

Monterey Peninsula Water Supply Project (MPWSP) Test Slant Well

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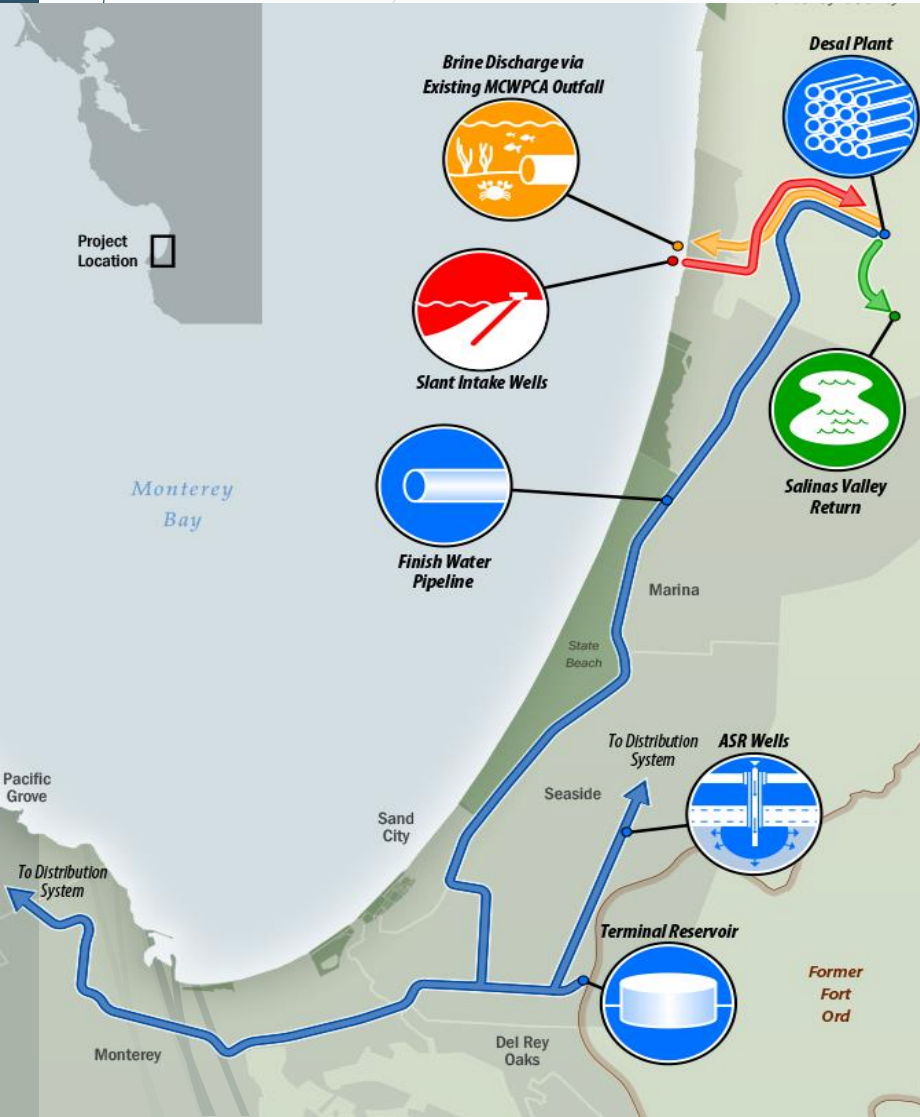
MPWSP Background

- ▶ In 2009 the State Water Resources Control Board (SWRCB) issued WR2009-060, which stated that California American Water (Cal-Am):
 - ▶ Stop diverting Carmel River water by December 31, 2016.
 - ▶ Loss of ~7,000 AFY of potable water.
- ▶ Desalination determined to be most viable source, therefore, Cal-Am began development of the MPWSP.
- ▶ MPWSP calls for a subsurface intake and desalination plant to produce new potable water source to serve the Monterey Peninsula.

MPWSP Background

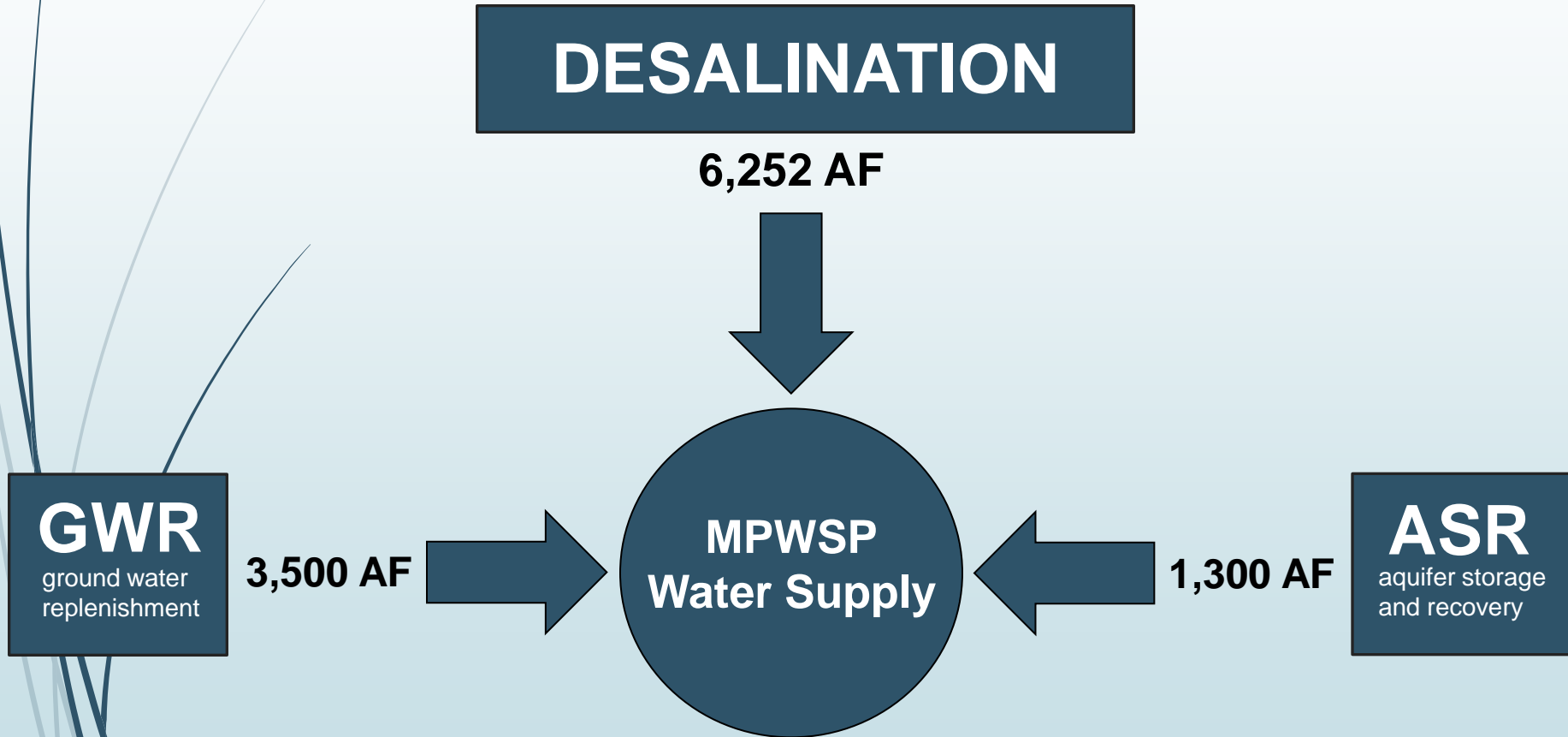
- ▶ The proposed MPWSP will produce 6.4 to 9.6 million gallons per day (mgd) of potable water which would be available for:
 - ▶ Direct use; and
 - ▶ Aquifer Storage and Recovery (ASR).
- ▶ The MPWSP is being evaluated by the California Public Utilities Commission (CPUC) in a separate EIR.

