000
Reserve Requirements and Financing	\$15,000,000
<b>Total MCWD/MCWRA Capital Cost</b>	<b>\$297,000,000</b>
<b>CAW</b>	
Raw Water and Brine Facilities	\$0
Treatment Plants	\$0
Conveyance Facilities	\$57,300,000
Terminal Reservoir	\$24,200,000
ASR System	\$25,500,000
<b>Total CAW Capital Cost</b>	<b>\$107,000,000</b>
<b>TOTAL REGIONAL PROJECT CAPITAL COST</b>	<b>\$404,000,000</b>

The objective of this Technical Memorandum is to estimate the capital cost for CAW to implement the northern facilities of the MPWSP, and to incorporate changes in the size and location of the desalination plant and intake (feedwater) wells, and changes in the alignment of feedwater and brine pipelines. An additional objective of this Technical Memorandum is to update O&M cost estimates for the entire MPWSP, including the newly defined northern facilities, as well as the southern facilities formerly described as "CAW-Only Facilities".

Previous relevant O&M cost estimating work by CAW on the Coastal Water Project includes a technical memorandum titled *Basis of Operations and Maintenance Costs for CWP Replacement Projects*, (Makrom Shatila, RBF Consulting), and *Appendix B-North Marina Alternative Replacement Project Operation and Maintenance Cost Summary Years 2017-2021*, (RBF Consulting), both of which were appended to Mark Schubert's May 22, 2009 testimony.

The O&M costs reported at that time were \$9,670,000 (2009 dollars) per year in the year 2021 for an 11 MGD desalination plant that would deliver 8,800 AFY to CAW and 800 AFY to users in Salinas Valley (via the CSIP system). Avoided costs attributable to the project were also reported as being \$2,010,000 per year.

## PROJECT FACILITIES

The capital cost estimates in this memorandum are based on the facilities described and in the Project Description Update TM, dated January 9, 2013 and summarized below in Table 2.

**Table 2**  
**Summary Description of Facilities**

Facility	6.4 MGD Desalination Option	9.6 MGD Desalination Option
INTAKE WELLS & SUPPLY/RETURN FACILITIES (Option 2 Configuration)		
Slant Test Well	790 LF, 29-Deg, 12-Inch, Diam., 1,000 gpm	
Slant Intake Wells and Pipelines	Six 12-in. wells, 580 LF, 22-deg, 1600 gpm	Eight 12-in. wells, 580 LF, 22-deg, 1880 gpm
Intake Pump Station	10,500 gpm, 600 hp, 3+1	16,000 gpm, 1,000 hp, 3+1
Tunnel Under Dunes	72-Inch TBM	
Feedwater Pipeline	8,300 LF of 42-in. diam. HDPE or FPVC	
Brine Pipeline	5,000 LF of 24-inch diam. HDPE, FPVC, or PVC	
SV Return PS & Pipeline	2 @ 10 hp, 700 gpm Located at desalination plant 6,200 LF 12-in. diam. PVC	2 @ 10 hp, 1,000 gpm Located at desalination plant 6,200 LF 12-in. diam. PVC
DESALINATION PLANT		
Feedwater Receiving Tanks	2 x 0.5 MG, covered, glass-lined steel	
Granular Media Filters	7 Pressure, Media Filters, 8 ft Diam x 40 ft Long	11 Pressure Filters, 8 ft Diam. X 40 ft Long
Filter Backwash System	2 x 750 gpm 25 hp pumps, 200,000 gallon storage tank	
Reverse Osmosis System	1 <sup>st</sup> Pass + 40-50% to 2 <sup>nd</sup> Pass 4 x 1.6 MGD modules	1 <sup>st</sup> Pass + 40-50% to 2 <sup>nd</sup> Pass 6 x 1.6 MGD modules
Post Treatment System	CO <sub>2</sub> + Calcite + NaOCl, 2 x 5000 cu ft. contactors	CO <sub>2</sub> + Calcite + NaOCl, 3 x 5000 cu ft. contactors
Chemical Storage and Feed	NaOCl, NaHSO <sub>3</sub> , CO <sub>2</sub> , Calcite, NaOH, CIP Chemicals	
Residuals Handling & Treatment	1 MG open, lined WWW settling basin with decant PS, 2 x 10,000 gal waste CIP storage tanks, 3 MG open, lined brine storage basin	
Clearwell PS	3 x 2400 gpm, 30 hp vfd	4 x 2200 gpm, 30 hp vfd
Clearwells	2 x 1.0 MG circular, lined steel/concrete, above-ground	
Desalinated Water Pump Sta.	3 x 2400 gpm, 150 hp vfd	4 x 2200 gpm, 200 hp vfd
Emergency Power (for DWPS)	600 kw diesel eng-gen	750 kw diesel eng-gen.
Admin/O&M/Lab Building	10,000 SF, Single Story	
Filter Structure	9,600 SF open pit, with concrete walls.	14,400 SF open pit, with concrete walls.
RO/Post Treatment/Chem.Bldg.	12,800 SF, 26 Ft High	19,200 SF, 26 Ft High
DWPS & Eng-Gen Bldg	2100 SF, Slab on Grade, CMU, Truss Roof System	
DESALINATED WATER CONVEYANCE PIPELINE (TO CAW)		
Product Water Pipeline	32,000 LF of 36-inch diam. ML/CSP 250 psi	

For the 9.6 MGD desalination option, Project facilities south of the Product Water Pipeline are identical to those previously described as the "CAW-Only Facilities" and the capital cost estimate for these facilities has not been changed. For the 6.4 MGD

desalination option, the cost of the ASR Pump Station will need to be increased to allow for higher horsepower pumps to deliver Carmel River water to the GWR injection wells, and an additional pipeline will be required to convey the Carmel River water to the GWR injection wells. The capital cost for this pipeline, which could be as high as \$7,000,000, is not included in this analysis. However, the costs to increase the horsepower of the ASR Pump Station would be covered by the contingency allowance for that pump station.

## **CAPITAL COST ESTIMATING METHODOLOGY AND GENERAL NOTES**

These cost estimates are built on the previous work done in RBF's 2009 technical memoranda, using similar methods. Implementation costs were estimated at 20 percent of base construction cost. Contingencies and mitigation costs were estimated at 25 percent and one percent, respectively, of the sum of base construction costs, implementation costs, and ROW/Land/Outfall costs. Unit quantities and unit costs have been checked and/or developed and have been revised and updated to current conditions.

Capital costs include construction costs, Land and ROW acquisition, and allowances for implementation, mitigation and contingencies. It should be noted that the design will first be prepared for the 9.6 MGD desalination option, followed by a decision to construct the smaller project, based on the progress of the GWR. Most, if not all, of the design effort for a 9.6 MGD desalination project will be expended even if the smaller project is constructed. For this reason, the implementation costs were estimated to be the same for both the 9.6 MGD and 6.4 MGD desalination options, at 20 percent of the base construction costs of the 9.6 MGD option. Similarly, the mitigation costs for both options are expected to be the same, and were estimated according to the 9.6 MGD desalination project. For the 6.4 MGD desalination option, the incremental increases in implementation costs and mitigation costs that resulted from these adjustments were taken from the contingency allowance, resulting in a lower contingency allowance percentage for the 6.4 MGD desalination option than for the 9.6 MGD desalination option.

## **SUMMARY OF UPDATED CAPITAL COST ESTIMATES**

The updated capital cost estimates for the two project options are summarized and compared to the Regional Project in Table 3. Detailed worksheets are also attached. The most probable capital cost for the 9.6 MGD desalination option is estimated to be approximately \$222,200,000, with an accuracy range of \$188,900,000 to \$277,800,000, in 2012 dollars. The most probable capital cost for the 6.4 MGD desalination option is estimated to be approximately \$178,800,000, with an accuracy range of \$152,000,000 to \$223,500,000, in 2012 dollars. Consistent with previous estimates, for this stage of project development, the estimate is considered to have an accuracy of -15% to +25%. This accuracy range is shown in Table 3.

**Table 3**  
**Summary Capital Cost Estimate (2012 Dollars)**

Item	Regional (10 MGD)	MPWSP	
		6.4 MGD	9.6 MGD
Base Construction Costs			
Intake Wells/Supply/Return Facilities	\$ 26.3 M	\$ 39.1 M	\$ 46.9 M
Desalination Plant	\$ 95.1 M	\$ 64.5 M	\$ 83.6 M
Product Water Pipeline	\$ 18.7 M	\$ 10.9 M	\$ 10.9 M
Base Construction Subtotal	\$ 140.1 M	\$ 114.5 M	\$ 141.4 M
Implementation Costs	\$ 32.2 M	\$ 28.3 M	\$ 28.3 M
ROW/Land/Outfall	\$ 5.0 M	\$ 5.0 M	\$ 5.8 M
Contingency Allowance	\$ 46.7 M	\$ 28.8 M	\$ 44.0 M
Mitigation Cost Allowance	\$ 2.0 M	\$ 2.2 M	\$ 2.2 M
Accuracy Adjustment-Low End of Range	\$ - 32.0 M	\$ - 26.8 M	\$ - 33.3 M
Accuracy Adjustment-High End of Range	\$ + 42.0 M	\$ +44.7 M	\$ 55.6 M
Total Capital Cost at High End of Range	\$ 268 M	\$ 223.5 M	\$ 277.8 M

### Intake Wells and Supply/Return Facilities

This category of facilities includes the facilities required to obtain and deliver raw water (feedwater) to the desalination plant, to convey intermittent pump-to-waste raw water from the intake wells to the MRWPCA outfall, to convey reverse osmosis RO concentrate (brine) from the desalination plant to the MRWPCA outfall, and to convey desalinated water from the desalination plant to the CSIP irrigation water storage basin. Brine storage and re-aeration facilities, and the expected one-time fee for two connections to the MRWPCA outfall are not included in this item (they are included in desalination plant capital costs). At the high end of the accuracy range, the estimated capital costs for these facilities for the 6.4 MGD and 9.6 MGD desalination options are \$77.6M and \$94.6 M, respectively, in 2012 dollars, with the following breakdown:

	<u>6.4 MGD</u>	<u>9.6 MGD</u>
Base Construction Costs		
Slant Test Well	\$ 5.0 M	\$ 5.0 M
Slanted Intake Wells Installation	\$ 16.2 M	\$ 21.6 M
Intake Pump Station	\$ 2.9 M	\$ 4.2 M
Beach Facilities	\$ 5.4 M	\$ 6.1 M
Tunnel Under the Dunes	\$ 5.0 M	\$ 5.0 M
Feedwater Pipeline	\$ 2.7 M	\$ 3.1 M
Brine Pipeline and Outfall Connection	\$ 1.2 M	\$ 1.2 M
SV Return PS & Pipeline	\$ 0.7 M	\$ 0.7 M
Base Construction Cost Subtotal	\$ 39.1 M	\$ 46.9 M
Implementation Costs	\$ 9.4 M	\$ 9.4 M
ROW/Land/Outfall	\$ 2.9 M	\$ 3.7 M
Contingency Allowance	\$ 10.0 M	\$ 15.0 M
Mitigation Cost Allowance	\$ 0.7 M	\$ 0.7 M
Accuracy Allowance	\$ 15.5 M	\$ 18.9 M
Total Capital Cost (High End of Accuracy Range)	\$ 77.6 M	\$ 94.6 M



These intake facility costs are higher than the intake facility costs for the Regional Project for the following reasons:

- Despite the reduced desalination plant size, the MRWSP will use more intake wells than the Regional Project (9 total wells versus 6 wells) because of different assumptions regarding the capacity of each well, the recovery percentage of the desalination plant, and the addition of standby well capacity;
- The addition of a tunnel under the dunes;
- The assumed use of trenchless construction methods for connection pipelines between intake wells, and;
- The method of construction for slant wells includes a complicated coffer-dam approach to comply with environmental restrictions.

### Desalination Plant

This category of facilities includes the facilities required to receive, filter, and desalinate the feedwater pumped from the intake wells; condition and disinfect the desalinated water; process and/or recycle residual streams from the process; store and pump desalinated water; and house equipment and personnel.

At the high end of the accuracy range, the estimated capital costs for these facilities for the 6.4 MGD and 9.6 MGD desalination options are \$128 M and \$165 M, respectively, in 2012 dollars, with the following breakdown:

	<u>6.4 MGD</u>	<u>9.6 MGD</u>
Base Construction Cost		
Plant Inlet and Pretreatment	\$ 5.4 M	\$ 7.2 M
Reverse Osmosis System	\$ 21.0 M	\$ 29.3 M
Post Treatment System	\$ 1.1 M	\$ 1.3 M
Residuals Handling and Treatment	\$ 1.1 M	\$ 1.1 M
Clearwell PS, Clearwells and DWPS	\$ 4.9 M	\$ 6.2 M
Plant Infrastructure	\$ 21.6 M	\$ 26.4 M
Engineering, Mobilization/Demobilization	\$ 9.4 M	\$ 12.1 M
Base Construction Cost Subtotal	\$ 64.5 M	\$ 83.6 M
Implementation Costs	\$ 16.7 M	\$ 16.7 M
ROW/Land/Outfall	\$ 0.6 M	\$ 0.6 M
Contingency Allowance	\$ 16.0 M	\$ 25.2 M
Mitigation Cost Allowance	\$ 1.0 M	\$ 1.0 M
Accuracy Allowance	\$ 24.7 M	\$ 31.8 M
Total Capital Cost (High End of Accuracy Range)	\$123.5 M	\$158.9 M

The heart of the desalination plant is the RO process, which has estimated base construction costs of \$21.0 M and \$29.3 M for the 6.4 MGD and 9.6 MGD options, respectively. The ratio of these costs is approximately 72 percent, which is approximately equal to the ratio of installed capacity for the two plants (8.0 MGD/11.2 MGD=0.71; installed capacity = rated capacity plus standby capacity.)

### Product Water Pipeline

The budgeted capital cost for this pipeline is \$23 M, in 2012 dollars, for both the 9.6 MGD and 6.4 MGD Desalination Options, and is broken down as follows:

	<u>6.4 MGD</u>	<u>9.6 MGD</u>
Base Construction Cost	\$ 10.9 M	\$ 10.9 M
Implementation Costs	\$ 2.2 M	\$ 2.2 M
ROW/Land/Outfall	\$ 1.5 M	\$ 1.5 M
Contingency Allowance	\$ 3.7 M	\$ 3.7 M
Mitigation Cost Allowance	\$ 0.2 M	\$ 0.2 M
Accuracy Allowance	\$ 4.5 M	\$ 4.5 M
Total Capital Cost (High End of Accuracy Range)	\$ 23.0 M	\$ 23.0 M

### O&M COST ESTIMATING METHODOLOGY AND GENERAL NOTES

The annual O&M costs for the MPWSP consist primarily of the following components:

- Energy;
- Chemicals;
- Labor;
- Membrane and Media Replacement; and
- General Repair and Replacement (R&R)

O&M cost estimates for Membrane and Media Replacement and General Repair and Replacement are presented here as annual expenses; however, a portion or all of these costs may be treated as capital expenditures in financial analysis.

Generally, the methodology to estimate O&M Costs follows the methodology described for estimating the North Marina Alternative costs in *Basis of Operations and Maintenance Costs for CWP Replacement Projects*, (Makrom Shatila, RBF Consulting, May 20, 2009), using updated unit cost information. The following sections within explain any differences in the cost estimating method from that used in the previous work.

For the 9.6 MGD desalination option, the O&M cost estimate is based on operating at the system at full capacity; i.e., use of the above facilities to deliver 9,747 AFY of desalinated water to the CAW system, plus 880 AFY of desalinated water to the CSIP system, plus the O&M costs for BIRP, Segunda Pump Station and the ASR Pump Station to capture and deliver 1,300 AFY of Carmel River water to the ASR wells, plus

the O&M costs for the ASR Pump Station to pump 2,106 AFY of desalinated water to the ASR wells, and the O&M costs to recover 3,407 AFY of water from the ASR wells.

For the 6.4 MGD desalination option, the O&M cost estimate is similarly based on operation of the system at full capacity in which the Project's facilities would be used to deliver 6,300 AFY of desalinated water to the CAW system, plus 550 AFY of desalinated water to the CSIP system. This option also includes:

- BIRP costs to treat 1,300 AFY of Carmel River Water;
- Segunda Pump Station power costs to pump Carmel River water;
- ASR Pump Station power costs to pump Carmel River water to the GWR injection wells; and
- ASR well power costs to pump 7,700 AFY (including 3,500 AFY of injected GWR water) from the ASR wells to the CAW system.

## SUMMARY OF UPDATED O&M COST ESTIMATES

A summary of the O&M cost estimates for the 6.4 MGD and 9.6 MGD options is shown in Table 4 and discussed in the paragraphs that follow. Detailed worksheets are also attached.

**Table 4**  
**Summary of MPWSP Annual O&M Costs (2012 dollars)**

<b>Cost Category</b>	<b>6.4 MGD Desalination Option</b>	<b>9.6 MGD Desalination Option</b>
Energy	\$ 4,950,000	\$ 6,600,000
Chemicals	\$ 630,000	\$ 770,000
Labor & Miscellaneous	\$ 2,730,000	\$ 3,090,000
Membrane and Media Replacement	\$ 410,000	\$ 550,000
General Repair and Replacement	\$ 1,580,000	\$ 1,960,000
Purchased GWR Water (at \$3000/AF) <sup>1</sup>	\$ 10,500,000	--
<b>Total O&amp;M Annual Cost</b>	<b>\$ 20,800,000</b>	<b>\$12,970,000</b>

Notes: 1. Purchase price is an assumption and includes all capitalized and annual expenses for treatment, conveyance and injection of advanced treated water from PCA.

## Energy Costs

Energy costs were developed for the following components:

- Pumping (intake wells, desalinated water pump station (to CAW and to SV), ASR pump station, Valley Greens Pump Station, ASR wells and Seaside wells extraction);
- Treatment process (filtrate forwarding, high-pressure RO feed, energy recovery boost, second pass feed, clearwell lift, backwash supply, decant recovery);
- Misc. facility power usage.

The total energy usages for the two desalination options are 32,000,000 kwhrs/yr and 49,000,000 kwhrs/yr, for the 6.4 MGD and 9.6 MGD desalination options, respectively.

Table 5 shows the pumping lifts used in the calculation of power costs for the major pumps in the system.

The RO process is assumed to be single pass, followed by a partial second pass. The RO process product water produced is a blend of first and second pass permeates and is assumed to be 40 percent second pass permeate. An operating pressure of 1000 psi has been assumed for the first pass (50 psi provided by the filtrate forwarding pump and 950 psi provided by the high pressure pump), and 125 psi for the second pass. An overall recovery rate of 43 percent has been assumed for the RO process, which includes the additional losses that occur in the partial second pass.

*Discussions were held with Pacific Gas and Electric (PG&E) in 2008 and 2009 to determine which electric rate schedule is applicable to each proposed facility. No discussions with PG&E have occurred since 2009, and the current rate schedules have not been reviewed, however, the power rates that were used in the 2009 analysis have been escalated at four percent per year for three years for the purposes of this current O&M cost estimate.*

**Table 5**  
**Pumping Lifts Used for Power Cost Calculations**

Pump	Total Dynamic Head (TDH) in Feet	
	6.4 MGD Desalination Option	9.6 MGD Desalination Option
Intake Wells	130	130
Filtrate Forwarding Pumps to RO	120	120
High Pressure RO Feed Pumps	2125	2125
Energy Recovery Booster Pumps	280	280
Second Pass Feed Pumps	290	290
Clearwell Pump Station	45	45
Desalinated Water Pump Station (to CAW)	235	260
Salinas Valley Return Pump Station	25	30
ASR Pump Station	200	60
ASR Wells	560	450
Carmel Valley Wells (to and through BIRP)	400	400
Valley Greens Pump Station	90	90
Segunda Pump Station	270	270

## Chemical Costs

Several chemicals are required during the pretreatment, desalination, and post-treatment processes. The chemicals that are assumed to be required during the treatment process consist of:

- Sodium Hypochlorite (Iron oxidant, Disinfection)
- Sodium bisulfite (Dechlorination)
- Carbon Dioxide (Alkalinity addition)
- Lime (calcite) (Remineralization)
- Sodium Hydroxide (pH adjustment)
- Various chemicals used in the Clean-in-Place (CIP) process for the RO membranes

Annual chemical consumption values are calculated based on flow rate and the dosages listed below:

- Sodium Hypochlorite – applied to plant raw feedwater at 1.3 mg/L, final plant product water at 2 mg/L, and ASR well extraction at 2 mg/L;
- Sodium bisulfite – applied to desalination plant filtered feedwater at 1.3 mg/L and Carmel River water injected into ASR or GWR wells at 2 mg/L;
- Carbon Dioxide – applied to desalination plant product water at 15 mg/L;
- Lime (calcite) – applied to desalination plant product water at 35 mg/L as  $\text{CaCO}_3$ ;
- Sodium Hydroxide – applied to desalination plant product water at 2 mg/L;
- BIRP chemicals – Estimated at \$23/AF; and
- CIP chemicals – not estimated, costs are negligible

For the 2009 O&M cost analysis, chemical costs were obtained from Univar USA, which is a leading chemical distributor in the United States. These chemical unit costs were escalated to 2012 prices at 4 percent per year. Some adjustments were also made based on consumption, with lower unit prices being assumed for chemicals that can be purchased in larger bulk quantities.

## Labor Costs

The labor rates that were used in the 2009 analysis were escalated to 2012 at 4 percent per year. Some adjustments in staffing levels were made to account for the smaller desalination plant sizes and the anticipated sharing of staff between the BIRP facility and the desalination plant.

## Membrane Replacement Costs

Membrane replacement costs associated with reverse osmosis membranes are included in the annual O&M cost, with approximately 17 percent of the membranes being replaced on a yearly basis. As mentioned previously, some or all of these costs may be treated as capital expenses. Membrane replacement cost associated with RO membranes is calculated below:

For 6.4 MGD desalination plant

- $(2785 - 1^{\text{st}} \text{ pass elements} \times 0.167 = 465 \text{ elements}) \times \$600/\text{element} = \$280,000/\text{yr}$
- $(570 - 2^{\text{nd}} \text{ pass elements} \times 0.167 = 95 \text{ elements}) \times \$600/\text{element} = \$ 57,000/\text{yr}$

For 9.6 MGD desalination plant

- $(3755 - 1^{\text{st}} \text{ pass elements} \times 0.167 = 627 \text{ elements}) \times \$600/\text{element} = \$ 376,000/\text{yr}$
- $( 768 - 2^{\text{nd}} \text{ pass elements} \times 0.167 = 128 \text{ elements}) \times \$600/\text{element} = \$ 77,000/\text{yr}$

This item also includes \$76,000/yr for the 6.4 MGD desalination plant, and \$112,000/yr for the 9.6 MGD desalination plant to cover replacement of multi-media sand in the pretreatment filters and replacement of cartridge filter media.

### **General Repair and Replacement**

A general Repair and Replacement (R&R) cost is included in the annual O&M costs for both projects. The R&R cost is a budgeted amount based on a long term average of expenditures for the repair and/or replacement of mechanical equipment (pumps, etc.), electrical equipment, instrumentation and controls, and basic facility maintenance. As mentioned previously, some portion of these costs may be treated as capital expenses. Industry standard assumptions for this type of cost range from one percent to three percent per year as a percentage of construction cost, with the higher percentages occurring as the facilities approach the end of their useful life. For newly constructed facilities, the annual average R&R cost was estimated at being 1.5 percent of the basic construction cost of the non-pipeline elements of the project, as follows:

- For the 6.4 MGD option:  $0.015 \times \$105,200,000 = \$1,600,000/\text{yr}.$
- For the 9.6 MGD option:  $0.015 \times \$130,000,000 = \$2,000,000/\text{yr}.$

# Attachment 4

Name: California American Water  
 Number: 9.6 MGD

## Usage Data for 12 Most Recent Months (CC&amp;B Source)

Month	Max Demand	onpk_kw	ptpk_kw	offpk_kw	onpk_kwh	ptpk_kwh	offpk_kwh
JAN	5,197	0	5,197	5,197	-	1,430,146	2,332,758
FEB	5,197	0	5,197	5,197	-	1,430,146	2,332,758
MAR	5,197	0	5,197	5,197	-	1,430,146	2,332,758
APR	5,197	0	5,197	5,197	-	1,430,146	2,332,758
MAY	5,225	5,225	5,225	5,225	668,832	780,304	2,396,648
JUN	5,225	5,225	5,225	5,225	668,832	780,304	2,396,648
JUL	5,225	5,225	5,225	5,225	668,832	780,304	2,396,648
AUG	5,225	5,225	5,225	5,225	668,832	780,304	2,396,648
SEP	5,225	5,225	5,225	5,225	668,832	780,304	2,396,648
OCT	5,225	5,225	5,225	5,225	668,832	780,304	2,396,648
NOV	5,197	0	5,197	5,197	-	1,430,146	2,332,758
DEC	5,197	0	5,197	5,197	-	1,430,146	2,332,758

Meter Type Customer Charge Mandatory E-20 (\$ per meter per day)



## ESTIMATED REVENUE USING RATES LAST UPDATE 1/1/2013

## E-20 Secondary Voltage

	Max Demand	Usage	Revenue by Component (\$)										Average	
Month	(kW)	(kWh)	Trans	Dist	PPP	ND	Gen	DWR Bond	CTC	ECRA	Total	(\$/kwh)		
JAN	5,197	3,762,904	\$ 26,290	\$ 46,055	\$ 49,106	\$ 1,881	\$ 202,114	\$ 18,551	\$ 9,784	\$ (715)	\$ 353,067	\$ 0.09383		
FEB	5,197	3,762,904	\$ 26,290	\$ 46,055	\$ 49,106	\$ 1,881	\$ 202,114	\$ 18,551	\$ 9,784	\$ (715)	\$ 353,067	\$ 0.09383		
MAR	5,197	3,762,904	\$ 26,290	\$ 46,055	\$ 49,106	\$ 1,881	\$ 202,114	\$ 18,551	\$ 9,784	\$ (715)	\$ 353,067	\$ 0.09383		
APR	5,197	3,762,904	\$ 26,290	\$ 46,055	\$ 49,106	\$ 1,881	\$ 202,114	\$ 18,551	\$ 9,784	\$ (715)	\$ 353,067	\$ 0.09383		
MAY	5,225	3,845,784	\$ 26,532	\$ 75,093	\$ 50,187	\$ 1,923	\$ 306,954	\$ 18,960	\$ 9,999	\$ (731)	\$ 488,917	\$ 0.12713		
JUN	5,225	3,845,784	\$ 26,532	\$ 75,093	\$ 50,187	\$ 1,923	\$ 306,954	\$ 18,960	\$ 9,999	\$ (731)	\$ 488,917	\$ 0.12713		
JUL	5,225	3,845,784	\$ 26,532	\$ 75,093	\$ 50,187	\$ 1,923	\$ 306,954	\$ 18,960	\$ 9,999	\$ (731)	\$ 488,917	\$ 0.12713		
AUG	5,225	3,845,784	\$ 26,532	\$ 75,093	\$ 50,187	\$ 1,923	\$ 306,954	\$ 18,960	\$ 9,999	\$ (731)	\$ 488,917	\$ 0.12713		
SEP	5,225	3,845,784	\$ 26,532	\$ 75,093	\$ 50,187	\$ 1,923	\$ 306,954	\$ 18,960	\$ 9,999	\$ (731)	\$ 488,917	\$ 0.12713		
OCT	5,225	3,845,784	\$ 26,532	\$ 75,093	\$ 50,187	\$ 1,923	\$ 306,954	\$ 18,960	\$ 9,999	\$ (731)	\$ 488,917	\$ 0.12713		
NOV	5,197	3,762,904	\$ 26,290	\$ 46,055	\$ 49,106	\$ 1,881	\$ 202,114	\$ 18,551	\$ 9,784	\$ (715)	\$ 353,067	\$ 0.09383		
DEC	5,197	3,762,904	\$ 26,290	\$ 46,055	\$ 49,106	\$ 1,881	\$ 202,114	\$ 18,551	\$ 9,784	\$ (715)	\$ 353,067	\$ 0.09383		
Annual	5,225	45,652,127	\$ 316,933	\$ 726,888	\$ 595,760	\$ 22,826	\$ 3,054,407	\$ 225,065	\$ 118,696	\$ (8,674)	\$ 5,051,901	\$ 0.11066		

## E-20 Primary Voltage

	Max Demand	Usage	Revenue by Component (\$)										Average
Month	(kW)	(kWh)	Trans	Dist	PPP	ND	Gen	DWR Bond	CTC	ECRA	Total	(\$/Kwh)	
JAN	5,197	3,762,904	\$ 26,290	\$ 34,445	\$ 45,983	\$ 1,881	\$ 214,053	\$ 18,551	\$ 9,219	\$ (715)	\$ 349,709	\$ 0.09294	
FEB	5,197	3,762,904	\$ 26,290	\$ 34,445	\$ 45,983	\$ 1,881	\$ 214,053	\$ 18,551	\$ 9,219	\$ (715)	\$ 349,709	\$ 0.09294	
MAR	5,197	3,762,904	\$ 26,290	\$ 34,445	\$ 45,983	\$ 1,881	\$ 214,053	\$ 18,551	\$ 9,219	\$ (715)	\$ 349,709	\$ 0.09294	
APR	5,197	3,762,904	\$ 26,290	\$ 34,445	\$ 45,983	\$ 1,881	\$ 214,053	\$ 18,551	\$ 9,219	\$ (715)	\$ 349,709	\$ 0.09294	
MAY	5,225	3,845,784	\$ 26,532	\$ 63,731	\$ 46,995	\$ 1,923	\$ 309,117	\$ 18,960	\$ 9,422	\$ (731)	\$ 475,950	\$ 0.12376	
JUN	5,225	3,845,784	\$ 26,532	\$ 63,731	\$ 46,995	\$ 1,923	\$ 309,117	\$ 18,960	\$ 9,422	\$ (731)	\$ 475,950	\$ 0.12376	
JUL	5,225	3,845,784	\$ 26,532	\$ 63,731	\$ 46,995	\$ 1,923	\$ 309,117	\$ 18,960	\$ 9,422	\$ (731)	\$ 475,950	\$ 0.12376	
AUG	5,225	3,845,784	\$ 26,532	\$ 63,731	\$ 46,995	\$ 1,923	\$ 309,117	\$ 18,960	\$ 9,422	\$ (731)	\$ 475,950	\$ 0.12376	
SEP	5,225	3,845,784	\$ 26,532	\$ 63,731	\$ 46,995	\$ 1,923	\$ 309,117	\$ 18,960	\$ 9,422	\$ (731)	\$ 475,950	\$ 0.12376	
OCT	5,225	3,845,784	\$ 26,532	\$ 63,731	\$ 46,995	\$ 1,923	\$ 309,117	\$ 18,960	\$ 9,422	\$ (731)	\$ 475,950	\$ 0.12376	
NOV	5,197	3,762,904	\$ 26,290	\$ 34,445	\$ 45,983	\$ 1,881	\$ 214,053	\$ 18,551	\$ 9,219	\$ (715)	\$ 349,709	\$ 0.09294	
DEC	5,197	3,762,904	\$ 26,290	\$ 34,445	\$ 45,983	\$ 1,881	\$ 214,053	\$ 18,551	\$ 9,219	\$ (715)	\$ 349,709	\$ 0.09294	
Annual	5,225	45,652,127	\$ 316,933	\$ 589,061	\$ 557,869	\$ 22,826	\$ 3,139,023	\$ 225,065	\$ 111,848	\$ (8,674)	\$ 4,953,951	\$ 0.10852	

## E-20 Transmission Voltage

	Max Demand	Usage	Revenue by Component (\$)											Average
Month	(kW)	(kWh)	Trans	Dist	PPP	ND	Gen	DWR Bond	CTC	ECRA	Total	(\$/kwh)		
JAN	5,197	3,762,904	\$ 26,290	\$ 6,204	\$ 40,865	\$ 1,881	\$ 188,570	\$ 18,551	\$ 8,429	\$ (715)	\$ 290,076	\$ 0.07709		
FEB	5,197	3,762,904	\$ 26,290	\$ 6,204	\$ 40,865	\$ 1,881	\$ 188,570	\$ 18,551	\$ 8,429	\$ (715)	\$ 290,076	\$ 0.07709		
MAR	5,197	3,762,904	\$ 26,290	\$ 6,204	\$ 40,865	\$ 1,881	\$ 188,570	\$ 18,551	\$ 8,429	\$ (715)	\$ 290,076	\$ 0.07709		
APR	5,197	3,762,904	\$ 26,290	\$ 6,204	\$ 40,865	\$ 1,881	\$ 188,570	\$ 18,551	\$ 8,429	\$ (715)	\$ 290,076	\$ 0.07709		
MAY	5,225	3,845,784	\$ 26,532	\$ 6,283	\$ 41,765	\$ 1,923	\$ 282,370	\$ 18,960	\$ 8,615	\$ (731)	\$ 385,717	\$ 0.10030		
JUN	5,225	3,845,784	\$ 26,532	\$ 6,283	\$ 41,765	\$ 1,923	\$ 282,370	\$ 18,960	\$ 8,615	\$ (731)	\$ 385,717	\$ 0.10030		
JUL	5,225	3,845,784	\$ 26,532	\$ 6,283	\$ 41,765	\$ 1,923	\$ 282,370	\$ 18,960	\$ 8,615	\$ (731)	\$ 385,717	\$ 0.10030		
AUG	5,225	3,845,784	\$ 26,532	\$ 6,283	\$ 41,765	\$ 1,923	\$ 282,370	\$ 18,960	\$ 8,615	\$ (731)	\$ 385,717	\$ 0.10030		
SEP	5,225	3,845,784	\$ 26,532	\$ 6,283	\$ 41,765	\$ 1,923	\$ 282,370	\$ 18,960	\$ 8,615	\$ (731)	\$ 385,717	\$ 0.10030		
OCT	5,225	3,845,784	\$ 26,532	\$ 6,283	\$ 41,765	\$ 1,923	\$ 282,370	\$ 18,960	\$ 8,615	\$ (731)	\$ 385,717	\$ 0.10030		
NOV	5,197	3,762,904	\$ 26,290	\$ 6,204	\$ 40,865	\$ 1,881	\$ 188,570	\$ 18,551	\$ 8,429	\$ (715)	\$ 290,076	\$ 0.07709		
DEC	5,197	3,762,904	\$ 26,290	\$ 6,204	\$ 40,865	\$ 1,881	\$ 188,570	\$ 18,551	\$ 8,429	\$ (715)	\$ 290,076	\$ 0.07709		
Annual	5,225	45,652,127	\$ 316,933	\$ 74,924	\$ 495,782	\$ 22,826	\$ 2,825,643	\$ 225,065	\$ 102,261	\$ (8,674)	\$ 4,054,760	\$ 0.08882		

# Attachment 5

# MEMORANDUM



**To:** Richard Svindland, California American Water

**From:** Paul Findley, RBF Consulting

**Date:** January 9, 2013

**Subject:** MPWSP Project Implementation Schedule Analysis

## Introduction

The Cease and Desist Order requires dramatic reductions in diversions from the Carmel River which started in 2009, and will culminate with a large final reduction on October 1, 2016 (Target Date), less than 5 years from now. The Monterey Peninsula Water Supply Project (MPWSP or Project) is currently programmed to be on line by December of 2017, or more than one year beyond the Target Date. Several contingency options for the MPWSP have been proposed by stakeholders in the Project and are discussed in this memorandum. These contingency options are described in more detail in "Contingency Planning for the Monterey Peninsula Water Supply Project" prepared November 1, 2012 by RBF Consulting. When evaluating contingency options for the MPWSP, it is prudent to consider the risks of additional delays in implementation that would be caused by considering those contingency options in detail as "Alternatives" in the EIR. The purpose of this memorandum is to evaluate the implementation schedule implications of considering these contingency options.

