ENVIRONMENTAL CHECKLIST FORM

1. Project Title:

Dana Point Ocean Desalination Project Phase 3 Extended Pumping and Pilot Plant Testing

2. Lead Agency Name and Address:

Municipal Water District of Orange County
10500 Ellis Avenue
P.O. Box 20895
Fountain Valley, CA 92728

3. Contact Person and Telephone Number:

Richard Bell, P.E.
(714) 593-5003

4. Project Location:

Doheny State Beach, 25300 Dana Point Harbor Drive, in the City of Dana Point (City). The site is bounded on the north/northeast by Pacific Coast Highway and on the south/southwest by the Pacific Ocean.

5. Project Sponsor's Name and Address:

Municipal Water District of Orange County
10500 Ellis Avenue
P.O. Box 20895
Fountain Valley, CA 92728

6. General Plan Designation:

Recreation/Open Space (California Department of Parks and Recreation 2003)

7. Zoning:

Open Space

8. Description of Project:

PROJECT OVERVIEW AND PURPOSE

In 2006, the Municipal Water District of Orange County (MWDOC) successfully constructed a fully buried 12-inch diameter, 350-foot long test slant well on Doheny State Beach (see Figure 1). Although preliminary pilot well tests have been promising, long-term testing is needed to more thoroughly validate and fine-tune the groundwater model, to verify the anticipated flow splits between brackish and ocean water, establish water quality and microbial parameters, and to establish full-scale desalination process design. Phase 3 pilot-plant testing and water quality testing will require an extended period of initial pumping to pull in ocean water. This will require operating the test slant well for up to 24 months. Phase 3 testing will measure changes in salinity and other water quality parameters affecting Reverse Osmosis (RO) process performance.

In addition to measuring water quality, Phase 3 testing will provide hydrologic and radium isotope data, which will then be used to validate and refine the existing ground water model. Finally, Phase 3 testing will evaluate RO process performance, post-treatment requirements for RO product and RO concentrate, materials corrosion, and microbial growth when operating the test slant well with a nitrogen environment to maintain anoxic conditions for both corrosion and biofouling control.

As a part of the slant well extended pumping tests and the pilot plant testing work, two exploratory boreholes are planned to be drilled on the beach south of the Doheny State Park (Park) campground. The exploratory boreholes are intended to additionally characterize the aquifer materials deposited in the alluvial channel at the mouth of San Juan Creek. Additionally, information obtained from the exploratory boreholes will assist in refining the existing groundwater model that is used to predict inflow quality to the well. Up to three additional monitoring wells and stations (e.g., gauging stations) may be installed, as necessary, to provide for supplemental information to measure groundwater and streamflow in areas where information is lacking.

OVERALL SCHEDULE

SCHEDULE FOR SLANT WELL EXTENDED PUMPING TESTING

Construction of all the facilities required to conduct the extended pumping test on the slant well will take place daily Monday through Friday from 10:00 AM to 6:00 PM with restricted working hours to avoid noise impacts to vacationers in the adjacent campground and nearby residents. The list below summarizes the general tasks and provides an approximate schedule:

Construction Tasks			
•	Wellhead construction	2 weeks	January 5 – January 19, 2009
•	Discharge facilities	4 weeks	January 20 – February 17, 2009
•	Electrical service installation	3 weeks	February 2 – February 20, 2009
•	Slant well redevelopment	2 weeks	February 18 – March 6, 2009
•	Submersible pump installation	1 week	March 9 – March 13, 2009
•	Mobile test facility installation	2 weeks	February 23 – March 9, 2009
•	Startup and shakedown testing	2 months	March 17 – May 15, 2009
•	24-Month Pilot Test	18 months	May 15, 2009 – May 15, 2011

The construction schedule has been planned so that all construction activities will be completed by mid-March 2009. This ensures that construction is completed well before the Doheny Blues Festival (mid-May). Startup and shakedown testing and pilot test do not involve any construction activities and will be limited to activities only within the mobile test facility and at Monitoring Well 1 (MW-1). Some additional work may be required at the wellhead, vault, and discharge diffuser up until May 15, 2009.

SCHEDULE FOR EXPLORATORY BOREHOLE DRILLING

The proposed work schedule for drilling the exploratory boreholes will be daily Monday through Friday from 10:00 AM to 6:00 PM with restricted working hours to avoid noise impacts to vacationers in the adjacent campground and nearby residents.

It is estimated that approximately seven working days are required for borehole drilling and destruction. Mobilization of the sonic drilling rig and ancillary equipment, project orientation, and setting up on the first site will take one day. Drilling both vertical exploratory boreholes to a depth of approximately 200 ft, including geophysical logging and other required testing and borehole destruction, will take approximately six days, or three days per borehole. No equipment will be left on the beach over a weekend, and no work will take place on Saturdays or Sundays. During the weekend, drilling equipment will be stored within the fenced staging area in the nearby parking lot.

This work is tentatively scheduled to take place in January 2010. At this time the drilling schedule is not final, however, drilling is planned to be completed early in the calendar year to prevent potential ecological impacts on grunion runs and wintering western snowy plovers.

SCHEDULE FOR REMOVAL OF ALL TEMPORARY FACILITIES

Removal of all temporary facilities installed for the extended pumping test will take place after completion of the pumping test in May 2011. It is expected that removal of the facilities (mobile test facility, discharge piping and diffuser, signal cables, and electrical services and conduits), and reinstating grassed areas and paved surfaces will take approximately three weeks.

LOCATION AND ACCESS

Figure 2 shows a plan view of the test slant well, discharge piping, and mobile test facility. A 2,000-gpm submersible pump will be installed in the existing test slant well, located south of the lifeguard station. Water pumped from the slant well will discharge through a buried pipeline and outfall diffuser into the surf zone adjacent to the concrete groin (see Figure 2). An approximate 150-gpm sidestream will be supplied from the wellhead to the mobile test facility where approximately 120-gpm will be used for a pump and eductor and approximately 30-gpm will be used for reverse osmosis process testing and online instrument monitoring. The air/water mixture from the pump and eductor, and from the online instruments, will then be returned to the slant well discharge to increase dissolved oxygen. RO process water may either be returned to the slant well discharge or may be pumped through a pipeline, which discharges into a nearby sanitary sewer (see Figure 2). Along with the water supply and return pipeline, three additional conduits will be supplied from the mobile test facility to the slant wellhead for instrument cables, submersible pump power, and nitrogen supply; all conduits will be run in the same trench. Signal cables from the pressure transducers installed in the test slant well and MW-1 monitoring well, and the oxygen sensor in the slant well, will be routed to the test facility and measured using a graphic data logger.

Nitrogen will be supplied to the wellhead at low pressure from a compressed nitrogen cylinder stored in the mobile test facility. To ensure that oxygen does not enter the well headspace, an oxygen sensor will be mounted in the upper portion of the well casing. Pumping levels in the test slant well will be measured using a pressure transducer; and as a backup, a redundant transducer will also be installed in the same sounding tube. A pressure relief valve and a gas-tight connection for the pump power supply cable will also be included in the well head flange assembly. Finally, the wellhead, electrical connection boxes, and appurtenant equipment will be contained in a vault located approximately 3 ft below the surface. Although the vault itself will be accessible year round, any repairs to the submersible pump will be restricted to the period between Labor Day and Memorial Day. During summer months, pump access will not be available due to restricted access to the beach.

STAGING AREA

Location

A fenced staging area approximately 80 ft wide by 140 ft long will be located within the Doheny State Beach parking lot (see Figure 2). The staging area will be needed only during the construction of the wellhead and discharge facilities (January – February 2009), and again during drilling of the two exploratory boreholes (January 2010). The fence around the staging area will be a minimum of 6 ft in height, and each panel will have its own support base or footing and will not be driven into the pavement. Privacy panels will be attached to the fencing sections to reduce the visibility of the equipment storage area.

Site Access

The staging area will be accessed from the Doheny State Beach parking lot (see Figure 3). Trips to and from the staging area will be kept to a minimum, with the majority of trips at the start and end of each work day.

TEST SLANT WELL

Location

The test slant well is located on Doheny State Beach, approximately 87 ft southwest of the new main lifeguard station and approximately 73 ft west of the rock and cement groin which comprises the western bank of San Juan Creek where it outlets to the Pacific Ocean (see Figure 2).

The test slant well wellhead is currently buried 3 ft vertically below ground surface so as not to create any nuisance on the beach. The well casing and screen extend perpendicular from the beach face offshore for 350 lineal ft at a 23° angle from horizontal. The well was located in a stable beach area above the mean high tide line in order to protect the well and the drilling operation from beach erosion. The width of Doheny State Beach west of San Juan Creek is kept relatively stable by the rock and cement groin which terminates in the cement structure known as "Thor's Hammer." The test slant well wellhead is located on the beach approximately 150 ft north of Thor's Hammer.

Site Access

The test slant well on Doheny State Beach will be accessed from the Doheny State Beach parking lot north of the slant well (see Figure 3). As the test slant well is located on the beach, track-mounted or all-wheel drive vehicles will be used to access the wellhead. Track-mounted vehicles will be equipped with rubber treads so that asphalted or paved surfaces will not be damaged. Track-mounted vehicles will produce a footprint pressure of approximately 6.2 pounds per square inch (psi). All other support vehicles provided by any contractor or geologist will be all-wheel drive to allow access to the site.

MOBILE TEST FACILITY

Location

The mobile test facility, which will be used over the entire course of the extended pumping test, will be located immediately to the east of the northeast parking lot and south of the northern park road, which exits onto the southbound lanes of Pacific Coast Highway (Figure 2). The test facility will consist of an ocean container converted into laboratory/office space and will have an approximate 30 ft x 8 ft foot print. An approximate 150-gpm sidestream will be supplied from the slant well discharge line to the mobile test facility, and another buried pipe will return a 130-gpm air/water flow from the test facility back to the slant well discharge line to raise dissolved oxygen levels in the slant well discharge. A third discharge line will be connected to a nearby sewer force main and will be used to discharge RO process water, if needed. This line may connect to the State Park sewer system or the South Coast Water District Sewer system. The mobile test facility will house:

- Online instruments used to continuously monitor slant well discharge for pH, dissolved oxygen, oxidation reduction potential, and specific conductance;
- An apparatus used for microbiological testing and corrosion testing;
- A reverse osmosis process which will be operating from a sidestream collected from the slant well;
- A sump and pump system to send water used for RO process testing, corrosion testing, biological testing, and online water quality monitoring, either to the well discharge or to a sanitary sewer connection;

- Two 150 ft^3 compressed nitrogen cylinders, which will be connected to the slant well through a small buried supply line; compressed nitrogen will be used to maintain a nitrogen blanket in the well headspace;
- A pump and eductor system used to add dissolved oxygen into a sidestream from the slant well discharge; and
- Electrical supply and control for process testing equipment in the mobile test facility and the submersible pump in the slant well.

Site Access

The mobile test facility will be accessed from the Doheny State Beach parking lot immediately west of the facility (see Figure 1). The site around the mobile test facility will be enclosed with a green chain link screening fence to limit access and protect the public. The test facility will have two large access doors at the rear and another access door towards the front.

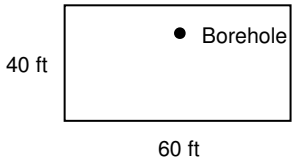
PROPOSED EXPLORATORY BORING SITES AND DRILLING FOOTPRINTS

Location

The proposed locations of the two exploratory borings (B-5 and B-6) are shown in Figure 2. The borings will be located on the beach (Doheny State Beach) east of the San Juan Creek channel and south of the Doheny State Beach campground. The exploratory borings will be located landward of the highest high water and mean high tide lines. Each exploratory boring will be drilled vertically to a maximum depth of approximately 200 ft.

The location of the exploratory boreholes will be within the alluvial channel at the mouth of San Juan Creek. Because the beach on the east side of the creek is less protected from erosional forces than is the west bank (protected by the groin), the drilling locations will be on the landward side of the beach. It may be necessary to reserve all adjacent campground spaces during the drilling phase of the project to prevent noise impacts to campers and avoid disrupting vacationers. The exact location of the exploratory borehole sites will be finalized after consultation with California State Parks.

The footprint required for the drilling operations is an area measuring approximately 40 ft wide by 60 ft long (2,400 square ft) with the borehole centered along one side of the drilling location as is shown below:



It is estimated that three loads of equipment (including the drilling rig, drill pipe carrier, and miscellaneous support equipment) will be mobilized to the Doheny State Beach parking area for use during drilling the exploratory boreholes. Additionally, two 4-wheel drive, one-ton trucks will be used by the crew for transportation of personnel and equipment to and from the site. To keep the drilling footprint on the beach to a minimum, a fenced staging area measuring 80 ft by 140 ft will be established in the Doheny State Beach parking lot for temporary storage of equipment (see Figure 2). Equipment that is required to be located on the beach during the exploratory borehole drilling activities includes the following:

Equipment Type	Approx. Dimensions
20-Ton Track-Mounted Sonic Drilling Rig	25 ft x 11 ft
20-Ton Track-Mounted Support Vehicle	25 ft x 8 ft
1,300-gal Trailer-Mounted Poly Tank	10 ft x 8 ft
6,000-lb. All-Terrain Forklift	8 ft x 6 ft
1 cu. yd Bins for Cuttings / Soil Disposal	4 ft x 4 ft

Geophysical borehole logging equipment will consist of a one-ton panel van containing geophysical tools and data processing equipment. Typically, geophysical logging in the field is accomplished by one person.

The consulting geologist will have a four-wheel drive pickup truck that will be used to transport lithologic core samples from the drilling rig to an area off the beach.

Site Access

Doheny State Beach is accessed from Dana Point Harbor Drive. The exploratory borehole drilling sites will be accessed from paved roads located within the park campground east of San Juan Creek. Because the exploratory borehole sites themselves are located in areas covered by loose beach sand, a track-mounted drilling rig and track-mounted pipe carrier vehicle will be used. Both vehicles are equipped with rubber treads so that asphalted or paved surfaces will not be damaged. Each of the vehicles will produce a footprint pressure of approximately 6.2 psi. All other support vehicles provided by the drilling contractor will be all-wheel drive to allow access to the site. The routes that are to be used for access through the park are depicted on Figure 1.

ADDITIONAL MONITORING WELLS

Up to three additional monitoring wells and stations (e.g., gauging stations) may be installed, as necessary, to provide for supplemental information to measure groundwater and streamflow in areas where information is lacking. Information could include groundwater levels, groundwater quality, streamflow and streamflow quality. The location of these additional wells would most likely be in existing parking areas or undeveloped land/lots upstream of PCH (e.g., between Stonehill and PCH). This work may be required as part of baseline monitoring and permit requirements. The monitoring well construction activities would be similar to that described for the test borings and initial construction activities in Spring 2005, except the activities would not be on the beach.

SLANT WELL EXTENDED PUMPING TEST

GENERAL DESCRIPTION OF EXTENDED PUMPING TEST

In 2006, MWDOC successfully constructed a 12-inch diameter, 350-foot long test slant well on Doheny State Beach. After completion, the well was briefly pump tested at 1,670 gpm to determine well performance, aquifer properties, water quality, and other parameters pertinent to RO operation. Preliminary testing has indicated that water produced from the test slant well may not require pretreatment prior to RO desalination, which would substantially lower capital costs. Preliminary testing has also indicated that the feed water may be initially high in dissolved iron and manganese until equilibrium with the ocean is established (after pumping for approximately one to two months); dissolved iron and manganese may foul or degrade the RO membranes if not kept in a dissolved form or removed. Preliminary testing has also shown that water produced from the test slant well has very low turbidity and SDI levels, indicating the effectiveness of the slow sand filtration provided by the alluvial aquifer. In addition, preliminary testing indicates that the well will be influenced from fresh groundwater and that low salinity water may be produced for a period of one to two months before producing high-salinity ocean water; this may require modification in the design and start-up operation of the RO desalination facility.

Although preliminary pilot well tests have been promising, long-term testing is needed to more thoroughly establish water quality parameters and to establish full-scale desalting process design. Phase 3 pilot-plant testing and water quality testing will require an extended period of initial pumping to pull in ocean water. This will require operating the test slant well for approximately 18 months. Phase 3 testing will measure changes in salinity and other water quality parameters affecting RO process performance; Figure 4 shows a plot of model-predicted salinity in the test slant well discharge and timelines for associated tests, which will be conducted over the course of the 18-month study.

In addition to measuring water quality, Phase 3 testing will provide hydrologic and radium isotope data, which will then be used to validate and refine the existing groundwater model. Finally, Phase 3 testing will evaluate RO process performance, post-treatment requirements for RO product and RO concentrate, materials corrosion, and microbiological growth when operating the test slant well with a nitrogen blanket to maintain anoxic conditions.

Figure 2 shows a plan view of the test slant well, discharge piping, and mobile test facility. A 2,000-gpm submersible pump will be installed in the existing test slant well. The submersible pump will be used to supply water through a temporary pipeline approximately 700 ft to the mobile test facility where a sidestream will be oxygenated by means of a pump and eductor. After going through the eductor, a pressurized mixture of air and water will then be returned to the pump discharge pipeline; and the oxygenated well water will be discharged into San Juan Creek through an outfall diffuser. Pump discharge may be controlled from a valve located near the mobile test facility; the valve may be used to throttle discharge or to provide sufficient backpressure to supply water to the test facility. A check valve will be provided at the wellhead to prevent backflow or siphoning into the test slant well. A process flow diagram of the well discharge and mobile test facility is shown in Figure 5 below.

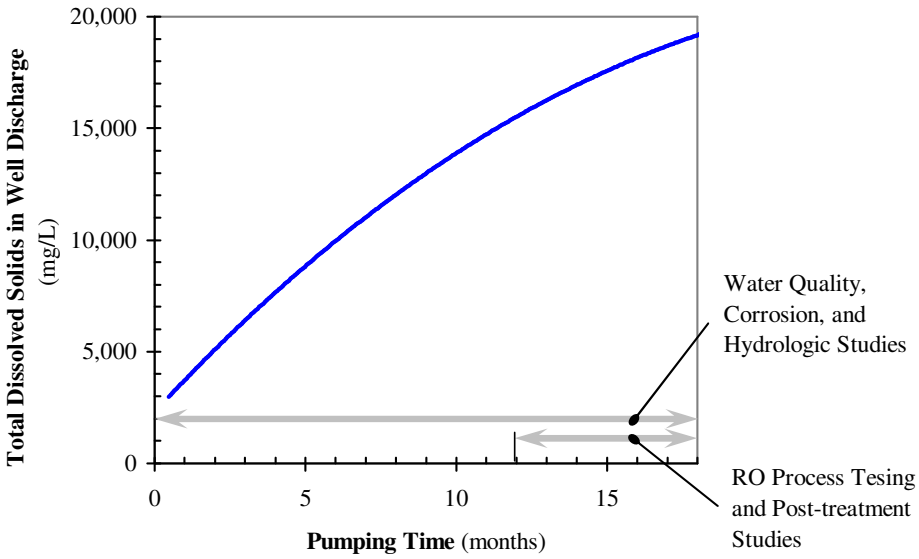


Figure 4. Model-Predicted Salinity Changes in the Test Slant Well Discharge and Associated Testing Over the 18-Month Extended Pumping Test

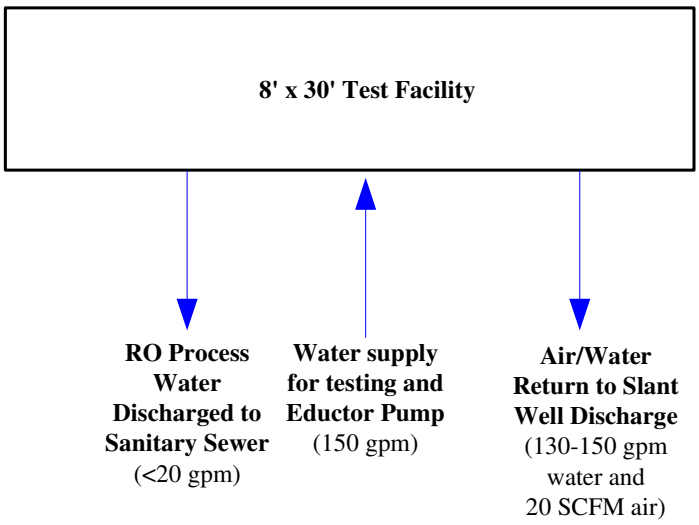


Figure 5. Process Flow Diagram for Well Water Supply to the Mobile Test Facility

Discharge piping will consist of buried pipe, which will run in an eastern alignment to the concrete groin structure and then south along the groin where water will then be discharged through an outfall diffuser located adjacent to the groin near Thor's Hammer—the structure located at the groin terminus. A 150-gpm sidestream will be supplied from the slant wellhead to the mobile test facility through a 4-inch buried pipeline. Pressure used to supply the 150-gpm flow to the test facility will be maintained by an orifice plate downstream of the sidestream supply. This will eliminate the need for a pressure control valve and minimize maintenance requirements during the 18-month pump test.

