ATTORNEY GENERAL
DEPARTMENT OF JUSTICE

33 CAPITOL STREET
CONCORD, NEW HAMPSHIRE 03301-6397

GORDON J. MACDONALD
ATTORNEY GENERAL

ANN M. RICE
DEPUTY ATTORNEY GENERAL

July 31, 2017

Via Hand Delivery and Email

Pamela G. Monroe, Administrator
N.H. Site Evaluation Committee
21 South Fruit Street, Suite 10
Concord, New Hampshire 03301-2429

Re: **SEC Docket No. 2015-04 – Application of Public Service Company of New Hampshire d/b/a Eversource Energy for a Certificate of Site and Facility for the Construction of a New 115 kV Transmission Line from Madbury Substation to Portsmouth Substation (Seacoast Reliability Project)**

Dear Ms. Monroe:

Enclosed for filing please find an original plus one copy of Pre-filed Direct Testimony of Payson R. Whitney, III, P.E. and Matthew D. Ladewig with three attachments on behalf of Counsel for the Public in the above-referenced matter. Please note that Matthew D. Ladewig of the ESS Group, Inc. has replaced Stephanie Wilson as a witness for Counsel for the Public.

A copy of this letter along with the testimony and attachments has been forwarded this day via electronic mail to the SEC Service List.

Thank you for your assistance and attention to this matter. Please contact me if you have any questions.

Sincerely,

Christopher G. Aslin
Assistant Attorney General
Environmental Protection Bureau
(603) 271-3679
christopher.aslin@doj.nh.gov

CGA/llm
Enclosures
cc: SEC Docket No. 2015-04 Service List

THE STATE OF NEW HAMPSHIRE
SITE EVALUATION COMMITTEE

Docket No. 2015-04

APPLICATION OF PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE D/B/A EVERSOURCE ENERGY FOR A CERTIFICATE OF SITE AND FACILITY FOR CONSTRUCTION OF A NEW 115kV TRANSMISSION LINE

THE SEACOAST RELIABILITY PROJECT

PRE-FILED DIRECT TESTIMONY OF PAYSON R. WHITNEY, III, P.E. AND MATTHEW D. LADEWIG ESS GROUP, INC.

ON BEHALF OF
COUNSEL FOR THE PUBLIC

JULY 31, 2017

Qualifications and Purpose of Testimony

Q. Please state your name, position and your employer.

A. My name is Payson R. Whitney, III, P.E., Vice President, Water & Coastal Engineering for ESS Group, Inc. ("ESS").

A. My name is Matthew Ladewig, Senior Scientist for ESS Group, Inc.

Q. Mr. Whitney, Please summarize your educational background and professional experience.

A. I hold a Bachelor of Science in Civil Engineering from Lehigh University. I am licensed as a Professional Engineer in New Hampshire, as well as several other states. I have over 20 years of experience as a Civil/Coastal Engineer and Project Manager, with a specialty in planning, routing, permitting, surveying, and installing High Voltage AC and DC submarine electric transmission cable systems. I have performed and managed submarine cable routing, constructability, and installation assessments and permitting for many of the submarine cable system projects developed in the eastern United States during the last 18 years. I have been employed with ESS since 1998. A copy of my *Curriculum Vitae* is attached as Attachment ESS-1.

Q. Have you testified previously before the New Hampshire Site Evaluation Committee or other regulatory bodies?

A. I have not testified before the New Hampshire Site Evaluation Committee ("SEC"). I have testified before other regulatory bodies in connection with the planning, siting, and permitting of high voltage overland and submarine transmission lines, where I provided written testimony and an oral presentation before the New York State Public Service Commission.

Q. Mr. Ladewig, Please summarize your educational background and professional experience.

A. I hold a Master of Science in Aquatic Resource Ecology and Management from the University of Michigan. I have more than 14 years of experience as an ecologist, with a

focus on marine and aquatic ecosystems. I have developed and implemented surface water monitoring, sediment testing, and biomonitoring programs associated with construction and operation of submarine electric transmission cable systems. I have been employed with ESS since 2006. A copy of my *Curriculum Vitae* is attached as Attachment ESS-2.

Q. Have you testified previously before the New Hampshire Site Evaluation Committee or other regulatory bodies?

A. I have not testified before the New Hampshire Site Evaluation Committee ("SEC"). I have not testified before other regulatory bodies.

Q. What is the purpose of your testimony?

A. On behalf of Counsel for the Public, ESS was retained to perform a technical review of the underwater portion of the Seacoast Reliability Project (the "Project") as proposed by Eversource Energy (the "Applicant"). As part of our assessment, we reviewed the relevant portions of the application for a Certificate of Site and Facility submitted by the Applicant, as well as the various accompanying expert reports. Our testimony introduces our Technical Review Report (Attachment ESS-3) and summarizes our findings and recommendations regarding the proposed Little Bay crossing and its potential environmental impacts.

Technical Review Process

Q. Please explain the scope of your review of the Project's proposed crossing of Little Bay.

A. The purpose of the ESS objective technical review of the Seacoast Reliability Project Application was to: (1) assess the adequacy of data and assessments used by the Applicant to identify the potential impacts to Little Bay resources, and (2) confirm that the methodologies used by the Applicant to characterize existing conditions and assess potential impacts are reasonable, given our understanding of applicable scientific standards, regulatory provisions, and industry practices.

The specific focus of our technical review was the information and details submitted by the Applicant, as contained within the administrative record, and available for ESS review, for the portion of the preferred transmission line route located within Little Bay. Review of upland portions of the Project for the Counsel for the Public was conducted by others.

The technical review was conducted on specific aspects of the Certificate of Site and Facility Application identified as important by the Counsel for the Public during the review. The following questions guided our review of the documents submitted to the record:

- Is the information presented by the Applicant sufficient to accurately characterize baseline conditions and potential impacts?
- Are there any obvious data gaps or limitations of data submitted as part of the Certificate of Site and Facility Application?
- Are there references made to additional information or surveys forthcoming (not in Certificate of Site and Facility Application record) that could aid in the technical review?
- Are the assessment methods used in the Certificate of Site and Facility Application appropriate and sufficient to characterize the impacts of the proposed Project?
- Is the characterization of the environmental impacts reasonable and supported by the data?
- Are there adequate references to support assumptions and conclusions?

Key Findings and Recommendations

Q. In your opinion has the Applicant provided a complete analysis of the proposed Little Bay crossing and its potential environmental impacts?

A. The Applicant's submittal to the record included technical information on a wide variety of subjects. The initial submittals made to the record contained a number of significant

inconsistencies and data gaps. Since the initial submittal, the Applicant has amended the Application and supplemented the record with additional information, which has improved the quality of the analyses. However, the record still contains data gaps as described below.

The types of analyses provided by the Applicant are generally consistent with the types of analyses performed by ESS and other consultants when evaluating the potential environmental impacts of proposed submarine cable projects.

Q. Please describe the most significant remaining data gaps and explain the level of resultant uncertainty.

A. The apparent remaining data gaps are summarized below and described in more detail in Section 2.0 of our report. Addressing the following remaining data gaps would complete and update the docket record with the current project information.

- The SRP Environmental Review Maps (Appendix 2) may need updating for the record based on the currently proposed installation methods for the Little Bay submarine cable crossing. This would provide for a complete and updated docket record.
- The Engineering Design Drawings (Appendix 5) may need updating for the record to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.
- The joint wetlands permit application to NHDES and the USACE will need to be updated and amended to reflect information developed and revised by the Applicant between April 2016 and June 2017 with regard to the Little Bay submarine cable installation and other relevant changes to the upland portion of the project to ensure NHDES and the USACE have the most up-to-date project information for their review. This revised submittal should include the findings of the revised sediment dispersion modeling and estimates of bottom area that could be impacted

by cable lay barge anchors and wire sweep that were provided in June 2017.

- The NHDES Section 401 Water Quality Certification Request will need to be updated and amended to reflect information developed and revised by the Applicant between April 2016 and June 2017 with regard to the Little Bay submarine cable installation and other relevant changes to the upland portion of the project to ensure NHDES has the most up-to-date project information for their review. This revised submittal should include the Applicant's estimated relationship between turbidity in terms of NTU and suspended sediment concentration in terms of mg/L.
- The NHDES Shoreland Permit Application or issued permit should be amended as necessary to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.
- The SRP Crossings Petition or issued license should be amended as necessary to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.
- The Natural Resource Impact Assessment should be updated for the record to reflect the currently proposed installation methods, the results of the June 2017 sediment dispersion modeling, and to report the potential impacts of the project currently proposed.

Addressing the following remaining data gaps would provide additional information to the docket record and reduce potential uncertainties.

- <u>Sediment Dispersion Model:</u> The June 2017 modeling estimates that 50% of the material volume in the trench would be suspended into the water column by the diver operated jetting tools. These tools include the use of a Water-lift device that removes close to 100% of the sediment from the trench. It is possible that the impacts associated with diver operated jetting tools could be greater than those predicted in the model if a Water-

lift device is used. It is noted that this device would largely be used within the area surrounded by turbidity curtains.

- When the Applicant was proposing minimum cable burial depth of eight feet, the shallow vibracore refusals presented a significant data gap. While the data gap and its associated uncertainty with regard to the ability to achieve the minimum burial still exist with the Applicant's now proposed five foot burial depth, their importance is lessened since a greater percentage of the sediment to be fluidized during installation has been characterized.

Q. In your opinion has the Applicant adequately characterized the likely and potential impacts of the Little Bay crossing on the environment?

A. For the most part, the Applicant has adequately characterized the potential environmental impacts of the work associated with installation of the submarine cables in Little Bay. The potential impacts identified are generally consistent with the type and extent of impacts ESS has experienced on other submarine cable crossing projects.

Q. Based on your expertise in submarine cable crossings, do you have any recommendations for improvements to the Applicant's proposed crossing of Little Bay to reasonably reduce environmental risk?

A. Yes. Based on our experience, we recommend the following improvements be considered by the Applicant, the Committee, and/or NHDES.

- <u>Decommissioning Plan:</u> If deemed necessary by the Committee, a Decommissioning Plan should be submitted to the record detailing the likely means of decommissioning of the submarine cable in Little Bay.

- <u>Water Quality Monitoring Program:</u> Since the fate and transport of chemical constituents in the sediment resulting from the jet plow operation has been raised as a concern by stakeholders, requiring monitoring of chemical constituents in the water column in samples

collected 500 feet up-current and down-current of the operating jet plow should be considered by the Committee or NHDES.

In addition, based on our experience with other water quality monitoring programs, obtaining water samples for testing of turbidity and total suspended solids would provide valuable information to verify the Applicant's estimated correlation between suspended sediment concentrations in mg/L to turbidity in NTU (i.e., that 20 mg/L is representative of 10 NTUs). By using expedited laboratory turnarounds, testing results from the first cable installation could be available in time to make adjustments to the monitoring plan for installation of the second and third cables if necessary.

The Water Quality Monitoring Plan should be revised to state that the regular hourly monitoring will continue to take place while the additional turbidity probe measurements will be obtained every 15 minutes at the location where any exceedances of the 10 NTU criterion are measured.

- NHDES or the Committee could also consider requiring the Applicant to provide NHDES with an analysis comparing the installation monitoring results with the suspended sediment model predictions to determine if the model provided a reasonable prediction of the conditions that occurred during the installation.

- Benthic Infaunal Community Monitoring: While the proposed monitoring methods are consistent with our experience, the Applicant plans to use sampling performed in 2014 as the baseline data. We suggest that the Applicant should perform the pre-construction benthic sampling just prior to the installation since that will be four years after the 2014 data was obtained and would provide a more direct comparison with the post-construction sampling data. We also suggest that the Applicant collect a minimum of three replicate samples at each of the proposed sampling locations as opposed to the single sample currently proposed.

- Determination of Recovery of Benthic Resource Function: We suggest that impact and non-impact stations be selected and finalized prior to installation of the cable to allow for collection of updated pre-construction benthic infaunal samples rather than based on as-built plans provided by the marine contractor as proposed by the Applicant.

- Existing Cable Removal Plan: Based on our experience with a recent cable removal project, we recommend the Applicant outfit the cable removal vessel with a floating absorbent or containment boom around the area where cables will exit the water to contain any debris or sheens that may result from removal and cutting of the cables.

Q. Does this conclude your testimony?

A. Yes.

PAYSON R. WHITNEY, III, PE
Vice President, Water & Coastal Engineering

Experience
ESS Group: 1998 to present

Years of Prior Related Experience: 4

Education
BS, Civil Engineering, Lehigh University, 1994

Professional Registrations
Professional Engineer Licenses:

- MA, No. 41706, 2001
- RI, No. 8551, 2006
- VA, No. 50185, 2012
- NH, No. 14163, 2013
- MD, No. 47100, 2015
- ME, No. 14040, 2015

National Council of Examiners for Engineering and Surveying Record, No. 47445, 2011

Master Design Certificate for Low Impact Development, State of Rhode Island, No. 1106011, 2006

Affiliations
Boston Society of Civil Engineers Section of the American Society of Civil Engineers (BSCES)—Board of Government Member (1999-2000)

BSCES Waterways, Ports, Coastal & Ocean Technical Group—Chairman (1999-2000)

Environmental Business Council of New England Ocean and Coastal Resource Committee Chairman (2014-2016)

Qualifications

Mr. Whitney is a Professional Engineer with more than 20 years of experience as a Civil/Coastal Engineer and Project Manager in a wide range of public and private sector projects, including project design and management activities in civil/site engineering, coastal permitting/shoreline assessment, and the planning and permitting of electrical transmission projects. He specializes in planning, routing, surveying and installing High Voltage AC and DC submarine electric transmission cable systems, landfall transitions, and interconnections with local grid substations. Mr. Whitney has conducted submarine cable routing, constructability, and installation assessments along the eastern seaboard for some of the largest submarine cable system projects developed in the last 15 years. He is considered to be among the foremost submarine cable system planners in the industry with several successful projects under his leadership.

Mr. Whitney's engineering design and management experience includes metals recycling site and stormwater management system design; marina planning and design; dredging design; roadway design; site layout and design; stormwater management permitting, design, and compliance; transportation analysis; third party technical peer reviews; preparing and reviewing construction bid documents and shop drawings; construction phase services, and environmental monitoring.

Mr. Whitney is also well versed in local, state, and federal environmental regulatory and land use permitting requirements and strategies, and has provided permitting services for projects in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, New Hampshire, Maine, Maryland, Virginia, and The Bahamas.

