3.0 PROJECT DESCRIPTION

The proposed Seawater Desalination Project at Huntington Beach consists of the construction and operation of a 50 million gallon per day (MGD) seawater desalination facility by the project applicant. The proposed project also consists of the construction and operations of off-site improvements, including water delivery pipeline (new pipeline and/or replacement of portions of existing pipeline) underground booster pump stations, and modifications to an existing booster pump station, all of which will be utilized by the Applicant to deliver desalinated seawater to Orange County retail water purveyors. The proposed seawater desalination facility would be located adjacent to the AES Huntington Beach Generating Station (HBGS), within the southeastern portion of the City of Huntington Beach (City). The proposed seawater desalination facility would convert seawater into high-quality potable drinking water using a reverse osmosis desalination process. The seawater desalination facility would require approximately 100 MGD of seawater to produce 50 MGD of high-quality potable drinking water, and discharge 50 MGD of concentrated seawater that would be further diluted prior to discharge to the ocean. Dilution requirements and total intake quantities needed to meet the dilution requirements are discussed more thoroughly in Section 4.10 of this SEIR. The HBGS currently uses a condenser cooling system (“once-through cooling”). HBGS is permitted to intake up to 514 MGD of seawater directly from the Pacific Ocean through an existing intake pipeline and circulate that water through the HBGS for cooling (NPDES No. CA0001163). The historical maximum flow rate at HBGS has been 507 MGD (Jenkins and Wasyl 2010). The source water for the proposed seawater desalination facility will be taken from the existing HBGS condenser cooling-seawater discharge pipeline system after the water has been used by HBGS for cooling. However, if in the future, the HBGS were to cease the use of once-through cooling, or if the HBGS were to permanently alter its cooling water system’s historical operations, the proposed seawater desalination facility would intake water directly from the Pacific Ocean via the existing HBGS intake pipe. In either case and in order to protect the marine environment, 50 MGD of concentrated seawater would re-enter the Pacific Ocean via the existing HBGS discharge pipe after blending with additional intake water to be used for dilution.

The overall objective of the project is to provide Orange County with a long-term, reliable, high quality, local source of potable water. Project implementation would create a local drought-proof supply of domestic water and could reduce Orange County’s dependence on imported water, consistent with the goal of integrated water resource management.

3.1 DESALINATION FACILITY PLANNING BACKGROUND

The applicant, Poseidon, has pursued the development of the site as a seawater desalination facility since 1999.The City of Huntington Beach prepared and circulated the initial final environmental impact report (FEIR) for the project in 2002. The City collected comments were collected and drafted responses to comments. After several public hearings the City of Huntington Beach Planning Commission certified the EIR on August 21, 2003. On appeal, the City Council voted to deny certification of the EIR on December 15, 2003, citing a lack of sufficient information in regards to marine biology (entrainment and impingement), growth inducement, and project water compatibility. To address these issues the EIR was revised and recirculated. The City Council certified the Recirculated FEIR (2005 REIR) for the Seawater Desalination Project at Huntington Beach on September 6, 2005. The City of Huntington Beach approved the project’s Conditional Use Permit and Coastal Development Permit on February 27, 2006. In its December 2006 decision on Surfrider *Foundation v. City of Huntington Beach* (case No. 06CC00063), the California Superior Court rejected an appeal of the certified 2005 REIR.

Since the 2005 REIR was certified and the project approved, certain circumstances surrounding the project have changed and new information that was not known and could not have been known at the time of certification has become available. Therefore, this Subsequent EIR (SEIR) is proposed to address the entire project, including the changes in the project description, and changes in circumstance. This SEIR will require new approvals from the City of Huntington Beach's City Council.

As seen in Section 2.1, since the 2005 REIR was certified and the 2006 CUP/CDP was approved, certain changes have been proposed, including: Changes in operational assumptions primarily related to seawater intake. The 2005 REIR analyzed seawater intake effects (and certain other potential impacts of the project) based on reasonably foreseeable operational characteristics of the HBGS. Under that scenario, a co-located condition, the desalination facility would draw source water from the discharge of the HBGS, after potential impacts associated with the HBGS intake have already occurred. However, future conditions could include cessation or reduction of the existing power plant's historic seawater intake. Therefore, in addition to addressing the potential impacts of the project based on a co-located condition, this SEIR also addresses seawater intake effects (and certain other potential impacts of the project) based on a "stand-alone" condition, where the desalination facility would be responsible for direct intake of seawater. Since the 2005 REIR, the project has been revised to relocate and reorient certain features of the project, including modification to the project site boundaries within the HBGS facility. Changes in the route and the pipeline design for the Delivery Pipeline include design variations and optional routes to provide more flexibility in water delivery options.

3.2 PROJECT LOCATION

The majority of the proposed project is located in the Cities of Huntington Beach and Costa Mesa, California. The City of Huntington Beach is a coastal city along the Pacific Ocean in northwestern Orange County. It is surrounded by the City of Westminster to the north, City of Fountain Valley to the northeast, Cities of Costa Mesa and Newport Beach to the east, and the City of Seal Beach to the northwest. Los Angeles is located approximately 35 miles to the northwest while San Diego is 95 miles to the southeast (refer to Figure 3-1, Regional Map).

The project site can be divided into two components. First, the seawater desalination facility site. Second, the off-site improvement locations, including tie in pipelines between the existing HBGS condenser cooling water discharge system and the proposed desalination site, product water delivery pipeline (new pipeline and/or replacement of portions of existing pipeline), underground booster pump stations and modification to an existing pump station. The proposed seawater desalination facility site is approximately 13 acres in size and is located at 21730 Newland Street. The desalination facility site is bordered by the Huntington Beach Channel (a facility operated by the Orange County Flood Control District [OCFCD]) to the north and east, HBGS facilities to the southwest, a wetland area to the southeast, and an electrical switchyard to the west (refer to Figure 3-2, Site Vicinity Map).

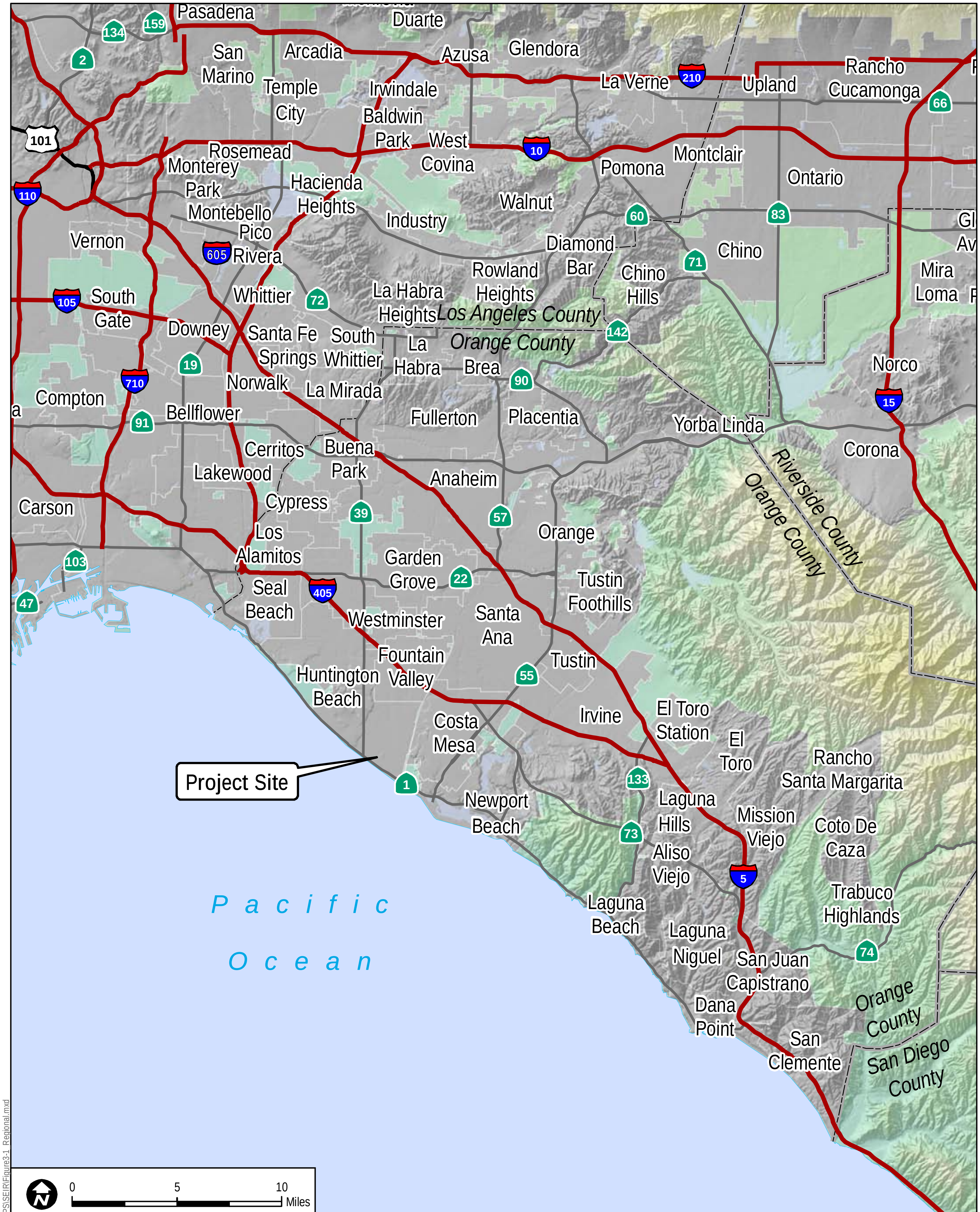

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FIGURE 3-1

Regional Map

Seawater Desalination Project at Huntington Beach

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SOURCE: DigitalGlobe 2007

FIGURE 3-2
Site Vicinity Map

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Seawater Desalination Project at Huntington Beach

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The proposed project also includes product water delivery improvements to convey water from the desalination facility. The product water delivery pipeline improvements would be located along public streets, easements or right-of-ways in urbanized areas. The primary route for off-site product water delivery improvements includes pipeline improvements along Newland Street, Hamilton Avenue, Placentia Avenue, Harbor Boulevard, Fair Drive and Del Mar Avenue (refer to Figure 3-3a, Offsite Water Delivery Facility Pipelines and Pump Stations - Primary Route). The primary route includes new pipeline and/or replacement of portions of existing pipelines. To complete the product water delivery improvements for the primary route, two new underground booster pump stations, bypass station, metering stations and modifications to an existing pump station are required (refer to Figure 3-3a). A detailed description of the proposed water delivery facilities is provided below.

The two off-site underground booster pump stations for the primary route are located in the City of Irvine, and the City of Newport Beach, California (refer to Figures 3-4, OC-44 Booster Pump Station Location Map, and 3-5, Coastal Junction Booster Pump Station Location Map). Also proposed are modifications to an existing booster pump station located at the pressure regulating station along the OC-35 pipeline in the City of Huntington Beach near the intersection of Springdale Street and Skylab Road. A bypass station is proposed in Santa Ana Avenue just southwest of Bristol Street intersection and two metering stations adjacent to Hamilton Avenue at Talbert Channel crossing and east of the Adams Avenue/Brookhurst Street intersection will be required.

In addition to the Primary Route, five optional alignments are being considered. As seen on Figure 3-3b, Offsite Water Delivery Facility Pipelines and Pump Stations, the product water delivery improvements include new pipeline and/or replacement of portions of existing pipelines along Hamilton Avenue, Victoria Street, Elden Avenue, Warner Avenue, Segerstrom Avenue, Brookhurst Street, Adams Avenue, Newland Street and Magnolia Street. Pump stations for the optional alignments would need to be constructed near the intersection of Orangewood Avenue/Magnolia Street, Brookhurst Street/Bixby Avenue and to the north of the Bear Avenue/Segerstrom Avenue intersection (see Figure 3.3b).

3.3 ENVIRONMENTAL SETTING

The desalination facility site and associated product water storage tank would be situated on the site of three existing fuel oil storage tanks, which were formerly owned and operated by Southern California Edison (SCE). In 2001, AES Huntington Beach, LLC (AES) acquired the property from SCE. In 2004, the City of Huntington Beach acquired a portion of the site from AES, specifically the area surrounding the unused fuel oil storage tank located in the northeastern corner of the site (refer to Figure 3-2). Upon project implementation, AES and/or the City of Huntington Beach would lease or sell a portion of the property to the project proponent, Poseidon Resources Corporation. The storage tank area contains a total of six tanks, ranging in capacity from 924,000 gallons to 8.64 million gallons. Implementation of the proposed project would require the demolition of three of the six tanks. The three fuel oil storage tanks to be demolished have historically been referred to as the “West”, “North”,and “South” tanks, but for purposes of this analysis, the fuel oil storage tanks will be referenced as follows: Tank 1 (formerly “West”), Tank 2 (formerly “North”) and Tank 3 (formerly “South”)(refer to Figure 3-2 for the precise location). Each of these storage tanks is 40 feet high, cylindrical in shape and surrounded by 10 to 15-foot high earthen containment berms, pipelines, pumps, and associated structures. On-site vegetation consists mainly of non-native grasslands and native and non-native low-lying shrubs. The topography of the site is relatively flat, gently sloping to the southwest, with an elevation ranging from approximately 9 to 14 feet above mean sea level (amsl) (refer to Section 4.7, Aesthetics/Light and Glare, for information on views of the existing site).

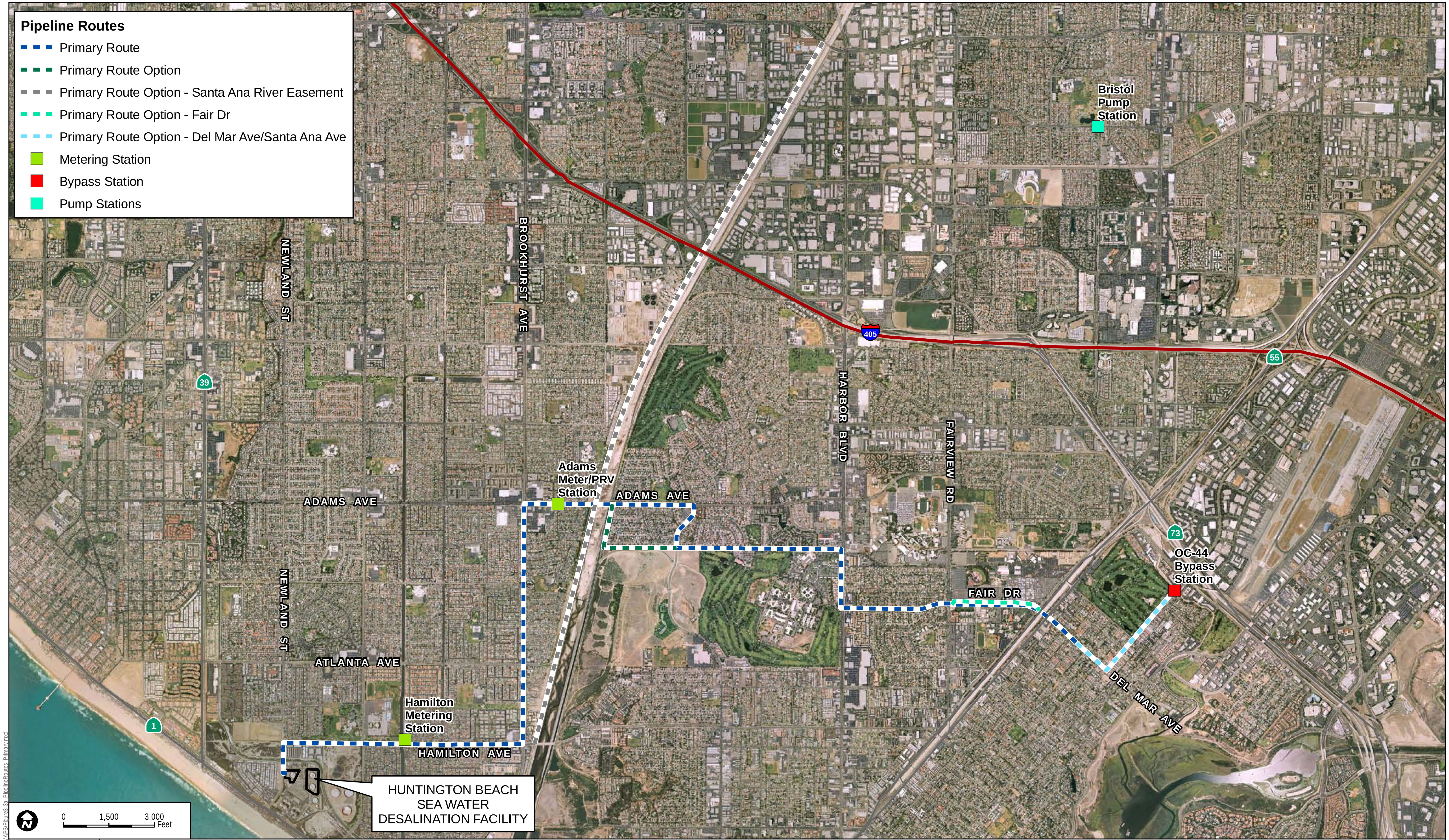
In addition to the desalination facility site, the proposed project would also include several related off-site improvements, including tie in pipelines between the existing HBGS condenser cooling water discharge system and the proposed desalination project, product water delivery pipelines, underground booster pump stations, modifications to an existing booster pump station, a bypass station and metering stations. The intake/discharge pipelines would be located entirely within the existing HBGS site, and would not require modifications to the coastal/marine portions of the existing HBGS ocean intake/discharge facilities. However, it should be noted that the existing HBGS intake/discharge facilities traverse land owned by the California State Lands Commission (CSLC), and the land is leased to AES. An amendment to the lease agreement between the CSLC, AES, and the project applicant may be required prior to project implementation.

Product water delivery pipelines being proposed include new pipeline and/or replacement of portions of the existing pipelines. The primary route includes improvements extending from the proposed desalination facility to the OC-44 water transmission line within the City of Costa Mesa, and east of State Route 55 (SR-55) at the intersection of Del Mar Avenue and Elden Avenue. Optional routes are also considered and evaluated in the SEIR conveying water northerly. The majority of the pipeline alignment would occur within existing public streets, easements, or other rights-of-way (ROWs) in urbanized areas. Although precise pipeline alignments may be modified during final engineering analyses, the conceptual pipeline alignments are shown on Figures 3-3a and 3-3b.

Two off-site underground booster pump stations and modifications to an existing booster pump station would be needed as part of the primary route product water's distribution system. The first off-site underground booster pump station (the OC-44 booster pump station) is proposed to be located within the City of Newport Beach, south of the intersection of Bonita Canyon Drive and Chambord Street (refer to Figure 3-4). The second underground booster pump station (the Coastal Junction booster pump station) would be located in the parking lot of St. Paul's Greek Orthodox Church, at 4949 Alton Parkway within the City of Irvine (refer to Figure 3-5). The booster pump station requiring modifications is located along the OC-35 pipeline, near the intersection of Springdale Street and Skylab Road, and will need to be modified to allow it to be used to pump water from the southern side of the station to the northern side, thus reversing the flow in the existing pipeline. Modifications include replacement of an existing pump.

Pump stations are also proposed for optional routes as seen in Figure 3-3b located near the intersection of Orangewood Avenue/Magnolia Street, Brookhurst Street/Bixby Avenue and to the north of the Bear Avenue/Segerstrom Avenue intersection (see Figure 3-3b). A bypass station is proposed for the primary alignment in Santa Ana Avenue just southwest of Bristol Street intersection, and two metering stations adjacent to Hamilton Avenue at Talbert Channel crossing and east of the Adams Avenue/Brookhurst Street intersection will be required.

In addition to these off-site improvements, minor modifications to existing water conveyance facilities will also be required, including addition of piping modifications around existing pump stations and pressure reducing stations, and installation of flow/meter control facilities. These minor modifications would occur within existing roadways and/or easements, and would require minimal construction activities.



SOURCE: Poiseidon, April 2010; DigitalGlobe 2007

NOTE: See Figure 3-5 for the location of the Coastal Booster Station

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Seawater Desalination Project at Huntington Beach

FIGURE 3-3a

Offsite Water Delivery Facility Pipelines and Pump Stations - Primary Route

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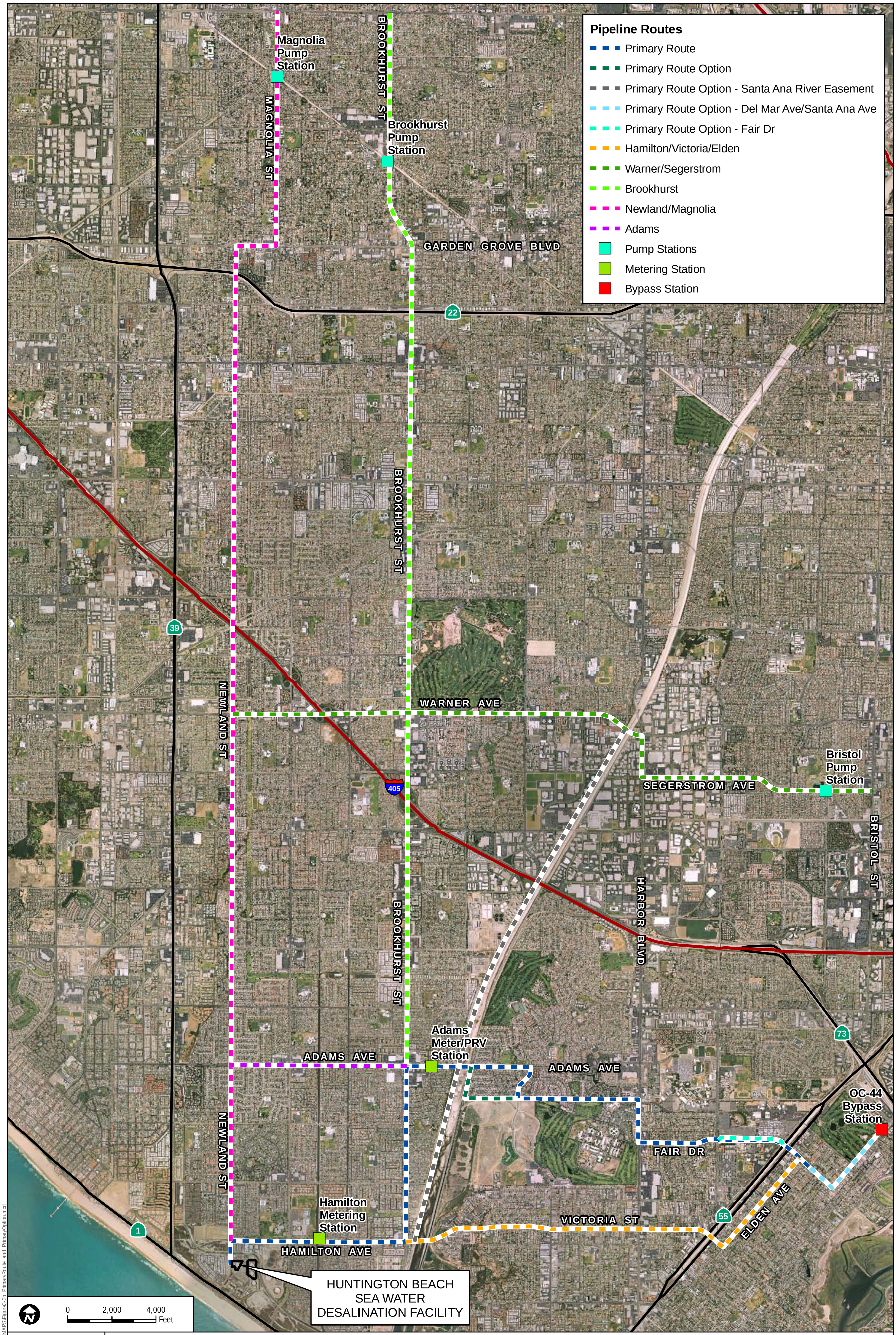

SOURCE: Poiseidon, April 2010; DigitalGlobe 2007

NOTE: See Figure 3-5 for the location of the Coastal Booster Station

FIGURE 3-3b

Offsite Water Delivery Facility Pipelines and Pump Stations

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Seawater Desalination Project at Huntington Beach

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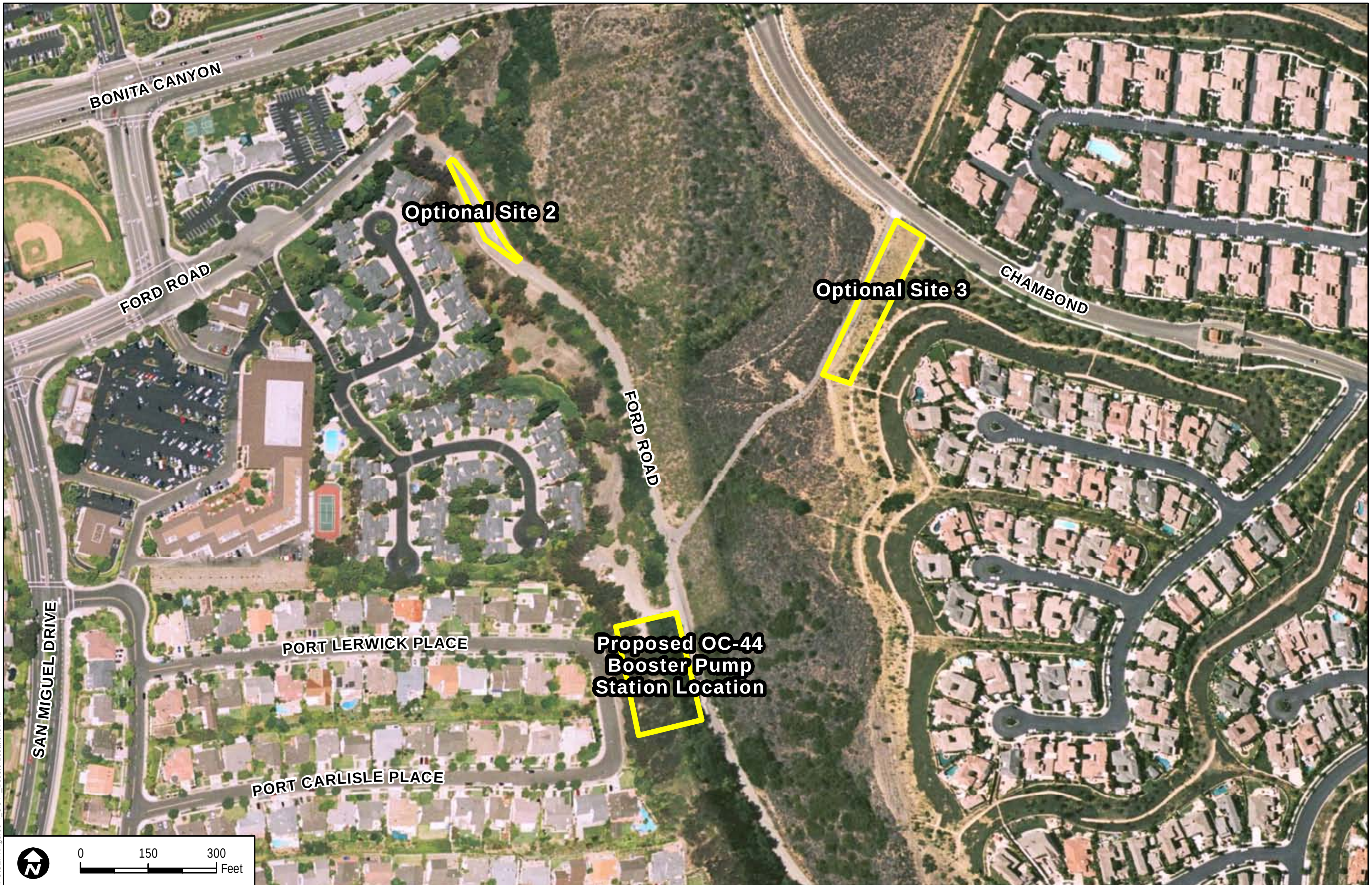