Approximately 130 gpm of water supplied to the mobile test facility, along with 20 Standard Cubic Feet per Minute (SCFM) of air, will be returned to the slant well discharge. Air added to the slant well discharge will increase dissolved oxygen levels above 5 mg/L. A 2-inch pipeline will run from the mobile test facility to a nearby sanitary sewer and will be used as a contingency for discharging RO process water. Piping will be buried a minimum 24 inches below grade. In addition to the water supply and return, three additional conduits will be supplied from the test facility to the slant well for instrument cables, submersible pump power, and for compressed nitrogen. Signal cables from the pressure transducers installed in the test slant well and monitoring well, and the oxygen sensor in the production well, will be routed to the test facility and measured using a graphic data logger.

To eliminate the possibility of air entering the test slant well and oxidizing dissolved iron and manganese and stimulating microbiological growth, nitrogen will be supplied to the wellhead at low pressure from a compressed nitrogen cylinder stored in the mobile test facility. To ensure that oxygen does not enter the well headspace, an oxygen sensor will be mounted in the upper portion of the well casing. Pumping levels in the test slant well will be measured using a pressure transducer; as a backup, a redundant transducer will also be installed in the same sounding tube. A pressure relief valve and a gas-tight connection for the pump power supply cable will also be included in the well head flange assembly. Finally, the wellhead, electrical connection boxes, and appurtenant equipment will be contained in a vault located 3 ft below the surface.

The principal objectives of the Phase 3 investigation are summarized as follows:

1. Conduct extended test slant well pumping test to:
    a. Measure water quality changes as well as water composition changes from brackish water to predominantly ocean water with particular emphasis on salinity, dissolved iron and manganese, dissolved oxygen, temperature, and microbials;

b. Measure parameters pertinent to the RO process that will determine the extent of pretreatment required for RO;

c. Measure radium isotope signatures to determine if the well is predominantly drawing water vertically from the open ocean or horizontally from ocean aquifers;

d. Measure water levels and other parameters in the two existing nested monitoring wells – MW1 and MW2; and

e. Validate and refine the existing ground water model using data (i.e., hydraulic, salinity, and radium isotope measurements) measured over the course of the 18-month test.

2. Conduct corrosion studies to determine appropriate materials for the wells, pumps, and conveyance pipelines;
3. Evaluate the effectiveness of using a nitrogen blanket in the test slant well headspace to maintain anoxic conditions in order to control microbiological growth in the well and dissolved iron and manganese oxidation;
4. Conduct studies to measure the extent of microbiological growth under anoxic conditions and determine the speciation of natural organisms, which may grow in the conveyance facilities and evaluate control approaches if necessary;
5. Test RO process performance using test slant well water—maintained under a nitrogen blanket—with high levels of dissolved divalent iron and manganese without first pre-treating the water;
6. In conjunction with researchers at the University of California, Los Angeles, Test advanced RO desalination nanocomposite membranes, which may offer higher performance, greater biofouling resistance, and/or cost savings over conventional desalination membranes;
7. Conduct preliminary evaluations to determine the likely process requirements for post-treating RO product water, prior to distribution, and RO concentrate, prior to ocean disposal; and
8. Determine if co-discharging RO concentrate with wastewater effluent will result in any permit discharge violations.

FACILITIES REQUIRED FOR EXTENDED PUMPING TEST

Wellhead Facilities

The slant wellhead will be contained within a concrete vault which will be buried approximately 3 ft below grade. The pre-cast concrete vault will provide a space for wellhead connections and will be accessible through a stainless-steel plate on top of the vault which will be secured by tamper-resistant fasteners. The vault will house the pump discharge line as it exits the well casing, connection to the 1-inch nitrogen gas supply line from the mobile test facility, a sounding tube for water level transducers, a connection to mount a gas-phase oxygen transducer, and a purge valve to release excess headspace pressure. A power supply cable for the submersible pump will be routed through a buried conduit and terminated in a water-tight junction box housed in the well-head vault. Figure 6 below illustrates the wellhead connection details.

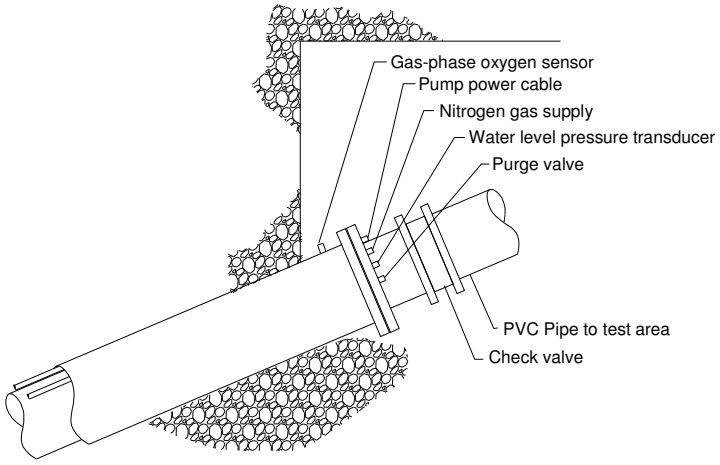


Figure 6. Wellhead Connection Details

Discharge Piping

Well discharge piping will consist of a 10-inch discharge pipe buried at least 3 ft beneath grade. The buried discharge pipeline will run in an eastern alignment to the concrete groin and then south along the groin where water will then be discharged through an outfall diffuser located adjacent to the groin near Thor's Hammer (see Figure 2). The outfall diffuser will be above grade and secured along the groin using the existing rip-rap lining. A 150-gpm sidestream will be supplied to the mobile test facility through a buried 4-inch pipeline which will run in an eastern alignment from the slant wellhead to the groin and then north along the edge of the bike path to the mobile test facility. A 6-inch water return line will then connect with the well discharge near the groin where the well discharge transitions from an east/west alignment to a north/south alignment. A second vault may be needed where the test facility return flow connects back to the slant well discharge. The vault would be large enough to house the valve and connection to the slant well discharge.

The pipeline from the mobile test facility will be constructed alongside the bike path before the Orange County Flood Control District commences with extending the bike path northwards in May 2009. This timing will limit disruptions during the bike path construction.

Air/Water Return and Gas Injection

In addition to the wellhead vault, another vault will be located along the groin to house the sidestream piping and an air/water injection diffuser, which will be installed in the discharge line to add dissolved oxygen to the well discharge before it flows into the surf zone. The air/water return will consist of a 6-inch pipeline which will carry approximately 130-150 gpm of water and approximately 20-SCFM of air. The gas and water mixture will have an approximate 10-20 psi gage pressure and return to the well discharge through a diffuser located in the 10-inch slant well discharge. A vault may be needed to house the valve where the water returns to the slant well discharge. The 20-SCFM gas phase injected into the slant well discharge will decrease by some amount, however, a substantial portion of the injected gas will remain as a separate, discontinuous phase in the slant well discharge and will ultimately vent through the downstream outfall diffuser.

Outfall Diffuser

Water pumped from the test slant well will be discharged into the surf zone through an outfall diffuser structure. The outfall diffuser will consist of an approximate 20-ft length of perforated stainless steel pipe and function as an energy dissipater and flow diffuser for the 2,000-gpm pump discharge. Due to its proximity to the surf zone and potential for filling with sand, the outfall diffuser may be constructed with a gravel pre-pack envelope to minimize sand clogging. The outfall diffuser will be situated directly adjacent to the groin near Thor's Hammer and will be secured by placing the existing rip-rap over the structure. To minimize the footprint, the diffuser may be constructed in square or rectangular section to minimize scouring.

Electrical Services

Electrical power service will be supplied from an existing San Diego Gas and Electric junction box located underneath the northern park road (see Figure 2). A buried conduit will then be installed from the junction box to a 480 VAC transformer located in the northeastern portion of the park.

Nitrogen Supply

Nitrogen will be supplied to the wellhead headspace to eliminate oxygen entrainment into the slant well discharge. Nitrogen will be stored in the mobile test facility in secured, 150-ft^3 gas cylinders. Nitrogen will be supplied to the slant well through a small-diameter, metal supply line and will be regulated at an approximate 2 to 5 psi pressure. A spare nitrogen cylinder will be stored onsite.

Monitoring Well Instrumentation

Monitoring wells MW-1 and MW-2 are to be used as observation wells during the extended pumping test (see Figure 2). The wells were completed in 2005 as part of the Phase I hydrogeology investigation. Each well contains three nested 2-inch PVC wells screened in a shallow, middle, and deep zone,[1] which were identified based on analysis of lithology and geophysical borehole logs.

Due to its location on the beach, the top of MW-1 well casing is buried 3 ft below ground surface so that there are no permanent obstructions created in the beach area. The MW-1 wellhead completion consists of a small concrete pad and 12-inch diameter, metal cover that can be located using a metal detector or other means. MW-1 can only be accessed after excavating the beach sand to expose the metal well cover that is 3 ft beneath the beach. As MW-2 is not located on the beach, its wellhead completion consists of a 12-inch diameter, metal monitoring well cover that is set within a concrete ring that is flush with the ground surface. Inside the metal well cover, each of the 2-inch casings is capped using expandable well seals that are locked.

MW-2 is currently instrumented to record continuous water level data. MW-1 previously had water level and water quality probes, but these were pulled out and the well covered when the test slant well was covered in May 2006. Before the extended pumping test takes place, MW-1 will need to be uncovered and instrumented with water level and water quality probes, and MW-2 will be instrumented with water quality probes. Signal cables from the pressure transducers and water quality probes installed in MW-1 will be routed to the test facility and measured using a graphic data logger. As MW-2 is readily accessible, data can be periodically downloaded by one person from the data logger during the 18-month test, and no trenching to lay cables to the mobile test facility is needed.

[1] Generally, the shallow aquifer zone is considered to be approximately 10-25 ft bgs, the middle aquifer zone is 40-130 ft bgs, and the deep aquifer zone is 140-165 ft bgs.

DETAILED DESCRIPTION OF EXTENDED PUMPING TEST TASKS

Install Wellhead and Discharge Facilities

Installing the test slant well discharge facilities will consist of the following tasks:

- Excavating existing slant wellhead and trenching for slant well discharge piping. This task will involve backhoe excavation around the slant wellhead, approximately 5 vertical feet below ground surface, and providing an approximate 3-4 ft trench in the beach area for the slant well discharge line (see Figure 2 for piping alignment);
- Install slant well discharge piping and outfall diffuser by setting the slant well discharge pipe in the trenches and installing the outfall diffuser along the side of the groin structure near the surf zone; existing rip-rap along the groin will be temporarily moved and then replaced once the discharge pipeline and diffuser have been installed; the outfall diffuser will not be otherwise attached to the groin, which would require Army Corp of Engineer's approval;
- Install submersible pump power supply, instrument conduit, and nitrogen supply;
- Install pre-cast vault over existing slant wellhead. This task will involve setting the pre-cast concrete vault around the wellhead and discharge piping using a 40-ton crane; after installation, the excavated portion will be re-filled and compacted, leaving the top of the vault accessible for subsequent well redevelopment and installation of the submersible pump;
- Install sidestream piping, electrical conduit, instrument signal cables, and compressed nitrogen line to the mobile test facility; connect the sidestream return line to the slant well discharge.

The submersible pump power cable and instrument cables will be run in separate conduits along the same alignment as the slant well discharge pipe and will not require separate trenching. The nitrogen supply line will consist of a 1-inch copper pipe, which will run parallel to the instrument and power conduits.

Schedule

The work schedule for construction of the wellhead and discharge facilities will be 10:00 AM to 6:00 PM, Monday through Friday, due to the proximity of the campground. The work to construct the wellhead is expected to take two weeks, with an anticipated start in January 2009.

It would take approximately four weeks to complete trenching and laying pipes for slant well discharge water, nitrogen line and signal cables. This work will start on approximately January 20, 2009, and be completed by February 25, 2009. No construction work will be conducted on the beach during the period from mid-May to Labor Day.

Number of Workers

Construction of the slant well discharge facilities will be undertaken by a four-person crew and overseen by the supervising geologist and engineer.

Install Electrical Services

Power service for testing will involve connection to San Diego Gas and Electric's (SDG&E) sub-grade junction box underneath the northern park road; a buried conduit will then be run from the SDG&E junction box to an above-ground transformer located in the northeastern portion of the Park. Figure 2 shows the approximate location of the power supply conduit and SDG&E-supplied 480 VAC transformer. A second buried conduit will then be run from the transformer to the mobile test facility. Conduit installation may involve trenching in portions of the northern parking lot and northern park road as well as trenching in landscaped areas (see Figure 2) or may involve boring/tunneling to install conduit. If boring is used, then a pit would need to be excavated in the northeastern portion of the park in the landscaped

area to accommodate the tunneling machine; the pit would be excavated by backhoe and would be approximately 4 ft wide 10 ft by 5 4 ft deep. After trenching in paved areas, the trenches will be re-compacted and re-paved following installation of power conduits. Trenches cut through landscaped areas will be re-compacted and re-landscaped if necessary. If boring is used, then the access pit would be re-filled and re-compacted after boring.

Schedule

It is estimated that installation of electrical conduits from the SDG&E tie-in to the new transformer and to the mobile test facility will require approximately three weeks to complete conduit installation and to pull wires and connect power. It is expected that the work would start in the beginning of February 2009 and be completed by February 20, 2009.

Number of Workers

It is estimated that a 4-person crew consisting of an electrician and helpers will be required for excavation, running conduit and running wiring.

Test Slant Well Redevelopment

Before the submersible pump to be used for the extended pumping test is installed in the slant well, the well will require redevelopment, as it has not been pumped since May 2006. The redevelopment process will first involve videoing the test slant well to inspect the condition of the casing and perforated intervals. A one-ton panel van with four-wheel drive capability will be used to drive up to the wellhead to conduct the video survey.

Swabbing the screened interval with a nylon brush will be the main method of redevelopment if encrustations are present. The final phase of redevelopment would involve a combination swab and airlift development using a temporary test pump to remove loose sediment and encrustation from the well. Vehicles that would be used by the redevelopment crew would include a truck-mounted pump installation unit on a one-ton truck, all-terrain forklift, flatbed / support vehicle, and trailer-mounted air compressor.

Discharge from the well during the redevelopment process will enter an onsite baffled Baker tank where suspended materials will settle out, and the resulting clear water will be discharged to San Juan Creek through a temporary tie-in to the discharge piping and diffuser. Initially, if discharge water from the Baker tank is not acceptable for meeting NPDES requirements prior to discharge, the fluid will be either filtered, discharged to the nearby sewer manhole, or removed using a vacuum truck and disposed in an acceptable manner.

A temporary chain-link fence that is 6 ft in height and has a 16-ft wide gate will enclose the work site at all times.

Schedule

The work schedule for the test slant well redevelopment will be 10:00 AM to 6:00 PM, Monday through Friday, due to the proximity of the campground. The work is expected to take two weeks, starting on approximately March 2, 2009.

Number of Workers

Slant well redevelopment will be undertaken by a three-person crew and overseen by the supervising geologist. An additional person from an outside company will provide the downhole video service.

Install Submersible Pump

The 2,000-gpm submersible pump will be installed in the test slant well, along with pipe column using a truck-mounted pump installation unit. Once the pump has been installed, it will be connected to the discharge piping and electrical supply.

The work site will be surrounded by temporary 6-ft fencing for pubic safety. Other vehicles that would be used by the pump installation crew would include all-terrain forklift, and a flatbed / support vehicle.

Schedule

It is expected that it would take approximately one week to install the submersible pump and connect it to the discharge piping and electrical supply. This task should start on March 17, 2009, and be completed by March 20, 2009.

Number of Workers

Pump installation will be undertaken by a three-person crew and overseen by a supervising engineer.

Extended Pumping Test

During the 24-month pumping test, the submersible pump will be left to run continuously. Water levels and quality within the test slant well and monitoring well MW-1 will be recorded by data loggers installed in the mobile test facility. Data from monitoring well MW-2 will be downloaded every month by one person. All other activities related to the pumping test involve the mobile test facility, and are described in greater detail in Section 0.

In the event that the pump needs to be repaired during the 24-month test period, a contractor will be called out to inspect and repair the pump. Although the vault itself will be accessible year round, any repairs to the submersible pump will be restricted to the period between Labor Day and Memorial Day. During summer months, pump access will not be available due to increased beach use.

Vehicles that would be used during the repair process would include a truck-mounted pump installation unit on a one-ton truck, all-terrain fork lift, flatbed / support vehicle, and trailer-mounted air compressor.

Schedule

It is expected that the full-time extended pumping test will commence in mid-May 2009, continuing until mid-May 2011.

Number of Workers

During the extended pumping test, no one is required to attend to the slant well or pump unless there is a problem with the pump itself or the connections within the buried vault. In the event that the pump needs to be repaired, a three-person crew will conduct the repairs with one MWDOC representative providing oversight.

MOBILE TEST FACILITY

GENERAL DESCRIPTION OF MOBILE TEST FACILITY

A mobile test facility will be constructed to house RO process equipment as well as appurtenances such as online instrumentation, eductor pump, and motor controls for the test slant well pump. The test facility will function as a stand-alone RO test platform and be housed in a 30 ft x 8 ft air-conditioned container. The site around the mobile test facility will be enclosed with a green chain link screening fence to limit

access and protect the public. The test facility will have two large access doors at the rear and contain sufficient ventilation for personnel to safely work in the structure. The facility will have separate areas for process equipment and for electronics and a test bench. Power will be supplied to a central power panel inside the container, which will then be used to power test equipment in the facility as well as power the submersible pump in the test slant well. The facility will house:

- RO test train and chemical feed;
- Online water quality instrumentation;
- Testing apparatus used for corrosion and microbiological testing;
- Eductor and pump for oxygenating well discharge water;
- Sump and pump system for returning water to either the well discharge or a nearby sanitary sewer;
- Electrical panel for power to the test facility and slant well pump;
- Electrical controls for the slant well submersible pump;
- Compressed nitrogen gas cylinders for maintaining inert gas in the well headspace;
- Visual data loggers for measuring water level transducers and online instruments; and
- A work bench for conducting onsite tests.

Figure 7 shows the location of various components and test equipment within the mobile test facility. Each of the major components housed in the test facility is described in more detail in the following sections.

The mobile test facility will be constructed offsite and delivered to the staging area and set in the location shown in Figure 2.