Representative Project Experience

Utility Siting, Engineering, and Permitting

LS Cable America, Inc. – Block Island Wind Farm/Block Island Transmission System – Narragansett, RI to Block Island, RI. Provided environmental support services in advance of the planned 2016 installation of the submarine electric cables associated with the Block Island Wind Farm and the Block Island Transmission System. Responsible for preparation of an environmental permit conditions/contract requirements tracking tool that will be used to identify environmental compliance requirements and track progress towards completion of those requirements. Reviewed LS Cable RFQs for subcontractors and installation procedure documents to incorporate environmental requirements.

Bayonne Energy Center, LLC – Bayonne Energy Center Project, Bayonne, NJ to Brooklyn, NY. Project Manager for environmental consulting, regulatory permitting, and preliminary engineering for the submarine electric transmission cable aspect of the project, which entailed the construction of a 512 MW electric generating plant in Bayonne, NJ. The plant is connected to the New York electrical grid via a 6.5 mile long, 345 kV submarine electric transmission cable with an interconnection at the ConEdison Gowanus substation in Brooklyn. Responsible for day-to-day coordination of ESS

services, coordination with the client and its project team, coordination with the project engineers, providing technical services related to submarine cable route design and construction, and for planning, directing, and overseeing marine geophysical and geotechnical field investigations. Responsible for developing the proposed submarine cable route and identifying from project survey and constraints information. Responsible for overseeing preparation of New York Article VII filing and U.S. Army Corps of Engineers permit application, as well as various separate supporting reports and responses to comments. Supported NJDEP Waterfront Development Permit application by preparing sections relevant to the submarine cable. During construction, was responsible for coordination with project owner and installation contractor to resolve routing challenges prior to installation, for verifying installer cable burial depth estimates, and for conducting required environmental inspections and monitoring in New York.

Cape Wind Associates, LLC – Cape Wind Project, Nantucket Sound, MA. Provided services related to the siting and design of a proposed renewable electric generating facility involving installation of 130 offshore wind turbine generators with a potential to generate 454 MW. The wind park is proposed to be sited on Horseshoe Shoal, and will interconnect with the regional power grid through an AC submarine cable system between the wind park and the southern shore of Cape Cod. Preparing conceptual facility layouts and evaluating geologic conditions for a project baseline environmental impact and feasibility study. Planning, directing, and overseeing extensive marine geophysical and geotechnical field investigation programs, included hydrographic, sub-bottom profiling, side-scan sonar, and magnetometer surveys, as well as advancing vibracores and surface sediment grabs, to evaluate surface and shallow/deep subsurface sediment/geologic conditions in the area of the proposed offshore renewable electric generating facility and the submarine electric cable links to the mainland electric grid. Prepared a detailed Navigational Risk Assessment, which was the first such assessment for an offshore wind energy facility submitted to the US Coast Guard, and assessed the possibility for project impacts to marine vessel traffic and USCG search and rescue operations.

Confidential Fiber Optic Cable Project – Virginia. Project manager responsible for preparing the desktop routing study for a proposed submarine fiber optic cable crossing in Virginia. Responsible for overseeing development of submarine cable crossing route alternatives and for developing regulatory permitting strategy. ESS will be retained to provide environmental consulting services for regulatory permitting in 2013.

Confidential Submarine Electric Generator Lead Project – Northeast U.S. Project manager responsible for preparing the desktop routing study for proposed submarine electric cable generator lead and transmission projects that would reallocate power generated from an existing generating station to a different ISO control area than presently served by the generating station.

Confidential Submarine Electric Cable Projects – Northeast U.S. Project manager responsible for preparing the desktop routing studies for several proposed submarine electric cable projects that included potential merchant projects, reliability projects, and projects that were being investigated by developers for possible response to RFP's issued by regulated utilities to provide electricity to various ISO zones.

Confidential Client – Electric Generating Facility Siting, Long Island, NY. Provided services related to the siting of a proposed electric generating facility. Responsible for field reconnaissance of potential site locations within a 1,000-square-mile area utilizing applicable local regulations and site development requirements.

Connecticut Light & Power Company and its Project Partners – Submarine Replacement Cable Project, Norwalk, CT to Northport, NY. Planning, directing, and overseeing an extensive marine geophysical and geotechnical field investigation program for an 11-mile, 300 MW AC submarine cable

system that replaced an existing series of electric transmission cables connecting existing power stations in Connecticut and Long Island. The seven existing fluid-filled submarine cables were replaced with three new solid dielectric AC cables within the existing cable corridor in 2008. Two survey vessels conducted geophysical and geotechnical surveys simultaneously. The field investigation program included bathymetric, sub-bottom profiling, side-scan sonar, and magnetometer surveys, as well as advancing vibracores and surface sediment grabs, to evaluate surface and shallow subsurface sediment/geologic conditions along the proposed alternative routes. The program consisted of over 400 miles of geophysical survey tracklines, over 30 vibracores, and approximately 100 surface sediment grabs.

Gamesa Energy USA – G11X Offshore Wind Turbine Project, Lower Chesapeake Bay, Cape Charles, VA. Task manager for the development of submarine and overland export cable routes for a prototype 5 MW offshore wind turbine. Provided technical support for the preparation of the Standard Joint Permit Application to the Virginia Marine Resource Council and U.S. Army Corps of Engineers – Norfolk District on behalf of the project.

West Point Partners, LLC – West Point Transmission Project – Athens, NY to Buchanan, NY. Project Manager responsible for development of the Project's overland and in-river transmission cable routes, managing initial stakeholder outreach meetings, and overseeing preparation of the Projects New York State Article VII and USACE Individual Permit applications. Responsible for day-to-day coordination of ESS services, coordination with the client and its project team, coordination with the selected installers, providing technical services related to submarine cable route design and construction, and for planning, directing, and overseeing in-river geophysical and geotechnical field investigations. Also responsible for overseeing development of the Project's Alternatives Analysis.

Hawaii Infrastructure Partners, LLC, Submarine Cable Routing and Assessment, HI. Project Manager for the completion of a due diligence and desktop routing assessment for the siting of submarine electric cables in the State of Hawaii. This assessment included site reconnaissance, regulatory outreach, and coordination and assessment of environmental constraints such as coral reefs, endangered species, geologic conditions, and cultural resources. Additionally factors such as U.S. Naval operations and navigational concerns were researched and analyzed.

Hudson Transmission Partners, LLC – The Hudson Project, Ridgefield, NJ to New York City, NY. Provided and coordinated engineering support for regulatory permitting efforts for the construction of a new High Voltage DC, 66 MW electric transmission facility linking the regional PJM Interconnection with the New York Independent System Operator. The Project will include the construction of a new back-to-back AC-DC-AC Converter Station to be located in Ridgefield and installation of a new 230 kV AC link to the nearby PSE&G Bergen Substation, also in Ridgefield. From the Converter Station a new 345 kV AC electric transmission cable system will be routed in an overland underground configuration from Ridgefield to Edgewater, New Jersey where it will then cross the Lower Hudson River estuary in a buried submarine cable configuration to make landfall at Piers 92 – 94 at the Mid-town Manhattan waterfront where it will then interconnect via upland underground cable to the existing Con Edison West 49th Street Substation.

Pepco Holdings, Inc. - Mid-Atlantic Power Pathway Project, Chesapeake Bay, MD. Project Manager for preliminary Desktop Routing Analysis, Bay & River Technical Studies, and Submarine Cable Owner's Engineer services for the 320 kV HVDC submarine cable segment of the larger 150-mile project. The preliminary routing analysis identified potential routes, constraints (geologic, navigation, installation feasibility), and critical planning issues. ESS also provided marine geophysical survey observations and landfall evaluations. PHI retained ESS to complete engineering and associated scientific evaluations to assess submarine cable system installation feasibility and constructability, including a marine sediment

sampling and testing program, turbidity/water quality impact modeling, an environmental risk assessment, and assessing the proposed submarine cable route, the planned installation methods, the Impact Producing Factors associated with both installation and operation of the submarine cable. ESS was also retained as PHI's owner's engineer for the submarine cable component of the MAPP Project.

PSEG Power LLC – Cross Hudson Project, Ridgefield, NJ to New York City, NY. Project Manager for environmental consulting and engineering services for the construction of a submarine electric cable system to transmit power from the PSEG Bergen Station in Ridgefield, New Jersey to the ConEd West 49th Street substation in New York City. The cable system was to be approximately seven miles long (including upland and submarine portions), and would transmit approximately 500 MW of AC energy as well as fiber optic communications. Was responsible for day-to-day coordination of ESS services, coordination with the client, coordination with the project engineers, providing technical services related to submarine cable route design and construction, and for planning, directing, and overseeing multiple marine geophysical and geotechnical field investigations. Was responsible for developing the proposed submarine cable route from project survey and constraints information. Responsible for overseeing preparation of New York Article VII filing and U.S. Army Corps of Engineers permit application, as well as various separate supporting reports and responses to comments.

Siemens Energy, Inc. – Civil/Site Engineering for Electrical Converter Station, The Hudson Project, Ridgefield, NJ. Project Manager responsible for the preliminary civil/site design of a proposed back-to-back electrical converter station. ESS prepared civil/site design plans for Siemens to provide to Hudson Transmission Partners to support their preparation of permit applications associated with the Ridgefield, New Jersey Converter Station Facility to the New Jersey Meadowlands Commission and New Jersey Department of Environmental Protection.

TransÉnergie U.S., Ltd. – Cross Sound Cable Project, New Haven, CT to Brookhaven (Shoreham), NY. Planned, directed, and oversaw geophysical and geotechnical field investigation programs, developed proposed cable route alignments, and provided dredging design/construction oversight for the project that crosses Long Island Sound between New Haven, Connecticut and Brookhaven, New York. The cable system is approximately 24 miles long, and transmits approximately 300 MW of DC energy. The DC cable energy is transformed to AC energy for power grid distribution at DC/AC Converter Stations located near each of the cable landfalls. The field investigation programs included hydrographic, sub-bottom profiling, side-scan sonar, and magnetometer surveys, as well as advancing jet probes and vibracores, to evaluate surface and shallow subsuface sediment/geologic conditions along the proposed alternative routes and in problematic areas encountered during cable installation. Developed the final proposed cable route from project survey and constraints information, and coordinated development of project plan sets. Provided engineering support for proposed construction methodologies and regulatory permitting application preparation. Served as an expert witness during Connecticut Siting Council proceedings. Responsible for designing and managing a 12,000-cubic-yard hydraulic dredging operation at the Shoreham landfall to facilitate cable embedment. Planned and executied a post-installation cable and obstruction survey to field locate the cable and to identify and characterize obstructions encountered during installation, and for determining proposed remedial cable burial means and methods.

American National Power – Preliminary Engineering and New York Article X Preparation, Ramapo, NY. Responsible for preliminary civil/site engineering for a proposed 1,100 MW natural gas-fired power plant. Design elements included lot and easement layout, site access/egress, storm water management, and site grading. Also provided project support for the preparation and submittal of the project's Article X Pre-Application Report and the Article X submission to the New York State Department of Public Service.

Nantucket Cable Electric Company, Inc. – Nantucket Cable Project, Harwich to Nantucket, MA. Provided technical support for completion of preliminary engineering and analysis of coastal engineering structures and other various project design issues necessary to complete design and permitting for the $28 million Nantucket Submarine Cable Project on Cape Cod.

Commonwealth Electric – Martha's Vineyard Cable, Vineyard Haven, MA. As project manager, conducted research on existing bottom sediment, navigational, and anchorage conditions for the existing cable located within Vineyard Haven Harbor. Coordinated production of plans showing general navigation and anchoring conditions in Vineyard Sound and Vineyard Haven Harbor.

New England Power – Quincy Cable Project, Boston, MA to Quincy, MA. Planned and executed a sediment sampling program for the proposed cable to cross the Neponset River between Dorchester and Quincy, Massachusetts. The purpose of the program was to obtain composite samples of the Neponset River bottom sediment for bulk physical/chemical characterization to support the various environmental regulatory permit applications required for the project. Also responsible for Chapter 91 jurisdiction research and historic tidelands delineations, preparation of the Chapter 91 Waterways License application, development of a conceptual traffic management plan for an Energy Facilities Siting Board filing, and conceptual routing of required construction detours.

Publications

Use of Marine Remote Sensing Data for Submarine Cable Route Planning and Siting, Whitney, P.R.; Natale, C.J.; and Nash, J.P., Marine Technology Society/IEEE Oceans 2000 Conference, Providence, Rhode Island, September 2000.

The Critical Connection for Offshore Wind Integration, Whitney, P.R.; Gowell, E.T.; and Natale, C.J., North American WindPower, April 2011 issue.

Submarine Cable Embedment: Integrating Suspended Sediment Modeling and Monitoring into the Regulatory Permit Process, Whitney, P.R and Herz S.M.; 4TH Annual Marine Renewable Energy Conference, Warwick, Rhode Island, January 2013.

MATTHEW D. LADEWIG
Senior Scientist

Experience
ESS Group, Inc.: 2006 to present

Years of Prior Related Experience: 3

Education
MS, Aquatic Resource Ecology and Management, University of Michigan, 2006

BA, Physical Geography, University of Illinois at Urbana-Champaign, 2000

Professional Registrations and Affiliations
Society for Freshwater Science – Chironomidae and Eastern EPT Taxonomist

North American Lake Management Society – Certified Lake Manager

40-hour OSHA HAZWOPER Supervisor Training

8-hour Offshore Water Survival Certification

SafeGulf Certification

Boat Massachusetts Boating Safety Certification

Qualifications

Mr. Ladewig is an ecologist with more than 14 years of experience in the monitoring, modeling, and management of aquatic ecosystems. He has developed and implemented numerous surface water monitoring, sediment testing, and biomonitoring programs for a wide variety of electric transmission, development, biological conservation, and water resource projects. Mr. Ladewig has also led or supported local, state, and federal permitting efforts for a number of inland and marine projects.

Mr. Ladewig is also an experienced taxonomist who has analyzed thousands of macroinvertebrate samples collected from freshwater and marine habitats in the Great Lakes, Northeast, the Mid-Atlantic and the Bahamas. His taxonomic experience extends to a wide variety of other biological resources, including fish, birds, aquatic plants and a number of rare species.

Representative Project Experience

US Wind – Development of Site Assessment Plan and Construction and Operation Plan for Maryland Offshore Wind Energy Project, DE and Federal Waters off the Coast of MD. Developed the benthic sampling plan and protocols for assessment of benthic habitats in Inland Bays and offshore waters. These were approved by the federal Bureau of Ocean Energy Management (BOEM) and state agencies. Also served as the senior taxonomist and quality assurance officer overseeing the safe handling, sorting, and identification and enumeration of benthic samples collected to date.

