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GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES
COASTAL/MARINE GEOTECHNICS

Project No.
P30462.000.001

January 22, 2026

Ms. Robin Huber
Associate Engineer
Water Utilities Department
300 N. Coast Highway
Oceanside, CA 92054

Subject: Buccaneer Lift Station
Oceanside, California

PROPOSAL FOR GEOTECHNICAL SERVICES

Dear Ms. Huber:

We are pleased to present this proposal to provide geotechnical services for the Buccaneer Lift Station at the La Salina Wastewater Treatment Plant in Oceanside, California. For our use, we were provided previous geotechnical information which included the previous lift station geotechnical report, groundwater sampling, and percolation testing. In addition, we received a site plan showing the proposed location of the lift station, and GIS map of the existing underground infrastructure and request for scope of work letter. From review of the provided documents, we understand the City of Oceanside is proceeding with decommissioning the La Salina Wastewater Treatment Plant and is implementing an infrastructure plan to convey wastewater to the San Luis Rey Wastewater Treatment Plant. For this improvement, a deeper wet well and associated tanks will be constructed with additional needs for supplemental geotechnical data and groundwater testing. We understand specific issues include constructability and groundwater dewatering during construction of the wet well structure, along with geotechnical recommendations for design of the proposed storage tank.

SITE BACKGROUND

We briefly reviewed existing geotechnical information collected at the site to understand preliminary geologic conditions at the site. From our review, we understand the site is located in a thick deposit of young alluvial soil (lagoonal/estuarine deposit) consisting primarily of clay with interbedded layers of sand. Below these younger materials, the Santiago Formation, which consists of sandstone with some clay and silt fines, was encountered to the total depth explored at the site. Near the site are also sensitive structures such as existing utilities and the nearby railway immediately to the east of the site. We anticipate dewatering and construction of the wet well structure to be feasible provided careful engineering is implemented to limit local impacts of dewatering and excavation deformation at the site. Given the existing geologic conditions, we expect various shoring systems and dewatering options are possible, such as a secant shoring system with internal dewatering at the base of the excavation within the Santiago Formation or a fully dewatered condition with a more traditional pile/lagging with internal bracing shoring system.

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We have significant expertise and have extensive experience in well design and dewatering modeling and excavation engineering. For this project, James Thurber, PG, CEG, CHG will be principal in charge who has over 40 years of hydrogeologic experience and well experience in the southern California region. Taylor Strack, PE, GE will be in the engineering lead with 12 years engineering experience who has significant experience in shoring designs, tunnelling, and treatment facilities.

Select example projects that exemplify suited experience relative to the subject site are provided below.

- LA Metro's Purple Line Extension Section 3 Stations Project—Los Angeles
- Penitencia WTP (PWTP)—San Jose, CA
- City of Oceanside (On-Call) North River Road and Sleeping Indian Road Storm Drain Outfall Improvements—Oceanside, CA
- City of Lathrop Well 21 Facility—Lathrop, CA
- City of Hayward Wastewater Treatment Plant Digester Dewatering Analysis—Hayward, CA
- Hydrogeologic Services, Four Injection Wells, Mid-Basin Project—Orange County, CA
- Hydrogeologic Services, Nested Monitoring Wells, Mid-Basin Project—Orange County, CA
- Sunset Gap Monitoring Well Project—Seal Beach, CA

Task 1 – Pre-Exploration Activities (Workplan, Permitting, and Utility Clearance)

Prior to commencing our subsurface exploration services, we will provide the following.

- Prepare a drilling program plan describing proposed field exploration activities. The drilling program plan will include, but not be limited to, proposed methods of drilling and sampling, subcontractor summary information, health and safety during work, and details on converting the geotechnical test borings to one monitoring well (for pump testing) and one observation well (for monitoring).
- Review existing geotechnical documents to support preliminary well design.
- Obtain a geotechnical drilling permit and well construction permit from San Diego County in general accordance with the Department of Water Resources Well Standards Bulletin.
- Retain the services of a private utility locator to mark private utilities that they are able to identify. Note we assume the Water Utilities Department will provide improvement plans and additional detailed documentation of existing infrastructure.
- Notify Underground Service Alert (USA) at least 72 hours prior to performing our subsurface exploration

Task 2 –Geotechnical Exploration and Monitoring Well Installation

Subsurface Exploration

To characterize subsurface soil and obtain hydrogeological information, we propose to drill two geotechnical borings to approximately 80 feet and collect drive samples at intervals of approximately 5 feet. Following completion of the boring exploration we plan to convert the geotechnical borings into one monitoring or observation well and one testing well for pump testing and groundwater sampling. The explorations and wells will be located near the planned wet well structure footprint and 50 feet away for measure groundwater response during the pumping test. Per Task 1, we will prepare an exploration plan detailing the subsurface exploration, well construction, and sequencing.