DETAILED DESCRIPTION OF MOBILE TEST FACILITY

Onsite Chemical Usage

Three chemicals will be used for the low flow RO process testing. Online water quality monitoring, corrosion testing, and biological testing will not require chemical addition.
Table 1 lists the chemicals and maximum anticipated chemical dose, which will be added to the 16-gpm RO feed. Each chemical is listed by the Chemical Abstract Services (CAS) registry number. The dose shown in Table 1 for each chemical is the maximum dose that would be used. Sulfuric acid may be needed to lower pH from a 7.0 ambient level down to pH 6.5, which is the lowest pH that would likely be used. Sodium bisulfite may be needed if dissolved oxygen levels increase in the slant well discharge water, however, if dissolved oxygen levels remain low, then a bisulfite dose lower than 5 mg/L would be used. Adding antiscalant to the RO feed will be needed to minimizing mineral scaling, which may occur in the reverse osmosis process. The maximum antiscalant dose would be 3 mg/L.

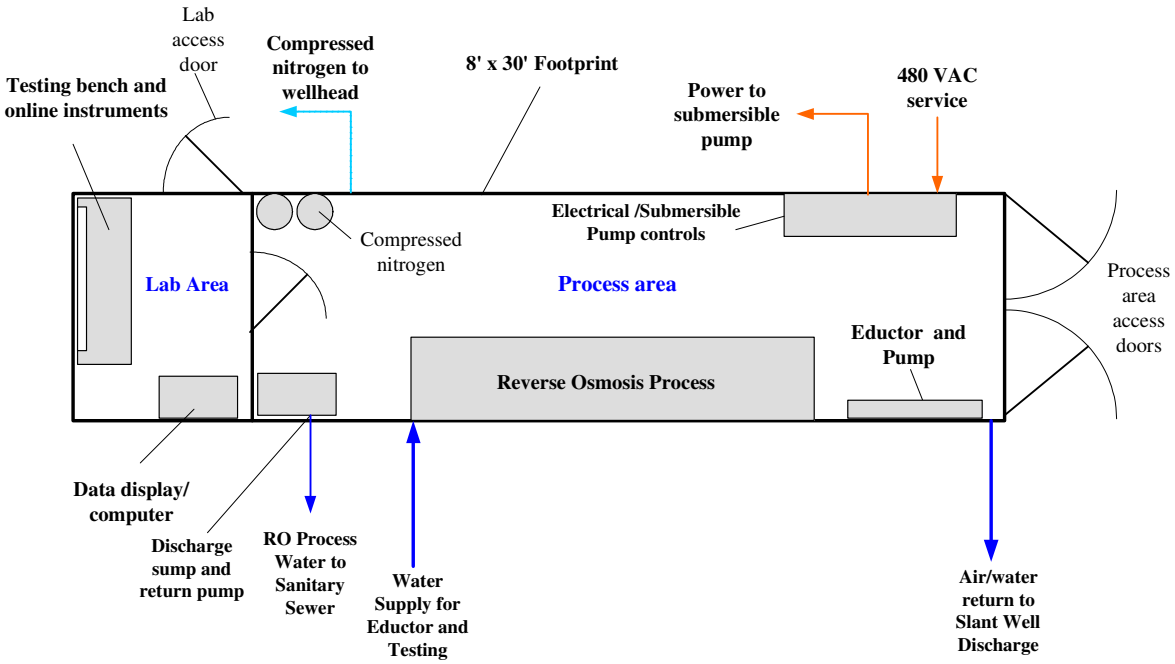


Figure 7. Plan View of the Mobile Test Facility Showing Location of Lab, Process Area, and Test Equipment

Adding sulfuric acid lowers water pH and results in sulfate ion increase. If the RO product and concentrate streams are discharged back to the slant well discharge, then adding a 50-mg/L sulfuric acid dose to the RO feed will result in an approximate 0.5-mg/L increase in sulfate concentration after the RO product and concentrate streams are returned to the slant well discharge pipeline. The sulfate level pumped from the slant well will likely vary between approximately 950 mg/L to 1,825 mg/L over the course of the Phase 3 extended pumping test. Although adding sulfuric acid will lower pH in 16 gpm RO feed, it will not lower slant well discharge pH by a measurable amount (less than 0.01 pH unit).

Adding sodium bisulfite will result in an increase of sodium ions, which are stable and non-reactive, and an increase in sulfite, which will react with dissolved oxygen. The stable end-product of sulfite is sulfate. Adding a 5-mg/L sodium bisulfite dose to the 16 gpm RO feed stream would result in a net 0.04-mg/L sulfate increase and 0.01-mg/L sodium increase after it is discharged back to the 2,000-gpm slant well discharge. Sodium concentrations in the test slant well discharge will vary between approximately 400 mg/L to approximately 6,000 mg/L over the course of the Phase 3 extended pumping test.

Antiscalant will be added to the RO feed at a maximum 3-mg/L dose to minimize the potential for sparingly soluble salt formation on RO membranes. Most of the antiscalant added will travel through the RO process and end up in the RO concentrate stream. At a 3-mg/L, neat-product[2] dose, the slant well discharge would contain approximately 0.07 mg/L antiscalant (as neat product) once the RO product and concentrate streams had been returned to the slant well discharge pipeline. Although largely proprietary, commercial RO antiscalant chemicals generally contain phosphates and/or weak organic acids (e.g., carboxylic acids) as the principal active ingredients. At the low doses used, antiscalant addition will not have a measurable effect on water quality discharged from the slant well. As a contingency, RO product and concentrate may be discharged to a nearby sanitary sewer connection. The sewer connection will be sized to accept approximately 20-gpm, which will accommodate the full RO process flow.

[2] Neat product dose refers to an undiluted product and does not consider the active ingredient concentration; because of their proprietary nature, antiscalants are dosed as a neat product and not as active product.

Table 1 Chemicals and Doses for Reverse Osmosis Pilot Testing

Chemical Name	CAS Number	Maximum Dose (mg/L)	Chemical Usage (gallons/day)	Approximate Maximum Concentration in Reverse Osmosis Concentrate (mg/L)	Approximate Maximum Concentration in Slant Well Discharge (mg/L)*	Effect on slant well discharge pH
Sulfuric Acid	7664-93-9	50	0.7	100***	0.5***	< 0.01 decrease
Sodium Bisulfite	7631-90-5	5	0.4	10***	0.05***	None
Antiscalant	**	3	0.07	6†	0.03†	None

*Assumes 2,000-gpm well discharge and an 8-gpm RO concentrate return flow and 8-gpm RO product return flow
**Antiscalants are generally proprietary mixtures of organic acids and/or phosphates
***Addition of Sulfuric Acid and Sodium Bisulfite will result in an increase in Sulfate concentration
† Concentration reflects dosage as neat product: active components (e.g., carboxylic acids and phosphate) will be lower as the product is not entirely composed of active ingredients

Onsite Chemical Storage and Chemical Spill Prevention Plan

Chemicals added to the RO process will be stored in 5-gallon, polypropylene or polyethylene containers with secondary containment to facilitate easier handling and to minimize the potential for spilling a large quantity of a given chemical. Secondary containment will consist of another polypropylene container with sufficient volume to hold contents of the primary chemical container. Chemicals will not be transferred from a storage container to a feed container; rather, to minimize the chance of spills, chemicals will be supplied in 5-gallon containers, which are able to connect directly to feed pumps. Therefore, chemicals will not need to be transferred out of their container. No more than ten gallons of each of the three chemicals will be kept onsite. Acid will be stored and handled in a different manner than sodium bisulfite, as exposing bisulfite to acid would have adverse impacts. A spray-on, corrosion-resistant liner will be applied to the process testing area in the mobile test facility to provide an additional level of spill protection. Chemical feed and supply facilities will incorporate vapor control measures on tank ventilation to ensure that gas-phase sulfur dioxide concentration in the process area does not exceed OSHA exposure guidelines. Finally, in the event of a spill, the mobile test facility will be equipped with a safety shower and eye wash station.

Power Supply

480 VAC power will be supplied to the mobile test facility from a transformer located in the northeastern portion of the park property; the transformer will be installed by SDG&E as part of this project. The transformer will tie into SDG&E's power service, which has a vault located underneath the northern park road. The approximate locations of SDG&E's tie-in structure, power supply conduits, and new transformer are shown in Figure 2.

Table 2 lists the power requirements for the mobile test facility as well as the submersible pump. The calculated submersible pump power requirements shown in Table 2 assume a 60-percent overall pump and motor efficiency, a 2000-gpm flow rate discharging through 10-in. and 12-in. pipe, and a 110-ft total dynamic head. Power requirements for the test facility include the power required for the pump and eductor system, RO process, online instruments, lights, and ventilation.

Table 2. Power Requirements for Pilot Test Facilities

Component	Power Requirement (kW)	Approximate Horsepower
Submersible Pump	70	90
Eductor Pump	9	14
RO process	3	5
Lighting, instrumentation, and ventilation	5	

Reverse Osmosis Process Testing

An RO test train will be fabricated and installed in the mobile test facility before it is installed at the test site. Feed to the RO process will be approximately 15 gpm and will be supplied directly from the test slant well discharge pipe to the RO feed pump influent. Chemicals will be added to the RO influent. The RO process will generate a low-salinity product stream and a high-salinity concentrate stream. Each stream will have an approximate 7.5-gpm flow rate. Chemicals added to RO feed will largely remain in the concentrate stream, however, they will be concentrated by an approximate factor of two as compared to their initial dose. Two options exist for discharging the RO concentrate stream:

1. Combine with the RO product stream and send back to the slant well discharge, where it will be discharged into the surf zone; and
2. Send the 15-gpm RO process stream to a nearby sanitary sewer connection and avoid discharge to the surf zone.

The option used for RO concentrate discharge will depend on allowances provided in the discharge permit as well as on decisions from other regulatory agencies involved in the permitting process.

Oxygen Addition to Well Discharge

Well discharge to the surf zone will require a minimum 5-mg/L dissolved oxygen residual. Water from the test slant well will not likely contain measurable dissolved oxygen residual; therefore, oxygen will need to be added to the 2,000-gpm well discharge to ensure levels exceed 5 mg/L. A pump and eductor system will be used to reliably add oxygen over the 18-month test. The eductor system will require drawing a 120-gpm sidestream from the well discharge, adding approximately 20 standard cubic ft per minute of air and sending the air/water mixture back into the well discharge pipeline through an inline diffuser assembly. A multi-stage centrifugal pump will be required to pressurize the 120-gpm sidestream to approximately 100 psi before sending the water through the eductor and diffuser nozzle. A standby pump will be supplied in case of pump failure. Figure 8 shows a process schematic of the pump, eductor, and injection nozzle.

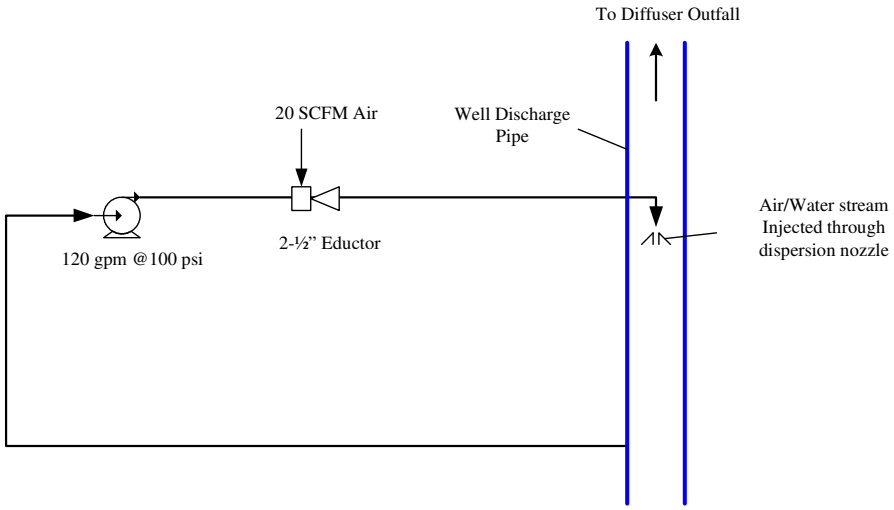


Figure 8. Pump and Eductor Process Flow Diagram for Adding Dissolved Oxygen to Discharge Water

Online Instruments for Water Quality Monitoring, Corrosion Monitoring, and Biological Monitoring

The mobile test facility will house instruments used for online testing, a corrosion testing apparatus, and an apparatus to measure biological growth. All of these tests will use an approximate 4-gpm sidestream from the slant well discharge for testing. Water from the slant well discharge will split and flow through three different manifold assemblies housing the various test setups. After water flows through the online instruments and other testing setups, it will collect in an effluent manifold and then be discharged to a sump, which will then pump back to the well discharge pipe. No chemicals will be added to this sidestream and water quality will not be altered except by the addition of oxygen.

DETAILED DESCRIPTION OF MODEL TEST FACILITY TASKS

Install Mobile Test Facility

The mobile test facility will be constructed offsite and delivered to the Doheny Beach Test site with the major components already installed. The mobile test facility will be delivered to the staging area and set in the location shown in Figure 2 using a 40-ton crane. Once the mobile test facility is in place the following connections will be required:

- Power service connection from the nearby 480 VAC transformer;
- 4-inch water supply and 5-inch return connections from the slant well discharge to the pump and eductor and online testing;
- A 2-inch discharge line connected to the sanitary sewer located in the north portion of the park;
- Instrument signal cables from the slant wellhead and monitoring well MW-1;
- Nitrogen supply line to the slant wellhead; and
- Submersible pump power supply from the mobile test facility to the slant wellhead.

Power service from the nearby transformer will require trenching landscaped areas to install a maximum 2-inch electrical conduit from the power meter and box on the above-ground transformer to an electrical junction box on the mobile test facility. Water supply and return lines from the slant well discharge will require trenching the grass area surrounding the mobile test facility and along the bike path to the slant

wellhead; all supply and return lines from the slant wellhead will be run through a single trench leading to the test facility.

A 2-inch line will be connected to the sanitary sewer, which runs along the western boundary of the park property. The buried pipeline will run in an approximate 4-6 inch wide trench at a depth below 2 ft. It may be placed in the same trench as the electric service line. The pipeline will run west from the mobile test facility to the edge of the parking lot and then north to an elbow, located in the north-eastern portion of the park property in the landscaped area, then west to a connection point across the street from Denny's. The connection to the s\ewer will use wet-tap methods to ensure the sewer line will not be taken out of services during the connection. Another option would be to connect to the State Parks sewer.

Schedule

Once delivered to Doheny Beach State Park, it is estimated that the mobile test facility can be placed in its final location within one day. Approximately two weeks will be required to complete mechanical and electrical connections to the test slant well discharge and for electrical service.

Number of Workers

It is estimated that a four-person crew, consisting of mechanics and electricians, and a supervisory engineer will be required for installing the mobile test facility. Another two- to three-person crew will be needed to backfill excavations required to run connecting piping and electrical service.

Water Quality Monitoring, Corrosion Testing, Biological Monitoring, and RO Process Testing

Testing conducted as part of the extended pump test will be largely confined to the mobile test facility. These activities will also involve occasionally sampling the slant well discharge in San Juan Creek and downloading data from nearby monitoring well MW-2, which is located in the parking lot to the west (see Figure 2).

Schedule

Prior to the 18-month extended pumping test, the mobile test facility and appurtenances such as down-hole instrumentation will require acceptance testing and shakedown for a period of four weeks. Once the 18-month pump test begins, water quality measurements, corrosion testing, and biological testing will continue throughout the course of testing. Reverse osmosis process testing will be conducted for approximately nine months.

Number of Workers

Prior to the start of the 18-month extended pumping test, engineers will be onsite to validate operation of all test equipment including online instrumentation, RO process equipment, and appurtenant equipment such as data collection, eductor pump, and RO process water return pumping. It is estimated that two engineers will be onsite for a period of four weeks prior to testing for mobile test facility shakedown.

Once testing begins, personnel will be onsite daily throughout the course of testing. During reverse osmosis process testing, an operator will be onsite for six to eight hours every day. Water quality sampling will be conducted by field geohydrologists or file field engineers, and will usually require only one person. During site tours, more people will likely be touring the test facility and beach area for brief periods. It is estimated that most site tours would contain fewer than 20 people.

DRILLING OPERATIONS FOR EXPLORATORY BORINGS

GENERAL DESCRIPTION OF SONIC DRILLING METHODOLOGY

The sonic drilling method is also known as Rotosonic, Sonicore, Vibratory, or Resonantsonic drilling and is most often used in the environmental drilling industry as it is a "dry" drilling method[3]. The sonic drilling method advances the borehole by using high-frequency mechanical vibrations that apply sinusoidal forces to the axis of the drill pipe. The borehole is cased with flush-threaded pipe as it is advanced through the formation materials. Advancement and casing of the borehole takes place simultaneously with collection of continuous, nearly undisturbed core samples containing both unconsolidated and consolidated formation materials.

A top head drive unit mounted on the mast of the drilling rig contains the hydraulically operated oscillator capable of generating vibrations with frequencies of 50 to 150 cycles per second. As the drill bit at the leading face of the flush-threaded sonic casing is advanced, the vibrations cause soil and rock particles to move away from the drill string, permitting fast penetration (drilling) rates. Very few drill cuttings are generated at the surface other than the core itself, and no water is produced unless it is pumped from the borehole. After approximately each 2.5 to 5-foot interval of borehole advancement, the core barrel is removed from the borehole, and the core is extruded into plastic sleeves. These plastic sleeves will protect the core from cross-contamination and loss during logging and transport. The sonic drilling system offers a very accurate method for collecting nearly undisturbed continuous formation samples, while avoiding generation of fluids.

Geophysical borehole logs will be run within temporary PVC casing that is installed in each borehole. Once logging is completed, the PVC casing will be removed.

Isolated aquifer sampling may be conducted at specific depths as the bore hole is advanced. The outer casing that is driven into place will prevent cross-contamination between aquifers and mixing of formation materials. Collection of isolated aquifer water samples will be accomplished by filter packing and sealing the zone before a small diameter pump is installed to extract water from the zone. Any water produced during zone testing will be contained in the trailer-mounted poly tank and will be transported to a nearby sewer manhole (maintained by SCWD) for disposal. Proper approval for disposal of fluids will be arranged by the contractor with SCWD prior to the start of drilling.

Noise levels generated by equipment operating at each drilling site will be a maximum of 85 to 90 dB within a distance of 25 ft from the drilling rig; diminishing to less than 75 dB at a distance of 50 ft. It should be known that normal conversation typically has a noise level of 70 dB, as do passing vehicle on a paved surface. The major source of the noise that is generated is from the rig engine and occurs on a continual basis. Additionally, noise occurs from the sonic head on an intermittent basis, particularly when hard formation materials are encountered. Baffled and insulated plywood sound barriers will be placed around the rig engine compartment to assist in reducing rig engine noise.

Once the total depth of the borehole has been reached and the core barrel has been removed, the outer sonic casing will be retracted from the borehole as temporary 4-inch PVC screen is installed[4]. Once the geophysical borehole logs have been run within the PVC screen, the PVC materials will be removed before the borehole is destroyed using a neat cement grout (i.e., Type II Portland cement and water only). The cement slurry will be pumped under pressure through a small-diameter tremie pipe that is placed near the bottom of the borehole. This ensures positive placement of the sealing materials. Any excess cuttings that are removed during the drilling process (that are not a part of the core) will be discharged into an onsite 1-cubic yard hopper. Materials in the hopper will be transferred to a larger roll-off container stored in the parking lot staging area. Proper disposal of soils in a nearby landfill will be the responsibility of the contractor.

[3] With dry drilling methods, typically no materials (air, water, or drilling additives) are added to the borehole during the drilling process.

[4] PVC screen is installed to ensure the borehole remains open during geophysical borehole logging.

DRILLING PERMITS

The required drilling permits for the exploratory boreholes will be obtained by the contractor prior to the start of work. The permits will be obtained from the Orange County Health Care Agency Environmental Health Division and the drilling shall be carried out as per their requirements.