Silver Run Electric, LLC – Benthic Sample Analysis to Support Permitting of a Transmission Project, NJ and DE. Senior taxonomist and quality assurance officer overseeing the safe handling, sorting, and identification and enumeration of nine macrofaunal samples collected from estuarine waters of New Jersey and Delaware. Samples were collected and processed in accordance with protocols approved by NJDEP and DE DNREC.

New Hampshire Department of Environmental Services (NHDES) – Wetland Macroinvertebrate Sample Analysis, Statewide, NH. Senior taxonomist and quality assurance officer overseeing the safe handling, sorting, and identification and enumeration of more than 70 macroinvertebrate samples collected from multiple wetlands in New Hampshire. These samples were collected and evaluated in support of New Hampshire's Wetlands Monitoring Strategy. Also coordinated with NHDES on the refinement of laboratory protocols for the state's wetland biomonitoring program.

Poseidon Transmission 1, LLC – Geotechnical and Benthic Surveys to Support Permitting of a Submarine Cable, NJ to NY. Completed an assessment of existing water quality, sediment quality, and benthic and shellfish resources in Raritan Bay and the New York Bight for a proposed electric transmission project between Middlesex County, New Jersey and Huntington, New York. As part of this assessment, assisted with wetland delineation and developed impact assessments for shellfish and benthic resources, sediment and water quality, and rare species. These impact assessments were used for the New York Article VII permit filing.

West Point Partners, LLC – New York State Article VII, Hudson River, NY. Completed an assessment of existing water quality, sediment quality, and benthic and shellfish resources in the Hudson River for a proposed power transmission project between Athens and Buchanan, New York. As part of this assessment, provided QA/QC for macroinvertebrates identified from the 51 baseline benthic samples collected along the In-River Cable Route. This information was used to help identify potential impacts of the electric transmission line for key state (New York Article VII) and federal (US Army Corps of Engineers) permit filings.

Gamesa USA, LLC – Geotechnical and Benthic Surveys to Support Construction of an Offshore Wind Turbine, Cape Charles, VA. Collected vibracore and benthic grab samples near a proposed offshore prototype wind turbine and associated submarine transmission cable route. Provided quality assurance/quality control and taxonomic identification on over 40 benthic macroinvertebrate samples from the project area. Completed a benthic macroinvertebrate community assessment report as part of the joint permit application.

Eversource Energy – Long Island Replacement Cable Project, Abandoned Cable Monitoring, Northport, NY. Assisted in the design and execution of this post-construction benthic macroinvertebrate monitoring program. Currently collects and analyzes water quality and benthic samples under a New York State Department of Environmental Conservation (NYSDEC) approved protocol to monitor the impacts, if any, to biological resources in the vicinity of several abandoned cable segments. Over 60 benthic samples have been collected under this monitoring program.

Pepco Holdings, Inc. – Mid-Atlantic Power Pathway Project, Chesapeake Bay, MD. In accordance with protocols tailored to meet the standards of the Maryland Department of Natural Resources, collected vibracore and benthic grab samples from numerous locations along a proposed high voltage submarine transmission cable route in Chesapeake Bay and the Choptank River. Provided quality assurance/quality control and taxonomic identification of benthic macroinvertebrates from 40 grab samples collected in oligohaline and mesohaline waters, including low-abundance samples collected from locations previously thought to be azoic. Analyzed data and completed report detailing the baseline benthic macrofaunal assessment. PRIMER v.6 was the primary statistical software used to analyze the benthic community during the existing conditions sampling program. This assessment was included in the Environmental Review Document filed with the state of Maryland for project permitting.

Bayonne Energy Center – Upper New York Bay, New York City, NY. Conducted taxonomic identification and data analysis for several rounds of marine benthic grab samples collected from the project area as part of baseline characterization and pre-/post-construction monitoring efforts. More than 40 benthic samples were collected and analyzed under this program. PRIMER v.6 was the primary statistical software used to analyze the benthic community during the pre-/post-construction monitoring program. Protocols, sampling plans, and reports were submitted to and reviewed by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Public Service. Independent Environmental Inspector for construction activities associated with the installation of a new submarine transmission line from Bayonne, New Jersey to Brooklyn, New York. Provided inspection services, documented any environmental compliance issues and prepared daily written inspection reports during all in-water construction activities associated with the installation at the New York landfall. Also monitored water quality during cable installation in New York waters.

Eversource Energy (Northeast Utilities) – Long Island Replacement Cable Project, Norwalk, CT. Collected infaunal grab samples and oversaw diver collection of epifaunal samples as part of the submarine cable post-construction monitoring programs conducted under Connecticut Department of Environmental Protection-approved protocols. Provided quality assurance/quality control and identified and enumerated benthic macroinvertebrates from these samples. Conducted benthic community statistical analysis and reporting for the monitoring programs.

Upstate NY Power Corporation – NYS Article VII Application, NY. Completed an assessment of existing benthic resources in Lake Ontario for a proposed power transmission project between a proposed wind farm on Galloo Island and the town of Mexico, New York. As part of this assessment, identified and enumerated benthic macroinvertebrates from baseline benthic samples collected along the Proposed Subaquatic Route. Additionally, assisted with the drafting of several sections of the New York Article VII application, including discussions of hydrology, wetlands, biological resources, and vegetation clearing. This was used, along with other studies, to identify potential impacts of the 51 mile, 230 kV electric transmission line and associated substations.

Cape Wind Associates, LLC – Cape Wind Offshore Renewable Energy Generation and Submarine Cable Project Geophysical and Geotechnical Surveys, Nantucket Sound, MA. Served as the onboard client representative for an extensive geotechnical program that was used to support final engineering design of the proposed 130-turbine Cape Wind offshore wind project. The geotechnical program included collection of vibracores, seabed cone penetrometer testing (CPT), deep CPT, and deep boring.

Town of Hull – Hull Wind Offshore Expansion, Hull, MA. Identified and enumerated macroinvertebrates from benthic samples collected in the Proposed Project Area as part of the baseline monitoring effort. Also completed analysis of targeted benthic samples in areas with the potential to support surf clam beds. Data from these efforts were summarized in a technical report on the baseline benthic resources.

Rose Island Hotel Company – Environmental Monitoring for Rose Island Resort, Rose Island, Bahamas. Collected water quality, sediment, phytoplankton and benthic samples in accordance with the environmental monitoring plan (EMP) for the pre-construction, construction and operation phases of a mixed-use development project. Also identified and enumerated marine invertebrate species from benthic samples collected in the shallow coastal waters surrounding the property.

Hudson Transmission Partners, LLC – Submarine Cable Installation, Lower Hudson River, NY and NJ. Identified and enumerated macroinvertebrates from 10 benthic samples collected in the lower Hudson River estuary. Summarized data in a report on baseline benthic resources in the Project area for New York Article VII submission.

City of New Haven – Monitoring Report Review for Water Diversion from the Mill River, New Haven, CT. Project manager for third party review of annual environmental monitoring reports concerning the Lake Whitney Water Treatment Plant. Met with members of the Environmental Study Team to evaluate the monitoring program on an annual basis. The reports generated by the monitoring program focused largely on the aquatic macroinvertebrate community and were prepared by an environmental study team contracted to the South Central Connecticut Regional Water Authority to monitor the impacts associated with the withdrawal of up to 15 million gallons per day of water from Lake Whitney. The area of evaluation included the Mill River system below Eli Whitney Dam, much of which flows through East Rock Park, a significant resource located in an urbanized area of New Haven. The third party evaluation was prompted in response to concern by the City of New Haven and members of the community over decreased flows and reduced water quality in Mill River below the Eli Whitney Dam.

Technical Review Report
Eversource Seacoast Reliability Project—Little Bay Crossing

Little Bay, New Hampshire

PREPARED FOR:
Christopher G. Aslin
Assistant Attorney General
New Hampshire Office of the Attorney General (Counsel for the Public)
Environmental Protection Bureau
33 Capitol Street
Concord, New Hampshire 03301

PREPARED BY:
ESS Group, Inc.
100 Fifth Avenue, 5th Floor
Waltham, Massachusetts 02451

ESS Project No. N510-000

July 28, 2017

Technical Review Report
Eversource Seacoast Reliability Project—Little Bay Crossing

Little Bay, New Hampshire

Prepared for:

Christopher G. Aslin
Assistant Attorney General
New Hampshire Office of the Attorney General (Counsel for the Public)
Environmental Protection Bureau
33 Capitol Street
Concord, New Hampshire 03301

Prepared by:

ESS Group, Inc.
100 Fifth Avenue, 5th Floor
Waltham, Massachusetts 02451

ESS Project No. N510-000

July 28, 2017

TABLE OF CONTENTS

SECTION **PAGE**

ATTACHMENTS

1.0 INTRODUCTION

In accordance with our agreement with the New Hampshire Office of the Attorney General (Counsel for the Public), ESS Group, Inc. (ESS) has conducted a technical review of the environmental documents submitted on behalf of the Seacoast Reliability Project as proposed by Eversource Energy (Applicant). The specific focus of this technical review has been on the information and details submitted by the Applicant, as contained within the administrative record, and available for ESS review, for the portion of the preferred transmission line route located within Little Bay. Review of upland portions of the Project for the Counsel for the Public is being conducted by others.

This section provides a framework for the technical review, an overview of the Project, and a summary of the principal source documents reviewed.

This Technical Review Report has been prepared under contract with the New Hampshire Office of the Attorney General and is only intended for use in the docket of the Seacoast Reliability Project.

1.1 Review Framework

The purpose of this objective technical review of the Seacoast Reliability Project Application was to: (1) assess the adequacy of data and assessments used to identify the potential impacts to Little Bay resources, and (2) confirm that the methodologies used by the Applicant to characterize existing conditions and assess potential impacts are reasonable, given our understanding of applicable scientific standards, regulatory provisions, and industry practices.

The technical review was conducted on specific aspects of the Certificate of Site and Facility Application identified as important by the Counsel for the Public. During the review, the following questions were asked:

- Is the information presented by the Applicant sufficient to accurately characterize baseline conditions and potential impacts?
- Are there any obvious data gaps or limitations of data submitted as part of the Certificate of Site and Facility Application?
- Are there references made to additional information or surveys forthcoming (not in Certificate of Site and Facility Application record) that could aid in the technical review?
- Are the assessment methods used in the Certificate of Site and Facility Application appropriate and sufficient to characterize the impacts of the proposed Project?
- Is the characterization of the environmental impacts reasonable and supported by the data?
- Are there adequate references to support assumptions and conclusions?

1.2 Project Overview

The Seacoast Reliability Project includes the construction and operation of a new 115 kilovolt (kV) transmission line, which the Applicant states will enhance the existing transmission system between the Deerfield and Scobie Pond Substations and address reliability concerns in the Seacoast Region of New Hampshire. The Project is proposed to be approximately 12.9 miles long and include a combination of overhead, underground, and underwater components. The efforts of this Technical Review focus on the

underwater components of the Project, mainly the 0.9 mile crossing under Little Bay. The underwater component is located in a charted Cable Area (NOAA Chart No. 13285) that is approximately 1,000 feet wide and is 1.1 miles long. The Applicant requested and received a license from the New Hampshire Public Utilities Commission (NHPUC) for the legal right to cross the Little Bay in the previously designated cable corridor (Order 25,998 dated March 10, 2017).

The Project will cross Little Bay via three submarine cables in the previously designated cable corridor. Existing submarine cables within Little Bay will be removed only where they will interfere with installation of the new submarine cables. The primary installation method will be jet plowing technology however conventional excavation and diver assisted burial will be utilized when necessary. The cables were initially proposed to be buried 3.5 feet in the tidal flat areas and 8 feet in the main channel. The Applicant subsequently amended its Application in June 2017 to include a minimum burial of 5 feet below present bottom instead of 8 feet in the channel. Installation will occur during the fall.

According to the New Hampshire Fish and Game Department, the tidal flats in and adjacent to the cable corridor are shellfish habitat, with softshell clams and razor clams being the dominant harvestable mollusk species, although small populations of oysters are present. Commercial lobstering and recreational fishing, lobstering, and shellfishing within the chartered Cable Area are permanently closed to harvest. At the time of Application, ten oyster aquaculture facilities operate in upper Little Bay on sites designated by the State. One of the oyster aquaculture facilities is located partially within the charted Cable Area, approximately 500 feet north of the new cable installation. It is our understanding that the New Hampshire Department of Environmental Services (NHDES) is working with the facility owner to resolve the location because shellfishing is prohibited in the Cable Area. The remaining aquaculture facilities are located further north of the Project, with the next closest lying approximately 0.5 miles to the north.

Impacts to water resources are anticipated to be almost entirely temporary. The Applicant expects that approximately 6.27 acres of temporary estuarine wetland impacts will result from the burial of cables under Little Bay. If protective cover is deemed necessary for the cables, 0.12 acres of tidal wetlands (intertidal unconsolidated bottom) may be permanently affected via the installation of concrete mattresses or other similar structures.

1.2.1 Cable Removal

Prior to embedding the new cable transmission lines; four existing cables and other minor debris that could present obstacles to the jet plow will be removed. As described in Appendices 13, 14, and 34 and the Existing Cable Removal Plan submitted on June 30, 2017, the cables currently lie on or within 24 inches of the sediment surface and are between 40 and 100 years old. Approximately 1,850 feet of the existing cables will be removed. According to the Existing Cable Removal Plan, divers will be utilized to expose and connect to the existing power cable and bring the end on board of the cable removal barge. Once on board and of suitable length sections of the existing cable will be cut and secured to the boat until it is determined that the section of the cable corridor needed for the new cable system is clear. The existing cables will then be transported to shore for disposal. It is important to note that only sections of the existing out-of-service cables will be removed to ensure a clear route for the installation of the new cable system.

As stated in Site 301.08, the Applicant will submit a decommissioning plan prior to initiating the removal of the new cable system if decommissioning should be required. At this time, the Applicant

does not anticipate that the cables will be removed so a detailed decommissioning plan has not been created by the Applicant. If required by the Committee, the Applicant's plan will include details of each element of the decommissioning that is consistent with then-current environmental, safety, and other regulatory requirements.

1.2.2 Submarine Cable Installation

The Applicant has identified three methods for installing the submarine cables beneath the sediments of Little Bay. Based on the information presented in the Application and our familiarity with submarine cable installation, the installation methods may be defined as follows:

- Water Jetting/Jet Plow – use of a jetting sled with a blade designed with high-pressure water nozzles on leading edge so plow creates a trench in bay bottom minimizing the force to tow the sled plow.
- Conventional Dredging – (Dredged Trench Excavation) use of a closed Environmental (clamshell) bucket to excavate the cable trenches.
- Diver Burial – diver assisted burial of submarine cables using a Water-Lift system or water lance.