MPWSP Overview



- Desalination Plant: 6.4 to 9.6 mgd
 - Size dependent on implementation of MRWPCA's GWR project
- Subsurface Slant Well Intake System - 13 to 25 mgd (10 wells)
- ASR System in Seaside GW Basin
- Brine Discharge via MRWPCA existing outfall
- Return Flow to CSIP

MPWSP Water Sources



MPWSP Key Benefits

- ▶ Restores Carmel River flows
- ▶ Recharges the Seaside Groundwater Basin
- ▶ Minimizes marine biology impacts through the use of subsurface intakes
- ▶ Includes green energy sources

Open Ocean Intake Pilot Plant



Open Ocean Intake Pilot Plant Facility in 2007
Co-Located at the Moss Landing Power Plant

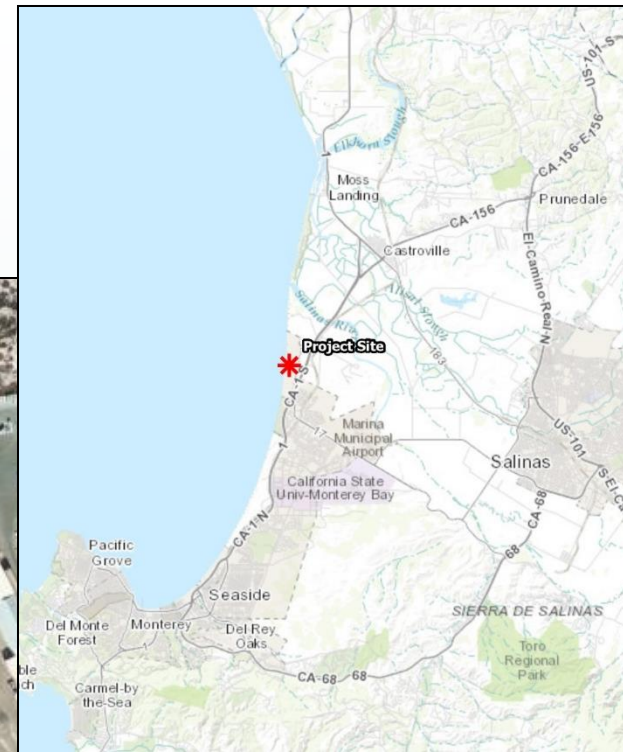
CA Ocean Plan Amendment

- ▶ Ocean Plan Amendments adopted in May 2015.
- ▶ Subsurface intakes have become the preferred method of seawater intake by coastal regulators, who are opposed to a screened open ocean intake.
- ▶ After substantial stakeholder and regulatory outreach, technical studies, and extensive research, the Test Slant Well project was developed at the CEMEX Site.



Test Slant Well - Purpose

- Evaluate feasibility of slant rather than vertical wells in order to reduce impacts to inland groundwater.
- Subsurface intakes require substantial research in order to establish a location with suitable hydrogeology and acceptable water quality that will not impact inland groundwater supplies.
- Collect groundwater and water quality data to evaluate feasibility of a subsurface intake well system on the CEMEX Site to supply 24 mgd for a 9.6 mgd desalination plant.
- Provide specs for final design of the intake well system.