In evaluating the potential time delay associated with proceeding with the MPWSP or an Alternative, it is important to note the tremendous variability and site-specific nature of the discretionary review and regulatory permitting process. Although examining a given project in light of an agency's statutory requirements for CEQA compliance and permit processing may be helpful, in reality, a project's entitlement path and overall processing time is much more a factor of various intangibles such as regulatory agency delay or opposition, stakeholder opposition, public/NGO opposition, economic viability, and/or changes in local water supply conditions. These factors influence the likelihood of successful approvals at the local, state and federal level. It should be recognizing that these approvals, while made under various governing policies and regulations, are nonetheless made by individuals that can be influenced by project opposition. Further complicating this process, particularly with ocean desalination, is the sheer number of discretionary review approvals required (over 25 in this case), overlapping nature of regulatory authority (multiple agencies regulate water quality, for example), ambiguity and/or uncertainty in regulatory agency practice, often conflicting goals and/or standards of different regulatory agencies, and many other factors. There is also a complex sequencing and inter-relationship among the various discretionary approvals required, in that some may be concurrent with the Draft EIR, some may occur following Final EIR certification, some must be completed prior to obtaining a permit, and some may occur during or following project construction.

Recent examples illustrate these points:

- **The Cambria Community Services District (CCSD)** has been pursuing a desalination facility since 1994. Coastal Commission rejected an open intake concept in 2007. CCSD certified a Water Master Plan Program EIR in 2008 which evaluated subsurface intakes (facility size estimated at 0.6 MGD). Since mid-2009, CCSD has been attempting to obtain Coastal Commission and State Parks approval for beach test wells that are required to determine feasibility and siting of a subsurface intake system.

- **Marin Municipal Water District (MMWD)** has been pursuing a desalination plant since 1990. In 2011, the MMWD Board placed the project on hold following litigation, and a ballot referendum, on top of reduced water demand, increased conventional supplies, and increases in estimated costs for the desalination facility.
- **Poseidon Carlsbad Desalination Plant (Poseidon)** has been pursuing its 50 MGD desalination plant since 2004, an open intake concept that has generated considerable opposition. Following Final EIR certification in June 2006, Poseidon has spent the last six years in regulatory permitting, defending various lawsuits, and negotiating water purchase agreements. Recently, San Diego County Water Authority has approved the water purchase agreement and the project will soon be in construction.
- **Sand City Desalination Plant** was approved by Coastal Commission in only four months and the 0.3 MGD plant was operating a little more than five years after Final EIR certification in January 2005. This can be credited at least in part to the small scale of the project and the use of a subsurface intake and subsurface brine discharge.
- **West Basin Municipal Water District Demonstration Facility (0.58 MGD)** was approved by the Coastal Commission only four months following Final EIR certification in December 2008. This can be attributed to the fact that this is a temporary facility, but also to the fact that this agency has excellent stakeholder relationships (strong recycled water and public education program) and a commitment to study state-of-the-art intake and discharge technologies (open and subsurface).

### **Proposed MPWSP Project Context**

The currently proposed configuration of the MPWSP (Base Project) in many ways physically resembles the configurations of the “Regional Project Alternative” (which became the Monterey Bay Regional Desalination Project) and the North Marina Alternative (NMA) in the Coastal Water Project EIR that was certified by the CPUC in December 2009. Among the EIR alternatives, the CPUC selected the MBRDP as the Preferred Project, and identified the NMA as similar in impact to or “Environmentally Superior” to the MBRDP.

The Base Project has many of the features of the MBRDP and the NMA relative to desalination entitlement:

- It utilizes a desalination plant site in the same general vicinity that is available from a private party;
- It will utilize subsurface intakes, which are preferred by regulators and the environmental community;
- It will utilize wastewater treatment plant discharge for brine disposal, which is environmentally preferred;
- It minimizes diversion of Carmel River Water beyond current annual withdrawals;
- It utilizes Aquifer Storage and Recovery (ASR) to minimize the required size of the desalination plant and to capture legally available excess Carmel River Water;
- It avoids direct diversion of Salinas River water;
- It minimizes and/or mitigates inter-basin groundwater transport; and
- Although there remains some levels of opposition and/or controversy, the associated issues are generally well known, identified, and have been factored into current plans.

## Risk Context

Implementation of the MPWSP, either as the Base Project, or in any of the configuration options described in the Contingency Plan, would require:

- Resolution of pending litigation;
- Selecting an alternative for implementation that minimizes CAW's risk and exposure to fines from non-compliance with the Cease and Desist Order;
- Issuance of a new CPCN and Notice of Determination (Key Milestones); and
- Completion of all regulatory permits (none of which are in hand at this time).

The following are the greatest risks to the overall entitlement process, to achieve a certified Final EIR that survives legal challenge, to obtain all regulatory permits, and to create an ownership and implementation approach that minimizes the time and cost in Project implementation:

- Revising the Project such that preparation of the EIR requires lengthy technical studies of a new or more severe environmental impact;
- Requiring permits or approvals from a new regulatory agency;
- Requiring land and/or ROW acquisition from new property owners;
- Introducing a new, mobilized and potentially opposed stakeholder; and
- Pursuing an option with known strong public opposition.

## Schedule Basics

In preparing schedules for the Base Project and the various contingency options, certain basic assumptions have been made regarding sequences and durations of activities:

**California Environmental Quality Act (CEQA) Compliance.** The Base Project and any contingency options that are carried forward as alternatives will be addressed in a Subsequent Environmental Impact Report (EIR), to be prepared by CPUC. The estimated completion date for CPUC's supplemental EIR for the MPWSP in its current configuration is November, 2013. However, if any of the contingency options involving direct intake of water from either Monterey Bay or from Moss Landing Harbor are evaluated in detail in the EIR, the completion of the EIR would be delayed 9 to 12 months in order to allow for a full year of biological sampling and preparation of an impingement and entrainment impact assessment. Similarly, if any of the contingency options involving direct discharge of undiluted brine from a new outfall are evaluated in detail in the EIR, the completion of the EIR would be delayed 9 to 12 months in order to allow for a full year of current studies, biological sampling and preparation of a revised hyper-salinity impact assessment. If both direct intake and direct discharge are studied in detail, the completion of the EIR would be delayed up to approximately 12 months.

The above EIR delays would apply even if direct intake or direct discharge is studied in detail but not selected as the preferred alternative.

**Certificate of Public Convenience and Necessity (CPCN).** For the Base Project, it has been assumed that CPUC's completion of the CPCN process requires 2 to 3 months after completion of the EIR, and that it will occur January of 2014. It is assumed that this duration would be increased to 4 months if the preferred alternative involves either direct intake of feedwater or direct discharge of undiluted brine to a new outfall.

**Jurisdictional Permitting.** It is assumed that jurisdictional permitting for waters of the U.S. or waters of the State of California requires 7 to 9 months after completion of the EIR, depending on the nature and extent of issues. This is an area of high schedule risk, particularly if the

Project impacts listed federal or state species, in which case consultations with the resource agencies can add months or even years to the permitting schedule.

**Coastal Development Permit.** It has been assumed that the California Coastal Commission permitting process cannot be completed until at least 6 months after issuance of the CPCN, and at least 2 months after all other environmental and regulatory permits have been obtained. This is a fairly aggressive assumption and it is based on an assumption of a consolidated review process for the Coastal Development Permit.

**ROW Acquisition.** Completion of ROW acquisition requires 50% completion of pipeline design.

**Design.** Design of Project facilities cannot commence until the CPCN is issued.

**Construction.** Construction of any facilities in the Coastal Zone cannot start until after completion of the Coastal Commission permitting process.

**Desalination Plant D/B Delivery.** The desalination plant will be implemented using the design/build delivery method, following a minimum 15-month process for preparation of a preliminary design and procurement of a design/build contractor. It is assumed that the preliminary design work can be started prior to issuance of the CPCN. The optimum design/build duration has been assumed to be approximately 36 to 40 months.

**Design/Bid/Build Delivery Items.** Conveyance pipelines pump stations, and the Terminal Reservoir will be via the design/bid/build delivery method. As required, these facilities will be divided into packages to fast-track the project through design, bidding, and construction; however, this increases project complexity and risk.

**Non-Scheduled Activities.** The schedule does not include the following activities, all of which are possible in a project with this complexity, and which could have significant impact on the schedule:

- Litigation arising out of challenges to the CEQA during the 30-day challenge period following the Notice of Determination (NOD), or for any other reason;
- Extended consultations with environmental resource agencies;

## Schedule Analysis

Implementation schedules have been prepared for the Base Project and the various Contingency Options. The results are discussed in the following paragraphs and summarized in Table 1. ("I" stands for Intake Contingency Options, "D" for Discharge Contingency Option and "S" for Site Contingency Option.) The contingency options are listed in order of preference, taking into account estimated schedule impacts, as well as perceived risk associated with meeting the estimated schedule shown for each option.

**Base Project and Contingency Options I-1, I-3, and D-1.** The implementation schedule for the Base Project is shown in Table 2 below. This is also the schedule for Intake Contingency Options I-1 (Ranney Wells at CEMEX) and I-3 (Slant Wells at Portrero Road), and Discharge Contingency Option D-1 (Modify MRWPCA outfall). As shown, the Base Project is currently programmed to be on-line by December of 2017, or more than one year beyond the Cease and Desist Order's targeted date of October 1, 2016 at which time dramatic reductions are required in diversions from the Carmel River. Key permitting milestones include CPUC's completion of the CEQA Supplemental EIR in November of 2013, CPUC's approval of the CPCN in January of 2014, and completion of a number of regulatory permit approvals leading to approval of the Coastal Development Permit (by the California Coastal Commission) in August of 2014. For Contingency Option I-3, additional time may be required for permitting of the intake pipeline crossings of the old Salinas River channel and the Salinas River.

**Table 1**  
**Summary of Schedule Milestones for**  
**Base Project and Contingency Options**

	Estimated Milestone Activity Completion Date			
	EIR	CPCN	CDP	Desalination Plant
<b>Base Project</b>				
Without EIR Evaluation of Direct Intake or New Outfall Options	Nov 2013	Jan 2014	Aug 2014	Dec 2017
With EIR Evaluation of Direct Intake or New Outfall Options	Aug 2014	Oct 2014	May 2015	April 2018
With EIR Evaluation of Direct Intake and New Outfall Options	Nov 2014	Jan 2015	Aug 2015	July 2018
<b>Contingency Options</b>				
D-1: CBR Site, Base Alt Slant Wells, Modify WPCA Outfall	Nov 2013	Jan 2014	Aug 2014	Dec 2017
I-1: CBR Site, Ranney Wells, WPCA Outfall	Nov 2013	Jan 2014	Aug 2014	Dec 2017
I-3: CBR Site, Slant Wells at Portrero Road, WPCA Outfall	Nov 2013	Jan 2014	Aug 2014	Dec 2017
D-2: CBR Site, Base Alt Slant Wells, New Ocean Outfall Near CBR site	Aug 2014	Dec 2014	Aug 2015	Apr 2018
D-4: CBR Site, Base Alt Slant Wells, Modify Mar. Ref. Outfall	Aug 2014	Dec 2014	Aug 2015	Apr 2018
S-5: FEIR ML Site, Portrero Road Slant Wells, Modify Mar Ref Outfall	Aug 2014	Dec 2014	Aug 2015	Apr 2018
S-6: FEIR ML Site, Portrero Road Slant Wells, New ML Ocean Outfall	Aug 2014	Dec 2014	Aug 2015	Apr 2018
D-3: CBR Site, Base Alt Slant Wells, MLPP Outfall	Nov 2013	Mar 2014	Nov 2014	Dec 2017
S-4: FEIR ML Site, Portrero Road Slant Wells, MLPP Outfall	Nov 2013	Feb 2014	Sept 2014	Dec 2017
I-6: CBR Site, Co-Locate with MLPP Intake, WPCA Outfall	Aug 2014	Dec 2014	May 2015	Dec 2017
I-2: CBR Site, Open Ocean Intake (off-shore CEMEX), WPCA Outfall	Aug 2014	Dec 2014	May 2015	Dec 2017
I-8: CBR Site, Open Ocean Intake (nr Moss Landing), WPCA Outfall	Aug 2014	Dec 2014	May 2015	Dec 2017
I-4: CBR Site, Modify MR Intake, WPCA Outfall	Aug 2014	Dec 2014	May 2015	Dec 2017
I-7: CBR Site, Modify MR Outfall, WPCA Outfall	Aug 2014	Dec 2014	May 2015	Apr 2018
S-8: FEIR ML Site, Modify Mar Ref Intake, Modify Mar Ref Outfall	Nov 2014	Mar 2015	Mar 2016	July 2018
S-1: Mar Ref Site, Modify Mar Ref Intake, Modify Mar Ref Outfall	Nov 2014	Mar 2015	Mar 2016	July 2018
S-7: FEIR ML Site, Modify Mar Ref Intake, MLPP Outfall	Aug 2014	Dec 2014	May 2015	Apr 2018
S-2: Capurro Ranch Site, Open Ocean Intake (in ML), MLPP Outfall	Nov 2014	Mar 2015	Mar 2016	July 2018
I-5: CBR Site, MLPP Spent Cooling Water, MRWPCA Outfall	Nov 2013	Mar 2014	Nov 2014	Dec 2017
S-3: FEIR ML Site, MLPP Cooling Water, MLPP Outfall	Nov 2013	Mar 2014	Nov 2014	Dec 2017

The schedule provided in Table 2 for the Base Project and Contingency Options I-1, I-3, and D-1 assumes that the EIR and CPCN are not delayed by detailed evaluation of contingency options that involve direct intake of feedwater from Monterey Bay or Moss Landing Harbor and discharge of undiluted brine from a new outfall. Table 3 is provided to show the impact on the implementation schedule for the Base Project and Intake Contingency Option I-1 if these types of contingency options are evaluated in detail in the EIR.

**Table 2**  
**Implementation Schedule for**  
**Base Project and Contingency Options I-1, I-3 and D-1**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Nov 2013
CPCN Reapplication and Approval	In Progress	Jan 2014
Coastal Development Permit Reapplication and Approval	In Progress	Aug 2014
Test Slant Well Program	In Progress	Sept 2015
Design of D/B/B Project Facilities	Feb 2014	Aug 2015
Bidding and Construction of Intake Wells	June 2015	Feb 2017
Construction of D/B/B Project Facilities	June 2015	Dec 2017
Desalination Plant Preliminary Design and D/B Contractor Procurement	July 2013	Sept 2014
Desalination Plant Construction (D/B)	Oct 2014	Dec 2017
Desalination Plant Start-up	July 2017	Dec 2017

**Table 3**  
**Implementation Schedule for Base Project and Contingency Options**  
**I-1 and D-1 Following EIR Evaluation of Direct Intake and New Outfall Options**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Nov 2014
CPCN Reapplication and Approval	In Progress	Feb 2015
Coastal Development Permit Reapplication and Approval	In Progress	Aug 2015
Test Slant Well Program	In Progress	Sept 2015
Design of D/B/B Project Facilities	Mar 2015	Aug 2016
Design of Intake Wells	Mar 2015	May 2016
Bidding and Construction of Intake Wells	June 2016	Feb 2018
Construction of D/B/B Project Facilities	Mar 2016	July 2018
Desalination Plant Preliminary Design and D/B Contractor Procurement	Jan 2014	Mar 2015
Desalination Plant Construction (D/B)	Dec 2015	July 2018
Desalination Plant Start-up	Jan 2018	July 2018

As shown in Table 3, detailed evaluation of direct intake and new outfall contingency options may delay completion of the Base Project or Contingency Options I-1 or D-1 by approximately 7 months. This is primarily due to the plan for construction of the intake wells at the CEMEX site to avoid impacts to the Snowy Plover during nesting season. The current plan is very challenging and includes construction of the wells in two phases in two consecutive years during the non-nesting season: Phase 1 from October 2015 to February 2016, and Phase 2 from October 2016 to February 2017. As shown in Table 3, if the CPCN is not issued until February of 2015, design of the intake wells could not be initiated until the following month (March 2015) leaving only 3 months to prepare the design for a four-month bid and award period in time for construction in the October 2015 to February 2016 non-nesting season. Thus, the schedule shown in Table 3 requires that construction of the wells occur during the non-nesting seasons of October 2016 through February 2017 and October 2017 through February 2018.



Intake Contingency Option I-3 is not affected in the same way, because it has been assumed that there would be no seasonal restrictions on construction of intake slant wells at the Portrero Road Site. However, the requirement for a long pipeline from the Portrero Road site to the desalination plant, on top of all of the other Project requirements, requires additional design and construction time that would probably push the Project completion date past December 2017.

In comparison to the schedule shown in Table 2, the schedule shown in Table 3 provides 4 months less construction time for Project facilities that are delivered with the D/B/B approach. The schedule risk has been minimized by assuming that a fast-tracked multi-package construction approach would be used for pipeline construction. Also, it may be possible to defer construction of some facilities not essential for conveyance of product water from the desalination plant.

**Intake Contingency Options I-2, I-4, I-6, I-7, and I-8.** These intake contingency options all share the feature of using direct intake of feedwater from either Monterey Bay or Moss Landing Harbor. The implementation schedule for any one of these options is shown in Table 4 below. Although the schedule shows that the desalination plant for each contingency option can be constructed by December 2017, this is highly dependent on how the non-governmental organizations (NGO's), regulatory agencies, and Coastal Commission react to a proposal to use an open intake. The Coastal Commission has indicated that permitting of an open ocean intake is a long and difficult path, particularly if a subsurface intake is a feasible alternative. All of these contingency options may require approximately 12 months of ichthyoplankton data collection and preparation of an impingement and entrainment assessment as part of the EIR analysis, thereby possibly delaying the completion of the EIR to August 2014. However, these contingency options do avoid the schedule risks associated with constructing intake wells at the CEMEX beach sites.

In comparison to the schedule shown in Table 2, the schedule shown in Table 4 provides 4 months less construction time for Project facilities that are delivered with the D/B/B approach. All of these contingency options except I-2 include an additional long pipeline south from the Moss Landing area. Additional time may be required for permitting of the pipeline crossings of Moro Cojo Slough, Tembladero Slough, and the Salinas River. Construction of this pipeline, as well as all of the other facilities required, must occur during this already compressed time frame and this increases project and schedule risk. The schedule risk has been minimized by assuming that a fast-tracked multi-package construction approach would be used for pipeline construction. Also, it may be possible to defer construction of some facilities not essential for conveyance of product water from the desalination plant.

**Contingency Options I-5, D-3, and S-3.** These contingency options involve using spent cooling water for feedwater (I-5), MLPP outfall for brine discharge (D-3), or both (S-3). The implementation schedule for any one of these three options is shown in Table 5 below. The EIR schedule for these options is the same as the EIR schedule for the Base Project, since the option of using spent cooling water for feedwater and/or the MLPP outfall for brine discharge have already been evaluated in the Coastal Water Project EIR. Additional time has been programmed into the schedule for CPUC's issuance of the CPCN following the EIR, and also some additional time has been programmed for obtaining a CDP. The Coastal Commission has already expressed strong concerns about using MLPP facilities to support a desalination project. All three of these options require a long additional pipeline south from the Moss Landing area. Additional time may be required for permitting of pipeline crossings of Moro Cojo Slough, Tembladero Slough, and the Salinas River. The schedule risk associated with additional construction requirements has been minimized by providing additional construction time for this pipeline. All three of these contingency options avoid the schedule risks associated with constructing intake wells at the CEMEX beach sites.

**Table 4**  
**Implementation Schedule for**  
**Contingency Options I-2, I-4, I-6, I-7, I-8**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Aug 2014
Marine Biology Technical Studies	March 2013	May 2014
CPCN Reapplication and Approval	In Progress	Dec 2014
Coastal Development Permit Reapplication and Approval	In Progress	May 2015
Test Slant Well Program	Not Required	Not Required
Design of D/B/B Project Facilities	Jan 2015	Aug 2016
Construction of D/B/B Project Facilities	Jan 2015	Dec 2017
Desalination Plant Preliminary Design and D/B Contractor Procurement	July 2013	Dec 2014
Desalination Plant Construction (D/B)	Aug 2015	Dec 2017
Desalination Plant Start-up	July 2017	Dec 2017

**Table 5**  
**Implementation Schedule for Contingency Options I-5, D-3, and S-3**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Nov 2013
CPCN Reapplication and Approval	In Progress	Mar 2014
Coastal Development Permit Reapplication and Approval	In Progress	Nov 2014
Design of D/B/B Project Facilities	Apr 2014	Aug 2015
Bidding and Construction of Intake Wells (D-3 Only)	June 2015	Feb 2017
Construction of D/B/B Project Facilities	Apr 2015	Dec 2017
Desalination Plant Preliminary Design and D/B Contractor Procurement	July 2013	Sept 2014
Desalination Plant Construction (D/B)	Dec 2014	Dec 2017
Desalination Plant Start-up	July 2017	Dec 2017

**Contingency Options D-2, D-4, and S-6.** These contingency options involve discharging undiluted brine through a new ocean outfall at CEMEX (D-2) or through a modified outfall at the Marine Refractory Site (D-4), or through a new ocean outfall near Moss Landing (S-6). Feedwater to the desalination plant would be from subsurface intakes. The implementation schedule for any of these three options is shown in Table 6 below. It has been assumed that the EIR for these options would be completed 9 months later than for the Base Project schedule, in order to conduct marine biology sampling and inventory, and to prepare a hyper-salinity impact assessment. This leads to the principle schedule concern for contingency options D-2 and D-4, which is that only 6 months of time is available for design prior to bidding of the intake wells. Additional time has been programmed into the schedule for CPUC's issuance of the CPCN following the EIR, and also some additional time have been programmed for obtaining an NPDES permit for the discharge, which will be necessary before obtaining a CDP.

In comparison to the schedule shown in Table 2, the schedule shown in Table 6 provides 4 months less construction time for Project facilities that are delivered with the D/B/B approach. Options D-2 and D-4 require a long brine pipeline north from the desalination plant at Charles Benson Road, and Option S-6 requires a long product water pipeline south from the Moss Landing area. Additional time may be required for permitting of the pipeline crossings of Moro Cojo Slough, Tembladero Slough, and the Salinas River. Construction of these pipelines, as well as all of the other facilities required, must occur during this already compressed time frame

**Table 6**  
**Implementation Schedule for**  
**Discharge Contingency Options D-2, D-4, and S-6**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Aug 2014
CPCN Reapplication and Approval	In Progress	Dec 2014
Coastal Development Permit Reapplication and Approval	In Progress	Aug 2015
Test Slant Well Program	In Progress	Sept 2015
Design of D/B/B Project Facilities	Jan 2015	Jan 2017
Bidding and Construction of Intake Wells	June 2015	Feb 2017
Construction of D/B/B Project Facilities	Jan 2016	April 2018
Desalination Plant Preliminary Design and D/B Contractor Procurement	Oct 2014	Dec 2015
Desalination Plant Construction (D/B)	Sept 2015	Apr 2018
Desalination Plant Start-up	Nov 2017	Apr 2018

and this increases project and schedule risk. The schedule risk has been minimized by assuming that a fast-tracked multi-package construction approach would be used for pipeline construction. Also, it may be possible to defer construction of some facilities not essential for conveyance of product water from the desalination plant.

**Site Contingency Options S-1, S-2, and S-8.** These contingency options all involve direct intake of feedwater from either Moss Landing Harbor or from Monterey Bay, and discharge of undiluted brine to a new ocean outfall. It has been assumed that the completion of the EIR would be delayed 12 months in order to allow for a full year of current studies, marine biological sampling and inventory, preparation of an impingement and entrainment impact assessment, brine discharge modeling, and preparation of a hyper-salinity impact assessment. The implementation schedule for these options is shown in Table 7 below. The subjects of direct intake and new brine outfall are both somewhat controversial and additional time has been programmed into the schedule to account for CPUC's issuance of the CPCN and Coastal Commission's issuance of the CDP.

In comparison to the schedule shown in Table 2, the schedule shown in Table 7 provides 3 months less construction time for Project facilities that are delivered with the D/B/B approach. All of these options require a long product water pipeline south from the Moss Landing area. Additional time may be required for permitting of the pipeline crossings of Moro Cojo Slough, Tembladero Slough, and the Salinas River. The schedule risk has been minimized by assuming that a fast-tracked multi-package construction approach would be used for pipeline construction. Also, it may be possible to defer construction of some facilities not essential for conveyance of product water from the desalination plant.

**Table 7**  
**Implementation Schedule for Site Contingency Options S-1, S-2, and S-8**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Nov 2014
Marine Biology and Oceanography Technical Studies	March 2013	July 2014
CPCN Reapplication and Approval	In Progress	Mar 2015
Coastal Development Permit Reapplication and Approval	In Progress	Mar 2016
Design of D/B/B Project Facilities	Apr 2015	Oct 2015
Construction of D/B/B Project Facilities	Apr 2016	July 2018
Desalination Plant Preliminary Design and D/B Contractor Procurement	Jan 2014	Mar 2015
Desalination Plant Construction (D/B)	Apr 2016	July 2018
Desalination Plant Start-up	Jan 2018	July 2018

**Discharge Contingency Options S-4.** This contingency option involves constructing slant wells at the Portrero Road site, and discharge of brine from a desalination plant at the Coastal Water Project FEIR Moss Landing site to the MLPP cooling water outfall. The implementation schedule for this option is shown in Table 8 below. This alternative was actually presented in the Coastal Water Project EIR, and it is assumed that re-evaluation of this alternative would not delay completion of the EIR. Similar to Contingency Options S-3 and D-3, use of MLPP facilities to support a desalination plant is somewhat controversial and additional time has been programmed into the schedule to account for CPUC's issuance of the CPCN and Coastal Commission's issuance of the CDP. The CDP could actually become a limiting factor in allowing construction to proceed, and if so, additional delays could occur. However, by utilizing slant wells at the Portrero Road site, it is assumed that this contingency option avoids the schedule risks associated with constructing intake wells at the CEMEX beach sites.

In comparison to the schedule shown in Table 2, the schedule shown in Table 8 provides 3 months less construction time for Project facilities that are delivered with the D/B/B approach. This option requires a long product water pipeline south from the Moss Landing area. Also, additional time may be required for permitting of the pipeline crossings of Moro Cojo Slough (two times for this alternative), the old Salinas River channel, Tembladero Slough, and the Salinas River. The schedule risk has been minimized by assuming that a fast-tracked multi-package construction approach would be used for pipeline construction. Also, it may be possible to defer construction of some facilities not essential for conveyance of product water from the desalination plant.

**Table 8**  
**Implementation Schedule for Site Contingency Option S-4**

<b>Implementation Activity</b>	<b>Start (month)</b>	<b>Finish (month)</b>
CEQA Subsequent EIR	In Progress	Nov 2013
CPCN Reapplication and Approval	In Progress	Feb 2014
Coastal Development Permit Reapplication and Approval	In Progress	Sept 2014
Test Slant Well Program	In Progress	Sept 2015
Design of D/B/B Project Facilities	Mar 2014	Aug 2015
Bidding and Construction of Intake Wells	June 2015	Feb 2017
Construction of D/B/B Project Facilities	Sept 2015	Dec 2017
Desalination Plant Preliminary Design and D/B Contractor Procurement	July 2013	Sept 2014
Desalination Plant Construction (D/B)	Oct 2014	Dec 2017
Desalination Plant Start-up	July 2017	Dec 2017

**Site Contingency Option S-5.** This contingency option involves constructing slant wells at the Portrero Road site, and discharge of brine from a desalination plant at the Coastal Water Project FEIR Moss Landing site to a modified Marine Refractories Outfall. The implementation schedule for this contingency option is similar to the implementation schedule for Discharge Contingency Option D-4 (See Table 6); however, by utilizing slant wells at the Portrero Road site, it is assumed that this contingency option avoids the schedule risks associated with constructing intake wells at the CEMEX beach sites.

**Site Contingency Option S-7.** This contingency option involves modifying the existing Marine Refractories outfall to use it as an intake, and discharge of brine to the MRWPCA Outfall. The implementation schedule for this contingency option is similar to Intake Contingency Option I-4 (See Table 4); however, the additive burdens of securing a desalination plant site in the Moss Landing area, coupled with unknown feasibility of converting this outfall to a different use and permitting sensitivities associated with direct intake from Monterey Bay, would probably would delay critical permitting milestones to the extent that completion of the project would be delayed until early in 2018.

# Attachment 6

	<b>Total Capital Cost (Most Probable)</b>	<b>High End of Accuracy Range 125%</b>	<b>Low End of Accuracy Range 85%</b>
Proposed Project	\$ 75,726,000	\$ 94,700,000	\$ 64,400,000
	<b>Total Incremental Capital Cost (Most Probable)</b>	<b>High End of Accuracy Range 125%</b>	<b>Low End of Accuracy Range 85%</b>
Intake Contingency Option 1	\$ 1,600,000	\$ 2,000,000	\$ 1,400,000
Intake Contingency Option 2	\$ 3,600,000	\$ 4,500,000	\$ 3,100,000
Intake Contingency Option 3	\$ 2,200,000	\$ 2,800,000	\$ 1,900,000
Intake Contingency Option 4	\$ 11,300,000	\$ 14,100,000	\$ 9,600,000
Intake Contingency Option 5	\$ 10,500,000	\$ 13,100,000	\$ 8,900,000
Intake Contingency Option 6	\$ 11,700,000	\$ 14,600,000	\$ 9,900,000
Intake Contingency Option 7	\$ 12,400,000	\$ 15,500,000	\$ 10,500,000
Intake Contingency Option 8	\$ 12,200,000	\$ 15,300,000	\$ 10,400,000
Discharge Contingency Option 1	\$ 9,500,000	\$ 11,900,000	\$ 8,100,000
Discharge Contingency Option 2	\$ 10,000,000	\$ 12,500,000	\$ 8,500,000
Discharge Contingency Option 3	\$ 18,800,000	\$ 23,500,000	\$ 16,000,000
Discharge Contingency Option 4	\$ 22,600,000	\$ 28,300,000	\$ 19,200,000
Site Contingency Option 1	\$ 2,300,000	\$ 2,900,000	\$ 2,000,000
Site Contingency Option 2	\$ 16,576,000	\$ 20,700,000	\$ 14,100,000
Site Contingency Option 3	\$ 624,000	\$ 800,000	\$ 500,000
Site Contingency Option 4	\$ 21,240,000	\$ 26,600,000	\$ 18,100,000
Site Contingency Option 5	\$ 21,200,000	\$ 26,500,000	\$ 18,000,000
Site Contingency Option 6	\$ 35,000,000	\$ 43,800,000	\$ 29,800,000
Site Contingency Option 7	\$ 224,000	\$ 300,000	\$ 200,000
Site Contingency Option 8	\$ 14,915,000	\$ 18,600,000	\$ 12,700,000

Base Project				
Facility	Unit	Cost		Total
Slant Wells				
Slant Test Well Installation,	1 EA	\$	5,000,000	\$5,000,000
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheeting	\$4,700,000
Subtotal Base Construction				\$32,300,000
Implementation %20				\$6,460,000
Land				\$1,100,000
Subtotal				\$39,860,000
Contingencies 25%				\$9,965,000
Mitigation 1%				\$498,250
Total				\$50,323,000
Tunnel				
Tunnel Caissons	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
Intake Pump Station				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000

Base Project				
<b>Intake Pipeline</b>				
Intake Pipeline	8300 LF	\$	310	\$2,600,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$3,100,000
Implementation %20				\$620,000
Subtotal				\$3,720,000
Contingencies 25%				\$930,000
Mitigation 1%				\$47,000
Total				\$4,697,000
<b>Brine Discharge Pipeline</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$1,200,000
Implementation %20				\$240,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,040,000
Contingencies 25%				\$1,010,000
Mitigation 1%				\$51,000
Total				\$5,101,000
<b>CSIP Return</b>				
Pumps for Delivery to CSIP Pond	1 LS	\$	100,000	\$100,000
Pipeline to CSIP Pond	6200 LF	\$	100	\$600,000
Subtotal Base Construction				\$700,000
Implementation %20				\$140,000
Subtotal				\$840,000
Contingencies 25%				\$210,000
Mitigation 1%				\$11,000
Total				\$1,061,000
Total				\$75,726,000



I-1: Ranney collectors at CEMEX property that extract seawater from the Sand Dunes formation				
ADDITIONAL COMPONENTS				
Ranney collectors	1 LS			\$23,000,000
Temporary Sheet Piling and Wave Protection for Construction	4 EA	\$	40 SF/Sheeting	\$3,700,000
Subtotal Base Construction				\$26,700,000
Implementation %20				\$5,340,000
Land				\$0
Subtotal				\$32,040,000
Contingencies 25%				\$8,010,000
Mitigation 1%				\$400,500
Total				\$40,000,000
Additional Beach pipeline				
Intake Pipeline-Special Construction	900 LF	\$	1,000	\$900,000
Subtotal Base Construction				\$900,000
Implementation %20				\$180,000
Subtotal				\$1,080,000
Contingencies 25%				\$270,000
Mitigation 1%				\$14,000
Total				\$1,400,000
TOTAL				\$41,400,000

I-1: Ranney collectors at CEMEX property that extract seawater from the Sand Dunes formation				
AVOIDED COMPONENTS				
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheeting	\$4,700,000
Subtotal Base Construction				\$26,300,000
Implementation %20				\$5,260,000
Land				\$0
Subtotal				\$31,560,000
Contingencies 25%				\$7,890,000
Mitigation 1%				\$394,500
Total				\$39,800,000
TOTAL				\$39,800,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$1,600,000</b>
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I-2: Open ocean intake offshore from CEMEX property				
ADDITIONAL COMPONENTS				
<b>Tunnel</b>				
Tunnel under the ocean floor	2700 LF	\$	2,000	\$5,400,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 40%		Marine Contingency Factor		\$2,592,000
Mitigation 1%				\$91,000
Total				\$9,163,000
<b>Terminal Structure</b>				
	1 EA	\$	2,000,000	\$2,000,000
Subtotal Base Construction				\$2,000,000
Implementation %20				\$400,000
Subtotal				\$2,400,000
Contingencies 40%		Marine Contingency Factor		\$1,000,000
Mitigation 1%				\$30,000
Total				\$3,400,000
<b>Wedge Wire Screens</b>				
	1 EA	\$	200,000	\$200,000
Subtotal Base Construction				\$200,000
Implementation %20				\$40,000
Land				\$0
Subtotal				\$240,000
Contingencies 40%		Marine Contingency Factor		\$100,000
Mitigation 1%				\$3,000
Total				\$300,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000
			TOTAL	\$46,200,000

I-2: Open ocean intake offshore from CEMEX property				
AVOIDED COMPONENTS				
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheeting	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,000,000
Subtotal				\$33,760,000
Contingencies 25%				\$8,440,000
Mitigation 1%				\$422,000
Total				\$42,600,000
			TOTAL	\$42,600,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$3,600,000</b>
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I-3: Slant well intake system at Portrero Road with feedwater pumped to Desalination Plant at CBR site				
ADDITIONAL COMPONENTS				
<b>Intake Pipeline</b>				
Intake Pipeline	34000 LF	\$	310	\$10,500,000
Intake Pipeline-Special Construction	1700 LF	\$	2,025	\$3,400,000
Subtotal Base Construction				\$13,900,000
Implementation %20				\$2,780,000
Land/ROW	13,000 LF	\$	16.0	\$208,000
Subtotal				\$16,888,000
Contingencies 25%				\$4,222,000
Mitigation 1%				\$211,000
Total				\$21,300,000
Feedwater Pipeline Between Clusters	1,600 LF	\$	300	\$500,000
Subtotal Base Construction				\$500,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$600,000
Contingencies 25%				\$150,000
Mitigation 1%				\$7,500
Total				\$758,000
<b>Intake Pump Station</b>				
PS	2000 \$/hp	\$	4,600,000	\$4,600,000
Subtotal Base Construction				\$4,600,000
Implementation %20				\$920,000
Land				\$100,000
Subtotal				\$5,620,000
Contingencies 25%				\$1,405,000
Mitigation 1%				\$70,000
Total				\$7,100,000
TOTAL				\$29,200,000