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SOURCE: Tetra Tech 2009; DigitalGlobe 2007

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FIGURE 3-4

OC-44 Booster Pump Station Location Map

Seawater Desalination Project at Huntington Beach

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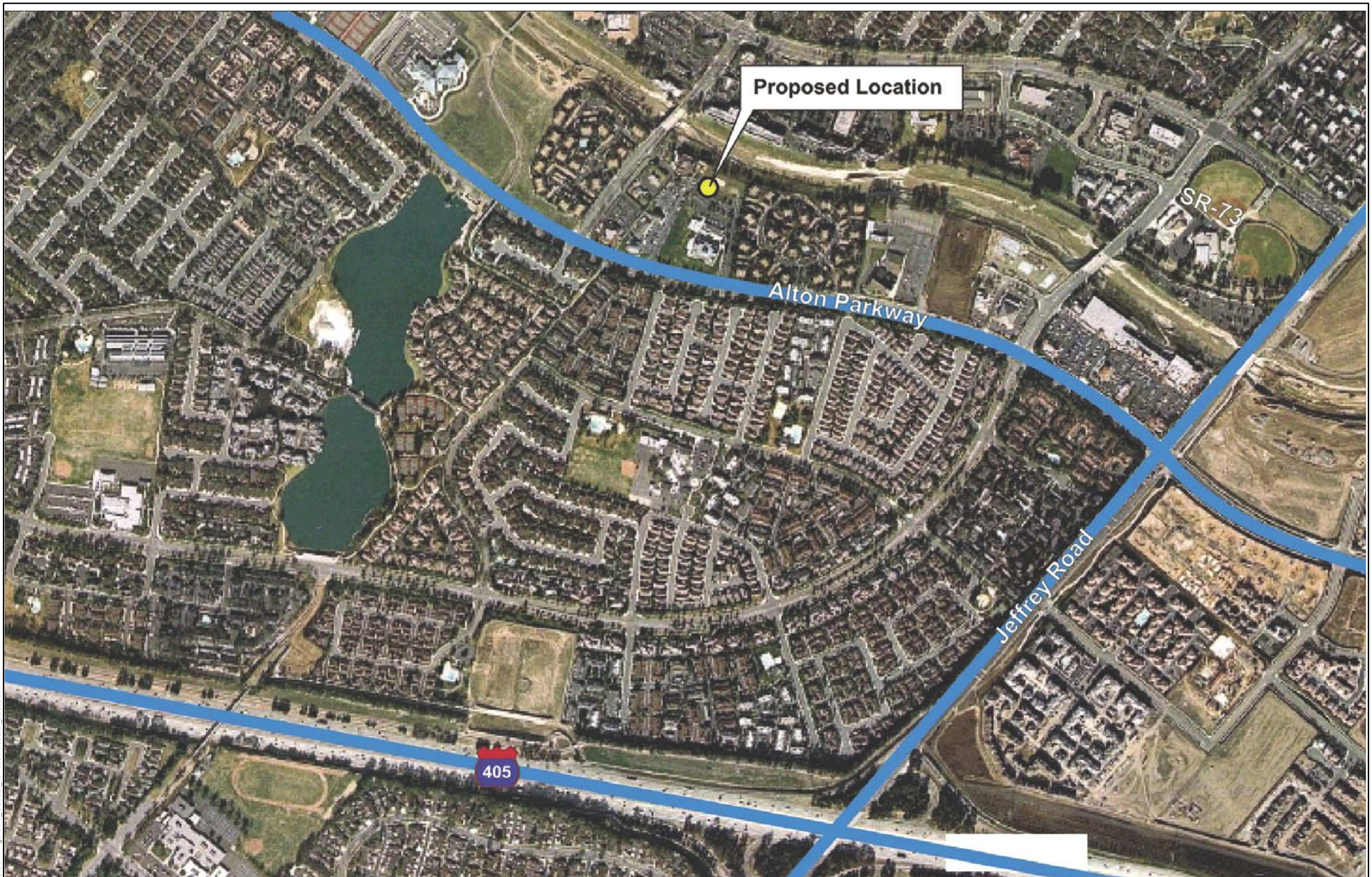

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FIGURE 3-5

Coastal Junction Booster Pump Station Location Map

Seawater Desalination Project at Huntington Beach

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3.4 PROJECT CHARACTERISTICS

The proposed project consists of construction of a seawater desalination facility to provide a local, drought proof source of potable water to the subscribed water agencies in Orange County. The proposed desalination project would consist of seawater intake system, pretreatment facilities, a seawater desalination facility utilizing reverse osmosis (RO) technology, post-treatment facilities, product water storage, on- and off-site landscaping, chemical storage, on- and off-site booster pump stations, and 48- to 54-inch diameter product water transmission pipelines. This section presents an overall description of the proposed project by summarizing six basic project characteristics associated with the desalination facility: on-site improvements, the proposed desalination facility's association with HBGS, off-site improvements, desalinated water distribution facilities, quality of potable water produced by the desalination facility, and facility operations.

The proposed project consists of an Entitlement Plan Amendment (No.10-001) to amend the CUP and CDP that were approved in 2006. The project also includes a Design Review Application (No. 10-004) and a parcel map to facilitate development of a desalination facility.

A. ON-SITE IMPROVEMENTS

The proposed project involves the implementation of a desalination facility producing approximately 50 MGD, or 56,000 acre-feet per year (afy) of potable water. The project would require the demolition of three fuel storage tanks and the remediation of any soil/groundwater impacted by contamination associated with previous site usage as a fuel storage facility. In addition, the existing berms interior to the project site would be demolished while the existing berms on the exterior perimeter of the site would remain as is. On-site structures would consist of an administration building, a reverse osmosis facility building, pretreatment filter structure, solids handling building, post treatment structure, chemical storage structure , product water pump station and surge tank, flush tank, ammonia tank, fluoride tank, influent pump station, a 66 kV substation and associated connections to existing electrical transmission lines, electrical building, an aboveground product water tank, and appurtenant facilities (refer to Figure 3-6, Conceptual Site Plan).

Proposed Buildings and Structures

All proposed buildings and structures would comply with state and local standards in regards to fire and structural safety. The proposed desalination project would consist of the following buildings and structures:

- **Administration Building (approximately 100 feet long x 50 feet wide x 15 feet high; 5,000 square feet):** This building is proposed to be Type-II, non-rated (generally defined by the California Building Code as structures incorporating non-combustible materials [steel, iron, concrete, or masonry] for structural elements, floors, walls, and roofs) and would be constructed of steel. The exterior would feature flat metal wall panels running vertically along the face of the structure. A metal panel roof system would be screened with a metal fascia using deep-ribbed metal panels running horizontally, and the roof will be fitted with photovoltaic solar panels. All glazing would be tinted and would include clear anodized window frames (refer to Figure 3-7, Administration Building Plan/Exterior Elevations).

- **Reverse Osmosis Building (approximately 287 feet long x 121 feet wide x 35 feet high; 34,727 square feet):** This building would be a Type-II, non-rated, steel-constructed building housing the reverse osmosis components of the desalination facility and associated indoor pumps. The exterior would feature flat metal wall panels running vertically along the face of the structure. A metal panel roof system would be screened with a metal fascia using deep-ribbed metal panels running horizontally, and the roof will be fitted with photovoltaic solar panels. Full height louvers would match the wall panel color and would be recessed slightly from the face of the structure to allow for shadowing. Panel coloring would match the Administration Building (refer to Figure 3-8, Reverse Osmosis Building Plan/Exterior Elevations).

- **Influent Pump Station (approximately 78 feet long x 28 feet wide x 25 feet high, 2,184 square feet):** This slab on grade would house the pumps that would bring the water from the HBGS discharge pipe to the pretreatment facility. (refer to Figure 3-6)

- **Pretreatment Filter Structure (approximately 397 feet long x 150 feet wide x 26 feet high; 59,550 square feet):** This open-air structure would house the pretreatment filter components of the facility. It would feature concrete walls matching the color of the Reverse Osmosis Building. The Pretreatment Structure would be surrounded by an architecturally enhanced screen made of metal wall panels running vertically along the face of the screen wall. These panels would match the fascia of the Administration and Reverse Osmosis Buildings (refer to Figure 3-9, Pretreatment Filter Structure Plan/Exterior Elevations).

- **Solids Handling Building (approximately 55 feet long x 32 feet wide x 21 feet high; 1,760 square feet):** This Type-II, non-rated, steel-constructed building would house solids handling equipment associated with facility operation. The building would architecturally match the Administration Building, featuring flat metal wall panels running vertically along the face of the structure. The metal panel roof system would be screened with a metal fascia using deep-ribbed metal panels running horizontally, and the roof will be fitted with photovoltaic solar panels. These metal roof panels would match the fascia of the Administration and Reverse Osmosis Buildings (refer to Figure 3-10, Solids Handling Building Plan/Exterior Elevations).

- **Chemical Storage and Carbon Dioxide Tank Structure (approximately 70 feet long x 30 feet wide x 24 feet high; 2,100 square):** This structure would also feature Type-II, non-rated, steel construction and would house various chemicals, as well as scale inhibitor polymers stored in bulk welded steel tanks. This structure would be surrounded by an architecturally enhanced screen made of a concrete base (for chemical containment) and metal wall panels running vertically along the face of the screen wall. These panels would match the fascia of the Administration and Reverse Osmosis Buildings (refer to Figure 3-11, Chemical Storage Structure Plan/Exterior Elevations and Figure 3-14, Carbon Dioxide Tank Plan/Exterior Elevations).

- **Post Treatment Structure (approximately 105 feet long x 50 feet wide x 23 feet high; 5,250 square feet):** This structure would also feature Type-II, non-rated, steel construction and would house various chemicals stored in bulk welded steel tanks. This structure would be surrounded by an architecturally enhanced screen made of metal wall panels (reveal type) running vertically along the face of the screen wall. The panels would begin approximately 8 feet above finish grade. These panels would match the fascia of the Administration and Reverse Osmosis Buildings.

- **Electrical Building (approximately 110 feet long x 44 feet wide x 30 feet high; 4,840 square feet):** This Type-II, non-rated, steel-constructed building would match the Administration Building architecturally. The exterior design utilizes flat metal wall panels running vertically along the face of the structure. The metal panel roof system would be screened with a metal fascia using deep-ribbed metal panels running horizontally, and the roof will be fitted with photovoltaic solar panels (refer to Figure 3-12, Electrical Room/Substation Building Plan/Exterior Elevations).

- **Electrical Substation (to be named the "Filter Substation") (approximately 140 feet x 140 feet wide x 12 feet high; 19,600 square feet):** A substation will be constructed on site to provide electrical services for the proposed project. The proposed substation will occupy approximately 19,600 square feet and will be located immediately west of the pretreatment filter structure and north of the administration building. A clear area around the perimeter of the substation measuring approximately 10 feet wide would be maintained for safety purposes.

  The on-site substation will include a 66 kV rack, approximately 23 feet in height, consisting of four 66 kV circuit breakers, eight three-phase disconnect switches, six 66 kV surge arresters and two overhead dead-end terminators. The substation will include two transformers on site to convert 66 kV to 12 kV, providing four 12 kV circuits to serve customer loads. The 66/12 kV transformers will be constructed within a 12 feet long X 12 feet wide by 12 feet high steel support structure and will be placed within a containment area per spill prevention, control and counter measure requirements. An approximate 20-foot x 30-foot mechanical electrical equipment room will be constructed on site to support substation components and will include switches, relay equipment, alarms, a remote terminal unit, battery and AC and DC distribution panels. The substation will be bounded by a minimum 8-foot-tall chain-link fence. A Spill Prevention, Control, and Countermeasures Plan as required by Title 40 CFR Section 112.7 will be prepared prior to operation of the substation.

  The on-site substation will require connections to an existing 66 kV line located to the northwest, including either the Hamilton – Huntington Beach 66 kV line or the Huntington Beach Wave 66 kV line. Both 66 kV lines run north south from Edison Avenue to the existing substation. The ultimate determination as to whether the substation would be connected to the Huntington Beach Wave 66 kV line or the Hamilton - Huntington Beach 66 kV line will be dependent upon SCE's final determination as to what line is most economical and reliable to provide service. The tie-in from the existing 66 kV line to the proposed substation will be constructed underground (approximately 500' in length). Underground vaults (10'L X 24'W x 12'H) will be constructed along the alignment to provide access for routine maintenance. The 66 kV tie-in to the substation will include installation of two steel pole risers. One of the steel pole risers will be used to transfer the existing 66 kV overhead line to an underground configuration to be tied into the proposed substation. A second steel pole riser would be constructed within the substation limits to transfer the underground alignment into an overhead configuration providing connections to the 66 kV rack at the substation.

- **Flush Tank (approximately 27 feet, 9 inches in diameter by 20 feet high; 605 square feet):** This single tank would store clean RO permeate water. If an RO train is shut down for some reason it needs to be flushed with clean water so that it does not scale (refer to Figure 3-13, Storage Tank Plan/Exterior Elevations).

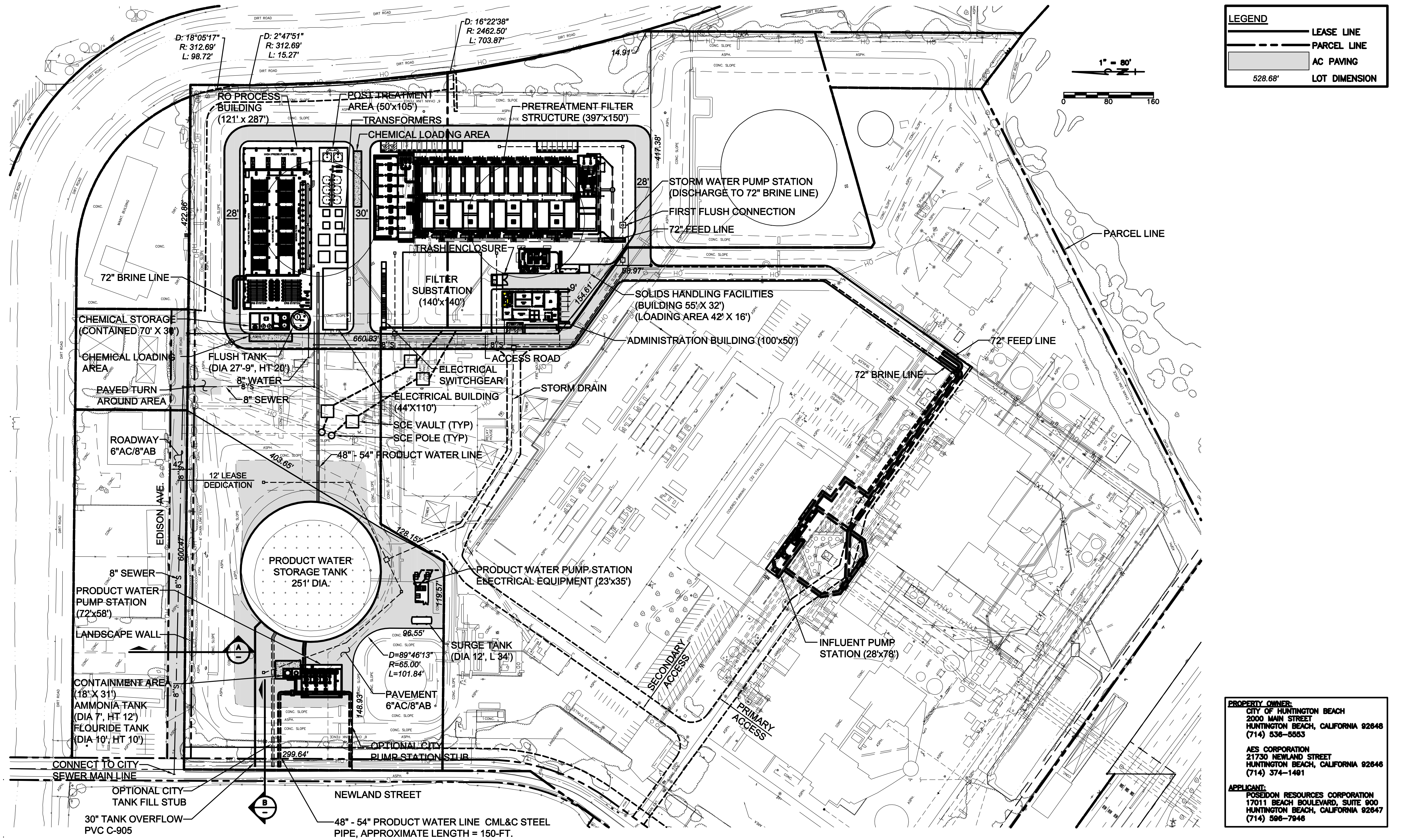
- **Ammonia Tank Structure (approximately 7 feet in diameter and 12 feet high; it sits in a containment area 18 feet by 31 feet, which it shares with the Fluoride tank. The two tanks have a divider wall between them):** This single tank would store ammonia and would be constructed of high density polyethylene or fiberglass reinforced polyester, and would have an approximate capacity of 3,000 gallons. This structure would be surrounded by an architecturally enhanced screen made of a concrete base (for chemical containment) and metal wall panels running vertically along the face of the screen wall.

- **Aboveground Product Water Storage Tank (approximately 251 feet in diameter by 30 feet; 49,481 square feet:** The aboveground product water storage tank would be circular in shape and would have an approximate capacity of 10 million gallons. The tank would be a concrete structure. This structure would be surrounded by an architecturally enhanced screen made of metal wall panels running vertically along the face of the screen wall. The screen would begin approximately 18 feet above finish grade (refer to Figure 3-15, Product Water Storage Tank Plan/Exterior Elevations).

- **Product Water Pump Station Structure (approximately 72 feet long x 58 feet wide x 19 feet, 6 inches high (above grade); 4,176 square feet):** This open air structure would house the pumps that would bring the water from the product water storage tank into the pipeline distribution system. This facility would be partially underground, with approximately 4 feet, 6 inches of the facility below grade, and surrounded by a chain-link fence.

- **Surge Tank Structure (approximately 12 feet in diameter x 34 feet long by 20 feet high; 408 square feet):** This steel tank would protect the distribution system from a pressure surge. If a pressure surge is realized this tank would store product water. **Fluoride**

- **Tank Structure (approximately 10 feet in diameter by 10 feet high):** This single tank would store fluoride and would be constructed of high density polyethylene or fiberglass reinforced polyester.



SOURCE: Tetra Tech 2010

FIGURE 3-6

Conceptual Site Plan

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Seawater Desalination Project At Huntington Beach

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SOURCE: Gillis & Associates 2010

FIGURE 3-7

Administration Building Plan/Exterior Elevations

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Seawater Desalination Project At Huntington Beach

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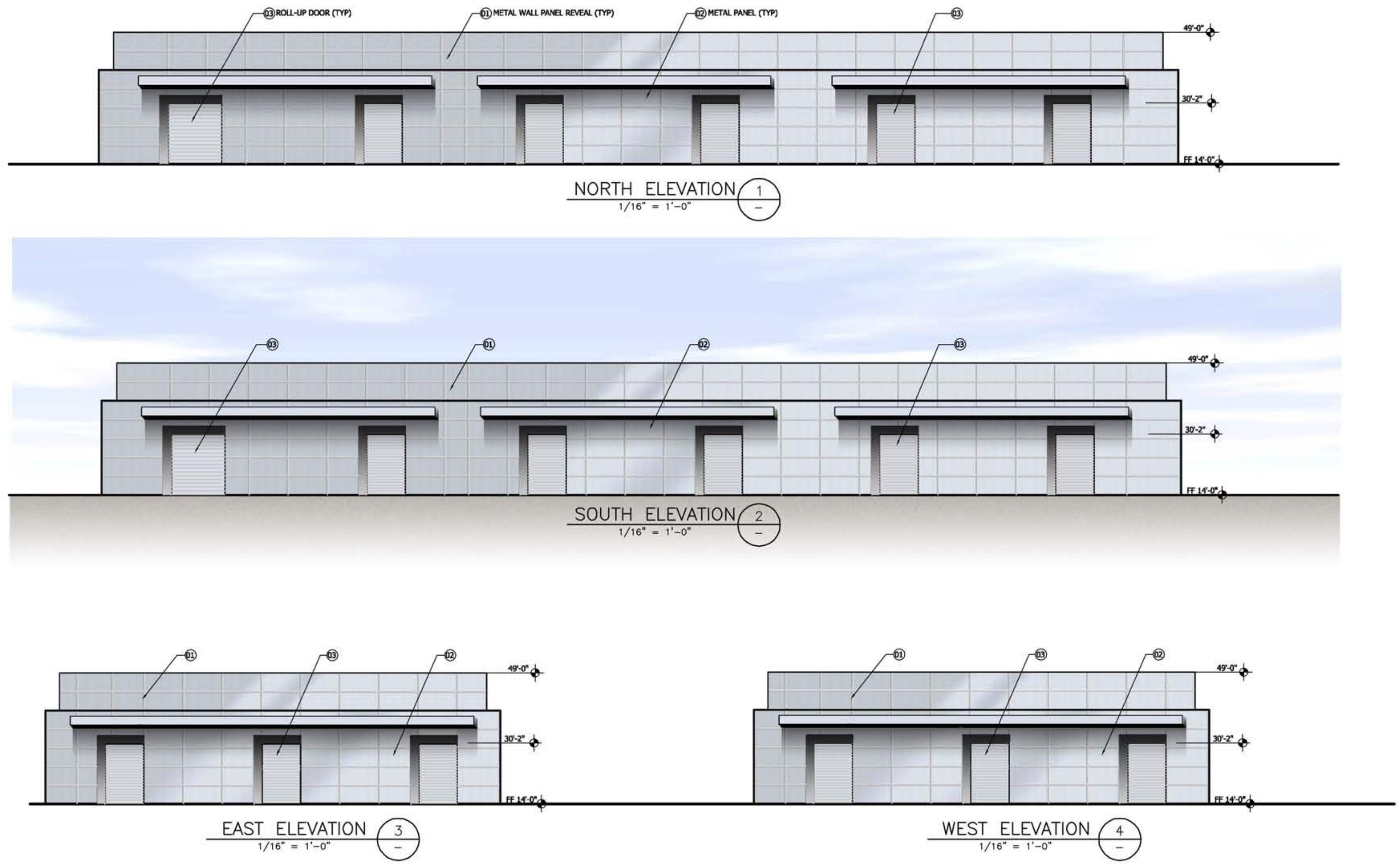

SOURCE: Gillis & Associates 2010

FIGURE 3-8

Reverse Osmosis Building Plan/Exterior Elevation

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Seawater Desalination Project At Huntington Beach

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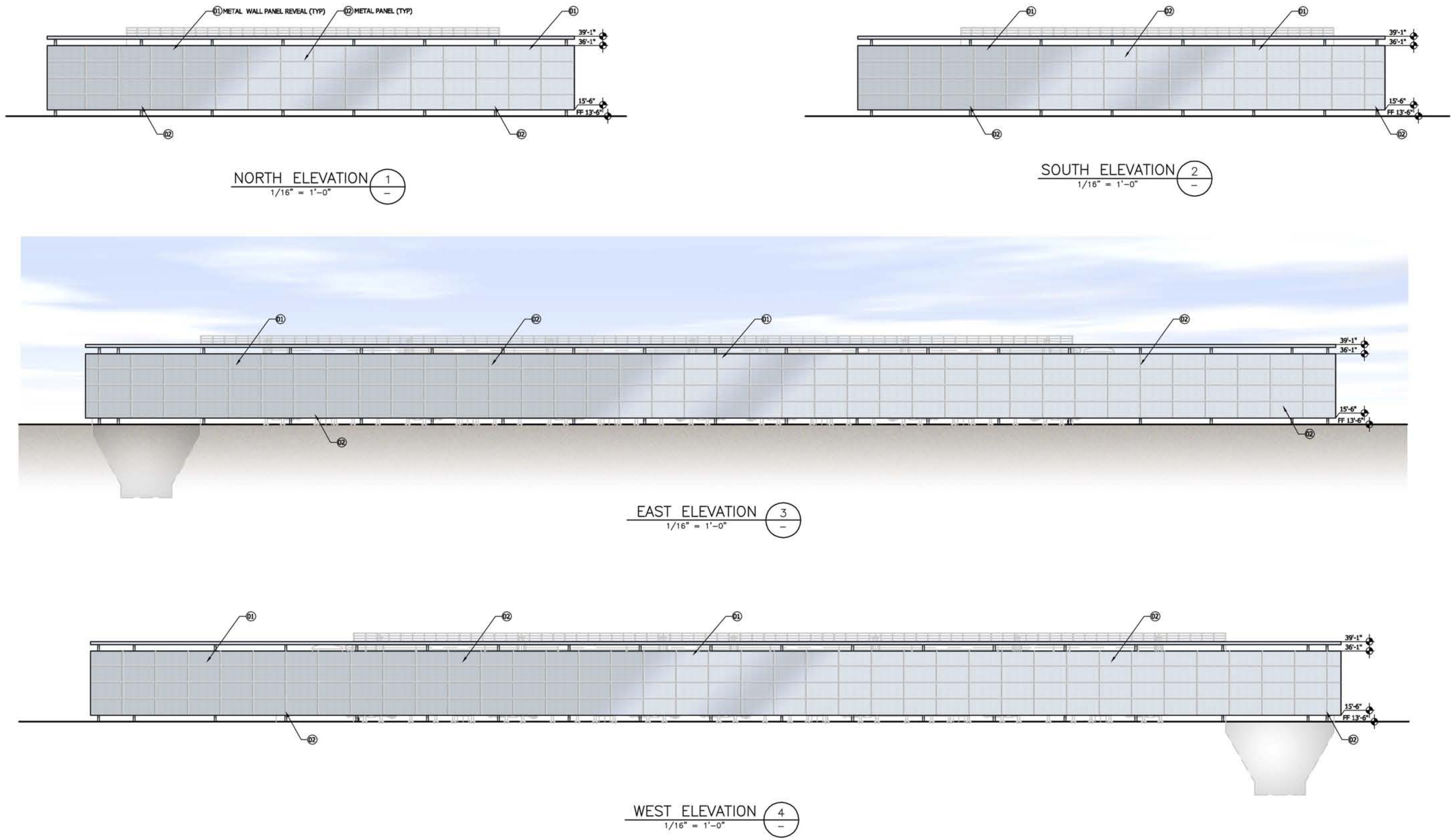