According to the Application Site 301.03 Section (g) 11, the primary installation method is a jet plow, which will be used for cable embedment in the subtidal and most of the intertidal zone. Diver burial will be used in the shallow intertidal zone and excavation will be performed for cable trenches in the transition zone from marine to terrestrial.

Cable burial will begin on the west shore. The cable lay barge will slowly move forward under anchor winches. The jet plow will reach within 600 feet of the east shore, at which point the water depth will not allow for further advancement. The section of temporarily unburied cable between the end of the jet plow position offshore and the excavated cable landing will be buried by divers utilizing a handheld burial nozzle or water-lift and an excavator in the nearshore intertidal area. The areas where diver burial is utilized will be enclosed within silt curtains.

The various submarine cable installation methods will be used in the locations described below:

Location	Approximate Bottom Elevation	Installation Method	Burial Depth below Bottom
Western Tidal Flat	0 to -2 FT MLLW	Diver Burial	42 inches
Western Tidal Flat	0 to -2 FT MLLW	Jet Plow Burial	42 inches
Channel	-2 to -32 FT MLLW	Jet Plow Burial	60 inches
Eastern Tidal Flat	0 to -10 FT MLLW	Diver Burial	42 inches

1.3 Source Documents Reviewed

The following source documents submitted by the Applicant which are officially part of the administrative record for the Certificate of Site and Facility Application were reviewed as part of this technical review. For purposes of this report, these documents are referred to as the Certificate of Site and Facility Application record:

- Application for Certificate of Site and Facility (Sections 301.03, 301.07 and 301.08) as amended March 29, 2017)
- Appendix 2: SRP Environmental Review Maps (as amended March 29, 2017)
- Appendix 5: Engineering Design Drawings (as amended March 29, 2017)
- Appendix 7: SRP Natural Resource Existing Conditions Report (as amended March 29, 2017)
- Appendix 13: Joint NHDES USACE Wetlands Permit Application (as amended March 29, 2017)
- Appendix 14: NHDES Section 401 Water Quality Certification Request (as amended March 29, 2017)
- Appendix 15: NHDES Shoreland Permit Application (as amended March 29, 2017)
- Appendix 19: SRP Crossings Petition
- Appendix 34: Natural Resource Impact Assessment (as amended March 29, 2017)
- Appendix 35: Modeling Sediment Dispersion from Cable Burial for SRP Little Bay, NH (Initial Version and June 27, 2017 Revised Version)
- Appendix 38: Essential Fish Habitat Assessment
- Characterization of Sediment Quality Along Little Bay Crossing (Initial Version, December 2016 Version, and June 2017 Version)
- Pre-Filed Direct Testimony of A. Pembroke (as amended March 29, 2017)
- Pre-Field Direct Testimony of S. Allen (as amended March 29, 2017)
- Pre-Filed Direct Testimony of M. Dodeman (subsequently adopted by W. Wall)
- Applicant's Responses to Counsel for the Public's First Set of Data Requests
- Applicant's Responses to Counsel for the Public's Second Set of Data Requests
- Applicant's Responses to Comments from Counsel for the Public to NHDES dated March 15, 2017
- Applicant's Responses to June 7, 2017 Technical Session Data Requests
- Eversource Existing Cable Removal Plan (submitted June 30, 2017)
- Revised Environmental Monitoring Plan for Little Bay (submitted June 30, 2017)
- Applicant's Response to July 11, 2017 Technical Session Data Requests.

ESS also participated in a stakeholder meeting at the offices of New Hampshire Fish & Game on January 12, 2017, a meeting with NHDES on February 15, 2017, a Technical Session with the Applicant's

environmental and construction witnesses on June 7, 2017, and a Technical Session with the Applicant's environmental witnesses on July 11, 2017.

ESS prepared a memorandum containing lists of comments for the Counsel for the Public to submit to NHDES, which is provided in Attachment A.

As is typical during the Certificate of Site and Facility process, additional information was filed by the Applicant subsequent to the original petition including: supplemental exhibits, attachments, correspondence, and responses to technical session data requests. In order to provide adequate time for Counsel for the Public to utilize the information presented in this Technical Review Report, we have not reviewed any additional information filed by the Applicant after July 21, 2017.

2.0 REVIEW OF DOCUMENTS PROVIDED

This section provides the results of ESS's review of the documents submitted to the Application Record, data gaps identified during our review, and potential mitigation measures based on our experience with similar submarine cable installations. The framework of the Application submittal is an Application followed by numerous Application Appendices that are either other permit applications or technical reports. Since many of the Application Appendices cover similar technical information, this section is divided into subsections based on the Application Appendix.

There is a large amount of redundancy among the various appendices submitted as part of the Application in that the same topics are often covered in multiple Application Appendices and a number of Application Appendices are also provided as appendices to other Application Appendices. In some cases, this redundancy has led to inconsistencies in reporting data or estimated impacts at various places within the Application. We have attempted to note inconsistencies where we have identified them, but there may be others in the Application record.

2.1 Application for Certificate of Site and Facility (Sections 301.03 and 301.07)

Section 301.03 provides a description of the Little Bay submarine cable crossing and the Applicant's planned means and methods for installing the submarine cable. Descriptions of potential impacts are not included in this section as they are described in Section 301.07 and elsewhere in the Application.

Sediment Disturbance and Suspension

Section 301.07(b)(1) provides summary level information on expected estuarine wetland impacts resulting from installation of the submarine cable in Little Bay. It states there will be approximately 6.27 acres of temporary estuarine wetland impacts from burial of the submarine cable in Little Bay. The temporary impacts would include open cut-and-cover in the salt marsh (1,222 square feet; 0.03 acres) and rocky shore (302 square feet, 0.01 acres), and burial via jet plow across the intertidal flat (144,091 square feet; 3.31 acres) and subtidal bottom (127,397 square feet, 2.92 acres).

In terms of permanent wetland impacts, it is stated that approximately 5,336 square feet (0.12 acres) of tidal wetlands (intertidal unconsolidated bottom) will be impacted if protective cover is needed over the buried cables.

Section 301.07(b)(3) summarizes expected impacts associated with suspension of sediments from the jetting and nearshore excavation based on the results of the suspended sediment dispersion

modeling provided in Appendix 35 of the Application. ESS review and comments on the model are provided in Sections 2.11 and 2.12.

Water Quality

Section 301.07(b)(1)(a) states that water quality impacts will include increases in total suspended solids during installation of the submarine cable in Little Bay. Refer to Sections 2.11 and 2.12 of this report.

2.2 Appendix 2: SRP Environmental Review Maps

ESS has no comments on the SRP Environmental Review Maps except that they may need updating for the record based on the currently proposed installation methods for the Little Bay submarine cable crossing.

2.3 Appendix 5: Engineering Design Drawings

ESS has no comments on the Engineering Design Drawings except that they should be updated for the record to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.

2.4 Appendix 7: SRP Natural Resource Existing Conditions Report

Appendix 7 describes the existing environment in Little Bay and the studies performed by the Applicant to characterize the existing environment. In general, the desktop and field studies performed by the Applicant to characterize the existing environment are consistent with those used by ESS and others when performing similar characterizations. ESS comments on specific studies provided by the Applicant as appendices to the Application or as subsequent data submission are described below in the sections for the relevant reports.

2.5 Appendix 13: Joint NHDES-USACE Wetlands Permit Application

Appendix 13 is the joint wetlands permit application to NHDES and the U.S. Army Corps of Engineers (USACE) submitted on April 12, 2016. This application will need to be updated and amended to reflect information developed and revised by the Applicant between April 2016 and June 2017 with regard to the Little Bay submarine cable installation and other relevant changes to the upland portion of the project to ensure NHDES and the USACE have the most up-to-date project information for their review.

Sediment Disturbance and Suspension

The bottom area that could be impacted by cable lay barge anchors and chain sweep of the installation vessel was not quantified in the original Application. ESS suggested that this should be quantified in its March 2017 comments to NHDES.

The Applicant provided this assessment in its June 2017 submittal as response to CFP-ESS-12. In the response, the Applicant states that a four-point anchoring system that is comprised of 6,000 pound anchors attached to 1 1/8" (no chain) wire will be used. The Applicant's estimated anchor-wire related bottom disturbance is approximately 5.5 acres with most of the disturbance being from wire sweeping on the Bay bottom rather than sweeping through the sediment.

These estimates seem reasonable based on the installation methods proposed and are small when compared to the bottom habitat in Little Bay.

This information should be provided to NHDES and the USACE as part of a revised joint wetlands permit application and submitted to the NHSEC.

Water Quality

The Application provides the findings of the sediment dispersion modeling and will need to be revised to reflect the updated modeling results submitted to the record in June 2017.

Natural Resources

Aquatic Vegetation

The Application states the submarine cable installation will take place beginning in September, which is when the eelgrass is at the end of its season.

There appear to be inconsistencies in the description of impacts provided in the Environmental Fact Sheet. Page 2 of the Environmental Fact Sheet states there will be no permanent impacts to tidal wetlands. This appears to conflict with statements made in Section 301.07(b)(1) where permanent impact to estuarine wetlands are described as being possible and associated with the use of concrete mattresses or other types of cable protection. In addition, the application makes the following apparently contradictory statements in the Environmental Fact Sheet:

> "Little Bay, including the Cable Area, provides habitat for shellfish, benthic infauna, lobsters and horseshoe crabs, and fish. The only permanent impacts will be limited to concrete mattresses used in locations near the shorelines if shallow bedrock prohibits cable burial to its full depth." [Appendix 13, PDF Page 45]
>
> "There will be no permanent impact to tidal wetlands." [PDF Page 45]

If NHDES or the USACE considers Little Bay a tidal wetland, there will be permanent impacts due to concrete mattresses and these impacts should be accounted for in the application.

[In its June 30, 2017 response to CFP-ESS-11, the Applicant indicated that the tidal wetland impact statement should read, "No permanent impact to salt marshes."]

Apparent Data Gaps

None remaining. As noted above, the Applicant should update the Joint NHDES-USACE Wetlands Permit Application with the revised project information it has developed since the original submittal was made.

2.6 Appendix 14: NHDES Section 401 Water Quality Certification Request

Sediment Disturbance and Suspension

Page 11 of the Appendix states, "In the areas where diver burial of the cables will take place within silt curtains, the suspended sediments will ultimately be redeposited within the entire enclosure forming a layer of unconsolidated material averaging approximately 1.2 (west) to 1.4 (east) inches thick although deposition will be greater directly over the trenches and thinner closer to the silt curtains." This statement is inconsistent with the ASA Report (Appendix 35, p. 40) which indicates that average deposition ranges from 3.7-4.3 inches. The Applicant should confirm the correct value. *[The Applicant subsequently confirmed the numbers on Page 11 were incorrect, but they have been superseded by the June 2017 Sediment Dispersion model results.]*

Water Quality

Page 11 – "Env-Wq 1703.11 states: "(b) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs." It is unclear whether the turbidity standard of 10 NTU above natural occurring conditions will be exceeded based on model results, which are reported in mg/L. The Applicant should explain the relationship between NTU and mg/L (i.e., no direct correlation), as well as define ambient conditions. *[The Applicant subsequently provided an estimate of the relationship between turbidity (NTU) and suspended sediment concentration (mg/L) in terms of the water quality standard in the Revised Environmental Monitoring Plan submitted on June 30, 2017. This estimate appears to be reasonable based on the data provided in Figure 1-2 of the Plan, but could be validated by obtaining and testing water samples as part of the water quality monitoring plan as described below. The relationship between turbidity and suspended sediment concentration should be provided to NHDES as part of a revised 401 Water Quality Certification application.]*

Applicant's Proposed Water Quality Monitoring Program

The Applicant initially proposed monitoring suspended solids at locations 1,000 feet upcurrent and downcurrent of the cable installation. Upon reviewing the initial monitoring plan, ESS felt that was a large separation distance from the cable installation and may not pick up the effects of the plume from cable installation activities based on a review of the Applicant's sediment dispersion model. It has been our experience that performing water quality monitoring at a distance of 500 feet upcurrent and downcurrent of the operating jet plow is more likely to capture potential exceedances of the water quality standard, if they occur.

The proposed water quality criteria for suspended sediment from the cable installation is based on NTUs. Since the sediment dispersion modeling presents concentrations in mg/L, a water quality threshold based on mg/L or a means of correlating NTUs to mg/L should be considered.

The Applicant states in Appendix D of the 401 Water Quality Certification application (Section 1.1, PDF page 261), "If it is determined that the impact station results are outside the range of natural variability, then the marine contractor will be required to modify their operation of the jet plow for the subsequent installation(s)." The Applicant should provide detail on how the monitoring team will ensure that sampling at the impact stations aligns (in time) with sampling at the reference station to make the comparison for a particular period of time and the types of operation modifications that could be implemented.

[The Applicant subsequently provided a revised monitoring plan in June 2017. Refer to Section 2.7 of this report for ESS comments on that report.]

Potential Additional Mitigation Measures for Consideration

Since the fate and transport of chemical constituents in the sediment resulting from the jet plow operation has been raised as a concern by stakeholders, requiring monitoring of chemical constituents in the water column in samples collected 500 feet up-current and down-current of the operating jet plow should be considered. Compliance could be determined by requiring that concentrations of constituents of concern in Little Bay not exceed either state-specified water quality limits or a multiplier of the highest ambient background level measured during the same sampling day at the up-current background station at the same depth as the down-current sample. This approach

has been used by environmental agencies in other states for similar jet plow installations where there has been concern about fate and transport of chemical constituents.

NHDES or the NHSEC could also consider requiring the Applicant to provide NHDES with an analysis comparing the installation monitoring results with the suspended sediment model predictions to determine if the model provided a reasonable prediction of the conditions that occurred during the installation.

2.7 Revised Environmental Monitoring Plan for Little Bay

The Applicant submitted a revised Environmental Monitoring Plan on June 30, 2017 that includes the Applicant's plans for monitoring of water quality, changes to seabed bathymetry, and benthic habitat.

Water Quality Monitoring During Construction

The Applicant's proposed water quality program is based on approval of a mixing zone by NHDES for the suspended sediment plume under Chapter Env-Wq 1707. The concept and definition of a mixing zone in Env-Wq 1707 pertains to wastewater discharge. When questioned about this during the July 11, 2017 technical session, the Applicant's environmental witnesses stated that NHDES has initially indicated that a mixing zone could be established for the suspended sediment plume induced by the submarine cable installation. Therefore, the Applicant is proposing monitoring to determine if the NHDES turbidity criterion of not exceeding 10 NTUs above background is met at the edge of the proposed mixing zone. If the mixing zone is not approved by NHDES for the project, the monitoring program should be revised to reflect the water quality standards imposed on the project.

