JUPITER CABLE

Geophysical Exploration Survey Report

Tierra del Mar, Oregon

SUBCOM

SUMMARY

On November 3, 2020, Benthic GeoScience, Inc. (Benthic), under contract with SubCom, LLC, mobilized geophysical equipment and staff to perform geophysical exploratory surveys to provide geophysical measurements of the subsurface geology west of Lot 3200, Tierra del Mar, Oregon, to better inform and prepare for future planned Horizontal Directional Drilling (HDD) operations.

Two geophysical sensors were selected to help inform the geologic interpretation: Electric Resistivity (ER) and Sub-Bottom Profiler (SBP). The Electric Resistivity was acquired using ground cables which lay across the ground and seafloor with exposed electrodes every 4m with a total of 56 electrodes. The method used to acquire the data was the Strong Gradient Method[1], and the graphics produced to represent the ER results was Electric Resistivity Tomography (ERT).

The SBP was acquired with a Bubble Pulser source utilizing the Single Channel Seismic (SCS) record technique. The Falmouth Scientific Instruments Bubble Pulser is a consistent seismic source for SBP work, which was helpful considering the November Oregon coast sea-state and ambient noise associated with the surf zone.

The surrounding geology in the vicinity of Tierra del Mar and Pacific City presents with abundant Holocene unconsolidated beach sands interspersed with outcrops of basaltic “Haystacks” and exposures of sandstone bedrock in a variety of compressed aggregate compositions.

The preliminary interpretation of the geophysical exploration for near surface geology along the Tierra del Mar Coast has detected a possible sandstone or basaltic geologic formation approximately halfway into the drill path. This formation appears to have a north-south linear orientation, forming an apparent ridge or rise perpendicular to the drill path within the Jupiter subsea cable easement corridor. The mineral composition, hardness and depth of the formation is not yet fully defined.

[1] i.e. Strong Gradient Method (https://www.agiusa.com/blog/gradient-array-electrical-resistivity-methods-part-8)

1. SCOPE OF WORK

Benthic mobilized the FV Lady Lee as the at sea platform for all geophysical operations. This was the platform for both ER deployment and measurement of cables while outside the surf zone. It was also the platform for all SCS acquisition which in its entirety was accomplished at sea.

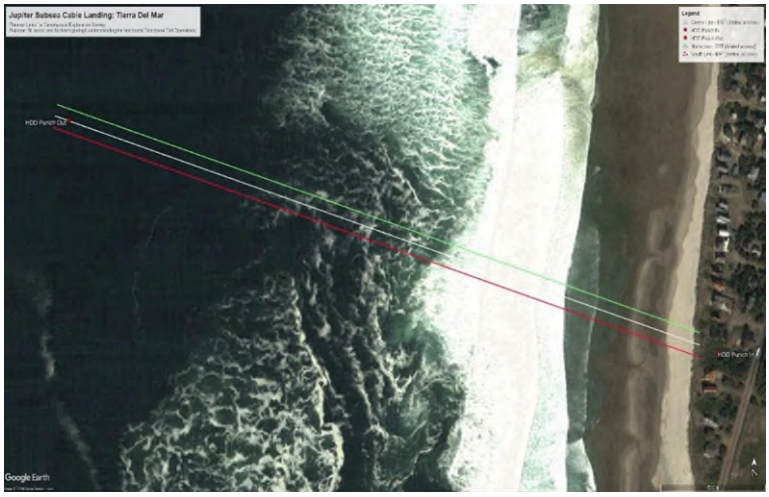

Figure 1..... Geophysical Survey Lines (North (Green), Center (White), and South (Red).

1.1 Electric Resistivity Tomography

Electrical Resistivity (ER) was the first acquisition method conducted during the survey. ER is a survey method that uses an electrical source and a line of sampling electrodes either laid on the beach or rested on the seafloor. For land, electrodes that are attached to the main cable are placed in the ground at 4m intervals over a straight alignment. Standard land-survey methodology is used to accurately position these sampling points. For the marine environment, a similar process is used, except the cable is statically towed/rested on the seafloor (without electrodes) and position is calculated using a layback method. For works in the surf zone, jet skis with GPS and a shore-end alignment system were used to extend the land-work into the surf and the marine work closer to the shore.

For post-processing, Electrical Resistivity Tomography (ERT) is the method for presenting the inversion datagram for ER. ERT characterizes the sub-surface based on resistivity, a property that can differentiate crystalline rock to unconsolidated material, for example.

This work was focused to collect data for the land and marine environments with a navigation plan of 3 primary survey lines, centered on the project HDD path, and one parallel line to the north and south. All three lines were extended from land to the proposed HDD punchout location.