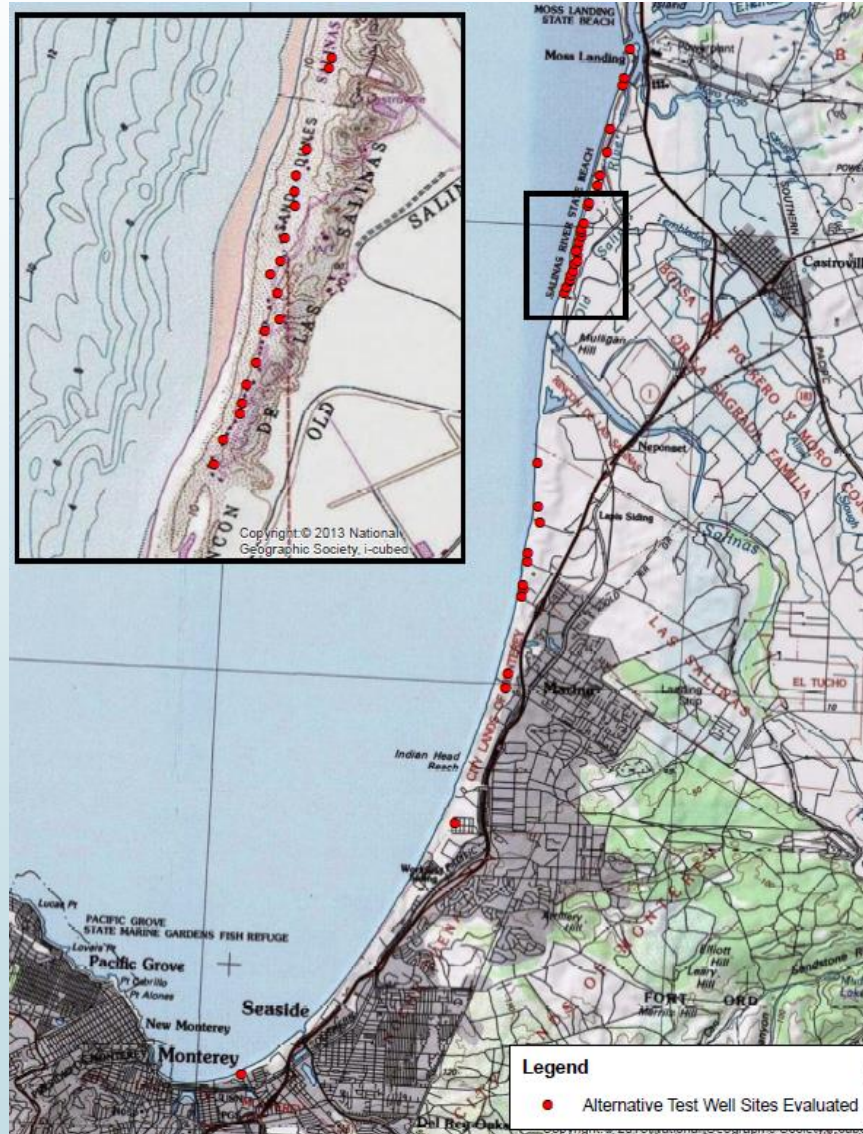
Test Well – Location



Legend

-  Anticipated Construction Footprint
-  Site Boundary

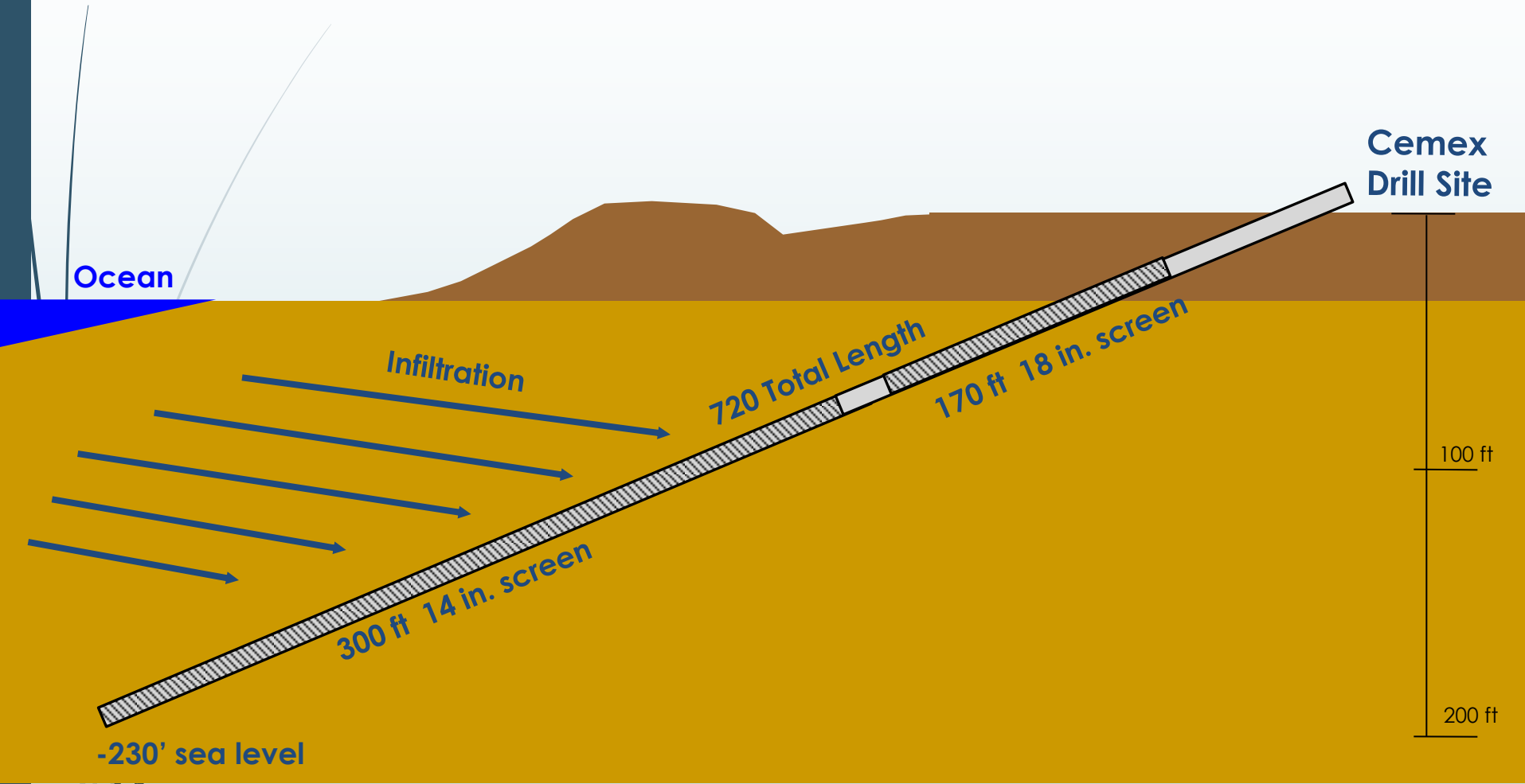
Other Well Sites Considered...



