West Basin Municipal Water District
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Ocean Water Desalination Program Master Plan (PMP)

Project Entitlements Acquisition Plan (PEAP)

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1. Introduction

1.1. Objective

The purpose of the Project Entitlement Acquisition Plan (PEAP) is to identify key project entitlements needed for the implementation of the Ocean Water Desalination Project (alternatives are noted in the West Basin Municipal Water District Ocean Water Desalination Program Master Plan, Conceptual System Design and Program Requirements Report (TM-1)) and to develop a plan and schedule for their acquisition. Many of the engineering support studies developed for the acquisition of project entitlements will also be used for the development of the conceptual project design, environmental review and permitting as well.

2. Project Entitlement Acquisition Plan (PEAP)

2.1. Site Option / Lease

a. Description

Preliminary site layouts for both the local and regional sized facilities are included as Figures 7-12 through 7-15 in the CSDPR (TM-1). For both sizing cases, facilities for the proposed West Basin Ocean Water Desalination Facility are located at either the NRG El Segundo Generating Station (ESGS) property or AES Redondo Beach Generating Station (RBGS) property, and are entirely within the jurisdiction of the City of El Segundo or City of Redondo Beach, respectively. Site Boundary sketches are included in TM-1 as Figures 3-1 and 3-2. Proposed layouts and access to the site will require review and approvals by the owner, NRG or AES, throughout the planning, design, and construction process. Plans to remove facilities that exist on the site and to construct the proposed project will undergo review and approval by the City of El Segundo or City of Redondo Beach, the California Coastal Commission, and other regulatory agencies.

The El Segundo Generating Station is located on Santa Monica Bay within the City of El Segundo, California. At this location two pairs of tunnels exist. The intake and discharge tunnels on the north side of the property, used for cooling water of units 1 and 2, have been decommissioned and would not be available for use. The intake and discharge tunnels on the south side of the property, used for cooling water of units 3 and 4, are currently operational. It is expected, per statements of NRG staff during the site visit on June 21 2011 that units 3 and 4 would be converted to air cooling in the near future and therefore its tunnels could be used for the desalination plant. Units 3 and 4 tunnels are 12-foot inside diameter, shore-perpendicular concrete pipes, buried approximately 5 feet under the seafloor in the offshore area and at about 10 feet across the beach area. The offshore end of the intake tunnel, at approximately 2,300 feet from the shoreline at a water depth of approximately -35 feet Mean Lower Low Water (MLLW), features a vertical 16 x 21-foot internal cross section structure, with a velocity cap, which extends approximately 10 feet above the seafloor (SCE, 1982). The shorter discharge tunnel is approximately 1,800 feet from the shoreline at a water depth of approximately -29 feet MLLW. (SCE, 1982).

For the purposes of this assessment, it is assumed that the ocean currents are parallel to the shore in a northwestward direction on flood tide and southeastward on an ebb tide, with a net drift to the south induced by the dominant northwestern waves and wind. Therefore, the intake would be placed to the north of the discharge and the northern tunnel would be used.

The RBGS, at the south end of Santa Monica Bay, features three pairs of tunnels that were designed for ocean water intake and discharge for the station's cooling system. The pair of tunnels located to the north of the King Harbor breakwater are considered for the desalination plant in the PMP. These tunnels have been used alternatively as intake and discharge facilities. The longer tunnel extends offshore approximately 2,000 feet to a water depth of approximately -33 feet MLLW. The shorter tunnel extends offshore approximately 1,800 feet to a water depth of approximately - 30 feet MLLW. Both tunnels are 10-foot inside diameter, shore-perpendicular concrete pipes, buried approximately 4 feet under the seafloor. Both tunnels feature a vertical intake structure with a 14-foot internal diameter cross section.

Similar to the ESGS, currents in the vicinity of Redondo Beach run parallel to the coast. However, the presence of the King Harbor breakwater affects the direction of the current inducing eddies and flows with directions that are difficult to determine. Given the conceptual nature of this study, it is assumed that current patterns are, in general, parallel to the coast and the breakwater, with currents flowing in the northwestward direction on flood tide, southeastward on an ebb tide, and with a net drift to the south induced by the dominant northwestern waves and wind. Therefore, the intake would be placed to the north of the discharge and would use the northern tunnel.

This section addresses the primary considerations involved in accounting for the specific footprint requirements associated with this new desalination facility at both siting alternatives.

The proposed West Basin Ocean Water Desalination Plant would treat raw ocean water collected at the existing intake structures and conveyed to the raw water pumping stations located on site. The primary treatment process for this desalination facility would include seawater reverse osmosis membranes (SWRO).