SPILL PREVENTION PLAN

Prior to the commencement of drilling operations, a containment area will be constructed to enclose the drill rig and other equipment to minimize the potential for releasing fuel, hydraulic fluid, or water from drilling operations to the surrounding environment. A temporary chain-link fence that is at least 6 ft in height with a locked 16-ft width gate will surround the entire drilling work site (approximately 60 ft x 40 ft). All drilling equipment will be underlain by heavy-duty (3-ply) plastic sheeting that will completely cover the area under and adjacent to the drilling rig and support equipment and will be bermed along the edges to contain potential spills. Additionally, absorbent materials will be maintained on site during work operations as part of a spill prevention plan (see Attachment A) to immediately clean up any spills that may occur. Used absorbent materials will be disposed in a proper manner at an approved offsite location.

It is estimated that drilling operations will require the use of 40 to 60 gallons of diesel fuel daily. Fuel will be delivered to the site daily using a portable tank mounted in the bed of one of the crew trucks. All fuel will be handled in accordance with the fuel containment plan. No fuel or oil products, other than that which is in equipment fuel tanks, will be stored onsite.

DRILLING WATER

Minimal water will be required for the drilling process and will be provided to the contractor from a fire hydrant that is maintained by South Coast Water District (SCWD). The fire hydrant is located in the main parking lot west of San Juan Creek and north of the new lifeguard building. The drilling contractor will be responsible for obtaining a hydrant meter from the water district and for paying the deposit or other required fees. The contractor will be responsible for transporting water from the hydrant to the drilling site. All flows will be metered with the cost of water service be paid by MWDOC. A maximum flow rate of 400 gallons per minute (gpm) is available. As the hydrant is used for fire flow, the contractor's work cannot interfere with its use by others.

DETAILED DESCRIPTION OF DRILLING TASKS

Drilling and Support Equipment

The drilling equipment will consist of the track-mounted drilling rig (see Figure 9), the track-mounted pipe truck, a 6,000-lb. all-wheel drive forklift, a 1-cubic yard hopper, a trailer-mounted water tank, and two 4-wheel drive crew trucks. Additionally, a 20-cubic yard roll-off bin will remain in the parking lot staging area. The supervising geologist will also have a four-wheel drive pickup truck.

Each drilling site will be surrounded by temporary 6-ft fencing for pubic safety. The drilling process will produce either 3.5-in or 5-in diameter continuous cores that are each 2.5 ft in length. The continuous cores will be extruded into plastic sleeves and will be transported offsite for additional testing. Minimal cuttings will be produced aside from the formation core, and they will be contained in plastic sleeves.

Geophysical borehole logging equipment will consist of a 1-ton panel van containing geophysical tools and data processing equipment.

Used with permission from Boart Longyear Company, 2008.

Figure 9. Example of a Track-Mounted Sonic Drilling Rig and Track-Mounted Pipe Carrier

Drilling and Sampling Process

Following the kick-off orientation meeting that will be attended by all parties involved in the extended pumping tests and pilot plant testing, the first activity related to the drilling operations will be the installation of temporary chain-link fencing on the beach to surround each 60 ft x 40 ft worksite. In addition, construction fencing with privacy panels will be installed surrounding the parking lot staging area as designated by California State Parks. The staging area in the parking lot will need to be of a sufficient size to store approximately three 40-ft flatbed equipment trailers, or an area that is approximately 80 ft x 140 ft in size. The beach worksite and parking lot staging area will have informational signs prominently displayed on the fencing describing the project and providing contact information for MWDOC.

Mobilization of drilling equipment will include approximately three trailer loads of equipment transported from the contractor's yard to the Doheny State Beach parking lot staging area. A lowboy trailer for heavy equipment hauling will be needed to transport the track-mounted sonic drilling rig and drill pipe carrier to Doheny State Beach. The lowboy trailer will be returned to the contractor's yard and will not be kept at the park during drilling.

Once the temporary fencing and protective plastic sheeting is in place, the drilling rig and support equipment will be brought onto the site. Equipment to be located on the beach includes the track-mounted sonic drilling rig and track-mounted pipe carrier. Each unit is approximately 25 ft in length and will exert not more than 6.2 psi to surfaces under the rubber tracks.

All flush-threaded drill pipe will be provided in sections that are 10 ft in length. All drill string and casing sections needed for each day's drilling activities will be brought from the parking lot staging area to the drilling site on a daily basis (see Figure 2). An all-terrain forklift with rubber tires will be used to lift and place the drill casing into place as needed.

Lithologic samples will be collected at approximately 2.5-ft intervals from core barrel and will be placed in heavy duty plastic sleeves that will be properly labeled as to depth of sample and borehole name. Samples will be identified as to material type and potential as a productive aquifer by visually logging them in the field using the Unified Soil Classification System (USCS). All excess drill cuttings will be transported to the roll off bin located in the parking lot staging area. At the end of the project the excess soil materials will be disposed of at a suitable location that is acceptable to MWDOC.

Geophysical borehole logging equipment will consist of a 1-ton panel van containing geophysical tools and data processing equipment.

Upon completion of drilling and testing, each borehole will be destroyed by filling with neat cement from total depth to 10 ft below ground surface. The upper 10 ft of each borehole will be backfilled using native materials. Each site will be cleaned and the sand will be raked so that all traces of the drilling operations are removed.

Drilling Schedule

The work schedule for the drilling operations will be 10 AM to 6 PM, Monday through Friday, due to the proximity of the campground. No construction work will be conducted on the beach during the period from Memorial Day to Labor Day. However, the drilling work is tentatively scheduled for January 2010 as described above. It is estimated that drilling each borehole to 200-ft depth will take three days, not including the initial mobilization.

Number of Workers

Drilling operations will require three drilling contractor personnel, including a driller and two helpers. Additionally, the contractor will provide an onsite safety officer to interact with the public and direct traffic when equipment is being moved. On a part-time basis one supervising geologist will also be onsite, as well as MWDOC personnel and one to two other authorized personnel. The geophysical logging will be conducted by one person and will be witnessed by the supervising geologist. Destruction of the boreholes will be undertaken by the three-person drilling crew and overseen by the supervising geologist.

PUBLIC SAFETY AND DRILLING CONTRACTOR TERMS AND CONDITIONS

Temporary 6-ft high chain link fencing and a 16-ft wide gate will be installed around the drilling site during all mobilization, well drilling, construction, development, testing and demobilization activities. The work site will be underlain by a heavy-duty plastic liner which will be changed when necessary due to wear and tear from driving equipment over it. Absorbent materials will be kept on site at all times for immediate availability if needed to contain all spills, potential waste and vehicle drippings. Following are a list of terms and conditions for the proposed drilling operations that were developed in collaboration with representatives from MWDOC and California State Parks.

Pre-Construction Meeting

Prior to drilling operations, there will be a meeting between MWDOC, its consultants, California State Parks personnel, and the Drilling Contractor to review the plan of work, park rules, safety considerations, and environmental commitments. Each exploratory borehole drilling site will be visited during the pre-construction meeting.

Safety Fencing

A temporary chain-link fence that is 6 ft in height and has a 16-ft wide gate will enclose the work site at all times.

Site Safety and Security Officer

In addition to the drilling crew, there must be one person (Site Safety Officer) on site to interact with the public and answer questions from the public. This person will not be integral to actual drilling operations. In addition to answering public inquiries, it will be this individual's job to ensure that the perimeter around the drilling operations is safe and secure. The Site Safety Officer will also redirect pedestrian and bicycle traffic in the event that the drilling operations obstruct a traffic route.

Informational Signage

MWDOC will prepare signage to be posted at the site of drilling operations. The sign will explain the project and provide a MWDOC telephone number where public inquiries can be directed. MWDOC will not prepare paper fliers due to the propensity for informational fliers to become litter.

Notice to Neighboring Community

MWDOC will mail an informational notice to the residents of the bluff overlooking the Doheny State Beach campground and all other property owners located near the Park prior to commencement of the pilot plant testing and exploratory borehole drilling.

Removal of Drill Cuttings and Water

During drilling, excess cuttings will be deposited in a 20-cubic yard roll-off bin located in the parking lot staging area. However, it is not anticipated that the volume of excess cuttings will be large as the majority of the materials drilled are contained in the continuous core that will be transported to an offsite location for analysis and testing. The excess cuttings will be removed from the site and will be disposed of at a nearby landfill via agreement with SCWD and MWDOC or at an Orange County landfill.

During the drilling process water will be discharged into a trailer-mounted tank for transport and discharge at an approved offsite location.

Preserving Vegetation

Drilling operations and mobilization of drilling equipment to the exploratory borehole sites will not disturb surrounding plant life, including overhead tree limbs, landscaping, or native vegetation.

Landing Mats

Landing mats will not be necessary as track-mounted and all-wheel drive vehicles will be used.

Bike Path and Access Roads

Drilling operations will take place on the sand such that drilling equipment will not obstruct bike paths or other access roadways. Where bicycle paths and roadways may be temporarily blocked, an alternative route/detour will be clearly marked.

Noise Suppression during Drilling

Sound panels will be installed around the drilling rig's engine compartment to minimize noise. Approximately 40 percent to 50 percent of sound would be absorbed by the sound panels.

Air Emission Controls

Diesel engines on drilling equipment will be equipped with best available technologies (Particulate filters, SCR [Selective Catalytic Reduction], diesel oxidation catalyst) to minimize particulate and nitrogen oxide (NOx) emissions.

Fire Hydrant

The fire hydrant located near the new lifeguard headquarters facility is dedicated to State Parks for future fire flow service. Therefore, neither the contractor nor the pilot plant testing facilities shall interfere with the use of the hydrant for fire purposes.

REMOVAL OF TEMPORARY TESTING FACILITIES

GENERAL DESCRIPTION OF REMOVAL OF TEMPORARY TEST FACILITIES

Removal of all temporary facilities installed for the extended pumping test will take place after completion of the pumping test in December 2010. Work would generally involve excavating and removing all buried pipes and cables, removal of the mobile test facility, the diffuser and instruments in monitoring well MW-1. After removal of these items, landscaping and grass would need to be reinstated and paved surfaces repaired where necessary.

DETAILED DESCRIPTION OF REMOVAL OF TEMPORARY TEST FACILITIES TASKS

Removal of Mobile Test Facility

Prior to its removal from Doheny Park State Beach parking lot, the mobile test facility will be disconnected from its power service, water supply and return connections, instrument signal cables, nitrogen supply line, and submersible pump power supply. It will be removed from its location using a 40-ton crane.

Schedule

It will take approximately less than one week to disconnect the facility from all outside connections and remove it from the site.

Number of Workers

It is estimated that a four-person crew, consisting of mechanics and electricians, and a supervisory engineer will be required for disconnecting the mobile test facility. Another two- to three-person crew will be needed to backfill excavations required for disconnecting piping and electrical service.

Removal of Discharge Facilities

Removal of the test slant well discharge facilities will involve excavating trenches to access the discharge line, power supply conduit, instrument conduits, and nitrogen supply line from the slant well to the mobile test facility. Excavations will be made using a backhoe excavation (see Figure 2 for piping alignment). The outfall diffuser attached to the discharge piping alongside the groin will be unanchored and removed.

Schedule

Two weeks have been scheduled for complete removal of the discharge facilities. The work will take place following removal of the mobile test facility.

Number of Workers

Removal of the slant well discharge facilities will be undertaken by a four-person crew and overseen by the supervising engineer.

Removal of Electrical Service

The power service for testing will need to be disconnected and removed. Buried conduits from the SDG&E junction box to the 480V transformer, and from the 480V transformer to the mobile test facility will be removed by excavating. The above-ground 480V transformer located in the northeastern portion of the Park will also be removed (see Figure 2). The work will require excavation for portions of the northern parking lot and northern park road as well as in landscaped areas (see Figure 2) to access the buried conduits.

After excavating in paved areas, the trenches will be re-compacted and re-paved following removal of power conduits. Trenches cut through landscaped areas will be re-compacted and re-landscaped if necessary.

Schedule

It is estimated that removal of the electrical conduits from the SDG&E tie-in to the transformer and to the mobile test facility will require approximately less than one week to complete. The work will be done concurrently with the removal of the mobile test facility.

Number of Workers

It is estimated that a four-person crew consisting of an electrician and helpers will be required for excavation and for removing conduit and wiring.

Surrounding Land Uses and Setting:

The location of the project is just to the west of the mouth of San Juan Creek on the beach, parking lot, and adjacent area, and on the beach just east of the creek. Doheny Beach is located in an urbanized area of Dana Point. Just west of the creek and the project site is the North Day Use Area which includes picnic, volleyball, horseshoe, parking, snack bar and rental concession, and restrooms. Just north of the beach and east of the creek is a campground area.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Hazards/Hazardous Materials	☐ Public Services
☐ Agriculture Resources	☐ Hydrology/Water Quality	☐ Recreation
☐ Air Quality	☐ Land Use and Planning	☐ Transportation/Circulation
☐ Biological Resources	☐ Mineral Resources	☐ Utilities and Service Systems
☐ Cultural Resources	☐ Noise	☐ Mandatory Findings of Significance
☐ Geology and Soils	☐ Population and Housing	

Determination

On the basis of this evaluation:

It has been determined that there would be no significant adverse impacts to an environmental resource as proposed, as all impacts would be at a level of less than significant. This Environmental Checklist has been prepared to support a Negative Declaration (ND).

Signature Date

Printed Name Agency

I. AESTHETICS

a) Would the project have a substantial adverse effect on a scenic vista?	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☑	☐

Construction equipment will be in the park only during the three-month construction period. Drilling equipment will be on the beach in front of the campground for one week during the exploratory boring in January 2010. Safety fencing and noise attenuation screening around the drilling equipment will partially shield the public from the equipment; however, equipment and activities will still be visible. The visual effect of the equipment on the beach will be adverse, but due to the short timeframe, impacts would be less than significant. With the exception of the one-week drilling operations, when construction has been completed in March 2009, the only structure that will be visible to the public is the mobile test facility. The mobile test facility will be a 30 foot by 8 foot container that will be located adjacent to the parking lot just west of San Juan Creek. The mobile test facility will not interfere with ocean views of beachgoers or creek views of cyclists and walkers on the bike path. The vegetation along the creek bank will make this structure unobtrusive to campers in the campground east of the creek, and the mobile test facility will not interfere with campers' views of the beach or the creek. The impact of the mobile test facility on scenic views will be less than significant.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☑

The program would not damage scenic resources.

c) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☑	☐

As described above under a), construction equipment will be in the park only during the three-month construction period. Drilling equipment will be on the beach in front of the campground for one week during the exploratory boring in January 2010. The visual effect of the equipment on the beach will be adverse, but due to the short timeframe, impacts would be less than significant. With the exception of the one-week drilling operations, when construction has been completed in March 2009, the only structure that will be visible to the public is the mobile test facility. The mobile test facility will be a 30 foot by 8 foot container that will be located adjacent to the parking lot just west of San Juan Creek. The mobile test facility will not interfere with ocean views or creek views of persons using the Park. The impact of the mobile test facility on the existing visual character of the site will be less than significant.

d) Would the project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☑

No lighting will be used, as such no impacts will result.

II. AGRICULTURE RESOURCES

a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project does not involve any conversion of land use, thus, no impacts to any areas designated as Prime Farmland, Unique Farmland or Farmland of Statewide Importance would occur.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

According to the Williamson Act contract, there is no existing zoning for agricultural usage. No impacts would result in the proposed project.

c) Would the project involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No other changes in the existing environment could possibly result in the conversion of Farmland to non-agricultural use. No impacts would result in the proposed project.

III. AIR QUALITY

The project site is located within the South Coast Air Basin (SCAB or Basin), which includes Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties. Air quality conditions in the SCAB are under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Both the state and federal governments have established health-based Ambient Air Quality Standards (AAQS) for six air pollutants, which include: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter less than 10 microns in diameter (PM_{10}). The SCAB does not attain California and federal AAQS for four of the six criteria air pollutants. The air basin is in compliance with federal SO_2 and Pb standards, but ambient CO, O_3, and PM_{10} reach twice the standards. SCAB is currently in the process of requesting re-designation on attainment of the federal NO_2 standard.

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☑	Less than Significant Impact ☐	No Impact ☐

The SCAQMD and the Southern California Association of Governments (SCAG) are the agencies responsible for preparing the Air Quality Management Plan (AQMP) for the Basin. Since 1979, a number of AQMPs have been prepared. The 1997 AQMP, updated in 1999 and replaced in 2003, was based on the 1994 AQMP and ultimately the 1991 AQMP, and was designed to comply with state and federal

requirements, reduce the high level of pollutant emissions in the Basin, and ensure clean air for the region through various control measures. To accomplish its task, the 1991 AQMP relied on a multilevel partnership of governmental agencies at the federal, state, regional, and local level. These agencies (i.e., the USEPA, CARB, local governments, SCAG, and SCAQMD) are the cornerstones that implement the AQMP programs.

The 2003 AQMP, adopted in August 2003, updated the attainment demonstration for the federal standards for ozone and PM_{10}; replaced the 1997 attainment demonstration for the federal CO standard and provided a basis for a maintenance plan for CO for the future; and updated the maintenance plan for the federal NO_2 standard that the Basin has met since 1992.

The most recent comprehensive plan is the 2007 AQMP adopted on July 13, 2007. The 2007 AQMP is designed to meet the State and Federal Clean Air Act planning requirements and focuses on ozone and $PM_{2.5}$. The 2007 AQMP incorporates significant new emissions inventories, ambient measurements, scientific data, control strategies, and air quality modeling.

The project would not involve growth-inducing impacts or cause an exceedance of established population or growth projections. The project would not create either short- or long-term significant quantities of criteria pollutants. With mitigation proposed in III(d) below, the project would not result in significant localized air quality impacts and would be consistent with the goals of the Air Quality Management Plan (AQMP) for the project area. A less than significant impact would occur.

b) Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The project includes the construction and testing of a test well. Air pollutant emissions associated with the project could occur over the short-term from construction activities to support the proposed project. Once installed and tested, the well would be abandoned in-place. As such, no long-term emissions are associated with the completed project.

Standards of Significance

Regional Emissions Thresholds for Construction

The following significance thresholds for construction emissions have been established by the SCAQMD. Projects in the SCAB with construction-related emissions that exceed any of these emission thresholds should be considered to be significant:

- 75 pounds per day of ROG
- 100 pounds per day of NOx
- 550 pounds per day of CO
- 150 pounds per day of PM_{10}
- 150 pounds per day of Sox

Local Emission Standards

- California State 1-hour CO standard of 20.0 ppm
- California State 8-hour CO standard of 9.0 ppm
- California State 1-hour NO_2 standard of 0.25 ppm

- SCAQMD 24-hour construction PM_{10} standard of 10.4 µg/m^3
- SCAQMD 24-hour operations PM_{10} standard of 2.5 µg/m^3

Short-term Air Quality Impacts

Regional Impacts

Less than Significant: Construction activities would result in the generation of air pollutants. These emissions would primarily be exhaust emissions from powered construction equipment and motor vehicle emissions associated with worker and materials haul trips.

The project includes the construction and testing of a test well. Construction activities will consume diesel fuel and thus produce combustion by-products. These emissions were estimated using SCAQMD emissions factors. The work crews, equipment and truck assemblage, horsepower utilization rating (i.e., load factor), hours, and days of use, are as presented by GEOSCIENCE Support Services, Inc. Emissions factors are based on factors included in the USEPA 2008 Offroad Emissions factors for the South Coast Air Basin. The results of this analysis for each phase of the project are included in Table AQ-1.