Test Slant Well – Description

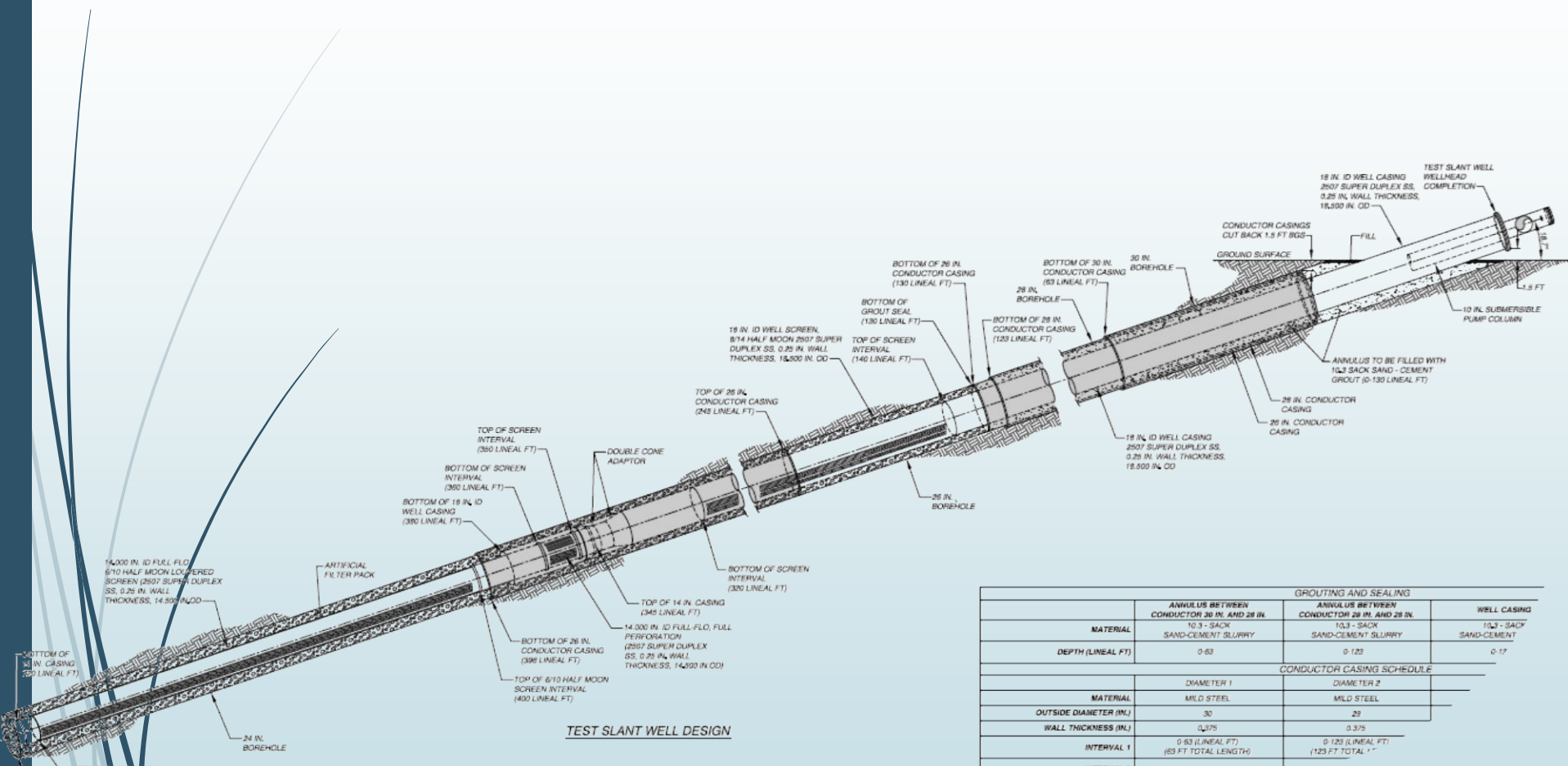
- **Drill Length:** 720 ft
- **Drill Angle:** 19 degrees below the horizontal
- **Well Tip:** ~ 200 feet below the ocean floor
- **Well Diameter:** 18-in casing and well screen (top 345 ft)
- **Well Diameter:** 14-in casing and well screen (bottom 375 ft)
- **Pump Column:** 10-in well pump column w/ discharge head
- **Pump:** 100 hp Indar submersible well pump
- **Material:** 2507 Super Duplex Stainless Steel

Test Slant Well – Schematic



* All measurements shown as approximate for presentation purposes only

Test Slant Well - Profile



TEST SLANT WELL DESIGN

GROUTING AND SEALING			
	ANNULUS BETWEEN CONDUCTOR 30 IN. AND 28 IN.	ANNULUS BETWEEN CONDUCTOR 28 IN. AND 28 IN.	WELL CASING
MATERIAL	10.3 - SACK SAND-CEMENT SLURRY	10.3 - SACK SAND-CEMENT SLURRY	10.3 - SACK SAND-CEMENT
DEPTH (LINEAL FT)	0-63	0-123	0-17
CONDUCTOR CASING SCHEDULE			
	DIAMETER 1	DIAMETER 2	
MATERIAL	MILD STEEL	MILD STEEL	
OUTSIDE DIAMETER (IN.)	30	28	
WALL THICKNESS (IN.)	0.375	0.375	
INTERVAL 1	0-63 (LINEAL FT) (63 FT TOTAL LENGTH)	0-123 (LINEAL FT) (123 FT TOTAL LENGTH)	
INTERVAL 2			

Test Slant Well – Permitting

1. **City of Marina**: Grading and Electrical Permit
2. **CA Coastal Commission**: CEQA Lead Agency, Coastal Dev. Permit
3. **Monterey Bay National Marine Sanctuary**: NEPA Lead Agency
4. **Central Coast RWQCB**: Discharge and CWA Section 401 Permit
5. **Monterey County Dept. of Environmental Health**: Well Permits
6. **Monterey Regional Water Pollution Control Agency**: Use of Outfall
7. **U.S. Fish and Wildlife Service (USFWS)**: Section 7 Consultation
8. **CA State Lands Commission**: State Lands Lease

Mitigation – Coastal Erosion



Movement of well insertion point east avoids long-term and storm coastal erosion.