The monitoring will consist of using multiple vessels [not stated in the Plan, but confirmed during the July 11 technical session] to obtain turbidity probe measurements at five up-current and five down-current pre-planned locations. The 10 pre-planned locations are set at the edge of the mixing zone, which the Applicant defines as the sediment dispersion model predicted extent of the 20 mg/L above ambient concentration. At each of these 10 locations, turbidity probe measurements will be obtained in the near-surface, mid-depth, and near-bottom portions of the water column.

The Applicant's witnesses stated at the July 11 technical session that water sampling for laboratory analysis is not part of the monitoring plan. Based on our experience with other water quality monitoring programs, obtaining water samples for testing of turbidity and total suspended solids would provide valuable information to verify the Applicant's estimated correlation between suspended sediment concentrations in mg/L to turbidity in NTU (i.e., that 20 mg/L is representative of 10 NTUs). By using expedited laboratory turnarounds, testing results from the first cable installation could be available in time to make adjustments to the monitoring plan for installation of the second and third cables if necessary.

Section 1.2 of the monitoring plan provides the procedures that will be implemented if exceedances of the 10 NTU criterion are measured. The procedures indicate that additional turbidity probe measurements will be obtained every 15 minutes at the location where the exceedance is measured. At the July 11, 2017 technical session, Counsel for the Public questioned whether the hourly monitoring would continue during this investigatory period. The Applicant's witnesses stated that it would. We recommend that this be included in the Plan document so it is clear in the record and to monitoring crews in the field.

Bathymetric Monitoring

The Applicant proposes monitoring to document changes in bathymetry resulting from the installation of the submarine cable. The monitoring method proposed is consistent with our experience on similar projects. The Applicant notes that either a single beam or multibeam sonar system will be used. The use of a multibeam system would provide more useful information for comparing pre-construction to post-construction conditions than a single beam system. The Plan does not state when the pre-construction bathymetric survey will be conducted, but the Applicant's witnesses stated during the July 11, 2017 technical session that it is expected to be completed approximately one month prior to submarine cable installation activities, which is similar to our experience on other submarine cable projects.

Benthic Infaunal Community Monitoring

The Applicant proposes monitoring to document changes to the benthic habitat resulting from installation of the submarine cable. The Applicant identifies three benthic monitoring transects that will contain five benthic monitoring stations each for a total of fifteen benthic monitoring stations.

The proposed monitoring is generally consistent with our experience. The Plan states that the baseline sampling will be the sampling that was performed in 2014. The Applicant's witnesses stated that use of this data allows a more system-wide approach. We suggest that the Applicant consider performing the pre-construction benthic sampling just prior to the installation since that will be four years after the 2014 data was obtained and would provide a more direct comparison with the post-construction sampling data.

The Applicant's proposed benthic infaunal community monitoring only includes one impact sample per transect. Given the spatial variability typically observed in benthic infaunal communities, we suggest that the Applicant consider collecting a minimum of three replicate samples at each proposed sampling location. This would strengthen the analysis required for the determination of recovery of benthic resource function.

Determination of Recovery of Benthic Resource Function

The Applicant proposes to evaluate the recovery of benthic resource function through the comparison of physical habitat (grain size) and biological parameters at impact and non-impact stations. Each transect will contain one station within the 100-ft wide area of disturbance (impact stations), two stations located to the north of the disturbed area, and two stations located to the south of the disturbed area. The Applicant states that station locations will be finalized based on as-built plans provided by the marine contractor. However, we suggest that station locations be finalized prior to installation of the cable to allow for collection of updated pre-construction benthic infaunal samples.

The Applicant selected two physical and seven biological parameters for use as evaluation criteria. The selection of the individual criteria appears to be based on a combination of prior use in other regional benthic monitoring programs and appropriateness, as determined through analysis of the 2014 baseline data. The Applicant's determination will be made on a transect-by-transect basis and will depend primarily on the biological criteria. If the majority (four or more) of the biological criteria are met for a given transect, the benthic infaunal community will be deemed recovered. If the majority of the biological criteria are not met for a given transect, monitoring and analysis will be repeated at

that transect for a second year. Based on our experience and the rationale provided in the revised Environmental Monitoring Plan, the proposed criteria appear to be adequate to determine recovery of the benthic infaunal community.

2.8 Appendix 15: NHDES Shoreland Permit Application

The Shoreland Permit Application was originally submitted in April 2016 and contains project information and impact estimates that have since been changed. The Application and/or any NHDES issued Shoreland Permits should be updated for the record to reflect the currently proposed installation methods and shoreland impacts for the Little Bay submarine cable crossing.

2.9 Appendix 19: SRP Crossings Petition

The Crossings Petition was originally submitted in April 2016 and contains project information and impact estimates that have since been changed. The Application and/or any NHPUC issued Licenses should be updated for the record to reflect the currently proposed installation methods and shoreland impacts for the Little Bay submarine cable crossing.

2.10 Appendix 34: Natural Resource Impact Assessment

The Natural Resource Impact Assessment was originally submitted in April 2016 (amended in March 2017) and contains project information and impact estimates that have since been changed. The Little Bay section of the report largely relies on and reports the results of the sediment dispersion model (Appendix 35), which was changed significantly in June 2017. The Natural Resource Impact Assessment should be updated for the record to reflect the currently proposed installation methods, the results of the June 2017 sediment dispersion modeling, and to report the potential impacts of the project currently proposed.

2.11 Appendix 35: Modeling Sediment Dispersion from Cable Burial for SRP Little Bay, NH (Initial Version)

The submitted report was prepared by RPS ASA, and is dated December 14, 2015. The evaluation includes modeling of expected tidal currents in Little Bay and predicted suspended sediment concentration and deposition resulting from operation of the jet plow, diver burial, and dredging at the two landfalls. The models and methods used for the analysis of expected tidal currents in Little Bay and predicted suspended sediment concentration and deposition resulting from operation of the jet plow, diver burial, and dredging at the two landfalls are typical of those used by ESS and others for evaluating the potential effects related to submarine cable installation in both marine and estuarine environments.

The results of the modeling are also similar to our experience in that they show that predicted suspended sediment concentrations and deposition induced by these operations is at its highest in the near-bottom portion of the water column near the operating device and lower concentrations and deposition thickness travel some distance from the cable alignment based on tidal current conditions. The results also show the suspended sediment concentrations return to ambient conditions within several hours of completion of installation operations, which has also been our experience—both with predictive modeling and field monitoring during submarine cable installations.

Sediment Disturbance and Suspension

The sediment dispersion modeling report indicates that the model assumed that 25% of the material volume in the trench would be suspended into the water column by the jet plow and 50% of the material volume in the trench would be suspended into the water column by the diver operated jetting tools. These percentages are consistent with ESS experience in modeling similar submarine cable installations and are considered to be conservative based on anecdotal descriptions ESS has received from divers and from the results of monitoring of actual suspended sediment concentrations performed by ESS during submarine cable installation where suspended sediment concentrations down-current from the operating jet plow were less than predicted by the model.

The predicted suspended sediment concentrations reported in Appendix 35 are consistent with other results ESS has seen from similar modeling. The increased concentrations decrease rapidly with distance from the operating plow and are highest in the near-bottom portion of the water column except where water depths are shallow. Suspended sediment concentrations above 10 mg/L above ambient are predicted to dissipate within approximately two hours of passage of the jet plow, which is quite rapid.

The model predicts that the majority of the suspended sediment deposition will occur along the path of the jet plow and diver jetting, which matches our experience with similar projects. While some suspended sediment will be carried by Little Bay currents away from the cable trench, the predicted cumulative deposition thickness from installation of the three cables is largely 0.5 mm or less in an area of 87.9 acres around the three submarine cables. Table 3-9 in the report shows that the predicted area of cumulative sediment deposition from jet plow installation of the three submarine cables (including that which occurs over the cable trenches) is 144.5 acres, which represents a very small percentage of Little Bay.

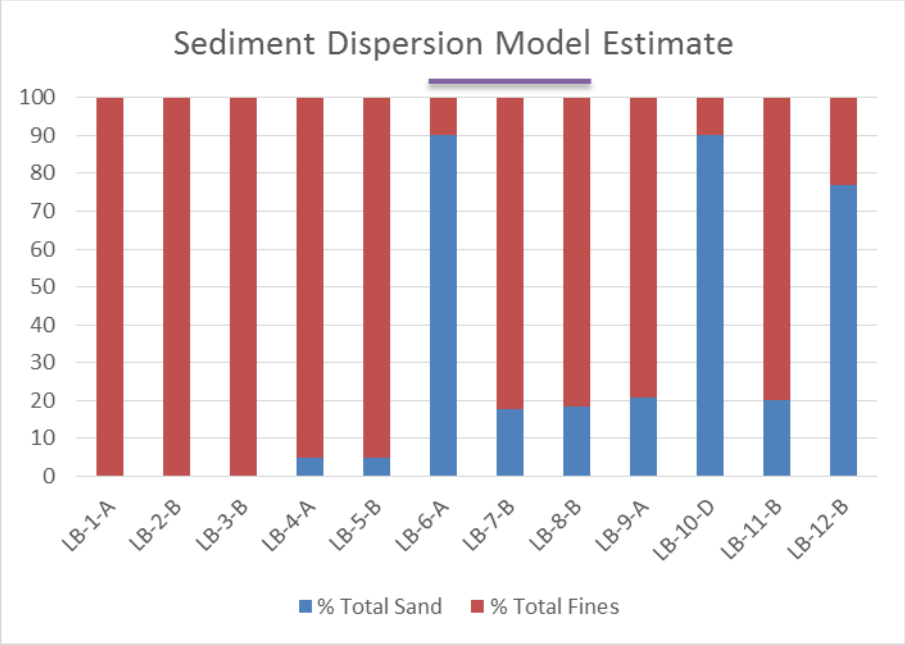
Apparent Data Gaps

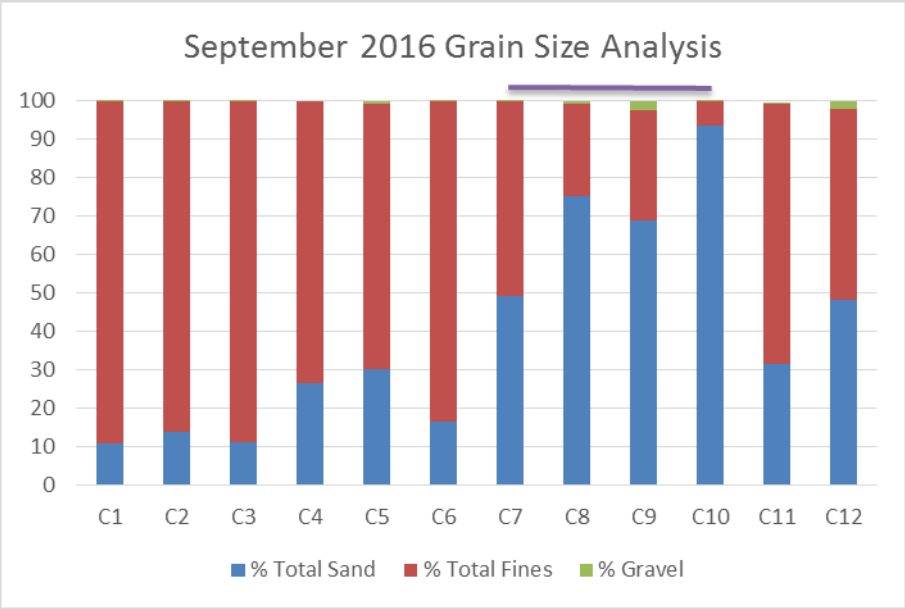
The report states that sediment modeling was based on sediment sampling performed for the project in April 2014. Page 7 of the report states that the sediment grain size information was “extracted from vibracore data logs” and that the “qualitative descriptions of each vibracore sediment sample were converted into fractions of sand, silt, and clay”. The April 2014 Normandeau vibracore logs, which were provided to the record in the response to the Counsel for the Public’s first set of data requests, show visual descriptions of the sediment in each vibracore. These descriptions are similar to those listed in Table 3-1 of the RPS ASA report. Therefore, the quantitative sediment size fractions were developed using a Normandeau representative’s qualitative observation and description of the sediment recovered in the vibracore. It has been our experience that the size fractions used in suspended sediment modeling are developed using the results of laboratory grain size analysis so that the size fractions are based on quantitative data rather than subjective observations of sediment type, which could vary from person to person. This is the first time we have seen visual observations of sediment type used to classify sediment size fractions for use in suspended sediment modeling.

As stated elsewhere in this report (e.g., Section 2.16), the sediment sampling that was used to generate the grain size distributions for the suspended sediment modeling did not reach the full depth of expected sediment disturbance from the jet plow. Therefore, the grain size distribution provided in

Appendix 35 may not be representative of the sediment column that would be temporarily fluidized by the jet plow.

The Applicant submitted an additional sediment sampling report in December 2016 that included grain size analysis results. Refer to Section 2.16 for more information. The locations of the 2014 and 2016 vibracores are different, but somewhat similarly located. ESS compared the grain size distributions provided in Appendix 35, Table 3-2 with the grain size analysis results provided in Table 3 of the 2016 sediment sampling report to determine the % Sand and % Total Fines in each. As shown in the graphs below, the grain size analysis results indicate a higher percentage of sand in the sediment than the 2014 visual observations, which could reduce the predicted suspended sediment concentrations and/or the deposition of suspended sediment away from the jet plow trench. The purple line indicates the samples that are located in the Little Bay deep channel.





Based on this comparison, it is possible the suspended sediment modeling over predicts the levels of suspended sediment concentration and deposition resulting from jetting installation of the submarine cable in Little Bay, which would be conservative. The Applicant could consider performing another run of the model using the grain size analysis results from the December 2016 sampling or from additional sampling that includes the entire depth of sediment disturbance from the jet plow.

The modeling considers predicted suspended sediment concentrations from the jet plow and diver jetting separately, which is appropriate if the two operations will not occur simultaneously. The order of operations is not clear in Appendix 35. A project schedule provided to the Application record in response to data request CFP 2-9 indicates that jet plow and diver jetting could occur simultaneously. If both jet plow and diver jetting will occur simultaneously, the cumulative effect on suspended sediment concentration increases above ambient should be addressed in Appendix 35.

The Applicant should explain how the predicted sediment deposition thickness compare to the natural deposition rates in this part of Little Bay. *[In its June 30, 2017 response to CFP-ESS-21, the Applicant stated that no information on natural sediment deposition rates was found during a literature review.]*

2.12 Appendix 35: Modeling Sediment Dispersion from Cable Burial for SRP Little Bay, NH (Revised Version)

The submitted report was prepared by RPS ASA, and is dated June 27, 2017. This revised modeling includes updated specifics with regard to cable burial depth and installation methods, uses results of laboratory sediment testing as ESS suggested above, and responds to comments raised by the Parties since the original submittal was made to the Committee (including those described above).