TABLE 1: Proposed Exploration Program

EXPLORATION SCOPE AND PURPOSE	
Borings	
Two borings **80 feet deep**	The borings will collect geotechnical data for characterization of soil that underlies the site. We will use samples collected from the test borings for laboratory testing of soil properties. An engineer or geologist from our firm will observe the drilling and log the subsurface conditions encountered at exploration locations. We will collect soil samples at frequent depth intervals for visual classification. We will collect soil samples using split-spoon and or modified California, and possibly Shelby Tube samplers depending on material encountered during drilling. Drilling Waste We will containerize the spoils from the exploratory borings in 55-gallon drums and temporarily store them at a designated location on site. Our fee assumes the material will be classified (based on the results of analytical testing) and disposed of as Class II non-hazardous material; should material disposal costs be greater than assumed, we will discuss with you prior to offhaul.
Two wells **80 feet deep**	Following completion of the geotechnical borings, we will design the monitoring (pumping) well and nested observation well based on borehole specific geology. The monitoring well and observation wells will be used to complete an aquifer test and collect groundwater information for dewatering analysis. The piezometers will be constructed within the borehole by reaming the borehole to a minimum diameter of 8 inches, then installing 4-inch-diameter PVC screen and solid PVC casings (schedule 40) in the zones of interest. The annular space will be filled with clean filter pack sand bentonite plug, and cement seal to the ground surface with a well cap structure per San Diego County well standards. We will furnish and install a minimum of two 2-inch-diameter nested PVC piezometer casings (potentially up to three depending on subsurface conditions) to selectively target the Santiago formation and the alluvial deposits for monitoring during the pumping test. We will also measure water level response in the existing LG-1 monitoring well. We will measure groundwater levels in the pumping well and piezometers continuously with pressure transducer and dataloggers and manually with electric sounders during the pumping test. We will compile the data for use in groundwater characterization and for use in dewatering design. Drilling Waste Drilling cuttings and heavy fluids will be containerized in 55-gallon drums and temporarily stored at a designated location on site. Our fee assumes the material will be classified (based on the results of analytical testing) and disposed of as Class II non-hazardous material; should material disposal costs be greater than assumed, we will discuss with you prior to offhaul.

Given the conditions at the site, a well size of 4 inches in a minimum 8-inch-diameter bore hole is suggested to allow for sufficient pumping capacity to adequately test aquifer yield of the underlying Santiago and finer alluvial materials. The drilling subcontractor and our experienced geologist will perform and monitor well development by both mechanical and pumping methods. Thorough and complete development of each well screen is critical to achieve maximum yield, efficiency, sand-free pumping, and representative water level response during the pumping tests. Well development will require bailing, double-swab air lifting, and pumping. Swabbing in clay dispersant and/or chlorine to remove thick filter cake may be recommended based on early airlift development results. We recommend that well development starts promptly after the final sanitary seal is placed. Well development water will be placed in temporary storage tanks to allow the settlement of fine sediment to achieve clear water for discharge to the on-site WWTP facility.

Task 3 –Laboratory Testing

We will transport soil samples collected from the field exploration to our in-house laboratory. We will perform laboratory testing to evaluate engineering characteristics of the soil and refuse material. Laboratory testing may include the following.

- Unit Weight
- Moisture Content
- Plasticity Index
- Gradation
- Unconsolidated, Undrained Isotropic Triaxial Compression
- Consolidation Testing

Testing will be performed on selected samples to understand their engineering and hydraulic properties as it relates to shoring, wet well structure and dewatering designs and constructability. The drilling contractor will be responsible for the testing and disposal of drill cuttings. A review of the State of California, GeoTracker website did not indicate the existence of contaminated soil or open cases on or adjacent to the project site.

Task 4 – Hydraulic Calculations and Groundwater Analysis

Using collected geotechnical and laboratory test data, and existing information available to us, combined with the pumping test data (described in Task 6), we will prepare geologic cross sections and use collected information to assign geotechnical parameters for design along with aquifer hydraulic conductivity and transmissivity for an estimate of dewatering rates. Estimated parameters for each geologic layer will be illustrated on the cross section and preliminary analytical results will be included for early estimation of dewatering volumes. We will include results of our analysis in Task 5.

OPTIONAL TASK: To quantify the volume that may be encountered during construction, we propose an optional task to prepare a MODFLOW finite difference model to understand groundwater and dewatering flow estimates and lateral affects at the site. This task may be used to understand potential shoring design systems and dewatering from a feasibility perspective.

Task 5 –Geotechnical Report for Lift Station Structure

We will analyze and summarize the subsurface conditions and laboratory test results for inclusion in our geotechnical report as shown below.