SWRO membranes require special consideration for pre-treatment and post-treatment to ensure long-term system reliability and acceptable product water quality. The proposed SWRO pre-treatment systems include the following:

- Intake Screens
- Coagulation/Flocculation
- Dissolve Air Flotation (DAF), or Sedimentation – to be further evaluated
- High rate Granular Media Filtration (GMF)
- Membrane Filtration and appurtenant systemsCartridge Filtration
- Chemical Conditioning (i.e. Scale Inhibitors, pH adjustment)

After the SWRO process, the product water (permeate) requires post-treatment conditioning to provide a stable and compatible product water. This entails the addition of minerals to the RO permeate to mitigate the corrosive nature of the permeate and to ensure compatibility with current water supplies. Post-treatment process includes:

- Lime addition via Calcite Beds
- Carbon Dioxide Addition
- pH adjustment with Caustic Soda, Sodium Hydroxide
- Disinfection

In addition to the processes and facilities described above, footprint consideration is also required for the following peripheral, or appurtenant, facilities:

- Chemical Storage and Handling
- Product Water Storage/ Clearwell
- Product Water Pumping
- Administrative Area/Control Room
- Electrical/MCC Buildings
- Maintenance Areas
- Power Sub-Stations.
- Residuals Handling

b. Timeframe

As the site option/lease is between two private entities determining a timeframe would be difficult at this time.

2.2. Product Water Pipeline Easement / Right of Way

a. Description

From TM1, there are a total of eight conveyance alternatives from both the ESGS Site and the RBGS Site to inland users as outlined in **Table 2-1**.

Table 2-1: Summary of West Basin Preliminary Conveyance Schemes

Alternative	Plant Site	Conveyance Scheme
1	NRG	Local Service Connections – WB and WC Feeders
2	AES	
3	NRG	Feeder Connection – WB Feeder West End Local Service Connections – WC Feeder
4	AES	
5	NRG	Feeder Connection – WB Feeder East End Local Service Connections – WC Feeder
6	AES	
7	NRG	Regional Feeder Connection – Sepulveda Feeder
8	AES	

All of the preliminary alternative alignments are located within the public right-of-ways (ROWs) including California Department of Transportation (Caltrans), Los Angeles County Department of Public Works (LADPW), and the Cities of El Segundo, Manhattan Beach, Redondo Beach, Hawthorne, Lawndale, and Gardena. Major streets affected include: Aviation Boulevard, Rosecrans Avenue, Manhattan Beach Boulevard, El Segundo Boulevard, and Vista del Mar. Many of these streets are expected to have extensive utilities located within their ROWs. The majority of the preliminary alternative alignments are located within incorporated city ROWs; however, there are some crossings over Sepulveda Boulevard and the 405 Freeway, which are within Caltrans ROWs. There are also several crossings over the Dominguez Channel, an open flood control channel, which is within the LADPW ROW.

Based on TM-1, which assumes that there is no need for intermediate booster pump stations, and based on the preliminary alternative alignments, it is anticipated that acquisition of ROWs or easements is not necessary for the construction of conveyance systems. However, for all of the ROWs, the construction of conveyance systems will require an encroachment permit, or a variation thereof from the respective jurisdictional agencies. The encroachment permit will typically regulate traffic control, stormwater pollution control, excavation and trenching, work hour, contractor license and insurance, construction, and inspection requirements.

In addition, there are other ROW-related issues such as traffic conditions and utility conflicts that had considerable impacts on the selection of preliminary alternative alignments. For each of the preliminary alternative alignments, analysis was conducted to determine street widths and lengths, number of traffic lanes and intersections, major utilities, and ROW jurisdictions based on the data available from the MWD Integration Study, aerial images, and limited Geographic Information Systems (GIS) databases. The ideal street section would need to have low traffic volume and intersection counts, sufficient widths and traffic lanes to avoid closure of at least one lane, few utilities, and sufficient space for construction.

All of the preliminary alternative alignments are subject to multiple jurisdictional agencies, utility conflicts, and traffic conditions. Obtaining encroachment permits from the respective jurisdictional cities would require the processing of a simple form (1-2 pages) and can be obtained in a relatively short timeframe (less than 3 months). Obtaining encroachment permits from Caltrans or LADPW, however, typically requires more effort and lengthier processing times. Within most street ROWs, utility conflicts with sanitary sewer lines, storm drains, and other water pipes are fairly common, especially when crossing street intersections. Caution would be taken when underground electrical, oil, gas, or communications lines (including fiber optics) are present.