SOURCE: Gillis & Associates 2010

FIGURE 3-9

Pretreatment Filter Structure Plan/Exterior Elevations

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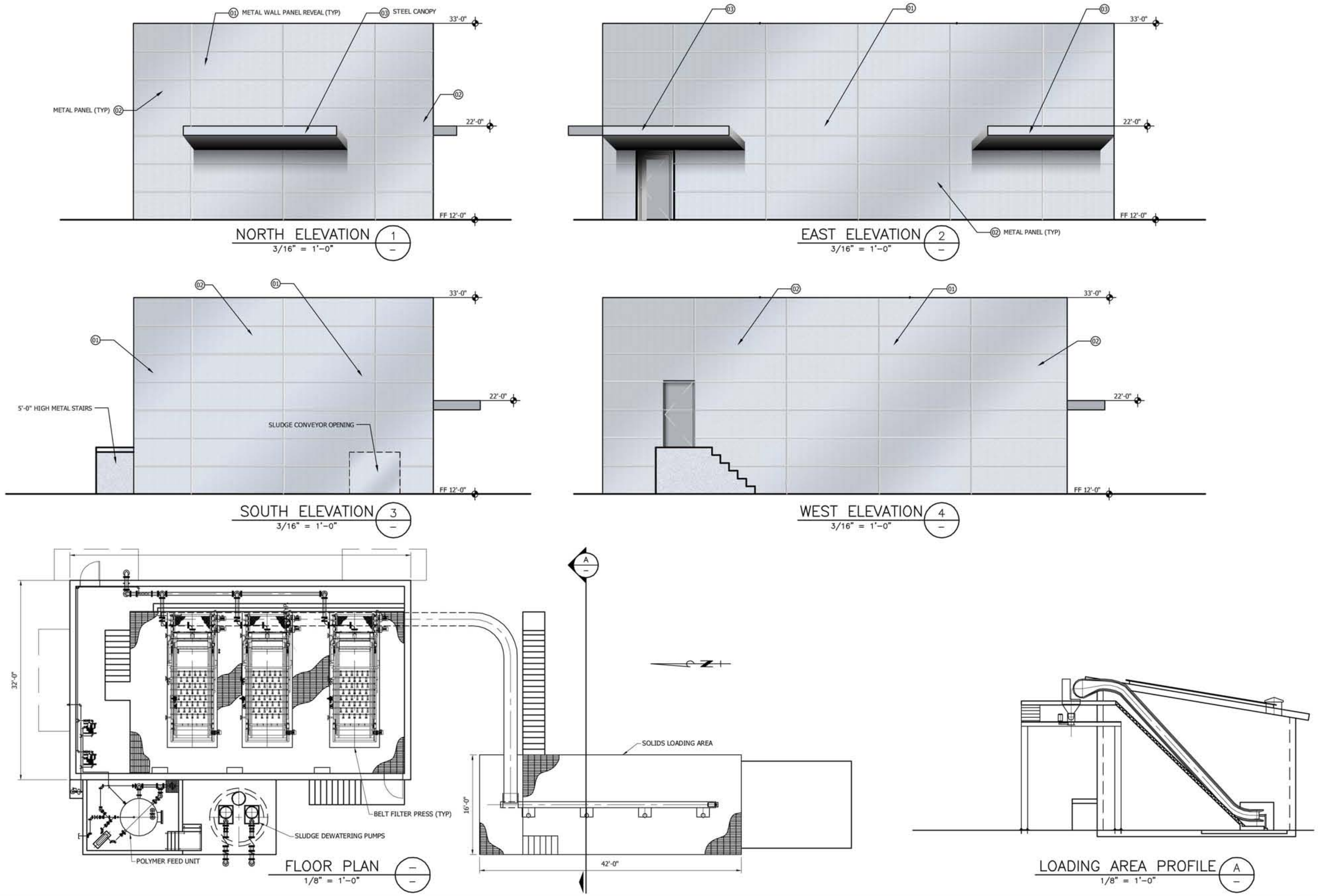

SOURCE: Gillis & Associates 2010

FIGURE 3-10

Solids Handling Building Plan/Exterior Elevations

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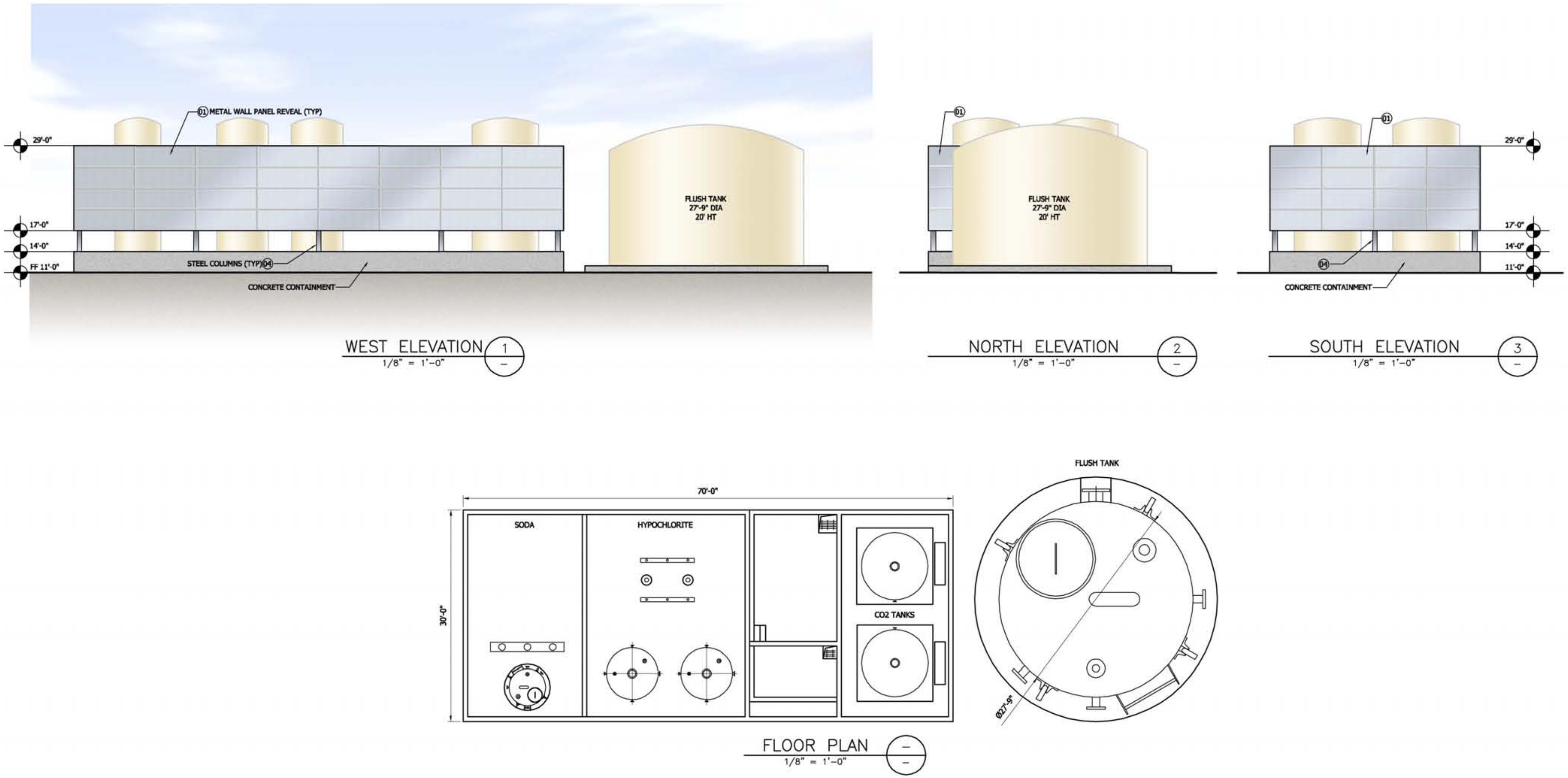

SOURCE: Gillis & Associates 2010

FIGURE 3-11

Chemical Storage Structure Plan/Exterior Elevations

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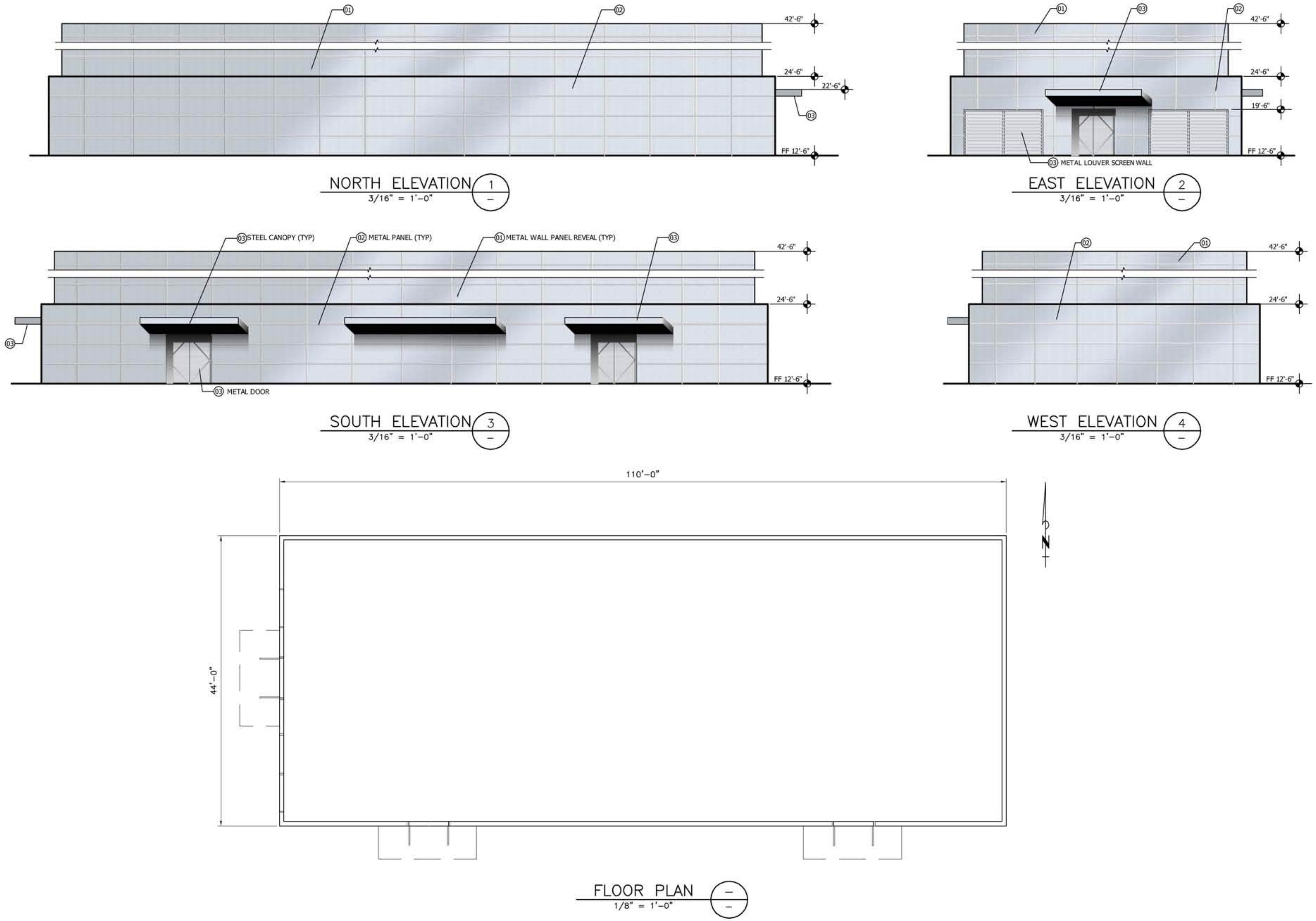

SOURCE: Gillis & Associates 2010

FIGURE 3-12

Electrical Room/Substation Building Plan/Exterior Elevations

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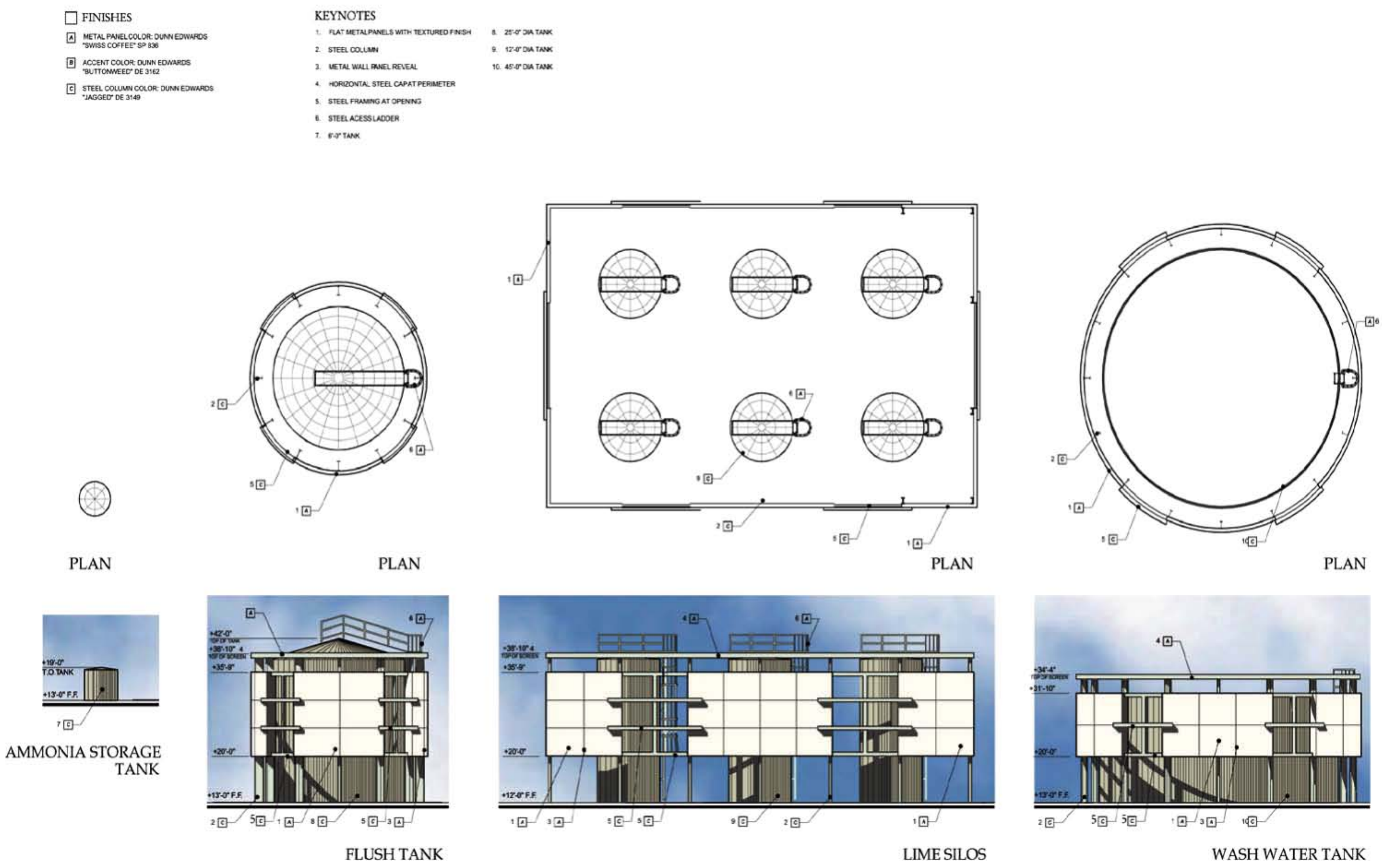

SOURCE: Gillis & Associates 2010

FIGURE 3-13

Storage Tank Plan/Exterior Elevations

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Seawater Desalination Project at Huntington Beach

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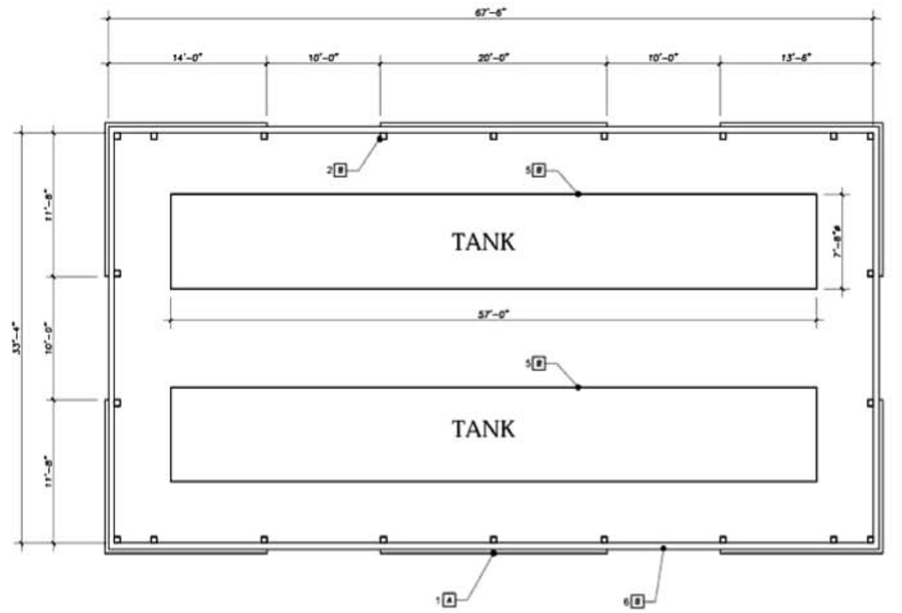
KEYNOTES

1. FLAT METAL PANELS WITH TEXTURED FINISH
2. STEEL COLUMN
3. METAL WALL PANEL REVEAL
4. HORIZONTAL STEEL CAP AT PERIMETER
5. 7'-8" DIA. TANK
6. STEEL FRAME AT OPENING

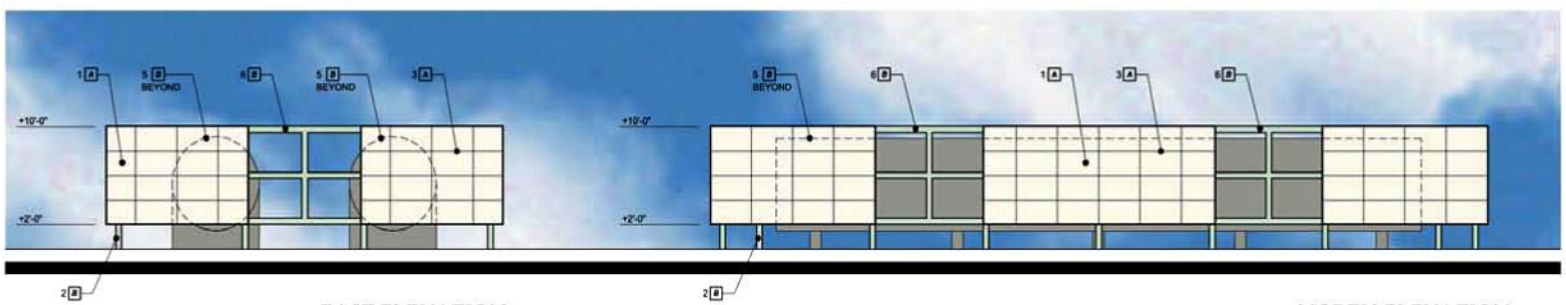
FINISHES

[A] METAL PANEL COLOR: DUNN EDWARDS "SWISS COFFEE" SP 836

[B] STEEL COLUMN COLOR: DUNN EDWARDS "JAGGED" DE 3149



PLAN



EAST ELEVATION

NORTH ELEVATION

SOURCE: Gillis & Associates 2010

FIGURE 3-14
Carbon Dioxide Tank Plan/Exterior Elevations

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Seawater Desalination Project at Huntington Beach

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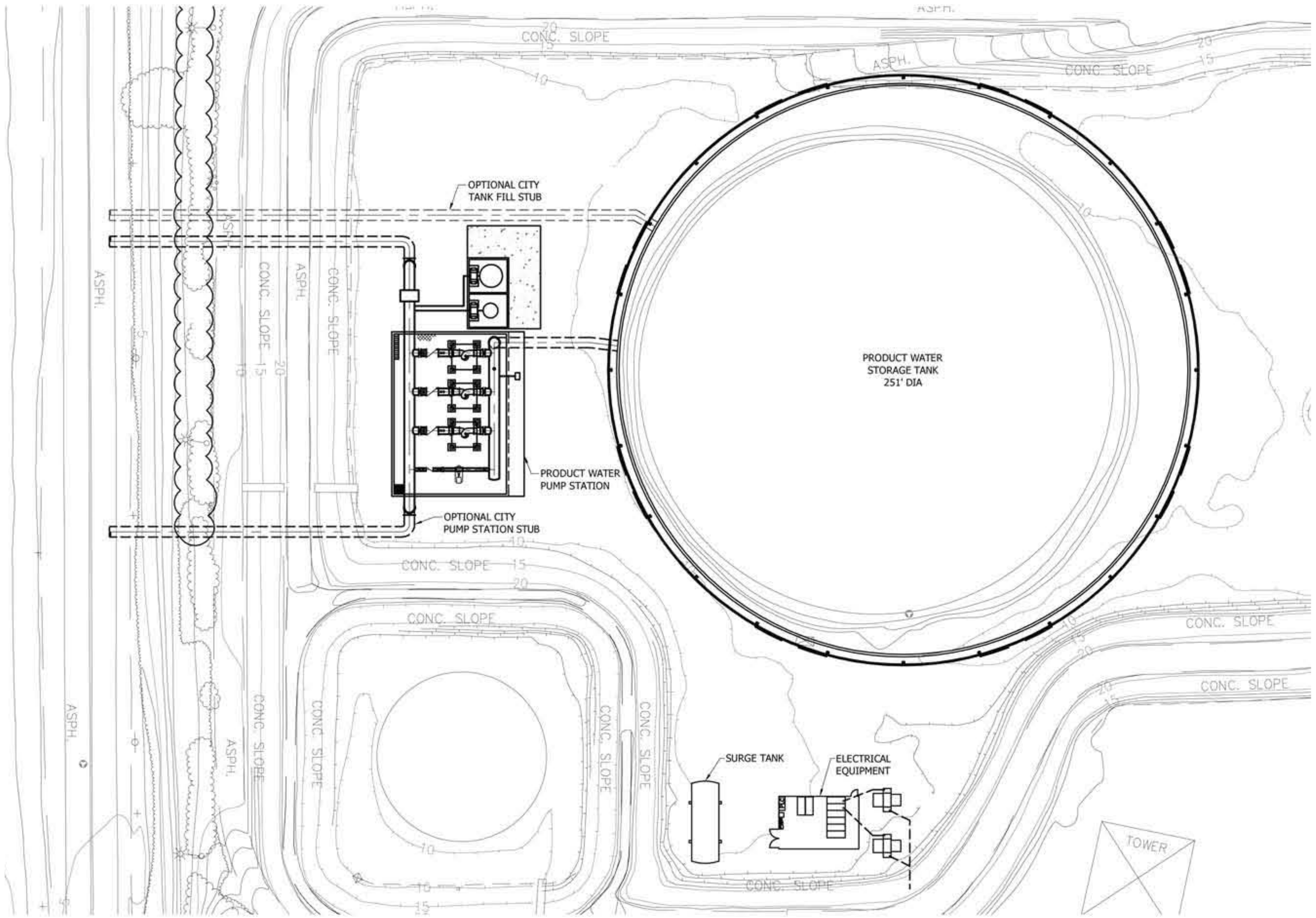
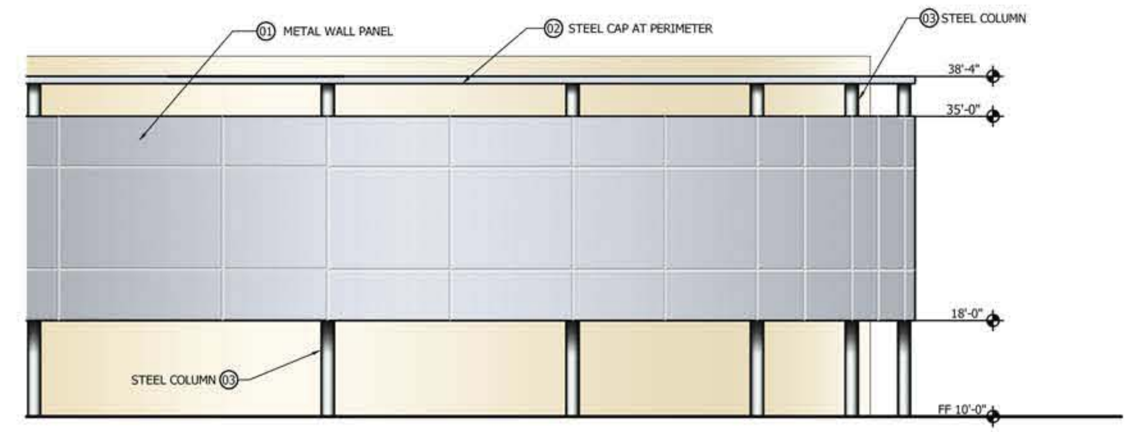
OVERALL ELEVATION 1
1/32" = 1'-0"



PLAN
1/32" = 1'-0"



PRODUCT WATER STORAGE TANK PARTIAL ELEVATION 2
1/8" = 1'-0"

FINISHES

01 FIELD COLOR: DUNN EDWARDS "SWISS COFFEE" SP 836

02 ACCENT COLOR: DUNN EDWARDS "BUTTONWEED" DE 3162

03 ACCENT COLOR: DUNN EDWARDS "JAGGED" DE 3149

SOURCE: Gillis & Associates 2010

FIGURE 3-15

Product Water Storage Tank Plan/Exterior Elevations

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Seawater Desalination Project At Huntington Beach

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Landscaping and Street Improvements

Landscaping and street improvements along Edison Avenue and Newland Street, as well as landscaping improvements along the eastern site boundary are included in the project and will be installed pursuant to Code requirements from the City of Huntington Beach Department of Public Works (refer to Figure 3-16, Conceptual Landscape Master Plan). The landscaping and street improvements are subject to Design Review Board review and approval, and may change based on the Board's review. Along the northern portion of the project site, Edison Avenue would be improved. These improvements would consist of the dedication of 12 feet along the frontage of the existing Edison Avenue (for curb, gutter, paving, turn-about, and street lighting improvements) for a total of approximately 600 linear feet. It should be noted that AES Huntington Beach, LLC or property owner would be responsible for dedication of property to the City for these improvements, However, the project applicant would be responsible for completing the roadway and landscaping improvements as a condition of approval for the project subsequent to property dedication. A ten-foot wide landscaping planter, including drought-tolerant species of street trees, accent palms, shrubs, and groundcover, with drought-conscious irrigation, would be constructed around the northern perimeter along Edison Avenue, and a twenty-foot wide landscaping planter would be planted along the western perimeter along Newland Street. In addition, an 8-foot-high masonry block wall with accent pilasters would be placed between the landscaping and the earthen berms, which are covered with asphalt concrete and concrete slurry. Adjacent to the eastern portion of the project site, landscaping would consist of compatible native vegetation, which would be coordinated with the Huntington Beach Wetlands Conservancy and the City of Huntington Beach.

The project will also be required to demonstrate compliance with the City's Water Efficient Landscape Ordinance (Municipal Code 14.52) in a manner approved by the City Departments of Planning and Building and Public Works.

Impact Avoiding Project Design Features

The proposed project will incorporate a number of design features intended to reduce project impacts. These features can be found in detail incorporated in the following sections and are summarized below:

- Vegetative and architectural screening will be added to ensure that exposed pipelines, tanks, and other industrial-type equipment are screened from public view.
- An on-site local stormwater drainage system would be implemented and if necessary stormwater would be treated in accordance with any requirements of the NPDES permit
- Drought-conscious irrigation systems would be included in the landscape plan.
- Noise levels from the reverse-osmosis building would be reduced by the inclusion of double walls, sound absorbing materials, acoustic barriers, sound-control curtains, and sound baffles.
- The RO membrane cleaning first-rinse solution will be discharged to the local sanitary sewer for treatment at the OCSD regional wastewater treatment plant.

- The inner housing of the concrete containment structure and plastic tanks used to store chemicals would be coated for resistance to chemicals and would be separated or divided from other chemicals to prevent mixing in the event of accidental spillage.

- The diesel-fuel storage tanks for pump stations would be double walled and would be equipped with monitoring equipment to prevent and detect leakage.