The revised report is much improved when compared to the original submittal and the apparent data gaps described above appear to have been resolved. The use of laboratory testing results rather than observations made by field personnel confirmed there is a larger coarse sediment fraction than was

originally modeled and the resulting predictions of sediment suspension and deposition from the jet plow and diver burial are less as a result. The sensitivity analyses provided in the revised report provide context for the effects of changing input variables and verify the input variables selected are conservative.

The revised sediment dispersion modeling report also assumed that 25% of the material volume in the trench would be suspended into the water column by the jet plow and 50% of the material volume in the trench would be suspended into the water column by the diver operated jetting tools. However, these tools include the use of a Water-lift device (refer to testimony of William Wall dated March 29, 2017) that removes close to 100% of the sediment from the trench. It is possible that the impacts associated with diver operated jetting tools could be greater than those predicted in the model if a Water-lift device is used. It is noted that this device would largely be used within the area surrounded by turbidity curtains

The results of the revised modeling show that predicted suspended sediment concentrations and deposition induced by these operations is at its highest in the near-bottom portion of the water column near the operating device and lower concentrations and deposition thickness travel some distance from the cable alignment based on tidal current conditions. The results also show the suspended sediment concentrations return to ambient conditions within several hours of completion of installation operations, which has also been our experience—both with predictive modeling and field monitoring during submarine cable installations.

2.13 Appendix 38: Essential Fish Habitat Assessment

The submitted report was prepared by Normandeau Associates, Inc. (Normandeau), and is dated March 2016. This report outlines the species with Essential Fish Habitat (EFH) designations for Great Bay estuary and provides tables comparing the existing habitat conditions with species habitat requirements and likelihood of species lifestages occurring within the Project Area. This report serves as an existing conditions summary on the EFH species in the Project Area. The methods for identifying Essential Fish Habitat species within the Project Area are typical of those used by ESS and others for such assessments. However, this report does not evaluate the potential effects on EFH species related to submarine cable installation.

Appendix 38 does not include a description of the construction and installation methods for the Project. Section 2.0 “Description of Habitat and Proposed Action” does not include any discussion on the proposed Project elements or the construction, installation, or operation of the submarine cable. There is no discussion of the submarine cable installation techniques and no discussion of the construction footprint or timeframe.

There is no description of potential impacts (indirect or direct) to EFH species. Section 4.0 “Summary” would benefit from descriptions on the potential construction, installation, and operational impacts associated with the techniques and methods proposed in the Project.

Sediment Disturbance and Suspension

Sediment disturbance and suspension is not addressed in Appendix 38.

Ms. Pembroke indicates that “the suspended sediment plume is unlikely to impede the passage of fish…because the plume will never encompass the width of the Bay” (per April 12, 2016 Pre-filed Direct Testimony, page 9, line 23). However, the Applicant should consider evaluating whether the vertical extent of the sediment plume in the shallow portions of the crossing has the potential to

impact any species (i.e., create a barrier to passage), particularly non-motile life stages, that may utilize the shallow portions of the project area during installation.

[In its response to June 30, 2017 response to CFP-ESS-18, the Applicant states the plume will be in the lower half of the water column (except at the western tidal flat where it will be throughout the water column) and that at least one study has shown that fish exposed to suspended sediments of more than 500 mg/L for duration of less than one day do not exhibit a behavioral response to the suspended sediment. This finding would appear to be reasonable, but the referenced study does not appear to have been provided to the record to enable review of the study.]

Sediment Quality

Sediment quality is not addressed in Appendix 38; however, Section 2.2 of this Appendix references the "Natural Resource Existing Conditions Report" (Appendix 7) for descriptions of existing substrates, biota, and water quality conditions. Section 2.2 also lists general facts about the existing habitat such as type of substrates found within the Project Area.

Water Quality

Water quality is not addressed in Appendix 38, however; Section 2.2 of this Appendix references the "Natural Resource Existing Conditions Report" (Appendix 7) for descriptions of existing substrates, biota, and water quality conditions. Section 2.2 also lists general facts about the existing habitat such as dissolved oxygen levels and mean water temperature range.

Natural Resources

Aquatic Vegetation

Aquatic vegetation is not addressed in Appendix 38; however Section 2.2 of this Appendix references the "Natural Resource Existing Conditions Report" (Appendix 7) for descriptions of existing substrates, biota, and water quality conditions.

Shellfish

Appendix 38 includes a brief description of one shellfish species with EFH designations for the Great Bay estuary that could be found within the Project Area during at least one lifestage. Further details are provided in Tables 1 and 2 with regards to salinity zone(s) inhabited by EFH species and descriptions of life stages and typical characteristics of habitat conditions.

While these tables provide important detail, the written report could benefit from a written description of species habitat characteristics for each lifestage with potential to occur in the Project Area.

Benthos

Benthos were not addressed in Appendix 38; however Section 2.2 of this Appendix references the "Natural Resource Existing Conditions Report" (Appendix 7) for descriptions of existing substrates, biota, and water quality conditions.

Fish

Appendix 38 identifies 12 species of finfish with EFH designations within the Great Bay estuary seawater salinity zone for at least one lifestage. There is a brief written species profile for each

EFH species identified in Section 3.0. Tables 1-4 included at the end of the report provide further detail and summarize EFH designations for the Great Bay Estuary, species habitat requirements (e.g., temperature, salinity, bottom depth) broken down by lifestage, periods of occurrence for each lifestage and water temperatures of a species, and EFH species and lifestage that could potentially occur within the Project Area. While this information supplements the brief species profiles in the body of the report, the species profiles could benefit from the details provided in the tables. A written description of each species broken down by lifestage (e.g., eggs, larvae, adult) with habitat requirements would be beneficial.

The details for each species are found throughout this Appendix in both the written report and the tables appended to the end, but this information could be provided in a more succinct and readable way. There are some discrepancies between the species profiles and the Tables at the end of the report (see explanation below).

Applicant Proposed Mitigation Measures

Mitigation measures are not proposed in Appendix 38. There is no description of the construction and installation components and potential associated impacts to EFH species. The report would first need to address potential impacts to evaluate potential mitigation measures.

Potential Additional Mitigation Measures for Consideration

There are no mitigation measures described in this Appendix. The report could describe those impacts associated with submarine cable installation that are temporary and localized, such as jet plow embedment, as mitigation measures. These techniques may minimize disturbance to EFH species and could be compared to other installation methods with potentially more severe impacts (e.g., increased suspended sediment, greater benthic disturbance, longer install times) on EFH species.

Mitigation measures such as burial depths could also be discussed for operational impacts (e.g., heat, EMF) once the cable is installed.

Another potential mitigation measure is in-water construction windows and respecting fishery time of year restrictions to avoid or minimize potential project impacts to fisheries in the Project Area during installation activities. When known EFH species lifestages are present, construction could be avoided or minimized.

Apparent Data Gaps

As stated above, there is no discussion of the proposed Project elements, construction or installation methods, construction footprint, or construction timeframes, and therefore, no discussion of potential Project impacts on EFH species are provided in the EFH document. The Applicant's environmental witnesses stated during the June 7, 2017 technical session that information on potential impacts is provided in the Natural Resource Impact Assessment (Appendix 34).

The EFH report could benefit from a written description of species habitat characteristics for each lifestage with potential to occur in the Project Area.

In Section 2.2, the existing habitat conditions (e.g., salinity, mean temperature range, maximum water depth) for the Project Area are outlined. These are the apparent criteria used to evaluate the potential occurrence of EFH species and lifestages within the Project Area. Table 2 breaks down species habitat characteristics by lifestage. Based on a comparison of the existing habitat conditions with the lifestage habitat characteristics, a determination was made by Normandeau regarding "EFH Present at Project Location" ("yes" or "no"). There appear to be some discrepancies between the existing habitat conditions and several EFH presence within the Project location determinations. Additionally, there are discrepancies between the species profiles, Table 2 EFH presence determinations, and Table 4 ("EFH species and life stage that potentially occur within the SRP Project Area"). This assumes that the "EFH Present at Project Location" in Table 2 correlates to Table 4.

We noted discrepancies between the species profiles text, Table 2 (EFH presence determinations), and Table 4 ("EFH species and life stage that potentially occur within the SRP Project Area"). For example:

- Table 2 and the species profile in Section 3.1.2 indicate that that there would not be Atlantic Halibut (*Hippoglossus hippoglossus*) adults present at the Project Location. This is based on the bottom depth requirements for Atlantic Halibut adults; the depth requirement is deeper than that found within the Project Area. Despite this determination, Table 4 indicates that Atlantic Halibut adults could potentially occur within the SRP Project Area.

- Table 2 indicates that there are no Atlantic Halibut spawning adults present within the Project Area. However, based on a comparison of the existing habitat characteristics and the characteristics of Atlantic Halibut spawning adults, this species lifestage could potentially be present within the Project Area. Additionally, Table 4 and the species profile in Section 3.1.2 indicate that this species lifestage could potentially occur within the SRP Project Area.

- Table 2 and Table 4 indicate that Yellowtail Flounder (*Limanda ferruginea*) eggs could be present within the Project Area. Yellowfin flounder eggs are found at depths of 30-90 m, which is significantly deeper than depths found within the project area in Little Bay. The Yellowtail Flounder species profile also states that "The proposed project location has a maximum depth of 12.3 meters (40.4 feet), and therefore does not contain EFH for Yellowtail Flounder eggs." EFH Present at Project Location in Table 2 should be listed as "No". Similarly, eggs should not be included in Table 4.

2.14 Characterization of Sediment Quality along Little Bay Crossing

The Applicant performed multiple rounds of sediment sampling and submitted multiple reports to the record. Vibracores were taken in April 2014, September 2016, and May 2017. The results of testing performed on these vibracores were provided in reports dated December 14, 2015 (Appendix 35, sediment dispersion model), December 1, 2016 and June 30, 2017, respectively. Vibracore logs sheets from the April 2014 vibracores were provided with the Applicant's responses to the first set of data requests.

The locations and spacing of the vibracores for the sediment sampling efforts are considered reasonable and appropriate for the routing assessments, but the discrepancy between penetration depth and planned sediment disturbance depth was questioned by ESS and other Parties.

Several of the vibracores taken in September 2016 and April 2014 were not advanced to the full planned burial depth of the cable with no explanation in the accompanying reports as to why full depth sampling was not achieved.

- April 2014 Sampling: The vibracore logs submitted in response to the Counsel for the Public's first set of data requests indicate that penetration to the full depth of the planned installation was not achieved at a number of locations. Therefore, sediment conditions in this portion of the route are apparently not fully characterized. There were notations about refusal or loss of material in the field data sheets, but there was no information about the refusal in the vibracore logs.

  The sediment sampling included the advancement of vibracores at 12 locations within the planned cable installation corridor. Ten of these locations are on the planned cable route, and two locations are located within Welsh Cove, which is southeast of the planned cable route. Vibracore penetration depths ranged from 29 inches to 120 inches (Appendix 35, Table 3-1). Vibracore recovery lengths are not provided in Table 3-1, so it is unclear what percentage of the vibracore was sampled. The reported vibracore penetration depths for locations in the deep part of the Little Bay crossing (called the channel in Appendix 35) are 44 inches (LB-6-A), 63 inches (LB-7-B), and 29 inches (LB-8-B). These penetration depths are substantially less than the original planned cable trench depth of 96 inches in this area. Therefore, sediment conditions in this portion of the route are apparently not fully characterized.

- September 2016 Sampling: This sampling was also performed with vibracores and recovered samples were tested for grain size and chemical analytes typically tested for dredging projects. The use of dredge testing analytes for a jet plow installation is quite common given that most states do not have analyte lists specifically for jet plow installation of submarine cables. Several of the 12 vibracores taken in September 2016 were not advanced to the full planned burial depth of the cable and therefore do not provide representative data of the entire sediment column that would be disturbed by the jet plow device. Two vibracores had core penetration/recovery that were less than 25% of the planned lengths. Also similar to the April 2014 sampling, no explanation of why the vibracores did not reach full planned penetration was provided in the report.

  It is noted that the 12 locations for the September 2016 vibracores are not the same as those used in the sediment model, which could lead to differences in the sediment size fractions identified using grain size analysis in 2016 and the size fractions estimated from visual vibracore observations that were used as part of the sediment dispersion model originally provided as Appendix 35.

- May 2017 Sampling: The Project's burial depth in the channel was decreased to five feet, and consequently, the planned penetration depth of the vibracores was reduced to 60 inches. Three of the four vibracore locations in the channel achieved penetrations well short (11-24 inches) of the reduced planned penetration depth. It was noted in the report that this was "likely because of the density of the underlying clay substrate at these stations." The vibracore penetrations achieved at these locations were generally consistent with the penetrations achieved during the September 2016 sampling.

The inability to reach the desired vibracore penetration depths and the effects of the unknown sediment characteristics below the penetration depth achieved were of more concern before the Applicant reduced the minimum cable burial depth in the deeper parts of the route from eight feet to five feet. The

Applicant's witnesses at the June 7, 2017 Technical Session expressed confidence that the new five foot burial depth could be achieved during the installation despite the inability to advance vibracores to the full planned depth of burial.

In the September 2016 sampling, the vibracores were sampled in four foot long segments for physical and chemical analysis. Since stratigraphy was observed at three locations (C-8, C-9, and C-11), ESS questioned why the vibracores were not sampled and analyzed at the observed change in sediment type (comments provided to NH DES on March 15, 2017).

In the May 2017 response to comments from the Parties, the Applicant stated it sampled the top two feet of the vibracores to assess sediment quality in the trench section most likely to be suspended by the jetting operations when the submarine cable is installed. We note that the jet plow will mix the entire sediment column during the installation such that there is the potential that some deeper sediments are among those suspended in the water column even though it is likely that the upper sediments will primarily be suspended.

Sediment Quality

The sediment samples from the September 2016 and May 2017 sampling efforts were submitted to a laboratory for testing of bulk physical and chemical properties. The analytes tested included those commonly tested for dredging projects as well as constituents of local concern to the Little Bay environment. The results of the bulk chemical testing of the sediment were compared to the NOAA Effects Range-Low (ER-L) and Effects Range-Median (ER-M), which is common practice, and appropriate, for evaluating concentrations of analytes in sediments for potential environmental impacts.