A key factor in limiting the difficulties associated with ROW issues is the length, size, and alignment of pipes. Once a conveyance scheme is selected, a detailed street alignment and utility survey would be recommended in the future to develop the alignments and to analyze traffic conditions and utility conflicts in greater detail. Any alternative that crosses Caltrans ROW would require an approved Caltrans encroachment permit prior to submitting a local city encroachment request.

b. Timeframe

The Caltrans Encroachment Permit process would be expected to take between 12 and 24 months and the MWD Encroachment Permit process would be expected to take between 12 and 24 months. Local Encroachment Permits could take between 3 and 6 months.

2.3. Power Supply Agreement

a. Description

The power demand is estimated at approximately 0.5 to 0.6 MW/MGD. However, with efficiency improvement the power demand can be reduced to between 0.4 -0.5 MW/MGD. It is likely that the distribution network will require additional pumping power, however the exact amount is undetermined at this time.

Using the above factors, the total power requirement for the local supply option (20 MGD) is estimated at approximately 12 MW, while the total power requirement for the regional supply option (60 MGD) is estimated at approximately 36 MW.

West Basin is evaluating power procurement options as part of this effort. Direct purchase of electricity from SCE is one of the main considerations along with self-generation. However, on-site/off-site self-generation options are evaluated in TM-2, Power Supply Plan (PSP).

The existing 220 kV SCE switchyard on site can be available to draw power for the new desalination plant. Alternately, the site also has a 61 kV feed (to be verified). Details on 220 kV and 61 kV switchyard configurations, after NRG's tie-in, will be coordinated with SCE when the new combined cycle plant is completed.

The California Coastal Commission (CCC) has issued a directive to phase out once through cooling of coastal power plants, however the AES's future plans for the RBGS is not clear at this time.

b. Timeframe

The process of completing a Power Supply Agreement with SCE is expected to take between 12 and 24 months.

2.4. Negotiation of Intake/Outfall Easement

a. Description

The California State Lands Commission (SLC) has jurisdiction and management control over approximately four million acres of land underlying the State's navigable and tidal waterways, including the State's tide and submerged lands along the California's 1,100 miles of coastline and offshore islands extending from the mean high tide line to three nautical miles offshore.

The SLC holds these lands for the benefit of all the people of the State, subject to the Public Trust for water related commerce, navigation, fisheries, recreation, open space and other recognized Public Trust uses. Accordingly, the SLC maintains a multiple use management policy to assure the greatest possible public benefit is derived from these lands.

Upon receipt of an inquiry about the proposed use of State lands, the SLC Title Unit reviews its files and information submitted to determine the extent of the State's property interest in the project site. If agency staff determines that the proposed project is within SLC jurisdiction, an application must be submitted. No project can proceed until the SLC has considered and taken action on the application. The issuance by the SLC of any lease, permit or other entitlement for use of State lands is reviewed for compliance with the provisions of the California Environmental Quality Act (CEQA). The SLC may also consult with California Department of Fish and Game in the review of lease application.

Permit Requirements

Prior investigations conducted by ARCADIS for the project entitlements research indicated that the site for the ocean water desalination plant at the El Segundo Power Generating Station or Redondo Beach Generating Station is subject to an SLC lease for operating the existing intake and outfall. Therefore, if this existing infrastructure were used in the operation of the ocean water desalination plant, there would be several options for obtaining authorization from the SLC:

- Obtain a new lease; or
- Amend the current lease held by NRG/AES (subject to agreement by the lessee); or
- Sublease the use of the existing infrastructure from NRG/AES

For any of these options, a new SLC Application for Lease of State Lands would be required. In conjunction with the application, the SLC requires a completed CEQA document and a Mitigation / Monitoring Program. After all of the required materials have been submitted, the SLC would then notify the project proponent that the application is complete, initiating the formal review process.

As part of the lease application to use the existing intake and outfall infrastructure system, additional scope of works and studies would be required to complete the SLC Application for Lease of State Lands.

b. Additional Studies

i. *Scope of Work for Configuration and Capacity of Intake/Outfall System*

It was determined in TM1 that the existing Units 3 & 4 intake and discharge tunnels at the El Segundo Power Generating Station Site or the existing pair of tunnels located to the north of the King Harbor breakwater at the RBGS would be considered for the desalination plant. To meet the plant scenarios of 20 MGD or 60 MGD capacity, new smaller diameter piping would be placed within the existing larger tunnels.

For the 20 MGD scenario, the total intake volume is estimated to be 45.1 MGD and total discharge volume is estimated to be 30 MGD. The preliminary piping design for intake flows at ESGS includes two 42 in. diameter pipes installed within the existing 12 ft. diameter intake tunnel. For discharge flows at ESGS, one 42 in. diameter pipe is installed within the existing 12 ft. diameter outfall tunnel. The piping design for intake flows at RBGS includes two 42 in. diameter pipes installed within the existing 10 ft. diameter intake tunnel. For discharge flows at RBGS, one 42 in. diameter pipe is installed within the existing 10 ft. diameter outfall tunnel.