1. Earthwork
   - Site clearing and original ground preparation
   - Treatment of over-optimum soil moisture conditions
   - Acceptable on-site and imported fill materials
   - Subgrade and fill compaction requirements
   - Utility trench backfill compaction
2. Evaluation and mitigation of Geologic Hazards including expansive soil, soft soil, loose and liquefiable soil
3. Seismic Design Parameters
4. Pump House, Tank and Wet Well Foundations
   - Foundation Type
   - Minimum dimensions
   - Maximum allowable soil bearing capacity
   - Allowable lateral passive earth pressures and coefficient of sliding friction
   - Estimated total and differential foundation settlement
5. Concrete Slabs-on-Grade
   - Minimum design thickness
   - Slab moisture vapor reduction
6. Shoring Design Recommendations
   - Earth pressures
   - Surcharge loading from adjacent structures
   - Recommendations for type selection
   - Construction considerations
7. Groundwater and Dewatering
   - Geologic cross sections
   - Groundwater conditions
   - Estimated settlement from dewatering
   - Aquifer hydraulic parameters
   - Groundwater flow modeling results (Task 4)
   - Pump test results (Task 6)

The geotechnical report for the wet well will be signed by a licensed Engineering Geologist and Geotechnical Engineer. The report will also include figures showing exploration locations and subsurface log information and testing.

Task 6 – Pump Testing for Dewatering Analysis

Following completion of the test-well construction and well development, we will install pressure transducers and dataloggers within the test well and observation wells for use during the aquifer testing. The tests will be performed on the pumping-well using an approximately 50-gallon per minute pump to assess aquifer parameters and assist in dewatering design and planning. We will

perform up to 24 hours of constant rate pumping for adequate understanding of groundwater drawdown and recovery. We assume that the water can be directly discharged into the WWTP facility, and that a tank will not be required for temporary water storage, and will discuss disposal with the plant operator We will also conduct slug tests in the shallow observation well (piezometers). A short duration pumping test may be performed in the 4-inch-diameter existing monitoring well LG-1 to confirm aquifer parameters in the upper aquifer.

The aquifer test results will be included in the geotechnical report (Task 5) summarizing the drilling, well construction, development, and testing of the pumping wells. The report will include lithologic logs, as-built well completion schematics, and well development records. We will provide analysis of the local hydrogeologic conditions including aquifer and aquitards within and below the proposed construction dewatering interval and provide a statement to local effects of the tidal influence from the Pacific Ocean and potential connectivity if encountered. The pump test and analysis will be provided to estimate transmissivity, hydraulic conductivity, and storage. We will also outline recommendations for dewatering well borehole and casing depth, pump depth setting, and pumping rate.

FEE

We propose to provide the services outlined above, for a fee as outlined below.

TASK OF WORK	EST. SUB-CONSULTANT COST	FEE ESTIMATE
Task 1: Pre-Exploration Activities		**$13,000**
Exploration and Well Plan		$4,500
County of San Diego Permitting		$2,000
Underground Utility Clearance and Private Locating	$2,000	$4,500
Document Review		$2,000
Task 2: Geotechnical Exploration and Monitoring Well Installation		**$163,700**
Geotechnical Exploration and Well Construction	$88,800	$106,300
Well Development	$30,500	$39,200
Drum testing and removal	$18,200	$18,200
Task 3: Laboratory Testing		**$8,000**
Task 4: Hydraulic Calculations and Groundwater Analysis		**$6,000**
Task 5: Geotechnical Report for Wet Well Structure		**$20,000**
Task 6: Pump Testing for Dewatering Analysis		**$38,800**
Pump Testing	$25,000	$33,800
Data review and engineering		$5,000
TOTAL		**$249,500**

For the OPTIONAL task of MODFLOW modeling we suggest an additional budget of $10,000 to be billed on a time-and-expense basis to support feasibility of excavation for the lift station.

Our proposal utilizes the following assumptions and exclusions.

- We anticipate that the area is clear of obstructions and that our geotechnical explorations and well construction will be performed in 2026 during regular business working hours: Monday through Friday, between the hours of 7:00 AM and 5:00 PM. Should we need to perform our explorations outside of these hours, please let us know and we can prepare a revised fee estimate for your review.
- The above scope of services assumes prevailing wage rates which do not include specific labor agreements or union requirements.
- Drummed spoils generated from the drilled borings may remain on site for up to 5 weeks; we will work with you and stakeholders at the site to select an acceptable temporary storage location.

SCHEDULE

We anticipate completion of our geotechnical scope of work (Tasks 1 to 6) will be approximately 2 to 3 weeks following completion of Task 6 which is subject to contractor availability. We will work directly with you providing project schedule and as needed updates.

LIMITATIONS AND AUTHORIZATION

ENGEO's liability for damage due to professional negligence, acts, errors, omissions, breach of contract and consequential damages will be limited by Client to an amount not to exceed an aggregate limit of one million dollars or ENGEO's fee, whichever is greater, regardless of the legal theory under which such liability is imposed.

If you agree with the scope of services and fee outlined in this proposal, please issue a new task order in accordance with the previously agreed upon PSA. Our services will commence upon receipt of a fully executed agreement for this scope.

We thank you for considering our firm for your important project. If you have any questions on any portion of the scope of services, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Taylor Strack, PE, GE
Associate

James Thurber, PG, CEG, CHG
Principal

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