EVERSOURCE ENERGY
SEACOAST RELIABILITY PROJECT

RESPONSE TO COMMENTS FROM COUNSEL FOR THE PUBLIC AND THE TOWN OF DURHAM/UNIVERSITY OF NEW HAMPSHIRE

June 30, 2017

Introduction

Eversource Energy (Eversource) has been evaluating the ecological impacts of a proposed buried transmission line crossing of Little Bay since 2014 for the Seacoast Reliability Project (SRP or Project). The evaluation has included multiple meetings with regulatory agencies and various stakeholders, site-specific studies of the physical, biological and chemical conditions of the crossing, and assessments of impacts from the proposed burial techniques. A series of technical reports was released as part of the April 12, 2016, Site Evaluation Committee (SEC) Application for a Certificate of Site and Facility. Additional studies of the chemical and physical characteristics of the sediments within the cable route were conducted after the application was submitted, and were provided to the SEC and to the New Hampshire Department of Environmental Services (NHDES) on December 1, 2016. Counsel for the Public and the Town of Durham/University of New Hampshire submitted comment letters to NHDES, dated march 15, 2017 and February 28, 2017, respectively, developed by technical consultants engaged by the parties to review the Little Bay crossing. The following report presents Eversource's response to those comment letters, based in part on the knowledge and opinions of its consultants, RPS, GEI and Normandeau, and in part on additional data collected in the Spring of 2017.

Eversource remains confident that the proposed underwater crossing can be accomplished safely and effectively, without harm to the bay and the surrounding environment. The results of the most recent sediment dispersion modeling and sediment sampling support the previous findings of an ephemeral and transient sediment plume, and no evidence of potential contamination in the bottom sediments in the cable area. As a result of several design refinements and supplemental data, the risk of adverse impacts and other concerns raised by the reviewers are demonstrated to be minimal. The ongoing rigorous state and federal permitting processes will further refine cable installation methods and requirements for additional avoidance, minimization, and mitigation efforts through best management practices including water quality monitoring.

The following responses are structured to include the comments as written by the reviewers in italics, followed by Eversource's response in regular font. The comments are grouped and numbered by Eversource for ease of reference.

Counsel for the Public (letter prepared by ESS, dated March 15, 2017)

Sediment Sampling, Testing, and Analysis

CFP-ESS-1

- *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?*

  Response:
  The vibracore field crew indicated that the refusals were generally a result of encountering stiff clay although dense sand was the likely reason for refusal at Station C-10. Eversource has recently determined that it will not be necessary to bury cables under 8 feet (ft) of cover, and that 5 ft of cover will suffice. As a result of discussions with agencies and stakeholders, Eversource engineers assessed the potential for a shallower cable burial depth in the channel. The Applicant has determined that 5 feet of burial would provide adequate protection against potential risk of damage from scour and boating activities. As a result of this decision, the combination of the September 2016 and May 2017 sediment sampling adequately characterizes the sediments that will be disturbed during cable installation.

CFP-ESS-2

- *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?*

  Response:
  Based on their assessment of the sediment substructure, the marine contractor does not anticipate having difficulty installing the cable in clay sediments. Eversource has determined that burial to 5 ft of cover in deeper portions of the crossing, rather than 8 ft as originally proposed, will provide sufficient protection for the cable.

CFP-ESS-2a

- *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.*

  Response:
  See response to comment CFP-ESS-1.

CFP-ESS-3

- *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.*

Response:
While the jet plow will fluidize sediment for the entire depth that the plow blade is inserted into the sediments, only the sediments in the upper portions of the “trench” will be subject to suspension in the water column. Sediment sampling in 2016 and 2017 has successfully retrieved sediments from the portion of the sediment likely to be released. Measurements taken along each core between the surface and burial depth were averaged based on the relative quantity each sample contributed to the whole. See section 3.2 of the Revised Sediment Dispersion Modeling report.

CFP-ESS-3a

- *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?*

Response:
Please see response to CFP-ESS-2.

CFP-ESS-4

- *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?*

Response:
Eversource is evaluating the measures that would be required to ensure adequate protection of the cables should sufficient burial not be achievable. Note that Eversource’s cable engineers have concurred that 5 ft of cover will be acceptable across the channel rather than the 8 feet previously proposed.

CFP-ESS-5

- *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 ft).*
- *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?*

Response:
Cores were split into four-foot segments so that the upper portion of the sediments that were most likely to have been exposed to anthropogenic sources of contamination could be characterized to avoid masking any pockets of elevated contaminants. Although several stations did show differences in sediment types with depth and the text does not identify this, all of the strata were less than 2 feet in length, generally the cut-off point that U.S. Army Corps of Engineers (USACE) uses to require separation of strata for chemical analysis. The sediment characterization report has been revised to include results from sampling during May 2017 and the text regarding stratification in the 2016 samples has been amended to reflect this correction. Please see response to CFP-ESS-1.

CFP-ESS-6

- *The results of the chemical testing of the sediment were compared to the National Oceanic and Atmospheric Administration (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 Environmental Protection Agency's (EPA) 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.*

  Response:
  No comment.

CFP-ESS-7

- *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.*

  Response:
  We have rerun the sediment dispersion model using the site-specific grain size data from samples collected in September 2016. The revised modeling used the 2016 samples based on the 2016 and 2017 analysis of these cores. The 2016 lab analysis was used to determine the moisture content and the 2017 data was used to define the grain size distribution; the 2017 data included both sieve and hydrometer analysis specifically aimed at determining the mass distribution within finer sediments. As compared to the 2014 study, the sediment grain sizes shifted to a more coarse distribution; this shift resulted in more mass settling out of the water column more quickly. See section 1.3.3 of the Revised Sediment Dispersion Modeling report for more information.

CFP-ESS-8

- *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).*
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  Response:
  In estuaries of this sort the unconsolidated, silty surface sediment layer reflects more recent depositional events (e.g., through erosion/runoff or bedload transport) and are more likely to contain any anthropogenic contaminants. The deeper stiff clay-dominated sediments represent native materials These clays have low penetration potential by contaminants from above, and are more immobile. The clays with refusal would not be expected to have significant anthropogenic influence. However, they may contain naturally occurring chemicals such as the arsenic, that is pervasive in southern New Hampshire substrates. The data set includes a few samples from the 4-8 foot interval which do not show notable increases. Further, the May 2017 resampling included sampling of the 0-2 foot interval, to determine if there was a notable vertical zonation of arsenic and other potential contaminants in the top 4 ft. Vertical zonation was not observed. There is no reason to think there would be more arsenic released from the deeper materials if remobilized. See also response to comments Dur-GI-21 and Dur-GI-26.

<u>Ecological Risk Assessment</u>

CFP-ESS-9

- *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.*

Response:

The watermark was inadvertently left in the document after it was finalized. A corrected version has been submitted to the New Hampshire Site Evaluation Committee (SEC).

CFP-ESS-10

- *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.*

Response:

The comment from ESS is well taken. The ecological evaluation presented as "Appendix A: Ecological Risk Analysis" which evaluated the sediment data in the light of potential ecological exposures was not intended as a complete ecological risk evaluation, but was focused on identifying (screening) if any ecological concerns were at all likely to be present in potentially troublesome levels, considering available information. We appreciate the observation that the conclusions of this abbreviated report still concords with ESS experience at other similar sites, which suggests that the data analysis has been sufficient for the objective. Considering the overall adequacy of the data, and the apparent consistency of the conclusions based on similar sites, the existing data should be sufficient to address the concerns of the interested parties. However, we acknowledge that addressing certain issues highlighted by both GI/Woods Hole Group (WHG) and ESS in their comments would strengthen the evaluation, and we have revised the evaluation accordingly. The following sections identify where such strengthening is in order.

Appendix 13: Joint New Hampshire Department of Environmental Services (NHDES) USACE Wetlands Permit Application

CFP-ESS-11

- *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."