I-3: Slant well intake system at Portrero Road with feedwater pumped to Desalination Plant at CBR site				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Temporary Sheet Piling and Wave Protection for Construction</b>				
	2 EA	\$	40 SF/Sheetir	\$4,700,000
Subtotal Base Construction				\$4,700,000
Implementation %20				\$940,000
Land				\$0
Subtotal				\$5,640,000
Contingencies 25%				\$1,410,000
Mitigation 1%				\$70,500
Total				\$7,100,000
<b>Feedwater Pipeline Between Clusters</b>				
	900 LF	\$	1,140	\$1,000,000
Subtotal Base Construction				\$1,000,000
Implementation %20				\$200,000
Land				\$1,100,000
Subtotal				\$2,300,000
Contingencies 25%				\$575,000
Mitigation 1%				\$28,750
Total				\$2,904,000
<b>Intake Pump Station</b>				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,920,000
Contingencies 25%				\$480,000
Mitigation 1%				\$24,000
Total				\$2,424,000
TOTAL				\$27,000,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$2,200,000</b>
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**I-4: Direct intake of water from Moss Landing Harbor, using existing Marine Refractory intake infrastructure, with feedwater pumped to a desalination plant at the CBR site**

**ADDITIONAL COMPONENTS**

**Intake Pipeline**

Intake Pipeline	43500 LF	\$	310	\$13,500,000
Intake Pipeline-Special Construction	2500 LF	\$	2,025	\$5,100,000
Subtotal Base Construction				\$18,600,000
Implementation %20				\$3,720,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$23,071,000
Contingencies 25%				\$5,768,000
Mitigation 1%				\$288,000
Total				\$29,100,000

**Intake Pump Station**

PS	2000 \$/hp			\$4,900,000
Subtotal Base Construction				\$4,900,000
Implementation %20				\$980,000
Land				\$100,000
Subtotal				\$5,980,000
Contingencies 25%				\$1,495,000
Mitigation 1%				\$70,000
Total				\$7,500,000

**Pretreatment**

	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000

**Intake and Screen Mods**

	1 EA	\$	650,000	\$650,000
Subtotal Base Construction				\$650,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$750,000
Contingencies 40%			Marine Contingency Factor	\$300,000
Mitigation 1%				\$10,000
Total				\$1,100,000

**TOTAL \$71,000,000**

**I-4: Direct intake of water from Moss Landing Harbor, using existing Marine Refractory intake infrastructure, with feedwater pumped to a desalination plant at the CBR site**

**AVOIDED COMPONENTS**

**Tunnel**

Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000

**Intake Pipeline**

Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000

**Intake Pump Station**

Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$	3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200		\$600,000
Subtotal Base Construction					\$4,200,000
Implementation %20					\$840,000
Land					\$0
Subtotal					\$5,040,000
Contingencies 25%					\$1,260,000
Mitigation 1%					\$63,000
Total					\$6,363,000

**Slant Wells**

Slant Production Well Installation	8 EA	\$	2,900		\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000		\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140		\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40	SF/Sheetp	\$4,700,000
Subtotal Base Construction					\$27,300,000
Implementation %20					\$5,460,000
Land					\$1,100,000
Subtotal					\$33,860,000
Contingencies 25%					\$8,465,000
Mitigation 1%					\$423,250
Total					\$42,700,000

**TOTAL \$59,700,000**

**INCREMENTAL CAPITAL COST**

**\$11,300,000**

**I-5: Use of spent cooling water from the Moss Landing Power Plant, with feedwater pumped to a desalination plant at the CBR site**

**ADDITIONAL COMPONENTS**

<b>Intake Pipeline</b>				
Intake Pipeline	43500 LF	\$	310	\$13,500,000
Intake Pipeline-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$17,600,000
Implementation %20				\$3,520,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$21,871,000
Contingencies 25%				\$5,468,000
Mitigation 1%				\$273,000
Total				\$27,600,000
<b>Intake Pump Station</b>				
PS	2000 \$/hp			\$4,900,000
Subtotal Base Construction				\$4,900,000
Implementation %20				\$980,000
Land				\$100,000
Subtotal				\$5,980,000
Contingencies 25%				\$1,495,000
Mitigation 1%				\$70,000
Total				\$7,500,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Equalization Basin	1 EA	\$	666,700	\$666,700
Subtotal Base Construction				\$22,666,700
Implementation %20				\$4,500,000
Land				\$0
Subtotal				\$27,170,000
Contingencies 25%				\$6,800,000
Mitigation 1%				\$340,000
Total				\$34,300,000
<b>Intake Connection at Dis. Basin</b>				
	1 EA	\$	500,000	\$500,000
Subtotal Base Construction				\$500,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$600,000
Contingencies 25%				\$200,000
Mitigation 1%				\$10,000
Total				\$800,000
<b>TOTAL</b>				<b>\$70,200,000</b>

**I-5: Use of spent cooling water from the Moss Landing Power Plant, with feedwater pumped to a desalination plant at the CBR site**

**AVOIDED COMPONENTS**

**Tunnel**

Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000

**Intake Pipeline**

Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000

**Intake Pump Station**

Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$	3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200		\$600,000
Subtotal Base Construction					\$4,200,000
Implementation %20					\$840,000
Land					\$0
Subtotal					\$5,040,000
Contingencies 25%					\$1,260,000
Mitigation 1%					\$63,000
Total					\$6,363,000

**Slant Wells**

Slant Production Well Installation	8 EA	\$	2,900		\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000		\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140		\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40	SF/Sheetii	\$4,700,000
Subtotal Base Construction					\$27,300,000
Implementation %20					\$5,460,000
Land					\$1,100,000
Subtotal					\$33,860,000
Contingencies 25%					\$8,465,000
Mitigation 1%					\$423,250
Total					\$42,700,000

TOTAL \$59,700,000

**INCREMENTAL CAPITAL COST**

**\$10,500,000**



I-6: Use of water diverted from the Moss Landing Power Plant cooling water intake facilities, with feedwater pumped to a desalination plant at the CBR site				
ADDITIONAL COMPONENTS				
<b>Intake Pipeline</b>				
Intake Pipeline	43500 LF	\$	310	\$13,500,000
Intake Pipeline-Special Construction	2500 LF	\$	2,025	\$5,100,000
Subtotal Base Construction				\$18,600,000
Implementation %20				\$3,720,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$23,071,000
Contingencies 25%				\$5,768,000
Mitigation 1%				\$288,000
Total				\$29,100,000
<b>Intake Pump Station</b>				
PS	2000 \$/hp			\$5,100,000
Subtotal Base Construction				\$5,100,000
Implementation %20				\$1,020,000
Land				\$100,000
Subtotal				\$6,220,000
Contingencies 25%				\$1,555,000
Mitigation 1%				\$80,000
Total				\$7,900,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000
<b>Intake and Screen Mods</b>				
	1 EA	\$	650,000	\$650,000
Subtotal Base Construction				\$650,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$750,000
Contingencies 40%	Marine Contingency Factor			\$300,000
Mitigation 1%				\$10,000
Total				\$1,100,000
TOTAL				\$71,400,000

I-6: Use of water diverted from the Moss Landing Power Plant cooling water intake facilities, with feedwater pumped to a desalination plant at the CBR site				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissons	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Intake Pump Station</b>				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheet	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000
TOTAL				\$59,700,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$11,700,000</b>
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**I-7: Convert existing Marine Refractory outfall into an open ocean intake, with feedwater pumped to a desalination plant at the CBR site**

**ADDITIONAL COMPONENTS**

**Intake Pipeline**

Intake Pipeline	43500 LF	\$	310	\$13,500,000
Intake Pipeline-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$17,600,000
Implementation %20				\$3,520,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$21,871,000
Contingencies 25%				\$5,468,000
Mitigation 1%				\$273,000
Total				\$27,600,000

**Intake Pump Station**

PS	2000 \$/hp			\$5,100,000
Subtotal Base Construction				\$5,100,000
Implementation %20				\$1,020,000
Land				\$100,000
Subtotal				\$6,220,000
Contingencies 25%				\$1,555,000
Mitigation 1%				\$80,000
Total				\$7,900,000

**Pretreatment**

	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000

**Outfall Modifications**

	1 EA	\$	650,000	\$650,000
Subtotal Base Construction				\$650,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$750,000
Contingencies 40%			Marine Contingency Factor	\$300,000
Mitigation 1%				\$10,000
Total				\$1,100,000

**Screens**

	1 EA	\$	1,300,000	\$1,300,000
Subtotal Base Construction				\$1,300,000
Implementation %20				\$300,000
Land				\$0
Subtotal				\$1,600,000
Contingencies 40%			Marine Contingency Factor	\$600,000
Mitigation 1%				\$20,000
Total				\$2,200,000

**TOTAL \$72,100,000**

**I-7: Convert existing Marine Refractory outfall into an open ocean intake, with feedwater pumped to a desalination plant at the CBR site****AVOIDED COMPONENTS****Tunnel**

Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000

**Intake Pipeline**

Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000

**Intake Pump Station**

Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$	3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200		\$600,000
Subtotal Base Construction					\$4,200,000
Implementation %20					\$840,000
Land					\$0
Subtotal					\$5,040,000
Contingencies 25%					\$1,260,000
Mitigation 1%					\$63,000
Total					\$6,363,000

**Slant Wells**

Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheet	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000

**TOTAL****\$59,700,000****INCREMENTAL CAPITAL COST****\$12,400,000**

**I-8: Construct a new open ocean intake near Moss Landing, with feedwater pumped to a desalination plant at the CBR site**

**ADDITIONAL COMPONENTS**

**Intake Pipeline**

Intake Pipeline	34000 LF	\$	310	\$10,500,000
Intake Pipeline-Special Construction	800 LF	\$	2,025	\$1,600,000
Subtotal Base Construction				\$12,100,000
Implementation %20				\$2,420,000
Land/ROW-Private	13,000 LF	\$	16.0	\$208,000
Subtotal				\$14,728,000
Contingencies 25%				\$3,682,000
Mitigation 1%				\$184,000
Total				\$18,600,000

**Intake Pump Station**

PS	2000 \$/hp			\$4,600,000
Subtotal Base Construction				\$4,600,000
Implementation %20				\$920,000
Land				\$100,000
Subtotal				\$5,620,000
Contingencies 25%				\$1,405,000
Mitigation 1%				\$70,000
Total				\$7,100,000

**Pretreatment**

	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000

**Tunnel**

Tunnel under the ocean floor	2700 LF	\$	2,000	\$5,400,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 40%			Marine Contingency Factor	\$2,592,000
Mitigation 1%				\$91,000
Total				\$9,163,000

**Terminal Structure**

	1 EA	\$	2,000,000	\$2,000,000
Subtotal Base Construction				\$2,000,000
Implementation %20				\$400,000
Subtotal				\$2,400,000
Contingencies 40%			Marine Contingency Factor	\$1,000,000
Mitigation 1%				\$30,000
Total				\$3,400,000

**Wedge Wire Screens**

	1 EA	\$	200,000	\$200,000
Subtotal Base Construction				\$200,000
Implementation %20				\$40,000
Land				\$0
Subtotal				\$240,000
Contingencies 40%			Marine Contingency Factor	\$100,000
Mitigation 1%				\$3,000
Total				\$300,000

**TOTAL \$71,863,000**

**I-8: Construct a new open ocean intake near Moss Landing, with feedwater pumped to a desalination plant at the CBR site**

**AVOIDED COMPONENTS**

**Tunnel**

Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000

**Intake Pipeline**

Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000

**Intake Pump Station**

Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$	3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200		\$600,000
Subtotal Base Construction					\$4,200,000
Implementation %20					\$840,000
Land	Included above				\$0
Subtotal					\$5,040,000
Contingencies 25%					\$1,260,000
Mitigation 1%					\$63,000
Total					\$6,363,000

**Slant Wells**

Slant Production Well Installation	8 EA	\$	2,900		\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000		\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140		\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40	SF/Sheetir	\$4,700,000
Subtotal Base Construction					\$27,300,000
Implementation %20					\$5,460,000
Land					\$1,100,000
Subtotal					\$33,860,000
Contingencies 25%					\$8,465,000
Mitigation 1%					\$423,250
Total					\$42,700,000

**TOTAL \$59,700,000**

**INCREMENTAL CAPITAL COST**

**\$12,200,000**

D-1: Modify outfall by inserting separate pipe for brine discharge, and adding dedicated brine diffusers at the end of the outfall				
ADDITIONAL COMPONENTS				
<b>Brine Pump Station</b>				
PS	2500 \$/hp			\$2,300,000
Subtotal Base Construction				\$2,300,000
Implementation %20				\$460,000
Land				\$0
Subtotal				\$2,760,000
Contingencies 25%				\$690,000
Mitigation 1%				\$30,000
Total				\$3,500,000
<b>Slip Lining</b>				
Slip Lining	13500 LF	\$	200	\$2,700,000
Subtotal Base Construction				\$2,700,000
Implementation %20				\$540,000
Subtotal				\$3,240,000
Contingencies 25%				\$800,000
Mitigation 1%				\$40,000
Total				\$4,100,000
<b>Exit Structure</b>				
Exit Structure	1 EA	\$	1,300,000	\$1,300,000
Subtotal Base Construction				\$1,300,000
Implementation %20				\$260,000
Subtotal				\$1,560,000
Contingencies 25%				\$400,000
Mitigation 1%				\$20,000
Total				\$2,000,000
<b>New Diffusers</b>				
New Diffusers	1 EA	\$	350,000	\$350,000
Subtotal Base Construction				\$350,000
Implementation %20				\$70,000
Subtotal				\$420,000
Contingencies 25%				\$100,000
Mitigation 1%				\$10,000
Total				\$500,000
TOTAL				\$10,100,000

D-1: Modify outfall by inserting separate pipe for brine discharge, and adding dedicated brine diffusers at the end of the outfall				
AVOIDED COMPONENTS				
<b>Brine Discharge Facilities</b>				
Brine Storage Basin	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$400,000
Implementation %20				\$80,000
Subtotal				\$480,000
Contingencies 25%				\$120,000
Mitigation 1%				\$6,000
Total				\$606,000
TOTAL				\$600,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$9,500,000</b>
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D-2: Install new outfall off-shore of CEMEX property				
ADDITIONAL COMPONENTS				
<b>Brine Pipeline</b>				
Brine Pipeline	10500 LF	\$	180	\$1,900,000
Brine Pipeline-Special Construction	500 LF	\$	2,025	\$1,000,000
Subtotal Base Construction				\$2,900,000
Implementation %20				\$580,000
Land	3500 LF	\$	16	\$120,000
Subtotal				\$3,600,000
Contingencies 25%				\$900,000
Mitigation 1%				\$45,000
Total				\$4,500,000
<b>Outfall Tunnel</b>				
Outfall Tunnel	2700 EA	\$	2,000	\$5,400,000
Subtotal Base Construction				\$5,400,000
Implementation %20				\$1,080,000
Subtotal				\$6,480,000
Contingencies 25%				\$1,600,000
Mitigation 1%				\$80,000
Total				\$8,200,000
<b>Terminal Structure and Diff</b>				
Terminal Structure and Diff	1 EA	\$	2,000,000	\$2,000,000
Subtotal Base Construction				\$2,000,000
Implementation %20				\$400,000
Subtotal				\$2,400,000
Contingencies 25%				\$600,000
Mitigation 1%				\$30,000
Total				\$3,000,000
TOTAL				\$15,700,000

D-2: Install new outfall off-shore of CEMEX property				
AVOIDED COMPONENTS				
<b>Brine Discharge Facilities</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Basin	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$5,700,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$10,000,000</b>
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D-3: Construct brine pipeline to Moss Landing, and discharge to the MLPP cooling water outfall				
ADDITIONAL COMPONENTS				
<b>Brine Pipeline</b>				
Brine Pipeline	47000 LF	\$	180	\$8,500,000
Brine Pipeline-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$12,600,000
Implementation %20				\$2,520,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$15,871,000
Contingencies 25%				\$3,968,000
Mitigation 1%				\$198,000
Total				\$20,000,000
<b>Brine Pump Station</b>				
PS	2500 \$/hp		210 ft TDH	\$2,775,000
Subtotal Base Construction				\$2,775,000
Implementation %20				\$555,000
Land				\$0
Subtotal				\$3,330,000
Contingencies 25%				\$832,500
Mitigation 1%				\$40,000
Total				\$4,200,000
<b>Disengaging Basin Conn.</b>				
Disengaging Basin Conn.	1 EA	\$	200,000	\$200,000
Subtotal Base Construction				\$200,000
Implementation %20				\$40,000
Subtotal				\$240,000
Contingencies 25%				\$100,000
Mitigation 1%				\$0
Total				\$300,000
TOTAL				\$24,500,000

D-3: Construct brine pipeline to Moss Landing, and discharge to the MLPP cooling water outfall				
AVOIDED COMPONENTS				
<b>Brine Discharge Facilities</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Basin	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$5,700,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$18,800,000</b>
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D-4: Construct brine pipeline to Moss Landing, and discharge to the existing Marine Refractory outfall, with modifications				
ADDITIONAL COMPONENTS				
<b>Brine Pipeline</b>				
Brine Pipeline	47000 LF	\$	180	\$8,500,000
Brine Pipeline-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$12,600,000
Implementation %20				\$2,520,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$15,456,000
Contingencies 25%				\$3,864,000
Mitigation 1%				\$193,000
Total				\$19,500,000
<b>Brine Pump Station</b>				
PS	2500 \$/hp		210 ft TDH	\$2,775,000
Subtotal Base Construction				\$2,775,000
Implementation %20				\$555,000
Land				\$0
Subtotal				\$3,330,000
Contingencies 25%				\$832,500
Mitigation 1%				\$40,000
Total				\$4,200,000
<b>Outfall Modifications</b>				
Outfall Modifications	1 EA	\$	2,700,000	\$2,700,000
Subtotal Base Construction				\$2,700,000
Implementation %20				\$540,000
Subtotal				\$3,240,000
Contingencies 25%				\$800,000
Mitigation 1%				\$40,000
Total				\$4,100,000
<b>New Diffusers</b>				
New Diffusers	1 EA	\$	350,000	\$350,000
Subtotal Base Construction				\$350,000
Implementation %20				\$70,000
Subtotal				\$420,000
Contingencies 25%				\$100,000
Mitigation 1%				\$10,000
Total				\$500,000
TOTAL				\$28,300,000

D-4: Construct brine pipeline to Moss Landing, and discharge to the existing Marine Refractory outfall, with				
AVOIDED COMPONENTS				
<b>Brine Discharge Pipeline</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$5,700,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$22,600,000</b>
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S-1: Desalination plant at Marine Refractory site				
ADDITIONAL COMPONENTS				
<b>Intake Pump Station</b>				
PS	2500 \$/hp			\$2,537,500
Subtotal Base Construction				\$2,537,500
Implementation %20				\$507,500
Land				\$0
Subtotal				\$3,045,000
Contingencies 25%				\$761,250
Mitigation 1%				\$40,000
Total				\$3,800,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000
<b>Intake and Screen Mods</b>				
	1 EA	\$	650,000	\$650,000
Subtotal Base Construction				\$650,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$750,000
Contingencies 40%				\$300,000
Mitigation 1%				\$10,000
Total				\$1,100,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000
<b>Product Water Pipeline</b>				
PW Pipeline	39000 LF	\$	340	\$13,300,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$17,400,000
Implementation %20				\$3,480,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$21,631,000
Contingencies 25%				\$5,408,000
Mitigation 1%				\$270,000
Total				\$27,300,000
TOTAL				<b>\$67,700,000</b>

S-1: Desalination plant at Marine Refractory site				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Implementation %20				\$320,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Intake Pump Station</b>				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheet	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000
<b>Brine Discharge Facilities</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$65,400,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$2,300,000</b>
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S-2: Desalination plant at Capurro Ranch site				
ADDITIONAL COMPONENTS				
<b>Intake Pump Station</b>				
PS	2500 \$/hp			\$2,537,500
Subtotal Base Construction				\$2,537,500
Implementation %20				\$507,500
Land				\$0
Subtotal				\$3,045,000
Contingencies 25%				\$761,250
Mitigation 1%				\$40,000
Total				\$3,800,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000
<b>Intake and Screen Mods</b>				
	1 EA	\$	650,000	\$650,000
Subtotal Base Construction				\$650,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$750,000
Contingencies 25%				\$200,000
Mitigation 1%				\$10,000
Total				\$1,000,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		115 ft	\$1,472,000
Subtotal Base Construction				\$1,472,000
Implementation %20				\$294,400
Land				\$0
Subtotal				\$1,766,400
Contingencies 25%				\$441,600
Mitigation 1%				\$20,000
Total				\$2,200,000
Brine Discharge Pipeline	7100 LF	\$	200	\$1,400,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$1,700,000
Implementation %20				\$340,000
Subtotal				\$2,040,000
Contingencies 25%				\$510,000
Mitigation 1%				\$26,000
Total				\$2,576,000
<b>Product Water Pipeline</b>				
PW Pipeline	46100 LF	\$	340	\$15,700,000
PW-Special Construction	4700 LF	\$	2,025	\$9,500,000
Subtotal Base Construction				\$25,200,000
Implementation %20				\$5,040,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$30,991,000
Contingencies 25%				\$7,748,000
Mitigation 1%				\$387,000
Total				\$39,100,000
TOTAL				<b>\$81,976,000</b>

S-2: Desalination plant at Capurro Ranch site				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Intake Pump Station</b>				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheetp	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000
<b>Brine Discharge Pipeline</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$65,400,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$16,576,000</b>
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S-3: FEIR proposed project at Moss Landing Desalination Plant site				
ADDITIONAL COMPONENTS				
<b>Intake Pump Station</b>				
PS	2500 \$/hp			\$1,912,500
Subtotal Base Construction				\$1,912,500
Implementation %20				\$382,500
Land				\$0
Subtotal				\$2,295,000
Contingencies 25%				\$573,750
Mitigation 1%				\$30,000
Total				\$2,900,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Equalization Basin	1 EA	\$	666,700	\$666,700
Subtotal Base Construction				\$22,666,700
Implementation %20				\$4,500,000
Land				\$0
Subtotal				\$27,170,000
Contingencies 25%				\$6,800,000
Mitigation 1%				\$340,000
Total				\$34,300,000
<b>Intake Connection at Dis. Basin</b>				
	1 EA	\$	325,000	\$325,000
Subtotal Base Construction				\$325,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$430,000
Contingencies 25%				\$100,000
Mitigation 1%				\$10,000
Total				\$500,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000
<b>Brine Discharge Pipeline</b>				
	6300 LF	\$	200	\$1,300,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Subtotal				\$1,920,000
Contingencies 25%				\$480,000
Mitigation 1%				\$24,000
Total				\$2,424,000
<b>Product Water Pipeline</b>				
PW Pipeline	32000 LF	\$	340	\$10,900,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$15,000,000
Implementation %20				\$3,000,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$18,751,000
Contingencies 25%				\$4,688,000
Mitigation 1%				\$234,000
Total				\$23,700,000
TOTAL				<b>\$66,024,000</b>

**S-3: FEIR proposed project at Moss Landing Desalination Plant site**

**AVOIDED COMPONENTS**

**Tunnel**

Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000

**Intake Pipeline**

Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000

**Intake Pump Station**

Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$	3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200		\$600,000
Subtotal Base Construction					\$4,200,000
Implementation %20					\$840,000
Land					\$0
Subtotal					\$5,040,000
Contingencies 25%					\$1,260,000
Mitigation 1%					\$63,000
Total					\$6,363,000

**Slant Wells**

Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissions with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheetir	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000

**Brine Discharge Pipeline**

Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000

**TOTAL \$65,400,000**

**INCREMENTAL CAPITAL COST**

**\$624,000**



S-4: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to MLPP outfall				
ADDITIONAL COMPONENTS				
<b>Intake Pipeline</b>				
Intake Pipeline	15000 LF	\$	310	\$4,700,000
Intake Pipeline-Special Construction	3000 LF	\$	2,025	\$6,100,000
Subtotal Base Construction				\$10,800,000
Implementation %20				\$2,160,000
Subtotal				\$12,960,000
Contingencies 25%				\$3,240,000
Mitigation 1%				\$162,000
Total				\$16,400,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000
<b>Brine Discharge Pipeline</b>				
	6300 LF	\$	200	\$1,300,000
Brine Connection to Dis. Basin	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Subtotal				\$1,920,000
Contingencies 25%				\$480,000
Mitigation 1%				\$24,000
Total				\$2,424,000
<b>Product Water Pipeline</b>				
PW Pipeline	32000 LF	\$	340	\$10,900,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$15,000,000
Implementation %20				\$3,000,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$18,751,000
Contingencies 25%				\$4,688,000
Mitigation 1%				\$234,000
Total				\$23,700,000
TOTAL				<b>\$44,724,000</b>

S-4: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to MLPP outfall				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Temporary Sheet Piling and Wave Protection for Construction</b>				
	2 EA	\$	40 SF/Sheetp	\$4,700,000
Subtotal Base Construction				\$4,700,000
Implementation %20				\$940,000
Land				\$0
Subtotal				\$5,640,000
Contingencies 25%				\$1,410,000
Mitigation 1%				\$70,500
Total				\$7,100,000
<b>Brine Discharge Facilities</b>				
	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
			TOTAL	\$23,483,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$21,240,000</b>
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S-5: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to Marine Refractory outfall				
ADDITIONAL COMPONENTS				
<b>Intake Pipeline</b>				
Intake Pipeline	15000 LF	\$	310	\$4,700,000
Intake Pipeline-Special Construction	3000 LF	\$	2,025	\$6,100,000
Subtotal Base Construction				\$10,800,000
Implementation %20				\$2,160,000
Subtotal				\$12,960,000
Contingencies 25%				\$3,240,000
Mitigation 1%				\$162,000
Total				\$16,400,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000
<b>Brine Discharge Pipeline</b>				
Brine Discharge Pipeline	6300 LF	\$	200	\$1,300,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Subtotal				\$1,920,000
Contingencies 25%				\$480,000
Mitigation 1%				\$24,000
Total				\$2,424,000
<b>Product Water Pipeline</b>				
PW Pipeline	32000 LF	\$	340	\$10,900,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$15,000,000
Implementation %20				\$3,000,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$18,751,000
Contingencies 25%				\$4,688,000
Mitigation 1%				\$234,000
Total				\$23,700,000
TOTAL				<b>\$44,724,000</b>

S-5: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to Marine Refractory outfall				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Temporary Sheet Piling and Wave Protection for Construction</b>				
	2 EA	\$	40 SF/Sheet	\$4,700,000
Subtotal Base Construction				\$4,700,000
Implementation %20				\$940,000
Land				\$0
Subtotal				\$5,640,000
Contingencies 25%				\$1,410,000
Mitigation 1%				\$70,500
Total				\$7,100,000
<b>Brine Discharge Pipeline</b>				
	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$23,483,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$21,200,000</b>
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**S-6: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to a new outfall**

**ADDITIONAL COMPONENTS**

**Intake Pipeline**

Intake Pipeline	15000 LF	\$	310	\$4,700,000
Intake Pipeline-Special Construction	3000 LF	\$	2,025	\$6,100,000
Subtotal Base Construction				\$10,800,000
Implementation %20				\$2,160,000
Subtotal				\$12,960,000
Contingencies 25%				\$3,240,000
Mitigation 1%				\$162,000
Total				\$16,400,000

**Product Water Pump Station**

PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000

**Brine Discharge Pipeline**

	15000 LF	\$	200	\$3,000,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$3,300,000
Implementation %20				\$660,000
Subtotal				\$3,960,000
Contingencies 25%				\$990,000
Mitigation 1%				\$50,000
Total				\$5,000,000

**Outfall Tunnel**

Outfall Tunnel	2700 EA		2000	\$ 5,400,000
Subtotal Base Construction				\$ 5,400,000
Implementation %20				\$ 1,080,000
Subtotal				\$ 6,480,000
Contingencies 25%				\$ 1,600,000
Mitigation 1%				\$ 80,000
Total				\$ 8,200,000

**Terminal Structure and Diff**

Terminal Structure and Diff	1 EA		2000000	\$ 2,000,000
Subtotal Base Construction				2000000
Implementation %20				\$400,000
Subtotal				\$2,400,000
Contingencies 25%				\$600,000
Mitigation 1%				\$30,000
Total				\$3,000,000

**Product Water Pipeline**

PW Pipeline	32000 LF	\$	340	\$10,900,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$15,000,000
Implementation %20				\$3,000,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$18,751,000
Contingencies 25%				\$4,688,000
Mitigation 1%				\$234,000
Total				\$23,700,000

**TOTAL \$58,500,000**

**S-6: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to a new outfall**

**AVOIDED COMPONENTS**

**Tunnel**

Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000

**Intake Pipeline**

Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000

**Temporary Sheet Piling and Wave Protection for Construction**

	2 EA	\$	40 SF/Sheetp	\$4,700,000
Subtotal Base Construction				\$4,700,000
Implementation %20				\$940,000
Land				\$0
Subtotal				\$5,640,000
Contingencies 25%				\$1,410,000
Mitigation 1%				\$70,500
Total				\$7,100,000

**Brine Discharge Pipeline**

	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000

**TOTAL \$23,483,000**

**INCREMENTAL CAPITAL COST**

**\$35,000,000**

S-7: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a MLPP outfall				
ADDITIONAL COMPONENTS				
<b>Intake Pump Station</b>				
PS	2500 \$/hp			\$1,912,500
Subtotal Base Construction				\$1,912,500
Implementation %20				\$382,500
Land				\$0
Subtotal				\$2,295,000
Contingencies 25%				\$573,750
Mitigation 1%				\$30,000
Total				\$2,900,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000
<b>Intake and Screen Mods</b>				
	1 EA	\$	650,000	\$650,000
Subtotal Base Construction				\$650,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$750,000
Contingencies 40%			Marine Contingency Factor	\$300,000
Mitigation 1%				\$10,000
Total				\$1,100,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000
<b>Brine Discharge Pipeline</b>				
	6300 LF	\$	200	\$1,300,000
Brine Connection to Dis Basin	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Subtotal				\$1,920,000
Contingencies 25%				\$480,000
Mitigation 1%				\$24,000
Total				\$2,424,000
<b>Product Water Pipeline</b>				
PW Pipeline	32000 LF	\$	340	\$10,900,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$15,000,000
Implementation %20				\$3,000,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$18,751,000
Contingencies 25%				\$4,688,000
Mitigation 1%				\$234,000
Total				\$23,700,000
TOTAL				<b>\$65,624,000</b>

S-7: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a MLPP outfall				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land	Included above			\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Intake Pump Station</b>				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissons with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40 SF/Sheetir	\$4,700,000
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000
<b>Brine Discharge Pipeline</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$65,400,000

<b>INCREMENTAL CAPITAL COST</b>	<b>\$224,000</b>
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S-8: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a new outfall				
ADDITIONAL COMPONENTS				
<b>Intake Pump Station</b>				
PS	2500 \$/hp			\$1,912,500
Subtotal Base Construction				\$1,912,500
Implementation %20				\$382,500
Land				\$0
Subtotal				\$2,295,000
Contingencies 25%				\$573,750
Mitigation 1%				\$30,000
Total				\$2,900,000
<b>Pretreatment</b>				
	1 EA	\$	22,000,000	\$22,000,000
Subtotal Base Construction				\$22,000,000
Implementation %20				\$4,400,000
Land				\$0
Subtotal				\$26,400,000
Contingencies 25%				\$6,600,000
Mitigation 1%				\$330,000
Total				\$33,300,000
<b>Intake Connection</b>				
	1 EA	\$	325,000	\$325,000
Subtotal Base Construction				\$325,000
Implementation %20				\$100,000
Land				\$0
Subtotal				\$430,000
Contingencies 25%				\$100,000
Mitigation 1%				\$10,000
Total				\$500,000
<b>Product Water Pump Station</b>				
PS	2000 \$/hp		110 ft	\$1,422,000
Subtotal Base Construction				\$1,422,000
Implementation %20				\$284,400
Land				\$0
Subtotal				\$1,706,400
Contingencies 25%				\$426,600
Mitigation 1%				\$20,000
Total				\$2,200,000
<b>Brine Discharge Pipeline</b>				
	20000 LF	\$	200	\$4,000,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Subtotal Base Construction				\$4,300,000
Implementation %20				\$860,000
Subtotal				\$5,160,000
Contingencies 25%				\$1,290,000
Mitigation 1%				\$65,000
Total				\$6,515,000
<b>Outfall Tunnel</b>				
Outfall Tunnel	2700 EA	\$	2,000	\$5,400,000
Subtotal Base Construction				\$5,400,000
Implementation %20				\$1,080,000
Subtotal				\$6,480,000
Contingencies 25%				\$1,600,000
Mitigation 1%				\$80,000
Total				\$8,200,000
<b>Terminal Structure and Diff</b>				
Terminal Structure and Diff	1 EA	\$	2,000,000	\$2,000,000
Subtotal Base Construction				\$2,000,000
Implementation %20				\$400,000
Subtotal				\$2,400,000
Contingencies 25%				\$600,000
Mitigation 1%				\$30,000
Total				\$3,000,000
<b>Product Water Pipeline</b>				
PW Pipeline	32000 LF	\$	340	\$10,900,000
PW-Special Construction	2000 LF	\$	2,025	\$4,100,000
Subtotal Base Construction				\$15,000,000
Implementation %20				\$3,000,000
Land/ROW-Private	21000 LF	\$	16.0	\$336,000
Land/ROW-TAMC	8300 LF	\$	50.0	\$415,000
Subtotal				\$18,751,000
Contingencies 25%				\$4,688,000
Mitigation 1%				\$234,000
Total				\$23,700,000
TOTAL				<b>\$80,315,000</b>



S-8: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a new outfall				
AVOIDED COMPONENTS				
<b>Tunnel</b>				
Tunnel Caissions	2 EA	\$	200,000	\$400,000
Tunnel under the dunes	2500 LF	\$	2,000	\$5,000,000
Implementation %20				\$1,080,000
Land				\$0
Subtotal				\$6,480,000
Contingencies 25%				\$1,620,000
Mitigation 1%				\$81,000
Total				\$8,181,000
<b>Intake Pipeline</b>				
Intake Pipeline	3500 LF	\$	310	\$1,100,000
Intake Pipeline-Special Construction	500 LF	\$	1,000	\$500,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Land/ROW	3,500 LF	\$	16.0	\$56,000
Subtotal				\$1,976,000
Contingencies 25%				\$494,000
Mitigation 1%				\$25,000
Total				\$2,495,000
<b>Intake Pump Station</b>				
Intake Pump Station Equipment, Electrical and I&C	1000 hp	\$	2,000	\$ 3,600,000
Intake Pump Station Structural and Civil	3000 SqFt	\$	200	\$600,000
Subtotal Base Construction				\$4,200,000
Implementation %20				\$840,000
Land				\$0
Subtotal				\$5,040,000
Contingencies 25%				\$1,260,000
Mitigation 1%				\$63,000
Total				\$6,363,000
<b>Slant Wells</b>				
Slant Production Well Installation	8 EA	\$	2,900	\$20,200,000
Slant Well Caissions with Manifolding	8 EA	\$	160,000	\$1,400,000
Feedwater Pipeline Between Clusters	900 LF	\$	1,140	\$1,000,000
Temporary Sheet Piling and Wave Protection for Construction	2 EA	\$	40	\$F/Sheetii
Subtotal Base Construction				\$27,300,000
Implementation %20				\$5,460,000
Land				\$1,100,000
Subtotal				\$33,860,000
Contingencies 25%				\$8,465,000
Mitigation 1%				\$423,250
Total				\$42,700,000
<b>Brine Discharge Pipeline</b>				
Brine Discharge Pipeline	5000 LF	\$	180	\$900,000
Brine Connection to Outfall	1 EA	\$	300,000	\$300,000
Brine Storage Pond	1 EA	\$	400,000	\$400,000
Subtotal Base Construction				\$1,600,000
Implementation %20				\$320,000
Outfall connection fee	1 LS	\$	2,600,000	\$2,600,000
Subtotal				\$4,520,000
Contingencies 25%				\$1,130,000
Mitigation 1%				\$57,000
Total				\$5,707,000
TOTAL				\$65,400,000
<b>INCREMENTAL CAPITAL COST</b>				<b>\$14,915,000</b>

# Attachment 7

# MEMORANDUM

**To:** Richard Svindland, California American Water

**From:** Paul Findley, RBF Consulting

**Date:** January 9, 2013

**Subject:** O&M Cost Comparison for the Contingency Options



## Introduction

A contingency plan was prepared in November, 2012 to evaluate the intake, discharge and alternative desalination plant site options for the MPWSP. The Contingency Plan included additional capital costs of these contingency plans. This memorandum provides additional O&M costs for each contingency option. The O&M costs provided in this memorandum are additional costs to the proposed MPWSP O&M Costs. Please see the Cost Memorandum, dated January 5, 2013 for latest MPWSP O&M costs. The summary of the additional O&M costs associated with each contingency option is listed in Table 1.