The laboratory testing found concentrations of arsenic in the sediment that were similar to those found in Little Bay by the EPA's National Coastal Condition Assessment Program. The Applicant's December 2016 report compares its results to the ER-L and ER-M for both the upper layer only and the entire recovered core length. The jet plow will mix the entire sediment column during the installation, therefore use of the entire core length for the evaluation of impacts is appropriate. The June 2017 report provides results of arsenic testing of the upper two feet of sediment and found results that were consistent with the results reported in September 2016.

Laboratory testing was also performed for PAHs, PCBs, TPH, dioxins/furans, PFOA, and PFOS. Concentrations of these analytes were found to be either very low or not detectable by the laboratory test methods.

Apparent Data Gaps

When the Applicant was proposing minimum cable burial depth of eight feet, the shallow vibracore refusals presented a significant data gap. While the data gap and its associated uncertainty with regard to the ability to achieve the minimum burial still exist with the Applicant's now proposed five foot burial depth, their importance is lessened since a greater percentage of the sediment to be fluidized during installation has been characterized. While the data gap and its associated uncertainty with regard to the ability to achieve the minimum burial still exist with the Applicant's now proposed five foot burial depth, their importance is lessened since a greater percentage of the sediment to be fluidized during installation has been characterized.

2.15 Existing Cable Removal Plan

The Applicant submitted an Existing Cable Removal Plan on June 30, 2017 to describe the existing submarine cables that cross Little Bay in the area where the Seacoast Reliability submarine cables will be installed and the methods proposed to remove the existing cables. The existing cables were installed at multiple times between 1902 and the 1970s.

The existing cables will be removed from Little Bay in two areas where they cross the proposed submarine cable route. The estimated lengths of cable to be removed from these areas are 951 feet (Area-1) and 899 feet (Area-2), respectively. The methods to remove the existing cables described in Appendix C are consistent with methods ESS has observed in other submarine cable projects. Based on that experience, we recommend the Applicant consider outfitting the cable removal vessel with a floating absorbent or containment boom around the area where cables will exit the water to contain any debris or sheens that may result from removal and cutting of the cables. While it is not described in the Removal Plan, we would expect sediment disturbance and suspended sediment from removal of the cables from the Bay bottom to be negligible based on our experience.

Appendix C of the Removal Plan also describes route clearance using a Pre-Lay Grapnel Run (PLGR). Use of a PLGR to remove debris from the path of the submarine cable installation prior to submarine cable installation is standard practice and reduces the potential for delays or the need for increased jetting pressures as a result of marine debris in the path of the jet plow. The impacts associated with the PLGR are minor and are located in the same alignment as the submarine cable installation that will follow the PLGR.

3.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

This section summarizes the findings of our review and our recommendations for improvements as described in more detail in Section 2.0.

3.1 Key Findings

- There is a large amount of redundancy among the various appendices submitted as part of the Application in that the same topics are often covered in multiple Application Appendices and a number of Application Appendices are also provided as appendices to other Application Appendices. In some cases, this redundancy has led to inconsistencies in reporting data or estimated impacts at various places within the Application. We have attempted to note inconsistencies where we have identified them, but there may be others in the Application record.

- There are apparent remaining data gaps as summarized below in Section 3.2 and described in more detail in Section 2.0.

- The Applicant's estimated estuarine wetland impacts resulting from installation of the submarine cable in Little Bay are approximately 6.27 acres of temporary estuarine wetland impacts from burial of the submarine cable and approximately 0.12 acres of permanent impact to intertidal unconsolidated bottom if protective cover is need over the buried cables. The temporary impacts would include open cut-and-cover in the salt marsh (1,222 square feet; 0.03 acres) and rocky shore (302 square feet, 0.01 acres), and burial via jet plow across the intertidal flat (144,091 square feet; 3.31 acres) and subtidal bottom (127,397 square feet, 2.92 acres).

- In general, the desktop and field studies performed by the Applicant to characterize the existing environment and potential impacts are consistent with those used by ESS and others when performing similar characterizations.

- The estimates of bottom area that could be impacted by cable lay barge anchors and wire sweep provided by the Applicant seem reasonable based on the installation methods proposed and are small when compared to the bottom habitat in Little Bay.

- Sediment Dispersion Model: The models and methods used for the analysis of expected tidal currents in Little Bay and predicted suspended sediment concentration and deposition resulting from operation of the jet plow, diver burial, and dredging at the two landfalls are typical of those used by ESS and others for evaluating the potential effects related to submarine cable installation in both marine and estuarine environments. The estimated percentages of material volume that could be suspended by the jet plow are consistent with ESS experience and are considered conservative based on anecdotal descriptions. The results of the modeling are also similar to our experience in that they show that predicted suspended sediment concentrations and deposition induced by these operations is at its highest along the path of cable installation and in the near-bottom portion of the water column near the operating device with lower concentrations and deposition thickness traveling some distance from the cable alignment based on tidal current conditions. The results also show the suspended sediment concentrations return to ambient conditions within several hours of completion of installation operations, which has also been our experience—both with predictive modeling and field monitoring during submarine cable installations.

  The original sediment dispersion model relied on subjective visual descriptions of sediment type rather than laboratory testing of the bulk physical properties of the sediment. ESS used the December 2016 sediment sampling report to estimate that sediments contain a higher percentage of sand than the 2014 visual description. The June 2017 revised sediment dispersion model used the results of laboratory testing of the bulk physical properties and confirmed that the sediments are coarser than originally estimated.

  The revised sediment dispersion modeling report is much improved when compared to the original submittal and the apparent data gaps described above appear to have been resolved. The sensitivity analyses provided in the revised report provide context for the effects of changing input variables and verify the input variables selected are conservative.

- The methods for identifying Essential Fish Habitat species within the Project Area are typical of those used by ESS and others for such assessments. However, this report does not evaluate the potential effects on EFH species or potential mitigation measures related to submarine cable installation and the reader must search through the other Appendices submitted as part of the Application for that information.

- Sediment Sampling: The locations and spacing of the vibracores for the sediment sampling efforts are considered reasonable and appropriate for the routing assessments, but the discrepancy between penetration depth and planned sediment disturbance depth was questioned by ESS and other Parties. The inability to reach the desired vibracore penetration depths and the effects of the unknown sediment characteristics below the penetration depth achieved were of more concern before the

Applicant reduced the minimum cable burial depth in the deeper parts of the route from eight feet to five feet. The Applicant's witnesses at the June 7, 2017 Technical Session expressed confidence that the new five foot burial depth could be achieved during the installation despite the inability to advance vibracores to the full planned depth of burial.

- In the May 2017 response to comments from the Parties, the Applicant stated it sampled the top two feet of the vibracores to assess sediment quality in the trench section most likely to be suspended by the jetting operations when the submarine cable is installed. We note that the jet plow will mix the entire sediment column during the installation such that there is the potential that some deeper sediments are among those suspended in the water column even though it is likely that the upper sediments will primarily be suspended.

- Existing Cable Removal Plan: The methods to remove the existing cables described in the Plan are consistent with methods ESS has observed in other submarine cable projects. While it is not described in the Removal Plan, we would expect sediment disturbance and suspended sediment from removal of the cables from the Bay bottom to be negligible based on our experience.

3.2 Remaining Data Gaps

- The SRP Environmental Review Maps (Appendix 2) may need updating for the record based on the currently proposed installation methods for the Little Bay submarine cable crossing.

- The Engineering Design Drawings (Appendix 5) may need updating for the record to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.

- The joint wetlands permit application to NHDES and the USACE will need to be updated and amended to reflect information developed and revised by the Applicant between April 2016 and June 2017 with regard to the Little Bay submarine cable installation and other relevant changes to the upland portion of the project to ensure NHDES and the USACE have the most up-to-date project information for their review. This revised submittal should include the findings of the revised sediment dispersion modeling and estimates of bottom area that could be impacted by cable lay barge anchors and wire sweep that were provided in June 2017.

- The NHDES Section 401 Water Quality Certification Request will need to be updated and amended to reflect information developed and revised by the Applicant between April 2016 and June 2017 with regard to the Little Bay submarine cable installation and other relevant changes to the upland portion of the project to ensure NHDES has the most up-to-date project information for their review. This revised submittal should include the Applicant's estimated relationship between turbidity in terms of NTU and suspended sediment concentration in terms of mg/L.

- The NHDES Shoreland Permit Application or issued permit should be amended as necessary to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.

- The SRP Crossings Petition or issued license should be amended as necessary to reflect the currently proposed installation methods for the Little Bay submarine cable crossing.

- The Natural Resource Impact Assessment should be updated for the record to reflect the currently proposed installation methods, the results of the June 2017 sediment dispersion modeling, and to report the potential impacts of the project currently proposed.

- Sediment Dispersion Model: The June 2017 modeling estimates that 50% of the material volume in the trench would be suspended into the water column by the diver operated jetting tools. These tools include the use of a Water-lift device that removes close to 100% sediment from the trench. It is possible that the impacts associated with diver operated jetting tools could be greater than those predicted in the model if a Water-lift device is used. It is noted that this device would largely be used within the area surrounded by turbidity curtains.

- When the Applicant was proposing minimum cable burial depth of eight feet, the shallow vibracore refusals presented a significant data gap. While the data gap and its associated uncertainty with regard to the ability to achieve the minimum burial still exist with the Applicant's now proposed five foot burial depth, their importance is lessened since a greater percentage of the sediment to be fluidized during installation has been characterized.

3.3 Recommendations for Improvements

- Decommissioning Plan: If deemed necessary by the Committee, a Decommissioning Plan should be submitted to the record detailing the likely means of decommissioning of the submarine cable in Little Bay.

- Water Quality Monitoring Program: Since the fate and transport of chemical constituents in the sediment resulting from the jet plow operation has been raised as a concern by stakeholders, requiring monitoring of chemical constituents in the water column in samples collected 500 feet up-current and down-current of the operating jet plow should be considered by the Committee or NHDES.

  Based on our experience with other water quality monitoring programs, obtaining water samples for testing of turbidity and total suspended solids would provide valuable information to verify the Applicant's estimated correlation between suspended sediment concentrations in mg/L to turbidity in NTU (i.e., that 20 mg/L is representative of 10 NTUs). By using expedited laboratory turnarounds, testing results from the first cable installation could be available in time to make adjustments to the monitoring plan for installation of the second and third cables if necessary.

  The Water Quality Monitoring Plan should be revised to state that the regular hourly monitoring will continue to take place while the additional turbidity probe measurements will be obtained every 15 minutes at the location where any exceedances of the 10 NTU criterion are measured.

- NHDES or the Committee could also consider requiring the Applicant to provide NHDES with an analysis comparing the installation monitoring results with the suspended sediment model predictions to determine if the model provided a reasonable prediction of the conditions that occurred during the installation.

- Benthic Infaunal Community Monitoring: While the proposed monitoring methods are consistent with our experience, the Applicant plans to use sampling performed in 2014 as the baseline data. We

suggest that the Applicant consider performing the pre-construction benthic sampling just prior to the installation since that will be four years after the 2014 data was obtained and would provide a more direct comparison with the post-construction sampling data.

We also suggest that the Applicant consider collecting a minimum of three replicate samples at each proposed sampling location. This is a reasonable measure that will strengthen the analysis required for the determination of recovery of benthic resource function.

- Determination of Recovery of Benthic Resource Function: We suggest that impact and non-impact stations be selected and finalized prior to installation of the cable to allow for collection of updated pre-construction benthic infaunal samples rather than based on as-built plans provided by the marine contractor as proposed by the Applicant.

- Existing Cable Removal Plan: Based on our experience with a recent cable removal project, we recommend the Applicant consider outfitting the cable removal vessel with a floating absorbent or containment boom around the area where cables will exit the water to contain any debris or sheens that may result from removal and cutting of the cables.

Attachment A

ESS Memorandum with Comments for NHDES

100 Fifth Avenue, 5th Floor
Waltham, Massachusetts 02451
p 781.419.7696 f 781.622.2612
www.essgroup.com

M E M O R A N D U M

TO:	Chris Aslin, Counsel for the Public	DATE:	March 15, 2017
FROM:	Payson Whitney Stephanie Wilson	ESS PROJECT NO.:	N510-000.01
SUBJECT:	**Seacoast Reliability Project—Little Bay Crossing Comments for Submission to NHDES**		
COPY TO:			

Based on our review to date of the information provided to the record for the Seacoast Reliability Project, ESS has prepared the following list of comments for submission to NHDES as a follow-up to our meeting on February 15, 2017. The comments are organized by technical topic area. We also provide some comments specific to the information presented in the Applicant's Joint NHDES-USACE wetlands permit application and their 401 Water Quality Certification request.

Sediment Sampling, Testing, and Analysis

Sampling

- The locations and spacing of the vibracores for the sediment sampling effort is considered reasonable and appropriate for routing assessments, but the discrepancy between penetration depth and planned sediment disturbance depth should be adequately explained by the Applicant.
- Several of the vibracores taken in September 2016 and April 2014 were not advanced to the full planned burial depth of the cable with no explanation as to why full depth sampling was not achieved.
    - April 2014 Sampling: The vibracore logs submitted in response to the Counsel for the Public's first set of data requests indicate that penetration to the full depth of the planned installation was not achieved at a number of locations. Therefore, sediment conditions in this portion of the route are apparently not fully characterized.
        - There are notations about refusal or loss of material in the field data sheets, but they are not included in the vibracore logs. What was the nature of the refusals?
        - Does the fact that the vibracore reached refusal in clay sediments mean that there is potential that the jet plow will not be able to install the cable to the planned depth of burial?
    - September 2016 Sampling: Several of the 12 vibracores taken in September 2016 were not advanced to the full planned burial depth of the cable and therefore do not provide representative data of the entire sediment column that would be disturbed by the jet plow device. Two vibracores had core penetration/recovery that were less than 25% of the planned lengths. Also similar to the April 2014 sampling, no explanation of why the vibracores did not reach full planned penetration is provided.
- It is not clear if the nature of the sediment column between the sediment-water interface and the planned depth of burial is understood due to the shallow depth of the vibracores submitted. It is important to understand the sediment types that will be fluidized by the jet plow—both for evaluation of potential impacts and for the installer to achieve the required burial depth.

- Does the cable installer expect that the full depth of burial will be achieved in the areas where cores hit refusal prior to the planned 4 or 8 foot burial depth?
- Will alternative methods for burial be permitted for use if sediment conditions prevent burial to the required depth by either jet plow or diver jetting[1]?

- The Applicant should provide a justification for splitting the long cores into 4 foot segments for analysis, particularly in areas that will require deeper burial (8 feet).
  - The text indicates that there was no stratification evident (page 6); however, cores collected from C-8, C-9, and C-11 are described as having a distinct difference in sediment type across the length of the core (Table 2).
  - Why were the cores not split at the observed change in sediment type and analyzed separately, as proposed in the sampling plan?
  - Core C-10 penetration reached only 24 inches below the sediment-water interface and sediment is noted as uniform fine sand. Why did this core not reach the intended 96 inch penetration depth?