  "There will be no permanent impact to tidal wetlands."

  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.

Response:

The tidal wetland statement should read "No permanent impact to salt marshes".

As described Section 5.2.3 in the Natural Resource Impact Report, impacts from the mattresses are currently estimated as 5,470 square ft. (0.12 ac). Placement of the concrete mattresses will convert soft-bottomed substrates to artificial hard substrates. It is expected that macroalgae such as *Ascophyllum nodosum* and *Fucus vesicularis,* and invertebrates such as oysters, barnacles and ribbed mussels that are common on the rocky intertidal habitats in Little Bay will ultimately colonize the mattresses.

CFP-ESS-12

- *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.

  Response:
  The marine contractor who served as an adviser during the development of the Natural Resources Impact Report stated that the barge could be operated using a single anchoring point on the eastern side of Little Bay crossing. In this case, the anchor scar and cable sweep would occur within the area identified as being impacted by cable installation. However, Durocher, the marine contractor hired to install the cables, has indicated that it is likely that they will use a multipoint anchoring system.

  Durocher will maintain position of the jet plow barge using a four-point anchoring system. The anchoring system will include 6000-lb anchors attached to 1 1/8" wire rope with no chain. The barge will be advanced by winching in the bow anchor wires while simultaneously releasing the stern anchor wires. The anchors will be placed up to 400 ft to both sides of the barge. The total width encompassed by the anchoring system will be approximately 950 ft for the three cables combined. It is necessary to maintain tension wire rope. Due to its lighter weight, as compared to chain which is typical of such systems, the wire rope will remain primarily in the water column rather than resting on the substrate.

  For an approximate one-mile crossing, Durocher estimates that they will set the 4 anchors 3 times per crossing (total of 12 anchor placements). Each anchor footprint will be about 25 square ft. The total disturbance from anchor placement over three cable installations will, therefore, be 900 square ft (0.02 acres). Benthic organisms in the anchor footprint may be disturbed or killed. The anchor flukes are expected to penetrate approximately 5 feet but this depression will fill in initially through slumping and then through natural sediment transport and current friction processes. The exact location of each anchor placement cannot be determined at this time, although care will be taken to avoid the Bay Point Oysters lease area.

  The relatively shallow water depths will allow the jet plow operation to eliminate the anchor chain typically used in this type of operation and rely solely on 1 1/8 inch wire rope. The purpose of an anchor chain is to increase the holding power of an anchor. Chain may disturb the top 6-12 inches of substrate. Wire rope, on the other hand, will lift the anchor shank on a slight angle. The portion of the wire near the anchor will skim across the substrate surface minimizing bottom disturbance. Near-surface organisms disturbed by the wire may be impacted but deeper dwelling organisms (e.g., lobsters and clams) are not likely to be harmed. Use of mid-line buoys with wire rope, therefore, does not provide an additional measure of protection to the substrate.

  Substrate disturbance from anchor cable sweep will be limited to a short, but difficult to define, distance from each anchors. Assuming that 400 ft of wire at each anchor sweeps an area 10 ft wide, the total disturbance from anchor wire sweep during installation of three cables would be 240,000 sq. ft. (5.5 acres). Given that penetration by the anchor wire would be superficial, it is expected that benthic fauna will be able to readily repopulate the disturbed area after completion of the cable installation.

<u>Appendix 14: NHDES Section 401 Water Quality Certification Request</u>

CFP-ESS-13

- *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.*

Response:
The quoted statement from the Water Quality Certificate request appendix is incorrect; the depths reported by RPS are accurate. However, modeling of the diver burial sedimentation has been refined as shown in the Revised Little Bay Sediment Dispersion Model, and these numbers have decreased to approximately 3 inches.

CFP-ESS-14

- *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.

Response:
As indicated by the commenter, there is no clear direct correlation between turbidity (measured in Nephelometric Turbidity Units [NTUs]) and total suspended sediments (TSS, measured in mg/L). Normandeau has collected coincident turbidity and TSS data in Little Bay in 2016 and 2017, and it appears that 10 NTUs is roughly equivalent to 20 mg/L (see Revised Little Bay Environmental Monitoring Plan).

<u>Applicant's Proposed Water Quality Monitoring Program</u>

CFP-ESS-15

- *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.*

Response:
The water quality monitoring plan was developed to meet the requirements of Env-Wq 1700 that stipulates turbidity must not exceed 10 NTUs above background at the edge of the mixing zone. The purpose of the monitoring is to demonstrate compliance with that standard, not to document the behavior of the plume inside the mixing zone. The location of the proposed mixing zone relative to cable installation has been re-examined based on the results of the revised modeling. Given a rough relationship between turbidity and TSS that has been observed in Little Bay where 10 NTUs is roughly equivalent to 20 mg/L, the proposed mixing zone will be proposed to be near the modeled 20 mg/L contour, approximately 850 ft from the cable corridor centerline.

- *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 ft 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.*

  Response:
  The commenter is apparently suggesting that NHDES change their regulatory standard to conform to monitoring plans in other jurisdictions and to have compliance based on measurement of a parameter that must be determined through laboratory analysis rather than in real time in situ. Eversource does not agree that the delayed laboratory analyses needed to measure TSS would improve the ability to respond to water quality exceedances in a timely fashion.

- *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.*

  Response:
  Based on various comments received regarding the water quality monitoring from this and other reviewers and on the revised plume dispersion modeling, Eversource has revised the water quality monitoring plan and has taken this comment into consideration (See Revised Environmental Monitoring Plan for Little Bay). Ultimately, NHDES has final authority to approve the plan and Eversource anticipates interacting with the agencies to finalize the plan.

- *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 ft 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.*

  Response:
  Regarding fate and transport of chemical constituents associated with the sediments, Eversource has considered the potential for desorption of contaminants and release into the dissolved phase as detailed in response to comment Dur-GI-26 . This analysis indicates that when applying the USACE Regional Implementation Manual (RIM) mass balance approach to evaluating potential water quality impacts as a result of the sediment plume, there is no potential for exceedance of the applicable acute criteria (see Supplement to the Sediment Characterization Report for Little Bay Crossing). The Applicant continues to have the opinion that water quality monitoring for chemical analysis is not needed during environmental monitoring.

- *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.*

  Response:
  As indicated above, the NHDES regulations only require documentation that the project complies with water quality standards at the edge of the agreed-upon mixing zone. Should NHDES require that Eversource conduct a study to verify the accuracy of the model, the project will work with the department to develop an appropriate study design. As of this time, however, such a requirement is not anticipated.

<u>Appendix 34 Natural Resource Impact Assessment</u>

CFP-ESS-16

- *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.*

  Response:
  The marine contractor has determined that approximately 2600 linear ft of existing cable will require removal. See the report entitled "Existing Cable Composition and Removal Plan" for details of the proposed methods of removal and disposal, and anticipated impacts.

  Portions of the cables are visible on the substrate surface and portions are buried (inches to up to 2 ft of cover). Removal of sections of the cables will disturb sediments in localized areas resulting in small amounts of suspended sediments. Benthic infauna in the areas where buried cables are removed will be disturbed and either released into the water column or pushed off onto adjacent substrate. Some organisms will survive, others will perish. The total area affected will be approximately 1100 sq. ft. This minor amount of disturbance will not adversely affect the ecological functioning of Little Bay.

CFP-ESS-17

- *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?*

  Response:
  The contractors for the Project have determined that concrete mattresses will be needed on both shores in the lower intertidal zone due to shallow bedrock. None are anticipated in the subtidal zone. Ground and water level surveys indicate that the mattresses will be under water for much of the tidal cycle. Neap tide cycles (when the low tide is higher than average) will only expose the mattresses near low tide. Spring high tides (when the low tide is lower than average) are expected to expose all of the mattresses at low tide. For most areas, the mattresses will be placed at or below the existing sediments and are expected to be either covered with sediment or colonized by organisms and algae. The mattresses will be placed seaward of the salt marsh on the west side, with strategic boulder placement to protect the marsh from ice and wave scour. On the east side, the mattresses will be away from the shoreline and not expected to present a scour hazard. Standard mattresses are 8x20 ft of linked concrete blocks and weigh approximately 4 tons, although those used for the project may vary somewhat from these numbers. Ice and wave action will not be able to move them.