Table 1 – Additional O&M Costs for Each Contingency Option

Contingency Option	Additional O&M Cost
Intake Contingency 1	\$ -
Intake Contingency 2	\$ 1,000,000
Intake Contingency 3	\$ 300,000
Intake Contingency 4	\$ 1,400,000
Intake Contingency 5	\$ 1,200,000
Intake Contingency 6	\$ 1,400,000
Intake Contingency 7	\$ 1,400,000
Intake Contingency 8	\$ 1,400,000
Discharge Contingency 1	\$ -
Discharge Contingency 2	\$ -
Discharge Contingency 3	\$ 800,000
Discharge Contingency 4	\$ 800,000
Site Contingency 1	\$ 900,000
Site Contingency 2	\$ 1,000,000
Site Contingency 3	\$ 800,000
Site Contingency 4	\$ -
Site Contingency 5	\$ -
Site Contingency 6	\$ -
Site Contingency 7	\$ 1,000,000
Site Contingency 8	\$ 1,000,000

**Intake Contingency 1**

This option does not include any additional O&M costs.

**Intake Contingency 2**

The O&M costs associated with this option includes:

- Reduced intake pumping due to open ocean intake: Reduction of \$100,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,000,000

**Intake Contingency 3**

The O&M costs associated with this option includes:

- Additional intake pumping due to location of the intake wells: \$300,000

Total additional O&M Costs: \$300,000

**Intake Contingency 4**

The O&M costs associated with this option includes:

- Additional intake pumping due to location of the intake: \$240,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,400,000

**Intake Contingency 5**

The O&M costs associated with this option includes:

- Additional intake pumping due to location of the intake: \$100,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,200,000

**Intake Contingency 6**

The O&M costs associated with this option includes:

- Additional intake pumping due to location of the intake: \$240,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,400,000

**Intake Contingency 7**

The O&M costs associated with this option includes:

- Additional intake pumping due to location of the intake: \$240,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,400,000

**Intake Contingency 8**

The O&M costs associated with this option includes:

- Additional intake pumping due to location of the intake: \$260,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,400,000

**Discharge Contingency 1**

This option does not incur any additional O&M costs.

**Discharge Contingency 2**

This option does not incur any additional O&M costs.

**Discharge Contingency 3**

The O&M costs associated with this option includes:

- Additional brine pumping due location of the discharge: \$800,000

Total additional O&M Costs: \$800,000

**Discharge Contingency 4**

The O&M costs associated with this option includes:

- Additional brine pumping due location of the discharge: \$800,000

Total additional O&M Costs: \$800,000

**Site Contingency 1**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower desalination plant elevation: Reduction of \$400,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$900,000

**Site Contingency 2**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower desalination plant elevation: Reduction of \$400,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,000,000

**Site Contingency 3**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower desalination plant elevation: Reduction of \$520,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$800,000

**Site Contingency 4**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower desalination plant elevation: Reduction of \$200,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000

This option does not incur any additional O&M costs.

**Site Contingency 5**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower elevation of desalination plant: Reduction of \$200,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000

This option does not incur any additional O&M costs.

**Site Contingency 6**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower elevation of desalination plant: Reduction of \$200,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000

This option does not incur any additional O&M costs



**Site Contingency 7**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower elevation of desalination plant: Reduction of \$340,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,000,000

**Site Contingency 8**

The O&M costs associated with this option includes:

- Reduced intake pumping due to lower elevation of desalination plant: Reduction of \$340,000
- Increased product water pumping due to location and lower elevation of the desalination plant: \$200,000
- Increased pretreatment requirements due to open ocean intake: \$690,000
- Membrane Replacement for Membrane Filtration Pretreatment: \$135,000
- Additional Repair and Replacement costs associated with pretreatment: \$300,000

Total additional O&M Costs: \$1,000,000

# Attachment 8

	Additional O&M Cost
Intake Contingency 1	\$ -
Intake Contingency 2	\$ 1,000,000
Intake Contingency 3	\$ 300,000
Intake Contingency 4	\$ 1,400,000
Intake Contingency 5	\$ 1,200,000
Intake Contingency 6	\$ 1,400,000
Intake Contingency 7	\$ 1,400,000
Intake Contingency 8	\$ 1,400,000
Discharge Contingency 1	\$ -
Discharge Contingency 2	\$ -
Discharge Contingency 3	\$ 800,000
Discharge Contingency 4	\$ 800,000
Site Contingency 1	\$ 900,000
Site Contingency 2	\$ 1,000,000
Site Contingency 3	\$ 800,000
Site Contingency 4	\$ -
Site Contingency 5	\$ -
Site Contingency 6	\$ -
Site Contingency 7	\$ 1,000,000
Site Contingency 8	\$ 1,000,000

**I-1: Ranney collectors at CEMEX property that extract seawater from the Sand Dunes formation**

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-
Coagulation (FeCl3)	0 mg/L					
Consumption	0 lbs/yr	\$ 0.75	lbs.			\$0
Materials	Membrane Replacement	\$135,600	0 LS			\$0
<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>		\$0	1.5%		\$0

Total \$ -

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-11 psi	-25 ft			
Summer	-125 hp	-93 kw	4,416 hrs	-412,849 kwh	\$ (61,828)	
Winter	-124 hp	-93 kw	4,344 hrs	-403,916 kwh	\$ (41,167)	\$ (102,995)

[illegible]

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm				
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm				
	Vacuum Lift	11 psi	25 ft					
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828		
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167		
Coagulation (FeCl3)	10 mg/L							
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875		\$ 687,776

<b>Membrane Filter Base Construction Costs</b>	<i>R&amp;R</i>	\$20,000,000	1.5%	\$300,000
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Total	\$ 1,000,000
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**I-3: Slant well intake system at Portrero Road with feedwater pumped to Desalination Plant at CBR site**

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	28 psi	65 ft			
Summer	317 hp	238 kw	4,416 hrs	1,050,889 kwh	\$	157,381
Winter	316 hp	237 kw	4,344 hrs	1,028,150 kwh	\$	104,789 \$ 262,170

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-
Coagulation (FeCl3)	0 mg/L					
Consumption	0 lbs/yr	\$ 0.75 lbs.				\$0

Materials	Membrane Replacement	\$135,600	0 LS	\$0
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>	\$0	1.5%	\$0
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Total \$ 300,000

**I-4: Direct intake of water from Moss Landing Harbor, using existing Marine Refractory intake infrastructure, with feedwater pumped to a desalination plant at the CBR site**

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	26 psi	60 ft			
Summer	295 hp	221 kw	4,416 hrs	975,825 kwh	\$ 146,140	
Winter	293 hp	220 kw	4,344 hrs	954,711 kwh	\$ 97,304	\$ 243,444

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$ 44,966	
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$ 29,940	

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$ 61,828	
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$ 41,167	
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.			\$509,875	\$ 687,776

Materials	Membrane Replacement	\$135,600	1 LS	\$135,600
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>	\$20,000,000	1.5%	\$300,000
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Total \$ 1,400,000

**I-5: Use of spent cooling water from the Moss Landing Power Plant, with feedwater pumped to a desalination plant at the CBR site**

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	13 psi	30 ft			
Summer	147 hp	110 kw	4,416 hrs	487,913 kwh	\$	73,070
Winter	147 hp	110 kw	4,344 hrs	477,356 kwh	\$	48,652

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875

Materials	Membrane Replacement	\$135,600	1 LS	\$135,600
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>	\$20,000,000	1.5%	\$300,000
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Total \$ 1,200,000



I-6: Use of water diverted from the Moss Landing Power Plant cooling water intake facilities, with feedwater pumped to a desalination plant at the CBR site

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	26 psi	60 ft			
Summer	295 hp	221 kw	4,416 hrs	975,825 kwh	\$ 146,140	
Winter	293 hp	220 kw	4,344 hrs	954,711 kwh	\$ 97,304	\$ 243,444

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$ 44,966	
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$ 29,940	

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$ 61,828	
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$ 41,167	
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.			\$509,875	

Materials	Membrane Replacement	\$135,600	1 LS	\$135,600		
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>		\$20,000,000	1.5%	\$300,000	
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Total \$ 1,400,000

**I-7: Convert existing Marine Refractory outfall into an open ocean intake, with feedwater pumped to a desalination plant at the CBR site**

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	26 psi	60 ft			
Summer	295 hp	221 kw	4,416 hrs	975,825 kwh	\$ 146,140	
Winter	293 hp	220 kw	4,344 hrs	954,711 kwh	\$ 97,304	\$ 243,444

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$ 44,966	
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$ 29,940	

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$ 61,828	
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$ 41,167	
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.			\$509,875	

Materials	Membrane Replacement	\$135,600	1 LS	\$135,600		
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>		\$20,000,000	1.5%	\$300,000	
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Total \$ 1,400,000

**I-8: Construct a new open ocean intake near Moss Landing, with feedwater pumped to a desalination plant at the CBR site**

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

**Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	28 psi	65 ft			
Summer	317 hp	238 kw	4,416 hrs	1,050,889 kwh	\$	157,381
Winter	316 hp	237 kw	4,344 hrs	1,028,150 kwh	\$	104,789 \$ 262,170

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875

Materials	Membrane Replacement	\$135,600	1 LS	\$135,600
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>	\$20,000,000	1.5%	\$300,000
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Total \$ 1,400,000

D-1: Modify outfall by inserting separate pipe for brine discharge, and adding dedicated brine diffusers at the end of the outfall

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

Pump Station

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-
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### D-2: Install new outfall off-shore of CEMEX property

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

## Pump Station

[illegible]

D-3: Construct brine pipeline to Moss Landing, and discharge to the MLPP cooling water outfall

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

Pump Station

Summer Annual Flow (Applied)		12,540 afy	22.4 MGD	15,541 gpm		
Winter Annual Flow (Applied)		12,472 afy	22.3 MGD	15,457 gpm		
		Additional Lift	86 psi	199 ft		
Summer	975 hp	731 kw	4,416 hrs	3,227,730 kwh	\$	483,385
Winter	969 hp	727 kw	4,344 hrs	3,157,890 kwh	\$	321,852
					Total	\$ 800,000

D-4: Construct brine pipeline to Moss Landing, and discharge to the existing Marine Refractory outfall, with modifications

PG&E Average Power Rates		
Facility	Summer	Winter
PS	\$ 0.150	\$ 0.102
Desal Plant / MF	\$ 0.150	\$ 0.102

Pump Station

Summer Annual Flow (Applied)		12,540 afy	22.4 MGD	15,541 gpm		
Winter Annual Flow (Applied)		12,472 afy	22.3 MGD	15,457 gpm		
		Additional Lift	86 psi	199 ft		
Summer	975 hp	731 kw	4,416 hrs	3,227,730 kwh	\$	483,385
Winter	969 hp	727 kw	4,344 hrs	3,157,890 kwh	\$	321,852
					Total	\$ 800,000

**S-1: Desalination plant at Marine Refractory site**

PG&E Average Power Rates			
Facility	Summer	Winter	
PS	\$ 0.150	\$	0.102
Desal Plant / MF	\$ 0.150	\$	0.102

**Inlet Water Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm			
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm			
	Additional Lift	-43 psi	-99 ft				
Summer	-487 hp	-365 kw	4,416 hrs	-1,613,865 kwh	\$	(241,692)	
Winter	-485 hp	-363 kw	4,344 hrs	-1,578,945 kwh	\$	(160,926)	\$ (402,619)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm			
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm			
	Additional Lift	47 psi	109 ft				
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682	
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027	\$ 187,709

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm			
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm			
	Power Equivalent	8 psi	18 ft				
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966	
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940	

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm			
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm			
	Vacuum Lift	11 psi	25 ft				
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828	
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167	
Coagulation (FeCl3)	10 mg/L						
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875	
Materials	Membrane Replacement	\$135,600	1 LS			\$135,600	

<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>	\$20,000,000	1.5%	\$300,000
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Total	\$ 900,000
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**S-2: Desalination plant at Capurro Ranch site**

PG&E Average Power Rates			
Facility	Summer	Winter	
PS	\$ 0.150	\$	0.102
Desal Plant / MF	\$ 0.150	\$	0.102

**Inlet Water Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-43 psi	-99 ft			
Summer	-487 hp	-365 kw	4,416 hrs	-1,613,865 kwh	\$	(241,692)
Winter	-485 hp	-363 kw	4,344 hrs	-1,578,945 kwh	\$	(160,926)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm		
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm		
	Additional Lift	46 psi	106 ft			
Summer	222 hp	167 kw	4,416 hrs	736,409 kwh	\$	110,285
Winter	221 hp	166 kw	4,344 hrs	720,475 kwh	\$	73,431 \$ 183,715

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875
Materials	Membrane Replacement	\$135,600	1 LS			\$135,600

**Membrane Filter Base Construction Costs**    *R&R*    \$20,000,000    1.5%    \$300,000

Total    \$ 1,000,000

**S-3: FEIR proposed project at Moss Landing Desalination Plant site**

PG&E Average Power Rates			
Facility	Summer	Winter	
PS	\$ 0.150	\$	0.102
Desal Plant / MF	\$ 0.150	\$	0.102

**Inlet Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-56 psi	-129 ft			
Summer	-635 hp	-476 kw	4,416 hrs	-2,101,778 kwh	\$	(314,762)
Winter	-631 hp	-473 kw	4,344 hrs	-2,056,301 kwh	\$	(209,578) \$ (524,340)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm		
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm		
	Additional Lift	47 psi	109 ft			
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027 \$ 187,709

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875

Materials	Membrane Replacement	\$135,600	1 LS			\$135,600
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>		\$20,000,000	1.5%		\$300,000
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Total \$ 800,000

**S-4: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to MLPP outfall**

PG&E Average Power Rates			
Facility	Summer		Winter
PS	\$	0.150	\$ 0.102
Desal Plant / MF	\$	0.150	\$ 0.102

**Inlet Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-22 psi	-51 ft			
Summer	-249 hp	-187 kw	4,416 hrs	-825,698 kwh	\$	(123,657)
Winter	-248 hp	-186 kw	4,344 hrs	-807,832 kwh	\$	(82,334)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm		
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm		
	Additional Lift	47 psi	109 ft			
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027 \$ 187,709

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-
Coagulation (FeCl3)	0 mg/L					
Consumption	0 lbs/yr	\$ 0.75 lbs.				\$0

Materials	Membrane Replacement	\$135,600	0 LS			\$0
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b><i>R&amp;R</i></b>		\$0	1.5%		\$0
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Total \$ -

**S-5: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to Marine Refractory outfall**

PG&E Average Power Rates			
Facility	Summer	Winter	
PS	\$ 0.150	\$	0.102
Desal Plant / MF	\$ 0.150	\$	0.102

**Inlet Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-22 psi	-51 ft			
Summer	-249 hp	-187 kw	4,416 hrs	-825,698 kwh	\$	(123,657)
Winter	-248 hp	-186 kw	4,344 hrs	-807,832 kwh	\$	(82,334)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm		
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm		
	Additional Lift	47 psi	109 ft			
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-
Coagulation (FeCl3)	0 mg/L					
Consumption	0 lbs/yr	\$ 0.75 lbs.				\$0

Materials	Membrane Replacement	\$135,600	0 LS			\$0
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>		\$0	1.5%		\$0
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Total \$ -

**S-6: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to a new outfall**

PG&E Average Power Rates			
Facility	Summer		Winter
PS	\$	0.150	\$ 0.102
Desal Plant / MF	\$	0.150	\$ 0.102

**Inlet Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-22 psi	-51 ft			
Summer	-249 hp	-187 kw	4,416 hrs	-825,698 kwh	\$	(123,657)
Winter	-248 hp	-186 kw	4,344 hrs	-807,832 kwh	\$	(82,334)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm		
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm		
	Additional Lift	47 psi	109 ft			
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	0 psi	0 ft			
Summer	0 hp	0 kw	4,416 hrs	0 kwh	\$	-
Winter	0 hp	0 kw	4,344 hrs	0 kwh	\$	-
Coagulation (FeCl3)	0 mg/L					
Consumption	0 lbs/yr	\$ 0.75 lbs.				\$0

Materials	Membrane Replacement	\$135,600	0 LS			\$0
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>		\$0	1.5%		\$0
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Total \$ -

**S-7: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a MLPP outfall**

PG&E Average Power Rates			
Facility	Summer		Winter
PS	\$	0.150	\$ 0.102
Desal Plant / MF	\$	0.150	\$ 0.102

**Inlet Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Additional Lift	-36 psi	-83 ft			
Summer	-408 hp	-306 kw	4,416 hrs	-1,351,143 kwh	\$	(202,347)
Winter	-406 hp	-304 kw	4,344 hrs	-1,321,908 kwh	\$	(134,729)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm		
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm		
	Additional Lift	47 psi	109 ft			
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027 \$ 187,709

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Power Equivalent	8 psi	18 ft			
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm		
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm		
	Vacuum Lift	11 psi	25 ft			
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167
Coagulation (FeCl3)	10 mg/L					
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875

Materials	Membrane Replacement	\$135,600	1 LS			\$135,600
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>		\$20,000,000	1.5%		\$300,000
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Total \$ 1,000,000

**S-8: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a new outfall**

PG&E Average Power Rates			
Facility	Summer		Winter
PS	\$	0.150	\$ 0.102
Desal Plant / MF	\$	0.150	\$ 0.102

**Inlet Pump Station**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm			
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm			
	Additional Lift	-36 psi	-83 ft				
Summer	-408 hp	-306 kw	4,416 hrs	-1,351,143 kwh	\$	(202,347)	
Winter	-406 hp	-304 kw	4,344 hrs	-1,321,908 kwh	\$	(134,729)	\$ (337,076)

**Product Water Pump Station**

	Summer Annual Flow (Applied)	5,349 afy	9.6 MGD	6,629 gpm			
	Winter Annual Flow (Applied)	5,320 afy	9.5 MGD	6,593 gpm			
	Additional Lift	47 psi	109 ft				
Summer	227 hp	170 kw	4,416 hrs	752,418 kwh	\$	112,682	
Winter	226 hp	169 kw	4,344 hrs	736,137 kwh	\$	75,027	\$ 187,709

**Mixing**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm			
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm			
	Power Equivalent	8 psi	18 ft				
Summer	91 hp	68 kw	4,416 hrs	300,254 kwh	\$	44,966	
Winter	90 hp	68 kw	4,344 hrs	293,757 kwh	\$	29,940	

**Membrane Filtration**

	Summer Annual Flow (Applied)	12,540 afy	22.4 MGD	15,541 gpm			
	Winter Annual Flow (Applied)	12,472 afy	22.3 MGD	15,457 gpm			
	Vacuum Lift	11 psi	25 ft				
Summer	125 hp	93 kw	4,416 hrs	412,849 kwh	\$	61,828	
Winter	124 hp	93 kw	4,344 hrs	403,916 kwh	\$	41,167	
Coagulation (FeCl3)	10 mg/L						
Consumption	679,833 lbs/yr	\$ 0.75 lbs.				\$509,875	

Materials	Membrane Replacement	\$135,600	1 LS			\$135,600	
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<b><u>Membrane Filter Base Construction Costs</u></b>	<b>R&amp;R</b>		\$20,000,000	1.5%		\$300,000	
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Total \$ 1,000,000

# Attachment 9



# MEMORANDUM

To: Richard Svindland, California American Water  
From: Paul Findley, RBF Consulting  
Date: January 9, 2013  
Subject: Contingency Planning for the MPWSP (*Update of November 1, 2012 TM*)



*On November 1, 2012, RBF produced the original Technical Memorandum (TM) on this subject and provided descriptions and cost estimates of intake and discharge facilities for the proposed project and various contingency options. Since that time, as a result of discussions with Federal and State regulatory agencies, the size of the desalination plant and location and construction method for the proposed slant intake wells on the beach sites at CEMEX has changed significantly, and the Project's conceptual design, cost estimate, and schedule have been updated (see RBF Consulting TMs dated July 7, 2013 and July 9, 2013 on these subjects). In some cases, the description of the contingency option has also been refined, based on information developed since the date of the original TM. This has resulted in changes in the estimates of incremental capital costs for the contingency options, and these changes are presented in this update. This update also provides the incremental cost impacts for the site contingency options, which were not provided in the original memorandum but are provided here at the request of CPUC.*

*In this update, additions or changes to the original TM are shown in bold italics.*

As requested, this technical memorandum presents contingency planning options to consider in the event that the Monterey Peninsula Water Supply Project cannot be implemented as currently proposed. The project proposed in the original application envisions a **9.6** mgd or **6.4** mgd desalination plant located at a site on Charles Benson Road (CBR) near the Monterey Regional Water Pollution Control Plant. This desalination plant would receive water from **7 to 9** slant wells located on the beach on sites that would be acquired from CEMEX **and/or the State of California**. These wells were originally conceived as drawing water from under the ocean floor from the 180-foot aquifer. However, in order to minimize impacts on the 180-aquifer, the currently proposed concept is for these wells to draw water from under the ocean floor from either the surface formation (aquifer) known as the Sand Dunes Formation or the deeper 180-foot aquifer, or from both. Concentrate from the RO process, also known as brine, will be discharged through a pipe connection to the ocean outfall of the Monterey Regional Water Pollution Control Plant.

We believe that this project concept for intake, plant site, and brine discharge is the most cost-effective of the options that have been reviewed in the last year. However, this technical memorandum considers contingency plans in the event the proposed intake method or site is not feasible; in the event the proposed method of brine disposal is not feasible, or in the event a change in the desalination plant site is required.

***Implementation Schedules for the Proposed (Base) Project and each Contingency Option have been prepared and are provided in a separate RBF Consulting Memorandum dated January 7, 2013.***

The above dates do not include time for potential litigation which could range from 2 to 10 years for certain options such as open ocean intakes.

**PROPOSED PROJECT: Shallow slant wells at CEMEX that extract seawater from the Sand Dunes and/or 180- foot formations.**

The slant test well at north CEMEX site is currently planned to have screens that test both the 180-foot and Sand Dunes formation, with the objective of testing to determine if the Sand Dunes and/or 180-foot formations are sufficiently productive to meet project requirements with 10 or fewer wells. For purposes of illustration, it is assumed that **9** wells (two four-well clusters *plus the test well converted to a production well*) would be required to extract **23** mgd of water from the Sand Dunes and/or 180-foot formations in order to support a **9.6** mgd desalination plant.

The slant wells would be configured *as gravity wells* in order to minimize access and maintenance requirements associated with submersible well pumps. The final selection will be made on the basis of the test well program results. All wells would be connected by a **900 LF 36-inch** diameter beach pipeline that would connect to a **2,500 LF 36-inch** diameter carrier pipe that would convey the seawater under the dunes to *a 23 mgd intake pump station which would be installed at the eastern edge of the dunes. The beach pipeline and beach access tunnel would be installed by trenchless construction. An 8,300 LF 36-inch diameter pipeline would convey the water from the eastern edge of the dunes to the desalination plant. The pipeline crossing under Highway 1* would be installed with trenchless construction.

The brine generated from the desalination plant would be conveyed to the MRWPCA wastewater treatment facility and discharged into the existing outfall.

The configuration of intake and discharge facilities for the proposed project is presented in Figure 1.

The estimated capital costs (2012) of the intake and brine discharge costs are presented below.

	<u>November, 1, 2012</u>	<u>January 9, 2013</u>
<i>Slant Intake Wells (wells, pipelines, land):</i>	<i>\$ 36,000,000</i>	<i>\$ 50,300,000</i>
<i>Tunnel under Coastal Dunes:</i>	<i>\$ 8,900,000</i>	<i>\$ 8,200,000</i>
<i>Intake Pump Station:</i>	<i>\$ 5,900,000</i>	<i>\$ 6,400,000</i>
<i>Intake Pipeline :</i>	<i>\$ 5,000,000</i>	<i>\$ 4,700,000</i>
<i>Brine Discharge Pipeline:</i>	<i>\$ 1,000,000</i>	<i>\$ 5,100,000</i>
<i>Outfall Connection Fee:</i>	<i>\$ 3,100,000</i>	<i>Included above</i>
<i>CSIP Return</i>	<i>Not Included</i>	<i>\$ 1,100,000</i>
<b>Total Capital Costs (2012)</b>	<b>\$ 59,900,000</b>	<b>\$ 75,700,000</b>

**Note that cost analysis presented in the remainder of this memo is presented on the basis of incremental cost difference (i.e., net change) to the above January 9 cost estimate.**

#### **INTAKE CONTINGENCY OPTIONS**

If a slant well intake system at CEMEX as proposed in the application is not possible, then:

**Intake Contingency Option 1: Ranney collectors at CEMEX property that extract seawater from the Sand Dunes formation.**

This contingency option would also be considered if the proposed extraction from the 180-foot aquifer is not possible, and slant well test results indicate that the Sand Dunes formation is sufficiently productive for a design

based on Ranney collectors. Each Ranney collector would consist of a 10- to 20-foot diameter buried caisson, extending to a depth of approximately 50 feet below the beach surface, with 100 to 300 foot long horizontal collector wells extending radially in a semi-circle pattern. Although portions of the horizontal well screens would be under the ocean floor, portions would be under the beach. For purposes of illustration, it is assumed that four Ranney collectors would be required for this contingency option in order to extract **23** mgd of feedwater for a **9.6** mgd desalination plant. ***The Ranney collectors would be configured as a gravity system draining to a pump station on the east side of the dunes.***

***The collectors would be connected by an 1,800 LF 36-inch diameter beach pipeline that would connect to a 2,500 LF 36-inch diameter carrier pipe that would convey the seawater under the dunes to a 23 mgd intake pump station which would be installed at the eastern edge of the dunes. The beach pipeline and beach access tunnel would be installed by trenchless construction. An 8,300 LF 36-inch diameter pipeline would convey the water from the eastern edge of the dunes to the desalination plant.*** The pipeline crossing under Highway 1 would be installed with trenchless construction.

The brine generated from the desalination plant would be conveyed to MRWPCA wastewater treatment facility and discharged into the existing outfall.

This contingency option is presented in Figure 2.

#### ***Estimated Capital Cost Impacts***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>4 Ranney Collectors (Excl. Land):</i></b>	<b><i>\$ 35,000,000</i></b>	<b><i>\$ 40,000,000</i></b>
<b><i>Additional 600-ft of Beach Pipeline:</i></b>	<b><i>\$ 900,000</i></b>	<b><i>\$ 1,400,000</i></b>
<b><i>Avoided Costs of Slant Wells (Excl. Land) :</i></b>	<b><i>(\$35,000,000)</i></b>	<b><i>(\$ 39,800,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 900,000</i></b>	<b><i>\$ 1,600,000</i></b>

#### ***Pros***

- Ranney collectors are proven technology and have been used in numerous projects
- This intake contingency option would not have any advantages with respect to the proposed project, although it would allow project to move forward on the current site if slant wells become infeasible.

#### ***Cons***

- Construction of each Ranney collector might not be completed in a 5-month Snowy Plover non-breeding season. Deep and large diameter collector shaft construction could increase the costs and increase permitting risks.
- Higher average use and pumping costs due to potentially greater drawdown compared to the slant wells
- Ranney collectors are difficult to test at a demonstration scale.
- Confined space below ground entry is required for maintenance.
- Possible length limitation on horizontal collectors could result in significantly less well screen directly below the ocean floor.

#### **Intake Contingency Option 2: Open ocean intake offshore from CEMEX property.**

This contingency option involves construction of a new wedge-wire passive screen intake which would be installed on the ocean floor at a depth of approximately 40 feet of water approximately 2,400 feet offshore from

the CEMEX property. The intake screen would be mounted on a vertical shaft that that would be connected to a 5,000-foot long 36-inch diameter pipeline that would terminate at a 23 mgd pump station on the eastern edge of the dunes. This pipeline would be installed with trenchless technology under the ocean floor, the beach and the dunes. From the pump station, **an 8,300 LF** 36-inch diameter pressure pipeline would convey the water to the desalination plant. The pipeline crossing under Highway 1 would be installed with trenchless construction.

A membrane or media filtration system would be required for this alternative to provide adequate removal of algae and suspended and colloidal solids prior to reverse osmosis, and to provide pathogen log-removal credits as required by the Safe Drinking Water Act.

The brine generated from the desalination plant would be conveyed to the MRWPCA wastewater treatment facility and discharged into the existing outfall.

This contingency option is presented in Figure 3.

### ***Estimated Capital Cost Impact***

	<b><i>November, 1, 2012</i></b>	<b><i>January 9, 2013</i></b>
<b><i>Longer Tunnel:</i></b>	<b><i>\$ 10,500,000</i></b>	<b><i>\$ 9,200,000</i></b>
<b><i>Terminal Structure:</i></b>	<b><i>\$ 3,000,000</i></b>	<b><i>\$ 3,400,000</i></b>
<b><i>Wedge-wire Screens:</i></b>	<b><i>\$ 300,000</i></b>	<b><i>\$ 300,000</i></b>
<b><i>Pretreatment:</i></b>	<b><i>\$ 30,000,000</i></b>	<b><i>\$ 33,300,000</i></b>
<b><i>Avoided Cost of Slant Wells:</i></b>	<b><i>(\$ 36,000,000)</i></b>	<b><i>(\$ 42,600,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 7,800,000</i></b>	<b><i>\$ 3,600,000</i></b>

### ***Pros***

- No impact on groundwater
- No construction on the beach
- Virtually unlimited supply
- Faster to construct
- No seasonal construction restrictions
- No initial tests required

### ***Cons***

- Increased construction risk
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown feasibility of acquiring a construction permit in the marine sanctuary
- Increased pretreatment requirements
- Intake screens are exposed to ocean hazards
- Unknown additional impingement and entrainment mitigation costs

### **Intake Contingency Option 3: Slant well intake system at Portrero Road with feedwater pumped to Desalination Plant at CBR site.**

For this contingency option, slant wells would be installed at the parking lot on the west end of the Portrero Road and along the roadway that parallels the beach north of the parking lot. For purposes of illustration, it is

assumed **that 9 pumped** wells would be required to extract 23 mgd of water from the Sand Dunes formation at this location. The intake wells would pump water into a **1,600 LF 36-inch diameter connector pipeline that would convey the flow to a 23 mgd intake pump station. The intake pump station would pump into a 34,000 LF 36-inch diameter pressure pipeline** to the desalination plant at the CBR site. The route of this pipeline from the slant wells would be along Portrero Road to Highway-1, on private easements parallel to Highway 1, and then along Molero Road to Artichoke Road. Trenchless construction would be used to install the pipeline under Highway 1 and the Salinas River from the south end of the Artichoke Road to a private easement on the east side of Highway 1 and south of the river. The pipeline would then follow the TAMC right-of-way from this location south to Charles Benson road and to the desalination plant.

The brine generated from the desalination plant would be conveyed to MRWPCA wastewater treatment facility and discharged into the existing outfall.

This contingency option is presented in Figure 4.

#### **Estimated Capital Cost Impact**

	<u><b>November, 1, 2012</b></u>	<u><b>January 9, 2013</b></u>
<b>34,000 LF of Intake pipeline from Portrero Road to CBR:</b>	<b>\$19,400,000</b>	<b>\$ 21,300,000</b>
<b>Increased Pump Horsepower (500hp):</b>	<b>\$ 1,000,000</b>	<b>\$ 700,000</b>
<b>Avoided Feedwater Pipeline between Clusters</b>	<b>Not Included</b>	<b>(\$ 2,200,000)</b>
<b>Avoided Temporary Sheet Piling and Wave Protection</b>	<b>Not Included</b>	<b>(\$ 7,100,000)</b>
<b>Avoided Tunnel Cost:</b>	<b>(\$8,900,000)</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of intake pipeline for pump station to CBR from Dunes Tunnel to CBR :</b>	<b>(\$3,000,000)</b>	<b>(\$ 2,400,000)</b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$ 8,500,000</b>	<b>\$ 2,200,000</b>

#### **Pros**

- No tunneling under the dunes
- No beach construction
- Improved access to well pumps
- No seasonal construction restrictions

#### **Cons**

- Unknown geological conditions
- Wells located in restricted pumping area
- Site acquisition for slant wells and pump station in state-owned land (not included in cost estimate)
- Right-of-way acquisition requirements along Highway-1
- Higher energy requirements for conveyance
- Old Salinas River crossing
- Salinas River and Highway-1 crossings

#### **Intake Contingency Option 4: Direct intake of water from Moss Landing Harbor, using existing Marine Refractory intake infrastructure, with feedwater pumped to a desalination plant at the CBR site.**

For this contingency option, existing intake infrastructure at the Marine Refractory site in Moss Landing Harbor would be utilized to supply 23 mgd of feedwater to a desalination plant at the CBR site. It is assumed that this

existing intake would require modifications to comply with current and proposed modifications of the State Ocean Plan. A 23 mgd pump station, installed near the intake, would deliver the feedwater into a **43,500 LF** 36 –inch diameter pipeline to the desalination plant. This pipeline would be routed along Dolan Road; south in private easements on the west side of the railroad right-of-way; west in Benson Road and then crossing Hwy 156 using trenchless construction; west in private easements on the south side of Hwy 156; east on Nashua Road to the TAMC railroad right-of-way; south on the TAMC right-of-way to the Salinas River, crossing the Salinas River either with trenchless construction or with a pipe bridge constructed on the Del Monte Boulevard Bridge; south

<sup>1</sup> Horsepower provided to show relative increase over proposed project. The cost does not include additional annual operating cost. This note applies to all horsepower estimates provided in this memo.

on Del Monte Boulevard to CBR; and then east on CBR to the desalination plant at the CBR site. Trenchless construction or pipe bridges would be required for crossing Moro Cojo Slough and Tembladero Slough.

A membrane or media filtration system would be required for this alternative to provide adequate removal of algae and suspended and colloidal solids prior to reverse osmosis, and to provide pathogen log-removal credits as required by the Safe Drinking Water Act.

The brine generated from the desalination plant would be conveyed to MRWPCA wastewater treatment facility and discharged into the existing outfall.

This contingency option is presented in Figure 5.