Peak daily emissions for CO, NO_X, SO_X, PM_{10}, and $PM_{2.5}$ were modeled to determine their concentration and contribution to the ambient concentrations within the Project vicinity and as shown in Table III-1. As shown in Table III-1, a less than significant impact would occur under SCAQMD Regional Thresholds for all criteria pollutants without mitigation. The construction emissions spreadsheet calculations are included in Appendix A.

Table III-1
Peak Daily Emission Concentrations

Source	CO lb/day	ROG lb/day	NO_X lb/day	SO_X lb/day	Total PM_{10} lb/day	Total $PM_{2.5}$ lb/day
Well Head Construction Phase	17.07	4.24	32.86	0.11	13.32	9.69
Discharge facilities	17.07	4.24	32.86	0.11	13.32	9.69
Discharge Facilities and Electrical Service Install	35.86	9.54	90.93	0.26	24.53	19.24
Electrical Service Install & Slant well redevelopment	35.29	9.72	74.91	0.18	19.13	12.50
Slant well Redevelopment & Mobile Test facility Install	26.71	5.14	21.19	0.02	8.17	3.18
Submersible pump installation	16.18	4.56	28.04	0.03	5.55	2.57
startup and shakedown testing	3.86	0.70	0.23	0.00	2.77	0.74
18-month pilot test	20.04	5.26	28.27	0.03	7.28	3.10
Exploratory borings	26.21	6.65	54.09	0.08	8.85	3.81
Removal of Mobile testing facility and Electrical service	19.78	2.54	5.60	0.01	7.27	2.32
Removal of Discharge Facilities	10.79	2.27	5.47	0.01	6.80	2.13
Maximum Daily Project Emissions	***35.86***	***9.72***	***90.93***	***0.26***	***24.53***	***19.24***
SCAQMD Thresholds (lbs/day)	550	75	100	150	150	55
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**

c) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state AAQS (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The project area is designated as a non-attainment area for ozone and PM_{10}. The project-specific evaluation of emissions supports a conclusion that with mitigation the air quality impacts for the proposed project are less than significant on an individual project basis. CEQA Section 21100 (e) addresses evaluation of cumulative effects allowing the use of approved land use documents in a cumulative impact analysis. CEQA Guidelines Section 15064 (i)(3) further stipulates that for an impact involving a resource that is addressed by an approved plan or mitigation program, the lead agency may determine that a project's incremental contribution is not cumulatively considerable if the project complies with the adopted plan or program. In addressing cumulative effects for air quality, the AQMP is the most appropriate document to use because the AQMP sets forth a comprehensive program that will lead the SCAB, including the project area, into compliance with all federal and state air quality standards and utilizes control measures and related emission reduction estimates based upon emissions projections for a future development scenario derived from land use, population, and employment characteristics defined in consultation with local governments. Since the proposed project is in conformance with the AQMP and the project is not significant on an individual basis, it is appropriate to conclude that the project's incremental contribution to criteria pollutant emissions is not cumulatively considerable, and therefore less than significant.

d) Would the project expose sensitive receptors to substantial pollutant concentrations?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☑	Less than Significant Impact ☐	No Impact ☐

Localized Impacts

Less than Significant With Mitigation. In addition to the mass daily threshold standards, project construction has the potential to raise localized ambient concentrations. This could present a significant impact if these concentrations were to exceed the ambient air quality standards at receptor locations.

The potential for this impact is demonstrated through dispersion modeling. In accordance with the SCAQMD criteria, peak daily emissions for CO, NO_X, PM_{10} and $PM_{2.5}$ were modeled to determine their concentration and contribution to the ambient concentrations within the project vicinity. The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (*Methodology*) (SCAQMD June 2003). In accordance with the *Methodology*, dispersion modeling only includes those pieces of equipment that actually operate onsite and omits vehicle trips that are distributed over a large area.

In the *Methodology*, the SCAQMD notes receptor locations as "off-site locations where persons may be exposed to the emissions from project activities. Receptor locations include residential, commercial and industrial land use areas; and any other areas where persons can be situated for an hour or longer at a time." For this analysis, the campsites immediately north of the drilling operations are considered the closest sensitive receptors to the construction activities.

In accordance with the *Methodology*, receptor locations are to consider the actual location of the receptors. If these locations are unknown, or varied, they may be assumed to be located at distances of 25, 50, 100, 200, and 500 meters. In cases where proximate receptors may be closer than 25 meters, as per the *Methodology*, a value of 25 meters is to be used in the analysis.

In the cases of CO and NO_2, the projected concentration is then added to an assumed ambient concentration. This ambient concentration is source-area dependant and is based on the peak value observed over the last three years of accumulated data. Because PM_{10} is a non-attainment pollutant, no ambient concentration is added. Instead, construction is held to a concentration of 10.4 $\mu g/m^3$ as measured at the nearest sensitive receptor location.

The *Methodology* notes that PM_{10} impacts are significant only if they impact sensitive land uses that are occupied on a 24-hour basis, such as residential uses. This is because the standards are written based on continual 24-hour exposure. Commercial, industrial, and public use areas are not occupied on a 24-hour basis and as such, the standard is not applied to these uses. (These areas are, however, subject to the 1- and 8-hour standards.) The most proximate residential area is the camp grounds just north of the exploratory boring locations. The nearest of these residents are located within 25 meters from the bore site and project-generated PM_{10} levels could be on the order of 40.38 μ/m^3 at the campsites (sensitive receptors) for unmitigated emissions. The value exceeds the 10.4 $\mu g/m^3$ standard and the impact is potentially significant. (Modeling output in Appendix AQ-2)

Mitigation Measures

The following mitigation is recommended to reduce PM_{10} to a level that will reduce localized emission concentrations to less than significant levels:

- Reduce speeds on unpaved roads to 15 mph;
- Water unpaved areas 4x per day;
- All diesel-fueled equipment that is ten years or older shall have particulate traps with a minimum of 85 percent efficiency installed within the exhaust system.

Residual Impact for PM_{10}

Table III-2 presents the mitigated, peak daily projected construction emissions for CO, NO_X, SO_X, PM_{10}, and $PM_{2.5}$ for the project. Table III-3 shows the projected concentrations at the various distances referenced in the *Methodology*. All projected concentrations are below the Localized Significance Thresholds with mitigation and, therefore, the project would be less than significant with mitigation.

Table III-2
Mitigated, Peak Daily Projected Construction Emissions

Source	CO lb/day	ROG lb/day	NO_X lb/day	SO_X lb/day	Total PM_{10} lb/day	Total $PM_{2.5}$ lb/day
Well Head Construction Phase	17.07	4.24	32.86	0.11	3.31	3.05
Discharge facilities	17.07	4.24	32.86	0.11	2.28	2.10
Discharge Facilities and Electrical Service Install	35.86	9.54	90.93	0.26	4.18	3.84
Electrical Service Install & Slant well redevelopment	35.29	9.72	74.91	0.18	3.24	2.98
Slant well Redevelopment & Mobile Test facility Install	26.71	5.14	21.19	0.02	1.38	1.27
Submersible pump installation	16.18	4.56	28.04	0.03	0.92	0.85
startup and shakedown testing	3.86	0.70	0.23	0.00	0.48	0.44
18-month pilot test	20.04	5.26	28.27	0.03	1.22	1.13
Exploratory borings	26.21	6.65	54.09	0.08	1.49	1.37
Removal of Mobil testing facility and Electrical service	19.78	2.54	5.60	0.01	1.25	1.15
Removal of Discharge Facilities	10.79	2.27	5.47	0.01	1.17	1.08
Maximum Daily Project Emissions	35.86	9.72	90.93	0.26	4.18	3.84
SCAQMD Thresholds (lbs/day)	550	75	100	150	150	55
Significant Impact?	No	No	No	No	No	No

Table III-3
Projected Construction Emissions at Various Distances

	1-hour CO Total Concen-tration, ppm	8-hour CO Total Concen-tration, ppm	1-hour NO2 Total Concen-tration, ppm	24-hour PM10 Concen-tration, ug/m3	24-hour PM2.5 Concen-tration, ug/m3
Maximum Project Emissions	35.86	35.86	90.93	4.18	24.53
Concentration at 25 meters	2.1019	3.2713	0.0883	7.12	3.33
Concentration at 50 meters	2.1137	3.2796	0.0903	2.24	1.05
Concentration at 100 meters	2.1338	3.2937	0.0953	0.22	0.10
Concentration at 200 meters	2.1412	3.2988	0.1048	0.00	0.00
Concentration at 500 meters	2.0514	3.236	0.1004	0.00	0.00
Concentration at 800 meters	2.0293	3.2205	0.0976	0.00	0.00
Concentration at 1000 meters	2.0221	3.2155	0.0959	0.00	0.00
LST Thresholds	20	9	0.25	10.4	10.4
Significant Impact?	No	No	No	No	No

e) Would the project create objectionable odors affecting a substantial number of people?	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☑	☐

Project construction will involve the use of heavy equipment creating exhaust pollutants from construction activities and from trucks bringing materials to the site. With regards to nuisance odors, any air quality impacts will be confined to the immediate vicinity of the equipment itself. By the time such emissions reach any sensitive receptor sites away from the project site, they will be diluted to well below any level of air quality concern. An occasional "whiff" of diesel exhaust from trucks accessing the site from public roadways may result. Such brief exhaust odors are an adverse, but not significant, air quality impact.

IV. BIOLOGICAL RESOURCES

Fauna

The upper beach of Doheny State Beach and the adjacent parking lot are heavily used by beachgoers. Characteristic species in these areas include urban-adapted birds such as American crow (*Corvus brachyrhynchos*), northern mockingbird (*Mimus polyglottus*), Brewers blackbird (*Euphagus cyanaocephalus*), rock dove (*Columba livia*), European starling (*Sturnus vulgaris*), and house sparrow (*Passer domesticus*) (Chambers Group 2005, N.Davis, personal observations). The eucalyptus trees at the western edge of the parking lot are used for nesting by black-crowned night herons (*Nycticorax nycticorax*). Monarch butterflies (*Danaus plexippus*) sometimes use eucalyptus trees in the park for roosting (CNDDB 2008).

A variety of shorebird species forage in the intertidal and may, at times, forage on the upper beach. Shorebirds commonly observed at Doheny Beach near the San Juan Creek mouth include willet (*Catoptrophus semipalmatus*), marbled godwit (*Limosa fedoa*), black bellied plover (*Pluvialis squatarola*), and sanderling (*Calidris alba*).

Gulls and terns roost within the San Juan Creek lagoon and on the sand bar at the lagoon mouth. They forage in the lagoon and in nearshore ocean waters. Gull and tern species observed by Chambers Group personnel in visits to the area include herring gull (*Larus argentatus*), California gull (*L. californicus*), ring-

billed gull (*L. delawarensis*), glaucous-winged gull (*L. glaucescens*), Heermann's gull (*L. heermanni*), western gull (*L. occidentalis*), Bonapartes gull (*L. erodias hia*), mew gull (*L.canus*), Caspian tern (*Sterna caspia*), elegant tern (*Sterna elegans),*and Forsters tern (*S.forsteri*) (Chambers Group 2005, 2006, N.Davis, personal observations). Some of the gull species, particularly western gull, California gull, and ring-billed gull, are known to forage on debris and garbage and would be likely to occur within the project sites. Other bird species that occur both within San Juan Creek lagoon and in nearshore ocean waters include brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocorax auritis*) and western grebe (*Aechmophorus occidentalis*).

Bird species that typically occur within the lagoon but not offshore include mallard (*Anas platyrhynchos*), American coot *(Fulica Americana*), snowy egret (*Egretta thula*), great blue heron (*Ardea erodias*), and great egret (*Casmerodius albus*). The wetlands and riparian vegetation at the upper end of the lagoon supports such species such as red-winged blackbird (*Agelaius phoeniceus*), common yellowthroat (*Geothlypis trichas*), and song sparrow (*Melospiza melodia*).

San Juan Creek lagoon supports fish species such as topsmelt (*Atherinops affinis*), California killifish (*Fundulus parvipinnis*), and staghorn sculpin (*Leptocottus armatus)*, which are typical of southern California estuarine environments. Tidewater goby surveys in August and September 2006 at the mouth of San Juan Creek collected top smelt, California killifish, deep bodied anchovy (*Anchoa compressa*), mosquito fish (*Gambusia affinis*), yellowfin goby (*Acanthogobius flavimanus*) red fin shiner (*Lythrurus umbratilis*), and fathead minnow (*Pimephalus promelas*) but no tidewater gobies (Baskin and Haglund 2006). Common surf zone fishes in southern California include barred surfperch (*Amphisticus argenteus*), California corbina (*Menticrrhus undulates*), jacksmelt (*Atheinopsis californiensis*), and California grunion (*Leuresthes tenuis*). Grunion spawn on sandy beaches annually between March and September.

After a thorough literature review and an assessment of the various habitat types within the project vicinity, it was determined that eight wildlife species listed as threatened or endangered have the potential to occur within the general project area. Each of the sensitive wildlife species was evaluated for their potential occurrence on the project site. Of these eight species, five were considered to have a moderate to high potential to occur on or adjacent to the project site. Those species with potential to occur in the project area include southern steelhead (*Oncorhynchus mykiss irdeus*), California brown pelican, western snowy plover (*Charadrius alexandrinus nivosus*), least Bell's vireo (*Vireo bellii pusillus*), and California least tern (*Sterna antillarum browni*). Table IV-1 provides a list of the federal- and state-listed endangered, threatened, and sensitive wildlife species that have the potential to occur within the project site. A brief description of the sensitive wildlife species follows.

Tidewater goby is federal-listed as endangered and occurs in shallow lagoons and lower stream reaches. This fish requires fairly still water but not stagnant water with high oxygen levels. This species was recorded in 1968 in San Juan Creek, from the mouth to 2.5 miles upstream (CNDDB 2005). No tidewater gobies were found in 1994 or 2006 (USFWS 2004, Baskin and Haglund 2006). Tidewater gobies are considered extirpated from San Juan Creek (USFWS 2004).

Southern steelhead is federal-listed as endangered and is a California special concern species. This species occurs in the ocean and in rivers and streams. Steelhead are born in freshwater and spend a portion of their lives in the ocean before returning to freshwater to spawn. Adults require cool, well-oxygenated streams for spawning. This species recently has been recorded in San Juan Creek (Hogarth 2005, Brennan 2008). San Juan Creek recently was designated Critical Habitat for the Southern California Steelhead Evolutionarily Significant Unit (Hogarth 2005). Southern steelhead may pass through the mouth, when open, of San Juan Creek and may use the creek for foraging. Therefore, this species has a moderate potential to occur near the site. The San Juan and Trabuco Creeks Watershed Recovery Plan has the goal of restoring the watershed to support steelhead populations in a sustainable manner (CDM 2007).

Table IV-1
Sensitive Wildlife Species Potential for Occurrence (PFO) Within the Project Site

Scientific Name	Common Name	Status Listing	PFO	Habitat	Comments
CLASS OSTEICTHYES	**BONY FISH**				
Eucyclogobius newberryi	tidewater goby	FE, CSC	**Low**	Occurs in shallow lagoons and lower stream reaches. Requires fairly still water with high oxygen levels, but not stagnant water.	Historically tidewater gobies occurred in San Juan Creek. They were last collected there in 1968 and were not found during a 1994 survey (USFWS 2004) 0r a 2006 survey (Baskin and Haglund 2006).
Oncorhynchus mykiss irdeus	Southern steelhead	FE, CSC	**Moderate**	Occur in the ocean and in rivers, but return to rivers to spawn. Preferred spawning habitat is high elevation headwaters near the ocean with cool, well-oxygenated water.	Southern steelhead may use San Juan Creek lagoon for passage and for foraging. Steelhead recently were collected in San Juan Creek and San Juan Creek has been designated as Critical Habitat for the southern steelhead (Hogarth 2005).
CLASS AVES	**BIRDS**				
PELECANIIDAE	**PELICANS**				
Pelecanus occidentalis californicus	California brown pelican (nesting colony and communal roosts)	FE, SE	**Present**	Occurs in bays, coastal ponds and sloughs, and on piers and jetties. Builds nests of sticks on the ground on islands or offshore rocks.	Common in San Juan Creek lagoon and nearshore waters off Doheny State Beach.

Table IV-1 (continued)
Sensitive Wildlife Species Potential for Occurrence (PFO) Within the Project Site

Scientific Name	Common Name	Status Listing	PFO	Habitat	Comments
CHARADRIIDAE	**PLOVERS**				
Charadrius alexandrinus nivosus	western snowy plover (nesting)	FT, CSC	**High**	Occurs on sandy beaches, salt pond levees, and shores of large alkali lakes. It needs sandy, gravelly, or friable soils for nesting.	Does not breed at Doheny State Beach, but occurs at times, particularly during the winter. It was not observed during snowy plover monitoring in February-March, 2005 (Chambers Group 2005) was observed between February and April 2006 (McEntee 2006).
LARIDAE	**SKUAS, GULLS, TERNS, SKIMMERS**				
Sterna antillarum browni	California least tern (nesting colony)	FE, SE	**High**	Nests along the coast from San Francisco to northern Baja California. It is a colonial breeder on bare or sparsely vegetated, flat substrates, such as sand beaches and alkali flats.	Does not breed at Doheny State Beach but sometimes forages in the area. Large numbers were observed off the mouth of San Juan Creek in July 2005 (Willick 2005).
SYLVIIDAE	**OLD WORLD WARBLERS, GNATCATCHERS**				
Polioptila californica californica	Coastal California gnatcatcher	FT, CSC	**Low**	Occurs in coastal sage scrub vegetation on mesas, arid hillsides, and in washes and nests almost exclusively in California sagebrush.	There is not any suitable nesting habitat for this species on the project site. Additionally, the site does not provide likely foraging opportunities for this species.

Table IV-1 (continued)
Sensitive Wildlife Species Potential for Occurrence (PFO) Within the Project Site

Scientific Name	Common Name	Status Listing	PFO	Habitat	Comments
CUCULIDAE	**CUCKOOS AND RELATIVES**				
Vireo bellii pusillus	least Bell's vireo	FE, SE	**Low**	Occurs in moist thickets and riparian areas that are predominantly composed of willow and mule fat.	There is not any suitable nesting habitat for this species on the project site. Additionally, the site does not provide likely foraging opportunities for this species.
CLASS MAMMALIA	**MAMMALS**				
HETEROMYIDAE	**POCKET MICE & KANGAROO RATS**				
Perognathus longimembris pacificus	Pacific pocket mouse	FE, CSC	**Low**	Inhabits narrow coastal plains and prefers soils of fine alluvial sands near the ocean.	Suitable habitat does not occur on the project site.

Status Codes

Federal

FE = Federally listed; Endangered
FT = Federally listed, Threatened

State

SE = State listed; Endangered
CSC = California Species of Special Concern

* -- Taxa that are biologically rare, very restricted in distribution, declining throughout their range, or at a critical stage in their life cycle when residing in California.
-- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California.
-- Taxa closely associated with a habitat that is declining in California (e.g., wetland, riparian, old growth forest).

Definitions of Occurrence Probability:

- Absent from Site – Focused survey failed to detect the species or the site is completely absent of suitable habitat.
- Low Potential for Occurrence – Species is restricted to habitats that do not occur within the project site or no historical records exits of the species occurring within the project site or its immediate vicinity, and/or the habitats needed to support the species on the site are of poor quality.
- Moderate Potential for Occurrence – Either a historical record exists of the species within the immediate vicinity of the project site and/or the habitat requirements associated with the species occur within the project site.
- High Potential for Occurrence – There is either a recent historical record of the species occurring within the project site or its immediate vicinity and/or the diagnostic habitat requirements strongly associated with the species occur within the project site or its' immediate vicinity.
- Species Present – The species was observed within the project site at the time of the survey.

Source: 2005 California Natural Diversity Data Base (CNDDB), Dana Point USGS quad.