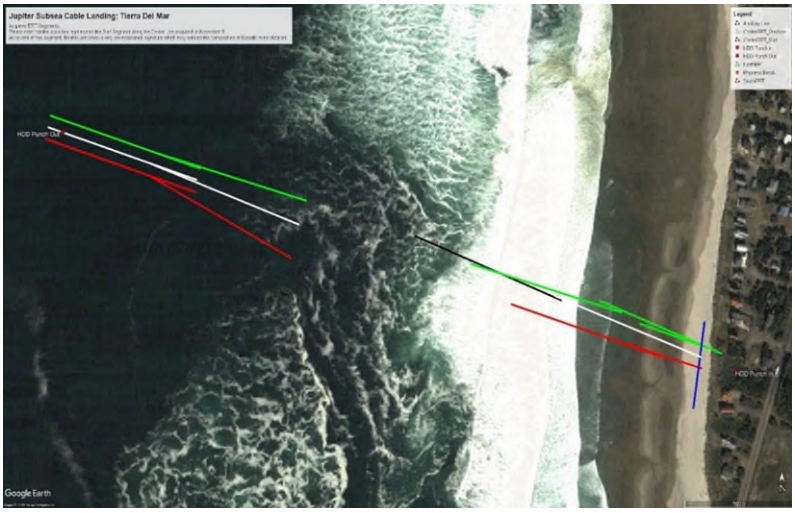

Figure 2..... Electric Resistivity Coverage acquired along the horizontal directional drill path. North (Green), Center (White & Black), and South (Red) ERT Lines.

1.2 Single Channel Seismic/Sub-Bottom Profile

Single Channel Seismic (SCS) was the second acquisition method conducted during this geophysical survey. The SCS survey was collected in the marine environment only using the same three navigation lines used for the ERT works. Additional cross-lines were also included in the survey plan to improve the overall 3-dimensional picture. A profile is collected in-transit while statically towed from the vessel. The acquired data is a measurement of two-way travel time from the source reflected to the various layers below the seafloor and to the receiving hydrophones. This information is co-located using a high-resolution global positioning system.

Figure 3..... Sub Bottom Profile Coverage acquired along the horizontal directional drill path.

2. SURVEY RESULTS

The proposed HDD route is approximately 1km in length and located within the easement area for the Jupiter subsea cable. As shown in the survey data images below, the geophysical survey indicates that the HDD drill operation will encounter unconsolidated aggregate sediments for the first 400 to 500 meters of the drill path. The HDD drill operation is then likely to encounter a formation of harder rock of either sandstone or basaltic composition. The formation is expected to be dome shaped or tapered near its peak. At the base of the formation, located near the point of contact with bedrock, it is expected to be approximately 150m in breadth from east to west.

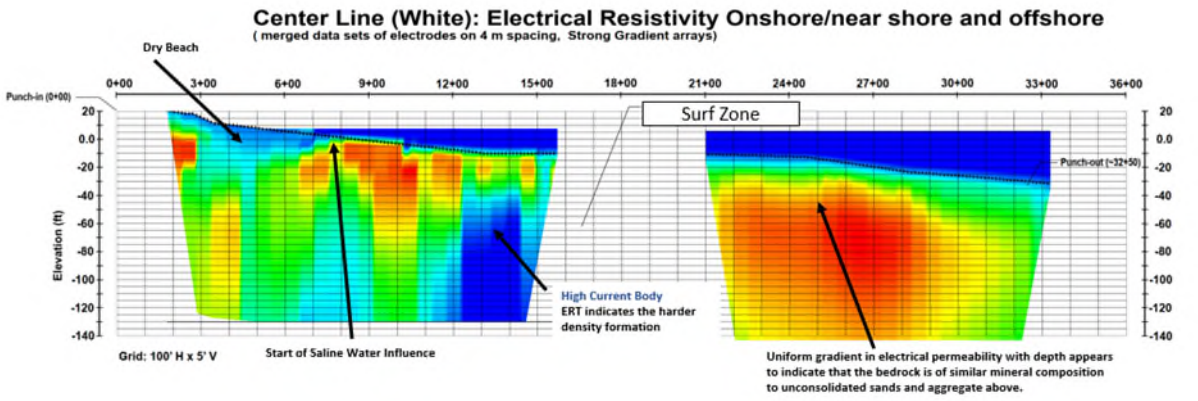

Figure 4..... Interpretation of ERT.

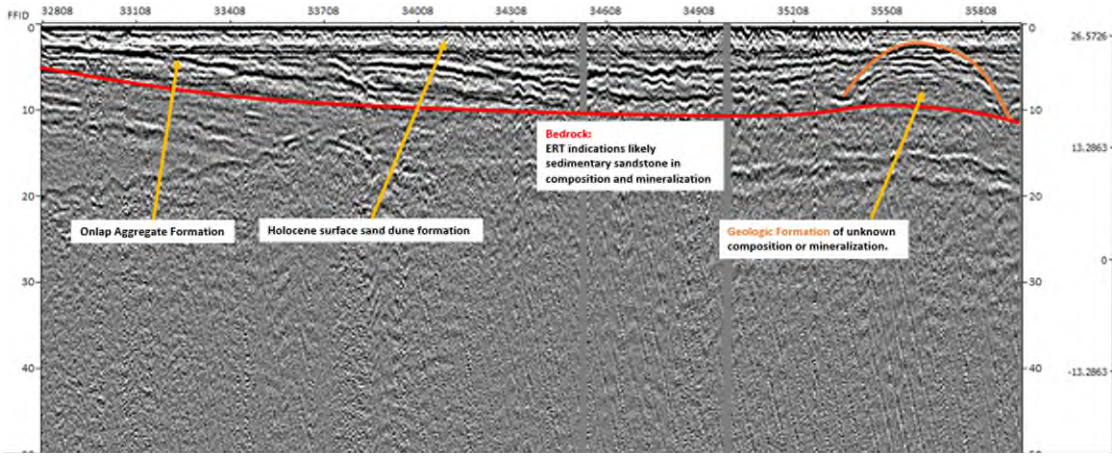

Figure 5..... Interpretation of SCS (Sub Bottom Profile).