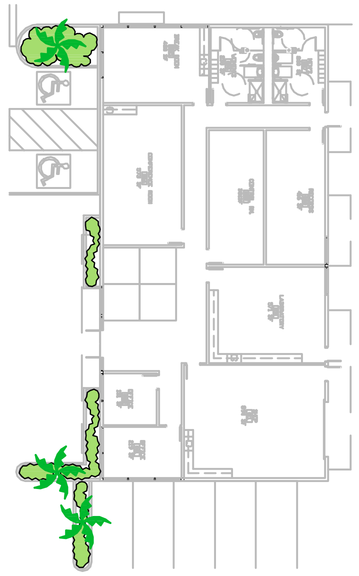
- Standard construction measures such as chain link fencing and nylon mesh would be utilized to screen the staging and construction areas from surrounding areas and the general public at the proposed desalination project site and underground pump station sites.

- The proposed desalination facility would not intake water from the HBGS cooling water system during heat treatments.

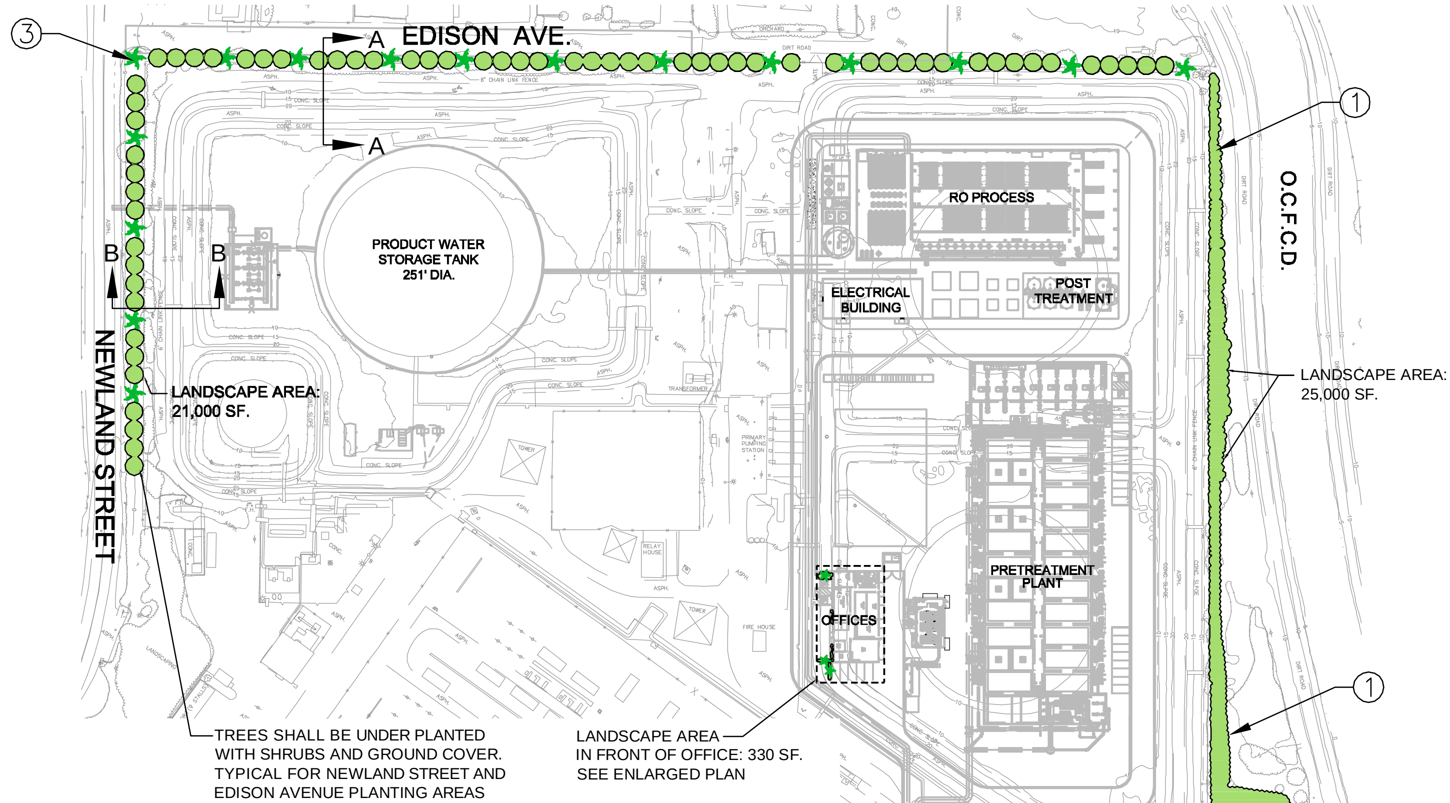
- The desalination facility intake would be equipped with instruments which would automatically measure and continuously monitor turbidity and salinity levels. The instrumentation would trigger alarms in the event of excessive increase in intake seawater turbidity and/or salinity.

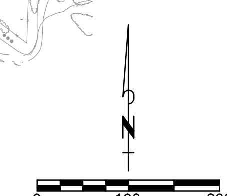
- A number of provisions would protect against the passage of red tide-related algal organic compounds through the treatment process, which are further described in Section 4.11, Product Water Quality:

  - Deep Intake Configuration to Minimize Algae Entrainment
  - Chlorination of Intake Seawater
  - Enhanced Coagulation of Intake Seawater
  - Microfiltration or Dual Media Sand Filtration Algae Barrier
  - Microfiltration or Dual Media Sand Filter Covers
  - Cartridge Filter Algae Barrier
  - RO Membrane Filtration
  - Final Disinfection
  - Emergency Facility Shutdown in the event of red tide/algal blooms of catastrophic proportions.

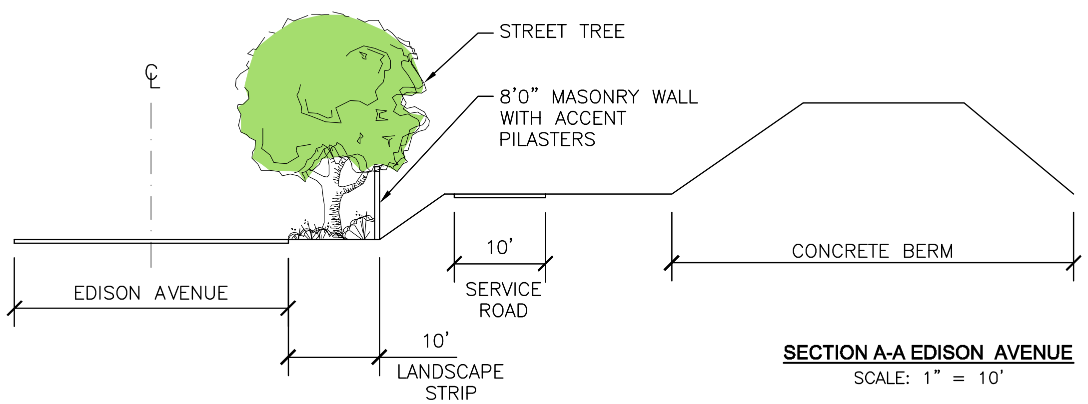


ENLARGED PLAN
SCALE: 1" = 20'

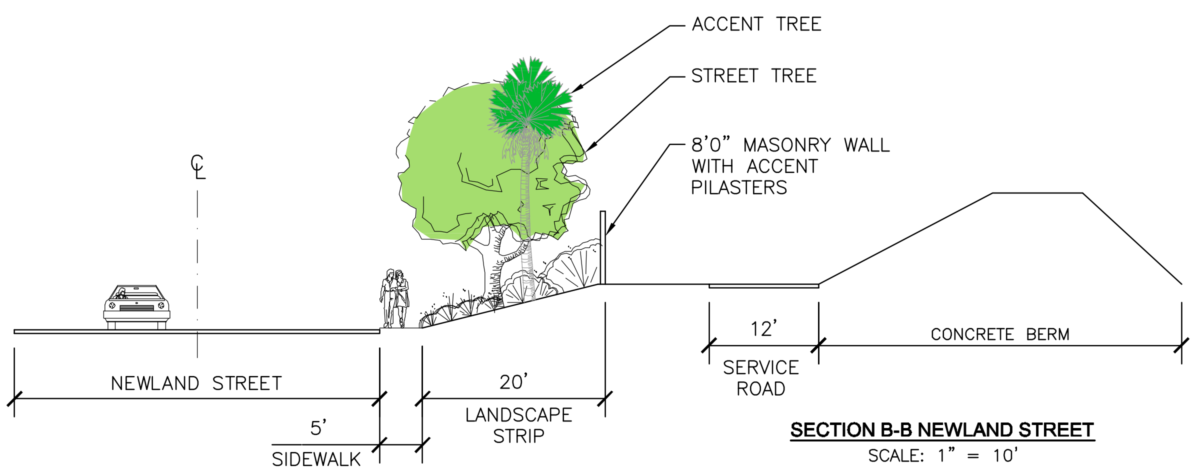




LANDSCAPE SITE PLAN
SCALE: 1" = 100'



SECTION A-A EDISON AVENUE
SCALE: 1" = 10'



SECTION B-B NEWLAND STREET
SCALE: 1" = 10'

PLANT LEGEND

SYMBOL	BOTANICAL/COMMON NAME	SIZE	SPACING	QUANTITY
	TREES:			
● (green circle)	METROSIDEROS EXCELSUS (NEW ZEALAND CHRISTMAS TREE)	15 GAL	AS SHOWN	63
✱ (green star)	WASHINGTON ROBUSTA (MEXICAN FAN PALM)	15 BTH	AS SHOWN	19
(green shrub band)	EVERGREEN SCREEN SHRUB:			
	ABELIA GRANDIFLORA (GLOSSY ABELIA)	5 GAL 75%/ 1 GAL 25%	5' O.C.	–
	HETEROMELES ARBUTIFOLIA (TOYON)	5 GAL 75%/ 1 GAL 25%	5' O.C.	–
	MYRICA CALIFORNICA (PACIFIC WAX MYRTLE)	5 GAL 75%/ 1 GAL 25%	5' O.C.	–
	NERIUM OLEANDER 'PETITE PINK' (DWARF OLEANDER)	5 GAL 75%/ 1 GAL 25%	5' O.C.	–
	PRUNUS ILLICIFOLIA (HOLLYLEAF CHERRY)	5 GAL 75%/ 1 GAL 25%	5' O.C.	–
	RHUS INTEGRIFOLIA (LEMONADE BERRY)	5 GAL 75%/ 1 GAL 25%	5' O.C.	–
				TOTAL 240
	GROUND COVER:			
	AGAPANTHUS AFRICANUS (LILY-OF-THE-NILE)	1 GAL	3' O.C.	–
	CARISSA MACROCARPA 'GAREEN CARPET' (PROSTRATE NATAL PLUM)	1 GAL	3' O.C.	–
	KNIPHOFIA UVARIA (RED HOT POKER)	5 GAL	3' O.C.	–
	RIBES SPECIOSUM (FUCHSLIA FLOWERED GOOSEBERRY)	1 GAL	3' O.C.	–
	RIBES VIBURNIFOLIUM (CATALINA CURRANT)	1 GAL	3' O.C.	–
	ZAUSCHNERIA CALIFORNICA (CALIFORNIA FUCHSIA)	1 GAL	3' O.C.	–
				TOTAL 800

NOTES

1. REMOVE EXISTING MYOPORUM WITHIN PLANTING LIMITS ON EASTERN PERIMETER.
2. REMOVE EXISTING PALM TREE.
3. 25'-0" VIEW CORRIDOR. NO LANDSCAPE PLANTING TALLER THAN 32" PERMITTED.
4. ALL PLANTING AREAS SHALL HAVE AN AUTOMATIC IRRIGATION SYSTEM WITH A PROGRAMMABLE CONTROLLER AND RAIN SENSING DEVICE. ALL SPRINKLER HEADS SHALL BE OF A POP-UP DESIGN WITH ANTI-DRAIN VALVES TO PREVENT LOW HEAD DRAINAGE. IRRIGATION REQUIREMENTS IN THE WETLANDS AREA MAY DIFFER FROM ORNAMENTAL LANDSCAPE AREAS.
5. ALL LANDSCAPE AND IRRIGATION SHALL BE IN CONFORMANCE WITH HUNTINGTON BEACH CITY ARBORICULTURAL AND LANDSCAPE STANDARDS AND SPECIFICATIONS.

SOURCE: Tetra Tech 2010

FIGURE 3-16
Conceptual Landscape Master Plan

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- The project would have provisions incorporating several protection devices to account for non-routine operations at the HBGS, as described below and in Section 4.11, including:
    - Automatic Control Interlock between HBGS Pumps and Desalination Facility Intake Pumps
    - Continuous Intake Pump Flow Measurement Devices
    - Continuous Intake Water Temperature Measurement Devices
    - Continuous Intake Water Salinity/Conductivity Measurement Devices
    - Continuous Intake Water Oil Spill/Leak Detection Monitoring Devices
    - Routine Communication with HBGS Staff regarding unusual planned or unplanned events at the HBGS.
- An average of 10% to 15% of the membrane elements would be replaced every year, thereby maintaining the product water quality at a steady level.
- The desalination facility would be designed with one standby RO train to provide additional reliability of water production and supply.
- To eliminate large negative pressures and the possibility of vapor cavity formation in the delivery pipeline system above, surge protection measures, including installation of pressurized surge tanks are incorporated into the project design for the product water pump station and the OC-44 booster pump station, as described further in this section, and in detail in Appendix V, Pressure Surge Analysis. These features may be further modified based on supplemental modeling that would be performed when additional design specifications are developed.
- In addition to the proposed surge tanks, additional hydraulic modifications would be needed for the existing water distribution system to avoid potential effects related to pressure surges and to facilitate product water delivery. These modifications, which include valves, bypass structures, and other minor modifications, are described further in this section, and in detail in Appendix V. These features may be further modified based on supplemental modeling that would be performed when additional design specifications are developed.
- As noted below, the vertical riser on the HBGS intake structure is fitted with a velocity cap, which is a physical barrier placed over the top of the intake pipe. Water is drawn into the pipe through 1.5-meter (5-foot) openings placed on the sides of the cap, which converts what had been a vertical current to a horizontal one. Motile fishes are less likely to react to dramatic changes in vertical currents, but exhibit a more consistent flight response when the changes are sensed in the horizontal current, thus preventing their capture by the intake system. Velocity caps are classified as an impingement reduction technology because they function by discouraging “impingeable” fishes from

entering the system. Studies at Huntington Beach have shown impingement reductions ranging as high as 90% (SWRCB 2010, pp. 100–101).

- The proposed project would be subject to the offset requirements set forth in the project's Energy Minimization and Greenhouse Gas Reduction Plan, which is further discussed in Section 4.12, Climate Change, of this SEIR, and included in its entirety as Appendix W, Energy Minimization and Greenhouse Gas Reduction Plan. These requirements are identified in Part III of the Plan, and are summarized below:
    - Prior to the commencement of project construction and subject to City of Huntington Beach concurrence, the project applicant shall make a one-time purchase of GHG offsets or RECs to zero-out the construction and aggregate 30-year direct operational GHG emissions associated with the proposed project.
    - Prior to the commencement of project operations, the project applicant shall be required to purchase offsets sufficient to cover estimated net (indirect) GHG emissions for at least the first year of operation, subject to City concurrence and based on the project's first annual GHG report. Following this initial purchase, the project applicant will have the option to purchase offsets for any longer period of time up to and including the entire 30-year life of the project.
    - Each year, the project applicant shall obtain new GHG emission factors from CARB or CCAR and prepare and submit its annual GHG report within 180 days of the date of publication of CCAR/CARB emissions reports. If the report shows a positive net GHG emissions balance, the project applicant shall purchase offsets and submit proof of such purchase to the City within 120 days from the date of the annual GHG report.
    - If, at any time during the life of the project, CARB, any California air district, or any federal regulatory agency initiates a carbon tax or carbon offset program that would allow the project applicant to purchase carbon offsets or payment of fees to compensate for GHG emissions, the project applicant may, at its option, elect to pay into such a program in order to fulfill all or part of its obligations under the Energy Minimization and Greenhouse Gas Reduction Plan.

The project applicant has determined the following LEED principles are reasonably practicable to be included in the project's building design:

- *Construction Activity Pollution Prevention* – The project will implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan will conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit and the State of California Regional Water Quality Control Board. The project will file an NOI with the RWQCB and create a Storm Water Pollution Prevention Plan.

- *Site Selection* – The current site is developed. The main project site is not classified as prime farmland and is more than 100 feet from any wetlands or body of water. Some ancillary project items are within 100 feet of wetlands but are necessary as part of the project operations. The main Project site meets the Site Selection Criteria.

- *Brownfield Redevelopment* – The site currently houses derelict oil storage containers that will be removed as part of the project.

- *Alternative Transportation – Bicycle Storage and Changing Rooms* – Non-covered bicycle racks will be provided for 5% or more of all building users and be located within 200 yards of the entrance to the Administration component of the Administration Building. Showers and changing facilities will be located within the Administration Building.

- *Alternative Transportation – Low Emitting and Fuel-Efficient Vehicles* – Preferred parking will be provide for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

- *Stormwater Design – Quantity Control* – The project will implement a stormwater management plan and SWPPP that prevents the post development peak discharge rate and quantity from exceeding predevelopment peak discharge rate and quantity for a 10 year storm.

- *Stormwater Design – Quality Control* – The site will implement a stormwater management plan that reduces impervious cover where reasonably practicable, promotes infiltration and captures and treat stormwater runoff from 90% of the average annual rainfall using acceptable best management practices.

- *Heat Island Effect – Roof* – The administration building will meet the requirements of the roof heat island effect credit. Roofing materials will have a solar reflective index value equal or greater than 78 for at least 75% of the roof surface.

- *Light Pollution Reduction* – The administration building will meet the requirements of the interior light pollution reduction credit by reducing the input power of all nonemergency interior luminaries with a direct line of sight to any openings in the envelope by at least 50% between 11Pm and 5am. For exterior lighting, lighting power densities will not exceed ANSI/ASHRAE/IESNA Standard 90.1-2007 for the classified zone.

- *Water Use Reduction – 20% Reduction* – The administration building will employ strategies that in aggregate use 20% less water than the water use baseline calculated in the building per the requirements of LEED 2009. The facility will accomplish the 20% of water use reduction by the use of waterless urinals and the use of high efficiency fixtures.

- *Water Efficient Landscaping* – Drought-tolerant and native species of landscaping will be utilized such that the potable water consumption for irrigation will be reduced by at least 50% from a calculated midsummer baseline case.

- *Innovative Wastewater Technologies* – The administration building will utilize water-conserving fixtures to reduce the potable water use for the building sewage conveyance by at least 50%.

- *Minimum Energy Performance* – The project will demonstrate a 10% improvement in the proposed building performance rating when compared with the baseline building performance rating. The project baseline performance will be based on the Title 24-2005, part 6. The project will attain the 10% improvement over the baseline case through the use of premium efficiency pumps, improved HVAC energy ratings, and high efficiency lighting.

- *Fundamental Refrigerant Management* – The project will not utilize chlorofluorocarbon based refrigerants in the building, heating, ventilation, air conditioning and refrigeration systems.

- *Enhanced Refrigerant Management* – Refrigerants and HVAC equipment will be selected that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The base building HVAC equipment will comply with the requirements set forth in the LEED 2009 documentation for Enhanced Refrigerant Management.

- *Storage and Collection of Recyclables* – To facilitate the reduction of waste generated by the building occupants that is hauled to and disposed of in landfills, the project will provide for a dedicated recycling area within the Administration building for the collection of paper, corrugated cardboard, glass and plastic.

- *Construction Waste Management* – In order to divert construction and demolition debris from disposal in landfills, during project construction Poseidon's contractors will recycle appropriate materials wherever feasible and redirect those items to proper recycling centers.

- *Recycled Content* – The project will utilize recycled materials wherever practical. Items that will contain recycled content include; concrete, steel framing elements, and site paving.

- *Certified Wood* – The project will utilize at least a minimum of 50% certified wood for wood based materials. The wood products will be certified in accordance with the Forest Stewardship Council's principle and criteria. The use of Certified Wood for building formwork, bracing, scaffolding and guardrails is not required per LEED 2009 and will be provided at the discretion of the project team.

- *Minimum Indoor Air Quality Performance* – To establish minimum indoor air quality performance to enhance the indoor air quality in buildings, the project will meet the minimum requirements of LEED 2009 through the use of increased natural ventilation and ventilation rate.

- *Environmental Tobacco Smoke Control* – To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke, the project will prohibit smoking within the building and within 25 feet of entries, doors, air takes, and operable windows. Signage will be utilized to designate smoking areas and to prohibit smoking within the building.

- *Outdoor Air Delivery Monitoring* – The project will install permanent monitoring systems to ensure that ventilation systems maintain the minimum design requirements per LEED 2009.

- *Increased Ventilation* – The project will provide increased outdoor ventilation rates to improve indoor air quality and promote occupant comfort.

- *Construction IAQ Management Plan – During Construction* - During construction, an indoor air quality (IAQ) management plan will be prepared and implemented to protect indoor building materials and equipment from contamination.

- *Construction IAQ Management Plan – Before Occupancy* – Before occupancy and after completion of interior finishes, the building ventilation systems and interior spaces will be flushed-out per the requirements of LEED 2009.

- *Low Emitting Materials – Adhesives and Sealants* – Low-Emitting adhesives and sealants will be utilized that meet the requirements of LEED 2009.

- *Low Emitting Materials – Paints and Coatings* – Low-Emitting paints and coatings will be utilized that meet the requirements of LEED 2009.

- *Low Emitting Materials – Flooring Systems* – Low-Emitting flooring systems will be utilized that meet the requirements of LEED 2009.

- *Low Emitting Materials – Composite Wood and Agrifiber Products* – Low-Emitting Composite Wood and Agrifiber Products will be utilized that meet the requirements of LEED 2009.

- *Indoor Chemical and Pollutant Source Control* – To minimize the exposure of building occupants to potentially hazardous particulates and chemical pollutants, the following strategies will be utilized for the Project: permanent entryway systems to capture dirt and particulates from entering the building, sufficiently exhaust spaces containing hazardous gases, install new air filtration media in regular intervals, and provide containment for hazardous materials.

- *Controllability of Systems – Lighting* – Controllability of lighting systems will be provided for at least 90% of the building occupants.

- *Thermal Comfort Design* – The project HVAC system will be designed to meet the requirements of ASHRAE Standard 55-2004 to provide a comfortable thermal environment that promotes occupant productivity and well-being.

- *Thermal Comfort – Verification* – A permanent monitoring system and thermal comfort survey will be conducted to assess the building occupant thermal comfort over time.

- *Daylight and Views – Daylight* – Daylighting will be provided to at least 75% of the occupied spaces per the requirements of LEED 2009 through the use of windows and translucent exterior building panels.

- *Innovation in Design* – The project will utilize two innovations in design. The first innovation is the projects purpose; to desalinate sea water for the purpose of providing a reliable and dependable source of drinking water. The project will help augment several regional water districts source of drinking water and help provide for the sustainability of that drinking water. The second source of innovative in design is the energy recovery of pressurized discharge water. High pressure water that is a by product of the reverse osmosis process will be run through a turbine type energy recovery system to help augment the power requirements of the facility.

- *LEED Accredited Professional* – The project team will have at least one member that is LEED Accredited Professional.

- *Regional Priority* – By providing day lighting to 75% of the occupied spaces in the administration component of the administration building, the project will receive an additional regional priority credit.

B. INTERACTION BETWEEN THE PROPOSED DESALINATION FACILITY AND THE HBGS

Background and History of the HBGS

The HBGS began operation in 1958 under the ownership of SCE. The power plant utilized fuel oil for production of electricity through its five generating units until the late 1980s, when the generating units were converted for natural gas operation. In 1995, SCE retired two existing generating units (Units 3 and 4) due to limited use.

AES Huntington Beach, LLC, acquired the HBGS from SCE in 1998, and later acquired the fuel oil storage tank property in 2001. In 2001, AES filed an Application for Certification (AFC) with the California Energy Commission (CEC) to rebuild and upgrade (“retool”) Units 3 and 4 to meet increasing electrical demand in California. The AFC (which was ultimately approved by the CEC in May 2001) and subsequent retool brought the total electrical generation capacity of HBGS to 1,103 megawatts (MW). Until October 2002, Units 1 through 5 were available for operation at the HBGS. However, as part of a South Coast Air Quality Management District (SCAQMD) order, Unit 5 (a combustion turbine unit) was permanently removed from operation, and all permits for this unit were surrendered. As such, current operation at the HBGS consists of four steam turbine generating units with a total capacity of 880 MW.

HBGS Operations

The existing HBGS consists of four generating units (Units 1 through 4). Each unit is equipped with two condensers. Units 1 and 2 are rated at 215 net MW and Units 3 and 4 are rated at 225 net MW. HBGS has a total nominal generating capacity of 880MW. The station uses a once-through cooling system with an offshore intake and outfall. The existing HBGS intake/discharge facilities traverse land owned by the California State Lands Commission (CSLC), and the land is leased to AES. Cooling water is supplied to the generating station from the ocean through an intake structure located 1,840 feet offshore (see Figure 3-17, HBGS Intake and Outfall Location Map). The generating station's offshore seawater intake structure consists of a vertical riser with a horizontal velocity cap supported 5 feet above the opening to the cooling water conduit. The entire structure rises about 15.8 feet above the ocean floor where the total water depth is approximately 34 feet. Cooling water flow most often varies between 127 MGD and 507 MGD depending on the number of pumps that are in operation. The intake collects seawater through a velocity cap into a 14-foot-diameter conduit, with screening, to the HBGS intake structure located on the HBGS property. The HBGS intake structure consists of an open forebay from which the seawater flows through two trash racks, each constructed of vertical steel bars with 3-inch openings between the bars. Downstream of the trash racks, the water flows through four vertical traveling screens with 3/8-inch mesh screening. The screened seawater is then conveyed through a 14-foot x 11-foot rectangular conduit into the generating station cooling water pump well structure. The condensers are supplied with cold seawater by eight cooling water pumps (two for each generating unit). Six of the cooling water pumps (Units 1, 2, and 4) are rated at 63.4 MGD (44,000 gallons per minute [gpm]), while the remaining two pumps (Unit 3) are rated at 66.7 MGD (46,300 gpm).

The cooling water pumps convey the screened seawater through thousands of 7/8-inch diameter tubes that make up the generating station's condensers. Steam exiting the facility's turbines, passes over the outer surfaces of the condenser tubes and is condensed back to a liquid state to be pumped back to the boilers.

During this process heat is transferred to the seawater and its temperature is raised, on average, by 18°F (10°C). The maximum temperature increase specified in the facility's NPDES permit is 30°F (16.5°C).

After passing through the condensers, the warmed seawater (cooling water) is returned to the discharge well located at the HBGS intake structure via two 108-inch (9-foot) diameter discharge pipelines. From the discharge well the cooling water flow is conveyed back to the ocean via a single 1,500-foot-long, 14-foot-diameter conduit, then through a discharge structure identical to the intake structure except for the absence of a velocity cap. Instead, the discharge vertical riser structure is capped with a 12-inch by 18-inch mesh screen constructed from one-inch by three-inch flat bars.

Design and Operation Criteria of Condenser Cooling Water Systems

Most industrial production processes need cooling water to operate efficiently and safely. Refineries, steel mills, petrochemical manufacturing facilities, electric utilities and paper mills all rely on equipment or processes that require efficient temperature control. Cooling water systems control these temperatures by transferring heat from the hot process fluids into cool water. At generating stations, such as the HBGS, the process fluid to be cooled is steam after it has passed through the steam turbine and generated power. As the cooling occurs, the cooling water itself gets warmer and must be cooled or discharged and replaced by a fresh supply of cooling water. Where the cooling water is used once and then discharged, the system is known as once-through cooling.