California brown pelican is federal- and state-listed as endangered and occurs in bays, coastal ponds and sloughs, and on piers and jetties. This species nests on the California Channel Islands and off Baja California. This species is commonly observed in San Juan Creek lagoon and in the nearshore ocean waters off Doheny State Beach (Chambers Group 2005, N. Davis, personal observations). Because it was observed by Chambers Group personnel during all visits to the site, it is considered present in the nearby area.

Western snowy plover is federal-listed as threatened and is found on sandy beaches, salt pond levees, and shored of large alkali lakes. This species needs sandy, gravelly, or friable soils for nesting. The nearest snowy plover nesting areas to Doheny State Beach are in the Bolsa Chica Wetlands to the north and on Camp Pendleton to the south. Wintering snowy plovers would be expected to forage at times in the project area. Few snowy plovers have been observed at Doheny State Beach (D. Pryor, Resource Ecologist, California Department of Parks and Recreation, pers. comm., 2004). None were recorded during monitoring of MWDOC's reconnaissance hydrogeology investigation on Doheny State Beach between February 15 and March 3, 2005 (Chambers Group 2005). However during monitoring of the test slant well program from January 30 through April 24, 2006, up to 11 snowy plovers were observed foraging and roosting adjacent to the jetty at the east end of the beach between February 22 and February 24 (McEntee 2006). In addition, snowy plovers were observed 0.5 miles downcoast of San Juan Creek on an almost daily basis during the monitoring. Snowy plovers are considered to have a high potential to occur in the project area.

California least tern is federal- and state-listed as endangered and nests along the coast from San Francisco Bay south to northern Baja California. This species is a colonial breeder on bare or sparsely vegetated, flat substrates, sand beaches, alkali flats, land fills, or paved areas. California least terns are only present in California during their breeding season of April to September. The nearest least tern breeding colonies to Doheny State Beach are in Upper Newport Bay to the north and Camp Pendleton to the south. Although least terns do not breed in the project area, they may at times forage in San Juan Creek lagoon or in the nearshore waters off Doheny State Beach. In July of 2005, as many as 175 least terns were observed near the mouth of San Juan Creek (Willick 2005). Therefore, least terns are considered to have a high potential to occur in the project area.

California gnatcatcher is federal-listed as threatened, is a California Species of Special Concern, and is an obligate resident of southern California coastal sage scrub communities. This species is found near arid hillsides, mesas, and washes. Coastal California gnatcatchers have been recorded in the coastal bluff north of Doheny State Beach (1980) and at the Dana Point Headlands (2001) (CNDDB 2008). There is limited foraging and nesting habitat within the project site; therefore, this species has a low potential to occur.

Least Bell's vireo is federal- and state-listed as endangered and occurs in moist thickets and riparian areas that are predominantly composed of willow and mule fat. Although one CNDDB record of this species is reported for the Dana Point quadrangle, it is not within five miles of the site (CNDDB 2008). The site does not support robust willow or mule fat habitat and is thus void of suitable nesting habitat. Riparian habitat along the banks of San Juan Creek in the project area is too sparse to support vireo breeding. Least Bell's vireos potentially could pass through the area in migration. The site also offers limited foraging opportunities for this species; therefore, it has a low potential to occur.

Pacific pocket mouse is federal-listed as endangered and inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles County. This species seems to prefer soils of fine alluvial sands near the ocean. This species was recorded in the Dana Point Headlands (1999) along the south side of Scenic Drive (CNDDB 2008). Suitable habitat for this species does not occur within the project area. Therefore, this species has a low potential for occurrence.

Flora

The vegetation found along the banks of the channel at the mouth of San Juan Creek in Dana Point can be classified into three categories:

- Native riparian species sensitive to water fluctuation;
- Native riparian species unaffected by water fluctuation; and
- Undesirable non-native weed species.

The first category includes those native plant species that are typically found in wetland or riparian habitats and would be sensitive to a groundwater drawdown (Table 1). These Obligate Wetland species almost always occur (estimated probability 99 percent) under natural conditions in wetlands. Wetland vegetation is typically very shallowly-rooted. On average, 95 percent of the root mass of wetland plants is found within the first 23 inches below ground (Rogers et al. 2003). Typically, species within this category require standing water or fully saturated soil. If the groundwater level is lowered and surface runoff is not sufficient to replace the amount of water lost, these plants will typically not survive. The species in the Obligate Wetland category which require a permanent source of water have a high tolerance for salinity. This suggests that they have acclimated to living within the estuary and are most likely receiving their water from the San Juan Creek.

Table IV-2
Obligate Wetland Plants Observed on the San Juan Creek Project Site

Scientific Name	Common Name	Side of Channel
ANGIOSPERMS (DICOTYLEDONS)		
ASTERACEAE	**SUNFLOWER FAMILY**	
Jaumea carnosa	fleshy Jaumea	E
ANGIOSPERMS (MONOCOTYLEDONS)		
CYPERACEAE	**SEDGE FAMILY**	
Scirpus americanus	winged three-square	W
Scirpus californicus	California bulrush	W
Scirpus maritimus	river bulrush	W
Typha domingensis	slender cattail	W

The second category of plants includes all other native species (Facultative Wetland and Upland species) that do not require a permanent water supply to survive. Facultative Wetland species usually occur in wetlands (estimated probability 67 to 99 percent), but occasionally are found in non-wetlands. Species found within this category onsite include Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and willow species (Salix spp.). Facultative Upland species may be Facultative or Obligate Upland species and usually occur in non-wetlands, but occasionally are found in wetlands (estimated probability 1 to 33 percent for Facultative Upland species). These plant species would most likely not be affected by a groundwater drawdown (Table IV-3).

The third category includes invasive exotic species that should be monitored to prevent widespread invasion into other habitats or within the current project site (Table IV-4Many of these weeds are found on the California Invasive Pest Plant Council List of Invasive Non-Native Plants that Threaten Wildlands in California (Cal-IPC 2006).

The vegetation was mapped onto an aerial photograph. Acreages of each type of vegetation series was calculated using Geographic Information Systems (GIS) technology (Table IV-5) and are shown on the vegetation map (Figure 10).

Table IV-3
Non-Obligate Wetland Native Plants Observed on the San Juan Creek Project Site

Scientific Name	Common Name	Side Of Channel
ANGIOSPERMS (DICOTYLEDONS)		
ANACARDIACEAE	**SUMAC OR CASHEW FAMILY**	
Rhus integrifolia	lemonadeberry	W
ASTERACEAE	**SUNFLOWER FAMILY**	
Ambrosia psilostachya	western ragweed	W,E
Baccharis salicifolia	mule fat	W,E
Heterotheca grandiflora	telegraph weed	W,E
Isocoma menziesii	coast goldenbush	W
Xanthium spinosum	spiny cocklebur	E
Heliotropium curassavicum	salt heliotrope	W,E
CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**	
Sambucus mexicana	Mexican elderberry	W,E
CHENOPODIACEAE	**GOOSEFOOT FAMILY**	
Atriplex lentiformis	quail brush	W
FAGACEAE	**OAK FAMILY**	
Quercus agrifolia	coast live oak	W
ONAGRACEAE	**EVENING PRIMROSE FAMILY**	
Camissonia micrantha	small primrose	W
PLATANACEAE	**SYCAMORE FAMILY**	
Platanus racemosa	western sycamore	W,E
ROSACEAE	**ROSE FAMILY**	
Heteromeles arbutifolia	toyon	W
SALICACEAE	**WILLOW FAMILY**	
Populus fremontii	Fremont cottonwood	W,E
Salix gooddingii	black willow	E
Salix laevigata	red willow	E
Salix lasiolepis	arroyo willow	W
ANGIOSPERMS (MONOCOTYLEDONS)		
POACEAE	**GRASS FAMILY**	
Distichlis spicata	saltgrass	W,E

Table IV-4
Non-Native Plants Observed On the San Juan Creek Project Site

Scientific Name	Common Name	Side of Channel
ANGIOSPERMS (DICOTYLEDONS)		
APIACEAE	**CARROT FAMILY**	
Apium graveolens	celery	E
ASTERACEAE	**SUNFLOWER FAMILY**	
Carduus pycnocephalus	Italian thistle	W
Centaurea melitensis	tocalote	W,E
Cotula coronopifolia	brass-buttons	W
Cynara cardunculus	cardoon	W
Gnaphalium luteo-album	white cudweed	W,E
Sonchus oleraceus	common sow thistle	W
BRASSICACEAE	**MUSTARD FAMILY**	
Brassica nigra	black mustard	E
Cakile maritima	sea rocket	W,E
Hirshfeldia incana	short-podded mustard	W,E
Lepidium latifolium	peppergrass	W,E
Raphanus sativus	radish	W,E
CARYOPHYLLACEAE	**PINK FAMILY**	
Spergularia sp.	Boccone's sandspurrey	E
CHENOPODIACEAE	**GOOSEFOOT FAMILY**	
Chenopodium album	lamb's quarters	W,E
EUPHORBIACEAE	**SPURGE FAMILY**	
Ricinus communis	castor-bean	W
FABACEAE	**LEGUME FAMILY**	
Acacia sp.	acacia	E
Lathyrus odoratus	sweet pea	E
Melilotus indica	sourclover	W,E
GERANIACEAE	**GERANIUM FAMILY**	
Erodium cicutarium	red-stemmed filaree	W,E
MALVACEAE	**MALLOW FAMILY**	
Malva parviflora	cheeseweed	W
MYOPORACEAE	**MYOPORUM FAMILY**	
Myoporum laetum	myoporum	W,E
POLYGONACEAE	**BUCKWHEAT FAMILY**	
Emex spinosa	devil's thorn	W
Polygonum arenastrum	common knotweed	W
Rumex crispus	curly dock	W,E
Rumex sp.	dock	W
PRIMULACEAE	**PRIMROSE FAMILY**	
Anagallis arvensis	scarlet pimpernel	W,E
Solanum sp.	nightshade	W,E
TAMARICACEAE	**TAMARISK FAMILY**	
Tamarix ramosissima	Mediterranean tamarisk	E
ANGIOSPERMS (MONOCOTYLEDONS)		
ARECACEAE	**PALM FAMILY**	
Washingtonia robusta	Mexican fan palm	W

Table IV-4 (continued)
Non-Native Plants Observed On the San Juan Creek Project Site

IRIDACEAE	**IRIS FAMILY**	
Iris sp.	Iris	W
POACEAE	**GRASS FAMILY**	
Arundo donax	giant reed	W,E
Bromus diandrus	ripgut grass	W,E
Bromus madritensis ssp. *rubens*	foxtail chess	W
Cynodon dactylon	Bermuda grass	W,E
Hordeum murinum	glaucous foxtail barley	W
Polypogon monspeliensis	annual beard grass	W

Table IV-5
Vegetation Series Occurring on the San Juan Creek Project Site

Vegetation Series	Size (Acres)
Big Saltbush Series	0.0367
Bulrush-Cattail Series	0.0425
California Buckwheat Series	0.0131
Developed	0.1093
Disturbed/Ruderal	0.5063
Fleshy Jaumea Series	0.0056
Fremont Cottonwood-California Sycamore Series	0.2496
Giant Reed Series	0.0089
Mexican Elderberry Series	0.0253
Mixed Willow Series	0.0963
Mule Fat Series	0.1249
Ornamental Landscaping	0.1745
Tamarisk Series	0.0019
Toyon-Lemonade Berry Series	0.0568

a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and game or U.S. Fish and Wildlife Service?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The Federal and State Endangered California brown pelican rests and forages in the lagoon and nearshore coastal waters adjacent to the project. The State and California Endangered California least tern also visits these areas at times. San Juan Creek has been designated as Critical Habitat for the Southern California Steelhead Evolutionarily Significant Unit (Hogarth 2005). Steelhead may be present in the lagoon or in nearshore ocean waters.

The proposed project will have no direct affect on the lagoon or on nearshore ocean waters. Water produced from the slant well extended pumping test would be discharged to the surf zone. All discharges would meet applicable water quality criteria, which are protective of aquatic life. Therefore, this temporary

discharge would have no impact on any of these special status species. A Spill Contingency Plan has been prepared and would be implemented to insure that no fuel or other substances from project equipment would enter tidal waters (Layne Christensen 1999). With adherence to measures specified in the Spill Contingency Plan, the proposed project would have a less than significant impact on special status species.

Based on groundwater modeling, the maximum decline in groundwater levels (i.e. lowering of shallow groundwater levels) in the vicinity of riparian vegetation adjacent to the mouth of San Juan Creek after three years of pumping would be approximately 1.8 ft. (Table IV-6). Hydrographs showing the model-predicted groundwater elevations near the mouth of San Juan Creek under project conditions (i.e. Test Slant Well pumping of 2.88 MGD) were plotted (Figure 11). As shown, the streambed elevation is approximately 4 ft NAVD88[5]) in the mouth of San Juan Creek area. The groundwater elevation after three years of pumping would range from 5 ft to 7 ft (NAVD88) and is higher than the streambed elevation. As such, rising water is still expected in the area during the three-year pumping test cycle.

Streamflows would be minimally impacted from the pumping, if at all. During the recent dry period from 1999 through 2003, the average summer streamflow measured just upstream of the lagoon area ranged from 2.5 cfs to 5 cfs. Groundwater modeling indicates a reduction in the rising groundwater at 0.3 cfs, which is less than 10 percent of the dry period inflow rate.

Because rising water conditions within the lagoon are predicted to continue over the entire test period underlying and adjacent soils will remain saturated due to vertical percolation from the lagoon to the underlying groundwater, or from rising water (flow from the aquifer into the lagoon) depending on different hydrologic conditions. In addition, base streamflows will also supply the lagoon and will irrigate the riparian vegetation over the test period. Because soils will remain saturated, the extended pumping test will have no effect on wetland and riparian vegetation and, thus, will not decrease shading along the creek bank for steelhead.

Table IV-6
Maximum Predicted Changes in Ground Water Levels over 3 Year Pumping Test

	Point A*	Point B*	Point C*	Point D*
Initial Ground Water Elevation, ft NAVD88	7.67	7.40	7.21	7.08
Lowest Ground Water Elevation During Three Years, ft NAVD88	6.72	6.15	5.40	5.21
Maximum Decline in Ground Water Level, ft	0.95	1.25	1.80	1.87

*locations of points are shown on Figure 11

Results from the ground water level model were also used to estimate the decline in water level and resultant maximum effect on the depth of water in the lagoon due to the project. Assuming Point B in Table IV-2 is representative of lagoon levels, the minimum depth of water in the lagoon over the three year period, excluding base streamflows entering the lagoon, would be 2.15 ft (calculated by subtracting the lagoon streambed elevation from the lowest ground water elevation during the three-year period: 6.15 – 4 = 2.15 ft). However, because streamflows into the lagoon are expected to continue over the summer months at minimum levels of 5 to 10 acre-feet per day during the test period, and the lagoon volume is approximately 90 acre-feet (assumes 10-foot depth to the top of a fully-formed sand berm), the impact from the test pumping on lagoon water levels would be too small to be measured.

Natural changes in the lagoon water level can be significant and rapid. When the lagoon is breached, water levels rapidly fall and are then primarily controlled by the tides and streamflow. Therefore, the drawdown would only very slightly affect lagoon levels when the lagoon is closed and high water is ponded behind the berm. When water is ponded, the water levels in the lagoon rise as water backs up. The minimum depth for the successful migration of steelhead is reported to be 7 inches (McEwan and

[5] NAVD88 is the North American Vertical Datum of 1988. 2.4 ft NAVD is equivalent to zero ft above mean sea level in Orange County.

Predicted Groundwater Level Elevation
in the Mouth of San Juan Creek Area
Test Slant Well Pumping of 2.88 MGD

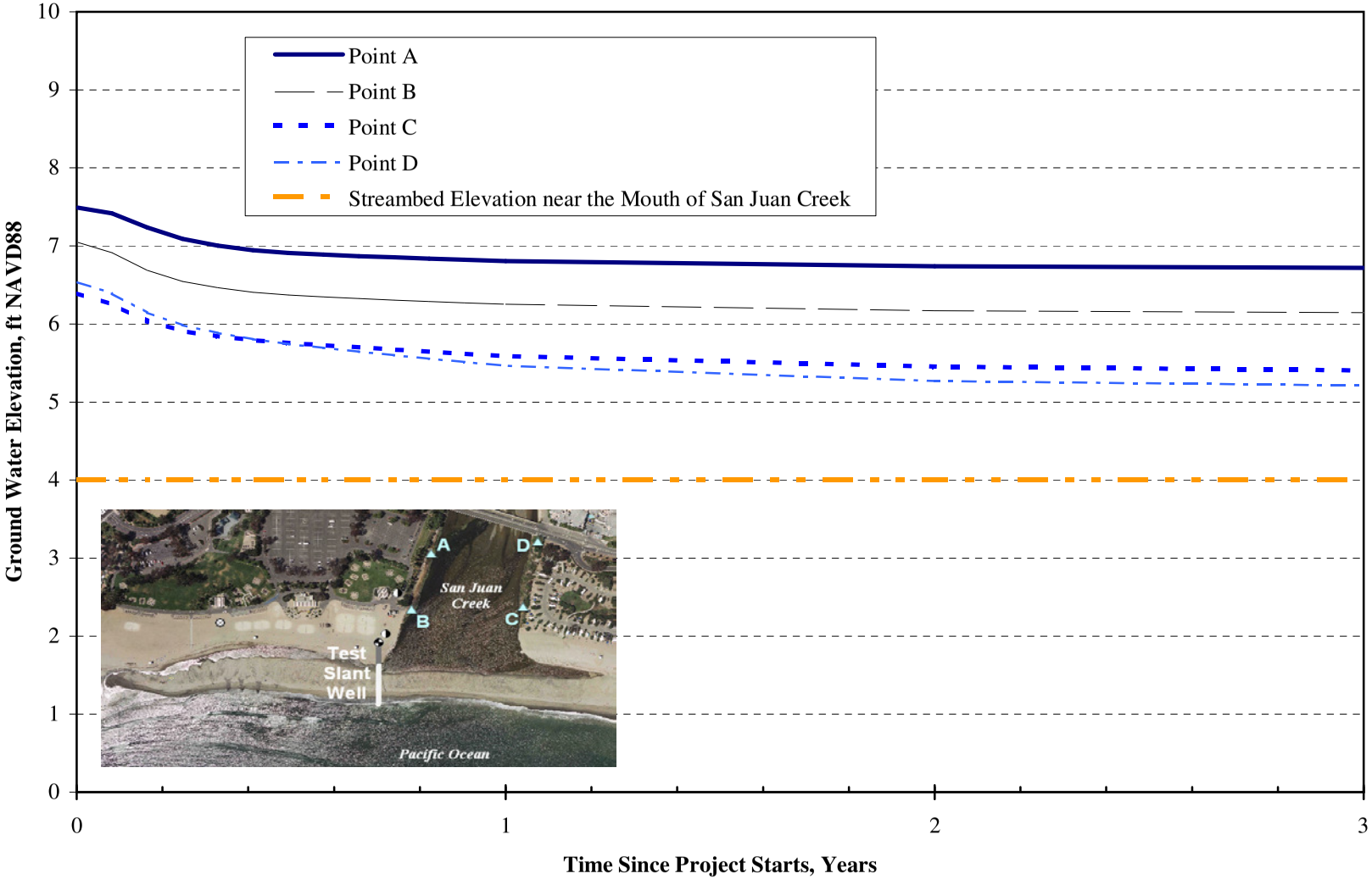


Figure 11

Jackson 1996). During the test, the pond levels will be near normal levels as base streamflows greatly exceed any impact of pumping on lowered rising groundwater flow rates. Therefore, the extended pumping test will not reduce the lagoon water level to a depth that might impede steelhead migration. The impacts of groundwater pumping on the lagoon water level would have a less than significant effect on the habitat for southern steelhead.