CFP-ESS-18

- *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).*

  Response:
  Please see the Fish section of the Natural Resource Impact Assessment Report (Section 5.8 of SEC Appendix 34), and specifically Section 5.8.2 which addresses diadromous fish. Most diadromous adults will not be affected because the cable installation will occur in the fall after their migrations through Little Bay are complete. Adult American eel and juvenile alewife, blueback herring, American shad and rainbow smelt may encounter the cable installation during their seaward migration. Because of the ephemeral nature of the construction and the plume, these species are expected to be able to avoid adverse effects by either leaving the affected area or tolerating the short-term exposure. In addition, while the plume predicted on the western tidal flat will encompass the entire water column, the densest concentrations (>500 mg/L) will be in the lower half of the water column. Wilber and Clarke (2001) reported that behavioral responses in fishes exposed to elevated suspended sediments (more than 500 mg/L) were generally not observed during exposure durations of less than a day.

  Wilber, D.H. and D.G. Clarke. 2001. Biological Effects of Suspended Sediments: A Review of Suspended Sediment Impacts on Fish and Shellfish with a Relation to Dredging Activities in Estuaries. North American Journal of Fisheries Management 21: 855-875.

<u>Appendix 35 Sediment Dispersion Model</u>

CFP-ESS-19

- *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.*

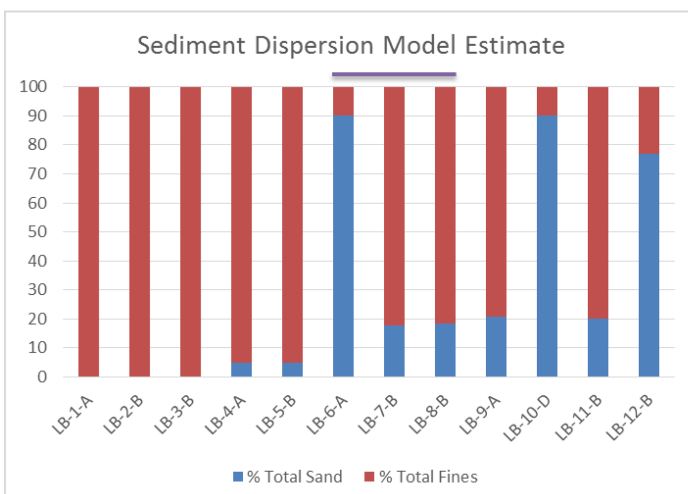
- *The results of the modeling are also similar to our experience in that they show that predicted suspended sediment concentrations and deposition induced by these operations is at its highest in the near-bottom portion of the water column near the operating device and lower concentrations and deposition 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.*

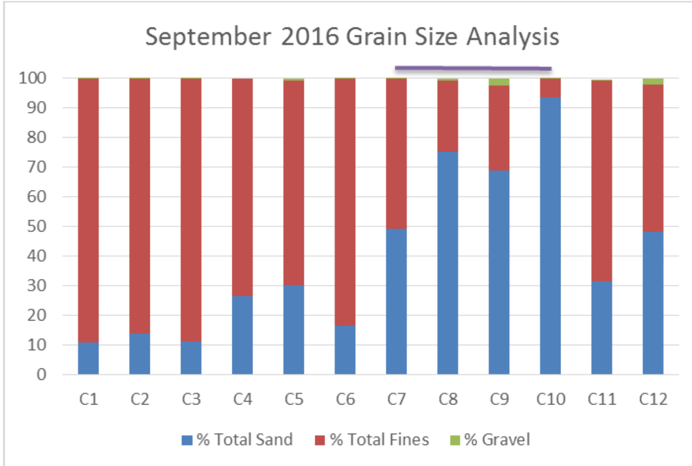
- *The sediment dispersion modeling report indicates that the model assumed that 25% of the material volume in the trench would be suspended into the water column by the jet plow and 50% of the material volume in the trench would be suspended into the water column by the diver operated jetting tools. 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.*

  Response:
  PSNH conducted additional grain size analyses to include a hydrometer analysis of the silt and clay fractions. RPS used the results from this analysis in their revised sediment dispersion model (see Revised Little Bay Sediment Dispersion Modeling Report). The model was rerun with the grain size data from the 2016 cores. If more than one sediment sample depth was taken from a vibracore, a composite of the size fractions was calculated based on the relative quantities each sample contributed to the whole. The 2016 grain size analysis results indicated a higher percentage of sand in the sediment than the 2014 visual observations, which reduced the predicted suspended sediment concentrations and/or the deposition of suspended sediment. See section 3.2 of the Revised Sediment Dispersion Modeling report.

CFP-ESS-20

- *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.*

  Response:
  The marine contractor does not anticipate that jet plowing and diver burial will occur simultaneously, in part for logistical reasons for staff and equipment, and in part for overlapping work areas and safety concerns.

CFP-ESS-21

- *The Applicant should explain how the predicted sediment deposition thicknesses compare to the natural deposition rates in this part of Little Bay.*

  Response:
  No information was found in the literature on the natural sediment deposition rate for Upper Little Bay. However, it can still be stated that the construction activity is a temporary event whereas the natural sediment transport and deposition is an ongoing process.

Town of Durham NH (letter dated February 28, 2017)

MICHAEL F. DACEY, P.G. (GEOINSIGHT, INC.)

Based upon GeoInsight's review of the report titled Modeling Sediment Dispersion from Cable Burial for SRP Little Bay, NH, (Sediment Dispersion Report), references provided in the Sediment Dispersion Report, and associated SEC documents listed above, it is our opinion that the Sediment Dispersion Report does not adequately represent potential sediment dispersion and associated deposition related to the proposed cable-laying activities.

Dur-GI-1

The report states that wind currents were not considered because of the small surface area (i.e. fetch) at the location of the crossing. However, while fetch can be a limiting factor for wave height and corresponding depth of impact in the water column, the 0.9-mile long crossing and 2-mile north-south length of Little Bay is sufficient fetch to generate wind-driven currents, particularly during periods of sustained winds from a consistent direction. Wind-driven currents can enhance or mute tidal current velocities, so a persistent wind from the southeast or southwest across the approximately 2.7-mile north-south length of Little Bay during an ebb tide would increase the velocity of northward flowing currents, which, in turn, potentially increases bottom shear stress, thus increasing sediment transport and possible entrainment into the water column.

Wind driven currents have the largest potential impact to current velocities and bottom shear stress in shallow intertidal mudflat and upper slope areas. The Sediment Dispersion Report states that hand jetting (and silt curtains) will be used on 296 feet of the western mudflat area, indicating that the remaining approximately 1,700 feet of the western mudflat will be subject to jet plowing, presumably without silt curtains. Using the stated jet plow advance rate of328 feet per hour, 1,700 feet of the western mud flat would be traversed in 5.2 hours. The model assumes that it takes 7 hours to proceed from high slack, when jet plowing is proposed to begin and when the approximate depth of water over the mudflats would be 8 to 9 feet, through the ebb cycle to the subsequent flood cycle; therefore, work would proceed across the western mudflat for 4 to 5 hours in ebbing conditions and in progressively decreasing water depths. Therefore, the later segments of jet plowing across the western mud flats would be most subject to potential impacts from wind currents that could both disperse suspended sediments and potentially entrain bottom sediments.