### ***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>43,500 LF of intake pipe from Marine refractory site to CBR:</i></b>	<b><i>\$26,800,000</i></b>	<b><i>\$ 29,100,000</i></b>
<b><i>Increased Pump Capacity (650hp):</i></b>	<b><i>\$ 1,300,000</i></b>	<b><i>\$ 1,100,000</i></b>
<b><i>Pretreatment:</i></b>	<b><i>\$30,000,000</i></b>	<b><i>\$ 33,300,000</i></b>
<b><i>Intake &amp; Screen Modifications:</i></b>	<b><i>\$ 1,000,000</i></b>	<b><i>\$ 1,100,000</i></b>
<b><i>Avoided Dunes Tunnel Cost:</i></b>	<b><i>(\$ 8,900,000)</i></b>	<b><i>(\$ 8,100,000)</i></b>
<b><i>Avoided Cost of 3,500 LF of intake pipeline from pump station to CBF:</i></b>	<b><i>(\$ 3,000,000)</i></b>	<b><i>(\$ 2,500,000)</i></b>
<b><i>Avoided Cost of Slant Wells (including Land):</i></b>	<b><i>(\$36,000,000)</i></b>	<b><i>(\$ 42,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 11,200,000</i></b>	<b><i>\$ 11,300,000</i></b>

### ***Pros***

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions

### ***Cons***

- Unknown surge protection requirements
- Higher energy costs for conveyance
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156.
- Private property acquisition and facility use agreements (not included in cost estimate) at Marine Refractory site.

- Right-of-way acquisition requirements along highways (not included in cost estimate)
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs

**Intake Contingency Option 5: Use of spent cooling water from the Moss Landing Power Plant, with feedwater pumped to a desalination plant at the CBR site.**

Similar to the intake proposed as part of the Moss Landing Alternative in the Coastal Water Project EIR, this contingency option would use a diversion facility at the disengaging basin of the Moss Landing Power Plant (MLPP) to supply water to the desalination plant. The disengaging basin receives spent cooling water from Units 1 and 2 and directs this water to the MLPP outfall. The source of cooling water for Units 1 and 2 is water drawn from Moss Landing Harbor. This alternative assumes that the power plant circulates a minimum amount of seawater (23 mgd or more) even if the plant is not generating any power. The diversion from the disengaging basin would be by vacuum-actuated siphons with the feedwater flowing by gravity in a 48-inch diameter pipeline to a site along Dolan Road approximately 7,000 feet east of the disengaging basin (as described previously for the Coastal Water Project Moss Landing Alternative). A 23 mgd intake pump station at this site would deliver feedwater to a desalination plant at the CBR site via a 36-inch diameter pressure pipeline.

The feedwater pipeline from the intake pump station to the desalination plant would be constructed along the same pipeline route as described for Intake Contingency Option 4. Additional pretreatment requirements and brine disposal would also be as described for Intake Contingency Option 4.

This contingency option is presented in Figure 6.

***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>43,500 LF of Intake pipeline from disengaging basin to CBR:</i></b>	<b><i>\$ 26,800,000</i></b>	<b><i>\$ 27,600,000</i></b>
<b><i>Increased Pump Horsepower (650hp):</i></b>	<b><i>\$ 1,300,000</i></b>	<b><i>\$ 1,100,000</i></b>
<b><i>Pretreatment:</i></b>	<b><i>\$ 30,000,000</i></b>	<b><i>\$ 34,300,000</i></b>
<b><i>Intake Connection at Disengaging Basin:</i></b>	<b><i>\$ 500,000</i></b>	<b><i>\$ 800,000</i></b>
<b><i>Avoided Dunes Tunnel Cost:</i></b>	<b><i>(\$ 8,900,000)</i></b>	<b><i>(\$ 8,100,000)</i></b>
<b><i>Avoided Cost of 3,500 LF of intake pipeline from pump station to CBR:</i></b>	<b><i>(\$ 3,000,000)</i></b>	<b><i>(\$ 2,500,000)</i></b>
<b><i>Avoided Cost of Slant Wells (Including Land):</i></b>	<b><i>(\$ 36,000,000)</i></b>	<b><i>(\$ 42,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars)</i></b>	<b><i>\$ 10,700,000</i></b>	<b><i>\$ 10,500,000</i></b>

***Pros***

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions
- Warmer feedwater from the spent cooling water potentially reduces desalination costs
- No intake permit required

***Cons***

- Warmer feedwater from the spent cooling water potentially increases second pass requirements
- Unknown surge protection requirements

- Higher energy costs for conveyance
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River and Highway 156
- Private property acquisition and facility use agreements at MLPP
- Right-of-way acquisition requirements along highways
- Use of power plant cooling water makes permitting relatively more challenging and diminishes NGO support
- Intake operations dependent on power plant operation

**Intake Contingency Option 6: Use of water diverted from the Moss Landing Power Plant cooling water intake facilities, with feedwater pumped to a desalination plant at the CBR site.**

This contingency option would utilize the MLPP cooling system intake screens to screen desalination plant feedwater. New diversion pumps for pumping seawater to the desalination plant would be installed behind the existing MLPP intake screens and the desalination plant intake system would be independent of the cooling operations at the MLPP. For purposes of illustration, it is assumed that a 23 mgd feedwater pump station would be installed at or near the MLPP intake for Units 6 and 7, but it would also be capable of receiving flow from a pipeline connection to the MLPP intake for Units 1 and 2.

The feedwater pipeline, additional pretreatment requirements, and brine disposal would be identical to that described for Intake Contingency Option 4.

This contingency option is presented in Figure 7.

***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>43,500 LF of Intake Pipeline from disengaging basin to CBR:</i></b>	<b><i>\$26,800,000</i></b>	<b><i>\$ 29,100,000</i></b>
<b><i>Increased Pump Horsepower (650hp):</i></b>	<b><i>\$ 1,300,000</i></b>	<b><i>\$ 1,500,000</i></b>
<b><i>Pretreatment:</i></b>	<b><i>\$30,000,000</i></b>	<b><i>\$ 33,300,000</i></b>
<b><i>Intake and screen modifications:</i></b>	<b><i>\$ 1,000,000</i></b>	<b><i>\$ 1,100,000</i></b>
<b><i>Avoided Dunes Tunnel Cost:</i></b>	<b><i>(\$ 8,900,000)</i></b>	<b><i>(\$ 8,100,000)</i></b>
<b><i>Avoided Cost of 3,500 LF of intake pipeline from Tunnel to CBR:</i></b>	<b><i>(\$ 3,000,000)</i></b>	<b><i>(\$ 2,500,000)</i></b>
<b><i>Avoided Cost of Slant Wells (including land):</i></b>	<b><i>(\$ 36,000,000)</i></b>	<b><i>(\$ 42,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars)</i></b>	<b><i>\$ 11,200,000</i></b>	<b><i>\$ 11,700,000</i></b>

***Pros***

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions

***Cons***

- Unknown surge protection requirements
- Higher energy costs for conveyance
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Private property acquisition and facility use agreements at MLPP
- Right-of-way acquisition requirements along highways
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support



- Unknown additional impingement and entrainment mitigation costs

**Intake Contingency Option 7: Convert existing Marine Refractory outfall into an open ocean intake, with feedwater pumped to a desalination plant at the CBR site.**

This contingency option involves installing a new wedge-wire passive screen intake on the ocean end of the existing outfall at the Marine Refractory site and using the existing outfall piping to draw seawater into a 23 mgd pumping station located on or near the existing headworks of the existing outfall. This pump station would deliver feedwater to a desalination plant at the CBR site via a pipeline identical to the feedwater pipeline described in Intake Contingency Option 4. Additional pretreatment requirements and brine disposal would be identical to that described for Intake Contingency Option 4.

This contingency option is presented in Figure 8.

***Estimated Capital Cost Impacts***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b>43,500 LF of Intake pipeline from disengaging basin to CBR:</b>	<b>\$ 26,800,000</b>	<b>\$ 27,600,000</b>
<b>Increased Pump Horsepower (650hp):</b>	<b>\$ 1,300,000</b>	<b>\$ 1,500,000</b>
<b>Pretreatment:</b>	<b>\$ 30,000,000</b>	<b>\$ 33,300,000</b>
<b>Outfall modifications:</b>	<b>\$ 1,000,000</b>	<b>\$ 1,100,000</b>
<b>Screens:</b>	<b>\$ 2,000,000</b>	<b>\$ 2,200,000</b>
<b>Avoided Tunnel Cost:</b>	<b>(\$ 8,900,000)</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of Pipeline:</b>	<b>(\$ 3,000,000)</b>	<b>(\$ 2,500,000)</b>
<b><u>Avoided Cost of Slant Wells (including land):</u></b>	<b><u>(\$ 36,000,000)</u></b>	<b><u>(\$ 42,700,000)</u></b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$ 13,200,000</b>	<b>\$ 12,400,000</b>

***Pros***

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions

***Cons***

- Unknown surge protection requirements
- Higher energy costs
- Special construction required to cross Tembladero Slough, Moro Cojo Slough and Salinas River
- Additional private property acquisition and facility use agreements
- Right-of-way acquisition requirements along highways
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs
- Unknown outfall condition
- Unknown feasibility of acquiring a construction permit in the marine sanctuary
- Screens are exposed to ocean hazards

**Intake Contingency Option 8: Construct a new open ocean intake near Moss Landing, with feedwater pumped to a desalination plant at the CBR site.**

This contingency option involves construction of a new wedge-wire passive screen intake which would be installed on the ocean floor at a depth of approximately 40 feet of water approximately 2,400 feet offshore from the coastline near the parking lot at the end of Portrero Road. The intake screen would be mounted on a vertical shaft that would be connected to a 3,100-foot long 36-inch diameter pipeline that would terminate at a 23 mgd pump station in or near the parking lot. This pipeline would be installed with trenchless technology under the ocean floor and the beach. From the pump station, a **34,000** LF 36-inch diameter pressure pipeline would convey the water to the desalination plant along the same pipeline route as described previously for **Intake Contingency Option 3**. Additional pretreatment requirements and brine disposal would be identical to that described for **Intake Contingency Option 4**.

This contingency option is presented in Figure 9.

***Estimated Capital Cost Impacts***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b>34,000 LF of pipe</b>	<b>\$ 19,400,000</b>	<b>\$ 18,600,000</b>
<b>Pretreatment</b>	<b>\$ 30,000,000</b>	<b>\$ 33,300,000</b>
<b>2,700 ft of Intake Tunnel</b>	<b>\$ 5,600,000</b>	<b>\$ 9,200,000</b>
<b>Intake Structure and Screens</b>	<b>\$ 3,300,000</b>	<b>\$ 3,700,000</b>
<b>Increased Pump Capacity (500hp)</b>	<b>\$ 1,000,000</b>	<b>\$ 700,000</b>
<b>Avoided Dunes Tunnel Cost:</b>	<b>(\$ 8,900,000)</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</b>	<b>(\$ 3,000,000)</b>	<b>(\$ 2,500,000)</b>
<b><u>Avoided Cost of Slant Wells (including land):</u></b>	<b><u>(\$ 36,000,000)</u></b>	<b><u>(\$ 42,700,000)</u></b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$11,400,000</b>	<b>\$ 12,200,000</b>

**Pros**

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions
- Reduced construction costs

**Cons**

- Unknown surge protection requirements
- Higher energy costs
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Additional private property acquisition and facility use agreements
- Right-of-way acquisition requirements along highways
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs
- Unknown feasibility of acquiring a construction permit in the marine sanctuary
- Old Salinas River crossing
- Salinas River and highways crossing
- Additional site acquisition for the pump station

## DISCHARGE CONTINGENCY OPTIONS

If discharge of brine from CBR site desalination plant to an unmodified MRWPCA outfall is not possible, then:

### **Discharge Contingency Option 1: Modify outfall by inserting separate pipe for brine discharge, and adding dedicated brine diffusers at the end of the outfall.**

This contingency option involves inserting a brine discharge pipeline inside the existing outfall pipeline. The annular space between the outer wall of the inserted pipeline and the inner wall of the outfall would continue to be used for effluent flow. At an offshore location, an exit structure would be constructed on the existing pipeline, and a separate brine diffuser would be constructed for brine discharge. This pipe-in-pipe arrangement would be configured with a new pump station that would be used during wet weather periods, when effluent flows are high, to pump a mixture of brine and effluent through the inserted pipe and the new diffusers. For purposes of illustration, it is assumed that 13,500 ft of 20-inch brine pipeline would be inserted in the MRWPCA outfall starting at the outfall headworks and extending to the first off-shore bend in the outfall. At this point, approximately 3,500 ft off-shore, the exit structure would be constructed, and a 500-foot long brine diffuser section would be constructed on the ocean floor.

This contingency option is presented in Figure 10.

#### ***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>Slip Lining:</i></b>	<b>\$ 4,000,000</b>	<b>\$ 4,100,000</b>
<b><i>Exit Structure from Existing Outfall:</i></b>	<b>\$ 2,000,000</b>	<b>\$ 2,000,000</b>
<b><i>New Diffusers:</i></b>	<b>\$ 500,000</b>	<b>\$ 500,000</b>
<b><i>Brine Pump Station :</i></b>	<b>\$ 1,200,000</b>	<b>\$ 3,500,000</b>
<b><i>Avoided Cost of Brine Discharge Facilities</i></b>	<b><i>Not Included</i></b>	<b><i>(\$ 600,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b>\$ 7,700,000</b>	<b>\$ 9,500,000</b>

#### **Pros**

- Allows MRWPCA to use the outfall to maximum capacity at all times
- Discharge operations are independent of MRWPCA discharge
- ***Eliminates brine storage requirement at desalination plant***

#### **Cons**

- New discharge permit required for brine
- Higher energy requirements when brine pump station is operating
- Additional maintenance requirements for the brine pump station

### **Discharge Contingency Option 2: Install new outfall off-shore of CEMEX property.**

For this contingency option, brine would be discharged from the desalination plant at the CBR site through a 13,000 LF 24-inch diameter brine pipeline to brine diffusers that would be located approximately 2,500 LF off-shore of the CEMEX property near the slant well intake system. Approximately 5,400 LF of the brine pipeline would be constructed under the ocean floor, beach and dunes using a tunnel boring machine. The diffusers would be designed to meet anticipated requirements of the modified State Ocean Plan.

This contingency option is presented in Figure 11.

#### ***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>Brine Pipeline from Desalination Plant to Tunnel:</i></b>	<b><i>\$ 3,500,000</i></b>	<b><i>\$ 4,500,000</i></b>
<b><i>Outfall Tunnel:</i></b>	<b><i>\$ 13,000,000</i></b>	<b><i>\$ 8,200,000</i></b>
<b><i>Terminal Structure and diffusers:</i></b>	<b><i>\$ 3,000,000</i></b>	<b><i>\$ 3,000,000</i></b>
<b><i>Avoided Cost of Brine Discharge Facilities</i></b>	<b><i>Not Included</i></b>	<b><i>(\$ 5,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 19,500,000</i></b>	<b><i>\$ 10,000,000</i></b>

#### **Pros**

- Allows MRWPCA to use the outfall to maximum capacity at all times
- Discharge operations are independent of MRWPCA discharge
- ***Eliminates brine storage requirement at desalination plant***

#### **Cons**

- New discharge permit required
- Higher energy requirements
- Additional maintenance costs associated with the pump station

#### **Discharge Contingency Option 3: Construct brine pipeline to Moss Landing, and discharge to the MLPP cooling water outfall.**

For this contingency option, a brine pumping station would be constructed at the desalination plant at the CBR site, for discharging brine into a 47,000 LF long 24-inch diameter brine pipeline to Moss Landing for discharge to the MLPP cooling water outfall (using a connection to the MLPP Disengaging Basin). This contingency option would possibly be limited during those periods when cooling water flow in the MLPP outfall is insufficient to provide adequate dilution of the brine discharge.

This contingency option is presented in Figure 12.

#### ***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>Brine Pipeline from Desalination Plant to MLPP:</i></b>	<b><i>\$ 16,200,000</i></b>	<b><i>\$ 20,000,000</i></b>
<b><i>Brine Pump Station:</i></b>	<b><i>\$ 2,000,000</i></b>	<b><i>\$ 4,200,000</i></b>
<b><i>Disengaging Basin Connection:</i></b>	<b><i>\$ 300,000</i></b>	<b><i>\$ 300,000</i></b>
<b><i>Avoided Cost of Brine Discharge Facilities</i></b>	<b><i>Not included</i></b>	<b><i>(\$ 5,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 18,500,000</i></b>	<b><i>\$ 18,800,000</i></b>

#### **Pros**

- Allows MRWPCA to use the outfall to maximum capacity at all times
- Discharge operations are independent of MRWPCA discharge
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- Additional right-of-way acquisition required
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Hwy 156
- Additional private property acquisition and facility use agreements
- Right-of-way acquisition requirements along highways
- Facility use agreements required at MLPP.

**Discharge Contingency Option 4: Construct brine pipeline to Moss Landing, and discharge to the existing Marine Refractory outfall, with modifications.**

This contingency option is similar to Discharge Contingency Option 3, except that the brine would be discharged through the existing Marine Refractory outfall, with modifications to meet the State Ocean Plan requirements. A brine pumping station would be constructed at the desalination plant at the CBR site, for discharging brine into a 47,000 LF 24-inch diameter brine pipeline to the Marine Refractory outfall. This contingency plan would require brine-only discharge permitting through the Marine Refractory outfall as it is assumed that no dilution water would be available.

This contingency option is presented in Figure 13.

***Estimated Capital Cost Impact***

	<b><u>November, 1, 2012</u></b>	<b><u>January 9, 2013</u></b>
<b><i>Brine Pipeline from Desalination Plant to MLPP:</i></b>	<b><i>\$ 16,200,000</i></b>	<b><i>\$ 19,500,000</i></b>
<b><i>Brine Pump Station</i></b>	<b><i>\$ 2,000,000</i></b>	<b><i>\$ 4,200,000</i></b>
<b><i>Outfall Modification</i></b>	<b><i>\$ 4,000,000</i></b>	<b><i>\$ 4,100,000</i></b>
<b><i>New Diffusers</i></b>	<b><i>\$ 500,000</i></b>	<b><i>\$ 500,000</i></b>
<b><i>Avoided Cost of Brine Discharge Facilities</i></b>	<b><i>Not Included</i></b>	<b><i>(\$ 5,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars)</i></b>	<b><i>\$ 22,700,000</i></b>	<b><i>\$ 22,600,000</i></b>

**Pros**

- Allows MRWPCA to use the outfall to maximum capacity at all times
- Discharge operations are independent of MRWPCA discharge
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- New discharge permit required
- Additional right-of-way acquisition required
- Unknown feasibility of acquiring a construction permit in the marine sanctuary
- Unknown surge protection requirements
- Higher energy costs
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Additional private property acquisition and facility use agreements
- Right-of-way acquisition requirements along highways

## DESALINATION PLANT SITE CONTINGENCY OPTIONS

If slant well intake at CEMEX is not possible and it is not possible to use the existing or modified MRWPCA outfall, then the desalination plant would be moved to Moss Landing, as described below. Cost impact for each of the plant site contingency options was not estimated.

### Desalination Plant Site Contingency Option 1: Desalination plant at Marine Refractory site

For this contingency plan, the desalination plant would be located at the Marine Refractory Site. Feedwater would be supplied by the existing intake infrastructure, with modifications as described in Intake Contingency Option 4. Product water from the desalination plant would be conveyed to Monterey Peninsula using the alignment previously described for the intake pipeline in Intake Contingency Option 4 down to CBR, and from there using the product water pipeline route described in the application. The brine from the desalination would be discharged through the existing Marine Refractory outfall, with modifications to meet State Ocean Plan requirements. This contingency plan would require brine-only discharge permitting through the Marine Refractory outfall as no dilution water would be available.

This contingency option is presented in Figure 14.

	<u>January 9, 2013</u>
<b>Intake Pump Station</b>	<b>\$ 3,800,000</b>
<b>Pretreatment</b>	<b>\$ 33,300,000</b>
<b>Intake and Screen Modifications</b>	<b>\$ 1,100,000</b>
<b>Product Water Pump Station (Net)</b>	<b>\$ 2,200,000</b>
<b>Product Water Pipeline, 39,000 LF</b>	<b>\$ 27,300,000</b>
<b>Avoided Dunes Tunnel Cost:</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</b>	<b>(\$ 2,500,000)</b>
<b>Avoided Intake Pump Station</b>	<b>(\$ 6,400,000)</b>
<b>Avoided Brine Discharge Facilities</b>	<b>(\$ 5,700,000)</b>
<b><u>Avoided Cost of Slant Wells (including land):</u></b>	<b><u>(\$ 42,700,000)</u></b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$ 2,300,000</b>

#### Pros

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

#### Cons

- Unknown surge protection requirements
- Higher energy costs for conveyance
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156.
- Private property acquisition and facility use agreements at Marine Refractory site.
- Right-of-way acquisition requirements along highways
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs

- Additional pipeline construction to Moss Landing
- Discharge Permit required

### **Desalination Plant Site Contingency Option 2: Desalination plant at Capurro Ranch site**

For this contingency option, the desalination plant would be located at Capurro Ranch, north of Elkhorn Slough. Feedwater would be provided by an open ocean intake located near the terminus of the former Sandholdt Pier. From Moss Landing Harbor, the seawater pipeline would be routed along Highway 1 north to the desalination plant at Capurro Ranch. The product water would be conveyed south from the desalination plant on Highway 1 to Dolan Road, then east on Dolan Road to the alignment previously described for the intake pipeline in Intake Contingency Option 4. The brine from the desalination plant would be conveyed to the MLPP outfall for final discharge.

This contingency option is presented in Figure 15.

	<b><u>January 9, 2013</u></b>
<b><i>Intake Pump Station</i></b>	<b><i>\$ 3,800,000</i></b>
<b><i>Pretreatment</i></b>	<b><i>\$ 33,300,000</i></b>
<b><i>Intake and Screen Modifications</i></b>	<b><i>\$ 1,000,000</i></b>
<b><i>Product Water Pump Station (Net)</i></b>	<b><i>\$ 2,200,000</i></b>
<b><i>Brine Discharge Pipeline, 7,100 LF</i></b>	<b><i>\$ 2,600,000</i></b>
<b><i>Product Water Pipeline, 46,100 LF</i></b>	<b><i>\$ 39,100,000</i></b>
<b><i>Avoided Dunes Tunnel Cost:</i></b>	<b><i>(\$ 8,100,000)</i></b>
<b><i>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</i></b>	<b><i>(\$ 2,500,000)</i></b>
<b><i>Avoided Intake Pump Station</i></b>	<b><i>(\$ 6,400,000)</i></b>
<b><i>Avoided Brine Discharge Facilities</i></b>	<b><i>(\$ 5,700,000)</i></b>
<b><i>Avoided Cost of Slant Wells (including land):</i></b>	<b><i>(\$ 42,700,000)</i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 16,600,000</i></b>

#### **Pros**

- No tunneling under the dunes
- No beach construction
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

#### **Cons**

- Discharge Permit required
- Project requires two pipeline crossings of Elkhorn Slough
- Long product water pipeline from Moss Landing to California American Water service area
- Unknown surge protection requirements
- Higher energy costs for conveyance
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Private property acquisition
- Right-of-way acquisition requirements along highways
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs

**Desalination Plant Site Contingency Option 3: FEIR proposed project at Moss Landing Desalination Plant site**

For this contingency option, the desalination plant would be located at the eastern MLPP property as proposed in the FEIR. MLPP cooling water would be utilized for both intake and discharge of brine. Intake system would be connected to the Disengaging Basin and divert water east to the desalination plant. The product water from the desalination plant would be conveyed south to Monterey Peninsula as described in the FEIR and the brine would be conveyed west to the disengaging basin and connect to the basin downstream of the intake location.

	<b><u>January 9, 2013</u></b>
<b><i>Intake Pump Station</i></b>	<b><i>\$ 2,900,000</i></b>
<b><i>Pretreatment</i></b>	<b><i>\$ 34,300,000</i></b>
<b><i>Intake Connection to Disengaging Basin</i></b>	<b><i>\$ 500,000</i></b>
<b><i>Product Water Pump Station (Net)</i></b>	<b><i>\$ 2,200,000</i></b>
<b><i>Brine Discharge Pipeline, 6,300 LF</i></b>	<b><i>\$ 2,400,000</i></b>
<b><i>Product Water Pipeline, 32,000 LF</i></b>	<b><i>\$ 23,700,000</i></b>
<b><i>Avoided Dunes Tunnel Cost:</i></b>	<b><i>(\$ 8,100,000)</i></b>
<b><i>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</i></b>	<b><i>(\$ 2,500,000)</i></b>
<b><i>Avoided Intake Pump Station</i></b>	<b><i>(\$ 6,400,000)</i></b>
<b><i>Avoided Brine Discharge Facilities</i></b>	<b><i>(\$ 5,700,000)</i></b>
<b><i><u>Avoided Cost of Slant Wells (including land):</u></i></b>	<b><i><u>(\$ 42,700,000)</u></i></b>
<b><i>Net Capital Cost Increase (2012 dollars):</i></b>	<b><i>\$ 600,000</i></b>

The pros and cons of this contingency option are the same as listed for the Intake Contingency Option 5 and Discharge Contingency Option 3.

This contingency option is presented in Figure 16.

**Desalination Plant Site Contingency Option 4: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to MLPP outfall**

For this contingency option, the desalination plant would be located at the eastern MLPP property as proposed in the FEIR. Slant wells would be installed at the parking lot on the west end of the Portrero Road and along the roadway that parallels the beach north of the parking lot. For purposes of illustration, it is assumed that 10 pumped wells would be required to extract 22 mgd of water from the Sand Dunes formation at this location. The intake wells would pump water into a 15,000 LF 36-inch diameter pressure pipeline to the desalination plant at a desalination plant on Dolan Road east of the MLPP. Brine from the desalination plant would be returned to Moss Landing for discharge to the MLPP cooling water outfall (using a connection to the MLPP Disengaging Basin). The product water from the desalination plant would be conveyed south to Monterey Peninsula as described in the FEIR.



	<u>January 9, 2013</u>
<i>Intake Pipeline, 15,000 LF</i>	<i>\$ 16,400,000</i>
<i>Product Water Pump Station (Net)</i>	<i>\$ 2,200,000</i>
<i>Brine Discharge Pipeline, 6,300 LF</i>	<i>\$ 2,400,000</i>
<i>Product Water Pipeline, 32,000 LF</i>	<i>\$ 23,700,000</i>
<i>Avoided Dunes Tunnel Cost:</i>	<i>(\$ 8,100,000)</i>
<i>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</i>	<i>(\$ 2,500,000)</i>
<i>Avoided Sheet Piling and Wave Protection</i>	<i>(\$ 7,100,000)</i>
<i><u>Avoided Brine Discharge Facilities</u></i>	<i><u>(\$ 5,700,000)</u></i>
<i>Net Capital Cost Increase (2012 dollars):</i>	<i>\$ 21,300,000</i>

**Pros**

- No tunneling under the dunes
- No beach construction
- Improved access to well pumps
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- Discharge may not be possible during periods of MLPP shutdown
- Difficult pipeline construction in Hwy 1 at Moro Cojo Slough crossing
- Unknown geological conditions
- Wells located in restricted pumping area
- Site acquisition for slant wells and pump station in state-owned land
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Higher energy costs for conveyance
- Private property acquisition and facility use agreements at MLPP
- Right-of-way acquisition requirements along highways

This contingency option is presented in Figure 17.

**Desalination Plant Site Contingency Option 5: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to Marine Refractory outfall**

For this contingency option, the desalination plant would be located at the eastern MLPP property as proposed in the FEIR. Slant wells would be installed at the parking lot on the west end of the Portrero Road and along the roadway that parallels the beach north of the parking lot. For purposes of illustration, it is assumed that 10 pumped wells would be required to extract 22 mgd of water from the Sand Dunes formation at this location. The intake wells would pump water into a 15,000 LF 36-inch diameter pressure pipeline to the desalination plant on Dolan Road east of the MLPP. Brine from the desalination plant would be discharged to the existing Marine Refractory outfall, with modifications. The product water from the desalination plant would be conveyed south to Monterey Peninsula as described in the FEIR.

	<u>January 9, 2013</u>
<i>Intake Pipeline, 15,000 LF</i>	<i>\$ 16,400,000</i>
<i>Product Water Pump Station (Net)</i>	<i>\$ 2,200,000</i>
<i>Brine Discharge Pipeline, 6,300 LF</i>	<i>\$ 2,400,000</i>
<i>Product Water Pipeline, 32,000 LF</i>	<i>\$ 23,700,000</i>
<i>Avoided Dunes Tunnel Cost:</i>	<i>(\$ 8,100,000)</i>
<i>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</i>	<i>(\$ 2,500,000)</i>
<i>Avoided Sheet Piling and Wave Protection</i>	<i>(\$ 7,100,000)</i>
<i><u>Avoided Brine Discharge Facilities</u></i>	<i><u>(\$ 5,700,000)</u></i>
<i>Net Capital Cost Increase (2012 dollars):</i>	<i>\$ 21,300,000</i>

**Pros**

- No tunneling under the dunes
- No beach construction
- Improved access to well pumps
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- New discharge permit required
- Property acquisition and facility use agreements required at Marine Refractory Site
- Difficult pipeline construction in Hwy 1 at Moro Cojo Slough crossing
- Unknown geological conditions
- Wells located in restricted pumping area
- Site acquisition for slant wells and pump station in state-owned land
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Higher energy costs for conveyance
- Private property acquisition and facility use agreements at MLPP
- Right-of-way acquisition requirements along highways

This contingency option is presented in Figure 18.

**Desalination Plant Site Contingency Option 6: Slant intake wells at Portrero Road and FEIR proposed desalination plant site with brine discharge to a new outfall**

For this contingency option, the desalination plant would be located at the eastern MLPP property as proposed in the FEIR. Slant wells would be installed at the parking lot on the west end of the Portrero Road and along the roadway that parallels the beach north of the parking lot. For purposes of illustration, it is assumed that 10 pumped wells would be required to extract 22 mgd of water from the Sand Dunes formation at this location. The intake wells would pump water into a 15,000 LF 36-inch diameter pressure pipeline to the desalination plant along Dolan Road, east of the MLPP. Brine from the desalination plant would be discharged to a new outfall that would be constructed at the parking lot on the west end of the Portrero Road. The outfall diffusers would be located approximately 3,000 LF off-shore. The product water from the desalination plant would be conveyed south to Monterey Peninsula as described in the FEIR.

	<u><b>January 9, 2013</b></u>
<b>Intake Pipeline, 15,000 LF</b>	<b>\$ 16,400,000</b>
<b>Product Water Pump Station (Net)</b>	<b>\$ 2,200,000</b>
<b>Brine Discharge Pipeline, 15,000 LF</b>	<b>\$ 5,000,000</b>
<b>Outfall Tunnel, 2,700 LF</b>	<b>\$ 8,200,000</b>
<b>Terminal Structure and Diffusers</b>	<b>\$ 3,000,000</b>
<b>Product Water Pipeline, 32,000 LF</b>	<b>\$ 23,700,000</b>
<b>Avoided Dunes Tunnel Cost:</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</b>	<b>(\$ 2,500,000)</b>
<b>Avoided Sheet Piling and Wave Protection</b>	<b>(\$ 7,100,000)</b>
<b>Avoided Brine Discharge Facilities</b>	<b>(\$ 5,700,000)</b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$ 35,100,000</b>

**Pros**

- No tunneling under the dunes
- No beach construction
- Improved access to well pumps
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- New discharge permit required
- Property acquisition and facility use agreements required at Marine Refractory Site
- Difficult pipeline construction in Hwy 1 at Moro Cojo Slough crossing for brine and feedwater pipeline
- Unknown geological conditions
- Wells located in restricted pumping area
- Site acquisition for slant wells and pump station in state-owned land
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Higher energy costs for conveyance
- Right-of-way acquisition requirements along highways

This contingency option is presented in Figure 19.

**Desalination Plant Site Contingency Option 7: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a MLPP outfall**

For this contingency option, the desalination plant would be located along Dolan Road east of the MLPP, as proposed in the Coastal Water Project FEIR. Existing intake infrastructure at the Marine Refractory site in Moss Landing Harbor would be utilized to supply 23 mgd of feedwater to a desalination plant at a site located along Dolan Road, approximately 7000 LF from Highway 1. It is assumed that this existing intake would require modifications to comply with current and proposed modifications of the State Ocean Plan. A 23 mgd pump station, installed near the intake, would deliver the feedwater into a 6,300 LF 36 –inch diameter pipeline to the desalination plant. Brine from the desalination plant would be discharged conveyed to Moss Landing for discharge to the MLPP cooling water outfall (using a connection to the MLPP Disengaging Basin). The product water from the desalination plant would be conveyed south to Monterey Peninsula as described in the FEIR.

	<u><b>January 9, 2013</b></u>
<b>Intake Pump Station</b>	<b>\$ 2,900,000</b>
<b>Pretreatment</b>	<b>\$ 33,300,000</b>
<b>Intake and Screen Modifications</b>	<b>\$ 1,100,000</b>
<b>Product Water Pump Station (Net)</b>	<b>\$ 2,200,000</b>
<b>Brine Discharge Pipeline, 6,300 LF</b>	<b>\$ 2,400,000</b>
<b>Product Water Pipeline, 32,000 LF</b>	<b>\$ 23,700,000</b>
<b>Avoided Dunes Tunnel Cost:</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</b>	<b>(\$ 2,500,000)</b>
<b>Avoided Intake Pump Station</b>	<b>(\$ 6,400,000)</b>
<b>Avoided Brine Discharge Facilities</b>	<b>(\$ 5,700,000)</b>
<b><u>Avoided Cost of Slant Wells (including land):</u></b>	<b><u>(\$ 42,700,000)</u></b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$ 200,000</b>

**Pros**

- No tunneling under the dunes
- No beach construction
- Improved access to well pumps
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- Property acquisition and facility use agreements required for both the Marine Refractory Site and MLPP
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River, and Highway 156
- Right-of-way acquisition requirements along highways
- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs
- Higher energy costs for conveyance

This contingency option is presented in Figure 20.

**Desalination Plant Site Contingency Option 8: Marine Refractory open ocean intake and FEIR proposed desalination plant site with brine discharge to a new outfall**

For this contingency option, the desalination plant would be located along Dolan Road East of the MLPP property as proposed in the FEIR. Existing intake infrastructure at the Marine Refractory site in Moss Landing Harbor would be utilized to supply 23 mgd of feedwater to a desalination plant at a site located along Dolan Road, approximately 7000 LF from Highway 1. It is assumed that this existing intake would require modifications to comply with current and proposed modifications of the State Ocean Plan. A 23 mgd pump station, installed near the intake, would deliver the feedwater into a 6,300 LF 36-inch diameter pipeline to the desalination plant. Brine from the desalination plant would be discharged into a new ocean outfall. The brine would be conveyed west in Dolan Road, south on Highway 1 and west on Moss Landing Road to Sandholdt Road. From a location to be determined on Sandholdt Road, the outfall would convey brine to approximately 1,000 LF off-shore for disposal. The product water from the desalination plant would be conveyed south to Monterey Peninsula as described in the FEIR.