The Federal threatened western snowy plover does not breed in or near the project area but may at times forage on the beach in the project area. Doheny State Beach has not been designated as critical habitat for the snowy plover. Snowy plovers occur but are relatively uncommon in the Doheny Beach area (D. Pryor, California Department of Parks and Recreation, pers. comm.). The location where project activities would take place is in a developed beach park subject to frequent human disturbance. Therefore, the project area is poor foraging and resting habitat for snowy plovers. The proposed project activities would affect a small amount of the upper beach at Doheny Beach above the high tide line and therefore would have minimum potential to interfere with snowy plover foraging. There is a slight chance that equipment involved in project activities could injure a snowy plover. Snowy plovers are cryptically colored and sometimes take refuge in depressions on the beach. A snowy plover monitor will be present during project activities to insure that no activities occur if snowy plovers are present within any of the work areas until the plovers have left the site. With this measure, the proposed project would have an insignificant impact on snowy plovers.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact X	No Impact ☑

If the pumping of groundwater occurs onsite during a wet year (as in 2005), Chambers Group does not expect there to be any observable effects to any riparian plants species, including the Obligate Wetland species. However, because the groundwater table is variable at the project site and weather patterns are difficult to predict, for the purposes of this analysis, it was assumed that the Test Phase would result in up to a 1 to 2-foot drawdown of groundwater and that this decline in below-ground water would occur during a dry year. Furthermore, because many of the obligate wetland species onsite tolerate flood drawdown cycles that occur to varying degrees in different wetland and riparian systems, the effects of the drawdown may not be apparent for several months, if not years. Tree of Life Nursery conducted a study in which they observed the effects of a receding water table (St. John 1995). We can predict that the species most likely to be affected at the San Juan Creek site will be the Obligate Wetland species (Table 1), followed by black willow (*Salix gooddingii*), arroyo willow, and mule fat (*Baccharis salicifolia*). The already established mature riparian tree species are not likely to be affected by a 2-foot drawdown.

Several of the riparian tree species (arroyo willow, western sycamore, Fremont cottonwood) that have recently been installed by State Parks did not appear to be in excellent condition. It is possible that these saplings may have been placed in marginal or inappropriate areas, or were installed during a suboptimal time of year not conducive to plant establishment. Perhaps a deep pipe temporary irrigation system that directly feeds these saplings would aid in their establishment if the groundwater table is to decline. A localized irrigation system also helps to minimize the spread of weeds throughout the area.

c) Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

All project activities will occur in unvegetated areas. Therefore, the proposed project would have no direct impacts to vegetation

As described above under a) and b), the maximum drawdown of shallow groundwater adjacent to the mouth of San Juan Creek after three years of pumping would be approximately 1.8 ft. Because water is predicted to be above the streambed elevation during the entire three years of the pumping test, underlying and adjacent soils will remain saturated due to vertical percolation from the lagoon to the underlying groundwater, or from rising water (flow from the aquifer into the lagoon). Because soils will remain saturated, the extended pumping test will have no effect on wetland and riparian vegetation

d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The proposed project would involve temporary activities in a developed beach park. It would not interfere directly with fish or wildlife movement. As described above under a), the extended pumping test will not reduce water depths below the minimum water levels required to support steelhead migration.

Doheny State Beach is used by grunion for spawning. Activities on the beach would occur above the extreme high tide line and thus above the grunion spawning area. In addition, all construction activities would occur between January 5 and March 13, which is outside the grunion spawning season. Project construction would have no impact on grunion.

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The activities would occur for a few weeks in a developed beach park. The proposed project would not interfere with any policies or ordinances protecting biological resources. Impacts to biological resources are expected to be less than significant.

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed activities would not conflict with the provisions of an adopted Habitat Conservation Plan or other approved local, regional or state habitat conservation plan.

V. CULTURAL RESOURCES

a) Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

A cultural resources records search for the desalinization plant project site and a one-half mile radius of the project area was completed on September 21, 2005, at the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton. The SCCIC acts as a branch of the California Historical Resources Information System (CHRIS) maintained by the Office of Historic Preservation (OHP) and is the designated repository for records concerning archaeological and historical resources and associated studies documented in Orange County. The SCCIC reports that three archaeological sites have been recorded within 0.5 mile of the project area, including two prehistoric and one historic archaeological site. None are within the project's proposed boundary**.** No historic resources will be affected.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

While the greater Dana Point area contains a variety of cultural resources, previous studies of Doheny State Beach have found no evidence of prehistoric occupation (California Department of Parks and Recreation 2003, SCCIC Records Search September 21, 2005). There will be no impacts to archaeological resources.

c) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

As in b) above, there is no potential to disturb resources.

d) Would the project disturb any human remains, including those interred outside of formal cemeteries?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No disturbance of human remains would be expected from the drilling program.

VI. GEOLOGY AND SOILS

a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No potential for disturbance of geologic formations would occur that would result in adverse effects to people or structures.

ii) Strong seismic ground shaking?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The drilling of the wells and test pumping are temporary activities. No effects to people or structures from seismic shaking would occur as a result of the extended pumping and pilot plant testing program.

iii) Seismic-related ground failure, including liquefaction?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The drilling of the wells and test pumping are temporary activities. No ground failure or liquefaction would occur and no impacts would result to people or structures as a result of the extended pumping and pilot plant testing program

iv) Landslides?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

Landslide activity is not of concern with this program given the location on and adjacent to the beach.

b) Would the project result in substantial soil erosion or the loss of topsoil?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

Soil erosion is not of concern, given the location on the beach. A containment area will be constructed to enclose the drill rig and other equipment, which would also encase sand within its boundary. While this is to ensure containment of leaks from the equipment, it will also protect and contain the beach sand beneath and within the footprint of the equipment.

Based on an analysis of potential wave and flooding effects to the new lifeguard tower which would be located just north of the proposed well site, wave action is unlikely to damage the test slant well, monitoring wells or exploratory boreholes (Coastal Environments 2004). Because Doheny State Beach is located at the end of the littoral cell and is protected from north-northwest waves, the shoreline is likely to lose only a small amount of sand during dry periods and to accrete sand during wet periods. The analysis of wave runup and overtopping performed by Coastal Environments (2004) for the lifeguard tower showed that there would be no significant wave runup or overtopping with two- or five-year return period design waves. Ten-year or greater return period conditions could cause some level of damage. However, no significant damages would be expected to occur near the project area if the beach retains its minimum width of 300 feet. Doheny State Beach has retained a minimum width of greater than 300 feet even following the significant winter storms of 1982/83, 1988, 1993, 1995, and 1998. Therefore, potential damage to the test slant well, monitoring wells, and exploratory boreholes is considered less than significant. The discharge pipeline to the surf zone would be along the side of the groin above the high tide line. The diffuser will be protected by placing riprap from the groin on top of it.

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse would be expected.

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project would not be located on expansive soil, and no structures (buildings) are associated with the program. A temporary container beside the parking lot will serve as the mobile test facility.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The soils structure of the project areas will not change. The project would not result in soils being incapable of supporting septic tanks or other wastewater treatment systems. No septic tanks or alternative wastewater disposal systems would be constructed.

VII. HAZARDS AND HAZARDOUS MATERIALS

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No transport of hazardous materials is associated with the project. Emissions from construction equipment are addressed under Air Quality.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The project would use only diesel fuels for construction equipment. No other hazardous materials would be associated with the drilling and extended pumping and pilot plant testing program. A Prevention and Response Plan has been prepared to define practices to keep fuel from entering the ocean or San Juan Creek. Potential spills/leaks are further discussed under Hydrology/Water Quality. However the project will, prior to commencement of drilling operations, prepare a containment area under the entire footprint of the active area to contain any released fuels or fluids.

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No schools are located within one-quarter mile of the park are. No impacts would occur.

d) Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

There are no hazardous materials sites within the park.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project is not located within an airport land use plan.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project is not located within the vicinity of a private airstrip.

g) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project involves temporary construction, exploratory drilling, and a pumping test. These activities would have no impact on local emergency response planning.

h) Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project is within a developed beach park and not near combustible vegetation.

VIII HYDROLOGY AND WATER QUALITY

Surface Water Bodies

Surface water bodies in the project vicinity include the Pacific Ocean and the mouth of San Juan Creek. Doheny Beach is a south-facing beach exposed to waves from south swells and tropical storms (Coastal Environments 2004). The area is most exposed to storms arriving from the southwest. These waves have heights that range from 2 feet to 7.5 feet with an average height of 4 feet. Shallow-water waves at Doheny State Beach during the largest north Pacific winter storms range from 5 feet to 12 feet.

Tides along the California coast are mixed, with two high and two low tides of unequal amplitude each day. In the project area the maximum tidal range is about 9 feet from 7.2 feet above mean lower low water (MLLW) to 1.8 feet below MLLW (Coastal Environments 2004). As measured on September 29, 2005, test slant well site was approximately 54 feet above the extreme high tide line.

San Juan Creek is a perennial creek that intersects the beach about midway across Doheny State Beach. The watershed of San Juan Creek is 176 square miles. The lower 2.6 miles of the creek were channelized in the 1950s for flood control (Coastal Environments 2004). At the mouth of San Juan Creek, a natural beach berm often blocks the creek from entering the ocean from late spring to late fall. The buildup of water occasionally breaks this berm. A jetty, known as Thor's Hammer, was constructed by the USACE in 1964 at the west side of San Juan Creek to prevent erosion and to stabilize the adjacent west beach. The San Juan Creek outlet is on the San Diego Regional Water Quality Control Board list of impaired water bodies under Section 303(d) of the Clean Water Act for bacteria indicators (RWQCB 2003).

Flooding from the creek and/or high tides occasionally occurs in the park (Coastal Environments 2004). Flooding of the bike trail on the west side of the creek near the Pacific Coast Highway Bridge has been a problem. The hundred year flood discharge at the San Juan Creek ocean outfall is about 53,300 cubic feet per second. A storm of this magnitude would be likely to flood the park to a depth of 3 to 5 feet. This would not impact the buried well.

Groundwater Hydrology

Under natural conditions, the underflow (groundwater) of San Juan Creek outflows to the ocean at various rates depending on the antecedent hydrologic conditions (R. Bell, MWDOC, personal communication 2005). During wet years the alluvial system is relatively full, and subsurface losses to the ocean are estimated to be in the range of approximately 1,500 acre-feet per year (Geoscience). During prolonged droughts, groundwater levels can decline significantly, which results in a corresponding decrease in subsurface outflows and potential seawater intrusion. This decline in freshwater gradient results in inland movement of higher density ocean water within the alluvial aquifer. If freshwater gradients are reduced significantly as the result of inland groundwater pumping, intrusion of ocean water would become more significant. The fresh water/salt water interface location was estimated using the Ghyben-Herzberg and Glover Models, estimated hydraulic conductivity based on test borings, and an estimated subsurface outflow of 1,050 acre-feet per year. This analysis indicates that the interface is approximately 150 feet oceanward of Monitoring Well 1.

The Phase 1 Hydrogeology Investigation test borings showed a shallow aquifer zone underlain by a three to five foot clay layer at a depth of approximately 25 ft. bgs. Fresher water in the uppermost part of this shallow zone would appear to support localized vegetation in the landscaped area and to a lesser extent the limited riparian habitat found along the banks of San Juan Creek. Riparian vegetation in this location appears to be supported in large part by freshwater flows of San Juan Creek and by localized precipitation and runoff that percolates into the uppermost sands and silty sands in this area, with drainage gradients in the nearby area to the lower San Juan Creek channel.

a) Would the project violate any water quality standards or waste discharge requirements?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The proposed project would not violate any water quality standards or waste discharge requirements. Water produced during the extended pumping and pilot plant testing would be discharged to the surf zone through a diffuser located next to the groin on the west side of the San Juan Creek mouth. The flow velocities through the diffuser would be designed to cause no liquefaction or erosion of beach sands. All discharges to the surf zone would meet NPDES permit requirements for surf zone discharges. Because the well water would be low in oxygen it would be aerated prior to discharge to meet dissolved oxygen requirements. Well discharge to the surf zone will require a minimum of 5 mg/l dissolved oxygen residual. A pump and eductor system will be used to reliably add oxygen to the well water over the 18-month test. Because all constituents in the discharge would meet NPDES requirements, discharge of test well water will have an insignificant effect on water quality.

b) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

A water budget was performed for the model run with the Test Slant Well pumping 2,000 gpm (2.88 MGD, 3,226 acre-ft/yr) for a period of three years. Ocean and offshore recharge accounts for 67 percent (2,161 acre-ft/yr) of the recharge to the slant well with 33 percent (1,065 acre-ft/yr) of the recharge originating from the inland sources. Under existing conditions, there is a total outflow of 1,521 acre-ft/yr to the ocean including 854 acre-ft/yr of underflow and 667 acre-ft/yr of rising water. The 1,065 acre-ft/yr of recharge from inland sources to the test slant well is less than the 1,521 acre-ft/yr outflow to the ocean under existing conditions. Therefore, it can be concluded that the project would not interfere with developed groundwater rights, but would be extracting groundwater that is otherwise lost to the ocean.

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or offsite?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The extended pumping and pilot test plant program is to determine the feasibility of developing a subsurface intake system for the desalination project. Drainage patterns would not be altered.

d) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or offsite?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project involves the pumping and testing of groundwater from a well located above the high tide line for informational purposes. Drainage patterns and/or rates and amount of run-off would not be altered.

e) Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project would not contribute to existing runoff to stormwater drainage systems.

f) Would the project otherwise substantially degrade water quality?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The proposed project involves the extended pumping of a test well and drilling of two exploratory boreholes on the beach. Activities would occur on a developed beach or park areas above the high tide line. To prevent any fuels, drilling fluids or other potentially toxic materials from entering the ocean or the mouth of San Juan Creek a Spill Prevention and Response Plan has been developed (Layne Christensen 1999). Prior to the commencement of drilling operations, a containment area underlain by heavy plastic sheeting will be constructed to enclose the drill rig and other equipment to minimize the potential for releasing fuel, hydraulic fluid, or water from drilling operations to the surrounding environment. Additionally, absorbent materials will be maintained onsite during work operations as part of a spill prevention plan. It is estimated that drilling operations will require the use of 40 to 60 gallons of diesel fuel daily. Fuel will be delivered by bulk truck to the site daily and will be handled in accordance with a fuel containment plan. No fuel or oil products, other than that which is in equipment fuel tanks, will be stored onsite. With adherence to the protective measures specified in the Spill Contingency Plan, degradation of water quality will be prevented.

g) Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project does not involve the construction of any housing.

h) Would the project place, within a 100-year flood hazard, area structures that would impede or redirect flood flows?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project would not involve the construction of any structures that would affect flood flows.

i) Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project would not expose people or structures to a risk of flooding.

j) Would the project expose people to inundation by seiche, tsunami, or mudflow?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project would not expose people to inundation by seiche, tsunami, or mudflow.

IX. LAND USE AND PLANNING

a) Would the project physically divide an established community?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

There would be no division of an established community. Therefore no impacts would result.

b) Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over it. Therefore no impacts would result.

c) Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No changes would occur that would affect habitats or natural communities. The project would not conflict with any applicable habitat conservation plan or natural community plan. No impacts would result.

X. MINERAL RESOURCES

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

There are no known mineral resources in the project area, thus, no loss of an available mineral could occur. No impact would result.

b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

There is no known resource of a locally important mineral recovery site delineated on a local general plan, specific plan or other land use plan. Therefore no impacts would result.

XI. NOISE

a) Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

Because if its location, the drilling program would be subject to the local noise ordinance of the City of Dana Point. Noise Ordinance Section 11.10.014 "Special provisions" exempts:

"(e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 pm and 7:00 am on weekdays, including Saturday, or any time on Sunday or a federal holiday."

Drilling and other activities associated with the proposed project are scheduled to occur between 10 am and 6 pm, Monday through Friday. These hours are requisite and the project proposes to construct between these hours; all project construction would comply with these days and hours. Adherence to the Code will ensure that construction impacts remain less than significant.

Workers exposed to onsite noise during drilling activities would be subject to the requirements for worker safety and hearing conservation as dictated under the Occupational Safety and Health Administration (OSHA) and any potential impacts to on-site receptors would be less than significant.

b) Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

Groundborne vibration is measured in terms of the velocity of the vibration oscillations. As with noise, a logarithmic decibel scale (VdB) is used to quantify vibration intensity. When groundborne vibration exceeds 75 to 80 VdB, it is usually perceived as annoying to building occupants. The degree of

annoyance is dependent upon type of land use, individual sensitivity to vibration, and the frequency of the vibration events. Typically, vibration levels must exceed 100 VdB before any building damage occurs.

The only potential for vibration is usually during construction activities. Excessive vibration is typically associated with blasting activities or the use of a percussive pile driver in proximity (i.e., less than 200 feet) of sensitive land uses. Percussive pile driving is not expected to occur, and no sensitive land uses are located within this distance. As a result, although construction of the proposed project would include use of heavy equipment, it is unlikely that construction would result in perceptible, let alone excessive, groundborne vibration or groundborne noise levels. Impacts would be less than significant.

c) Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project includes the construction and testing of a well. Once testing is complete, the well would be abandoned in place and no permanent noise increase is associated with the project. No permanent impacts to ambient noise levels are anticipated.

d) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

Noise levels associated with construction activities would be higher than the ambient noise levels in the project area today, but would subside once construction of the proposed project is completed.

Two types of noise impacts could occur during the construction phase. First, the transport of workers and equipment to the construction site would incrementally increase noise levels along site access roadways. The number of construction workers would be minimal (no more than about six on any given day). Furthermore, the number of heavy truck deliveries would be limited, averaging no more than about one per day. Even though there could be a relatively high single event noise exposure potential with passing trucks (a maximum noise level of 86 dBA at 50 feet), the increase in noise would be less than 1 dBA when averaged over a 24-hour period, and would therefore have a less than significant impact on noise receptors along the truck routes.

The second type of impact is related to noise generated by on-site drilling operations and local residents could be subject to elevated noise levels due to the operation of on-site heavy equipment. Construction activities are carried out in discrete steps, each of which has its own mix of equipment, and consequently its own noise characteristics. These various sequential phases would change the character of the noise levels surrounding the construction site as work progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow noise ranges to be categorized by work phase. Table XI-1 is typical construction equipment noise levels recommended for noise impact assessment at a distance of 50 feet.

Table XI-1
Noise Levels Generated By Typical Construction Equipment

Type of Equipment	Range of Sound Levels Measured (dBA at 50 feet)	Suggested Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers, 12,000 to 18,000 ft-lb/blow	81 to 96	93
Rock Drills	83 to 99	96
Jack Hammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	68 to 80	77
Dozers	85 to 90	88
Tractor	77 to 82	80
Front-End Loaders	86 to 90	88
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 86	86
Trucks	81 to 87	86

Source: Noise Control for Buildings and Manufacturing Plants, BBN 1987.

Construction at the well site is located on the Doheny State Beach. The nearest existing permanent residential units are situated in the Dana Point Marina Mobile Home Estates located to the north, just north of Pacific Coast Highway (PCH) and the temporary RV/campers across San Juan Creek from the well drilling site. The RV/camper area is north and adjacent to the exploratory borehole locations and is within 50 feet of the nearest boring operations. The test slant well area is approximately 700 feet from the nearest RV/camper parking location. Based on an L_{eq} value of 85 dBA as measured at a distance of 50 feet, resultant exterior noise levels will be approximately 85 dBA at the closest campsite during construction activities. The actual CNEL could be considerably less, as this analysis assumes the continual production of 85 dBA Leq with no breaks in the noise, due to drill bit change-out, equipment maintenance, breaks, etc. According to GEOSCIENCE Support Services, Inc., sound panels will be installed around the drilling rig's engine compartment to minimize noise. Approximately 40 to 50 percent of the engine sound will be absorbed. As the engine remains running during the entire drilling operation, this will significantly decrease the noise levels at the nearest closest RV/camper parking location.