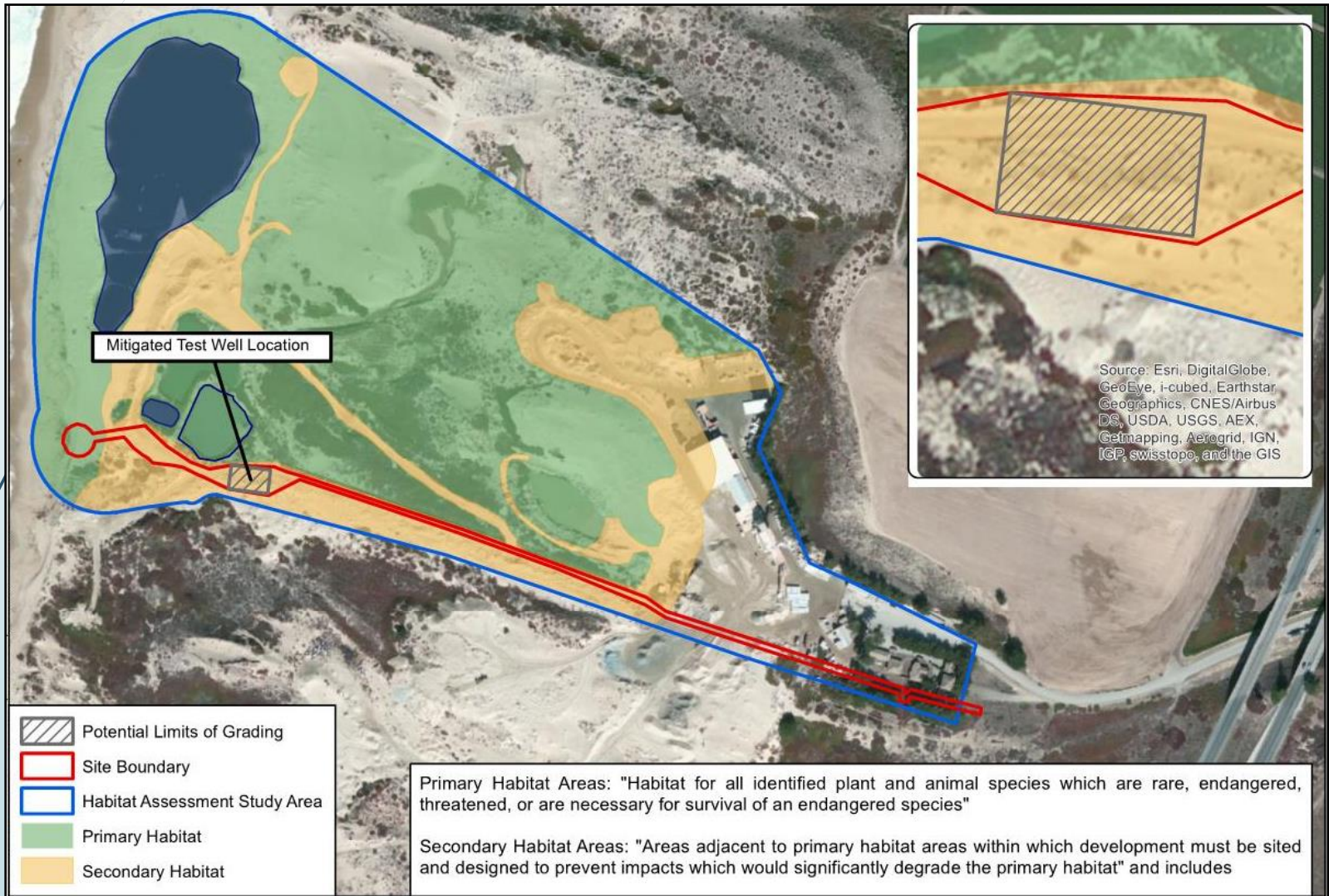
Further avoids potential impacts to Snowy plover nesting areas.

Mitigation - Biological

Although the project area has experienced prolonged and substantial disturbance due to sand mining operations, several mitigation measures were implemented to reduce impacts to the biological resources, which include:

- Preconstruction surveys, mapping, staking, noting habitat to be avoided (Snowy plover, Spineflower, Coast buckwheat).
- Biological Monitoring by Zander Associates and Point Blue.
- Construction window limited to OCT - Mar to avoid Snowy plover nesting activities.
- Upon completion, project site returned to pre-project conditions.

Mitigation - Biological



Mitigation - Biological



Mitigation - Biological



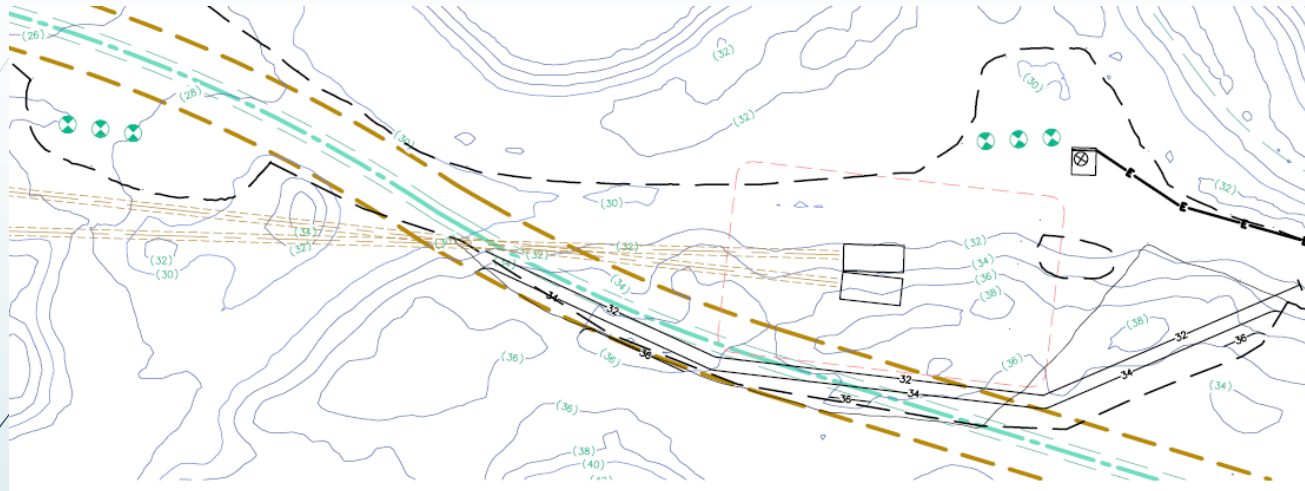
“Spine Flower Island”