The Sediment Dispersion Report assumes that 25% of the material in the jet plow cross-sectional area will likely be suspended during the jet plowing process, but also acknowledges that redeposited sediments will be re-suspended during subsequent tidal cycles. The sediment dispersion model does not consider the fate of re-suspended sediments. However, sediment resuspension, particularly in the deeper part of the channel where tidal velocities are high and previously cohesive fine-grained sediments have been liquefied by jet plowing, may be particularly significant. Based upon a review of vibracore logs from the 2014 and 2016 coring programs, channel stratigraphy generally consists of a thin veneer (<2 feet thick) of fine- to medium-grained sand overlying silt and clay. The silt and clays are of glaciomarine origin and are characteristically dense, stiff, moderately to highly cohesive, and plastic. These characteristics present three potential concerns pertaining to jet plowing the channel crossing:

Response:

The winds for Pease International Tradeport from the NOAA DS3505 database were examined for the September-October period for the decade 2007-2016. It was found the 88% of the winds were below 5 m/s and that only 0.4% exceed 10 m/s with none of the with none of the largest wind events originating from the north or northwest, the alignment of Upper Little Bay thus making it very unlikely that wind-induced effects would be significant (See Revised Sediment Dispersion Modeling report section 1.1.3).

Resuspension is evaluated in the Revised Sediment Dispersion Modeling report, section 3.4.2 The analysis showed a footprint of suspended sediment excess concentrations that was larger than the base case, though the concentrations were present intermittently and confined to the very bottom of the water column. Much of the area has the potential for continued resuspension due to the relatively strong currents. Resuspension was most pronounced on the first tide following jet plowing and fully dissipated by the third day. The model does not include all processes that would interact with the continued resuspension and serves as a conservative prediction.

Dur-GI-2

1. *The inability of jet plow to penetrate dense silts and clays to target depths without increasing jetting pressures, which may result in additional sediment suspension, the effects of which were not modeled.*

Response:

The cable installer has investigated sediments within the cable lay routes, and does not anticipate having difficulty penetrating the sediments. However, if stiff clay is encountered, the advance rate is typically reduced to allow the jets to fluidize the material. See also the advance rate sensitivity analysis in the Revised Sediment Dispersion Modeling report, section 3.3.2.

Dur-GI-3

2. The inability of jet plow to penetrate to the target depths or to the regulatory required depth and defaulting to the use of concrete mats. The use of concrete mats in the channel environment and their potential impacts to the benthic environment and sedimentation patterns was not considered by the applicant.

Response:

Eversource's cable engineer has reviewed the burial depth requirements and has determined that burial under 5 ft of cover will be sufficient in areas previously described as needing 8 ft of cover. See CFP-ESS-1. This change will reduce the likelihood that additional protection, such as concrete mattresses, will be required in the deeper sections of the bay crossing. Impacts from the use of concrete mattresses were discussed in Section 5.2.3 of the Natural Resources Impact Report. It is anticipated that the planned burial depth will be achievable in the channel and concrete mattresses will only be required in shallow areas. The Revised Sediment Dispersion Modeling report did include a sensitivity to loss rate, which is the assumed percent of the trench sediments that suspended in to the water column; in that sense the modeling did evaluate the potential for areas with increased loss rate. See section 3.4.2 of the revised report.

Dur-GI-4

3. By liquefying stiff, cohesive silts and clays during the jetting process the deposit's cohesiveness and bulk density are significantly reduced, and these properties are directly related to its shear strength. Cohesive silts and clays have higher shear strengths than unconsolidated silts and clays, which is why cohesive silts and clays can exist in high-energy channel environments while unconsolidated, liquefied silts and clays will be eroded and entrained into the water column. This physical change potentially makes liquefied silts and clays occupying the cross-sectional area of *the cable trench available for re-suspension during multiple tidal cycles until trench sediments are in equilibrium with the channel flow regime.*

The fate of the re-suspended sediments and the degree, geographic spread, and duration to which turbidity in the water column will be increased was not addressed by the applicant.

Response:
Resuspension of sediments that settle out of the jet plow plume is addressed in section 3.4.2 of the Revised Little Bay Sediment Dispersion Modeling Report.

Dur-GI-5

Another concern regarding the 2014 and 2016 vibracore program and associated sediment sampling, that has a potential bearing on sediment dispersion during jet plowing, is that the amount of flocculation (i.e., the "clumping" and deposition of clay minerals) assumed by the model does not consider actual variations in grain size or mineralogy. The degree of flocculation is important because incorrectly high flocculation assumptions can under-estimate the amount of suspended sediment.

The assumed flocculation in the model was based upon approximated volumes of clays in the samples, but the fine-grain size fraction of the samples was not differentiated between silts and clays using testing methods (e.g., pipette or hydrometer analysis). The estimations provided in the Sediment Dispersion Report are based upon methods that use cutoff criteria for grain sizes that are different from the suspended sediment model. For example, the classification from Flemming (2000) used in the report specifies 2 micrometers (µm) as the silt/clay boundary, but SSFATE considers clay to be up to 7 µm (more than three times the particle size used in the Flemming classification). Therefore, using diagrams from Flemming (2000) to estimate grainsize fractions for the SSF ATE model can be inaccurate. The visual approximations used in the report also suggest the assumed percentage of clay may be too high because grain size analysis of comparable units in Great Bay indicated more silt and less clay (Trainer, 1997) than assumed in the report.

The mineralogy of the sediment is also important in evaluating flocculation because not all clay minerals flocculate in the same degree. Some clay minerals (e.g., smectites) are expected to readily flocculate, while other clay minerals (e.g., illiltes and kaolinites) are not expected to flocculate and may remain suspended in the water column. The Sediment Dispersion Report uses a simplified flocculation assumption that is not supported with data regarding actual grain sizes or mineralogy of the fine-grained sediment at the study site.

Response:
The sediment dispersion model has been rerun using site-specific grain size data.

Dur-GI-6

Ecological aspects of the Sediment Quality Report are addressed in a separate preliminary report by Woods Hole Group, but because the Sediment Quality Report relies upon data presented in the Sediment Dispersion Report, the Sediment Quality Report cannot adequately address issues pertaining to sediment quality.

Response:

The reviewer is incorrect in that the sediment quality report does not rely on data presented in the sediment dispersion report. Section 2.1 of the Characterization of Sediment Quality along Little Bay Crossing describes the sediment sample collection used in the analysis.

Dur-GI-7

Some specific concerns about the Sediment Quality Report are as presented as follows. The Sediment Quality Report states that "Each sediment sample was tested for the parameters shown on Table 1 which were taken from the recommended testing limits outlined in the Regional Implementation Manual (RIM; U.S. EPA and USACE, 2004), a document that delineates how estuarine and marine sediments being proposed for dredging and aquatic disposal should be tested for contaminants." The RIM includes pesticides in the list of chemicals of concern, but pesticides were not analyzed in the samples collected from Little Bay. This is a particular concern for sediments that were deposited prior to 1980 (Partnership, 2013), before compounds such as DDT were banned or became highly regulated. Presumably, these buried sediments will be suspended during hand jetting and jet plowing activities; therefore, potential ecological impacts from pesticides should be evaluated, as specified in the RIM.

Response:

As is typical in a sediment sampling survey, the list of parameters tested for the Seacoast Reliability Project (SRP) project area was developed through consultation with the regulatory agencies, NHDES and USACE, and neither required the analysis of pesticides. However, Eversource has resampled at the same stations and has included pesticides in the list of analytes. To summarize, all pesticides at all stations were non-detectable (below the reporting limit). Results are presented in the Supplement to the Sediment Characterization Report.

Dur-GI-8

The 2016 vibracore program was completed to collect the samples so that sediment quality could be evaluated. However, as with the 2014 vibracore program, channel cores failed to penetrate to the target trench depth of 8 feet, which raises the concern previously described that jet plowing may not attain target depths, and that the potential response (i.e. higher jetting pressure, concrete mats in the channel) to not attaining target depths are not adequately addressed in the Sediment Dispersion Report or the Sediment Quality Report.

