Appendix 5.2-C

Results of Model Simulations of Sediment Deposition from Cable Burial Operations in Lewis bay, MA

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REPORT

TITLE

Results of Model Simulations of Sediment Deposition from Cable Burial Operations in Lewis Bay, MA

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Introduction

ASA was requested by ESS Group, Inc (ESS) to simulate water column sediment concentration and sediment deposition thickness and extent resulting from the embedment of submarine electrical cables in Lewis Bay in Nantucket Sound. SSFATE model simulations were completed to quantify these impacts for cables buried to a depth of 6 feet in sand-sized marine sediments. The SSFATE model, jointly developed by ASA with the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC) in Vicksburg, MS, was modified by ASA to simulate sediment injection from jetting devices.

This report presents model predictions of the areal extent and thickness of the sediment deposition with distance from the centerline of the proposed cable route and the resultant water column concentrations of suspended sediment resulting from the submarine cable burial operations in Lewis Bay on the south shore of Cape Cod, MA. These results are based on the simplifying assumptions of constant water depth and typical tidal currents within this water body that were used in the analysis.

Model Simulations

Model simulations were completed along a representative straight-line segment 4200 ft in length in sand-sized sediment near the inlet to Lewis Bay.

Core VC01-L2 located at the mouth of Lewis Bay (Figure 1) was used to specify sand-sized sediment parameters for one SSFATE simulation. Cable burial was modeled along a short section of the proposed cable route closest to core VC01-L2. The water depth at this site is approximately 3.5 feet at mean sea level (MSL) estimated from the local NOAA chart. Maximum flood and ebb tidal currents of 0.6 ft/s at this location intersect the line of the cable route at a 45° angle. The bathymetry and tidal currents were assumed constant along the cable route segment.

<u>Suspended Sediment Source Strength Determination</u>

Cable burial was assumed to occur at a 6-foot depth below the seabed. A trench with a trapezoidal cross section measuring 6 feet across at the top, 2 feet across at the bottom, and 8 feet deep was used. The jetting device was modeled to travel at 300 ft/hr (0.083 ft/s) based on vendor specifications along the cable path encountering sediment in the 32 ft^2 cross-section of the bottom. It was assumed that 30% of the total sediment volume fluidized within the trench was evenly distributed vertically through the overlying water column by the jetting device. The remaining 70% of the sediment was assumed to remain within the limits of the trench during the burial process. This resulted in 0.36 yd^3 of suspended sediment injected into the water column along every foot of the 4200 ft cable route simulated.

Model Results

The results of the SSFATE simulations are presented in graphs showing the model predicted sediment thickness (Figure 2), and the model predicted suspended sediment concentration in the water column above the trench (Figure 3), both as a function of distance from the cable. Each curve in the graphs shows the maximum, average and minimum values that were derived from a series of nine representative transects perpendicular to the cable route for the 4200 feet of simulated installation.

Figures 2 and 3 present data generated by the SSFATE model using a gridded model area with a 16.4 ft (5 meter) grid cell resolution. This grid resolution affects the lower limit of the model to resolve sediment deposition thickness or water column suspended sediment concentration to within approximately 50 feet from the cable route even though a modeled estimate at 0 feet is shown in the figures.

The suspended sediment concentrations presented in Figure 3 occur only as the jetting device passes a fixed location along the cable route. The rate of advance of the device was modeled at 300 ft/hour (0.083 ft/s), resulting in increased sediment concentrations lasting only a few minutes to less than one hour at any fixed location. Background or ambient concentrations were not included in these results.

The results presented herein can be considered typical and generally representative of the subsurface sediment types expected to be encountered within the cable corridor. As bathymetry and the tidal currents (both speed and direction) change along various segments of the cable route, sediment deposition thicknesses and water column suspended sediment concentrations may vary depending on location.