For the 60 MGD scenario, the total intake volume is estimated to be 135.3 MGD and total discharge volume is estimated to be 60 MGD. The preliminarypiping design for intake flows at ESGS include two 63 in. diameter pipes installed within the existing 12 ft. diameter intake tunnel. For discharge flows at ESGS, one 63 in. diameter pipe is installed within the existing 12 ft. diameter outfall tunnel. The piping design for intake flows at RBGS include two 54 in. diameter pipes installed within the existing 10 ft. diameter intake tunnel. For discharge flows at RBGS, one 63 in. diameter pipe is installed within the existing 10 ft. diameter outfall tunnel.

Model data for intake and outfall flows under the currently chosen scenario were estimated at 5.3 fps. The Approach Velocities at the Intake Screens should not exceed 0.30 fps with a 2.4 mm mesh screen to reduce impingement and entrainment of aquatic organisms.

ii. Intake Impingement and Entrainment Study

The annual entrainment estimates, in conjunction with demographic data collected from the fisheries literature, were used in modeling intake effects using adult equivalent loss (*AEL*) and fecundity hindcasting (*FH*). Data for the same target taxa from sampling of the entrained larvae and potential source populations of larvae were used to calculate estimates of proportional entrainment (*PE*) that were used to estimate the probability of mortality (P_m) due to entrainment using the Empirical Transport Model (*ETM*). In the ESGS and RBGS entrainment studies each approach (e.g., *AEL*, *FH*, and *ETM*), as appropriate for each target taxon, was used to assess effects of desalination facility losses.

iii Flow Impingement and Entrainment Minimization Plan

A seawater intake located at the ESGS site and designed with the approach velocities and intake screens as noted above, is be expected to reduce annual entrainment losses and combined total losses of Essential Fish Habitat (EFH) and California Department of Fish and Game special-status species. However since some of the individual species of fish in the EFH and special status categories were entrained in greater numbers at the El Segundo site (e.g. California halibut), it is important to consider effects on individual species in any comparison of the alternative sites.

iv. Wetland Restoration Plan

The scope of work for the Wetland Restoration Plan for the ESGS or RBGS will consist of the following steps and products:

- Pre-project site inventory to include at a minimum:
  1. Characterization of existing conditions including
     a. habitat type
     b. percent cover
     c. habitat assessment
     d. species identification (floral and faunal)
     e. identification of endangered/threatened and species of concern with potential to occur

2. Potential hazardous materials.

3. Existing overriding permitting and regulatory conditions, i.e. California Coastal Commission; Local considerations; etc.

- Document summary, history, background, and regulatory environment.
- Identification of species to be reintroduced (plants) and appropriate elevations by mean high tide mark.
- Identification of resource supplier and installation contractor.
- Guidelines for appropriate actions regarding irrigation, soil amendments, weeding, and monitoring.
- Restoration target goals as compared with pre-project conditions.
- Project lifetime/closure conditions (agency write-off).

v. Energy Minimization and Greenhouse Gas Reduction Mitigation Plan

As part of the lease application to the SLC, an Energy Minimization and Greenhouse Gas Reduction Plan (GHG Plan) would need to be prepared. This plan would need to be approved by the California Coastal Commission (CCC) prior to submittal to the SLC. Consistent with CCC protocols, this plan would:

- Identify GHG emissions expected from the project's electricity use;
- Identify on-site and project-related measures to reduce expected operational emissions; and
- Identify potential off-site mitigation measures to offset remaining emissions.

GHG emissions associated with the project are a function of the amount of energy used by the project, the source of the energy, and the energy avoided as a result of the project's operations. Electricity use by the project for the production of desalinated water as well as the conveyance and delivery of the water will be the predominant source of project-related energy use. Certified emission factors for delivered electricity will be obtained from the utility's annual emissions report.

A consult with the project proponent to determine planned on-site and project-related GHG reduction measures that would reduce the project's potential GHG emissions. After discussions with the proponent, the consultant will research and recommend additional on-site GHG reduction measures. Offsite reductions of GHGs that are not part of the project would also be considered.

These measures would be cost-effective measures that the project would not otherwise be able to reduce. A schedule for the implementation of the project's GHG Plan will be developed and include the identification of the reduction measure, the process required for the measure, and the timing of the measure.

The consultant will organize and attend a pre-application meeting with CCC staff at their headquarters in San Francisco to discuss the GHG Plan to allow for input from the CCC to minimize any delays in the permitting process.

c. Timeframe

This process would be expected to take between 12 and 24 months. Restoration goals are often set with 2, 3, 5, or 10 year timeframes upon completion. Given the relatively small size of impact a 2-3 year lifespan seems reasonable.