Once-through cooling systems characteristically involve large volumes of water and small increases in water temperature. Once-through cooling systems for generating stations are typically operated at a high load factor. They are started several hours prior to startup of the balance of the facility, and are operated several hours after facility shutdown in order to fully cool the steam condensing equipment.

Although simple in design and operation, once-through cooling systems are subject to corrosion, scaling and microbial growth and fouling. Microbial growth and fouling result in energy losses due to increased frictional resistance and increased heat transfer resistance, increased capital costs for excess equipment capacity to account for fouling, increased maintenance costs for replacement of equipment with severe under-deposit corrosion, and shutdowns to clean equipment with loss of production. With respect to the HBGS, the most significant problems are debris plugging the condenser tubes, algae growth, and mussel growth and the requirement that all three of these are controlled without removing the units from service.

The cleaning methods for bio-fouled (bio-fouling is the attachment of biological materials such as protozoa, amoeba, fungi, and other organisms to surfaces, forming a “bio-film”) systems consist of physical and chemical methods (biocides sanitization). Physical methods are simple but show limited efficacy (flushing) or are effective only for loosely adherent films (backwashing) or for thinner deposits (non-abrasive sponge balls). These cleaning methods also require the power generation units to shutdown. The most common approach to bio-fouling problems in cooling water systems is the use of biocides, substances able to drastically reduce the total number of cells in the feedwater and to attack and weaken the stability of the bio-film.

The efficacy of biocides depends on several factors like the kind of biocide and its mechanism of action, its concentration, its kinetics, and the way it is dosed. Research has shown that a continuous bio-fouling monitoring system (on-line and side-stream monitors, visual inspections, etc.) and a chlorine dioxide (ClO_2) dosage provides the best results (Belluati et al. 1997). The HBGS utilizes chlorination, heat treating, and mechanical cleaning to control condenser fouling problems.

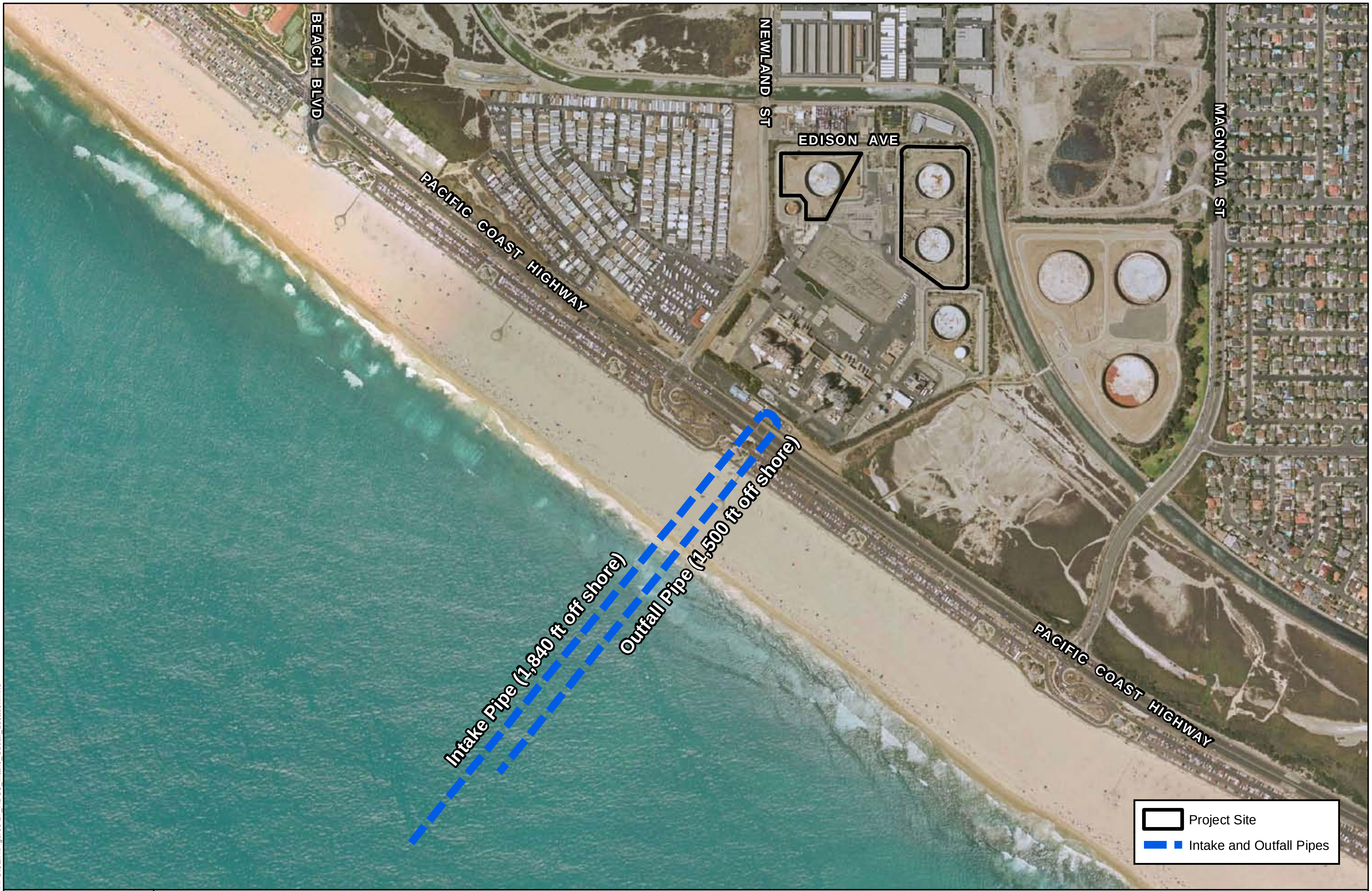
There are benefits to continuous operation (as opposed to pumping water only when units are generating electricity) of once-through cooling water systems at facilities such as the HBGS. These include:

- Continuous monitoring and control of steam condenser fouling (bio-film formation)
- Reduction of potential leaching of steam condenser metals (copper) typically caused by shutdowns
- Reduction of potential cold shock (loss of thermal plume) to affected aquatic life.

The HBGS is allowed to operate its pumps 24 hours per day, every day under its NPDES discharge permit, issued and monitored by the Santa Ana Regional Water Control Board (SARWQCB).

Alternative Modes of HBGS Operation

Currently, HBGS has three distinctive modes of operation: normal (typical) mode, standby mode, and heat treatment mode.



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SOURCE: Digitalglobe 2007

FIGURE 3-17

HBGS Intake and Outfall Location Map

Seawater Desalination Project at Huntington Beach

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Normal Mode of HBGS Operation

During normal operation mode the generating station produces electricity. The amount of electricity being generated dictates how many units are running. This in turn dictates the condenser cooling water flow rate. Table 3-1 shows the cumulative effect on rated capacity flow rate based on the number of units running and therefore the number of pumps running. The historical maximum cooling water system flow rate at HBGS is 507 MGD.

TABLE 3-1
RATED CAPACITY FLOW RATE AT HBGS

GENERATING UNITS ON LINE	1	1,2	1,2,4	1,2,3,4
Number of Pumps on Line	2	4	6	8
Condenser Cooling Water Pump Rated Capacity (MGD)	127	254	380	514

In normal mode, the generating station's discharge is, on average, about 18°F (10°C) above ambient seawater temperature. As mentioned in HBGS regulatory framework, during the normal mode of operation the maximum discharge temperature specified in the facility's NPDES permit is 30°F (16.5°C).

Standby Mode of HBGS Operations

During the HBGS standby mode of operation, a generating unit does not generate electricity. However, the station's equipment is operated at a level of readiness that allows the unit to begin generating electricity on short notice. If the HBGS is not generating electricity and is in standby mode, the temperature of the discharge is approximately the same as the ambient seawater temperature entering through the intake. The frequency and duration of standby mode operation is driven by the grid's demand for electricity. Historically, this scenario has occurred less than 1% of the time (Jenkins and Wasyl 2010).

Heat Treatment Mode of HBGS Operations

HBGS periodically conducts a heat treatment procedure to further control the growth of bio-fouling organisms that attach to the walls of the generating station intake structure and cooling water conduits. The larger bio-fouling organisms or macro-fouling organisms (primarily barnacles and mussels in the case of HBGS) attach themselves to surfaces within the cooling water system and can restrict water flow and interfere with the operation of facility equipment (pumps, valves, etc.). If the shells of these organisms are detached from the substrate, they can be carried by the cooling water flow to the condensers where they can clog tubes and degrade the performance of the condensers. Heat treatments are typically completed once every six to eight weeks. The entire procedure takes about six to eight hours to complete. Heat treatment is a routine operation at many of California's coastal generating stations and is permitted and regulated under the HBGS' NPDES permit conditions.

The main goal of heat treatment is to remove the marine organisms that have settled within the generating station's cooling water system while they are still small enough to detach and pass through the condenser tubes without clogging the tubes. During heat treatment, flow is reversed within the cooling water system and seawater is drawn into the system via the discharge conduit and discharged out of the intake conduit. Only a very small amount of seawater flow is actually taken from the ocean during this process, and most of the cooling water flow is circulated within the generating station system rather than discharged from the generating station. By recirculating the seawater flow through the condensers, rather than discharging it to the ocean, the seawater temperature in the recirculation loop is raised from ambient ocean water temperature to approximately 110°F–115°F (43°C–46°C). The elevated water temperature removes the marine organisms within the system, which are then discharged through the intake structure.

The Seawater Desalination Project would have six different provisions incorporating several protection/notification devices to account for non-routine operations at the HBGS:

- Automatic Control Interlock between HBGS Pumps and Desalination Facility Intake Pumps: The shutdown controls of the desalination facility intake pumps would be interlocked with the HBGS pumps, so when HBGS pump operation is discontinued to prepare for heat treatment, non-routine or even routine pump shutdown, this would automatically trigger an alarm at the desalination facility along with shutdown of the desalination intake pumps. After this emergency shutdown, the intake pumps would have to be started up manually, and the operations staff would be required to check the reason of shutdown with the HBGS staff before restarting the treatment facility intake pumps.

- Continuous Intake Pump Flow Measurement Devices: Seawater intake pumps would be equipped with flow meters, which would record the pumped flow continuously. If the intake flow is discontinued for any reason, including non-routine HBGS operations, this would trigger automatic intake pump shutdown.

- Continuous Intake Water Temperature Measurement Devices: The desalination facility intake pump station would be equipped with instrumentation for continuous measurement of the intake temperature. Any fluctuations of the intake temperature outside preset normal limits would trigger alarm and intake pump shutdown. This monitoring equipment would provide additional protection against heat treatment or other unusual intake water quality conditions.

- Continuous Intake Water Salinity/Conductivity Measurement Devices: The desalination facility intake pump station would be equipped with instrumentation for continuous measurement of the intake seawater salinity. Any fluctuations of the intake salinity outside preset normal operational limits would trigger an alarm and initiate intake pump shutdown. This monitoring equipment would provide additional protection against discharge of unusual fresh water/surface water streams in the facility outfall.

- Continuous Intake Water Oil Spill/Leak Detection Monitoring Devices: The desalination facility intake pump station would be equipped with instrumentation for oil spill/leak detection. Detection of oil in the intake water even in concentrations lower than 0.5 mg/L would automatically trigger an alarm and initiate intake pump shutdown. This monitoring equipment would provide additional protection against unusual intake water quality conditions.

- Routine Communication with HBGS Staff: The desalination facility staff of each shift would be required to contact HBGS personnel at least once per shift and inquire about unusual planned or unplanned events at the HBGS. If non-routine operations are planned at the HBGS, the desalination facility would be informed and would modify desalination facility operations accordingly.

Proposed Physical Connection between the Desalination Facility and the HBGS

Source water for the desalination facility would be taken from the existing condenser cooling seawater discharge pipe system of the HBGS (Figure 3-18, Desalination Facility/HBGS Cooling Water Connection). The seawater desalination facility intake would be connected to the HBGS 108-inch cooling water discharge lines and would collect seawater that has already been screened and pumped through the generating station cooling water system facilities.

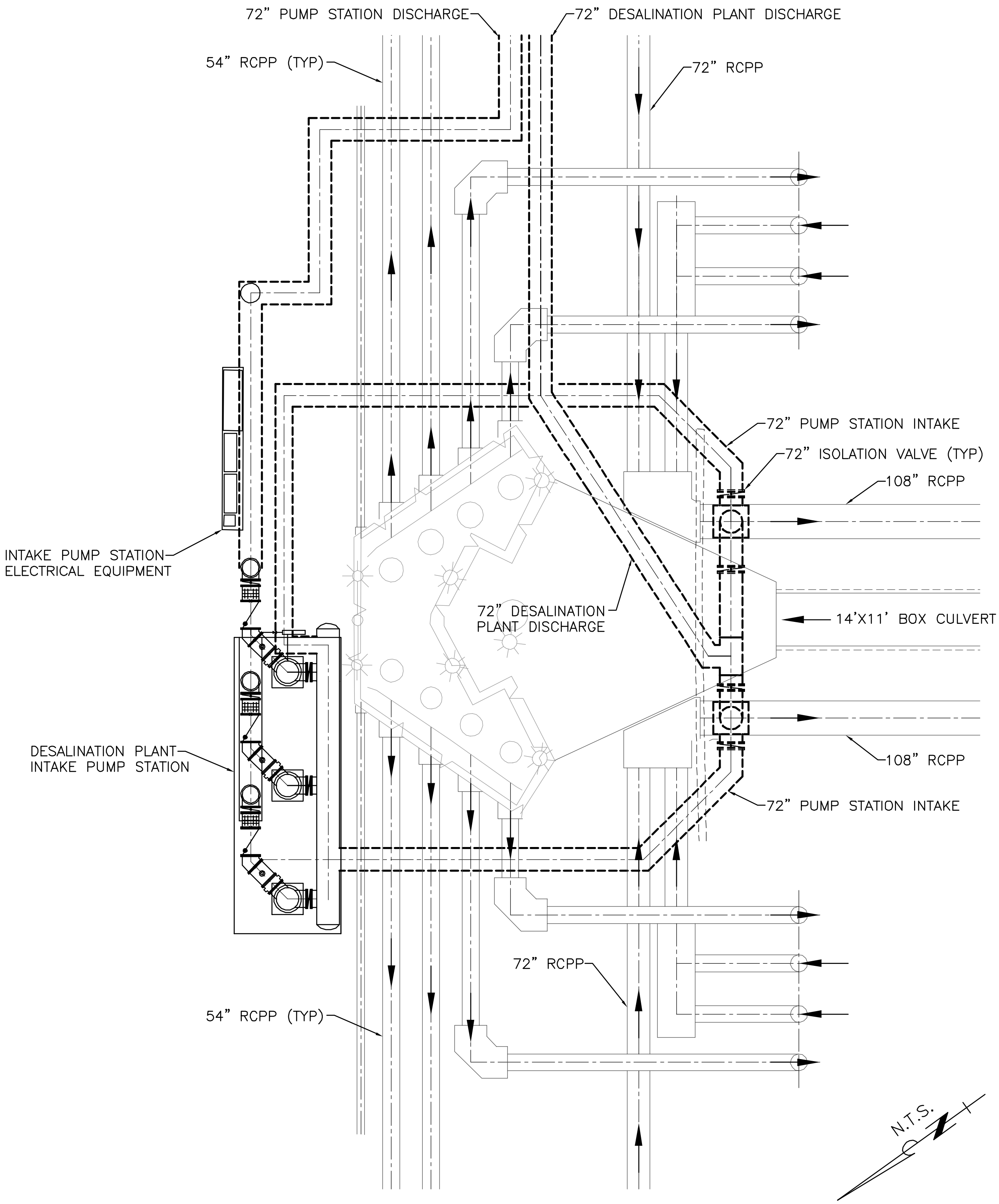
The desalination facility would collect approximately 100 MGD of seawater from the HBGS cooling water discharge pipelines. The desalination facility would operated on average at 50 MGD of potable water production capacity. The desalination facility will include an automatic control interlock between HBGS pumps and desalination facility intake pumps. This project feature will provide shutdown controls of the desalination facility intake pumps, so that during co-location, when HBGS pump operation is discontinued to prepare for heat treatment, non-routine, or even routine pump shutdown, an alarm at the desalination facility would be automatically triggered along with shutdown of the desalination intake pumps. After this emergency shutdown, the intake pumps will be started up manually, and the operations staff would be required to check the reason of shutdown with the HBGS staff before restarting the treatment facility intake pumps. This desalination facility operation is expected to change only during unpredictable emergencies.

Currently, HBGS is permitted to operate at full capacity and to use and discharge up to 514 MGD of seawater 24 hours per day, and averaging 254 MGD (Jenkins and Wasyl 2010). The historical maximum flow rate at HBGS has been 507 MGD, with a minimum flow rate not often falling below 127 MGD. Additional detail on the operation of the HBGS is provided in Appendix A, Background and History of the HBGS Site. In co-located operating conditions, the source water for the proposed seawater desalination facility will be taken from the existing HBGS condenser cooling-seawater discharge pipeline system after the water has been used by HBGS for cooling. The operation of the desalination facility would not result in any changes to the permitted operations or in the maximum HBGS intake flow rate. If the HBGS were to permanently cease or reduce its existing power plant’s historic seawater intake, the applicant has the option to purchase the intake/discharge infrastructure to ensure continued operation of the water facility. This SEIR analyzes effects of the proposed project under two scenarios: (1) the existing baseline conditions that include operation of the HBGS and the project’s withdrawal of source water from the HBGS cooling water discharge (also referred to in this SEIR as the “co-located” operating condition); and (2) the potential condition under which the HBGS were to permanently discontinue or reduce its existing power plant’s historic cooling water circulation operations, resulting in direct intake of seawater by the proposed project (also referred to in this SEIR as the “stand-alone” operating condition). Sections 4.1 through 4.12 of this SEIR discuss project impacts in terms of both co-located and stand-alone operating scenarios, where appropriate.

Stand-Alone Desalination Facility Operation

Under the scenario where the HBGS were to permanently discontinue or permanently alter their cooling water system's current and historical circulation operations, the proposed project would be responsible for operation and maintenance of intake and pumping systems to ensure adequate flows to supply water for processing, as well as to circulate water through the discharge pipeline at sufficient flows to ensure adequate dilution of the concentrated seawater discharge to protect the marine environment, as described below. No changes in the infrastructure or configuration of the intake facilities would be necessary for the stand alone operating condition. However, the applicant would purchase the HBGS pumps and intake/discharge facilities and continue to produce and distribute potable water.

As stated previously, each one of the eight HBGS' seawater intake pumps brings in approximately 63.4 MGD. Section 4.10 explains how the flow rate for the stand alone operating condition was determined, and indicates that the 50 MGD of concentrated seawater would need to be mixed with an additional 52 MGD of seawater to achieve adequate dilution to avoid adverse effects related to elevated salinity. Therefore, the total intake volume would be 152 MGD (50 MGD of product water + 50 MGD of concentrated seawater + 52 MGD of dilution seawater = 152 MGD) in the stand-alone condition. In order to meet the stand alone condition required flow rate of 152 MGD for the desalination project, two existing pumps will run at 63.4 MGD each and third pump will be replaced by a smaller 25.3 MGD, or one existing pump will run at 63.4 MGD and a second existing pump would need to be replaced by a slightly larger pump so that the desalination facility may receive the needed 88.5 MGD for its source water. The desalination facility intake pump station will be equipped with variable frequency drive (VFD) system to closely control the volume of the collected intake seawater. As water demand decreases (below 50 MGD) during certain periods of the day and the year, the VFD system will automatically reduce the intake pump motor speed thereby decreasing intake pump flow to the minimum level needed for water production. Under these conditions, the intake flow of the desalination facility would be controlled by the VFD system of the desalination facility intake pump station.



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SOURCE: Tetra Tech 2010

FIGURE 3-18

Desalination Facility/HBGS Cooling Water Connection

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Seawater Desalination Project At Huntington Beach

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C. DESALINATION TREATMENT PROCESS

The desalination facility treatment process is presented in Figure 3-18 and includes the following key treatment facilities, processes, and characteristics:

- Intake system, which consists of:
  - Intake pipeline connection to HBGS discharge lines
  - Intake pump station
- Pretreatment filtration system
- Reverse osmosis membrane system, which includes:
  - Reverse osmosis membrane maintenance process facilities
- Product water post treatment facilities
- Chemical storage/handling facilities
- Reverse osmosis concentrated discharge and filter backwash discharge facilities
- Energy consumption.

Intake System

The desalination facility intake system would consist of a connection to the existing HBGS discharge pipes, a 72-inch desalination facility intake pipeline and approximately a 100 MGD pump station. The point of the desalination facility connection would be downstream from the HBGS condensers (refer to item 1 on Figure 3-19, Desalination Treatment Process Flow Schematic). Under the co-located condition, approximately 100 MGD of source seawater for the desalination facility would be drawn from the existing HBGS condenser cooling water discharge system through this connection and conveyed to the desalination facility intake pump station via the 72-inch pipeline. This intake pipeline would be located entirely within the existing HBGS site. The desalination facility pump station would consist of three vertical turbine pumps of approximate capacity of 50 MGD each. Two of the three pumps would be operational while one would be a standby unit. It should be noted that these pumps would operate when source water is available from HBGS discharge. To prevent growth of marine organisms in the intake system, chlorination and de-chlorination of the supply water would be on an as-needed basis. Aside from the connection point within the HBGS site, no modifications to the HBGS would be required.

If the HBGS permanently discontinues or reduce its existing power plant's historic cooling water circulation operations the desalination facility would operate and maintain the intake/discharge infrastructure independently of HBGS. In the stand alone operating condition, the desalination facility would intake up to 152 MGD of raw seawater through the existing HBGS intake pipeline and pumps. Therefore, intake effects evaluated in this SEIR are based on both the co-located condition (HBGS operations of the intake system), and the stand-alone condition (operation of the desalination facility independent from HBGS operations, with intake volumes of 152 MGD). Section

4.10, Ocean Water Quality and Marine Biological Resources, provides a discussion of the intake system in relation to marine biology.

Pretreatment Filtration System

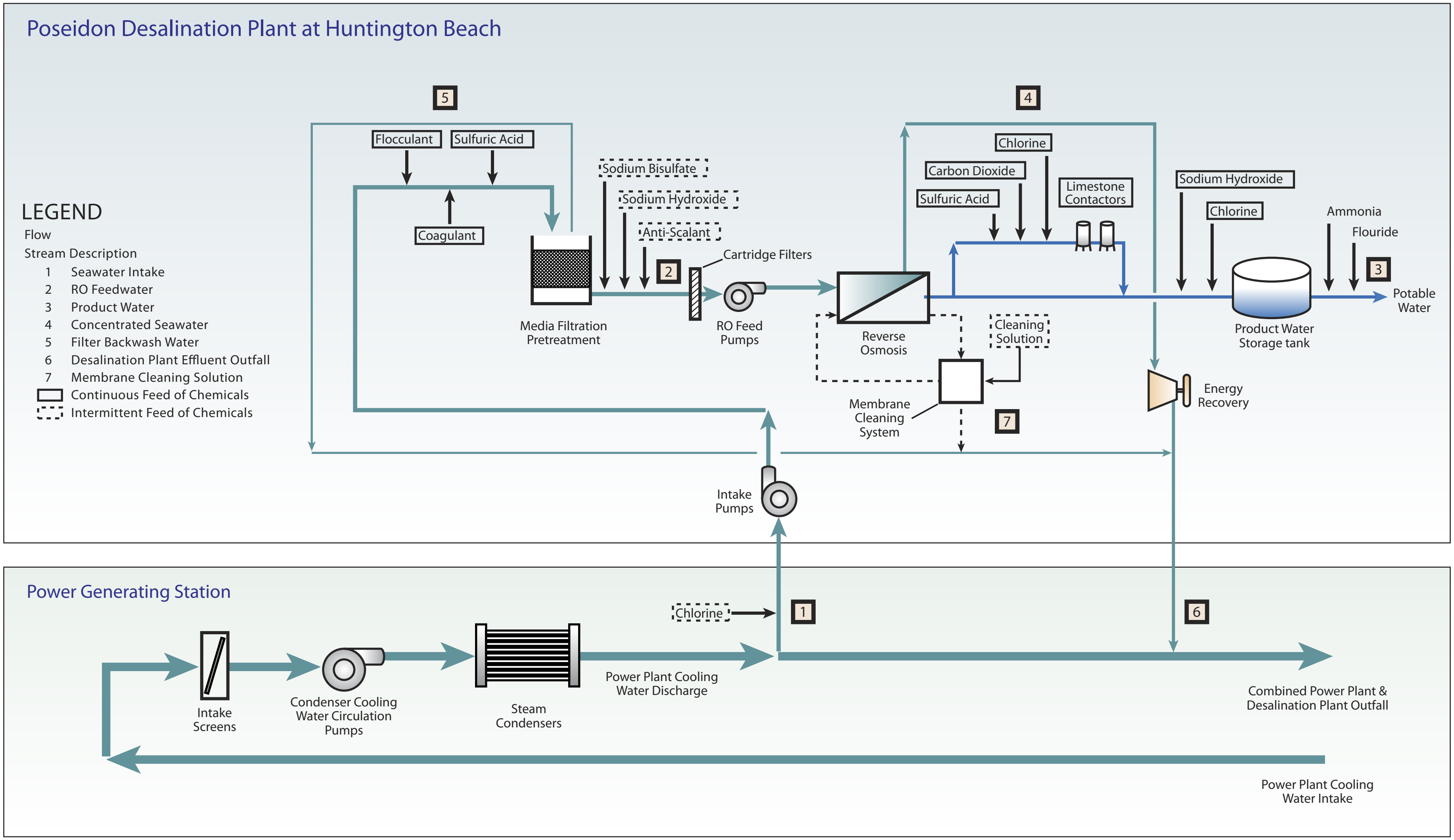
Regardless of the operating condition (co-located or stand-alone), the pretreatment and reverse osmosis filtration process would not differ. The proposed desalination facility would utilize either a single-stage or two-stage gravity media filtration pretreatment system. The addition of coagulants, such as ferric chloride and polymers, would be provided as appropriate to enhance the operation of the media filters and to prepare the water for RO treatment. There are a variety of pretreatment filtration systems and technologies available that can meet the requirements for RO treatment. The actual pretreatment process to be used would be determined during the final design phases of the project. The final phase of pretreatment would be cartridge filtration. The filter cartridges would be standard polypropylene wound filters enclosed in a pressure vessel. The pressure vessels would be located on the RO feed water piping between the pretreatment and RO processes. The surface of all pretreatment filters and filter channels would be covered to minimize sunlight exposure. Filter cell covers have proven to be an effective measure for minimizing algae growth in the filter cells. In combination with chlorination and enhanced coagulation, this measure would assure that the intake water algae are effectively retained and their growth in the filter media suppressed.

The RO intake water would be chlorinated intermittently to prevent microbiological growth on the filter media. Since any chlorine remaining in the filter effluent water can damage the RO membranes, the filter effluent would be dechlorinated using sodium bisulfite. In addition, the RO feed water would be treated with sulfuric acid as needed to reduce the potential for scale formation in the RO system. The amount of sulfuric acid added to the water would be determined by the bicarbonate concentration of the seawater and the Stiff Davis Index (SDI) needed in the RO concentrate. The acid also provides carbon dioxide in the RO permeate (product water), which is needed to react with the limestone for product water stabilization in the post-treatment step.