Projected noise levels would exceed the 60 dBA CNEL level established by the City. However, The City recognizes that the control of construction noise is difficult at best and provides exemption for this type of noise when work is limited to those hours included in the Code of Ordinances discussed above. Therefore, the project will have less than significant noise impacts.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

At about 18 miles to the northwest, John Wayne International Airport represents the nearest public use airfield. The project is not directly in the flight path and is well outside of the airport's 65 dBA CNEL noise contour. As such, no impacts are associated with aircraft noise.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project is not located in the vicinity of a private airstrip and would not be impacted by private airport operations. No impacts associated with air traffic or private airstrips would result from the implementation of the proposed project.

XII. POPULATION AND HOUSING

a) Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

There are no proposed new homes and or businesses as part of this project. No impacts would result.

b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No existing housing would be affected or require removal/relocation. No impacts would result.

c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project would not displace substantial numbers of people. No impacts would occur.

XIII. PUBLIC SERVICES

a)	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Fire Protection? Police Protection? Schools? Parks? Other public facilities?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The extended pumping and pilot plant testing project would not require public services or new public facilities. The project will have no impact on public services.

XIV. RECREATION

a)	Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No increase in recreational facilities is proposed. No increase in or expansion of recreational facilities will occur.

b)	Does the project include recreational facilities or require the construction or expansion or recreational facilities which might have an adverse physical effect on the environment?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No increase in recreational facilities is proposed. No increase in or expansion of recreational facilities will occur.

c)	Does the project include potential safety impacts to recreational users?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

A number of measures will be implemented to ensure that the project does not represent a threat to public safety.

Drilling areas and equipment staging areas will be fenced. Temporary 6-ft high chain link fencing and a 16-ft wide gate will be installed around the drilling site during all mobilization, well drilling, construction,

development, testing and demobilization activities. A fenced staging area approximately 80 ft wide by 140 ft long will be located within the Doheny State Beach parking lot (see Figure 2). The staging area will be needed only during the construction of the wellhead and discharge facilities (January – February 2009), and again during drilling of the two exploratory boreholes (January 2010). The fence around the staging area will be a minimum of six feet in height, and each panel will have its own support base or footing and will not be driven into the pavement.

The work site at the exploratory boreholes will be underlain by a heavy-duty plastic liner which will be changed when necessary due to wear and tear from driving equipment over it. Absorbent materials will be kept on site at all times for immediate availability if needed to contain all spills, potential waste and vehicle drippings.

Prior to drilling operations, there will be a meeting between MWDOC, its consultants, California State Parks personnel, and the Drilling Contractor to review the plan of work, park rules, safety considerations, and environmental commitments. Each exploratory borehole drilling site will be visited during the pre-construction meeting.

In addition to the drilling crew, there will be one person (Site Safety Officer) onsite to interact with the public and answer questions from the public. This person will not be integral to actual drilling operations. In addition to answering public inquiries, it will be this individual's job to ensure that the perimeter around the drilling operations is safe and secure. Drilling operations will take place on the sand such that drilling equipment will not obstruct bike paths or other access roadways. Where bicycle paths and roadways may be temporarily blocked, an alternative route/detour will be clearly marked. The Site Safety Officer will also redirect pedestrian and bicycle traffic in the event that the drilling operations obstruct a traffic route.

MWDOC will prepare signage to be posted at the site of drilling operations. The sign will explain the project and provide a MWDOC telephone number where public inquiries can be directed. MWDOC will mail an informational notice to the residents of the bluff overlooking the Doheny State Beach campground and all other property owners located near the Park prior to commencement of the pilot plant testing and exploratory borehole drilling.

With the exception of construction and exploratory borehole drilling, the project operations would pose no threat to public safety. Wells would be buried and inaccessible to the public. The discharge of pumped well water through the diffuser would be gentle and would not liquefy sands or create a gully. The flow velocities through the diffuser would be designed to cause no liquefaction or erosion of beach sands.

With the proposed safety measures, the project would not pose a threat to the safety of recreational park and beach users and would not impair recreational activities.

XV. TRANSPORTATION/TRAFFIC

a)	Would the project cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

As per the project description only a few pieces of heavy equipment are required for the construction and exploratory boring activities. In general, no more than five persons will be onsite for each day of activity. Those vehicles would come and go each day. This small number of vehicles would not add to a substantial increase of the local capacity of the street system.

b)	Would the project exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

Because there will not be a permanent increase in traffic, there will be no cumulative addition to the roadways in the area, and no impacts to established congestion management plans.

c)	Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	Potentially Significant Impact ☐	Less than Significant With Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project does not involve air traffic, thus there will be no impacts.

d)	Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project does not propose to redesign roadways. There will be no hazards impacts.

e)	Would the project result in inadequate emergency access?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The project involves only temporary construction equipment and worker vehicles to be active in the area for the periods of construction and exploratory borehole drilling. Construction equipment will be working off the roadways, and no impacts to emergency access would occur. The footprint is small, such that, if necessary, emergency equipment would still be able to access the beach.

f)	Would the project result in inadequate parking capacity?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

No permanent changes to parking capacity will occur as a result of the proposed modifications. Heavy construction equipment will be confined to the working footprint. A staging area for drilling operations will be established in the eastern parking lot area as shown on Figure 2. Workers may use some of the visitor parking, however, due to low parking lot usage during the time of construction (winter), a less than significant impact would occur.

g)	Would the project conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project is of a temporary nature and will not affect existing plans, policies or programs. No impacts will occur.

XVI. UTILITIES AND SERVICE SYSTEMS

a)	Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project entails only minor construction, and operations are comprised only of well pumping and pilot plant testing. No exceedance of wastewater treatment requirements will occur.

b)	Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

No need for new water or wastewater treatment or expansion of existing facilities will occur.

c)	Would the project require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project entails only minor construction. No need for new stormwater drainage facilities will occur.

d)	Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project entails only minor construction. No need for new or expansion of existing water supplies facilities will occur.

e)	Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project entails only minor construction. No need for new or expansion of existing wastewater treatment facilities will occur.

f)	Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The project entails only minor construction. Because waste quantities are small, any impacts will be less than significant.

g)	Would the project comply with federal, state, and local statutes and regulations related to solid waste?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The project entails only minor construction. No need for new or expansion of existing solid waste facilities will occur.

XVII. MANDATORY FINDINGS OF SIGNIFICANCE

a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The proposed project would not degrade the quality of the environment. Project activities would take place within developed areas of the park or on the upper beach above the high tide line. Most of the proposed activities would occur above the mean high tide. Groundwater drawdown during the extended pumping test would not reduce the amount of time that soils along the creek bank are saturated and there would be no impacts from the pumping on riparian and wetlands vegetation.

The decline in water depth in the lagoon from the extended pumping test would be largely offset by streamflows, and the impact from the test pumping on lagoon water levels would be too small to be measured. When the lagoon is breached, water levels are primarily controlled by the tides. Therefore, the drawdown would primarily affect lagoon levels when the lagoon is closed and high water is ponded behind the berm. Therefore, the extended pumping test will not reduce the lagoon water level to a depth that might impede steelhead migration or degrade the lagoon habitat.

The State and California Endangered California least tern and California brown pelican may visit the area during migration, however, the project would have negligible affect on the lagoon or nearshore water and thus not affect the species. Federal threatened western snowy plover may at times visit the site. Biological monitors will be present during project activities to make sure that no resting or foraging snowy plovers are harmed or disturbed. San Juan Creek is designated Critical Habitat for the Southern California Steelhead Evolutionarily Significant Unit. Steelhead may at times occur in San Juan Creek lagoon or nearshore ocean waters. A Spill and Containment Plan would insure that no fuel or fluids enters tidal waters. The decline in the lagoon water level at the end of the extended pumping test would be relatively small and would not affect the use of the lagoon by steelhead or the quality of the lagoon habitat.

Previous studies of Doheny State Beach have found no evidence of prehistoric occupation, and no impacts would be expected to cultural resources.

b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☐	No Impact ☑

The proposed project is of short duration and minimal environmental impact; and, thus, would not contribute to the impacts of the cumulative environment.

c)	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	Potentially Significant Impact ☐	Less than Significant with Mitigation Incorporation ☐	Less than Significant Impact ☑	No Impact ☐

The proposed project has only a minor, short-term potential to adversely but not significantly impact Doheny Beach users. The footprint of the proposed construction and exploratory drilling work would affect only a small portion of the beach during the winter when use of the beach and park is low. Environmental commitments are incorporated into the proposed drilling program that would assure that public access is maintained, that noise impacts are minimize, and public safety ensured.

XVIII DOCUMENT SOURCES

Baskin, J.N. and T.R. Haglund. 2006. Tidewater Goby (*Eucyclogobius newberryi*) Protocol Survey in San Juan Capistrano Creek Lagoon, Dana Point, Orange County, California. Produced for P&D Consultants Inc.

Brennan, P. 2008. Big Fish, Bigger Plans. The Orange County Register

California Department of Parks and Recreation. 2003. Doheny State Beach General Plan & Draft EIR. December 2003.

California Invasive Plant Council. 2006. California Invasive Plant Inventory. Accessed November 6, 2007 at http://www.cal-ipc.org/ip/inventory/index.php#inventory. California Invasive Plant Council, Berkeley, California.

California Natural Diversity Data Base (CNDDB). 2008. Dana Point USGS Quadrangle.

CDM. 2007. San Juan and Trabuco Creeks Watershed Steelhead Recovery Plan. Prepared for Trout Unlimited, South Coast Chapter and California department of Fish and Game

Chambers Group, Inc. 2005. Analysis of Impacts to Western Snowy Plover at the Dana Point Ocean Desalination Project – Reconnaissance Hydrogeology Investigation. Letter to Richard Bell, P.E., Municipal Water District of Orange County.

Coastal Environments. 2004. Coastal Processes and Hydraulic/Hydrology studies for Doheny State Beach Technical Report for State of California Department of Parks and Recreation.

GeoScience Support Services, Inc. 2005. Dana Point Ocean Desalination Project. Test Angle Well Drilling Plan. September 2005.

Glenn, E., T.L. Thompson, R. Frye. J. Riley, and D. Baumgartner. 1995. Effects of salinity on growth and evapotranspiration of Typha domingensis Pers. Aquatic Botany 52(1):75-91.

Hogarth, W.T. 2005. Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California; Final Rule. Federal Register 70: 52488-52586.

Layne Christensen. 1999. Spill Contingency Plan.

McEntee. 2006. Analysis of Impacts to Western Snowy Plover at the Dana Point Ocean Desalination Project - Reconnaissance Hydrogeology Investigation. Letter Report to Richard Bell, P.E., Municipal Water District of Orange County

McEwan, D. and T.A. Jackson. 1996. Steelhead Restoration and Management Plan for California. California Department of Fish and Game

Regional Water Quality Control Board, San Diego Region (RWQCB) 2003. 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments.

Rogers, T., E. Hedblom, and J. Mayasich. 2003. Design of a Wetland Cap to Chemically Isolate Biota from PAH-Impacted Sediments. Prepared by Service Engineering Group for In-Situ Contaminated Sediment Capping Workshop, Cincinnati, OH. Accessed via the World Wide Web: http://www.serviceenv.com/Web2005/Docs/Rogers%20Web%20Pageb%205-21-03.pdf.

South Coast Air Quality Management District. 2003. Final 2003 AQMP, August 1, 2003.

South Coast Air Quality Monitoring District. 1993. *CEQA Handbook*, January 1993.

St. John, T. 1995. The Willows of Southern California. A Restoration Action Guide. Tree of Life Nursery.

U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, Bolt, Beranek, and Newman, 1971.

U.S. Fish and Wildlife Service. 2004. Draft Recovery Plan for the Tidewater Goby (*Eucyclogobius newberryi*). U.S. Fish and Wildlife Service, Portland, Oregon.

Willick, D. 2005. Rarities in Orange County. *Wandering Tattler* 55 (2): 4.

APPENDIX

AIR QUALITY

Summary of Construction Emissions - Dana Point Test Well Project

UNMITIGATED

Source	CO lb/day	ROG lb/day	NO_X lb/day	SO_X lb/day	Total PM_{10} lb/day	Total $PM_{2.5}$ lb/day
Well Head Construction Phase	17.07	4.24	32.86	0.11	13.32	9.69
Discharge facilities	17.07	4.24	32.86	0.11	13.32	9.69
Discharge Facilities and Electrical Service Install	35.86	9.54	90.93	0.26	24.53	19.24
Electrical Service Install & Slant well redevelopment	35.29	9.72	74.91	0.18	19.13	12.50
Slant well Redevelopment & Mobile Test facility Install	26.71	5.14	21.19	0.02	8.17	3.18
Submersible pump installation	16.18	4.56	28.04	0.03	5.55	2.57
startup and shakedown testing	3.86	0.70	0.23	0.00	2.77	0.74
18-month pilot test	20.04	5.26	28.27	0.03	7.28	3.10
Exploratory borings	26.21	6.65	54.09	0.08	8.85	3.81
Removal of Mobil testing facility and Electrical service	19.78	2.54	5.60	0.01	7.27	2.32
Removal of Discharge Facilities	10.79	2.27	5.47	0.01	6.80	2.13
Maximum Daily Project Emissions	***35.86***	***9.72***	***90.93***	***0.26***	***24.53***	***19.24***
SCAQMD Thresholds (lbs/day)	550	75	100	150	150	55
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**

MITIGATED

Source	CO lb/day	ROG lb/day	NO_X lb/day	SO_X lb/day	Total PM_{10} lb/day	Total $PM_{2.5}$ lb/day
Well Head Construction Phase	17.07	4.24	32.86	0.11	3.31	3.05
Discharge facilities	17.07	4.24	32.86	0.11	2.28	2.10
Discharge Facilities and Electrical Service Install	35.86	9.54	90.93	0.26	4.18	3.84
Electrical Service Install & Slant well redevelopment	35.29	9.72	74.91	0.18	3.24	2.98
Slant well Redevelopment & Mobile Test facility Install	26.71	5.14	21.19	0.02	1.38	1.27
Submersible pump installation	16.18	4.56	28.04	0.03	0.92	0.85
startup and shakedown testing	3.86	0.70	0.23	0.00	0.48	0.44
18-month pilot test	20.04	5.26	28.27	0.03	1.22	1.13
Exploratory borings	26.21	6.65	54.09	0.08	1.49	1.37
Removal of Mobil testing facility and Electrical service	19.78	2.54	5.60	0.01	1.25	1.15
Removal of Discharge Facilities	10.79	2.27	5.47	0.01	1.17	1.08
Maximum Daily Project Emissions	***35.86***	***9.72***	***90.93***	***0.26***	***4.18***	***3.84***
SCAQMD Thresholds (lbs/day)	550	75	100	150	150	55
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**

	1-hour CO Total Concentration, ppm	8-hour CO Total Concentration, ppm	1-hour NO2 Total Concentration, ppm	24-hour PM10 Concentration, ug/m3	24-hour PM2.5 Concentration, ug/m3
Maximum Project Emissions	35.86	35.86	90.93	4.18	3.84
Concentration at 25 meters	2.1019	3.2713	0.0883	7.12	3.33
Concentration at 50 meters	2.1137	3.2796	0.0903	2.24	1.05
Concentration at 100 meters	2.1338	3.2937	0.0953	0.22	0.10
Concentration at 200 meters	2.1412	3.2988	0.1048	0.00	0.00
Concentration at 500 meters	2.0514	3.236	0.1004	0.00	0.00
Concentration at 800 meters	2.0293	3.2205	0.0976	0.00	0.00
Concentration at 1000 meters	2.0221	3.2155	0.0959	0.00	0.00
LST Thresholds	20	9	0.25	10.4	10.4
Significant Impact?	No	No	No	No	No

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Dana Point CO

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = AREA
EMISSION RATE (G/(S-M**2)) = .100000E-04
SOURCE HEIGHT (M) = 5.0000
LENGTH OF LARGER SIDE (M) = 212.0100
LENGTH OF SMALLER SIDE (M) = 212.0100
RECEPTOR HEIGHT (M) = 2.0000
URBAN/RURAL OPTION = URBAN
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
25.	116.6	5	1.0	1.0	10000.0	5.00	45.
50.	130.0	5	1.0	1.0	10000.0	5.00	45.
100.	153.0	5	1.0	1.0	10000.0	5.00	45.
200.	161.5	5	1.0	1.0	10000.0	5.00	45.
500.	58.81	5	1.0	1.0	10000.0	5.00	45.
800.	33.49	5	1.0	1.0	10000.0	5.00	45.
1000.	25.24	5	1.0	1.0	10000.0	5.00	43.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	161.5	200.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

04/25/08
08:33:12

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Dana Point NOX

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =          AREA
   EMISSION RATE (G/(S-M**2))  =      .253000E-04
   SOURCE HEIGHT (M)          =        5.0000
   LENGTH OF LARGER SIDE (M)   =      212.0100
   LENGTH OF SMALLER SIDE (M)  =      212.0100
   RECEPTOR HEIGHT (M)        =        2.0000
   URBAN/RURAL OPTION         =         URBAN
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =      .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN DISCRETE DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ----------  ----  -----  -----  ------  ------  -------
    25.   295.0        5     1.0    1.0 10000.0    5.00     45.
    50.   329.0        5     1.0    1.0 10000.0    5.00     45.
   100.   387.2        5     1.0    1.0 10000.0    5.00     45.
   200.   408.7        5     1.0    1.0 10000.0    5.00     45.
   500.   148.8        5     1.0    1.0 10000.0    5.00     45.
   800.   84.74        5     1.0    1.0 10000.0    5.00     45.
  1000.   63.85        5     1.0    1.0 10000.0    5.00     43.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN      408.7          200.        0.

**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

04/25/08
08:26:28

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Dana Point PM10

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =         AREA
   EMISSION RATE (G/(S-M**2))  =      .120000E-05
   SOURCE HEIGHT (M)          =       1.0000
   LENGTH OF LARGER SIDE (M)   =     212.0100
   LENGTH OF SMALLER SIDE (M)  =     212.0100
   RECEPTOR HEIGHT (M)        =       2.0000
   URBAN/RURAL OPTION         =        URBAN
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN DISCRETE DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ----------  ----  -----  -----  ------  ------  -------
     1.   24.05        6     1.0    1.0 10000.0    1.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC    DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN      24.05            1.        0.


**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Dana Point PM10 Unmitigated

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =          AREA
   EMISSION RATE (G/(S-M**2))  =      .680000E-05
   SOURCE HEIGHT (M)          =        1.0000
   LENGTH OF LARGER SIDE (M)   =      212.0100
   LENGTH OF SMALLER SIDE (M)  =      212.0100
   RECEPTOR HEIGHT (M)        =        2.0000
   URBAN/RURAL OPTION         =         URBAN
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =      .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN DISCRETE DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ----------  ----  -----  -----  ------  ------  -------
     1.   136.3        6     1.0    1.0 10000.0    1.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------     -----------   -------   -------
SIMPLE TERRAIN      136.3            1.        0.


**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

04/25/08
08:28:42

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Dana Point PM2.5

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =          AREA
   EMISSION RATE (G/(S-M**2))  =      .110000E-05
   SOURCE HEIGHT (M)          =        5.0000
   LENGTH OF LARGER SIDE (M)   =      212.0100
   LENGTH OF SMALLER SIDE (M)  =      212.0100
   RECEPTOR HEIGHT (M)        =        2.0000
   URBAN/RURAL OPTION         =         URBAN
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =      .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN DISCRETE DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ----------  ----  -----  -----  ------  ------  -------
     1.   11.24        5     1.0    1.0 10000.0    5.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------     -----------   -------   -------
SIMPLE TERRAIN      11.24            1.        0.


**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```