Mitigation - Biological



Sound
Walls

Design Considerations

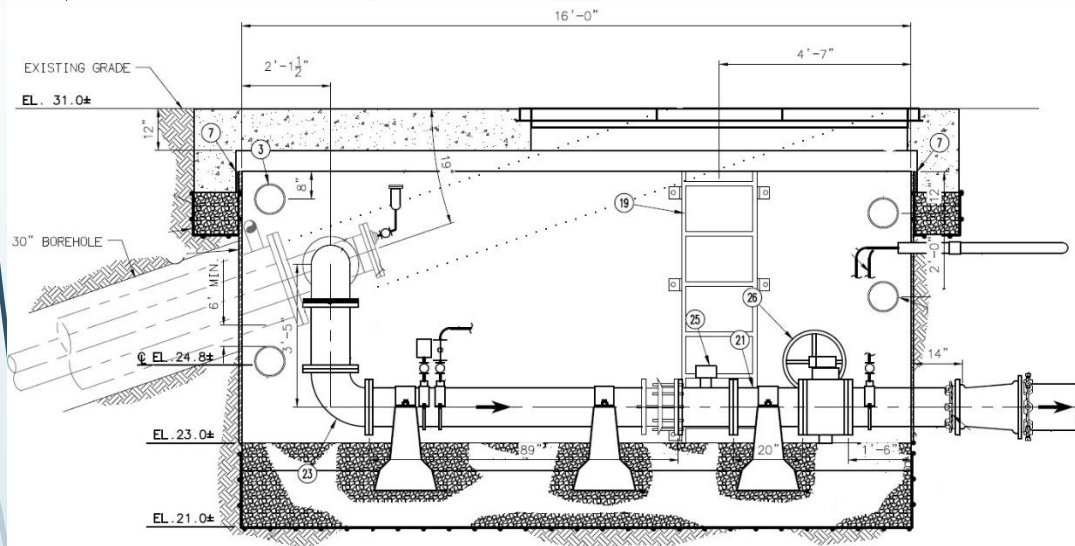


- Re-align slant well to not interfere with “Spine Flower Island”



- Modify well screen design to improve filter pack installation

Design Considerations



- Due to time constraints, we had to complete the mechanical piping above ground rather than a vault as designed.



Test Well – Construction Schedule

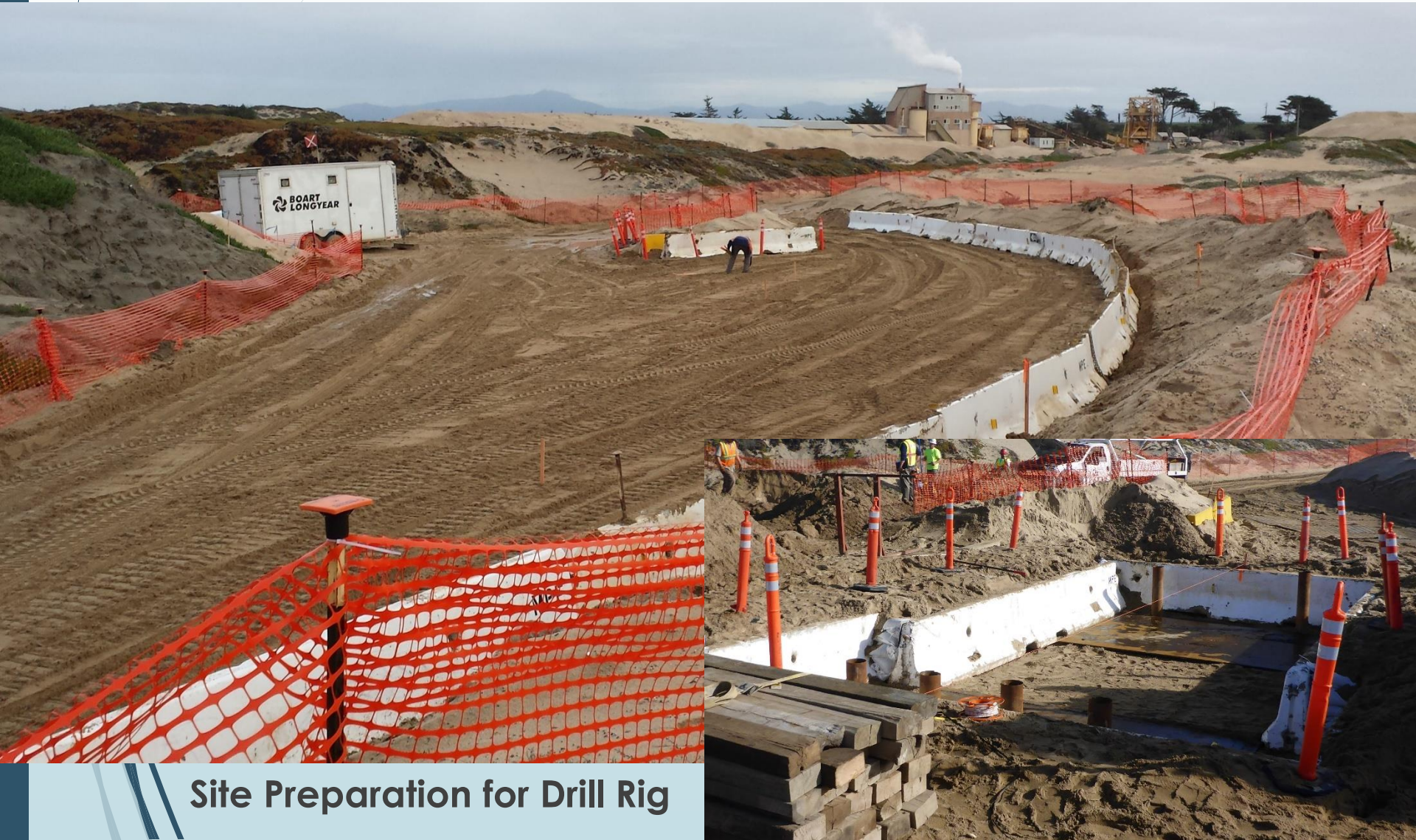
- ▶ **Nov 2014 to Dec 2014:**
 - ▶ Install disposal pipeline, valve vault, and connection to ocean outfall
 - ▶ Begin drilling, installing and developing Monitoring Wells