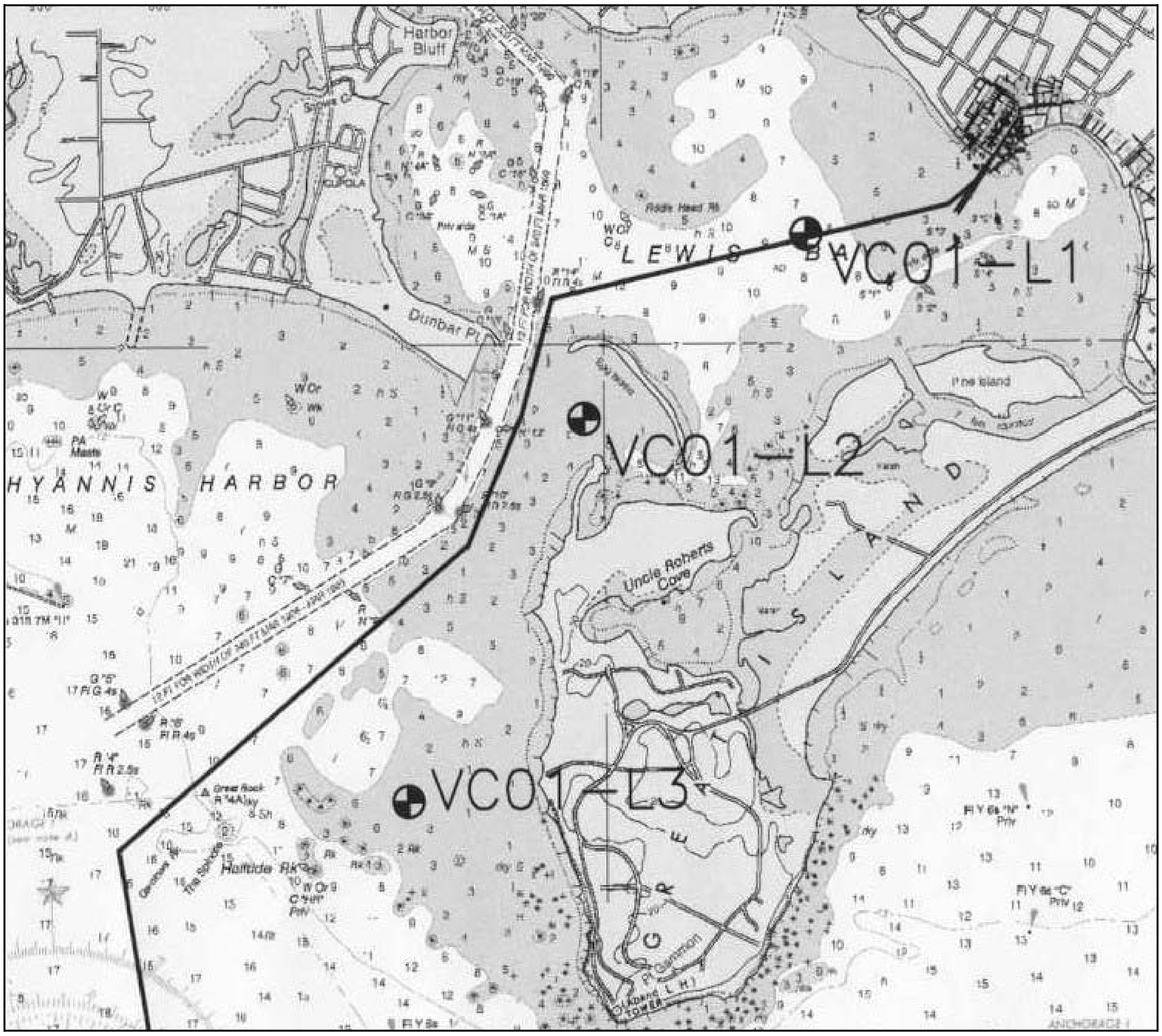

Figure 1. Location of Core VC01-L2 at the mouth of Lewis Bay.