Response:

As indicated in response to Dur-GI-3, Eversource has re-evaluated the need to bury cables under 8 ft of cover and has concluded that 5 ft of cover will be sufficient in the channel.

Dur-GI-9

In conclusion, based on the three testimonies of the GIWHG team, and given the gaps in data and the narrowly focused data interpretation provided so far by Eversource, it is GeoInsight's opinion that:

• As of now, the identified data gaps do not allow the Town of Durham to conclude that there are no significant environmental risks; and,

• Based upon the Applicant documents presented to date, there are significant data and evaluation deficiencies that preclude the Applicant from designing adequate control measures or mitigation measures to mitigate potential risks associated with the proposed cable crossing in Little Bay. Such uncertainties need to be reduced through further suggested data collection and analysis; only thereafter can adequate controls and mitigation measures be designed and implemented.

Response:
The Applicant disagrees with this opinion. The Applicant is confident in its position and has provided supplemental data herein to support its conclusion.

MATT SHULTZ, PE (WOODS HOLE GROUP)

Dur-GI-10

In my opinion, there is an overarching concern with the modeling conducted to assess the sediment dispersion, transport, and deposition that would occur as a result proposed cable installation within Little Bay, NH. Many assumptions were made with regard to the environmental conditions at the time of the burial and the sediment release that would occur as a result of the cable burial process. Specifically, assumptions were made in the hydrodynamic and sediment transport modeling conducted for the cable burial process in Little Bay with regards to the following:

1. degree of water mixing in Great Bay (the model assumes that the Great Bay estuary is well-mixed),
2. discharge values used for river inflow,
3. effect of winds (with or without gusts) on currents in Little Bay,
4. water depth for variable tidal conditions during each of the cable installations,
5. current velocity for variable tidal conditions during each of the three cable installations, ,
6. sediment characteristics for sediment layers that w5re not sampled,
7. degree of sediment flocculation for different sediment mineralogy (further discussed in GeoInsight comments),
8. volume of sediment released from a jet plow,
9. height of sediment release and vertical distribution above the seafloor,
10. jet plow advance rate,
11. water flow rate at exit nozzles of the jet plow,
12. water pressure at exit nozzles of the jet plow, and
13. resuspension of sediments after initial deposition.

No sensitivity analyses were conducted to assess these assumptions, and the impact of varying these parameters on the model results of plume formation and sediment deposition. Thus, the modeled plume results shown in the report using the assumed parameters may not be representative of what occurs in this dynamic estuarine environment. Conducting a sensitivity analysis of the above parameters would provide a better understanding of the range of sediment plume and deposition variations that may occur during the cable installation.

Response:
Discussion was included in the Revised Sediment Dispersion Modeling report. Specifically to the above comments:

a. The fact that the Great Bay Estuarine System (GBES) is well-mixed has been demonstrated in many scientific publications going back more than 35 years. The measure of a well-mixed system is the ratio of the freshwater inflow to the tidal prism, which in this case is less than 2%. See report section 1.4.1. The lack of a vertical salinity gradient has also been long reported (see section 1.4.2).

b. Discharge values were analyzed using available USGS data and showed that the September-October cable installation window was much smaller than the yearly average (see section 1.4.2).
c. Winds were analyzed over a 10-year period and showed that wind speed and direction are typically insufficient to drive currents (see section 1.4.3).
d. Variable tidal conditions (spring and neap cycle) were analyzed in section 3.3.6 and section 3.4.2.
e. Variable tidal conditions (spring and neap cycle) were used in the modeling runs showing that the current did not have a significant effect on sediment transport. See section 3.4.2.
f. Sediment layers were sampled as appropriate based on professional staff decisions. Sediment characterization is presented in section 3.2.
g. A sediment flocculation calculation is made in the model during sediment particle settling. See section 3.1.
h. Volume from sediment released from a jet plow was addressed as a sensitivity to loss rate (see section 3.3.4)
i. Height of sediment release and vertical distribution was addressed in sections 3.3.5 and 3.3.9.
j. A sensitivity analysis to advance rate was conducted (see section 3.3.2).
k. A sensitivity to loss rate integrates the effect of exit nozzle water flow rate (section 3.3.4).
l. A sensitivity to loss rate integrates the effect of exit nozzle water pressure (section 3.3.4).

The effects of resuspension are presented in section 3.3.7

Dur-GI-11

While some of the assumptions related to the jet plow installation method are based on past studies, they are not founded based on analyses conducted for Little Bay and/or the Great Bay Estuarine system. The validity of these underlying assumptions could be evaluated by validating the results produced by the SSFATE model used to simulate the sediment dispersion. The validation would be done using actual turbidity and plume measurements made during previous installations or a demonstration project in similar sediments, using the same jet-plow method. No evidence has been provided that the SSFATE model results have been validated.

Response:

The Suspended Sediment FATE (SSFATE) model has been previously validated as described in section 3.1 of the Revised Sediment Dispersion Modeling report.

Dur-GI- 12

Because of the assumptions used and lack of sensitivity testing conducted combined with the lack of SSFATE model validation in a similar environment, the accuracy of the sediment plume and deposition results presented for cable burial process is not known and the uncertainty cannot be quantified. The model results are therefore inadequate for evaluating the potential impacts to resources within Little Bay and the larger Great Bay Estuary.

Based on what was presented in SEC Appendix 35- "Modeling Sediment Dispersion from Cable Burial for SRP Little Bay, NH", there are shortcomings in the application of the BELLAMY hydrodynamic model that should be addressed to fully understand the sediment dispersion that would occur as a result of the burial process. Specifically, with regards to the selection of the hydrodynamic model, there is no *justification made or data shown to support the use of a two-dimensional (2-D), depth averaged model for the Great Bay estuarine system rather than a three-dimensional (3-D) model. A 2-D model is appropriate for estuarine systems that are well mixed (i.e. little vertical stratification), while a 3-D model should be applied for estuaries that have vertical salinity gradients in order to capture density-driven circulation patterns (due to combined fresh water and tidal inflow). In past studies where the BELLAMY model was used, it is stated the estuary is well mixed and references are made to a field data collection program conducted in the late 1970s1.• However, a' review of the data from this study at Adams Point in the upper estuary shows vertical variability in current velocities of up to 20 m/sec. In addition, any observations made regarding the characteristics of the estuary are specific to the measurement period of this study (summer of 1975) which is a typical dry season with relatively little river inflow. Because the cable burial installation process will release sediments in the bottom layers of the water column, characterizing the vertical profile of current velocities is important to how the sediment will be dispersed both vertically and laterally within the estuary. There is no data shown to indicate whether the upper portion of the Great Bay estuary is well mixed during the season when the installation will occur to preclude the use of a three-dimensional hydrodynamic model.*

For rivers feeding into the Great Bay estuary, average freshwater discharge values were applied as constant inputs to the model simulations. There is no comparison given, however, as to how these average values compare with the time period over which the cable burial is expected to occur. It has been noted elsewhere in the permit application that the installation is proposed for the fall season when historically there is an increase in precipitation (based on a review of discharge data from USGS gauge 01073 500 at Lamprey River near Newmarket, NH). There is no analysis or discussion of how a significant precipitation event occurring prior to or during installation may affect the river flow contributions and how that could increase stratification in the upper estuary and change the hydrodynamics where the cable will be installed. A range of river discharge values which are representative of the period when the cables are to be installed should be applied in the model.

Response:
A review of the scientific literature concerning circulation in the GBES indicates many descriptions of the system as well mixed. See section 1.4.1

A two-dimensional (2D), vertically averaged (2D) hydrodynamic model is suitable because there is no significant vertical salinity stratification because of the large tidal prism relative to the river flow. Although there is some vertical structure in the ebb currents with lower speeds near bottom possibly due to friction effects, the 2D approach is conservative in that it somewhat over predicts the near bottom speed. See section 1.4.2.2 for salinity discussion and section 1.4.1 for tides.

