Comprehensive Assessment and Report
Part II

Environmental Resources and Energy Infrastructure of Long Island Sound

Prepared by the

Task Force on Long Island Sound

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NeptuneRTS Phase IV

The Neptune Regional Transmission System Project, sponsored by Atlantic Energy Partners, LLC, envisions a multi-phase project consisting of several thousand miles of HVDC cables that would connect generation in Maine, New Brunswick, and Nova Scotia with markets in Boston, New York City, Long Island, and Connecticut. The FERC approved NeptuneRTS's Phase I application for two 600 MW merchant transmission cables from Sayreville, New Jersey, to New York City and to Newbridge on the south shore of Long Island. The Phase I project received its completeness determination from the New York PSC in February 2002, and has an expected in-service date of 2004 to 2005. Phase II, from Nova Scotia to New York City, has not been filed with the New York PSC. No applications have been filed for Phase IV, a marine cable connecting Connecticut with Maine and Maritimes Canada; the status of this future project is uncertain.

2.7 Environmental and Ecological Impacts of Marine Infrastructure

PA No. 02-95 Section 3(D) requires the Task Force to evaluate the individual and cumulative environmental impacts of electric power line, gas pipeline, and telecommunication crossings of Long Island Sound, and the methods to minimize such impacts. This section provides a review of available background information regarding the short-term and long-term environmental impacts associated with each of the available marine construction methods, as well as the impacts associated with long-term operation of infrastructure crossings. The discussion also incorporates the measures available to avoid, minimize, or mitigate such impacts.

An overview of the construction methods and their general environmental impacts was presented in Part I. For convenience and completeness, relevant sections of that material are reproduced here. That discussion is augmented here with available information on current research in the scientific and regulatory communities on the ecological impacts of construction and operation of energy transmission and telecommunication cables in marine environments. Projects undertaken in the last two years, such as Cross-Sound Cable, the Hubline pipeline project in Boston Harbor and the Eastchester pipeline project in southwestern Long Island Sound have provided marine construction contractors with recent local field experience. The design of these projects represent the current "state of the art" with respect to marine energy infrastructure construction techniques and reflect a variety of methods for avoiding, minimizing, and/or mitigating adverse impacts to the marine environment. To the extent such information is available; it is incorporated in this section

2.7.1 Marine Construction Methods

Submarine pipeline, electric cable, and telecommunication cable projects utilize a variety of construction methods. It is not uncommon for pipeline and cable projects in marine environments to utilize different construction methods for different line segments. The selection of a particular method for use along specific segments is dependent on a number of factors, including biological communities and habitat resources, sediment characteristics, depth to bedrock, distance from shore, and water depth.

In general, there is similarity between the construction methods used for a submarine pipeline, and those used for an electric or telecommunications cable installation. However there are very significant differences as well. Even techniques that go by the same name, such as "jetting," operate on different principles for a pipeline installation than for an electric or telecommunications cable installation. There is also the difference in scale. The size of the equipment required to bury a 24-inch pipeline, such as the Eastchester Project, is necessarily larger than that required to bury an eight-inch cable.

Each construction method has an associated impact footprint on the substrate surface and can cause changes in water quality during construction. The impact zone for each construction method is summarized in Table 12, and includes the trench and the spoil areas. Seafloor impacts include the direct footprint of a trench and adjacent areas when sediments removed from the trench are sidecast, as well as far field areas where sediments released into the water column are redeposited. If excavated sediments are not removed, they may be subject to dispersion into far field areas by strong currents resulting from storm events. Seafloor impacts may also include the footprint of any anchors or spuds which are used to position and stabilize the installation barge.

All trenching methods, including dredging, plowing, and jetting, cause a direct impact to bottom sediments and fauna, and the extent to which this effect is magnified is a function of the physical dimensions of the trench being excavated, the placement or degree of sidecasting of spoils, and backfilling. To the extent that anchors and spuds are used in positioning the trenching and lay barges and the HDD support vessels, they also directly disturb bottom sediments and habitats. In addition, the sea floor may be disturbed by the cable sweep of the anchors in the span between the barge and the anchor points. The impact associated with the anchor cable sweep may be minimized through the use of mid-line buoys.

The recovery of the seafloor to pre-construction conditions depends on the construction method employed, the geophysical characteristics of the sediments disturbed, and the physical environment, as well as on whether the trench is backfilled. Restoration of ecological function depends on factors such as type of preexisting biological community, complexity of the habitat, source of biota for recruitment, and time of year of the impact.

Shallow Water Installation

In both pipeline and cable installations, alternate construction techniques are required in shallow waters that are beyond the reach of the deepwater installation equipment.