	<u><b>January 9, 2013</b></u>
<b>Intake Pump Station</b>	<b>\$ 2,900,000</b>
<b>Pretreatment</b>	<b>\$ 33,300,000</b>
<b>Intake Connection</b>	<b>\$ 500,000</b>
<b>Product Water Pump Station (Net)</b>	<b>\$ 2,200,000</b>
<b>Brine Discharge Pipeline, 20,000 LF</b>	<b>\$ 6,500,000</b>
<b>Outfall Tunnel, 2,700 LF</b>	<b>\$ 8,200,000</b>
<b>Terminal Structure and Diffusers</b>	<b>\$ 3,000,000</b>
<b>Product Water Pipeline, 32,000 LF</b>	<b>\$ 23,700,000</b>
<b>Avoided Dunes Tunnel Cost:</b>	<b>(\$ 8,100,000)</b>
<b>Avoided Cost of 3,500 LF of Pipeline from Tunnel to CBR:</b>	<b>(\$ 2,500,000)</b>
<b>Avoided Intake Pump Station</b>	<b>(\$ 6,400,000)</b>
<b>Avoided Brine Discharge Facilities</b>	<b>(\$ 5,700,000)</b>
<b><u>Avoided Cost of Slant Wells (including land):</u></b>	<b><u>(\$ 42,700,000)</u></b>
<b>Net Capital Cost Increase (2012 dollars):</b>	<b>\$ 14,900,000</b>

**Pros**

- No tunneling under the dunes
- No beach construction
- Improved access to well pumps
- No seasonal construction restrictions
- ***Eliminates brine storage requirement at desalination plant***

**Cons**

- Impingement and entrainment concerns make permitting relatively more challenging and diminishes NGO support
- Unknown additional impingement and entrainment mitigation costs
- New Discharge Permit required
- Higher energy costs for conveyance
- Special construction required to cross Tembladero Slough, Moro Cojo Slough, Salinas River and Highway 156
- Private property acquisition and facility use agreements at MLPP
- Right-of-way acquisition requirements along highways

This contingency option is presented in Figure 21.

**SLANT INTAKE WELL LOCATIONS – CONTINGENCY PLANS NOT PURSUED****Slant Intake Wells at Seaside – Not Pursued:**

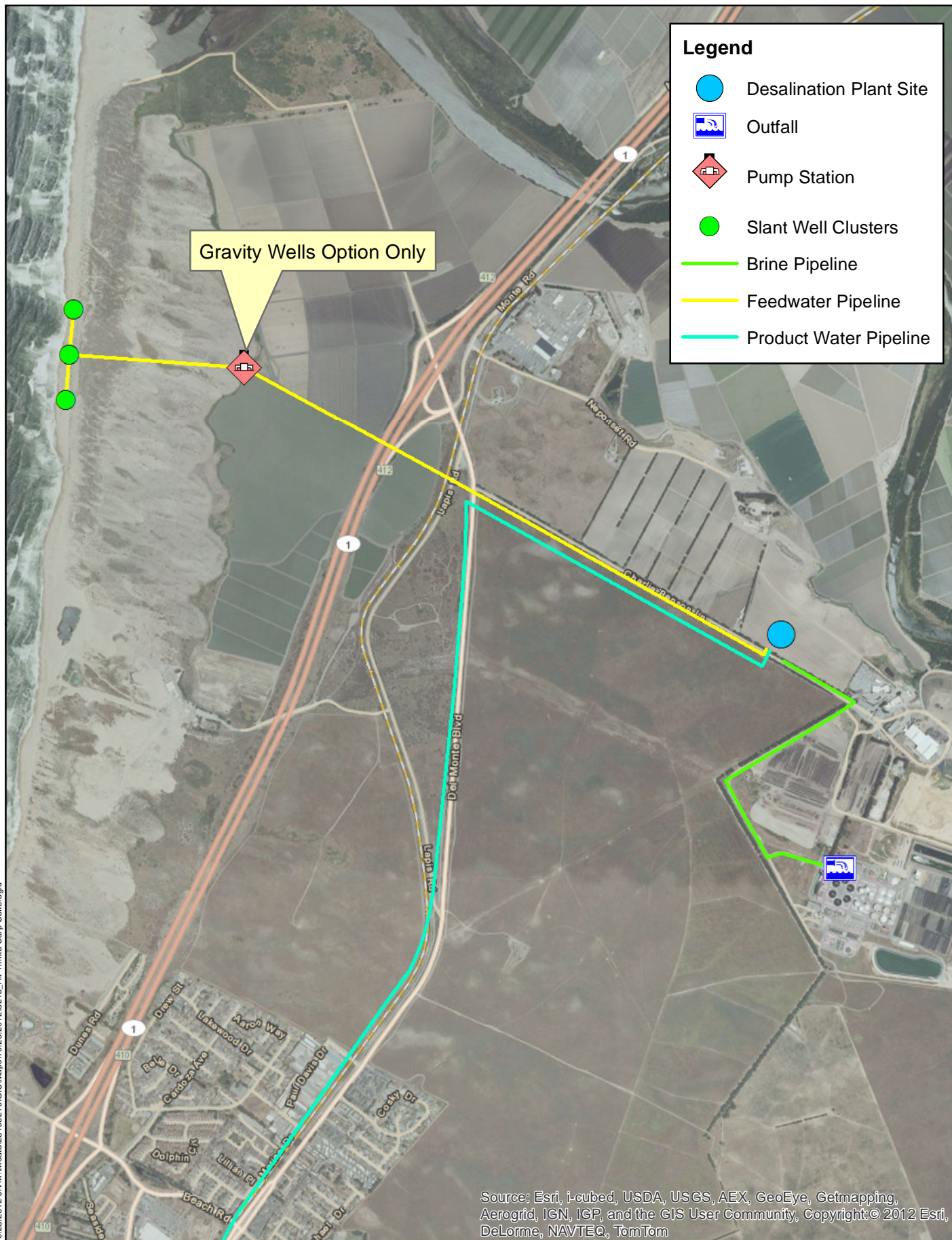
The geology along the shoreline of Seaside has been recently studied in detail (CDM and Feeney). It has been concluded by these studies that the existing geological conditions would not be supportive to install productive slant wells in the area. Therefore this contingency plan has not been pursued.

**Slant Intake Wells at Carmel River – Not Pursued:**

For this contingency plan, slant intake wells would be constructed around the Carmel River mouth. The existing geology at the Carmel River has not been studied in detail; however, it is suspected that the geology would not

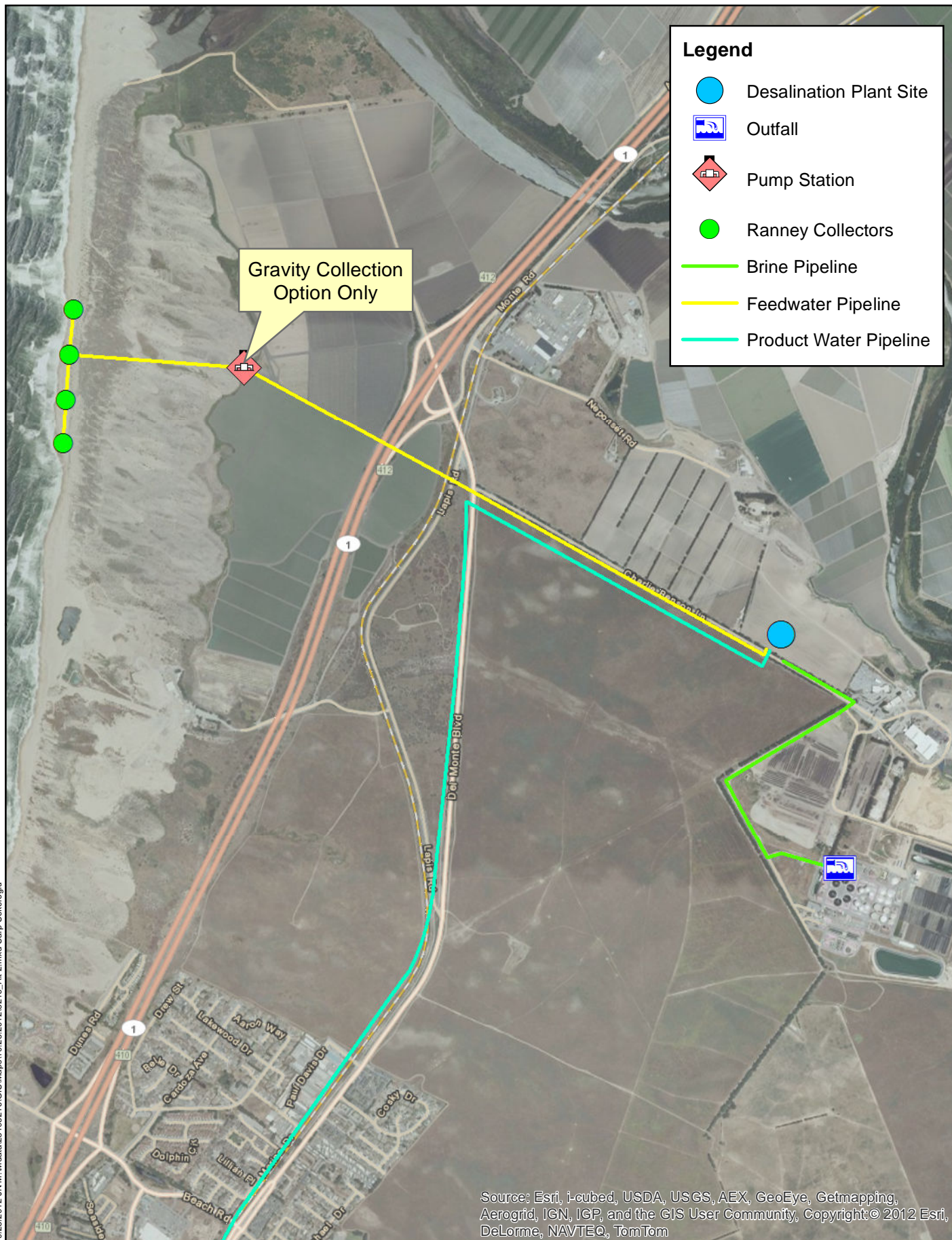
support construction of productive slant wells. Additionally, the intake wells would be too far (over 17 miles) from any feasible desalination plant site.

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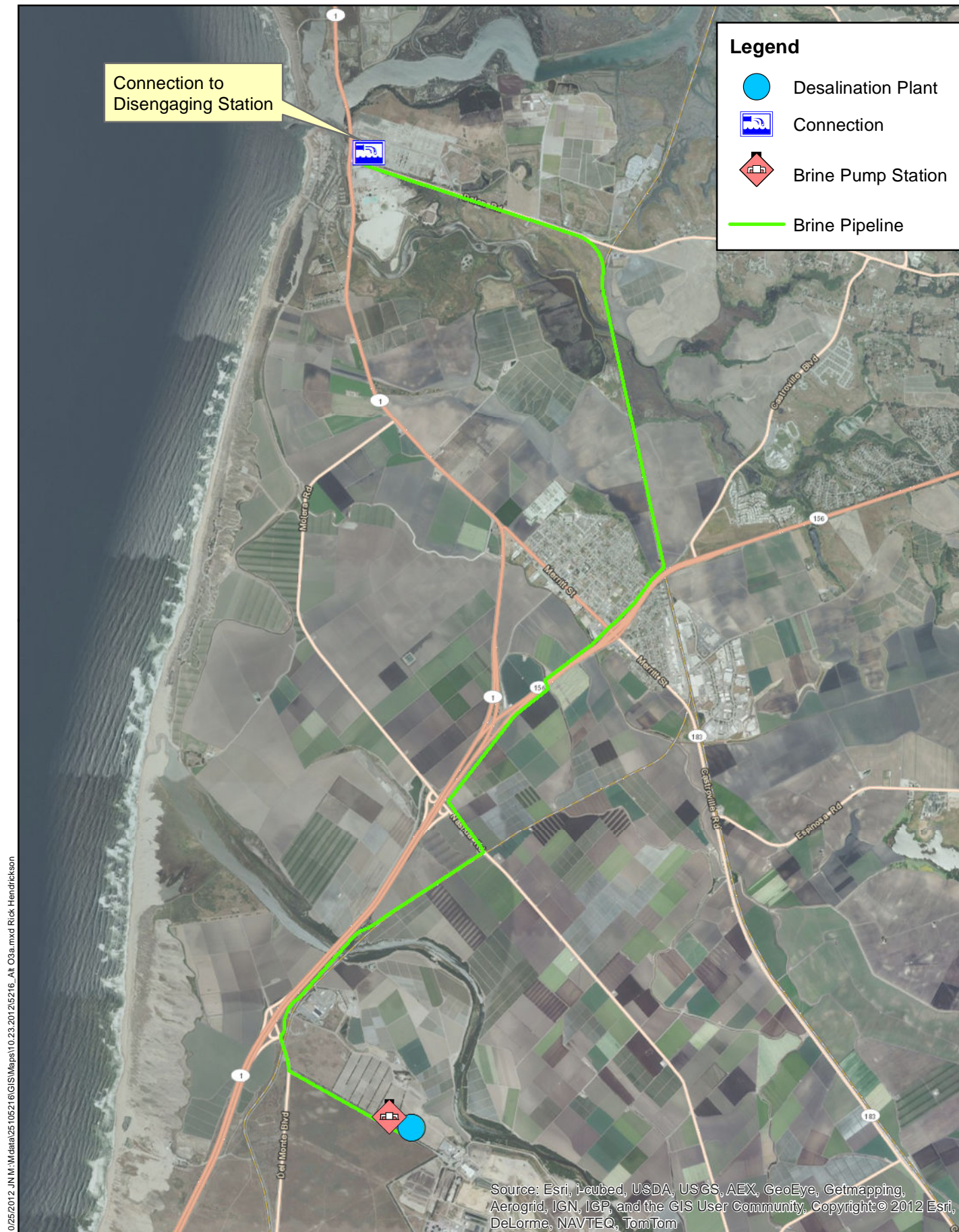




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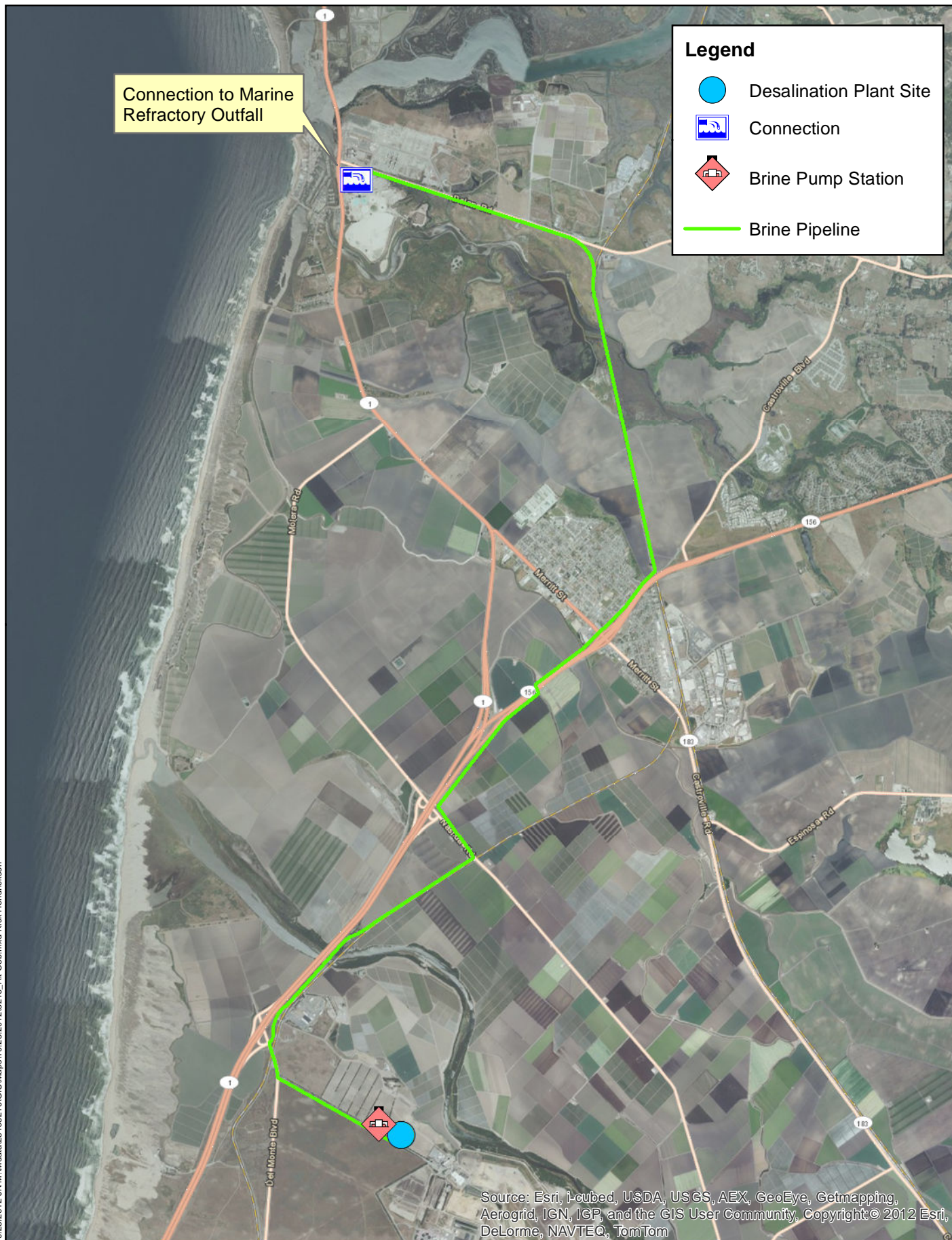




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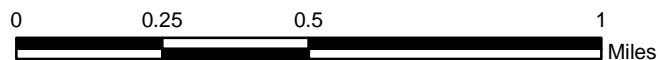
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Monterey Peninsula  
Water Supply Project

Figure 14 - Desalination Plant Site Contingency Option 1



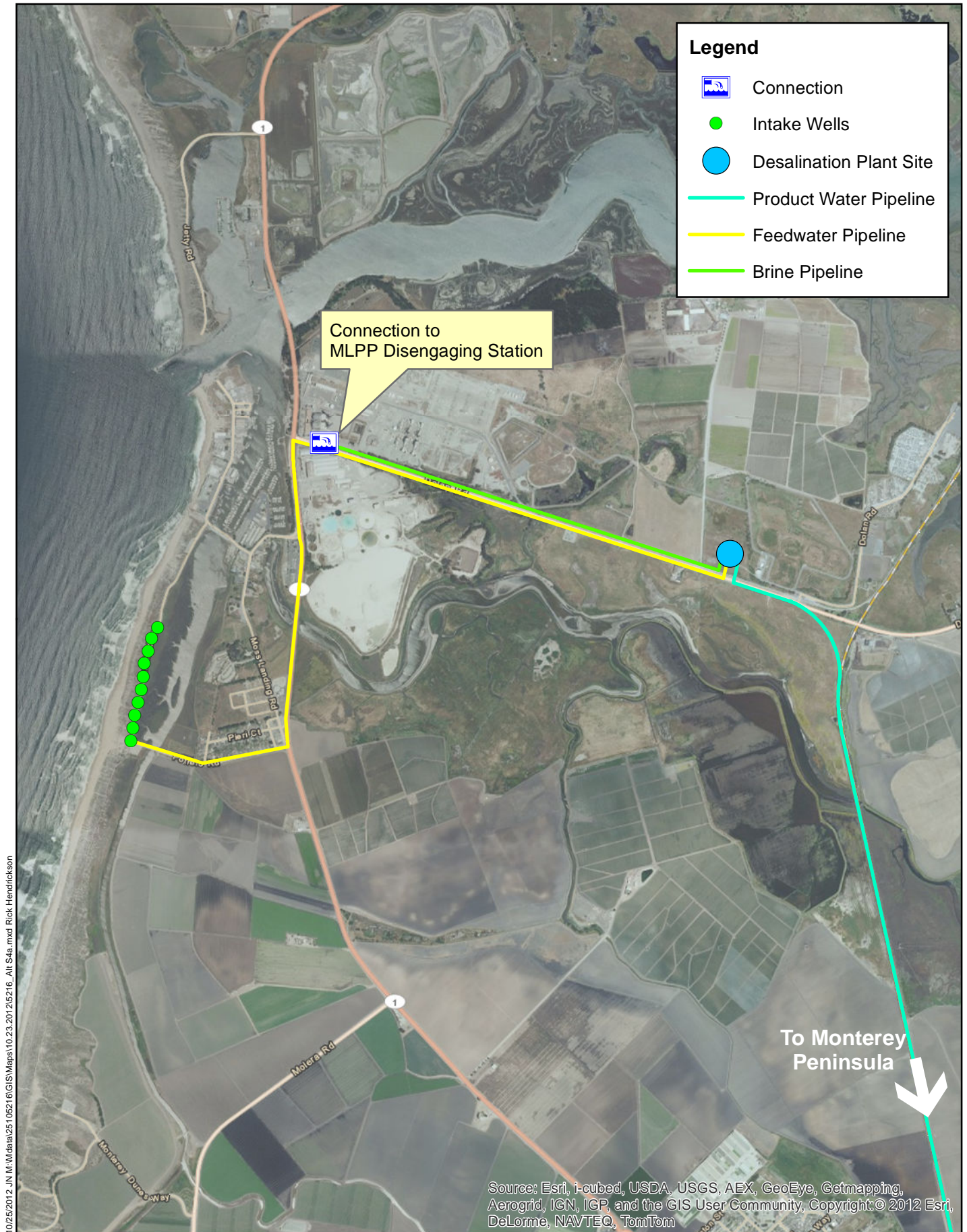


Figure 15 - Desalination Plant Site Contingency Option 2











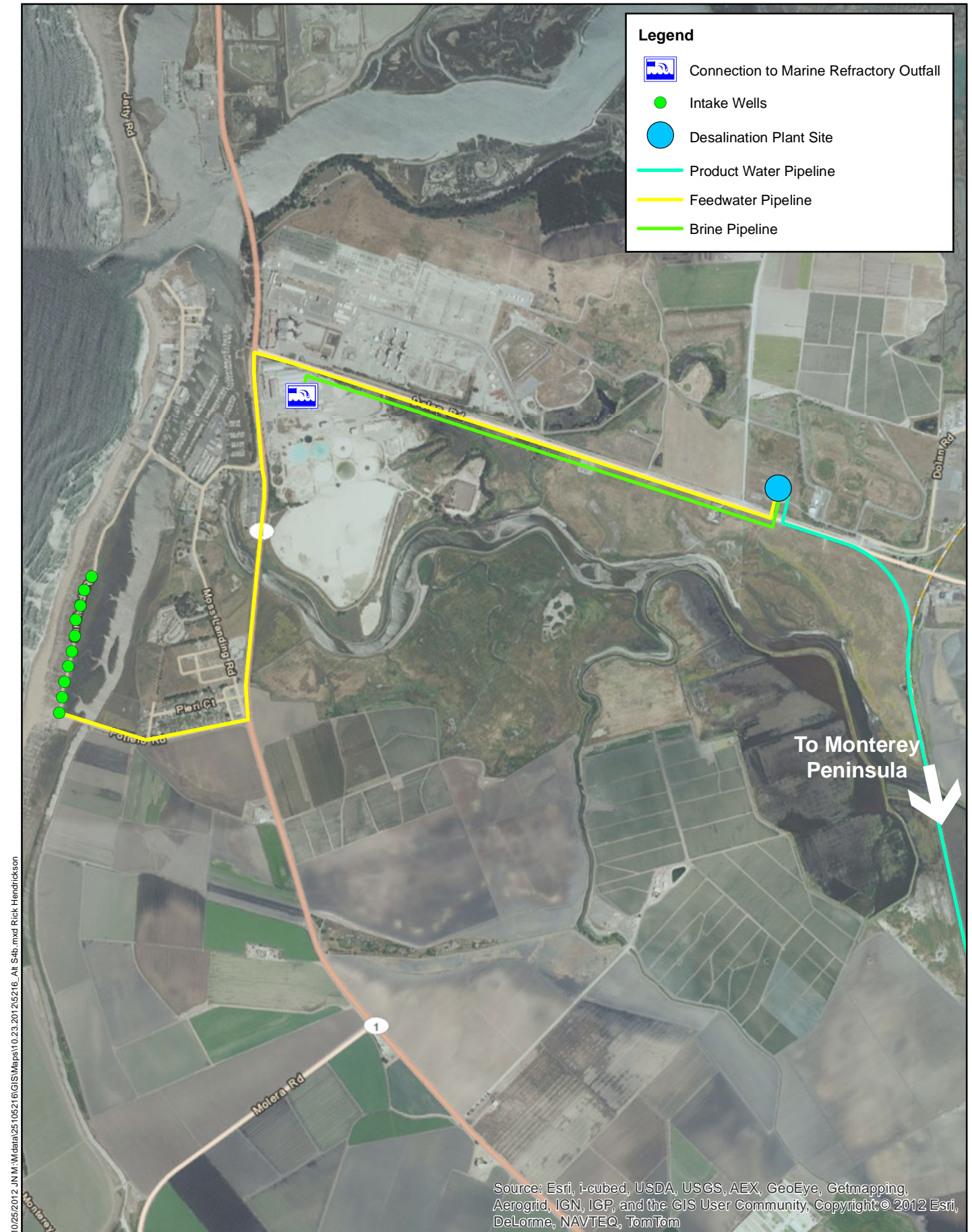


Figure 18 - Desalination Plant Site Contingency option 5







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Figure 21 - Desalination Plant Site Contingency Option 8

# Attachment 10

# MEMORANDUM

**To:** Richard Svindland, California American Water  
**From:** Kevin Thomas and Paul Findley, RBF Consulting  
**Date:** January 9, 2013  
**Subject:** Permitting Status Update

## Background

Since July 2004, CAW has been working with the regulatory community and other stakeholders to develop the most environmentally sound and technically feasible project. This included an extensive Permit Coordination Center and public outreach program that was conducted when the Project was known as the Coastal Water Project, with over 50 public meetings and a series of regulatory agency workshops. CAW successfully obtained all necessary regulatory permits for the Moss Landing Desalination Pilot Plant, which operated for 12 months through late 2009. In 2011, nearly all discretionary permits were submitted or obtained for the prior, similar "2010 Monterey Regional Desalination Project". In 2010 and 2012, Final Environmental Assessment/Finding of No Significant Impact (EA/FONSI) NEPA documents were submitted to the U.S. Army for the Monterey Presidio Pipeline Crossing (March 2012) and the Aquifer Storage and Recovery Facilities (September 2010) at Fort Ord.

## Monterey Peninsula Water Supply Project Permitting

The prior permitting work noted above provides CAW with a good foundation for regulatory permitting of the proposed Project. Current regulatory permitting activities include:

- 1) The CPUC CEQA process includes regulatory agency scoping as part of the Notice of Preparation (NOP) and related agency discussions to better understand and respond to permitting concerns. The December October 2012 NOP Scoping included written comments from key regulatory agencies and related environmental stakeholder organizations;
- 2) The CPUC CEQA process will include various technical studies that, together with a certified Subsequent EIR, will be essential components of the full-scale regulatory permitting process;
- 3) The list of regulatory permits and permitting agencies that were identified in the Coastal Water Project EIR is attached. It is anticipated that this list will be updated as part of the Subsequent EIR currently underway, and that permitting activities will be guided by that list and by the recommendations of that EIR;
- 4) CAW has been meeting with stakeholders and regulatory agencies since 2004, and most recently has met with key interest groups toward resolving Salinas Basin water rights concerns;
- 5) CAW has successfully obtained landowner consent from CEMEX for the test well, and continues negotiations with CEMEX regarding full-scale lease and access;

- 6) CAW has successfully closed escrow on acquiring the desalination plant site;
- 7) CAW is substantially complete with obtaining lease approvals from the U.S. Army for the Monterey Presidio Pipeline easement and for the ASR wells at Fort Ord;
- 8) CAW has had discussions with the City of Seaside and FORA concerning permitting and acquisition of a site or sites to accommodate the Terminal Reservoir and ASRPS.
- 9) Since May 2012, CAW has been exploring various design and siting options for the proposed test well, to demonstrate technical, environmental and permit feasibility of the subsurface slant well intake concept, generally located in north Marina at the CEMEX property.
- 10) Specific test well permitting activities have included the following:
  - a. Evaluation of test well sites from south of Reservation Road to north of Salinas River, including several potential locations and configurations at CEMEX, resulting in the currently proposed test well concept;
  - b. Several regulatory agency briefings for the proposed test well (held in September and October 2012);
  - c. Regulatory permit applications are in process for the following agencies and anticipated permits/approvals:
    - i. California Coastal Commission – Coastal Development Permit
    - ii. City of Marina – Coastal Development Permit, CEQA Lead Agency (for test well)
    - iii. County of Monterey – Coastal Development Permit (potential, depending on HDD launch and staging area on back side of dunes)
    - iv. State Lands Commission – lease
    - v. U.S. Army Corps of Engineers – Clean Water Act Section 404 compliance, Rivers and Harbors Act Section 10 Permit, NEPA Lead Agency
    - vi. Regional Water Quality Control Board – Central Coast Region – NPDES/WDR Permit, and Clean Water Act Section 401 Certification
    - vii. Monterey Bay National Marine Sanctuary – authorization and/or consultation as part of Coastal Act and Clean Water Act compliance
    - viii. U.S. Fish and Wildlife Service – Section 7 consultation through the U.S. Army Corps of Engineers
    - ix. California Department of Fish and Wildlife – consultation through the City of Marina CEQA compliance process
    - x. County of Monterey – Well Construction Permit (ministerial)
    - xi. State Historic Preservation Officer – consultation through the U.S. Army Corps of Engineers

**TABLE 3-14  
POTENTIAL PERMITS AND APPROVALS FOR THE CWP**

Agency or Department	Permit or Approval	Required for (Project)
<b>Federal Agencies</b>		
U.S. Fish and Wildlife Service (USFWS)	Incidental Take Statement in accordance with Section 7 of the Endangered Species Act of 1973, as amended (ESA) ( <u>16 U.S.C. 1531 et seq.</u> )	<ul style="list-style-type: none"> <li>The incidental take of a federally-listed species under the jurisdiction of USFWS, when a federal permit such as a Clean Water Act section 404 permit is required, requires the issuance of an Incidental Take Statement under Section 7 of the ESA. (If no federal approval were required, any incidental take of a federally listed species under the jurisdiction of USFWS would require an incidental take permit to be issued <u>and a habitat conservation plan to be approved</u> in accordance with ESA Section 10). <b>(both projects)</b></li> </ul>
	Incidental Take Permit in accordance with the Migratory Bird Treaty Act (16 USC 703–711)	<ul style="list-style-type: none"> <li>This Act prohibits the take of any migratory bird or any part, nest, or eggs of any such bird without an Incidental Take Permit from USFWS. <b>(both projects)</b>.</li> </ul>
	Consultation and issuance of a biological opinion in accordance with ESA Section 7	<ul style="list-style-type: none"> <li>The need for any federal permit requires the permitting agency to consult with USFWS to determine whether the proposed action is likely to adversely affect a federally-listed terrestrial, freshwater animal or plant species or designated critical habitat for such species, jeopardize the continued existence of such species that are proposed for listing under the ESA, or adversely modify proposed critical habitat. To make this determination, the permitting agency will prepare a Biological Assessment, the outcome of which will determine whether USFWS will conduct "formal consultation" with the agency and issue a Biological Opinion concerning the effects of the proposed action. If USFWS finds that that action may cause jeopardy or critical habitat destruction or modification, it will propose reasonable and prudent alternatives to the action. Alternatively, if USFWS finds no jeopardy, then the action can proceed. <b>(both projects)</b></li> </ul>
	Consultation in accordance with the Fish and Wildlife Coordination Act (16 U.S.C. 661-667c)	<ul style="list-style-type: none"> <li>This Act requires federal agencies to consult with the USFWS, NOAA Fisheries, and CDFG before they undertake or approve a project that controls or modifies surface water (e.g., by impoundment or diversion). The purpose of such consultation is to prevent loss of and damage to wildlife resources. <b>(both projects)</b></li> </ul>
	Consultation with State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO) in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA)	<ul style="list-style-type: none"> <li>The NHPA requires federal permitting agencies to "take into account" the effects of their actions that could affect properties that are included in the National Register of Historic Places or that meet the criteria for the National Register, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Thus, whenever there is federal agency involvement (e.g., USFWS issuance of an Incidental Take Statement or Incidental Take Permit) the federal permitting agency (here, USFWS) must consult with the SHPO and/or THPO, as appropriate. <b>(both projects)</b></li> </ul>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>Federal Agencies (cont.)</b>		
National Oceanic & Atmospheric Administration (NOAA) – Fisheries	Authorization by the Monterey Bay National Marine Sanctuary Superintendant of federal, state and local agencies' permits within the sanctuary in accordance with NOAA's National Marine Sanctuary Program requirements for the MBNMS. (15 Code Fed. Regs. Part 922)	<ul style="list-style-type: none"> <li>Authorization by the Monterey Bay National Marine Sanctuary Superintendant of any permit, lease, license, approval or other authorization issued or granted by a federal, state or local agency for activities within the sanctuary. This authorization indicates that the Monterey Bay National Marine Sanctuary Advisory Council does not object to issuance of the permit or other authorization, including the terms and conditions deemed necessary to protect Sanctuary resources and qualities. <b>(both projects)</b></li> </ul>
	Incidental Take Permit in accordance with Section 104 of the Marine Mammal Protection Act of 1972 (MMPA) (16 U.S.C. § 1374)	<ul style="list-style-type: none"> <li>The MMPA prohibits unauthorized "take" of marine mammals in U.S. waters by any person and by U.S. citizens in international waters. NOAA Fisheries can authorize incidental take that may occur during non-fishery commercial activities. <b>(both projects)</b></li> </ul>
	Incidental Take Statement in accordance with ESA Section 7 <u>(16 U.S.C. 1531 et seq.)</u>	<ul style="list-style-type: none"> <li>The incidental take of a federally-listed species under the jurisdiction of NOAA Fisheries, when a federal permit such as a Clean Water Act section 404 permit is required, requires the issuance of an Incidental Take Statement under Section 7 of the ESA. (If no federal approval were required, any incidental take of a federally listed species under this agency's jurisdiction would require an incidental take permit to be issued in accordance with ESA Section 10). <b>(both projects)</b></li> </ul>
	Consultation and biological opinion in accordance with ESA Section 7	<ul style="list-style-type: none"> <li>The need for any federal permit requires the permitting agency to consult with NOAA Fisheries to determine whether the proposed action is likely to adversely affect a federally-listed marine species or designated critical habitat for such species, jeopardize the continued existence of such species that are proposed for listing under the ESA, or adversely modify proposed critical habitat. To make this determination, the permitting agency will prepare a Biological Assessment, the outcome of which will determine whether NOAA Fisheries will conduct "formal consultation" with the agency and issue a Biological Opinion concerning the effects of the proposed action. If NOAA Fisheries finds that that action may cause jeopardy or critical habitat destruction or modification, it will propose reasonable and prudent alternatives to the action. Alternatively, if no jeopardy is found, then the action can proceed. <b>(both projects)</b></li> </ul>
	Consultation in accordance with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act ("the Sustainable Fisheries Act") (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>Whenever a federal or state approval is required for any activity that may adversely affect designated essential fish habitat (EFH), the agency must consult with NOAA Fisheries, similar to the consultation required under the ESA. If it is determined that the activity would adversely affect EFH, then NOAA Fisheries will recommend measures to the agency for conserving that habitat. <b>(both projects)</b></li> </ul>