A review of the average monthly river flow statistics published online by the USGS show very low river flows compared to the yearly average for the September-October period of cable installation thus any sensitivity analysis to river flow is unwarranted. See report section 1.4.2.

Dur-GI-13

It was stated in the pre-filed testimony of Ann E. Pembroke that a spring tidal cycle was used in the model simulations. The sediment dispersion model report shows example model currents (Figures 2-2 and 2-3) which appear to be from September 2nd of 2014 which is representative of a neap tidal cycle. There is no documentation of the start date and time of the predicted tides used in the 13-hour model simulations of the jet plow or the 10-day and 20-day simulations of the hand jetting. The type of spring tide level simulated (for jet plowing) and the window of time

simulated (for hand jetting) is important as it will directly affect the tidal currents and dispersion of sediments. Additionally, it has been documented
that the three cables will be installed via jet plow subsequently over a 3- to 4-week period. Hand jetting for the west and east shallow sections will follow for subsequent periods of 10 and 20 days per cable. The three subsequent cable installations will, therefore, be completed at different tidal cycles (including spring and neap). Installing the three cables subsequently at different tidal cycles will result in different plume dynamics and deposition patterns for each cable installation, however no modeling was done to assess these differences.

Response:
The SSFATE model was run for both spring and neap tidal cycles with minor differences in results. See sections 3.3.6 and 3.4.2.

Dur-GI-14

A statement is made in the sediment dispersion model report that "No wind forcing was applied to be consistent with previous studies, which showed the wind effect is short term and minimal, particularly since the modeling focused on steady state conditions." In reviewing the previous studies cited (Bilgili et al., 2005; McLaughlin et al., 2003; Swanson et al., 20 15)[2,3,4] there are no comparisons made to establish that wind effects are minimal and do not impact currents within the estuarine system. The modeling and simulations being conducted for the SRP cable burial are of a dynamic varying tidal condition and the construction activity being proposed via jet plow occurs over a 13-hour period and hand-jetting will occur over a 4-hour period. These installation periods are of sufficient duration for changes in wind patterns (speed and direction) to affect surface water currents and sediment plume movement, especially in the shallow water tidal flats where the model results of the sediment plume show suspended sediments reach nearly to the water surface. Additionally, the resuspension of sediments will continue to occur for hours after the construction activity. SEC Appendix 14- Application for Water Quality Certification pg.10 acknowledges the contribution of wind-induced currents and how it can affect the resuspension of sediments in the tidal flat areas. Given the duration of proposed construction activity, the potential resuspension, and the measured fetch length of Little Bay from north-to-south being approximately 2.7 miles (a sufficient distance over which winds can be sustained to produce surface stresses and induce currents), the modeling should include the expected range of wind conditions that will occur during the burial process. Based on what was presented SEC Appendix 35- "Modeling Sediment Dispersion from Cable Burial for SRP Little Bay, NH", the methods applied and assumptions made in the SSFATE model are not sufficient for characterization of the potential sediment dispersion that may occur as a result of the cable burial process. ' With regard to the sediment characteristics, the April 2014 sediment cores in the deeper channel (LB-6-A, LB-7-B, LB-8-B) did not penetrate to the proposed trench depth of 8 feet. An assumption was thus made as to the sediment characteristics below the core penetration depth and what would be released during the jetting process. It has been documented in the December 2016 Characterization of Sediment Quality report that the 2016 sediment cores in the channel did not hit target recoveries due to the "density of the underlying clay layer". It was not specified what the assumed sediment characteristics were for this this dense clay under-layer in the SSFATE model simulations:' Conservative higher fine fractions should be used for the clay layer that could not be penetrated to examine the maximum potential for sediment suspension and dispersion that rimy occur due to jetting.

Response:

The NOAA DS3035 wind record at Pease International Tradeport for the past decade of the September-October period was examined and found short-term and minimal. See report section 1.4.3.
The earlier 2014 cores were replaced by the 2016 cores. The new burial depth is now 1.5 m (5 ft) instead of the previous 2.4 m (8 ft). See section 1.3.3 of the Revised Sediment Dispersion report.

Dur-GI-15

The reference cited for the sediment release fraction from jet plow activity (Foreman, 2002)[5] states 10 to 35% of the trench volume is entrained in the water column and is based on sediment characteristics from New York Harbor. A 25% sediment release fraction was used in the SSP ATE model for the cable burial in Little Bay, although it does not appear an analysis was conducted to justify the sediment release fraction based on sediment characteristics within Little Bay. The reference cited also states "The analysis performed assumes that there is no variation in soil properties with trench depth." and "If the sediment is more consolidated, it will require a greater volume of water to fluidize it leading to a larger amount of sediment being resuspended". As shown in the 2014 and 2016 sediment core data acquired by the Applicant, there are variations in the sediment layers with depth in Little Bay and evidence of stiff and/or consolidated clays. Additionally, as the stiff clay layers found (and those found to be impenetrable) in the core samples are encountered, an increase in the jet water flow rate is likely required, which will result in an increased amount of sediment released to the water column. A higher sediment release fraction should be evaluated to assess a worst-case scenario and the sensitivity on the sediment plume and deposition.

Response:
A sensitivity to release rate was performed and documented in the Revised Sediment Dispersion Model report. See section 3.3.4

Dur-GI-16

With regard to the sediment being released by the jet-plow burial activity, no information is given as to the vertical distribution of the sediment released to the water column that was specified in the SSFATE model to represent the sediment source. The vertical distribution of sediment above the trench will vary based on the sediment characteristics and ambient currents. It is not clear how the vertical distribution of the sediment release was determined, how it was specified in the model, and if it was varied along the cable route. The model sensitivity to the vertical release distribution should also be evaluated. The jet-plow advance rate for the cable burial process was specified as a constant rate of 100 m/h in the SSFATE model. While a constant advance rate may be desirable, it has been documented there are stiff layers of sediment that may require adjustment of the jetting pressure, the Applicant is proposing to adjust the cable burial depth from 3.5 to 8 feet when moving from the western shallow flats to the deeper portion of the 'channel within Little Bay, and there are potential unknown obstacles along the route/ In addition, if water quality criteria are exceeded while operating, adjustments to the jetting process may be required. Any potential delay incurred during the burial operation (i.e. due to equipment failure/adjustments, obstructions, exceedance of water quality criteria, etc.) was not taken into account. If there is a delay in the cable burial process, the suspended sediment plume, dispersion, and deposition patterns all will be affected due to the varying tidal currents and flow reversals with flood and ebb tides. The model and resulting plume dynamics should be evaluated for unforeseen changes and potential varying of the plow advance rate. It is stated in the sediment dispersion model report that one cable route was simulated, however, the combined deposition results for all three cable routes are presented. It is not specified how the combined deposition results for all three cable routes were determined and if an assumption was made that the initial bed composition and post installation deposition would be the same for all three cable *runs. As sediments are disturbed by the first cable installation, any deposited sediments within the subsequent cable routes are subject to being remobilized by the jetting process. It is likely that these disturbed and deposited unconsolidated sediments would be the higher fine fractions that are more likely mobilized and would tend to generate larger plume sizes. The subsequent cable installations should be modeled explicitly to give a better characterization of the expected plume and deposition.*

Response:
The vertical distribution of the sediment release can be found in sections 3.3.5 and 3.3.9
The sensitivity analysis to advance rate provides bounds on the variability expected. It is unwarranted to attempt to model unforeseen conditions stochastically. The sediment characterization for the 2016 cores showed a much smaller fraction of fines which would minimize any potential for significant effects. See section 3.3.2.