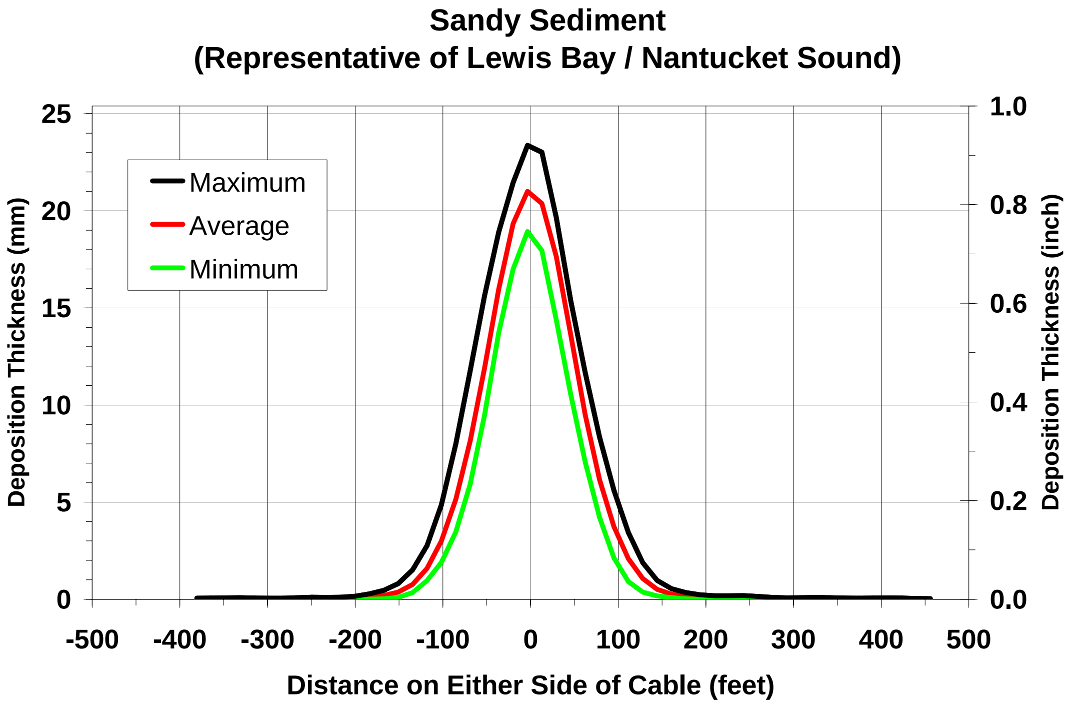

Figure 2. Sediment deposition thickness as a function of distance from the cable route in sand-sized sediment in Lewis Bay near core VC01-L2.

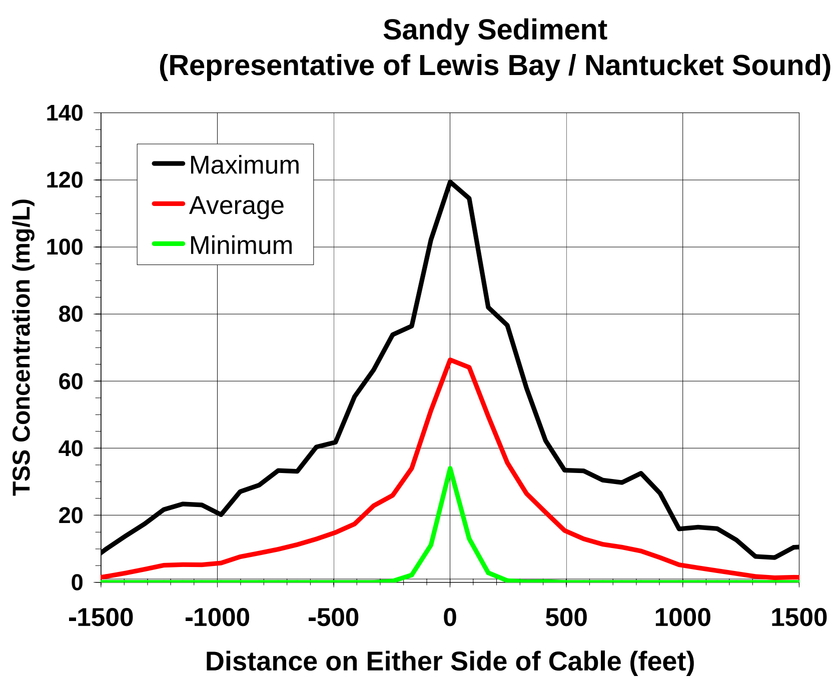

Figure 3. Suspended sediment concentration as a function of distance from the cable route in sand-sized sediment in Lewis Bay near core VC01-L2. Concentration levels are of short duration and expected to last from minutes to less than one hour.