**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>Federal Agencies (cont.)</b>		
National Oceanic & Atmospheric Administration (NOAA) – Fisheries (cont.)	Consultation with the SHPO and/or THPO, as appropriate, in accordance with NHPA Section 106.	<ul style="list-style-type: none"> <li>If a NOAA Fisheries permit is required, NOAA Fisheries must consult with the SHPO/THPO, as appropriate. See related discussion provided in the context of USFWS. <b>(both projects)</b></li> </ul>
U.S. Army Corps of Engineers (Corps)	Permit in accordance with Clean Water Act Section 404 (33 U.S.C. § 1344)	<ul style="list-style-type: none"> <li>Discharge of dredged or fill material into waters of the United States, including wetlands. <b>(Moss Landing Project-Salinas River Crossing; both projects-misc. small crossings)</b></li> </ul>
	Permit in accordance with Rivers and Harbors Act Section 10 (33 U.S.C. § 403)	<ul style="list-style-type: none"> <li>The creation of any obstruction to the navigable capacity of any waters of the United States. Permitting authority includes all structures and work in or over navigable waters of the U.S. that affect the course, location, condition, or capacity of such waters, such as the construction of a wharf, pier, bulkhead, ramp, or pipeline crossing. Other agencies have a consulting and review role in the Section 10 permit process, but issue no separate approval or authorization in connection with this role, e.g.: <ul style="list-style-type: none"> <li>The U.S. Coast Guard will consult with the Corps and review the Section 10 permit application for marine traffic safety and navigational hazards, including underwater intake and outfall pipelines.</li> <li>NOAA staff will review and comment on applications affecting National Marine Sanctuaries and sanctuary resources.</li> </ul> </li> </ul> <p><b>(Moss Landing Project-Salinas River Crossing)</b></p>
	Consultation under ESA Section 7	<ul style="list-style-type: none"> <li>ESA Section 7 requires a federal agency, such as the Corps, to ensure that any action that it authorizes, funds or carries out that may affect a federally-listed species is not likely to jeopardize the continued existence of that species or to destroy or adversely modify designated critical habitat. To do so, the agency (here, the Corps) will prepare a Biological Assessment. If the Biological Assessment concludes that the action is likely to affect such a species, the agency must engage in formal consultation with USFWS or NOAA Fisheries, as appropriate. Alternatively, a determination that the action is not likely to affect such a species would lead to a letter of concurrence from USFWS/NOAA Fisheries (assuming USFWS/NOAA Fisheries agrees with the determination) and the conclusion of the informal consultation process. <b>(both projects)</b></li> </ul>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>Federal Agencies (cont.)</b>		
U.S. Army Corps of Engineers (Corps) (cont.)	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If the Corps's issuance of any approval may adversely affect designated EFH, the Corps must consult with NOAA Fisheries. For any such action that would adversely affect EFH, NOAA Fisheries will provide conservation recommendations. The Corps then must provide a detailed written response to NOAA Fisheries within 30 days, including a description of measures proposed by the agency for avoiding, mitigating or offsetting the impact of the activity on EFH. If the response is inconsistent with NOAA Fisheries' recommendations, then the Corps must explain its reasons for not following the recommendations. <b>(both projects)</b></li> </ul>
	Consultation with the SHPO/THPO in accordance with NHPA Section 106	<ul style="list-style-type: none"> <li>If a Corps permit is required, the Corps must consult with the SHPO/THPO, as appropriate. See related discussion provided in the context of USFWS. <b>(both projects)</b></li> </ul>
<b>State Agencies</b>		
California Public Utilities Commission (CPUC)	Certificate of Public Convenience and Necessity (PUC Article 1)	<ul style="list-style-type: none"> <li>Construction and operation of the project and recovery of costs in connection therewith. <b>(both projects)</b>.</li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If the CPUC's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
Fort Ord Reuse Authority (FORA)	Finding of substantial conformance with the Base Reuse Plan and the FORA Master Resolution Chapter 8 consistency criteria	<ul style="list-style-type: none"> <li>Applications for local agency legislative land use planning approval (such as a proposed County General Plan amendment) are brought before the FORA Board of Directors for a determination of consistency between the application and the Base Reuse Plan. <b>(both projects)</b></li> </ul>
State Water Resources Control Board, Division of Water Rights	Order of approval	<ul style="list-style-type: none"> <li>Diversion of the Carmel River for aquifer storage and recovery (ASR) <b>(both projects)</b></li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If the State Water Resources Control Board's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
Regional Water Quality Control Board for the Central Coast Region	Compliance with National Pollutant Discharge Elimination System (NPDES) General Permit For Storm Water Discharges Associated With Construction Activity (WQO No. 99-08-DWQ)	<ul style="list-style-type: none"> <li>Any discharge of storm water to surface waters of the United States from a construction project that encompasses five or more acres of soil disturbance requires compliance with the General Permit, including:</li> </ul>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>State Agencies (cont.)</b>		
Regional Water Quality Control Board for the Central Coast Region (cont.)		<ul style="list-style-type: none"> <li>- Development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) that specifies Best Management Practices (BMPs), which will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters;</li> <li>- Elimination or reduction of non-storm water discharges to storm sewer systems and other waters of the U.S.; and</li> <li>- Inspection of all BMPs.</li> </ul> <p><b>(both projects)</b></p>
	National Pollutant Discharge Elimination System (NPDES) Permit in accordance with Clean Water Act Section 402 (33 U.S.C. § 1342)	<ul style="list-style-type: none"> <li>• The discharge of a pollutant or combination of pollutants (e.g., brine waste or concentrate) into surface waters of the United States, including wetlands, requires NPDES permit approval.</li> </ul> <p><b>(both projects)</b></p>
	Waste Discharge Requirements in accordance with the Porter-Cologne Water Quality Control Act (Water Code § 13000 <i>et seq.</i> )	<ul style="list-style-type: none"> <li>• Any activity that results or may result in a discharge of waste that directly or indirectly impacts the quality of waters of the State (including groundwater or surface water) or the beneficial uses of those waters is subject to WDRs. <b>(both projects-ASR settling basins)</b></li> </ul>
	Water Quality Certification in accordance with Clean Water Act Section 401 (33 U.S.C. § 1341)	<ul style="list-style-type: none"> <li>• Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into navigable waters, must provide the licensing or permitting agency a certification that the activity meets State water quality standards. <b>(Moss Landing Project-Salinas River Crossing; both projects-misc. small crossings)</b></li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>• If the Regional Board's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
California State Lands Commission	Amendment of Land Use Lease (Right-of-Way Permit) (Pub. Res. Code § 6000 <i>et seq.</i> ; 14 Cal. Code Regs. § 1900 <i>et seq.</i> )	<ul style="list-style-type: none"> <li>• Modification of Moss Landing Power Plant (MLPP) Outfall lease <b>(Moss Landing Project-brine discharge)</b></li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>• If the State Lands Commission's issuance of an approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>State Agencies (cont.)</b>		
California Department of Fish and Game (CDFG)	Incidental Take Permit in accordance with the California Endangered Species Act (CESA) (Fish & Game Code § 2081)	<ul style="list-style-type: none"> <li>The "take" of any endangered, threatened or candidate species may be allowed by permit if it is incidental to an otherwise lawful activity and if the impacts of the authorized "take" are minimized and fully mitigated. No permit may be issued if the permit would jeopardize the continued existence of the species. <b>(both projects)</b></li> </ul>
	Lake/Streambed Alteration Agreement (Fish & Game Code § 1602)	<ul style="list-style-type: none"> <li>Any substantial diversion, obstruction or change to the natural flow, or the bed, channel or bank of any river, stream, or lake in California that supports wildlife resources, and the use of any material from the streambeds without first notifying CDFG of such activity is unlawful. <b>(Moss Landing Project-Salinas River Crossing; both projects-misc. small crossings)</b></li> </ul>
	Consultation in accordance with the Fish and Wildlife Coordination Act (16 U.S.C. 661-667c)	<ul style="list-style-type: none"> <li>Consultation with CDFG and USFWS prior to the impoundment, diversion, control or modification of the waters of any stream or other body of water in accordance with a federal permit, license or other authorization. The purpose of such consultation is to prevent loss of and damage to wildlife resources. <b>(both projects)</b></li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If CDFG's issuance of any approval may adversely affect designated EFH, then the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
California Coastal Commission (CCC)	Coastal Development Permit in accordance with the California Coastal Act (Pub. Res. Code § 30000 <i>et seq.</i> )	<ul style="list-style-type: none"> <li>Development proposed within the Coastal Zone requires a Coastal Development Permit to be issued by the CCC except where the local jurisdiction has an approved Local Coastal Plan (LCP) in place. If an approved LCP is in place, primary responsibility for issuing coastal development permits shifts from the CCC to the local government although the CCC will hear appeals on certain local government coastal development permit decisions.</li> <li>Regardless of whether a coastal development permit must be obtained from a local agency in accordance with an approved LCP, the CCC retains coastal development permit authority over new development proposed on the immediate shoreline, including intake and outfall structures on tidelands, submerged lands and certain public trust lands, over any development which constitutes a "major public works project." (Pub. Res. Code §§ 30601, 30600(b)(2)).</li> </ul> <p><b>(both projects)</b></p>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>State Agencies (cont.)</b>		
California Coastal Commission (CCC) (cont.)	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If the issuance of a Coastal Development Permit (or other state approval) may adversely affect designated EFH, the permitting agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
California Energy Commission (CEC)	Approval of Petition to Amend Application for Certification No. 99-AFC-4 (Moss Landing Unit I & II - Duke)	<ul style="list-style-type: none"> <li>To add a desalination plant to the site of the existing CEC-permitted facility. <b>(Moss Landing Project)</b>.</li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If the CEC's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
<del>California Department of Health Services (CDOHS)</del> California Department of Public Health (CDPH)	Permit to Operate a Public Water System (Health & Safety Code § 116525)	<ul style="list-style-type: none"> <li>Operation of a public water system and oversight over the quality of the product water produced. <b>(both projects)</b></li> </ul>
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	<ul style="list-style-type: none"> <li>If the CDOHS's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. <b>(both projects)</b></li> </ul>
California Department of Transportation (Caltrans)	Encroachment Permit (Streets & Highway Code § 660 <i>et seq.</i> )	<ul style="list-style-type: none"> <li>Encroachments in, under, or over any portion of a state highway right-of-way, including for state Highway 156, Highway 68 and Highway 1. <b>(both projects)</b></li> </ul>
<b>Local Agencies</b>		
<u>Seaside Groundwater Basin Watermaster</u>	<u>Permit for Injection/Extraction</u>	<ul style="list-style-type: none"> <li><u>Injection/extraction activities affecting the Seaside Groundwater Basin require Watermaster approval. <b>(both projects)</b></u></li> </ul>
Monterey County Public Works Department	Encroachment Permit (Monterey County Code (MCC) Chapter 14.04)	<ul style="list-style-type: none"> <li>Designated activities within the right-of-way of a County highway require encroachment permit approval from the Public Works Director, whose decisions may be appealed to the County Board of Supervisors. <b>(both projects)</b></li> </ul>
Monterey County Health Department Environmental Health Division	Well Construction Permit (MCC Chapter 15.08)	<ul style="list-style-type: none"> <li>Construction of new water supply wells requires written permit approval to be issued by Health Officer of the County, whose decisions may be appealed to the County Board of Supervisors. <b>(both projects)</b></li> </ul>
	Permit to Construct Desalination Facility (MCC Chapter 10.72)	<ul style="list-style-type: none"> <li>The commencement of construction or operation of a desalination treatment facility requires permit approval to be issued by the Director of Environmental Health of the County of Monterey or his or her designee (MCC § 10.72.010), whose permit decisions may be appealed to the Director of Environmental Health within 30 days (MCC § 10.72.080). <b>(both projects)</b></li> </ul>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>Local Agencies (cont.)</b>		
Monterey County Planning and Building Inspection Department	Use Permit (MCC Chapter 21.74)	<ul style="list-style-type: none"> <li>To conduct a use for which a conditional use permit is required or allowed in a particular zone by the terms of the County Zoning Ordinance, a use permit must be issued by the appropriate planning authority, e.g., the Zoning Administrator or the Planning Commission, the decisions of which may be appealed to the Planning Commission and Board of Supervisors, respectively. <b>(both projects)</b></li> </ul>
	Coastal Development Permit in accordance with the California Coastal Act (Pub. Res. Code § 30000 <i>et seq.</i> )	<ul style="list-style-type: none"> <li>Development proposed within the Coastal Zone where the County has jurisdiction through its existing Local Coastal Plan, except in the instances noted above, where the CCC retains primary permit authority. Where the County is the permitting authority, the CCC retains jurisdiction over appeals. <b>(both projects)</b></li> </ul>
	Grading Permit (MCC Chapter 16.08)	<ul style="list-style-type: none"> <li>Grading, subject to certain exceptions, requires a permit to be issued by the Building Official, whose grading permit decisions may be appealed to the five-member Board of Appeals, which has been appointed by the Board of Supervisors, and subsequently to the Board of Supervisors. <b>(both projects)</b></li> </ul>
	Digging and Excavation Permit (MCC Chapter 16.10)	<ul style="list-style-type: none"> <li>Digging, excavation, ground disturbance and development require a separate permit from the county Building Official when they occur within the former Fort Ord military installation; permit decisions may be appealed to the Board of Appeals and subsequently to the Board of Supervisors. <b>(both projects)</b></li> </ul>
	Erosion Control Permit (MCC Chapter 16.12)	<ul style="list-style-type: none"> <li>Causing or allowing the continued existence of a condition on any site (including, for example, development and related construction activities such as site cleaning, grading, and soil removal or placement) that is causing or is likely to cause accelerated erosion requires a permit to be issued by the Director of Building Inspection; permit decisions may be appealed to the Board of Appeals and subsequently to the Board of Supervisors. <b>(both projects)</b></li> </ul>
Monterey Peninsula Water Management District (MPWMD)	Water System Expansion Permit in accordance with Ordinance 96 of the MPWMD Board of Directors	<ul style="list-style-type: none"> <li>Expansion of the MPWMD's water delivery system. <b>(both projects)</b></li> </ul>
Monterey Bay Unified Air Pollution Control District (MBUAPCD)	Authority To Construct in accordance with Local Rule 3.1	<ul style="list-style-type: none"> <li>The building, erection, alteration, or replacement of any article, machine, equipment or other contrivance which may cause the issuance of air contaminants from a stationary source or the use of which may eliminate or reduce or control the issuance of air contaminants requires an Authority to Construct to be issued by the Air Pollution Control Officer. <b>(both projects)</b></li> </ul>

**TABLE 3-14 (Continued)**  
**POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT**

Agency or Department	Permit or Approval	Required for (Project)
<b>Local Agencies (cont.)</b>		
Monterey Bay Unified Air Pollution Control District (MBUAPCD) (cont.)	Permit To Operate in accordance with Local Rule 3.2	<ul style="list-style-type: none"> <li>The operation or use of any article, machine, equipment or other contrivance that may emit air contaminants from a stationary source requires a Permit to Operate to be issued by the Air Pollution Control Officer or the District's Hearing Board. <b>(both projects)</b></li> </ul>
City of Monterey, City of Seaside, City of Marina, Sand City, Del Rey Oaks, <u>City of Pacific Grove</u>	Land Use <u>(including local Coastal Development Permit(s), as necessary)</u> , Building, Public Health, Public Works and/or similar approvals to those discussed above in the context of the County, each issued in accordance with the applicable city's municipal code.	<ul style="list-style-type: none"> <li>See related discussions provided in the context of the County. <b>(both projects)</b></li> </ul>
Transportation Agency for Monterey County	Easement	<ul style="list-style-type: none"> <li>To have a conveyance pipeline cross Agency property. <b>(both projects)</b></li> </ul>

# Attachment 11



# MEMORANDUM



**To:** Richard Svindland, California American Water

**From:** Paul Findley/Kevin Thomas/Sarp Sekeroglu, RBF Consulting

**Date:** January 9, 2013

**Subject:** Monterey Peninsula Water Supply Project (MPWSP) Project Description Update

## INTRODUCTION

The Monterey Peninsula Water Supply Project (MPWSP) includes the following facilities: a subsurface beach well intake system; a seawater desalination plant north of the City of Marina at a site west of the Monterey Regional Water Pollution Control Agency (PCA) wastewater treatment facility; open-water discharge of brine through the PCA outfall; desalinated water conveyance and storage infrastructure, including approximately 25 miles of pipeline; and Aquifer Storage and Recovery (ASR) facilities. The following MPWSP description is intended for use by CPUC and its environmental consultant in preparation of necessary documentation for compliance with the California Environmental Quality Act (CEQA).

## MPWSP SUPPLY CAPACITY

CAW plans to meet a projected demand condition of 15,290 acre-feet per year (AFY) with 11,046 AFY of supply from the MPWSP, and 4,244 AFY from existing sources (774 AFY of supply from the Seaside Groundwater Basin (SGWB), 3,376 AFY from the Carmel River, and 94 AFY from the Sand City Desalination Plant (SCDP)). The intended operation of the MPWSP includes operation of the existing Seaside groundwater wells at a long term average of 774 AFY, which is 700 AFY below the safe yield of the basin, effectively achieving 700 AFY of in-lieu replenishment water to the Seaside Groundwater Basin.

CAW is considering implementation of the MPWSP under two different possible scenarios. In both scenarios, available Carmel River would be injected in the Seaside Groundwater Basin (SGWB) during the wet season, and this stored water would then be extracted and used as supply during the dry season. In one scenario, the MPWSP would provide a long term average of up to 3,000 AFY of Carmel River water and 1200 AFY of desalinated water to the GWR Project, and this water would be combined with up to 3,500 AFY of highly treated GWR Project water and injected in the Seaside Groundwater Basin using wells provided by the GWR Project. This supply would then be extracted using the proposed ASR wells. The remaining supply increment of 7,590 AFY would be met with Carmel River Water direct to the system (1,670 AFY), desalinated water from the MPWSP desalination plant (5052 AFY), existing Seaside wells (774 AFY), and the existing SCDP (94 AFY). In this scenario, the MPWSP desalination plant would have a rated capacity of 6.4 million gallons per day (MGD); therefore, this scenario is referred to as the "6.4 MGD desalination option."

In the other scenario, which provides for a possible delay of GWR project implementation, the entire supply increment of 11,046 AFY would be met with supply from the ASR system and the desalination plant. The MPWSP would provide a long term average of up to 1,300 AFY of Carmel River water for injection in the SGWB during the wet season, and this stored water would then be extracted and used as supply during the dry season. The remaining supply

increment of 9,746 AFY would be met with desalinated water from the MPWSP desalination plant. The MPWSP desalination plant would have rated capacity of 9.6 MGD; therefore, this scenario is referred to as the “9.6 MGD desalination option.”

The Sand City Desalination Plant was analyzed in the Sand City Water Supply Project EIR (Sand City, 2004). It is not included in this current project description, because it has been constructed (by Sand City) and is now in operation.

## **PROJECT OBJECTIVES**

The primary objectives of the Monterey Peninsula Water Supply Project are to:

- Satisfy CAW’s obligations to meet the requirements of SWRCB Order 95-10;
- Diversify and create a reliable drought-proof water supply;
- Protect the Seaside Groundwater Basin for long-term reliability;
- Protect the local economy from the effects of an uncertain water supply;
- Minimize water rate increases by creating a diversified water supply portfolio;
- Minimize energy requirements and greenhouse gas (GHG) emissions per unit of water delivered to the extent possible;
- Provide facilities that can accommodate sea level changes;
- Explore opportunities for regional partnerships; and
- Provide flexibility to incorporate alternative water supply sources, such as GWR

## **SEASIDE GROUNDWATER BASIN REPLENISHMENT PROJECT (GWR)**

The GWR is a separate project, which CAW does not control. Given the urgency of the SWRCB’s Cease and Desist Order, CAW is proceeding with a full-scale project that includes a 9.6 mgd desalination plant. However, CAW remains committed to exploring incorporation of alternative water supplies into the overall Monterey Peninsula water supply solution. CAW has been in discussion with PCA, CPUC and other stakeholders regarding incorporating PCA’s GWR project into the overall water supply solution. As such, CAW has developed the proposed Project to be flexible, allowing for incorporating GWR water into the water supply portfolio. Therefore, this Project Description includes a scenario whereby approximately 3,500 AFY of recycled water would be contributed by the GWR Project under the “with GWR” scenario, based on information provided to CAW by PCA.

The GWR project would provide a year-round source of supply to the Seaside Groundwater Basin. As described in Section 5.3.6 of the FEIR, the GWR Project would include replenishment of the Seaside Groundwater Basin with advanced treated recycled water from PCA’s Regional Treatment Plant (RTP). All groundwater replenishment water would be treated through a proposed advanced water treatment plant (AWTP). The GWR Project would contribute up to 3,500 AFY of recycled water to the MPWSP over an 8-month period (September through April). The GWR Project would have injection wells located at inland locations in the Seaside Basin. Treated water from the AWTP would be conveyed to the Seaside Basin through a pipeline to be constructed as part of the Regional Urban Water Augmentation Project (RUWAP). If the RUWAP pipeline is not constructed or feasible for their use, PCA would explore other approaches to transmit the recycled water to the Seaside Basin.

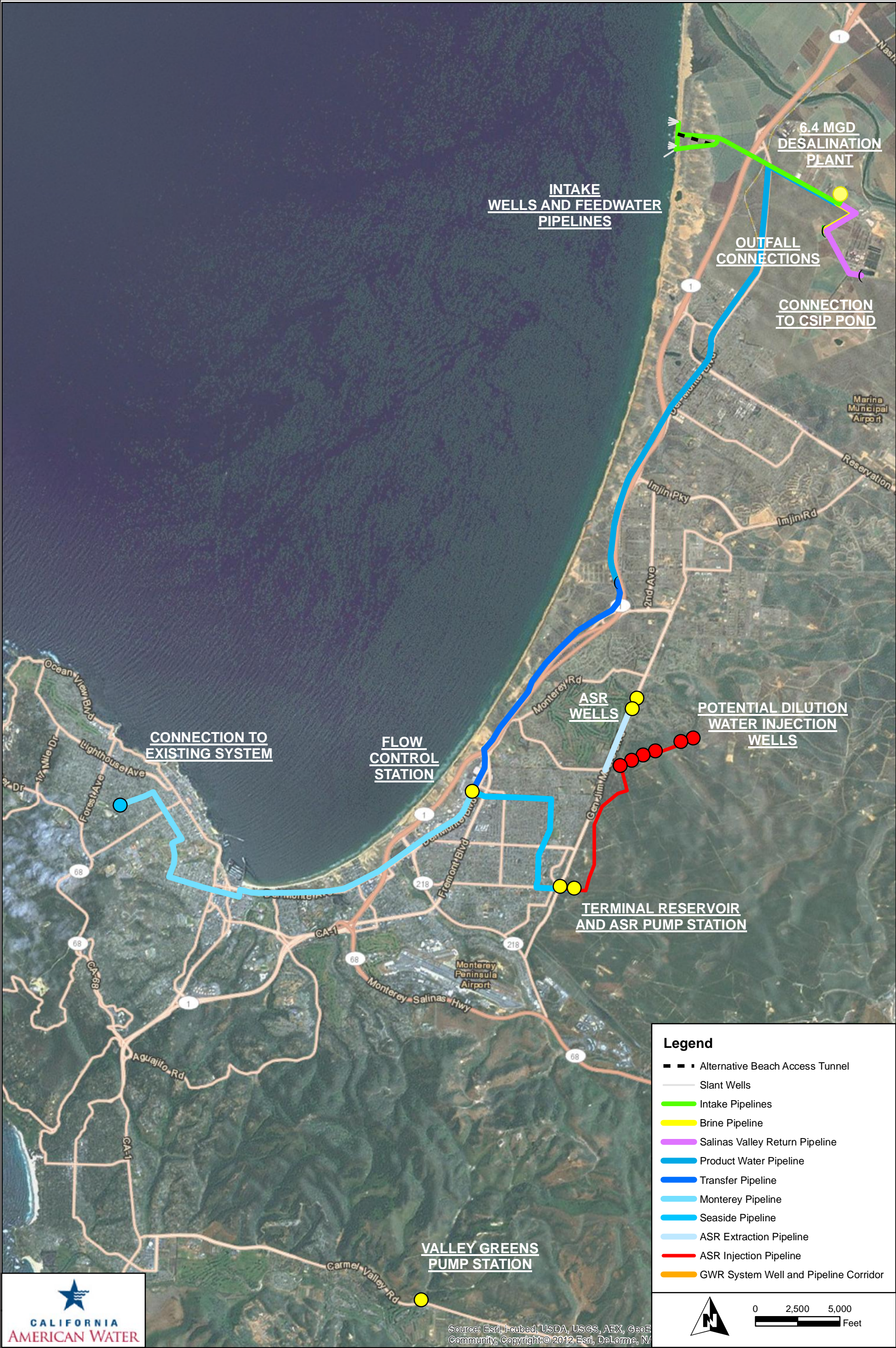
## **MPWSP FACILITIES**

The MPWSP’s facilities include a feedwater intake and conveyance system, a 6.4 or 9.6 MGD desalination plant, a brine discharge system, and a variety of conveyance and storage facilities, including an ASR system, as shown on **Figures 1 and 2**. **Tables 1 and 2** provide a summary











description for each component of the MPWSP with and without implementation of the Seaside Groundwater Basin Replenishment (GWR) Project by PCA. Some of these facilities have not changed from what is described in the FEIR; these facilities are marked with a “P” in Tables 1 and 2. Other facilities were described in the FEIR but have been modified for this Project Description; these facilities are marked with an “M” in Tables 1 and 2. Finally, some facilities in this Project Description have not been previously described and these facilities are marked with an “N” in Tables 1 and 2.

Table 1 MPWSP FACILITIES SUMMARY WITH GWR				
Facility	Quantity	Size and Characteristics	M/N/P <sup>1</sup>	FEIR Reference
<b>Northern Facilities</b>				
<b>Subsurface Intake:</b>				
Intake Wells	2 clusters of 3 plus 1 test well	Gravity wells; Angle from horizontal TBD by test well; -190 to -210 MSL depth; 580 ft average length, average capacity 1500 gpm each	M	Chapter 3.3.1
Beach Collector Pipeline	1600 LF	36-inch diameter trenchless construction under beach	N	Not described in FEIR
Gravity Intake Tunnel Pipeline	2,500 LF	72-inch diameter tunnel constructed under dunes	N	Not described in FEIR
Feedwater Pump Station	1	15 MGD; 150 ft TDH; 600 HP (VFD) installed	N	Not described in FEIR
Feedwater Pipeline	8,300 LF	36-inch diameter, includes trenchless 500 LF under Hwy 1	M	Chapter 3.3.1
<b>Desalination Plant:</b>			M	Chapter 3.3.2
Feedwater Receiving Tanks	2	0.5 MG each		
Pretreatment System	1	15 MGD, multimedia sand filters		
Backwash Supply System	1	0.2 MG elev. tank, 1,500 gpm fill pumping system		
Backwash Waste Handling	1	0.5 acre, 6 ft deep, lined open basin with decant system		
Desalination Process	1	6.4 MGD SWRO system, 40-50% second pass		
Post-Treatment System	1	Calcite, carbon dioxide, NaOH, and sodium hypochlorite		
Brine Storage Basin	1	3.0 MG lined open basin, 8 ft deep		
Clearwell Pump Station	1	6.4 MGD, 40 ft TDH, 90 HP installed		
Desalinated Water Storage	2	1.0 MG each, steel or concrete above ground tanks		
Desalinated Water Pumping (to CAW)	1	6.4 MGD, 280 ft TDH 600 HP (VFD) installed		
Desalinated Water Pumping (to SV)	1	1000 gpm, 20 HP installed		
<b>Brine Conveyance/Disposal:</b>			M	Chapter 3.3.3
Brine Pipeline	5,000 LF	24-inch diameter		
PCA Outfall Pipeline (Existing)	11,260 LF	80 MGD capacity (existing); 60-inch diameter		
PCA Outfall Diffuser (Existing)	1,368 LF	60-inch and 48-inch diameter pipes; 120 to 170 diffuser ports; 2-inch diameter ports; -95 to -109 ft MSL; 3.5 ft above seafloor		
<b>Desalinated Water Conveyance:</b>			M	Chapter 3.3.4.3
Product Water Pipeline	32,000 LF	36-inch diameter		
Desalinated Water Pipeline to SV	6,200 LF	12-inch diameter		
<b>Previous “CAW Only” Facilities (addressed in certified Final EIR)</b>				
<b>Conveyance and Storage:</b>			P	Chapter 3.2.5 & 3.2.6
Transfer Pipeline	15,700 LF	36-inch diameter		
Monterey Pipeline	28,400 LF	36-inch diameter		
Terminal Reservoir	2 tanks	3 MG each		
Valley Greens Pump Station	1	3.0 MGD; 110 ft TDH; 100 HP (VSD) installed		
<b>ASR:</b>			M	Chapter 3.2.6
ASR Extraction (only) Wells	2	1000-foot depth, 4.3 MGD extraction		
ASR Pump Station	1	14 MGD, 150 ft TDH, 500 HP installed		
ASR Pipeline	13,000 LF	30-inch diameter north of Coe Avenue to ASR Wells;		
ASR Pump-to-Waste Conveyance	5,800 LF pipeline	16-inch diameter pipeline		
ASR Pump-to-Waste Treatment	1 settling basin	2,500 square-foot by 12-foot deep basin		

Notes

1. N: New, M: Previously described in the FEIR but modified in this Project Description, P: Previously described in the FEIR

Table 2 MPWSP FACILITIES SUMMARY WITHOUT GWR				
Facility	Quantity	Size and Characteristics	M/N/P <sup>1</sup>	FEIR Reference
<b>Northern Facilities</b>				
<b>Subsurface Intake:</b>				
Intake Wells	2 clusters of 4 plus 1 test well	Gravity wells; Angle from horizontal TBD by test well; -190 to -210 MSL depth; 580 ft average length, average capacity 1780 gpm each	M	Chapter 3.3.1
Beach Collector Pipeline	900 LF to 1,600 LF (Depending on Selected Sites)	36-inch diameter trenchless construction under beach	N	Not described in FBR
Gravity Intake Tunnel Pipeline	2,500 LF	72-inch diameter tunnel constructed under dunes	N	Not described in FBR
Feedwater Pump Station	1	23 MGD; 150 ft TDH; 1000 HP (VFD) installed	N	Not described in FBR
Feedwater Pipeline	8,300 LF	42-inch diameter, includes trenchless 500 LF under Hwy 1	M	Chapter 3.3.1
<b>Desalination Plant:</b>			M	Chapter 3.3.2
Feedwater Receiving Tanks	2	0.5 MG each		
Pretreatment System	1	23 MGD, multimedia sand filters		
Backwash Supply System	1	0.2 MG elev. tank, 1,500 gpm fill pumping system		
Backwash Waste Handling	1	0.5 acre, 6 ft deep, lined open basin with decant system		
Desalination Process	1	9.6 MGD SWRO system, 40-50% second pass		
Post-Treatment System	1	Calcite, carbon dioxide, NaOH, and sodium hypochlorite		
Brine Storage Basin	1	3.0 MG lined open basin, 8 ft deep		
Clearwell Pump Station	1	9.6 MGD, 120 HP installed		
Desalinated Water Storage	2	1.0 MG each, steel or concrete above ground tanks		
Desalinated Water Pumping (to CAW)	1	9.6 MGD, 800 HP (VFD) installed		
Desalinated Water Pumping (to SV)	1	1000 gpm, 20 HP installed		
<b>Brine Conveyance/Disposal:</b>			M	Chapter 3.3.3
Brine Pipeline	5,000 LF	24-inch diameter		
PCA Outfall Pipeline (Existing)	11,260 LF	80 MGD capacity (existing); 60-inch diameter		
PCA Outfall Diffuser (Existing)	1,368 LF	60-inch and 48-inch diameter pipes; 120 to 170 diffuser ports; 2-inch diameter ports; -95 to 109 ft MSL; 3.5 ft above seafloor		
<b>Desalinated Water Conveyance:</b>			M	Chapter 3.3.4.3
Product Water Pipeline	32,000 LF	36-inch diameter		
Desalinated Water Pipeline to SV	6,200 LF	12-inch diameter		
<b>Previous "CAW Only" Facilities (addressed in certified Final EIR)</b>				
<b>Conveyance and Storage:</b>			P	Chapter 3.2.5 & 3.2.6
Transfer Pipeline	15,700 LF	36-inch diameter		
Monterey Pipeline	28,400 LF	36-inch diameter		
Terminal Reservoir	2 tanks	3 MG each		
Valley Greens Pump Station	1	3.0 MGD; 110 ft TDH; 100 HP (VSD) installed		
<b>ASR:</b>			M	Chapter 3.2.6
ASR Injection/Extraction Wells	2	1000-foot depth, 2.2 MGD injection/4.3 MGD extraction		
ASR Pump Station	1	8.4 MGD, 100 ft TDH, 300 HP installed		
ASR Pipeline	13,000 LF	30-inch diameter north of Coe Avenue to ASR Wells;		
ASR Pump-to-Waste Conveyance	5,800 LF pipeline	16-inch diameter pipeline		
ASR Pump-to-Waste Treatment	1 settling basin	2,500 square-foot by 12-foot deep basin		

Notes 1. N: New, M: Previously described in the FEIR but modified in this Project Description, P: Previously described in the FEIR

The ASR system and the major portion of the conveyance and storage facilities are as described for the North Marina Alternative in Chapter 3 of the Coastal Water Project FEIR (with the exception of a required increase in the installed horsepower of the ASR Pump Station for the 6.4 MGD desalination option). However, the intake wells and supply/return pipelines, the desalination plant, and the desalinated water conveyance pipelines of the MPWSP are different than those described for the North Marina Alternative, and are described here. Proposed Northern MPWSP facilities are shown on **Figure 3**.







It is important to note that the following facility descriptions are preliminary, and are subject to modification through the CEQA process and subsequent final design and construction. Facility sizing, location and quantities are best estimates at this time. It is CAW's intent to seek CPUC approval for a "project" addressed in the Subsequent EIR that will allow CAW adequate flexibility in project implementation. Therefore, wherever possible, facility siting, alignment and sizing should be understood and addressed as conceptual in nature, with "study areas" and "pipeline alignment corridors" addressed in the EIR. More detailed facility information will be developed as the project moves through the regulatory permitting and design process.

## **NORTHERN PROJECT FACILITIES**

As shown on Figure 3, the MPWSP northern project facilities involve a feedwater intake system, a desalination plant (6.4 MGD or 9.6 MGD), a brine conveyance and disposal system, and a desalinated water conveyance system.

### **Intake System**

This section describes the location, size, and configuration of feedwater intake wells, feedwater intake pump station, and feedwater intake pipelines in the MPWSP. Proposed MPWSP intake facilities are shown on **Figure 4**.