Dur-GI-17

In the sediment dispersion model report, a number of technical reports are referenced that demonstrate successful application of the SSFATE model to dredging. However, it has not been shown how the SSFATE model performs in its simulations of cable and pipeline burial operations via jet plow and hand jetting. As there are past submarine cable burial studies of this type where suspended solid concentrations have been monitored during installation, the SSFATE model results can be validated to show its capability in simulating the jetting burial process. This would help test some of the underlying assumptions made in the model's application for Little Bay, if the validation was performed for a similar estuarine environment having similar sediment characteristics. The model validation would provide some level of confidence in the predicted sediment plume and deposition and allow for quantification of the amount of uncertainty that should be taken into account when evaluating the results. Without any documentation of how the SSFATE model has been validated in similar settings for studies of this type, there is little assurance the model results are reasonable in predicting the sediment plume characteristics and resulting deposition that would occur with the cable burial process. There is a discussion of the stability of deposited sediments in the sediment dispersion model report and it was determined that most of the fine deposited sediments would be mobilized and re-suspended on subsequent tides. There is no analysis or modeling performed, however, to assess the increased suspended sediment concentrations, duration of exposure, and ultimately where these sediments would likely be distributed after the initial deposition. Re-suspension of unconsolidated fine-grained material disrupted by jet plow activity is expected to occur where tidal velocities are high and where newly deposited sediments will not be in equilibrium with the channel flow regime. Until an equilibrium is reached, the disrupted fine-grained material will be continually entrained into the water column, transported and deposited on subsequent tidal cycles. This would lead to increased suspended sediment concentrations, an extended period of exposure, and a larger area of deposition than what was shown in the model results presented by the Applicant, which could pose additional potential impacts. The re-suspended sediments would be transported to areas of natural deposition within the estuarine' system and likely south into Great Bay proper, which has shallow depths and lower current velocities. Additionally, the jetting process for the three submarine cable installations will result in a depression or scar on the seabed as a result of the jetting process. The potential impacts of sediment dispersion cannot be fully assessed unless an analysis is conducted to characterize the resuspension that would occur, thy ultimate fate of those sediments, and to estimate how long the scars will take to recover under ambient conditions.

Response:

The SSFATE model has been applied to many cable and pipeline burial projects and results accepted by regulatory agencies. Validation is described in response section 3.1. The effects of resuspension are presented in section 3.3.7.

Dur-GI-18

Additional concerns relate to the proposed cable installation methods and whether an alternate approach using a mechanical plow was considered for the Little Bay" cable crossing. There is no information given or analysis shown to justify why the use of a mechanical/shear plow was not considered to minimize potential impacts. Based on a review of past studies[6,7], a mechanical plow has been proposed for shallow burial depths (less than 7 feet) and the sediment release fraction used for a mechanical plow is 2-15%, which would pose reduced impacts than a jet plow which has been suggested to have a sediment release fraction of 10-35%. A 42-inch (3.5-foot) burial depth is already planned for the western tidal flats and in Welsh Cove. It was stated by the Applicant in a January 12th, 2017 public meeting presenting the Sediment Quality Report, that the required burial depth is 42 inches, and that the Applicant was targeting additional burial to 96 inches (8 ft) in the deeper channel voluntarily. If there is no requirement to bury the cable to a depth of 8 feet (i.e. 42" burial across the entire project area), the use of a mechanical plow could be considered. If the Applicant can show that a mechanical plow is not a feasible approach for the entire cable burial route, a mechanical plow, or zero to little jetting, should be considered to minimize impacts in the shallow tidal flat areas where the sediments properties support this method. The pocket penetrometer test results from the April 2014 sediment boring logs for the western flats (LB 1 through LB-5) show sediment shear strengths in the top 48-inches of sediment are less than 14 kPa, the maximum shear strength allowable for use of a mechanical/shear plow based on a shear plow analysis completed for cable burial in Lake Champlain (ETA, 2010)[8]. This data suggests the alternative of using a mechanical plow (zero/reduced jetting) for the cable burial process in Little Bay was not adequately addressed. Additionally, the applicant has not addressed the comparative impacts of the proposed deeper burial and what are the differences in water quality impacts from a 42-inch burial compared to a 96-inch burial.

Response:

Shear plowing or mechanical plowing is not an appropriate technology for this installation. Mechanical plowing is more commonly used for small-diameter fiber-optic cable in an open ocean environment. The Bollard-Pull force required to pull the plow through the sediments would require much heavier, larger and more powerful vessels than needed for the jet plow. These types of vessels have a much deeper draft than the barge supporting the Jet Plow, consequently they cannot approach a landing site in close proximity thereby causing a large length of the cable to be left unburied. This would cause a greater length of disturbance time to the bay due to the less efficient diver burial procedures required.

A Shear plow for this type of power cable may weigh up to 50 or 60 tons, are 40 or 50’ in length and approximately 20’ wide. The size and deployment of this type of shear plow would have a greater disturbance on the sea bed than the jet plow. Vessels of this size are not readily available in the NH area.

JOSEPH FAMELY (WOODS HOLE GROUP)

Issue 1: Risk Assessment Framework

Dur-GI-19

Failure to follow an established risk assessment framework

By failing to identify and follow an established risk assessment framework, and instead borrowing some of the steps and procedures from the formalized and deliberate process of ecological risk assessment, the Sediment Quality Report's Ecological Risk Analysis misses important potential contaminants and exposure pathways for the proposed work in Little Bay.

Response:
In our commentary to the observation from ESS on the "less detailed" nature of the evaluation (see CFP-ESS-10), we noted that the intent of the analysis was not to present a formally defined ecological risk assessment. As was stated in our technical memo, our analysis was a screening level review. The objective was a preliminary assessment of sediment contaminant data to evaluate whether any potentially concerning contaminant concentrations were present that could be sources of ecological risk under either current conditions or when disturbed by the activity. This was accomplished by screening the data against the strictest sediment screening criteria which demonstrate the absence of potentially unacceptable ecological risk under any exposure scenario unless exceeded. In the event of such exceedances being found, then a more formalized ecological risk assessment would have been in order.

The preliminary screening indicated that there were no concentrations present that could be the source of unacceptable ecological impacts. As ESS notes in their comments, these conclusions are in broad agreement with what they have observed for other submarine cable projects. Therefore, there was not a perceived need to further address this issue in a formal ecological risk assessment.

However, some of the subsequent comments call attention to certain specific concerns that we acknowledge could benefit from further clarification. We appreciate the commenters calling these issues to our attention and will address them as indicated below. However, this can be accomplished within the current presentation framework.

Dur-GI-20

<u>Famely p. 2</u> *By not identifying the regulatory framework for the risk assessment (or standard guidance and associated technical updates), the Sediment Quality Report does not provide a sound basis upon which to judge whether the data and assessment are sufficient to justify conclusions regarding potential ecological risk.*

<u>Famely p. 3</u>. *As an ecological risk assessment professional, I recommend that the Sediment Quality Report and supporting analyses unambiguously follow the standards of practice for ecological risk assessment provided by any one of the many state or federal agencies. This would provide the reviewer with a standard "checklist" of whether the analysis has been conducted in an environmentally protective manner; clearly define the regulatory program under which the risk assessment is being performed; and assure the general public that the assessment has been done under some well-reviewed and universally accepted standards.*

<u>Famely p. 3</u>. *It is my opinion that, of all the available ecological risk assessment frameworks, the most applicable to the SRP is the USACE Regional Implementation Manual (RIM) and associated USACE technical publications for assessing the environmental impacts of dredged material management sites.*

Response:
We concur that the *USACE Regional Implementation Manual* is the most appropriate formal guidance given the scope and nature of the proposed activity. Some of the other sources of formalized ecological risk assessment guidance cited by the commenter would be of doubtful

utility given the low concentrations of potential contaminants present in the sediments. However, we believe that the objective of demonstrating absence of potential for ecological risk due to contaminants from the activity is adequately achieved in the current preliminary screening framework, and that nothing seen in the sediment triggers concerns that would require further evaluation or analysis beyond those discussed in the following sections.