- ▶ **Dec 2014 to Mar 2015:**
 - ▶ Mobilize, Drill, Install, and Develop Test Slant Well

- ▶ **Mar 2015**
 - ▶ Well Start-up / Testing (Step Drawdown, 5-Day Constant Rate)

- ▶ **Mar 2015 to Mar 2016**
 - ▶ One Year Test Slant Well Sampling and Monitoring
 - ▶ Test Slant Well Sampling and Monitoring may continue longer than one year, which would be determined at the end of the first year.

Well Drilling / Installation



Site Preparation for Drill Rig

Well Drilling / Installation



Typical Equipment Required at Drilling Site

Well Drilling / Installation



DR-40 Slant Drill Rig

Well Drilling / Installation



Well Casing



Well Pump



Test Slant Well Installation



Completed Test Slant Well

Electrical Infrastructure



Well Development



Discharge Vault



Discharge Pipeline



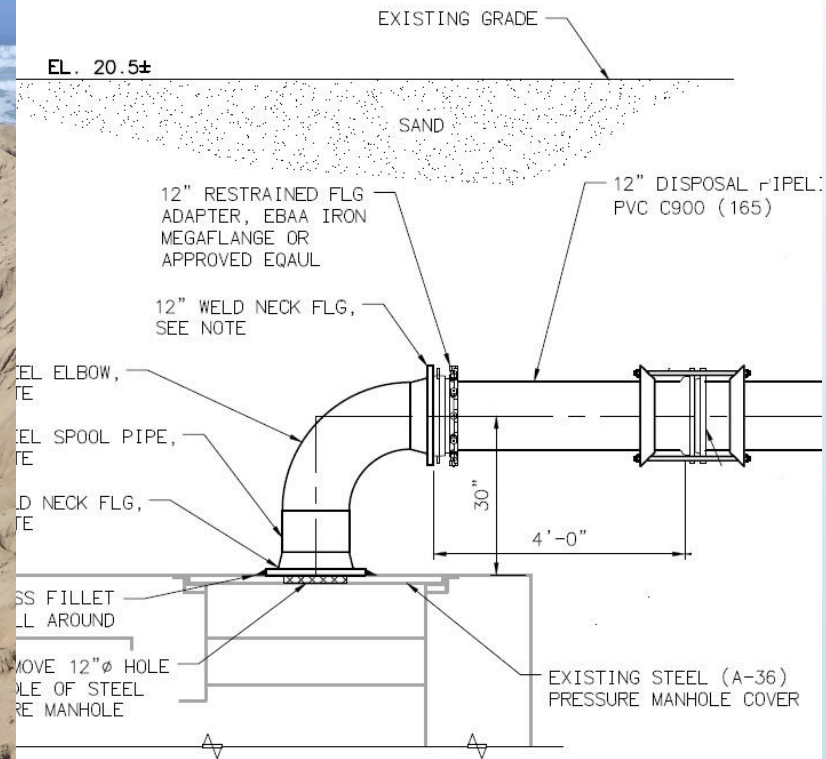
Discharge Pipeline



Connection to Outfall



Connection to Outfall



Operations

- ▶ **Long Term Pumping Begins:** April 2015
- ▶ **Duration:** 1-2 years
- ▶ **Flow Rate:** ~ 2,000 gpm
- ▶ **Issues:** Pump turned off in June 2015 due to water levels in MW-4 lower than permitted.
 - ▶ Regional agriculture pumping was cause, not test well.
 - ▶ Resumed pumping in late Oct 2015.
- ▶ **Reporting:** Weekly Long Term Pumping Test Report