Reverse Osmosis Membrane System

The RO process would be a single-pass design using high-rejection seawater membranes. The system would be made up of 14 process trains (13 duty and one standby), each train with a design capacity of about four MGD. This arrangement provides approximately 8% standby capacity, which is needed to ensure continuous water delivery with normal membrane wear and maintenance requirements.

High-pressure, electrically driven feed pumps would convey water from the intake filters through the RO membranes. The pumps would provide feed pressures ranging from 800 to 1,000 pounds per square inch (psi), and would be located within the RO building. The actual feed water pressure depends on several factors including temperature of the intake water, salinity of the intake water, and the age of the membranes. The pumps would be equipped with variable frequency drives to improve energy efficiency and to provide pressure control over a wide range of feed water quality and membrane conditions. To further improve energy efficiency, the high-pressure feed pumps would be equipped with energy recovery devices. A large amount of residual pressure remains in the concentrated seawater leaving the RO process. The energy recovery devices recover this energy, reducing the net energy demand for the system by approximately 30%.



SOURCE: Poseidon Resources Corporation 2010

FIGURE 3-19

Desalination Treatment Process Flow Schematic

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Seawater Desalination Project at Huntington Beach

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Reverse Osmosis Membrane Maintenance Facilities

The accumulation of silts or scale on the RO membranes causes fouling, which reduces membrane performance. The membranes would be periodically cleaned to remove these foulants and extend membrane life. Normally, cleaning frequency is twice per year per train and there are 14 trains. To clean the membranes, a chemical cleaning solution is circulated through the membranes. The RO system trains would be cleaned using a combination of cleaning chemicals such as industrial soaps (e.g., sodium dodecylbenzene, which is frequently used in commercially available soaps and toothpaste) and weak solutions of acids and sodium hydroxide.

The cleaning process includes two steps: first, circulating a number of cleaning chemicals in a predetermined sequence through the membranes; and second, rinsing the cleaned membranes with clean water (permeate) to remove the waste cleaning solutions and prepare the membranes for normal operation. It should be noted that the actual cleaning chemicals used would be based on the observed operation and performance of the system once it is placed in operation. For a detailed discussion of chemicals and materials to be utilized for reverse osmosis membrane maintenance, including a description of volumes/ratios, refer to Section 4.8, Hazards and Hazardous Materials.

As noted above, subsequent to the circulation of the cleaning chemicals through the RO membranes, membrane rinsing would be performed using membrane permeate fresh water, which would be free of chlorine. The membrane rinsing process would include a first rinse (removing most of the waste chemicals), and subsequent rinses (containing only trace amounts of cleaning chemicals). It should be noted that besides permeate and residual cleaning solution, the waste rinse water would also contain a small amount of concentrated waste cleaning solution. All chemicals used in the membrane cleaning process and the membrane's first rinse would generate approximately 91,000 gallons of spent cleaning solution and would be directed to a designated 300,000-gallon storage tank (wash water tank) for mixing and treatment. The wash water tank would be equipped with a mixing system and chemical feed system. The content of the tank would be continuously mixed and the pH of the waste cleaning mix would be monitored. The waste cleaning solution would be treated using sulfuric acid or sodium hydroxide as needed to neutralize the solution.

The first rinse water would go to the wash water tank to be neutralized and then discharged into the local sanitary sewer for further treatment at the Orange County Sanitation District (OCSD) regional wastewater treatment facility. The rinse water following the first rinse water would be diluted with the RO process discharge, treated filter backwash, and dilution water, and then sent to the Pacific Ocean via the HBGS outfall. An alternative to discharging the RO membrane cleaning solution into the OCSD system is to discharge the solution into the Pacific Ocean via the HBGS outfall. The majority of the chemicals within the membrane cleaning solution would be either below detection levels or regulatory limits, even before dilution with other desalination facility and HBGS discharges. Dilution with the HBGS discharge would ensure National Pollution Discharge Elimination System (NPDES) compliance. It should be noted that potable water coming from off-site City facilities would not be utilized for operation of the rinse tank or wash water tank.

For a discussion of potential impacts in regards to RO membrane cleaning solution, refer to Section 4.3, Hydrology, Drainage, and Stormwater Runoff; Section 4.6, Public Services and Utilities; and Section 4.8, Hazards and Hazardous Materials.

Product Water Post-Treatment Facilities

Product water from the RO process requires chemical conditioning prior to delivery to the distribution system to increase hardness and protect the new and existing distribution system against corrosion. Limestone and carbon dioxide would be used for post-treatment stabilization of the RO water as a source for pH and alkalinity adjustment. In addition, the final product water would be disinfected prior to delivery to the distribution system. Chlorimanation, in the form of sodium hypochlorite and ammonia, would be added to disinfect the product water by chloramination in order to meet the California Department of Health Services (DHS) water quality standards for potable water disinfection and to control biological growth in the transmission pipeline (refer to Section 4.11). Water fluoridation is the controlled addition of fluoride to reduce tooth decay. To ensure compatibility with MWD and other water supplies and to prevent a reduction in fluoride concentration for the users of these supplies when blending occurs, the Huntington Beach facility will also fluoridate the product water. Typical dosage rates are 0.5 to 1.0 mg/l of fluoride depending on temperature. Fluorosilic acid (also know as Hexafluorosilic acid) in solution strength of approximately 23 to 25% will be used because of its solubility, safety, and availability.

Chemical Storage/Handling Facilities

Various chemicals typically associated with desalination facility operation would be stored on site. These chemicals include sodium hypochlorite, ammonia, lime, carbon dioxide, ferric sulfate, polymer, sulfuric acid, sodium bi-sulfite, fluorosilic acid, and the RO membrane-cleaning solution described above. All such chemicals would be stored, handled, and used in accordance with all applicable federal, state, and local standards. This topic is further addressed in Section 4.8. These chemicals are food-grade purity compounds typically used in most conventional water treatment facilities.

Reverse Osmosis Concentrated Seawater Discharge and Filter Backwash Discharge Facilities

The byproduct of the RO process would be concentrated seawater. Approximately one gallon of concentrated seawater would be created for every gallon of potable drinking water produced. Therefore, for the proposed 50 MGD desalination facility, approximately 50 MGD of concentrated seawater would be generated. The salinity of the concentrate would be about 68,000 parts per million (ppm), twice the concentration of the incoming seawater prior to blending and dilution (refer to Section 4.10 for additional information). Initially, under the co-located operating condition, the concentrated seawater would re-enter and blend with up to 407 MGD of the HBGS's condenser cooling water circulation system for discharge back into the ocean. The blending point would be downstream of the intake point for the desalination facility to prevent recirculation of the concentrated seawater back into the desalination facility intake (refer to Figure 3-18). In the stand-alone operating condition, concentrated seawater would be mixed with approximately 52 MGD of dilution water that would be drawn through the seawater intake and would pass by the treatment process. The point of mixing for the concentrated seawater would be the same as with the co-located operating condition, and would be downstream of the desalination facility feedwater intake point. In addition, the filters would be cleaned (backwashed) to remove the seawater solids that accumulate in the media beds. The amount of backwash water necessary would be about 4% of the total intake water flow. For a 50 MGD facility, with an intake of approximately 100 MGD of raw seawater, approximately four million gallons of filter backwash water would be produced per day. The filter backwash water would be combined with the concentrated seawater for return back into the ocean. The constituent concentrations of the combined desalination facility concentrated seawater discharge and the dilution water would meet the requirements of the California Ocean Plan as administered by the state Regional Water Quality Control Board (also refer to Section 4.10, Ocean Water Quality and Marine Biological Resources).

Energy Consumption

A 50 MGD desalination facility would require approximately up to 35 megawatt hours of power to operate. Based on 24 hour per day operation, the daily energy consumption of the proposed desalination facility is estimated to be up to 840 megawatt hours per day. This amount of electricity could provide power for the average demand of between 30,000 and 35,000 residential units. To provide context, the total amount of power required to produce desalinated water for one family per year is approximately the same as the amount of power used by a typical refrigerator in one year.

The desalination facility would not include a backup generator. Emergency backup power would come from the electrical power grid and/or HBGS auxiliary reserve bank. For further discussion see Section 4.4, Air Quality.

D. OFF-SITE IMPROVEMENTS

Water Transmission Pipelines

In order to convey the project's potable drinking water off site, the project requires construction of water transmission lines to connect to existing regional transmission and local water distribution systems. Although precise pipeline alignments may be modified during final engineering analyses, the conceptual pipeline alignments are shown in Figures 3-3a and 3-3b*.* A number of alignment options have been identified to provide flexibility in alignment selection and to ensure that all potential alignment segments are analyzed in the SEIR. Although the SEIR includes project-level environmental analysis of several potential alignment options (see Figure 3-3b), only one of the potential alignment options will be constructed as part of the project. This provides for a worst-case analysis, in that not all of the segments of pipe that are analyzed for potential impacts will be built.

In general, the primary delivery route alignment follows Hamilton Avenue, Brookhurst Street, Adams Avenue, and Fair Drive to convey water easterly to the City of Costa Mesa, with optional alignments that could convey water northerly along Brookhurst Street and Newland Street. Associated with the primary alignments, there are several sub-alignments and/or options for segments of the alignments. For purposes of the analysis contained in the SEIR, all potential alignments and sub-alignments that have been identified by the applicant are analyzed, since the precise alignment of the pipeline system has not yet been determined. All of the potential alignment segments are depicted in Figure 3-3b.

Construction of a 24- to 54-inch-diameter pipeline will require one to two lanes to be closed during construction. The extent of these lane closures could be minimized through the contract documents to prevent a significant stretch of the road from being reduced by two lanes (500 feet minimum). In addition, hours of construction may be limited to exclude rush hour periods. Finally, lanes may also be restriped to balance the number of lanes in each direction, effectively resulting in the loss of one lane in each direction during construction. The majority of each pipeline alignment is planned for existing public streets, easements, or other rights-of-way, and the alignments are not anticipated to require disturbance of native vegetation or otherwise impact sensitive resources. The proposed alignments consist of a 24- to 54-inch pressure main, along the different conceptual alignments (see Figure 3.3-b). Flow control facilities would be constructed in conjunction with the proposed pipelines at connection points to existing water conveyance facilities. Rerouting of pipelines may also be required at interconnection points with existing water conveyance facilities. The flow control facilities and pipeline rerouting would occur within existing roadways and/or easements, and would require minimal construction activities.

Portions of the pipeline alignments will utilize trenchless construction in areas of sensitive environmental resources or at freeway and railroad crossings. The three methods under consideration are bore and jack tunneling, horizontal directional drilling, or auger boring. Generally, tunneling involves the excavation of two jacking and receiving pits, which are vertical excavations with shoring and bracing systems (one on each side of the area to be crossed). A tunneling machine, equipped with either an auger or slurry material removing device, is lowered into the jacking pit and creates a tunnel connecting the jacking and receiving pits. The pipeline can then be installed within the underground tunnel. This topic is further addressed in Section 4.9, Construction-Related Impacts.

Implementation of any pipeline segment within the cities of Costa Mesa, Garden Grove, Fountain Valley, Westminster, or Santa Ana, as well as unincorporated portions of Orange County, would require permits and/or approvals by the City and/or Water District prior to construction. In addition, the applicant will be required to secure approvals from private properties owners for any portions of the pipeline routes that traverse privately owned properties. The construction process would be subject to such measures as the exclusion of construction during rush hour periods, preparation of a Traffic Management Plan, and roadway restriping, among others. The pipeline project applicant would consult with the City of Costa Mesa during final design to ensure that adverse impacts are minimized to the maximum extent practicable.

Primary Route

The primary, or northern, route has a total length of up to 10 miles. This pipeline alignment would extend in a northerly direction from the desalination facility site within Newland Street. The pipeline would utilize tunneling or directional boring technology to cross under the Orange County Flood Control District's (OCFCD's) Huntington Beach Channel, as the bridge crossing the channel lacks the capacity to support the proposed pipeline. The first connection would be on Newland Avenue just off the project site allowing product water flow to enter the City's water system directly. The segment would proceed from Newland Street in an easterly direction within Hamilton Avenue from the Newland Street/Hamilton Avenue intersection to the Hamilton Avenue/Brookhurst Street intersection. Along Hamilton Avenue, the pipeline would be either tunneled or directionally bored to cross under the Talbert Channel. Once across the Talbert Channel, the pipeline will connect to the existing Newport Beach Reach B pipeline allowing water to be delivered to the southerly coastal communities. The pipeline would continue on Hamilton and turn northerly within Brookhurst Street. A connection will be made to the existing OC-44 pipeline located to the east of Brookhurst along Adams, which will allow northerly distribution of desalinated water to the HB OC-09 and HB OC-35 pipelines. The pipeline would then proceed in an easterly direction within Adams Avenue. The pipeline would again utilize trenchless methods to cross the Santa Ana River and Greenville-Banning Channel, as the Adams Avenue Bridge is not capable of supporting a 48- to 54-inch pipe. The alignment would proceed in a southerly direction within Placentia Avenue to the Costa Mesa Country Club, at which point the route would proceed east along the northern boundary (utilizing off-pavement, open trenching methods) of the property to Harbor Boulevard. The pipeline would then proceed along the eastern boundary of the Fairview State Hospital to the Harbor Boulevard intersection, again using off-pavement, open trenching methods. The pipeline alignment proceeds southerly along Harbor Boulevard to Fair Drive. The pipeline will continue easterly on Fair Drive passing under the SR-55 freeway utilizing trenchless construction until it ultimately terminates at OC-44, located at the intersection of Del Mar Avenue and Elden Avenue. At this point, the water will enter into the existing distribution system and deliver water east and south. Refer to Table 4.9-4, Pipeline Alignment Details.

Primary Route – Design Variations

Optional routes for the primary route are shown on Figure 3-3b. One of the optional routes includes an alternative alignment between the Santa Ana River channel and Placentia Boulevard. Instead of further traversing Adams after the Santa Ana River, this route has the pipe routed south along the river to just south of Swan Lane and then east along the northern boundary of the city park until it meets the original primary alignment at Placentia Boulevard. This alignment reduces congestion along Adams Avenue and utilizes some of the Santa Ana River right-of-way and the city park space. An optional route for Fair Drive is also being considered that would include pipelines to be placed along the northern side of the street allowing the construction of the line off-pavement and onto a parking lot once the Orange County Fairgrounds is reached. East of the fairgrounds, the pipeline would pass under the SR-55 freeway utilizing trenchless construction until it ultimately terminates at OC-44, located at the intersection of Del Mar Avenue and Elden Avenue. An extension from the terminus point at Del Mar Avenue and Elden Avenue intersection is also being considered that would include facilities extending along Fair Drive easterly to Santa Ana Avenue where the facility would travel northward towards the intersection of Bristol Street/Santa Ana Avenue, providing connections to a proposed bypass station.

Optional Routes

In addition to the primary route, a number of options have been identified to provide flexibility in route selection and to ensure that all potential segments are analyzed in the SEIR. These routes are provided on Figure 3-3b and described below.

Hamilton Avenue/Victoria Street/Elden Avenue – The optional alignment would follow a path located south of the primary alignment. This route would rely entirely on the implementation of the pipeline within public easements, through the Cities of Huntington Beach and Costa Mesa. The total distance for this route would be approximately 30,000 feet (5.7 miles). This pipeline would follow the same route as the primary alignment until the intersection of Hamilton Avenue and Brookhurst Street. At this point, the pipeline would continue eastward within Victoria Street and would utilize trenchless methods to cross under the Santa Ana River and Greenville-Banning Channel. Trenchless construction would also be necessary to cross Harbor Boulevard and the SR-55 along Victoria Street. After crossing SR-55, the pipeline would continue for a short distance along 22nd Street and would proceed northeast to its termination point at OC-44, located at the intersection of Del Mar Avenue and Elden Avenue. Refer to Table 4.9-3, Pipeline Alignment Details.

Warner Avenue/Segerstrom Avenue – This optional route would proceed easterly from the Newland Street/Warner Avenue intersection within Warner Avenue to the Santa Ana River and Greenville-Banning Channel. Trenchless construction would be necessary to cross the Santa Ana River and Greenville-Banning Channel. The alignment would then continue easterly to South Harbor Boulevard where the alignment would proceed south for approximately 2,000 feet along South

Harbor Boulevard. The pipeline would continue easterly along Segerstrom Avenue to its termination point at Bristol Street.

Newland Street/Magnolia Street – The optional alignment would follow a path located along Newland Street for approximately 45,000 feet to the north of the desalination facility. The route would then continue easterly along Garden Grove for approximately 2,000 feet where it would head north along Magnolia Street to its northern terminus at Katella Street.

Brookhurst Street -- The optional alignment would follow a path from the Adams Avenue/Brookhurst Street intersection north along Brookhurst Street to its northern terminus at Katella Street. The total distance for this route would be approximately 47,000 feet.

Adams Street -- The optional alignment would follow a path from the Newland Street/Warner Avenue street intersection east to the Brookhurst Street/Adams Avenue intersection. The total distance for this route would be approximately 8,000 feet.

Underground Booster Pump Stations

The primary route includes off-site construction of two underground booster pumping stations in order to convey potable water from the subject site to the regional distribution system. The pump stations would be operated to allow a base flow steady rate of water to be conveyed throughout the system.

The OC-44 underground pumping station is proposed to be located within the City of Newport Beach, approximately 1.5 miles south of the University of California, Irvine. The site is within an Orange County Resource Preservation Easement, and is located adjacent to, but outside of an area designated as "Reserve" by the Central/Coastal Natural Community Conservation Planning Program/Habitat Conservation Plan (NCCP/HCP). The site is located approximately 0.25 mile north of the San Joaquin Reservoir, where the East Orange County Feeder Number Two and the OC-44 transmission pipelines converge (refer to Figure 3-4). Although the Resource Preservation Easement is subject to various development restrictions, the pump station would be situated in an area of the easement where limited development is allowed and water pipelines and facilities exist.

The OC-44 underground booster pump station would include pumps, two surge tanks to protect the distribution system from sudden pressure changes, telemetry equipment, flow meter, appurtenances, and three diesel powered electrical generators for emergency back-up purposes. These generators would be Caterpillar Model 3516 units or similar equipment and would supply approximately seven megawatts of emergency power for adequate operation of the pump station (in regards to flow and pressure). These diesel-powered generators would require an 8,700-gallon diesel fuel storage tank (assuming a 24-hour emergency period), with a diameter of eight feet and a depth of 26 feet. The booster pump station, including the surge tanks, the three generators and diesel fuel storage tank, would require a total footprint area of approximately 60 feet by 152 feet, requiring a construction easement of 85 feet by 177 feet and would be placed entirely underground to maintain the natural character of the surrounding resource preservation easement except for a small pipe vent and a ground-level steel access door for maintenance. Any displaced vegetation would be replaced upon completion of construction. Bonterra Consulting conducted a Biological Constraints Survey for the OC-44 Underground Booster Pump Station Site in February 2010 (see Appendix L). The Biological Constraints Survey indicates that sensitive riparian habitat, specifically willow scrub, occurs along a blueline drainage in the southeastern corner of the site. The proposed project is not expected to directly impact the blueline drainage or the associated riparian habitat. Possible indirect impacts to this sensitive habitat will be reduced through mitigation measures recommended in the Biological Constraints Survey and included in Section 4.9 of this SEIR.

Two additional optional sites for the OC-44 Booster Pump Station have been identified. Both sites are located within the City of Newport Beach, approximately 0.5 mile north of the San Joaquin Reservoir, in an area adjacent to but outside of an area designated as "Reserve" by the Central/Coastal Natural Community Conservation Planning Program/Habitat Conservation Plan (NCCP/HCP). Optional Site 2 is approximately 0.14 acre, and located south of the terminus of Ford Road, along an access road to the San Joaquin Reservoir. Optional Site 3 is approximately 0.55 acre and is located adjacent to Chambord Road, along an additional access road to the reservoir that intersects with Chambord. Optional Sites 2 and 3 are depicted on Figure 3-4.

The second underground booster pump station (the "Coastal Junction" booster pump station) is proposed within the parking lot of St. Paul's Greek Orthodox Church within the City of Irvine, located at 4949 Alton Parkway (refer to Figure 3-5). The underground pump station would be constructed within the north/northwestern portion of the church parking lot, in an area used for both parking and volleyball activities. The site is surrounded by the St. Paul's Church to the south, the Woodbridge Village Association to the west, an apartment complex to the east, and open space to the north. St. Paul's Church is currently housing Crean Lutheran South High School, which enrolls over 300 students. The high school proposes to build a permanent campus in another location in the City of Irvine, and has received initial approvals from the City for the permanent site. It is likely that the school will be relocated from the St. Paul's site prior to construction of the booster pump station. The footprint of the proposed underground pump station would be approximately 100 feet by 100 feet, and would require a construction easement of 125 feet by 125 feet. The pump station would be entirely underground except for a small pipe vent and a ground-level steel access door for maintenance (the access door would not impede parking after construction). It should be noted that St. Paul's Greek Orthodox Church has been contacted by the applicant and has issued a statement of interest for the underground pump station site. This location is near the connection points of the existing regional water distribution system, Aufdenkamp Transmission Main, and the Tri-Cities Transmission Main to the East Orange County Feeder Number Two.

The Coastal Junction off-site underground booster pump station would include pumps, flow meters telemetry equipment, appurtenances, and one diesel powered electrical generator for emergency back-up purposes. This generator would be a Caterpillar Model 3516 unit or similar equipment and would supply approximately seven megawatts of emergency power for adequate operation of the pump station (in regards to flow and pressure). This diesel-powered generator would require a 1,300-gallon diesel fuel storage tank (assuming a 24-hour emergency period), with a diameter of six feet and a depth of 15 feet. The booster pump station, including the generator and diesel fuel storage tank, would require a total footprint area of approximately 100 feet by 100 feet, requiring a construction easement of 125 feet by 125 feet and would be placed entirely underground to maintain the appearance and functionality of the existing parking lot. Additional information regarding the proposed off-site pump stations is included in Section 4.9.

Pump stations are also proposed along Magnolia Street, Brookhurst Street, and Segerstrom Avenue as seen on Figure 3-3b. The footprint of the pump stations at these locations would be approximately 100 feet by 100 feet, and would require a construction easement of 125 feet by 125 feet. The pump stations would be entirely underground except for a small pipe vent and a ground-level steel access door for maintenance. The pump stations would include pumps, flow meters, telemetry equipment, appurtenances, and one diesel powered electrical generator for emergency back-up purposes.

Modification of Existing Huntington Beach Pump Station

The existing Huntington Beach Pump Station located at the Pressure regulating station along the OC-35 pipeline, near the intersection of Springdale Street and Skylab Road, will need to be modified to allow it to be used to pump water from the southern side of the station to the northern side into the West Orange County Board Feeder No. 2 (WOCBF #2). This will result in reverse flow in the existing pipeline. The existing pump station is enclosed and behind a 6-foot wall. Modifications include replacement of the existing pump increasing the horsepower by 125 HP and pipeline. The proposed modifications would not be visible from the exterior of the pump station.

Edison Avenue Improvements

As a condition of approval by the City of Huntington Beach for the proposed project, the applicant would be required to complete improvements along the southern side of Edison Avenue (situated north of the subject site as shown in Figure 3-2). These improvements would consist of the dedication of 12 feet along the frontage of the existing Edison Avenue (for curb, gutter, paving, and street lighting improvements) for a total of approximately 600 linear feet and a turn around location. It should be noted that AES Huntington Beach, LLC or property owner would be responsible for dedication of property to the City for these improvements. However, the project applicant would be responsible for completing these roadway and landscaping improvements as a condition of approval for the project subsequent to property dedication.

E. DESALINATED WATER DISTRIBUTION

As described in Section 3.5, Project Need and Objectives, the project would provide a new, potable water supply for Orange County that is an alternative to imported water. Water produced at the seawater desalination facility at Huntington Beach would be delivered via the off-site project pipeline and connect to the existing OC-44 water transmission line in three locations and the Newport Beach Reach B in one location. The first connection would be on Newland Avenue just off the project site allowing product water flow to enter the City's water system directly. The pipeline would proceed from Newland Street in an easterly direction along Hamilton Avenue, where it will have a connection to the existing Newport Beach Reach B pipeline (operated and maintained by Newport Beach), located on Hamilton and the Talbert Channel, allowing water to be delivered to the southerly coastal communities. The pipeline would continue on Hamilton and turn northerly within Brookhurst Street. A second connection will be made to the existing OC-44 pipeline to the east of Brookhurst along Adams, which will allow northerly distribution of desalinated water to the HB OC-09 and HB OC-35 pipelines (operated and maintained by Huntington Beach) and the West Orange County Board Feeder #2 (operated and maintained by the Cities of Huntington Beach, Westminster, Garden Grove, and Seal Beach). The third connection point to the existing OC-44 pipeline is within the City of Costa Mesa, east of State Route 55 (SR-55) at the intersection of Del Mar Avenue and Elden Avenue. The product water will flow southerly through the OC-44 pipeline into the East Orange County Feeder NO. 2, feeding the existing regional water distribution system that is operated and maintained by the Metropolitan Water District (MWD) of Southern California. By the time the Seawater desalination facility is fully operational, its owner and operator, Poseidon Resources Corporation, will have entered into institutional agreements with local Municipal Water Districts and/or cities to accept and distribute desalinated potable water at a negotiated price.

The retail water purveyors that may either receive the desalinated water or a blend of desalinated water and imported supply or wish to participate in the project through a water transfer arrangement include, but are not limited to:

- Santa Margarita Water District (SMWD)
- Irvine Ranch Water District (IRWD)
- El Toro Water District
- Laguna Beach County Water District
- South Coast Water District
- Trabuco Canyon Water District
- City of Santa Ana
- Moulton Niguel Water District
- City of Huntington Beach
- City of Fullerton
- City of Fountain Valley
- Municipal Water District of Orange County (MWDOC)
- Mesa Consolidated Water District
- City of Anaheim
- City of Garden Grove
- City of Seal Beach
- City of Newport Beach
- Yorba Linda Water District
- Orange County Water District (OCWD)
- Golden State Water Company
- City of Westminster
- City of San Clemente
- City of San Juan Capistrano.

The amount that is received by an agency may vary depending on a number of factors, but the main factor would be the water demands from the water agencies connected to the transmission pipelines that are conveying the desalinated water. For example, if the amount of water taken from the transmission pipelines in central Orange County increases, then the amount of desalinated water that actually makes its way to south Orange County decreases. Conversely, a decrease in central Orange County usage results in an increase of desalinated water going to south Orange County.

F. DESALINATED WATER QUALITY

The desalination facility would produce drinking water of very high and consistent quality, which meets or exceeds all applicable regulatory requirements established by the U.S. Environmental Protection Agency (EPA) and the California Department of Public Health (DHS). The desalinated water would be produced applying state-of-the-art seawater reverse osmosis membranes which are capable of removing practically all contaminants in the source water: turbidity, taste, odor, color, bacteria, viruses, salts, proteins, asbestos, organics, etc. With pores ranging from 0.00005 to 0.0000002 microns (for comparison – typical human hair size is 200 microns) the reverse osmosis membranes would retain and remove over 99.5% of the seawater salinity; over 99% of the metals and organics; 99.999% of the bacteria and other pathogens (*Giardia* and *Cryptosporidium*) and 99.9% of the viruses in the source water.

Currently, EPA recognizes reverse osmosis membrane treatment as a best available technology for water treatment and for meeting future more challenging water quality regulations. This technology has proven its viability and performance in a number of facilities worldwide over the last 20 years. An example of a seawater desalination facility in California is the Marina Coast Water District's (MCWD) facility, which has been in operation since 1996 in the City of Marina, at Marina State Beach. This facility has been delivering high quality desalinated water to the MCWD's distribution system for over 13 years – with no customer complaints or measurable corrosivity effects on the distribution system or household plumbing.