Testing and Analysis

- The results of the chemical testing of the sediment were compared to the NOAA Effects Range-Low (ER-L) and Effects Range-Median (ER-M), which is common practice, and appropriate, for evaluating concentrations of analytes in sediments for potential environmental impacts.
- The laboratory testing found concentrations of arsenic in the sediment that were similar to those found in Little Bay by the EPA's National Coastal Condition Assessment Program. The Applicant's report compares its results to the ER-L and ER-M for both the upper layer only and the entire recovered core length. The jet plow will mix the entire sediment column during the installation, therefore use of the entire core length for the evaluation of impacts is appropriate.
- The 12 locations for the September 2016 vibracores are not the same as those used in the sediment dispersion model, which could lead to differences in the sediment size fractions identified using grain size analysis in 2016 and the size fractions estimated from visual vibracore observations that were used as part of the sediment dispersion model provided in Appendix 35.
- In the areas of proposed 8 foot burial where the vibracores hit refusal prior to 4 feet, the Applicant should provide an evaluation as to whether there is any reason to believe the deeper (unsampled) material (reported in the application to be typically clay material) is chemically different from the upper (sampled) material that was recovered and analyzed, particularly if there is evidence of arsenic concentrations being higher in finer material sediments (i.e., silt/clay).

Ecological Risk Assessment

- An Ecological Risk Analysis was performed by GEI Consultants and is included at Appendices A1 and A2. The watermark on the GEI memoranda indicates the documents are draft reports. The final version of the reports should be provided for the record.

[1] ESS was involved in a submarine cable project where very stiff clays prevented the jet plow from being used for the installation and a trench had to be mechanically dredged to facilitate cable installation. The use of dredging as a backup means of installation in this area was identified prior to installation and included in the project's permits as an approved method in the event the plow proving run indicated the jet plow would not be able to install the cable to the required burial depth.

- The draft memoranda conclude that the reported sediment chemical concentrations result in no potential for ecological effects from the constituents of concern. The Ecological Risk Analysis performed by GEI Consultants is considerably less detailed than those ESS has performed and reviewed for other submarine cable projects; however, similar conclusions were made.

Appendix 13: Joint NHDES USACE Wetlands Permit Application

- There appear to be inconsistencies in the description of impacts provided in the Environmental Fact Sheet. For example, the application makes the following apparently contradictory statements:

  > "Little Bay, including the Cable Area, provides habitat for shellfish, benthic infauna, lobsters and horseshoe crabs, and fish. The only permanent impacts will be limited to concrete mattresses used in locations near the shorelines if shallow bedrock prohibits cable burial to its full depth." [PDF Page 45]
  >
  > "There will be no permanent impact to tidal wetlands." [PDF Page 45]

  If NHDES or the USACE considers Little Bay a tidal wetland, there will be permanent impacts due to concrete mattresses and these impacts should be accounted for in the application.

- The bottom area that could be impacted by cable lay barge anchors and chain sweep of the installation vessel can and should be quantified in some manner. This has been provided for other submarine cable installation projects under environmental review. Page 6-39 states:

  "Potential temporary impacts along the Little Bay crossing include:

  - Direct disturbance of the sediment surface from cable installation along each cable trench (quantifiable) and from anchoring of the installation vessel (not quantifiable)"

  Since bottom impacts related to anchor use have been quantified and described for other projects, a similar evaluation should be provided for this Project.

Appendix 14: NHDES Section 401 Water Quality Certification Request

- Page 11 of the Appendix states, "In the areas where diver burial of the cables will take place within silt curtains, the suspended sediments will ultimately be redeposited within the entire enclosure forming a layer of unconsolidated material averaging approximately 1.2 (west) to 1.4 (east) inches thick although deposition will be greater directly over the trenches and thinner closer to the silt curtains. " This statement is inconsistent with the ASA Report (Appendix 35, p. 40) which indicates that average deposition ranges from 3.7-4.3 inches. The Applicant should confirm the correct value.

- Page 11 – "Env-Wq 1703.11 states: "(b) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs."

  It is unclear whether the turbidity standard of 10 NTU above natural occurring conditions will be exceed based on model results, which are reported in mg/l. The Applicant should explain the relationship between NTU and mg/l (i.e., no direct correlation), as well as define ambient conditions.

Applicant's Proposed Water Quality Monitoring Program

- The Applicant proposes monitoring suspended solids at locations 1,000 feet upcurrent and downcurrent of the cable installation. This is a large separation distance from the cable installation and may not pick up the effects of the plume from cable installation activities based on a review of the Applicant's sediment dispersion model. Based on our experience, performing water quality monitoring at a distance of 500 feet upcurrent and downcurrent of the operating jet plow is

consistent with similar monitoring performed in other states and is more likely to capture potential exceedances of the water quality standard, if they occur.

- The proposed water quality criteria for suspended sediment from the cable installation is based on NTUs. Since the sediment dispersion modeling presents concentrations in mg/L, NHDES could consider a water quality threshold based on mg/L. As an example, a threshold of 200 mg/L above ambient conditions at a point 500 feet down-current of the operating jet plow could be used as the compliance criteria, which is similar to that used by environmental agencies in other states for dredging and jet plow installations. NHDES could further require that if concentrations measured 500 feet down-current of the operating plow exceed concentrations at the up-current background station by more the 200 mg/L, NHDES is to be notified as soon as possible and reasonable and feasible jet plow operation mitigation measures are to be implemented.
- The Applicant states, "If it is determined that the impact station results are outside the range of natural variability, then the marine contractor will be required to modify their operation of the jet plow for the subsequent installation(s)." The Applicant should provide detail on how the monitoring team will ensure that sampling the impact stations aligns (in time) with sampling at the reference station to make the comparison for a particular period of time and the types of operation modifications that could be implemented.
- Since the fate and transport of chemical constituents in the sediment resulting from the jet plow operation has been raised as a concern by stakeholders, NHDES could consider requiring monitoring of chemical constituents in the water column in samples collected 500 feet up-current and down-current of the operating jet plow. Compliance could be determined by requiring that concentrations of constituents specific to the water quality limits for Little Bay not exceed either the specified water quality limits or 1.3 times the highest ambient background level measured during the same sampling day at the up-current background station at the same depth as the down-current sample, which is similar to that used by environmental agencies in other states for dredging and jet plow installations.
- NHDES could also consider requiring the Applicant to provide NHDES with an analysis comparing the installation monitoring results with the suspended sediment model predictions to determine if the model provided a reasonable prediction of the conditions that occurred during the installation.

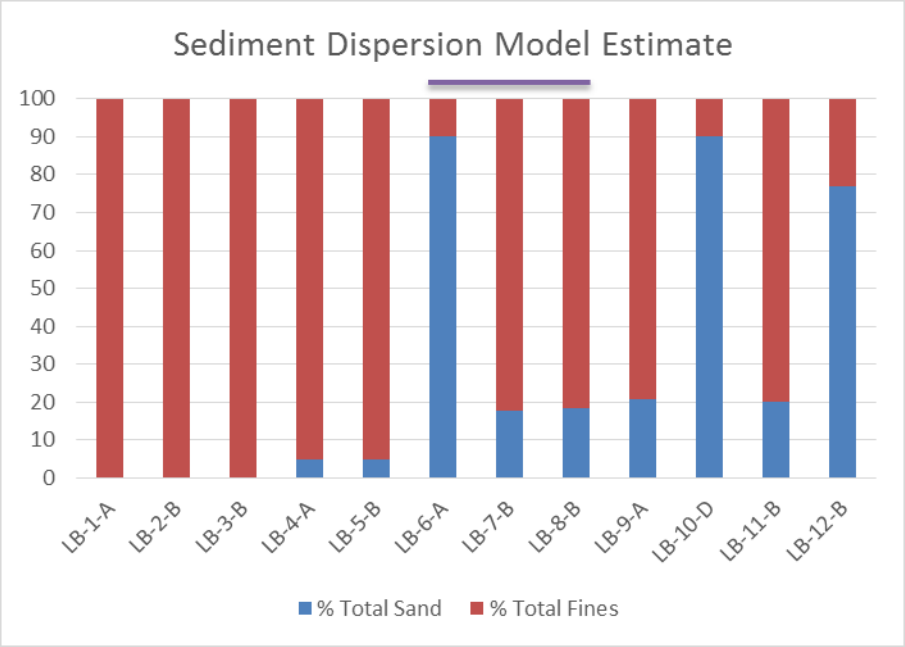
Appendix 34 Natural Resource Impact Assessment

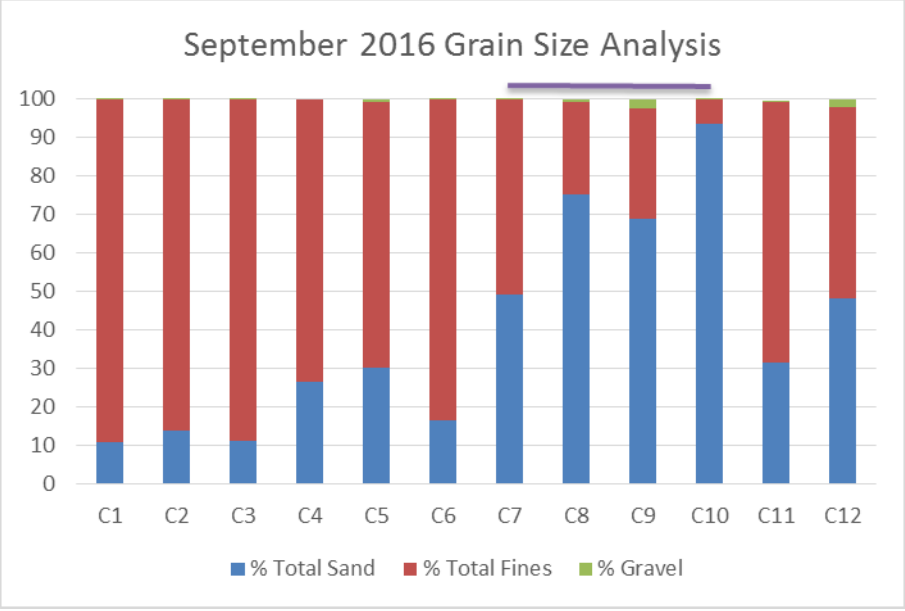
- The Application is unclear as to the length of existing cable that will be removed from the seabed of Little Bay. The anticipated length should be quantified and accounted for in the description of potential impacts to the bottom of Little Bay.
- The Applicant should explain whether the potential exists for the concrete mattresses to become exposed at low tide. Similarly, will placement of concrete mattresses in the shallow portions of Little Bay result in excess scour of the shoreline? Does the potential exist for ice scour to cause movement of the concrete mattresses?
- The Applicant should explain if the potential exists for the turbidity plume to create a barrier to the movement/dispersal of fish, particularly diadromous species that may utilize the shallow portions of the Bay where modeling indicates that the plume extends the entire depth of the water column (surface to bottom).

Appendix 35 Sediment Dispersion Model

- The models and methods used for the analysis of expected tidal currents in Little Bay and predicted suspended sediment concentration and deposition resulting from operation of the jet plow, diver burial, and dredging at the two landfalls are typical of those used by ESS and others for evaluating the potential effects related to submarine cable installation in both marine and estuarine environments.
- The results of the modeling are also similar to our experience in that they show that predicted suspended sediment concentrations and deposition induced by these operations is at its highest in the near-bottom portion of the water column near the operating device and lower concentrations and deposition thickness travel some distance from the cable alignment based on tidal current conditions. The results also show the suspended sediment concentrations return to ambient conditions within several hours of completion of installation operations, which has also been our experience—both with predictive modeling and field monitoring during submarine cable installations.
- The sediment dispersion modeling report indicates that the model assumed that 25% of the material volume in the trench would be suspended into the water column by the jet plow and 50% of the material volume in the trench would be suspended into the water column by the diver operated jetting tools. These percentages are consistent with ESS experience in modeling similar submarine cable installations and are considered to be conservative based on anecdotal descriptions ESS has received from divers and from the results of monitoring of actual suspended sediment concentrations performed by ESS during submarine cable installation where suspended sediment concentrations down-current from the operating jet plow were less than predicted by the model.
- The model predicts that the majority of the suspended sediment deposition will occur along the path of the jet plow and diver jetting, which matches our experience with similar projects. While some suspended sediment will be carried by Little Bay currents away from the cable trench, the predicted cumulative deposition thickness from installation of the three cables is largely 0.5 mm or less in an area of 87.9 acres around the three submarine cables. Table 3-9 in the report shows that the predicted area of cumulative sediment deposition from jet plow installation of the three submarine cables (including that which occurs over the cable trenches) is 144.5 acres, which represents a very small percentage of Little Bay.
- The report states that sediment modeling was based on sediment sampling performed for the project in April 2014. Page 7 of the report states that the sediment grain size information was “extracted from vibracore data logs” and that the “qualitative descriptions of each vibracore sediment sample were converted into fractions of sand, silt, and clay”. It has been our experience that the size fractions used in sediment dispersion modeling are developed using the results of laboratory grain size analysis so that the size fractions are based on quantitative data rather than someone’s observations of sediment type, which could vary from person to person. This is the first time we have seen visual observations of sediment type used to classify sediment size fractions for use in sediment dispersion modeling.
- ESS compared the grain size distributions provided in Appendix 35, Table 3-2 with the grain size analysis results provided in Table 3 of the 2016 sediment sampling report to determine the % Sand and % Total Fines in each. As shown in the graphs below, the grain size analysis results indicate a higher percentage of sand in the sediment than the 2014 visual observations, which could reduce the predicted suspended sediment concentrations and/or the deposition of suspended sediment

away from the jet plow trench. The purple line indicates the samples that are located in the Little Bay deep channel. Based on this comparison, it is possible the sediment dispersion modeling may over predict the levels of suspended sediment concentration and deposition resulting from jetting installation of the submarine cable in Little Bay, which would therefore be conservative.





- The Applicant should consider performing another run of the model using the grain size analysis results from the September 2016 sampling or from additional sampling that includes the entire depth of sediment disturbance from the jet plow.

- The modeling considers predicted suspended sediment concentrations from the jet plow and diver jetting separately, which is appropriate if the two operations will not occur simultaneously. The order of operations is not clear and should be more fully described in the Application record. If both jet plow and diver jetting will occur simultaneously, the cumulative effect on suspended sediment concentration increases above ambient should be addressed in Appendix 35.
- The Applicant should explain how the predicted sediment deposition thicknesses compare to the natural deposition rates in this part of Little Bay.