Horizontal Directional Drilling. Horizontal directional drilling (HDD) is typically employed in near-shore environments to achieve minimal disturbance of the bottom materials that would normally occur with conventional open-cut technology and to allow installation under obstacles or sensitive areas. It can be used for both pipeline and cable installation. As it is a trenchless process, there is minimal direct disturbance of benthic communities as well as minimal indirect disturbance from resettling sediment. However, in determining the advisability of this technique, one must also consider whether there are suitable places for both the entry hole and the transition basin at the exit hole. As previously mentioned, that transition basin often requires supplementary underwater excavation. Hand-jetting might be sufficient, but if dredging is required, then the resulting potential for adversely affecting a nearby sensitive area (e.g., shellfish beds) is a consideration that is balanced against the benefits achieved via this trenchless process. The drilling process is completed in a series of steps, including pilot drilling, reaming, swabbing, and conduit installation. Electronic positioning systems guide each step. The drill rig is typically staged and operated from the landfall area, where the entry pit is established.

Bentonite, a non-toxic, non-native clay, used to make the drilling fluid, is delivered to the cutting head to provide hydraulic cutting action, lubricate the drill bit, stabilize the hole, and remove cutting spoils as the drilling fluid returns to the entry point of the pilot hole. Typically, drilling fluid returns are processed to remove the cuttings, and the bentonite is recycled for use as the drilling operation continues. Some bentonite will leak from the HDD exit point. Because the drilling fluid is denser than water, it tends to remain near the seafloor, and can be recaptured at the exit hole. However, if the drilling fluid, which is under pressure, encounters a weakness in the soil or bedrock, it may "frac-out" and cause an uncontrolled discharge to the seafloor at a location other than the exit hole.

The feasibility of the HDD technique for a specific location is a dependent upon the subsurface geologic conditions, pipe diameter or cable strength, and entry and exit conditions. Installations through profiles with diverse geologic strata are difficult and may require re-tooling the drilling and reaming heads to accommodate the varying formations. Gravel lenses, cobble, or boulders within the profile strata represent the most adverse geologic condition for HDD installations, and consequently, the HDD technique is typically not a feasible alternative in this type of strata. Current technology can achieve directionally drilled installations of approximately 4,000 to 6,000 feet, under favorable conditions; however, the length of the installation may be limited by the physical characteristics of the cable or pipeline. Electric cables will not normally withstand such long cable pulls without some risk of damage.

Dredging (as sometimes used for pipeline installations). Dredging is used primarily for trenching along the shallow water portions of a pipeline route. Barges equipped with a crane and a bucket are used to excavate a trench to the appropriate depth. Barges may also support a hydraulic excavator. Depending on quality of the sediments and nature of the bottom environment, excavated material may be lifted to the surface and placed on a barge for transport to a disposal site, or side-cast adjacent to the trench. Barges are typically positioned by three spuds, large columns that are sunk into the bottom to anchor the barge. Once the pipeline has been installed and tested, the trench is backfilled. Dredging may also be used when directional drilling from an onshore location to offshore requires the construction of a transition basin, which must be made between the directionally drill exit hole and the pipeline or cable trench.

Short-term impacts may include an increase in water turbidity resulting from the loss of sediments from the bucket and release of contaminants. Longer-term impacts may include erosion of spoil mounds by wave action from storm events, if sediment is sidecast. Minimizing and mitigating these impacts calls for completing dredging, pipe lay and backfill of contaminated sediments in as short a time period as possible. The use of silt curtains, which are designed to restrict suspended sediments to a controlled area of the construction site, may be limited in certain areas (i.e., locations with less than 1-2 knot currents). Environmental dredge buckets, which minimize the loss of sediments from the dredge bucket, may also be employed for contaminated sediments. Monitoring of water quality is generally required during operations. Long-term impacts include alteration of bottom habitat within the trench footprint and sidecast footprint.

Dredging (as sometimes used for cable installations). For cable installations, this method need only be used in specialized instances where other techniques are impractical. For example, if there is a lens of material along the cable path that prevents installation to the required depth by jetting or plowing, the preferred solution is to circumvent the obstacle through a deviation in the route, or to simply leave the cable closer to the surface and protect it in other ways. However, if neither of these choices is allowed, then dredging is likely the only remaining option.

Jetting (the preferred technique for cable installations). For cable installations in shallow waters, jetting is the preferred technique, even for areas beyond the reach of a cable-laying ship. In this instance the jetting equipment is smaller, and may be diver assisted. The effects of operating a jetting burial tool in shallow water are no different from those in deep water, except that the column of water in which any escaping sediment disperses is much shallower.

Plowing (an alternate technique for cable installations). Plowing can also be used for cable installations, since both the dimensions of the sub-sea plow and the force required to pull it are moderate. The disadvantage of the sub-sea plow is that it is not self-propelled, and requires the barge from which is it operated to be solidly fixed at each pulling location with spuds or anchors.