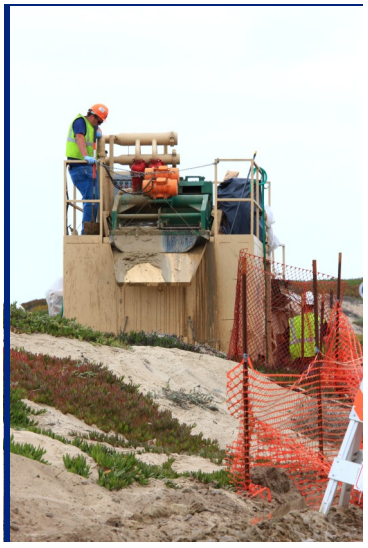
Case History

Desalination Plant Infiltration Well Monterey Bay – Sand City, California

The City of Sand City, California, constructed a desalination plant to convert brackish groundwater from the ocean/groundwater interface into potable water for residential and commercial use. Brackish water is pumped from vertical wells to supply the plant. The discharge from the plant has the approximate salinity of seawater, but environmental constraints made it difficult to obtain permitting to use a surface or subsurface outfall to discharge the brine directly to the ocean.

DTD was contracted to install an infiltration/discharge well, parallel to the beach, at a depth of approximately 50 feet below Mean High Tide. The well, 900 feet long and constructed with 6 inch diameter HDPE screen and casing, traversed beneath a protected dune area and endangered species habitats for the Snowy Plover and the California Black Legless Lizard.



DTD mobilized our American Augers DD210 drilling rig for this project. The rig can produce 210,000 pounds of thrust or pullback, and 25,000 ft/lbs of torque. To support the drilling operations, we also mobilized and interconnected two modular mud mixing systems, one owned by DTD and the other a leased unit from Mud Technology International. The combined systems included mixing hoppers, scalping screens and desanding shakers, and desilting hydrocyclones. Mud was recycled sequentially through the two systems to remove solids from the drilling fluid prior to reuse for drilling. The mud system also included a separate skid mounted high pressure mud pump to supply drilling fluid to the drill rig.

Prior to installation, the well string, which included 700 feet of 6-inch diameter SDR-11 HDPE well screen, and 276 feet of blank SDR-11 HDPE casing/riser was fusion welded and stretched out along the beach. After the pilot bore was completed, the borehole was pre-reamed to 14 inches prior to pullback of the well materials. A tremie pipe was inserted to a depth of approximately 40 feet, and the well annulus was grouted to the surface. Although the pilot bore was double-ended, the well itself was constructed as a single entry, with one end capped below the ground surface and the other open.

Although the drilling conditions were anticipated to be in soft beach sand, they proved to be in far more compact material, and the crew encountered some unexpected surprises, including abandoned steel cables from historic dredging operations in the area. Despite a few setbacks associated with the drilling conditions, the drilling was completed with minimal delays, and the well was installed to specification.

After the well was installed, it was flushed with a solution of water and a breaking enzyme to hasten the breakdown of the CETCO CleanDrill drilling mud. The well screen was then jetted for several passes to remove silt or fine sand that may have impacted into the slots during pullback.

The well was developed extensively by a combination of air lifting, pumping from the surface with three and four inch trash pumps, and pumping with a

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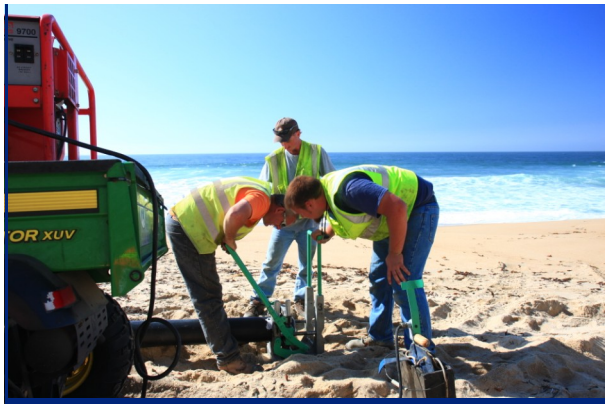

4 inch submersible pump. During the final stages of pumping, the well was instrumented with pressure transducers, and a strap-on flow meter was used to monitor flow rates and volumes. The well was eventually pumped at a rate exceeding 750 GPM, limited only by the pump capacity: the well showed no indication of excessive drawdown.

The well is currently operating at a rate above design capacity. The engineers are considering additions to the desalination plant that would nearly double the initially planned discharge through the well.

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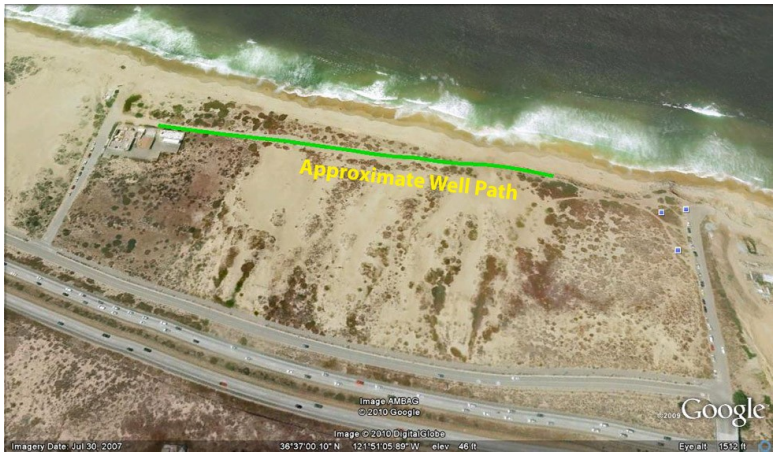

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