To provide an additional level of safety after RO membrane filtration, the desalinated water produced by the proposed facility would be disinfected applying the same chemicals that are currently used for disinfection of all other water sources in the Orange County's water distribution system (chloramines). In addition, the desalinated water would be conditioned with a combination of lime and carbon dioxide to make it non-corrosive to the water distribution system and to household plumbing. The desalinated water quality would be compatible with the water quality of all other sources of potable water with which it would be blended in the distribution system.

The viability and performance of seawater desalination treatment using Pacific Ocean water have been proven at Poseidon's demonstration desalination facility in Carlsbad, California (situated on site at the Encina Power Station). This facility has been in operation for over six years and has produced over 44,000 gallons of high-quality fresh water per day.

Table 3-2, Desalinated Water Quality Key Parameters, presents key desalinated water quality parameters and provides a comparison with the existing drinking water produced at the Diemer Water Treatment Plant, operated by the MWD, and federal and state limits. Currently, the Diemer Water Treatment Plant is one of the main plants supplying Orange County with drinking water.

TABLE 3-2
DESALINATED WATER QUALITY KEY PARAMETERS

PARAMETER	DESALINATED WATER	MWD DIEMER PLANT WATER	EPA/CDHS LIMITS
Total Dissolved Solids (TDS), mg/L	250 - 350	373 – 569	500/1,000
Hardness (as CaCO3), mg/L	40 – 100 (Moderately Hard)	200 – 260 (Hard)	No Limit
Sulfate, mg/L	5 - 20	111 – 212	250
Total Trihalomethanes (TTHMs), µg/L	5 - 10	27 – 51	80
Haloacetic Acids (HAAs), µg/L	1 - 5	10 – 24	60

Notes:
MWD = Metropolitan Water District of Southern California
EPA = Environmental Protection Agency
CDHS = California Department of Health Services
mg/L = milligrams per liter
µg/L = micrograms per liter.

A review of Table 3-2 indicates that the desalinated water would have approximately 100 mg/L lower salinity (listed in the table as TDS) than the existing drinking water. The lower drinking water salinity should result in better taste and lower water distribution system corrosivity. The desalinated seawater would be softer than the existing water sources. Softer water has a number of benefits such as: better taste; formation of less calcium deposits on household appliances and cutlery; and lower detergent use. Commercial and industrial establishments which currently use softening devices to treat the potable water would also benefit from introduction of the softer desalinated water in the distribution system – their softening costs would be reduced and some of these users may not need to soften their water anymore (most industrial users typically require water with a hardness below 80 mg/L – as desalinated water would reduce hardness by at least 50%, softening costs would also be reduced commensurately). Similar to TDS, drinking water of lower sulfate concentration would have a better taste. The desalinated water would have order-of-magnitude lower concentrations of disinfection byproducts (TTHM and HAA) than the existing drinking water. Disinfection byproducts are well known carcinogens and their reduction in the drinking water would be an added benefit.

Section 4.11 provides a more detailed analysis of the desalinated water quality and the potential water compatibility impacts that may result from introduction of desalinated seawater into the regional water distribution system.

G. SEAWATER DESALINATION FACILITY OPERATIONS

Parking

Automobile parking for facility employees and visitors would be provided in an area surrounding the administration building, located within the northern portion of the subject site. Approximately 30 parking stalls would be provided, which would include several stalls designated for disabled persons in accordance with Americans with Disabilities Act (ADA) requirements. The parking lot would feature appropriate landscaping along its perimeter, per City standards.

Site Access

Access to the proposed desalination site for employees, delivery trucks, and construction vehicles would be provided via the existing HBGS access point (main gate) along the eastern side of Newland Street. From this point vehicles would travel in a southeasterly direction, along the northern side of the HBGS generating units. At a point just east of HBGS generating unit number one and north of the service water tank, the access route would turn to the northeast and would proceed to the southwestern corner of the project site. Vehicles would then utilize internal access roads to their destination within the proposed project site. All access roads would comply with Huntington Beach fire code and City specifications.

Staffing

The proposed desalination facility would employ an approximate total of 18 people and would operate 24 hours a day, 365 days a year. Staff positions would include management, operators, maintenance, and administration/staff support. In addition, outside contracting of part-time staff is anticipated for specialized services such as electrical and mechanical maintenance. The estimated number of staff on duty during regular working hours Monday through Friday would be five to seven, with a minimum of two people on duty during swing shifts, graveyard shifts, and weekends.

Chemicals

For treatment of seawater feed, the seawater desalination facility would use the same type and grade of chemicals as any other conventional surface water treatment plant treating water for potable application. The normal operation of the desalination treatment facility would require the continuous use of the following chemicals:

- **Coagulant (Ferric Sulfate) for Removal of Naturally Occurring Solids from Seawater**

  The purpose of coagulant addition is to remove suspended solids, which occur naturally in the seawater. Ferric sulfate would be added in typical dosage of 1 to 4 mg/L. Occasionally, mostly during rainy events, the ferric sulfate dosage may be increased to up to 20 mg/L for the duration of the event. During episodes of red tide/algae blooms, coagulation dosage would be increased to up to 20 to 30 mg/L to achieve enhanced coagulation and removal of algae from the intake water

  The addition of ferric sulfate to the seawater would enhance removal of seawater solids and would generate a small amount of sulfates (0 to 5 mg/L vs. seawater sulfate concentration of 2,300 mg/L). The solid products of the coagulation process would be processed in the solids management system and disposed in the landfill. The additional sulfate ions would be returned to the ocean via the power plant outfall after blending with the concentrate from the desalination process and the dilution water. Because sulfates are environmentally safe, their discharge is currently not regulated by the California Ocean Plan.

- **Sulfuric Acid for Seawater Alkalinity Adjustment**

  The seawater is slightly alkaline (has pH of 7.8 to 8.3) and sulfuric acid would be added as needed to make the natural seawater more neutral (less aggressive and corrosive to the equipment) before membrane treatment. Typically, this dosage would be between 15 and 20 mg/L. As mentioned above, in case of ferric sulfates sulfates are environmentally safe, their discharge is currently not regulated by the California Ocean Plan.

  Addition of sulfuric acid will increase concentration of sulfate ions by up to 20 ppm compared with background sulfate concentration of 2300 ppm.

- **Lime and Carbon Dioxide for Product Water Alkalinity and Softness Adjustment**

  The water produced by the reverse osmosis desalination system (permeate) is very soft and cannot be used directly for potable purposes. Lime and carbon dioxide would be added to the permeate to increase product water alkalinity to a desirable range specified in the drinking water regulations. Lime and carbon dioxide addition for alkalinity adjustment and water distribution system corrosion control is very widely practiced at many conventional and desalination water treatment plants today. Added lime and carbon dioxide would not be discharged to the ocean.

- **Sodium Hypochlorite and Ammonia for Product Water Disinfection**

  Sodium hypochlorite and ammonia would be added continuously for product water disinfection by chloramination. Chloramination is the current disinfection practice used at most of the other product water sources in the plant service area, which the product water from the desalination facility would be blended with. The applied dosages of sodium hypochlorite and ammonia are in a similar range of that used at the other water treatment plants in the area.

- **Fluorosilic acid (also know as Hexafluorosilic acid)**

  Since the adoption of the REIR, MWD has initiated fluoridation at their regional surface water treatment plants. To ensure compatibility with MWD and other water supplies and to prevent a reduction in fluoride concentration for the users of these supplies when blending occurs, the Huntington Beach facility will also fluoridate the product water. Fluoride is added at the treatment facility as a liquid chemical in a manner similar to other chemicals required for treatment, such as the chlorine added for disinfection. The concentration of fluoride to be added is protective of public health and the optimal fluoride dose and precision of addition will be achieved in compliance with the regulations specified by the State of California. The cities of Huntington Beach and Fountain Valley also add fluoride to their treated groundwater, similar to the practices of MWD.

In addition, the desalination facility would intermittently use the following chemicals:

- **Sodium Hypochlorite and Bisulfite for Bacterial and Algal Control in feed**

  Chlorine in the form of sodium hypochlorite may need to be added to the seawater occasionally (for several hours per day and several days, two to three times per year) to protect the pretreatment facilities and the membrane equipment from excessive growth of algae and bacteria naturally conveyed in the seawater. Most of the sodium hypochlorite would be consumed in the disinfection process. The residual chlorine would be neutralized using sodium bisulfite. The chlorine would react with the seawater and the sodium bisulfite producing chlorides, sulfates, and sodium of amounts of less than 5 mg/L. For comparison, the concentration of chlorides in the seawater is usually in a range of 16,000 mg/L to 19,000 mg/L. The total increase in chloride, sodium and sulfate concentrations would be less than 0.05% and would have no harmful effect on the marine environment.

- **Sodium Hydroxide for Improvement of Rejection of Boron**

  Sodium hydroxide may be added to the seawater feed to the RO plant to improve boron rejection. The dosing of sodium hydroxide will be in the range of up to 20 ppm. Addition of sodium hydroxide will result in some increase of seawater pH by about 0.2 – 0.4 pH units and increase of sodium (Na) concentration by up to 12 ppm. For comparison, the concentration of sodium ions in seawater is 10,000 – 12,000 ppm.

- **Polymer for Enhanced Solids Removal from Seawater**

  Occasionally, typically during rainy events as needed, polymer would be added in small dosages (0.5 to 1 mg/L) to enhance the removal of solids from the intake seawater. Polymer addition would be intermittent for the duration of the event. The used polymers would be of high quality food grade approved for potable water production and would be of type customary for water treatment plants. The added polymer would react with the solids in the seawater and would be removed along with them and treated in the solids management system and disposed to the landfill. The amount of polymer in the discharge water would be negligible and below detection limits.

- **Scale Inhibitor for Prevention of Membrane Scaling**

  Scale inhibitor will be added to seawater at the dosing rate of 1–2 ppm. The scale inhibitor consists of organic inert polymers. Scale inhibitor does not react with water constituents. After passing through RO it will be discharged with the reject stream. The scale inhibitor that will be used in the Huntington Beach desalination facility will have NSF International (The Public Health and Safety Company) approval for use in RO desalination system operating for production of potable water.

- **Membrane Cleaning Chemicals**

  Two times per year reverse osmosis membranes would be cleaned with chemicals similar to those used for household cleaning. The cleaning chemicals are citric acid (used for cooking in everyday life); hydrochloric acid (widely used for swimming pool conditioning); mild detergents (which can be found in products such as toothpaste and baby shampoo) and low-concentration caustic soda. The use of these chemicals for membrane cleaning is not unique for the proposed desalination facility. These membrane cleaning chemicals are used in all existing desalination installations in California (i.e., West Basin Desalter, Marina Coast Water District Plant, Irvine Ranch Desalter, etc.), Florida and worldwide. All chemicals listed above would be of a high grade and are approved for potable water use by the National Safety Foundation. After membrane cleaning, the chemicals from the first rinse would be neutralized and sent to OCSD. Subsequent rinses would be mixed with the desalination facility concentrate and power plant seawater (in the event the HBGS is operational) and discharged through the power plant outfall. Because of the small amount of chemicals used, the concentration of the cleaning chemicals would be below their detection limits and would be in compliance with all local, state, and federal discharge regulations.

A more detailed description of the individual chemicals and their storage, delivery and handling at the proposed desalination facility is presented in Section 4.8.

3.5 PROJECT NEED AND OBJECTIVES

NEED FOR THE PROJECT

It is well established that Southern California as we know it today could not exist without the region's historic investment in numerous varied local and imported water projects. These well-known regional water projects include: the Los Angeles Aqueduct (operated by the Los Angeles Department of Water and Power); the State Water Project (operated by the California Department of Water Resources [DWR]); and the Colorado River Aqueduct (operated by the MWD), as well as award-winning conservation, recycling, and other regional water supply projects. MWD continues to encourage the development of local water projects to reduce reliance on the regional water projects and help meet the water needs of the region.

The Seawater Desalination Project at Huntington Beach is one of several local water projects currently being proposed to meet Orange County's ongoing water needs. The City of Huntington Beach was the first entity to reserve a portion of the desalinated water that will be produced by the project. In 2006, the City and Poseidon entered into an Owner Participation Agreement (OPA) that, among other things, requires Poseidon to supply the City with up to 3,360 acre-feet in each year that desalinated seawater is produced from the project. In May 2008, 10 retail water purveyors and the Municipal Water District of Orange County (MWDOC) entered into a Memorandum of Understanding (MOU) with Poseidon regarding the review and potential purchase of water from the Seawater Desalination Project at Huntington Beach. The MOU was updated in December 2009 to include several other Orange County retail water providers. In accordance with the MOU, individual Letters of Intent were submitted to Poseidon and the water agencies. As of April 2010, in addition to an agreement through the OPA with the City of Huntington Beach, 15 retail water purveyors and MWDOC had each signed individual Letters of Intent indicating their conditional interest in entering into purchase agreements with Poseidon to purchase specific amounts of desalinated seawater in each year that water is produced at the Seawater Desalination Project at Huntington Beach. The following is a list of Orange County water purveyors that have signed a "Letter of Interest" with Poseidon, or have otherwise shown interest in receiving desalinated seawater from the project.

With these letters, the entire 56,000 acre-feet of desalinated seawater to be produced by the project was reserved.

- City of Anaheim
- City of Huntington Beach
- City of Fountain Valley
- City of Fullerton
- City of Garden Grove
- City of Newport Beach
- City of Santa Ana
- City of Seal Beach
- City of Westminster
- El Toro Water District
- Golden State Water Company
- Irvine Ranch Water District
- Laguna Beach County Water District
- Mesa Consolidated Water District
- Moulton Niguel Water District
- Municipal Water District of Orange County
- Orange County Water District (OCWD)
- Santa Margarita Water District
- South Coast Water District
- Trabuco Canyon Water District
- Yorba Linda Water District

The project would meet Orange County's water needs in four different ways.

1. The project would provide Orange County with increased water supply reliability during times of drought or during shortages in other water supplies.
2. The project would replace imported water supplies that have been, and will be, lost by Orange County to statewide and environmental needs.
3. The project would provide a planned-for water supply source to accommodate Orange County's increasing water needs as shown in the water plans adopted by state, regional and local water agencies.
4. The project would provide a new water supply source, thus allowing operational flexibility in managing the amount of groundwater pumped from underground aquifers. This would assist in protecting the Orange County Groundwater Basin from seawater intrusion and/or replace groundwater supplies lost to overdraft concerns.

A. THE PROJECT PROVIDES A DROUGHT-PROOF WATER SUPPLY

On September 30, 2009, as the 2008–2009 Water Year ended, the State of California was officially mired in another multiyear drought. DWR is providing updates on the drought situation through monthly releases of a publication entitled California's Drought Update. In the October 30, 2009, edition of California's Drought Update, DWR summarized the drought situation as of October 1, 2009, the beginning of the Water Year (DWR 2009a, p. 16):

> The current drought period beginning in 2007, has left a significant deficit in our reservoir's carry-over supplies. . . the state entered the 2009–2010 Water Year, beginning October 1, with its key supply reservoirs at only . . . 42 percent of capacity. . . While the recent cumulative water supply deficits from below-average rainfall and runoff are not as deep as some past severe droughts, California's upcoming winter season is uncertain, so the State continues to prepare for the possibility of a dry 2010.

As summarized in the March 30, 2010, edition of California's Drought Update (DWR 2010a, p. 3), "The 2009 Water Year (October 1, 2008, through September 30, 2009) was the third consecutive year of below-average precipitation for the state. Annual statewide precipitation totaled 76%, 72%, and 63% of average for Water Years 2009, 2008, and 2007, respectively." Precipitation in the current Water Year has been higher than previous years, and as of April 10, 2010, average statewide precipitation and sierra snowpack slightly exceeded 100% of average (DWR 2010b). In addition to precipitation and snowpack, however, DWR also monitors storage levels in key reservoirs and runoff for major California rivers. In the March 30, 2010, edition (DWR 2010a, p. 8), DWR notes that storage in key reservoirs "was 86 percent of average" as of March 24, 2010. DWR concludes, "With average statewide precipitation forecast for the next few months, and below-average runoff forecast for the Sacramento River and San Joaquin River basins, it is still uncertain whether conditions have improved sufficiently to remove drought conditions" (DWR 2010a, p. 13).

While government officials are presently hoping for a sustained normal or even wet hydrologic conditions, it is recognized that Southern California, being in a semi-arid region, periodically experiences droughts that could be prolonged. The last time California experienced the hardships and environmental pressures of a prolonged drought, it lasted 6 years from 1987 to 1992. During long or extreme droughts, water supplies are reduced, groundwater levels decline and conflicts increase among water users. Business is also adversely affected, jeopardizing the economy, and ecosystems are strained, risking sensitive and endangered plants, animals, and habitats.

California's most severe recorded drought occurred in 1976–1977. Two consecutive years with little precipitation (1977 was the driest year in California's recorded history) left California with record low storage in its surface reservoirs and dangerously low groundwater levels. Socioeconomic and environmental impacts were very severe during these extreme drought conditions. According to DWR, the total loss due to the drought during these two years exceeded $ 2.5 billion ($6.5 billion at today's cost). The October 30, 2009, edition of California's Drought Update notes that, "Water Years 2007–2009 were the 13th driest consecutive 3-year period (tied with Water Years 1976–78) out of 87 years of record" (DWR 2009a, p. 7).

DWR studies indicate that in 1990–92 (the last 3 years of the 1987–92 drought) the drought resulted in reduced gross revenues of about $670 million to California agriculture. Energy utilities were forced to substitute hydroelectric power with more costly fossil-fuel generation at an estimated statewide cost of $500 million in 1991. The drought also adversely affected snow-related recreation businesses. Some studies suggested as much as an $85 million loss for snow-related recreation businesses during the winter of 1990–91. DWR (2009a, p. 9) reports the following economic results for the current (2007–09) drought:

> As of October 27, 2009, the USDA had granted agricultural disaster designations, either primary, contiguous, or both due to drought, for 50 of California's 58 counties. So far 25 California counties have requested primary designations and provided the California Emergency Management Agency with estimates of the dollar value of their drought-related losses for one or more crops for various reporting periods. The total loss for all the reporting counties is about $876.0 million.

Due to dry conditions in Southern California and uncertainty regarding future pumping operations from the State Water Project due to fishery protection measures in the Delta, MWD implemented a Water Supply Allocation Plan (the "MWD WASP") at Level 2 –10% reduction in available imported water supply. This action was taken on April 14, 2009 in order to manage water demands through the period of July 1, 2009 through June 30, 2010 and, on April 13, 2010, the reduction was extended through June 30, 2011. This is the first time in the history of the MWD that MWD has instituted consecutive years of mandatory water supply reductions for its Southern California customers. On April 15, 2009, the Municipal Water District of Orange County (MWDOC) established a similar Water Supply Allocation Plan (the MWDOC WASP) calling for the same 10% reduction in Orange County (MWDOC 2009). It is likely that the MWDOC WASP will be extended through June 30, 2011, as well.

MWD has also identified that water users will face a second consecutive year of mandatory water supply reductions under an allocation plan that was approved by MWD on April 13, 2010 (MWD 2010). The allocation plan identifies water reductions to the agency's 26 member public agencies for a second year. This is the first time in the MWD history that mandatory reductions will be in place for 2 consecutive years. The allocation plan is based on the fact that MWD water deliveries of imported water are down about 20% from previous years.

The California Water Plan Update 2009 (Bulletin 160-09), released on March 30, 2010, recognizes that one of the potential benefits that seawater desalination can provide is, "increased water supply reliability during drought periods" (DWR 2010c, Volume 2, Resource Management Strategies, Chapter 9, p. 9-9.) Because the supply available from the Pacific Ocean is not affected by drought conditions, the Seawater Desalination Project at Huntington Beach would add even more flexibility and reliability in operating California's water system, and it would provide particular drought relief in Orange County.

B. THE PROJECT PROVIDES A WATER SUPPLY TO ENSURE RELIABILITY TO HANDLE UNCERTAINTIES

Although Orange County has made a significant financial investment in the regional imported water system (through ongoing water purchases from MWD), and the system has historically met all of Orange County's water supply needs, there is concern regarding the amount of water that would continue to be available for delivery to Orange County through MWD's regional imported water system over both the near-term and the long run. While the current multiyear drought magnifies near-term concerns, increasing regulatory activity and environmental water needs may impact the availability of imported water supplies over the long run. The two main components of MWD's regional imported water system are the State Water Project and the Colorado River Aqueduct.

Increasing regulatory activity and environmental water needs in Northern California have reduced the amount of imported water supply (compared to system capacity and earlier projections) that is available to Southern California through the State Water Project (SWP). More specifically, recent court decisions and biological opinions released by the U.S. Fish and Wildlife Service have forced DWR to curtail pumping in the Delta to protect the threatened Delta smelt, thereby reducing the amount of SWP water that is available to MWD. According to the latest SWP Delivery Reliability Report (DWR 2009b, p. 46), average deliveries from the SWP will only be 60% of the “Table A” contracted amounts. In dry years, deliveries from the SWP would be even lower. Climate change is also likely to significantly affect the precipitation patterns in California, placing more stress on existing water systems and reducing the reliability of the SWP (DWR 2008).

Likewise, a fundamental change has occurred in the availability and use of Colorado River water because California has been required to reduce the amount of Colorado River water it uses. Implementation of the Colorado River Water Use Plan results, among other things, in a reduction of up to 1 million acre-feet per year as compared to the highest amount diverted in the past 25 years (from a high of 5.4 million acre-feet per year to the California allotment of 4.4 million acre-feet per year). In addition, there have been numerous predictions about the impact of climate change on the Colorado River. Three studies completed from 2005 through 2007 concluded that climate change could reduce the runoff of the Colorado River anywhere from 5% to 45% by the year 2050. (Report on Sustainable Water Deliveries from the Colorado River from the General Manager to the MWD Board, dated August 28, 2008.)

The California Water Plan Update 2009 recognizes that “[t]he primary benefit of desalting is to increase California’s water supply. Seawater desalting creates a new water supply by tapping the significant supply of feedwater from the Pacific Ocean” (DWR 2010b, p. 9-9). The Seawater Desalination Project at Huntington Beach provides a new source of supply to offset any imported water supply losses experienced by Orange County.

C. THE PROJECT PROVIDES A PLANNED-FOR SUPPLY TO MEET INCREASING WATER NEEDS

Water planning documents are legally required to provide projections of future water needs (based on population projections and other factors) and to identify, to the extent feasible, where the water supplies to meet those needs would be found. As is discussed below, state, regional and local planning documents have identified seawater desalination as one of the future supplies required to meet Orange County’s water needs.

<u>The California Water Plan</u>

The DWR provides an assessment of anticipated statewide population growth and related water consumption statistics in their “Bulletin 160 series” California Water Plan.[1] The DWR employs these projections in developing and implementing long-range strategies addressing California’s water demands. The 1998 Plan provided readers with estimates of the magnitude of dry-period water

[1] In 1957, the Department of Water Resources published Bulletin 3, the California Water Plan. Bulletin 3 was followed by the Bulletin 160 series. The Bulletin 160 series was published seven times between 1966 and 1998, updating the California Water Plan. A 1991 amendment to the California Water Code directed the Department to update the plan every 5 years. Update 2009 is the latest adopted plan in the series, released by DWR on March 30, 2010. This SEIR presents information provided in Bulletin 160-98, Update 2005, and Update 2009.

shortages in different areas of the state and also presented some options for reducing those shortages. DWR projected 2020 statewide water shortages at approximately 2.4 million acre-feet in an average water year, and 6.2 million acre-feet in drought years. In response, Senate Bills (SB) 221 and 610, which became effective January 1, 2003, required demonstration of water supply reliability prior to development.

The 1998 Plan recognized that "seawater desalting is sometimes described as the ultimate solution to Southern California's water supply shortfall" (DWR 1998, page 7-70), but failed to provide any projections regarding the estimated future water supply to be provided by seawater desalination projects. The California Water Plan Update 2005 (Update 2005) was the first plan to include a statewide inventory showing, "as of 2005, the number and capacity of groundwater and seawater desalting plants in operation, design and construction, and planned or projected for construction" (DWR 2005, Vol. 2, Resource Management Strategies, Chapter 6, Desalination, p. 6-3).

DWR has updated that information and included a table in the California Water Plan Update 2009 (DWR 2010c) that shows, "the number and capacity of groundwater and seawater desalting plants in operation, design and construction, and planned or projected for construction as of 2008. While not all of these are likely to be constructed, it is assumed that they, or an equivalent number, will be operational by 2025" (DWR 2010c, p. 9-9). As referenced in the table, DWR projects that a combination of new seawater desalination facilities, including the facilities proposed in response to the MWD solicitation (see the IRP explanation below), the proposed Seawater Desalination Project at Huntington Beach, and other facilities from San Francisco to San Diego, would provide over 300,000 acre-feet of California's urban water supply by 2025.

TABLE 3-3
DESALTING IN CALIFORNIA FOR NEW WATER SUPPLY

	FACILITIES IN OPERATION		FACILITIES IN DESIGN AND CONSTRUCTION		FACILITIES PLANNED OR PROJECTED	
Feedwater Source	Number of Facilities	Annual Capacity	Number of Facilities	Annual Capacity	Number of Facilities	Annual Capacity
Groundwater	20	82,200	4	30,000	3	57,300
Seawater	6	1,700	3	50,800	13	257,000
Total	26	83,900	7	80,800	16	314,300
Cumulative			33	164,700	49	479,000

Notes:
Capacity in AFY, assuming 10% downtime. No. of facilities is number of new plants. Capacity includes existing plant expansions. Design & Construction – Construction underway or preparation of plans and specifications has begun for new facilities or facility expansions.
Planned – Planning studies underway for new facilities or facility expansions.
Projected – Projected new facilities or facility expansions.
Sources: Water desalination – findings and recommendations (DWR 2003), news reports, technical papers, Prop 50 grant submissions, and Worldwide Desalting Plants Inventory series by the International Desalination Association (Global Water Intelligence 2006).The Seawater Desalination Project at Huntington Beach is identified by DWR as one of the proposed projects that would provide a planned-for water supply source to accommodate California's water needs (DWR 2009b, page 9-3).
Source: DWR 2010, p. 9-10.

Water Resources Planning for the Southern California Region

The Urban Water Management Planning Act requires all urban water suppliers to prepare and adopt an Urban Water Management Plan, and to update that plan every 5 years using a 20-year planning horizon. As the major imported water supplier in the Southern California region, MWD prepares a "Regional Urban Water Management Plan" every 5 years that is relied upon and referenced by local urban water suppliers in Southern California. The latest of these regional plans, MWD's 2005 Regional Urban Water Management Plan (2005 Regional Plan, MWD 2005), was adopted by MWD in November 2005. Due to the addition of new water conservation requirements implemented through the adoption of Senate Bill 7x-7 of 2009 (signed into law by the Governor in November 2009), an extension has been granted until July 1, 2011 for urban water suppliers to complete their next Urban Water Management Plan.

In addition to complying with the state-mandated planning requirements of the Urban Water Management Act, MWD engages in annual water management and resource planning. In 1996, MWD first adopted "Southern California's Integrated Water Resources Plan" (the IRP, MWD 2006) representing a dramatic shift in water management and resource planning for the region. The IRP recommended that groundwater recovery projects, storage projects, water recycling projects, water transfer projects and water conservation projects be considered in addition to available imported supplies to determine the "resource mix" available to the region. The IRP set resource development targets (in acre-feet per year) for water conservation and for each of the various water supply sources needed to meet projected water demands. Although no target was set for desalinated ocean water as a future supply, the 1996 IRP stated that, based on feasibility studies on potential projects, about 200,000 acre-feet per year (of desalinated ocean water) could be developed by 2010 (MWD 2006, p. 3-12).