### **Intake Wells**

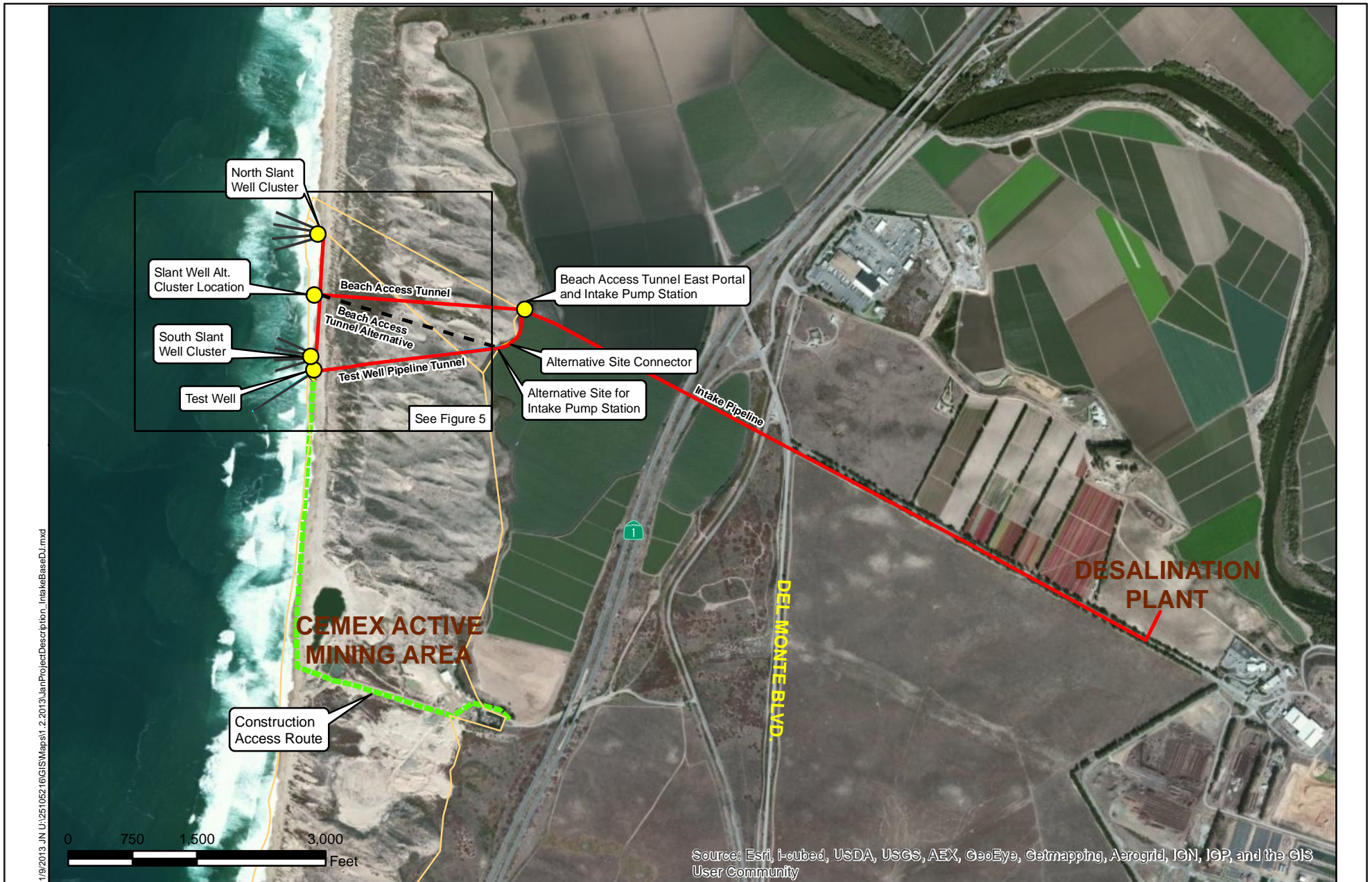
Feedwater for the MPWSP desalination plant would be extracted from subsurface slant wells that would draw seawater from beneath the shoreline. A slant well is a well that is drilled at an angle using modified vertical well construction methods. This allows construction of wells that extract water from as close to the coastline as possible, in order to extract water with higher salinity than can be obtained with conventional vertical wells. Angled drilling is beneficial because it results in a substantially increased screen length in the targeted water-bearing formations.

For the 9.6 MGD desalination option, the total well capacity required is approximately 23 MGD to meet the feedwater requirement for a 9.6 MGD desalination plant operating at an overall recovery of 42 percent. Nine wells operating at 1,800 gpm can meet this requirement. For the 6.4 MGD desalination option, the total well capacity required is approximately 15 MGD which can be met by seven wells operating at 1,500 gpm per well.

The preferred site (APN Number: 203 011 019 000) for construction of the slant wells is adjacent to a 376-acre parcel of land owned by the CEMEX corporation located due west of the proposed desal plant site and west of Highway 1. This property borders the Pacific Ocean and includes disturbed and undisturbed areas and approximately 7,000 feet of ocean shoreline. The wells would be constructed in two clusters along a 2000-foot stretch of this shoreline, at two of the three candidate cluster locations shown on Figure 4 and **Figure 5**. Most, if not all, of the facilities in the well clusters will actually be constructed on land owned by the State of California, under the authority of the California State Lands Commission.

One of the clusters would be constructed near the test well site, which is being separately permitted as a test facility, and the expectation is that the test well facility would be connected to this southern cluster, allowing the test well to be converted to a permanent facility. Four wells would be constructed at each cluster for the 9.6 MGD desalination option and three wells would be constructed at each cluster for the 5.4 MGD option. A preliminary layout and profile view of the well cluster is shown on **Figures 6 and 7**.

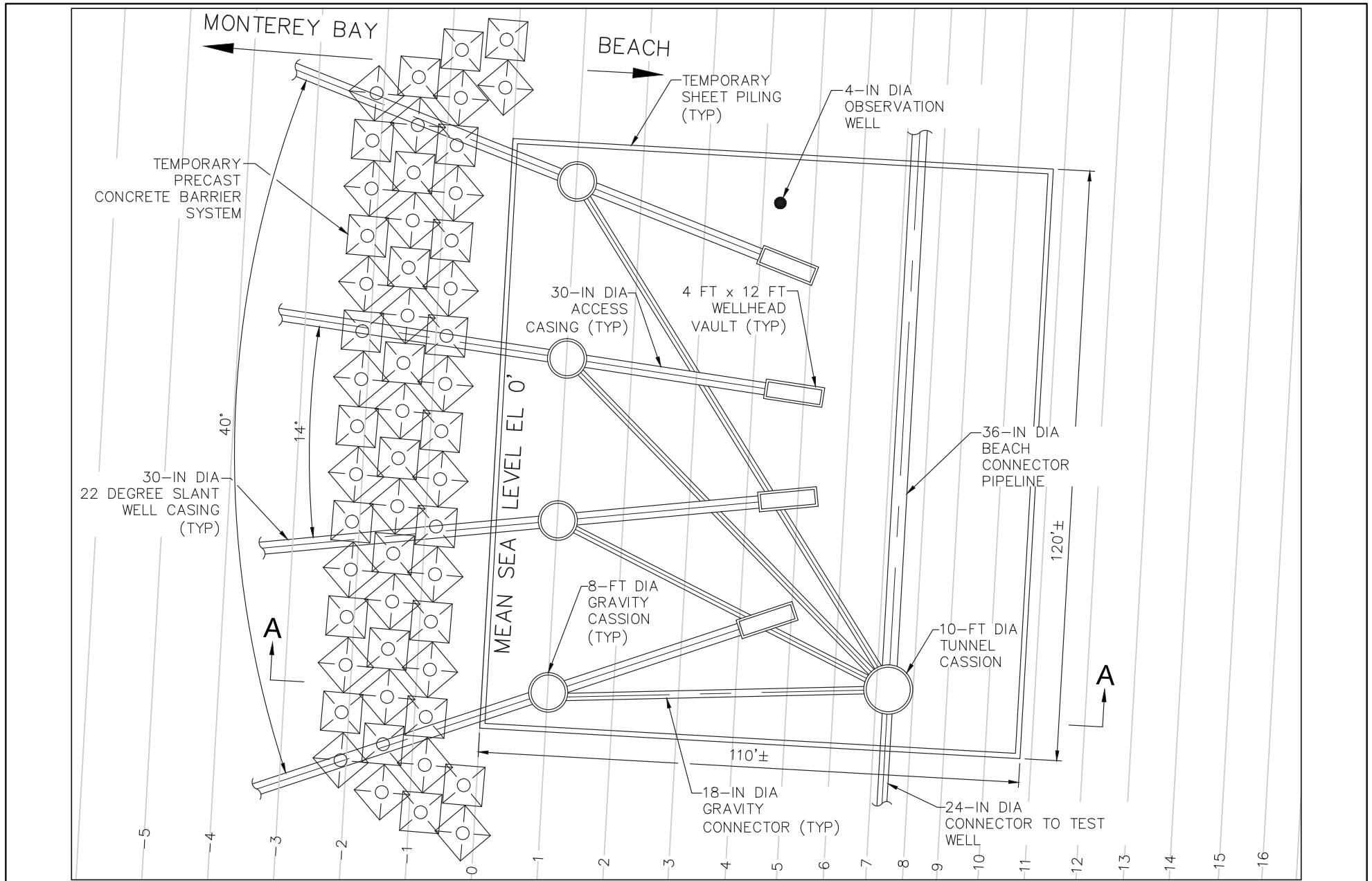


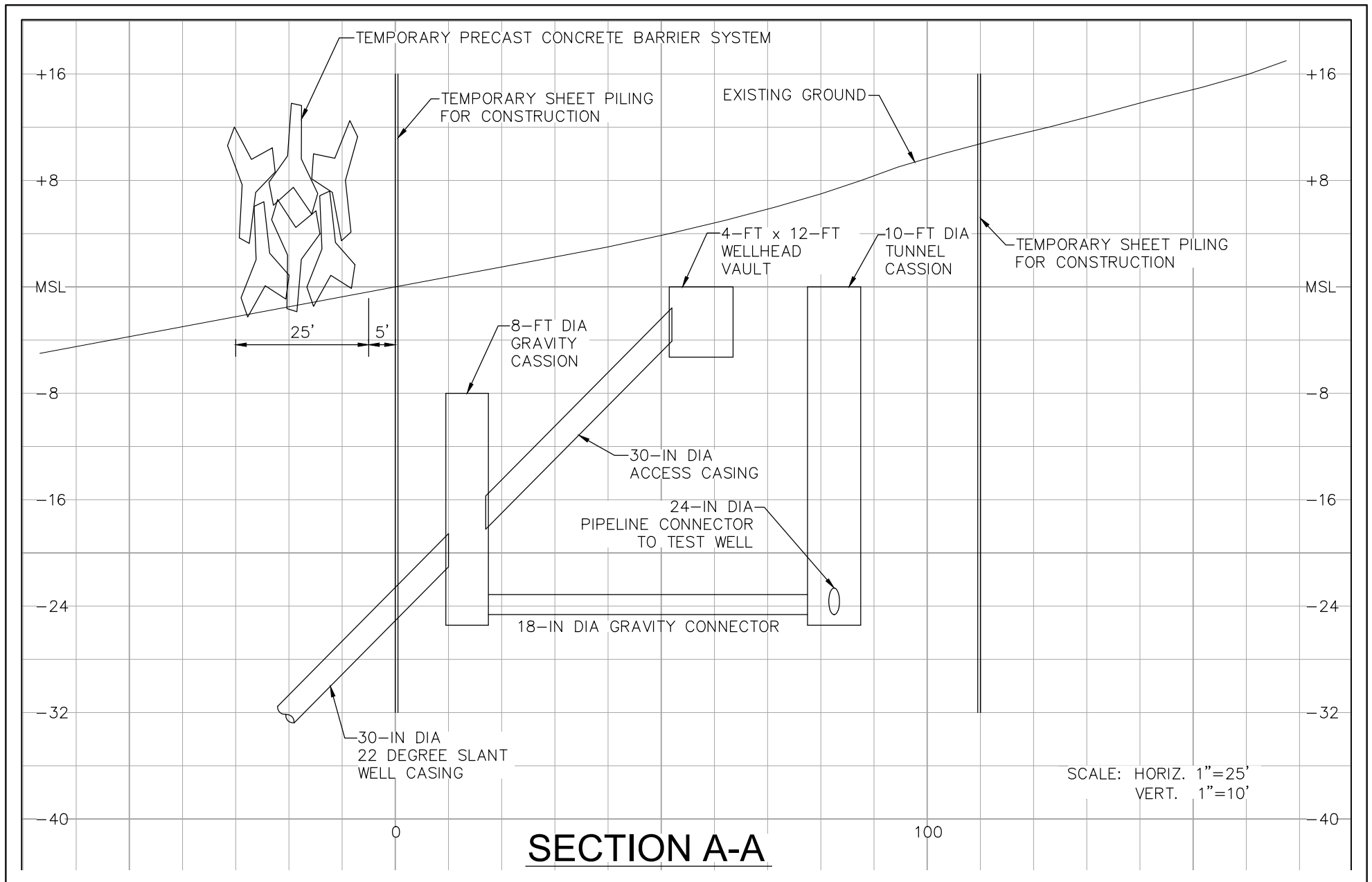




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**Slant Wells.** Subject to verification in the test well program, each slant well would be drilled at a 22 degree angle from horizontal to the bottom of the surface aquifer, which is referred to as the Sand Dunes Aquifer (SDA). In the proposed locations, the length of the wells is expected to range from 530 LF to 630 LF, measured from ground surface, and the length of the well screens is expected to range from 370 LF to 470 LF. The wells will be designed as gravity wells such that they will not require submersible well pumps or electrical power.

In order to protect the wellheads from wave damage, to eliminate any visual profile after construction, and to eliminate impacts on Snowy Plover nesting habitat, the wellheads will be completely buried below the beach surface in the area known as the “swash zone”, which is the portion of the beach that lies within the run-up of waves at normal high tide. In order to eliminate any possibility that the wellheads or any associated structures will be exposed by the combined effects of coastal erosion and sea level rise, they will be capped at or below mean sea level.

Construction of the intake wells in the swash zone will require a temporary barrier and sheet piling to protect equipment and personnel during construction. Further, the construction will need to be accomplished within the five-month (October through February) non-nesting season for the Snowy Plover, and the temporary barrier and sheet piling must be removed prior to March 1.

Access to the well facilities during construction will be obtained by two methods: (1) construction personnel and some of the construction equipment would travel to the shoreline through the active CEMEX mining area and travel north along the shoreline below the high water mark, as shown in Figure 4; and (2) barges would be used to deliver some construction equipment and most of the construction materials directly to the well sites. Once the slant test well is constructed, routine operational access to the slant test well site would not be necessary other than once every 5 to 10 years, for one to two weeks per well, during which time the well head would be excavated and uncovered, and well cleaning operations would be performed.

**Test Well.** CAW intends to construct a test slant well to collect data to facilitate overall intake and desalination plant design, operational and maintenance methods. The slant well will be permitted separately from the full-scale project, and would be located near the proposed southern well cluster, as shown on Figure 5. The test well is planned to be a pumped well, but it will be designed such that it could be converted to a gravity well, if desired. It is anticipated that the test well will be operated for twelve months, but this operational period may be longer as determined appropriate by CAW and applicable regulatory agencies.

### **Intake Pump Station and Pipelines**

The hydraulic design of the intake wells, beach connector pipelines, beach access tunnel, and intake pump station would induce gravity flow in the intake slant wells. The intake pump station would pump feedwater from the beach access tunnel into the intake pipeline for conveyance to the desalination plant.

**Beach Connector Pipelines.** The two well clusters would be connected to the west portal of the beach access tunnel with 36-inch diameter pipe tunnels, which would be installed using trenchless construction technology such as jack-and-bore or drill-and-burst. The connector pipes would be launched from the west portal of the beach access tunnel to the tunnel caissons located at each well cluster. (The tunnel caissons at each well cluster would be connected to the gravity wells via gravity connectors.) Material excavated during the trenchless technology construction would be conveyed in the pipe tunnels back to the beach access tunnel west portal



and from there conveyed in the beach access tunnel back to the east portal of the beach access tunnel.

**Beach Access Tunnel.** The beach access tunnel would be approximately 2,500 LF in length. Based on hydraulics, the minimum diameter of the tunnel would be 48-inches, however the final diameter and construction method of the tunnel will be determined based on constructability criteria and the requirement to remove spoils from beach trenchless technology construction operations.

**Intake Pump Station.** The intake pump station would be located on the east side of the coastal dunes at the east portal of the beach access tunnel, as shown on Figure 4. The intake pump station would have a capacity of approximately 23 MGD for the 9.6 MGD desalination option, and approximately 15 MGD for the 6.4 MGD option. The intake pumps (4 pumps at 150 HP each for 6.4 MGD desalination option or 4 pumps at 250 HP each for the 9.6 MGD desalination option) would be variable speed, vertical turbines mounted on vertical “pump cans”, enclosed in an above-ground 3,000 square-foot building.

**Intake Pipeline.** As shown in Figure 4, the 8,300 LF 36-inch diameter intake pipeline would convey pumped flow east from the intake pump station along an existing unpaved road between two agricultural fields, under Highway 1, then across the TAMC right-of-way to the intersection of Charles Benson Road and Del Monte Boulevard intersection. From there the pipeline would continue southeast on Charles Benson Road to the desalination plant. The crossing of Highway 1 would be constructed using trenchless technology.

### **Brine Conveyance Pipeline**

The desalination plant will generate a brine stream (with a salinity of approximately 55,000 to 60,000 mg/L or approximately 70 to 80 percent higher than seawater) at a flow rate equal to 120 to 140 percent of the plant's production rate, and possibly another 0.4 MGD of decanted waste backwash (at seawater salinity). These combined streams will flow by gravity from the RO process through approximately 3,300 LF of 24-inch diameter pipeline to the headworks of the Monterey Regional Pollution Control Authority's (PCA) outfall, where it will mix with effluent from PCA's Regional Treatment Plant (RTP) and be discharged to the ocean through the existing outfall diffusers. The amount of RTP effluent available for blending with the brine is expected to be highly variable throughout the year and may be zero for extended periods during the summer months when all of the RTP's effluent is reclaimed for agricultural irrigation.

### **Salinas Valley Desalinated Water Return Pipeline**

Groundwater modeling results indicate that, over the long term, feedwater pumped from the slant wells would include a small amount of intruded groundwater from the Salinas Valley Groundwater Basin (SVGB). The MPWSP desalination plant would be operated such that, on an annual average basis, the plant would return desalinated water to the SVGB in an amount equal to the freshwater amount in the water extracted from the slant wells. Geosciences Support Services, Inc. (GSSI) prepared a study for CAW titled *North Marina Groundwater Model Evaluation of Potential Projects*, dated September 26, 2008. This study looked at a CAW slant well only scenario to be located at MCWD Reservation Road property. The study predicted:

*‘The predicted TDS concentration of 33,000 mg/L for the feedwater extracted by the six slant wells is approximately 94 to 97 percent of the TDS concentration of seawater (34,000 to 35,000 mg/l). As the modeled layout represents a worse-case scenario (due to the steeper well angles), the most recent layout (six 700 ft wells with a 20 degree angle proposed by RBF, 2008) would most likely result in an even higher percentage of seawater in the extracted water.’*



For the purposes of this project description, the assumed percentage of seawater in the feedwater is approximately 97 percent. Therefore, freshwater in the feedwater, which would be returned to Salinas Valley, is approximately three percent. Considering plant recovery, the amount of water to be returned to Salinas Valley is assumed to be eight percent of the desalinated water production and is calculated as follows:

$$\text{Return Amount} = ((\text{Delivery to CAW})/0.92) - (\text{Delivery to CAW})$$

Using the above formula, the calculated return amounts for the 9.6 MGD desalination option and the 6.4 MGD desalination option are 850 AFY and 540 AFY, respectively.

The proposed method to return the excess desalinated water to the SVGB is to deliver the water to the Castroville Seawater Intrusion Project (CSIP) 80-acre foot (AF) storage pond located on the PCA's RTP property. During the irrigation season, the desalinated water would be blended with tertiary treated recycled water and delivered to farms connected to the CSIP. Desalinated water would be pumped from the clear well of the desalination plant into a 12-inch diameter PVC pipe which would convey the water approximately 7,000 LF to the CSIP irrigation storage pond.

### **Desalination Plant**

The MPWSP desalination plant would be constructed on approximately 46 acres of currently vacant and disturbed land west of the RTP, adjacent to Charles Benson Road (see Figure 3). For most of the site, ground elevations range from elevations 90 feet to 114 feet. Structures and facilities at the site, as shown in **Figure 8**, would consist of the following: feedwater receiving tanks; pre-treatment process; filter backwash supply system; waste washwater storage and settling basin; desalination process; post-treatment process and chemical systems; brine storage tanks; desalinated water storage tanks and pumping station; and non-process facilities.

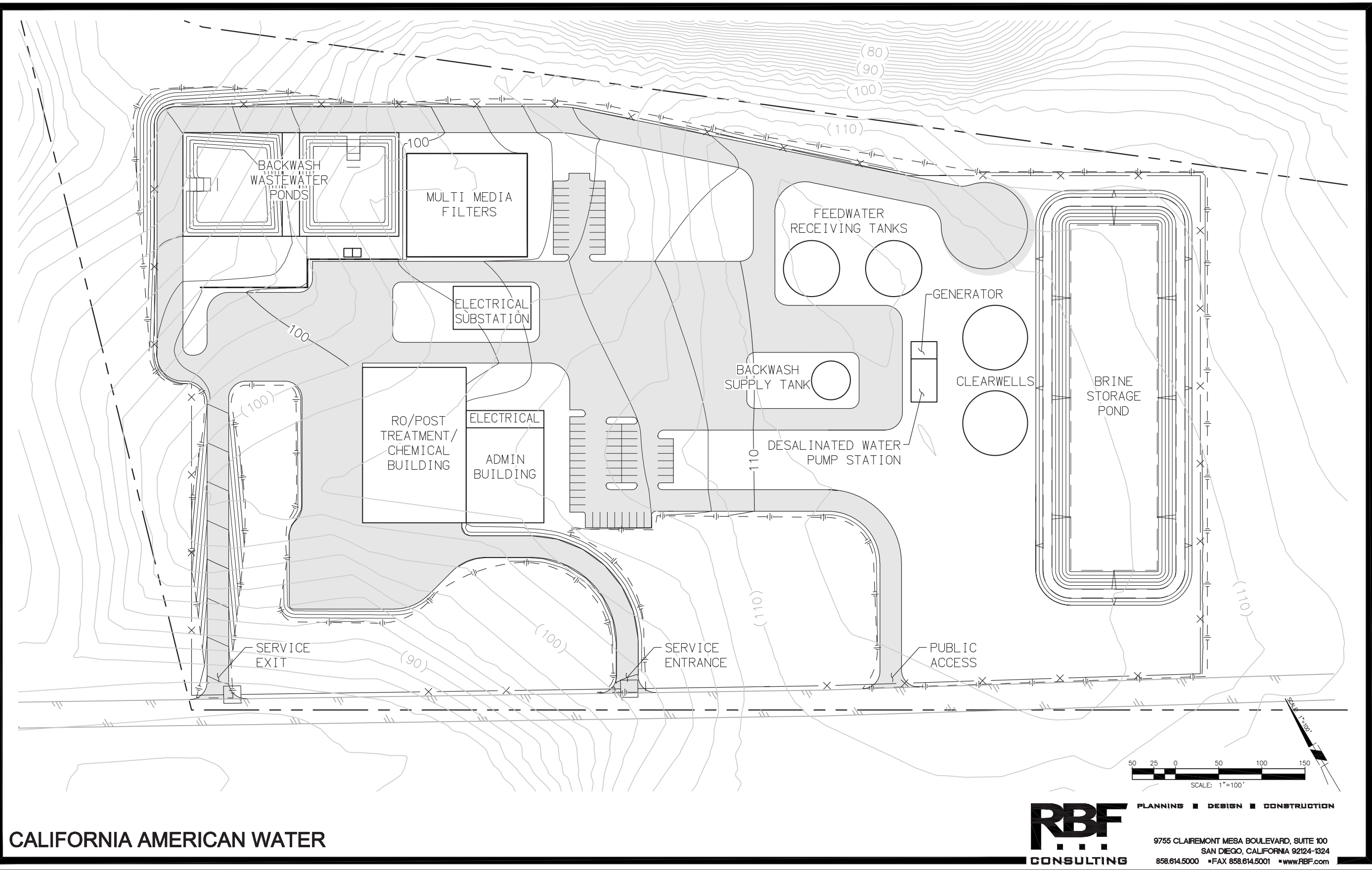
The following sections describe each of these facilities.

### **Feedwater Receiving Tanks**

Feedwater will be pumped from the feedwater intake wells directly to two above-ground feedwater receiving tanks at the desalination plant site. The two tanks will be each have a volume of approximately 0.5 million gallons, and will be either glass-lined steel or cast-in-place concrete construction. The tanks will be sized to receive the variable flow from the various combinations of constant speed well pumps, and produce an equalized flow rate to the pretreatment process. The tanks will be located on the plant site at approximately elevation 110 feet in order to provide a water surface in the tanks ranging from elevation 115 feet to 130 feet in order to deliver flow by gravity through the pretreatment filters.

### **Pretreatment**

Feedwater from the feedwater receiving tanks will be piped directly to pressure or gravity multimedia sand filters for removal of small particles that could otherwise foul the downstream cartridge filters and/or RO membranes. These filters may also play an important role in providing pathogen removal credit during initial plant operations during which time the feedwater supply may be considered to be groundwater under the influence of surface water, and therefore subject to the Surface Water Treatment Rule. Also, a low dosage of chlorine may be added to the feedwater as an oxidant in order to precipitate any dissolved iron and manganese,



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Monterey Peninsula Water Supply Project  
Desalination Plant Layout

Figure 8

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and the resulting precipitate will be removed by the filters. If pressure filters are used, they would be multiple parallel fiberglass or lined-steel tank units installed in a large walled open pit area which has a floor elevation that is 5 to 15 feet below grade. If gravity filters are used, they would be installed in below-grade multi-cell concrete structures.

### **Filter Backwash Supply System**

The filters will be backwashed periodically (approximately once per day) using process filtrate as backwash supply. The backwash supply may be chlorinated in order to control biological growth on the filters. The backwash supply, which must be provided at a relatively high flow rate for a short duration (10 minutes per backwash), will be from a 200,000 gallon backwash supply tank that will be located on the plant site high enough to provide gravity flow to the filters. The backwash supply tank will be filled by a process filtrate pump which will operate a relatively low rate between backwash cycles.

### **Waste Backwash Storage/Settling Basin**

Waste from the backwashing process will flow from the filters by gravity to a 0.5-acre 6-foot deep basin. The basin will be open, but will be equipped with an impermeable liner to prevent leakage of the water (seawater salinity) into the ground. Suspended solids in the waste wash water will settle to the bottom of the basin and the clarified water will be decanted. The decanted water will then be pumped to the brine discharge pipeline for blending with RO brine and ultimate disposal in the PCA outfall. Alternatively, it may be possible to pump the decanted water at a low rate to the feedwater receiving tank for blending with feedwater and subsequent retreatment through the pretreatment and RO process.

The basin will be equipped with ramps and divider walls to allow periodic draining and manual removal of accumulated solids of one half of the facility while the other half remains in service. Sodium hypochlorite may be added to the basin periodically or continuously for algae control.

### **Desalination Process**

Reverse osmosis (RO) is a molecular separation process that uses semi-permeable membranes to remove salts in saltwater and produce desalinated water (which is also called product water or permeate). Pretreated seawater is forced at very high pressures through the membranes, and the water molecules, smaller than almost all impurities, including salts, are selectively able to pass through the membranes. The remaining impurities and residual water are discharged as concentrate, which is commonly called "brine".

A schematic drawing of the proposed RO process is shown in Figure 3-12 of the Coastal Water Project FEIR. The assumed and proposed RO process would consist of a first pass with a partial (40 to 50 percent) second-pass. The partial second pass is required to provide additional removal of three constituents of concern, specifically boron, chloride and sodium. Variable-speed low-pressure pumps would "forward" filtered flow from the pretreatment process to constant-speed high-pressure first-pass RO feed pumps. The high pressure RO feed pumps would deliver flow to the first pass membrane arrays. Low pressure variable speed pumps would be used to pump 40 to 50 percent of the first-pass permeate to the second-pass membrane arrays. The second-pass permeate would then be blended with the by-passed portion of first-pass permeate. The overall recovery of the RO process is expected to be in the approximately 42 percent; thus, approximately 23 MGD of filtered feedwater is required to produce 9.6 MGD of desalinated water, and approximately 15 MGD of filtered feedwater is required to produce 6.4 MGD of desalinated water. The RO process will include energy recovery from the high-pressure brine stream using pressure exchanger technology.

The RO process will be modularized, with each module producing 1.6 MGD of permeate. Each module would include arrays that have 80 to 110 24-foot long by 10-inch O.D. pressure vessels (including both first-pass and second-pass vessels) mounted horizontally on a single rack, with each rack being approximately 16 feet wide by 24 feet long by 15 to 18 feet high.

For the 9.6 MGD desalination plant, the RO process will be housed in a 19,200 SF building with an interior ceiling height of approximately 26 feet. (For the 6.4 MGD desalination plant, the building may be reduced to approximately 12,800 SF.) This building will also house a clean-in-place (CIP) system for periodic cleaning of the RO membranes; the post-treatment facilities (see discussion below); and chemical storage/handling systems.

The RO process will produce a concentrate, or brine, which will flow continuously by gravity to the PCA outfall, at 120 to 140 percent of the plant's water production rate. As previously discussed, this brine stream will be conveyed by a gravity pipeline that will discharge into the PCA outfall. Spent cleaning solutions from the CIP process, which will occur two or three times per year, will be collected and neutralized and then either pumped or trucked to an appropriate disposal site.

### **Post-Treatment and Chemical Systems**

Hardness, alkalinity, and pH of the product water would be adjusted after the RO process to protect piping and plumbing materials and to make the water more compatible with the other sources of supply in the CAW system. Facilities will be included at the desalination plant to add carbon dioxide (to adjust alkalinity), followed by filtration through calcite beds (to adjust hardness), and addition of sodium hydroxide (to adjust pH).

Sodium hypochlorite will also be added for disinfection. Even though the feedwater to the desalination plant will be coming from wells, disinfection requirements for initial operation of the desalination plant may be established according to pathogen removal/inactivation standards of the Surface Water Treatment Rule. Following the installation and startup of the feedwater wells, a testing program may be required to demonstrate that the bacteriological water quality of the extracted from the wells is not being influenced by surface water. If the desalination plant must be placed in operation before this determination is made (by the California Department of Public Health), and if it is determined that the pretreatment filters, reverse osmosis process, and chlorination process do not provide sufficient pathogen removal credits, a temporary UV disinfection system may be required for disinfection.

Various chemicals to be used during treatment would be stored and processed onsite. The estimated use, dosage (in units of milligrams per liter [mg/l]), and annual consumption (in units of pounds per year [lbs/yr]) of each chemical are summarized in **Table 3**. Bulk storage will be located in the Desalination/Post-Treatment/Chemical building. The design of this building will incorporate the regulatory requirements for hazardous materials storage, such as spill containment features that exceed the capacity of the tanks; segregation of individual chemicals to prevent mixing in the case of accidental spillage; and appropriate alarm and fire sprinklers. Chemicals that have specific reactivity risks with one another will be stored at opposite ends of the storage area to reduce the risk of mixing.

**Table 3**  
**Desalination Plant Chemicals**

Chemical	Application	Dosage (mg/l)	Annual Usage (lbs)	
			6.4 MGD	9.6 MGD
Sodium Hypochlorite	Raw Feedwater	1.3	59,000	85,000
Sodium Bisulfite	Filtered Feedwater	1.3	59,000	85,000
Carbon Dioxide	RO permeate	15	280,000	420,000
Calcite	RO Permeate	35	660,000	960,000
Sodium Hydroxide	RO Permeate	2	38,000	55,000
Sodium Hypochlorite	Post-Treated Water	2	38,000	55,000
CIP Chemicals (Various)	Membrane Cleaning	Varies	Negligible	Negligible

### **Brine Storage Basin**

In the event of an interruption of this discharge, brine would be diverted to a 3 million-gallon lined open basin, on the desalination plant site. This storage will provide time for the plant to remain in operation for a short period to allow plant personnel to adjust or cease production and for system personnel to increase production from other sources (ASR wells, Seaside wells, BIRP).

### **Desalinated Water Storage Tanks and Pumping Stations**

Following post-treatment, desalinated water would flow by gravity to on-site storage tanks, called clearwells. Two 85-foot diameter clearwells will provide a total storage volume of 2 million gallons. The clearwells would be covered, steel or concrete, and constructed above-grade with a floor elevation of approximately 110 feet. A clearwell pump station, located in the desalination building, will deliver flow from the post-treatment process to the clearwells. Desalinated water pumps would pump desalinated water from the clearwells into the Desalinated Water Pipeline for conveyance to CAW's service area. A second set of pumps would pump desalinated water from the clearwells into the Salinas Valley Return Pipeline (SVRP). Both sets of pumps would be housed in the Desalinated Water Pump Station (DWPS), located near the clearwells. Surge control tanks (hydrodynamic) would be required and would be installed outside and next to the DWPS.

### **Non-Process Facilities**

A 10,000 to 12,000 sq-ft single story building would be constructed on-site. The building would house visitor reception, offices, restrooms, locker rooms, break rooms, conference rooms, control room, laboratory, equipment storage and maintenance area, and electrical service equipment for the adjacent Desalination/Post-Treatment/Chemical Building.

### **Power Supply**

Power to the MPWSP intake wells and desalination plant would be supplied by the existing power grid and no new power plant or other industrial emissions sources would be constructed. The total energy usage for the proposed intake wells, desalination plant, and desalinated water pump station would be approximately 49 million kwhrs/yr with the desalination plant producing 10,600 AFY(9.5 MGD average), and approximately 32 million kwhrs/yr with the desalination plant producing 6,850 AFY(6.1 MGD average). Energy use for each project component can be found in the MPWSP Capital and O&M Cost Estimate Update Memorandum dated January 2013. CAW is also investigating obtaining power from other sources, such as combinations of on-site solar, and/or use of power generated from landfill gas from the Monterey County Regional Solid Waste Management Agency.

## Desalinated Water Conveyance

### CAW Supply

Desalinated water will be pumped by the Desalinated Water Pump Station at the desalination plant into the 32,000 LF, 36-inch diameter Product Water Pipeline, which will connect to the 15,700 LF Transfer Pipeline. The alignment of the Product Water Pipeline heads west from the desalination plant on Charles Benson Road, and then south on Del Monte Boulevard, and then south in the TAMC right-of way to the intersection of Beach Range Road and 1<sup>st</sup> Street, at which point it will connect to the Transfer Pipeline.

### Salinas Valley Return

Desalinated water will be pumped by the Salinas Valley Return Pump Station at the desalination plant into a 6,200 LF, 12-inch diameter pipeline which will discharge into the Castroville Seawater Intrusion Program's irrigation water storage pond on PCA's property.

## PROJECT IMPLEMENTATION SCHEDULE

A preliminary implementation schedule for the proposed MPWSP is provided in **Table 4**. As shown, the Project is currently programmed to be on line by December of 2017, or more than one year beyond the Cease and Desist Order's targeted date of October 1, 2016 at which time dramatic reductions are required in diversions from the Carmel River. Key permitting milestones include CPUC's completion of the CEQA Subsequent EIR in November of 2013, CPUC's approval of the CPCN in January of 2014, and completion of a number of regulatory permit approvals leading to approval of the Coastal Development Permit (by the California Coastal Commission) in August of 2014. No construction of facilities in the Coastal Zone can occur prior to the Coastal Commission's approval of the CDP.

**Table 4 - Implementation Schedule for Proposed MPWSP**

Implementation Activity	Start (month)	Finish (month)
CEQA Subsequent EIR	In Progress	Nov 2013
CPCN Reapplication and Approval	In Progress	Jan 2014
Coastal Development Permit Reapplication and Approval	In Progress	Aug 2014
Desalination Plant and Intake Wells Site Acquisitions	In Progress	Jan 2014
Desalination Plant Intake System Design	Feb 2014	May 2015
Desalination Plant Intake System Bidding and Construction	June 2015	Feb 2017
Pipeline ROW Acquisition	Feb 2014	Nov 2014
Conveyance Pipeline Design	Feb 2014	June 2015
Conveyance Pipeline Bidding and Construction	July 2015	July 2017
Terminal Reservoir/ASRPS Site Acquisition	In Progress	Jan 2014
Terminal Reservoir/ASRPS Design	Feb 2014	July 2015
Terminal Reservoir/ASRPS Bidding and Construction	July 2015	July 2017
ASR Well Design and Construction	Feb 2014	Sept 2015
ASR Well-Head Facilities Design	June 2015	Oct 2015
ASR Well-Head Facilities Bidding and Construction	Oct 2015	July 2017
GWR Decision	In Progress	Oct 2015
Desalination Plant Preliminary Design and D/B Contractor Procurement	June 2013	Oct 2013
Desalination Plant Design/Construction	Jan 2015	Dec 2017
Desalination Plant Start-up	July 2017	Dec 2017



# Attachment 12





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