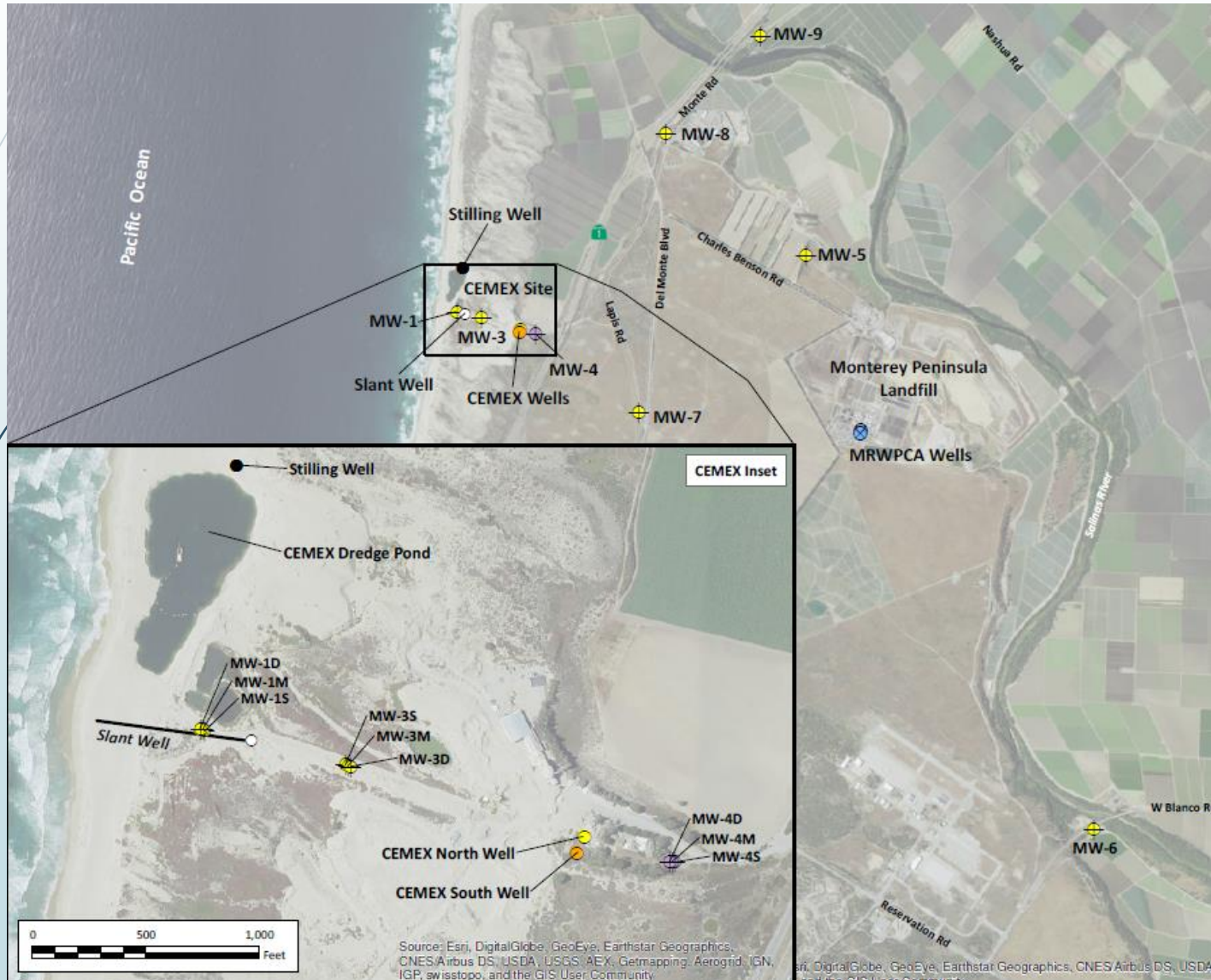
Sampling



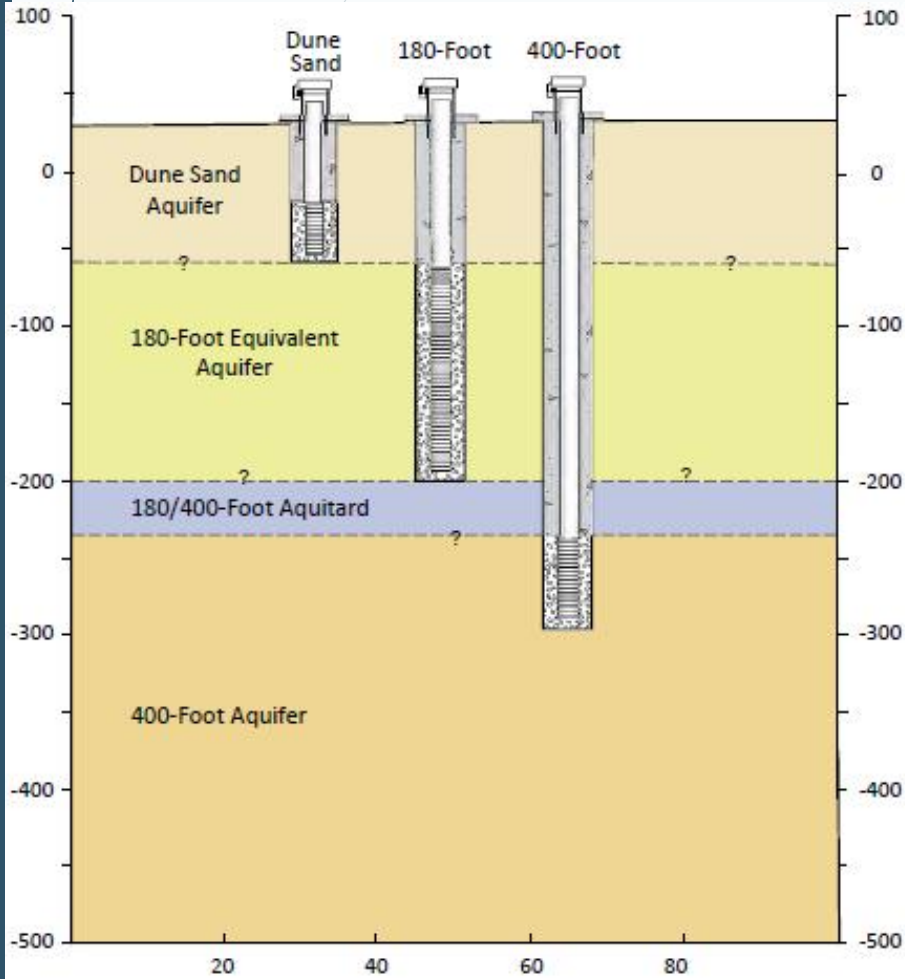
Sampling Panel Measures:

- Conductivity, Turbidity, pH, Dissolved Oxygen, and Temperature

Monitoring



Monitoring



Full-Scale Intake System

► **Description:**

- 10 slant wells (including test well)
- Provide 24.1 mgd to desalination plant
- 300 hp each (2,500 gpm @ 310' TDH)

► **Improvements:**

- Design of slant wells
- Drilling method (Boart Longyear)
- Filter pack installation method

► **Changes:**

- Well heads to be completed above ground
- Mechanical piping to be located in underground vault
- Electrical cabinets at each well site will be located in an above ground fiberglass enclosure

Full-Scale Intake System