MWD formally updated the IRP resource mix targets in 2004. As explained in MWD's 2005 Regional Plan, seawater desalination first became a targeted resource in the 2004 IRP Update. "In 2004, Metropolitan's board adopted an IRP Update that includes a target of 150,000 acre-feet per year for seawater desalination projects to meet future demands" (MWD 2005, p. III-22). According to MWD's 2005 Regional Plan, "recent breakthroughs in membrane technology and plant siting strategies have helped reduce desalination costs, warranting consideration among alternative resource options outlined in Metropolitan's IRP Update. The IRP Update includes a target of 750,000 af per year of local water production by 2025 that could include up to 150 taf [150,000 af] per year of seawater desalination" (MWD 2005, p III-29, see Table 3-4, Updated Resource Targets (With Supply Buffer)).

To meet the 150,000 acre-foot seawater desalination target, MWD issued a request to its member agencies to submit competitive seawater desalination project proposals that could develop up to 50,000 acre-feet per year. According to MWD's 2005 Regional Plan, "five member agencies submitted proposals for about 142 taf [142,000 af] per year of desalinated seawater, including San Diego County Water Authority, Long Beach Water Department, Los Angeles Department of Water and Power, West Basin Municipal Water District and the Municipal Water District of Orange County" (MWD 2005, p. III-29).[2] The 56,000 acre-foot-per-year Seawater Desalination Project at Huntington Beach is not included in the 142,000 acre-feet of seawater desalination project proposals submitted to MWD to date, but it would still be considered an Orange County local project for purposes of meeting the overall 750,000 acre-foot local water production target.

MWD periodically publishes Implementation Reports for its IRP. The latest IRP Implementation Report (published by MWD in October 2007) continued to confirm that seawater desalination projects were an important part of the 2025 target for local water production. "Metropolitan's Board

2 Refer to Section 5.3, Cumulative Impacts, for more information about these projects.

has decided to pursue the development of seawater desalination through regional facilitation and funding, one of the components previously identified to help meet this supply target" (MWD 2007, p. 1-5).

TABLE 3-4
UPDATED RESOURCE TARGETS (WITH SUPPLY BUFFER)

	1996 IRP 2020	IRP UPDATE 2020	CHANGE	IRP UPDATE 2025
Conservation	882,000	1,028,000	+145,600	1,107,000
• Recycling • Groundwater Recovery • Desalination	500,000	750,000	+250,000 (buffer)	750,000
Colorado River Aqueduct *	1,200,000	1,250,000	+50,000	1,250,000
State Water Project	593,000	650,000	+57,000	650,000
Groundwater Conjunctive Use	300,000	300,000	0	300,000
CVP/SWP Storage and Transfer	300,000	550,000	+250,000 (buffer)	550,000
MWD Surface Storage **	620,000	620,000	0	620,000

* The 1,250,000 acre-feet supply from the Colorado River Aqueduct is a target for specific year types when needed.
MWD is not depending upon a full aqueduct in every year.
** Target for Surface Storage represents the total amount of water that can be extracted from storage.
Source: MWD 2005, Table ES-1.

The project would provide a planned-for water supply source to accommodate Southern California's water needs as shown in the regional water plans adopted by MWD.

Orange County Water Plans

The County of Orange and the service area of the Municipal Water District of Orange County (MWDOC) are located at the center of the MWD service area. In addition to the water planning information available in the California Water Plan prepared by DWR and MWD's regional planning information, local water planning information is also readily available for Orange County water supplies.

The most recent MWDOC Regional Urban Water Management Plan, adopted December 21, 2005 (MWDOC 2005) discusses countywide water supply and demand planning efforts. In accordance with the Urban Water Management Planning Act, the information in MWDOC's 2005 UWMP is in the process of being updated (as extended by SB 7x-7, a revised UWMP must be adopted by MWDOC by July 1, 2011).

MWDOC's 2005 UWMP emphasizes that "Desalination of ocean water provides a potentially unlimited supply of water if it can be desalinated and treated at reasonable costs" and identifies the Seawater Desalination Project at Huntington Beach as one of "three proposed ocean desalination projects that could serve MWDOC and its member agencies with additional water supply" (MWDOC 2005, page 111). The other two projects are the joint San Diego County Water Authority and MWDOC proposed Regional San Onofre Seawater Desalination Project and the MWDOC proposed Dana Point Ocean Desalination Project (MWDOC 2005, Table 6-4, Planned Desalination Facilities along the Southern California Coast).

The project would provide a planned-for water supply source to accommodate Orange County's water needs as shown in the water plan adopted by MWDOC.

D. THE PROJECT PROVIDES A NEW SOURCE TO PROTECT AGAINST SEAWATER INTRUSION

The Orange County Water District (OCWD) oversees management of Orange County's most important local water supply – the Santa Ana River Groundwater Basin (the "Basin"). Because OCWD is the manager of the Basin and not an urban water supplier, it is not required to develop an Urban Water Management Plan. However, in 2004, OCWD adopted a Groundwater Management Plan (the "2004 GMP") in its capacity to ensure sufficient water supplies for present and future beneficial uses within Orange County. The 2004 GMP was updated in June 2009 (the "2009 GMP Update") and provides the most current information on OCWD's management of the Basin.

OCWD does not manage the Basin by trying to keep it full. Rather it has established a goal of maintaining an accumulated overdraft to allow storage space for replenishment when excess water is available during wet years. Groundwater withdrawals from the Basin (known as "Basin production") have increased from less than 200,000 acre-feet per year in the early 1960s to more than 300,000 acre-feet per year in recent times. Figure 6-5 from the 2009 GMP Update shows that Basin production has exceeded 300,000 acre-feet in every water year from 1991–1992 through 2007–2008. (See Figure 3-20, Basin Production and Recharge Sources.) In comparison to Basin production that can exceed 300,000 acre-feet, the natural recharge of the Basin is small (estimated by the OCWD to be about 69,000 acre-feet per year) (OCWD 2009). This natural or "incidental" recharge is directly related to the amount of local precipitation in a given year (see Figure 3-21, Net Incidental Recharge) Consequently, the Basin is primarily replenished through OCWD's "artificial recharge" operations. The "Representative Annual Basin Water Budget" created by OCWD for the 2009 GMP Update shows how artificial recharge in the amount of 272,500 acre-feet could support Basin production of 333,500 acre-feet. (See Table 3-5, Representative Annual Basin Water Budget.)

In 1965, OCWD installed injection wells along the coast near the mouth of the Santa Ana River (at a place called the "Talbert Gap") to pump water into the shallow aquifers. Injecting water into the shallow aquifers produced a groundwater mound that stood higher than sea level. With a barrier in place to retard seawater intrusion, it became feasible to draw water levels down during dry periods when local surface water and imported water sources were in short supply, instead of simply keeping the basin as full as possible to prevent seawater intrusion. During wet periods, the depleted aquifer could be replenished with storm runoff and excess imported water. Utilizing this method of groundwater management, OCWD allowed the amount of depleted groundwater supply (Basin overdraft) to fluctuate between "full" in 1969 to an accumulated overdraft of nearly 500,000 acre-feet in 1977 without causing irreparable damage to the resource (OCWD 2009. Table 3-5 illustrates the Basin accumulated overdraft since 1962.[3] OCWD manages the amount of production from the Basin through the establishment of a Basin Pumping Percentage ("BPP"), which represents the ratio of groundwater supply to the total water supply that a retail water agency uses to meet demands. To guard against excessive overdrafting of the Basin, OCWD sets the BPP annually based on a formula which includes Basin recharge estimates (2009 GMP Update, p. 6-14). In

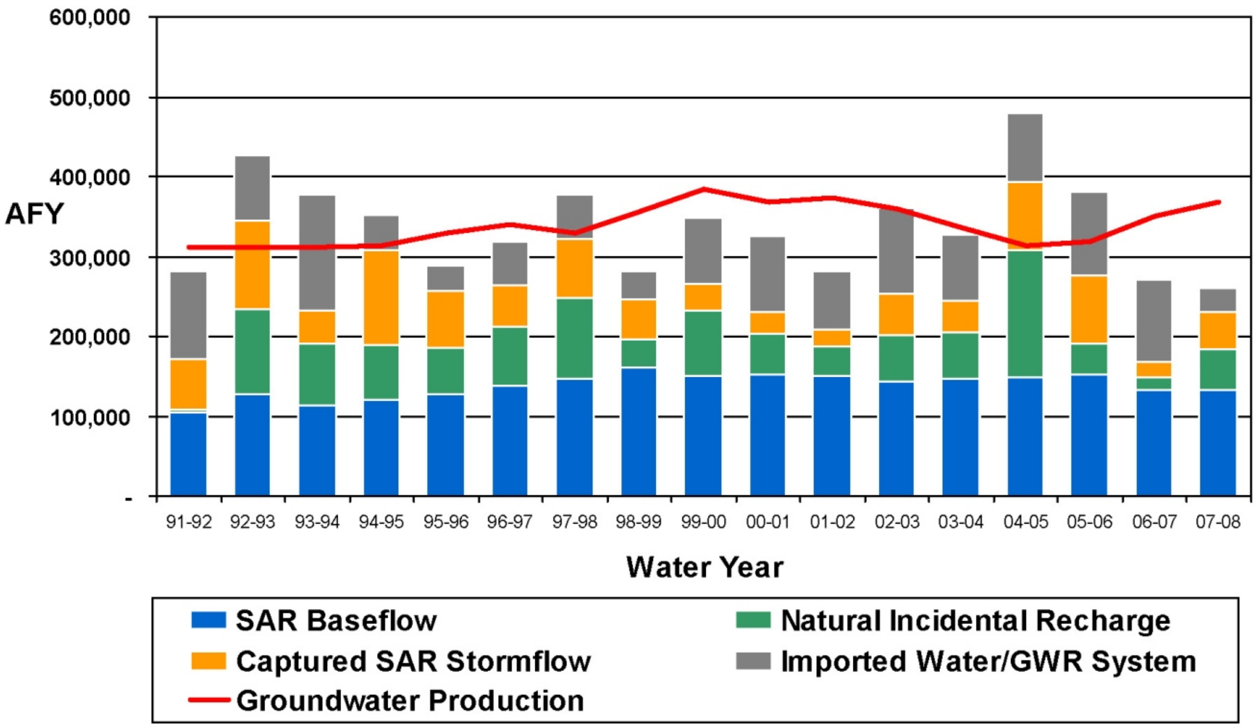
3 Based on an unprecedented storage increase of 170,000 acre-feet in the record-setting wet year of 2004–05, OCWD staff developed a new methodology to more accurately calculate accumulated overdraft in the Basin. That methodology is outlined in the 2009 GMP Update (OCWD 2009, p. 2-15).

recent years the BPP has ranged from a high of 80% to a low of 62% (see Figure 3-22, Basin Production Percentage History). Retail agencies are permitted to pump more groundwater than their BPP allotment. However, OCWD charges a basin equity assessment for every acre foot pumped over the BPP, making the cost of that water equal or greater to the cost of imported water (imported water is provided to the retail agencies from MWD through MWDOC). In this way, OCWD manages the Basin through financial incentives and deterrents rather than defined pumping restrictions.

TABLE 3-5
REPRESENTATIVE ANNUAL BASIN WATER BUDGET

FLOW COMPONENT	ACRE-FEET
INFLOW	
Measured Recharge	
1. Forebay recharge facilities	235,000
2. Talbert Barrier injection	35,000
3. Alamitos Barrier injection, Orange County portion only	2,500
Subtotal:	**272,500**
Estimated Unmeasured Recharge (average precipitation)	
1. Inflow from La Habra basin	3,000
2. Recharge from foothills into Irvine subbasin	14,000
3. Areal recharge from rainfall/irrigation into Main basin	17,500
4. Recharge from foothills into Yorba Linda subbasin	6,000
5. Subsurface inflow at Imperial Highway beneath Santa Ana River	4,000
6. Santa Ana River recharge, Imperial Highway to Rubber Dam	4,000
7. Subsurface inflow from Santiago Canyon	10,000
8. Recharge along Peralta Hills	4,000
9. Recharge along Tustin Hills	6,000
10. Seawater inflow through coastal gaps	500
Subtotal:	**69,000**
TOTAL INFLOW:	**341,500**
OUTFLOW	
1. Groundwater Production	333,500
2. Subsurface Outflow	8,000
TOTAL OUTFLOW:	**341,500**
CHANGE IN STORAGE:	**0**

Source: OCWD 2009, Table 2-2.



Water Year	SAR Baseflow	Natural Incidental Recharge	Captured SAR Stormflow	Imported Water/ GWR System	Groundwater Production
91-92	105,000	2,000	65,000	109,000	311,000
92-93	127,000	107,000	111,000	82,000	312,000
93-94	114,000	78,000	41,000	144,000	312,000
94-95	120,000	70,000	117,000	44,000	314,000
95-96	128,000	58,000	70,000	32,000	329,000
96-97	138,000	74,000	51,000	56,000	339,000
97-98	146,000	101,000	74,000	55,000	329,000
98-99	161,000	36,000	50,000	35,000	356,000
99-00	150,000	82,000	33,000	84,000	384,000
00-01	153,000	50,000	27,000	95,000	369,000
01-02	150,000	38,000	21,000	73,000	374,000
02-03	143,000	58,000	52,000	109,000	359,000
03-04	146,000	59,000	39,000	84,000	337,000
04-05	149,000	159,000	85,000	87,000	314,000
05-06	153,000	39,000	84,000	104,000	318,000
06-07	133,000	15,000	19,000	103,000	350,000
07-08	132,000	52,000	46,000	30,000	368,000

SOURCE: OCWD 2009

FIGURE 3-20

Basin Production and Recharge Sources

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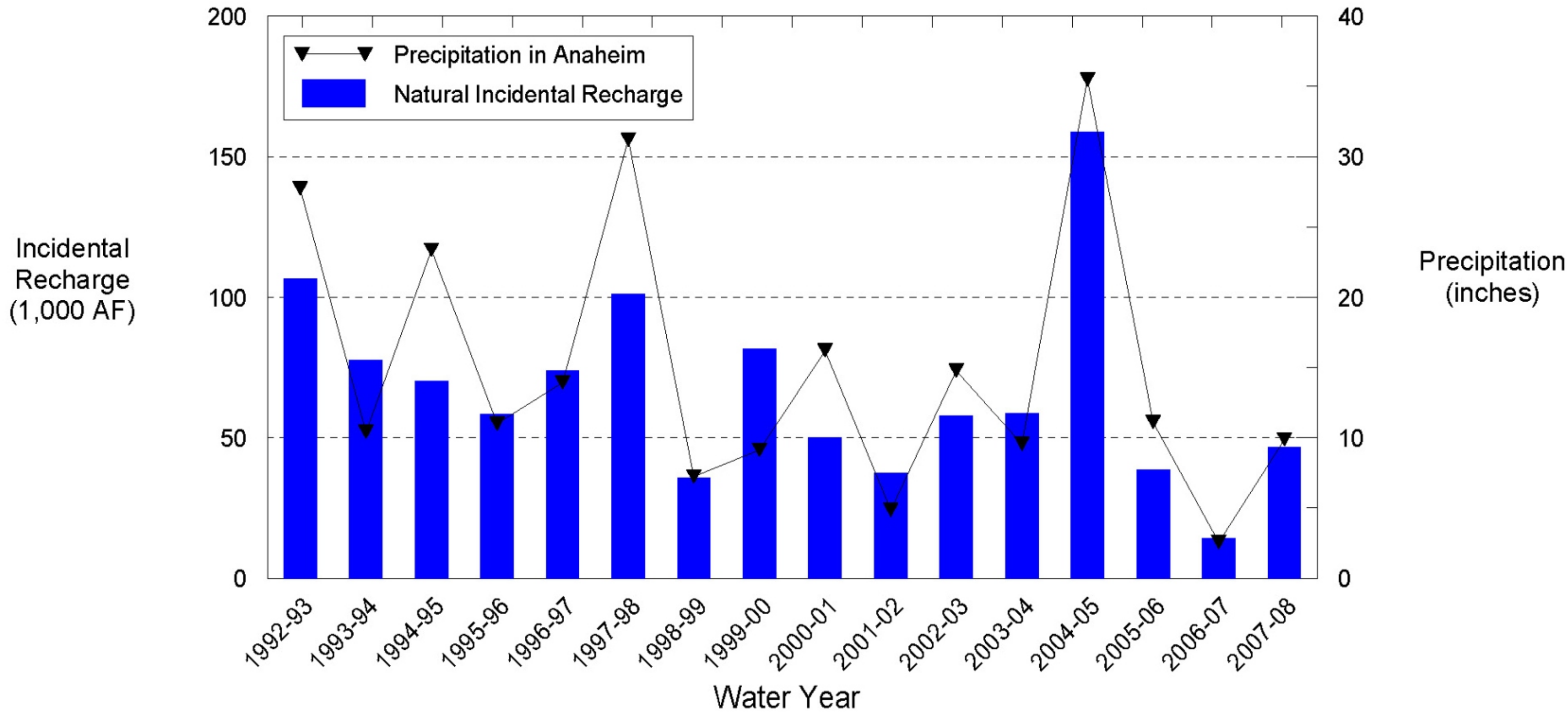

SOURCE: OCWD 2009

FIGURE 3-21

Net Incidental Recharge

6483-01

MAY 2010

Seawater Desalination Project at Huntington Beach

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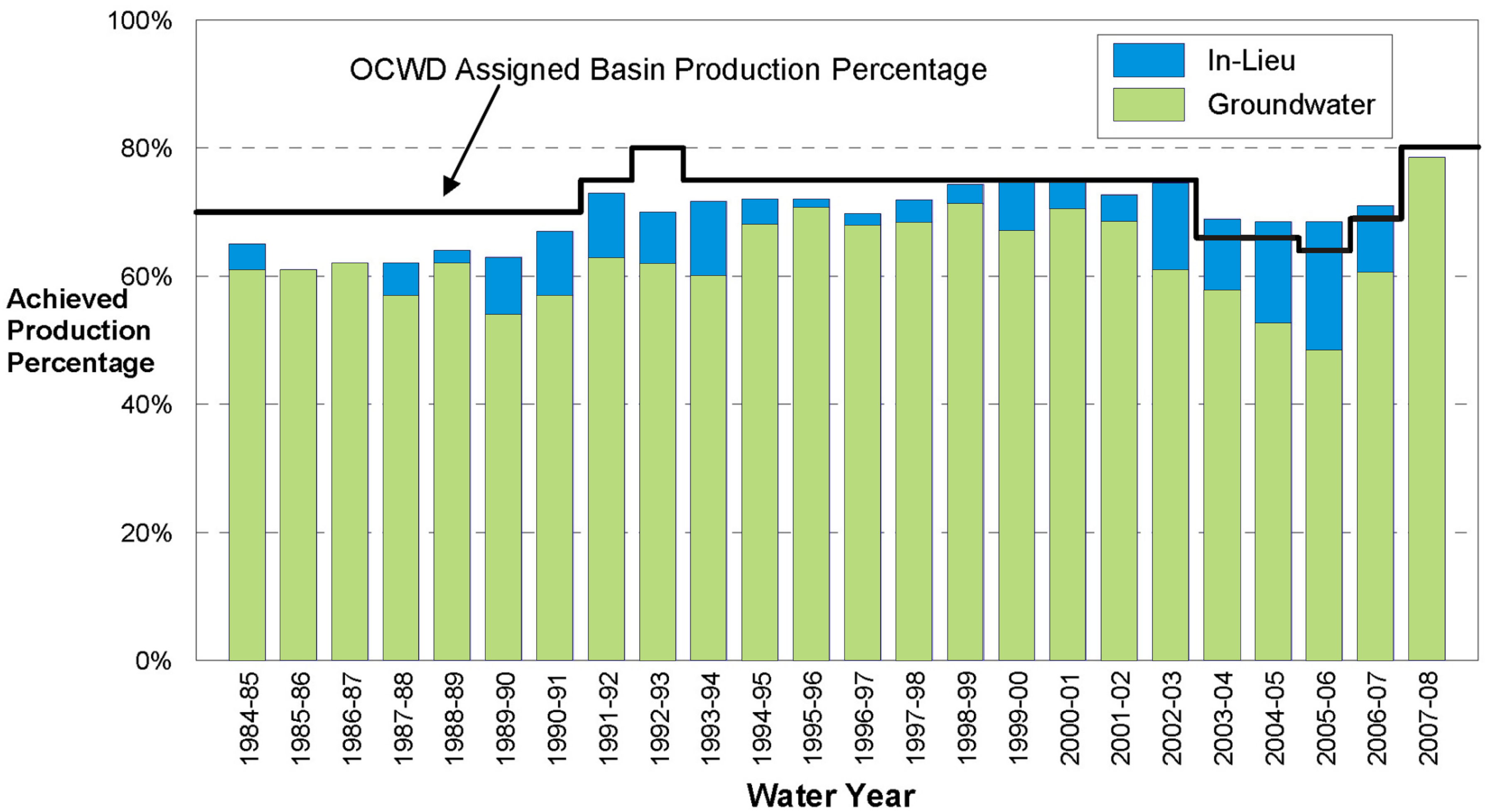

SOURCE: OCWD 2009

FIGURE 3-22

Basin Production Percentage History

Seawater Desalination Project at Huntington Beach

6483-01

MAY 2010

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One key finding made by a 2003-04 Grand Jury report was that depressed groundwater levels near the coast could exacerbate the inland advance of saline water into the Basin (finding No. 4, Grand Jury Study, p. 21). To remedy this condition, the Grand Jury recommended that "Orange County Water District curtail groundwater withdrawals from deep wells and obtain blending water for the Talbert Gap seawater-intrusion barrier from other sources" (recommendation No. 3, Grand Jury Study, p. 22). One new source is provided by the Groundwater Replenishment System (GWRS), which began operation in 2008. When in full operation, the GWRS would convert 100 million gallons per day of wastewater from the Sanitation District's sewer collection system into 72,000 acre-feet per year of purified water to recharge the Basin. Design of Phase 2 of the GWR expansion is underway at this time and would increase the yield from 72,000 acre-feet per year up to 102,000 acre-feet per year. However OCWD has not authorized the construction of the phase 2 project.

The 72,000 acre-feet produced by the GWRS, together with imported water that could be purchased from MWD each year, as well as natural and artificial replenishment of the Basin, could allow for an increase in Basin production. The Seawater Desalination Project at Huntington Beach could also provide an alternative supply of water that would allow increased Basin production and operational flexibility in managing the Basin.

3.6 PROJECT OBJECTIVES

The overall objective of the project is to provide Orange County with a long-term, reliable, high-quality, local source of potable water. Project implementation would create a local drought-proof supply of domestic water and could reduce Orange County's dependence on imported water, consistent with the goal of integrated water resource management. A key advantage of the selected site is to utilize existing ocean intake/discharge lines of sufficient seawater volume to avoid the impact of constructing new ocean intake/discharge facilities.

The project is intended to realize the following objectives:

- Provide a reliable local source of potable water to Orange County that is sustainable independent of climatic conditions and the availability of imported water supplies or local groundwater supplies
- Provide product water that meets the drinking water requirements of the Safe Drinking Water Act (SDWA) and the California Department of Public Health
- Reduce salt imbalance of current imported water supplies by providing a potable water source with lower salt loads for blending with existing supplies
- Remediate the subject site of on-site contaminants resulting from approximately 35 years of use as a fuel oil storage facility in order to protect the health and safety of those in the surrounding community
- Create ecosystem and biologic resource benefits that may accrue due to decreased pressures on existing water resources and reduced contamination within receiving waters
- Minimize demands on the existing imported water system.

3.7 PROJECT PHASING

The demolition, remediation, and construction process of the proposed project would last approximately 24 months, including time necessary to acquire all required agreements, permits, and approvals. Project phasing would be divided into three separate categories, composed of the following:

- **On-Site Desalination Facility Construction:** This portion of the proposed project would last approximately 24 months, and would include such activities as on-site demolition, grading/excavation, construction of desalination facilities, landscaping, and facility startup/testing. Import and export of earthen materials would occur primarily during the first six months and last four months of this phase of the project.

- **Off-Site Product Water Transmission Pipeline Construction:** This portion of the project would last approximately 21 months, and would start about three months after the beginning of on-site desalination facility construction. This phase would include such activities as pipeline installation, implementation of pipeline under waterways/major roadways, soil remediation, removal of pipeline, and facility startup/testing. Import and export of earthen materials would occur primarily during the middle 12 months of this phase.

- **Off-Site Product Water Underground Booster Pump Stations Construction:** This phase of the proposed project would last approximately 18 months, and would begin approximately six months subsequent to the commencement of on-site desalination facility construction. This portion of the project would include such activities as grading/excavation/paving, pump station construction, emergency power generator construction, landscaping, and facility startup/testing. Import and export of materials would occur mainly within the first six months and final six months of the phase.

It should be noted that it is anticipated that all three phases would be implemented concurrently for the final 18 months of the proposed project and the phasing would not change under the stand-alone condition.

3.8 AGREEMENTS, PERMITS, AND APPROVALS REQUIRED

In taking action on the following approvals, the following agencies may be acting as responsible agencies under CEQA. The SEIR is intended to cover all state and local governmental approvals which may be needed to construct or implement the project, whether explicitly listed or not. The following agreements, permits, and approvals are anticipated to be necessary, but are not limited to:

Approval/Permit, Permits to Operate	Agency
Final SEIR Certification	City of Huntington Beach
Conditional Use Permit	City of Huntington Beach

Coastal Development Permit [4]	City of Huntington Beach
Franchise Agreement	City of Huntington Beach
Owner Participation Agreement	City of Huntington Beach
Property Agreement	City of Huntington Beach
Sewer Connection Permit	City of Huntington Beach
Grading Permit	City of Huntington Beach
Demolition Permit	City of Huntington Beach
Gas Supply Agreement	City of Huntington Beach
Landfill Availability Agreement for Non-Hazardous Waste	City of Huntington Beach
Industrial Waste Discharge into sewer Permit	City of Huntington Beach
Coastal Development Permit (CDP) [5]	California Coastal Commission (CCC)
Lease Agreement/Amendment	California State Lands Commission
NPDES/WDR Permit	Santa Ana Regional Water Quality Control Board
Permit to Construct/Operate	South Coast Air Quality Management District
Permit to Construct (Electrical Substation)	California Public Utilities Commission
Incidental Take Permits [6]: • Section 104 of the Marine Mammal Protection Act • Section 7 of the Endangered Species Act	National Oceanographic and Atmospheric Administration (NOAA) - Fisheries
Consultation in accordance with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act [7]	

[4] The City's Coastal Development Permit approval may be appealed to the California Coastal Commission.

[5] A CDP is required from both the City of Huntington Beach and the CCC. Applicable Sections of the California Coastal Act are identified in Section 4.1 of this SEIR.

[6] Potentially required for stand-alone operating conditions.

[7] Potentially required for stand-alone operating conditions.

Encroachment Permits/Construction Approvals	U.S. Army Corps of Engineers (Santa Ana River Crossing)
	Caltrans, District 12 (SR-55 undercrossing)
	County of Orange (channel crossings, pump station)
	City of Huntington Beach (product water pipeline and any work within the City's public right-of-way including improvements on Edison Avenue))
	City of Costa Mesa (product water pipeline)
	Mesa Consolidated Water District (product water pipeline)
Institutional Agreements	Various cities, agencies, and regional water purveyors
Industrial Source Control Permit	Orange County Sanitation District
Domestic Water Supply Permit	California Department of Public Health