Issue 2: Sample Representativeness

Dur-GI-21

Famely p.3 Had the Applicant followed the RIM guidelines, the currently available data would not have been satisfactory for a Tier I evaluation. Current sediment chemistry data are not appropriate for Tier I evaluation because the 4-foot composite samples are not representative of the potential disturbance and mobilization of sediment to the water column (see below discussion of sediment compositing plan) or the post-construction benthic exposure zone.

Famely p. 5.. [The] sample compositing plan was not informed by the specific technologies to be used for cable installation, and therefore produced a dataset that is limited in its utility for determining potential impacts to biological communities from exposure to contaminants in suspended and resettled sediments. The Sediment Dispersion Modeling report assumes that 25% of sediments are suspended by jet plow operation, and that 50% of sediments are suspended by hand jetting. Based on a review of available literature4 and consultation with an engineer with expertise in submarine cable projects5, it is reasonable to assume that the portion of the sediment column that is suspended in the water column is the upper portion, and that deeper sediments fluidized in the trench stay in place. Thus, based on the assumptions used in the SRP model, it is reasonable to assume that the jet plow will suspend approximately the top 0.9 ft. of sediment in areas of 3.5 ft. burial, and will suspend approximately the top 2 ft. of sediment in areas of 8 ft. burial. Similarly, based on the assumptions used in the SRP model, it is reasonable to assume that hand jetting will suspend approximately the top 1.75 ft. of sediment in areas of 3.5 ft burial. The post-construction biologically active layer is potentially a mixture of the resettled sediments and adjacent surficial sediments which have sloughed in to the trench. Sediment sample compositing should be informed by the jetting suspension rates and the expected remnant surficial sediments in order to realistically quantify potential exposure and risk. Further consideration should be given to the fraction of those suspended sediments that remain suspended in the water column and subsequently may make contaminants available in the water column. The specific consideration of the fine silt and clay particles suspended by jetting is of particular importance because higher levels of contamination are typically associated with these fine organic fractions. For these reasons, the 4-foot composites analyzed for the Sediment Quality Report are inappropriate for characterizing ecological risk and not grounded in the physical and technological processes of the jetting installation processes.

Famely p. 6. Finally, it is likely that the compositing plan resulted in physical averaging over the 4-foot horizon. Therefore, any signal from legacy contamination associated with a particular (historical) sediment layer would have been lost due to mixing with other (cleaner) layers.

Response:

We disagree that the samples collected do not allow for adequate characterization of ecological risk. The compositing permits identification of potentially troublesome contamination, which then might be a trigger for further analysis. The signal would not have been "lost". The data are sufficient to conclude that no "hot spots" are present subject to release and redistribution, and therefore detailed analysis of post-construction sediment distribution becomes unnecessary.

Because the sediments were so uniformly below screening benchmarks, there is no reason to suspect that any hot spots were missed that could have resulted in materially increased and widespread post-construction concentrations.

To further address this potential concern, the additional sampling conducted in May 2017 targeted samples from 0-2 ft at representative locations previously sampled from 0-4 ft. The samples were tested for PAHs, PCBs, arsenic and lead in order to evaluate whether differences between the two intervals might indicate loss of signal due to compositing or depth segregation of contaminants in general. See report entitled *Supplemental Characterization of Sediment Quality Along Little Bay Crossing.*

There were only minor differences between the 0-2 foot interval and the 0-4 foot interval. The small differences confirm the absence of significant depth stratification and any consequent loss of signal in the previously reported 0-4 foot composites. The results demonstrate the absence of elevated concentrations in the top two feet of sediment which are most likely to be mobilized during jet plowing. The previously reported conclusions remain representative for the conditions in the footprint of the jet plowing.

Dur-GI-22

<u>Famely p. 6</u>. … [T]he Sediment Quality Report's compositing plan yielded sediment data that is not comparable to either the National Coastal Condition Assessment (NCCA) data or the ecological sediment benchmarks referenced in the Sediment Quality Report. The standard operating procedures for the National Coastal Condition Assessment specify the use of Young-modified Van Veen Grab (or similar) samplers which collect surficial (7 cm) sediment samples6 for chemical and other analyses. The comparisons made between NCCA data and SRP cores are inappropriate because the sampling and compositing methods were different. Therefore, the conclusion that sediment conditions in the planned cable installation corridor are consistent with NCCA sediment conditions for Little Bay (classified as "good") is not valid. Similarly, the ecological sediment benchmarks used as an "initial screening level review" in the Sediment Quality Report-the Effects Range Low (ER-L) and Effects Range Median (ER-M)7 - were developed from sediment toxicity test data using benthic organisms that inhabit the top 6 to 12 inches of sediment. It is therefore inappropriate to compare a 4-foot composite sample to these benchmarks unless the cable installation process homogeneously mixed all sediments within the trench, and that completely homogeneous mixture was representative of the post-construction biologically active layer. Since all accounts of the jetting process presented by the Applicant and in the literature, suggest that jet plows are designed to minimize sediment disturbance and suspension, comparison of a 4-foot composite sample to the ER-L or ER-M is not valid.

Therefore, there is not sufficient information upon which to base a judgment of whether post-construction sediment passes the Applicant's proposed "initial screening level review".

For these reasons, the conclusion that the sediments in the planned cable installation corridor do not pose a potential risk to ecological receptors is predicated on a faulty and misinformed sample compositing scheme and non-compatible comparisons.

Response:

ER-L and ER-M are standard sediment screening criteria universally used in marine environments for sediment collected by any method. They are not dependent on which technique was used. It is true that the relevance of these screening values is confined to the biologically active zone (i.e. the top 6 to 12 inches), which is why surveys of bedded sediment focus on collecting the surface layer using surface grab samplers such as the VanWeen article cited. In the present case, there is an interest in the contribution of deeper sediment to surface exposures from uncovering and remobilization, so comparing deeper sediment to the screening values is entirely appropriate. Further, as noted previously, the signal is not lost by the composition, although it might be diluted. The absence of a strong signal indicates that redeposited sediment will “pass” the screening independent of how it is rearranged.

It is true that the NCAA metals data were collected as surface grabs, which differs from the methods used for sampling for this evaluation. The differences can be explained by different sampling objectives. However, the comparisons are still valid for the reasons stated above given that the observed maximum concentrations for metals are well below the most stringent screening levels. The exception is arsenic, where some concentrations did exceed the most stringent screening levels, but not more so than seen in the NCAA upper range reported for the Bay.

In summary, it is our opinion that the data collected in the proposed work area are adequate to conclude no significant risk to ecological receptors resulting from the proposed cable installation project. The stated concerns about compositing and screening criteria do not cause us to revise our conclusions.

<u>Issue 3: Analytes: Pesticides</u>

Dur-GI-23

Famely p. 3 (issue also mentioned in Dacey p. 4). Additionally, the SRP analyses omitted pesticides, a standard group of contaminants recommended in Tier I RIM evaluations "based on their toxicity, their persistence in the environment, their ability to bioaccumulate and their widespread and consistent occurrence in New England estuarine, marine and freshwater sediments and organisms."1

Famely p. 7. … the Applicant omitted the following contaminants - which are listed as the required contaminants in the RIM[8] - from its list of parameters analyzed in Little Bay sediment cores:

- *Aldrin*
- *cis- and trans-Chlordane*
- *cis- and trans-Nonachlor*
- *Oxychlordane*
- *4,4'-DDT, DDE, DDD*
- *Dieldrin*
- *alpha- and beta-Endosulfan*
- *Endrin*
- *Heptachlor*
- *Heptachlor epoxide*
- *Hexachlorobenzene*
- *Lindane*
- *Methoxychlor*
- *Toxaphene*

The omission of these pesticides, which are routinely required for analysis under the RIM, is a major data gap because it ignores a significant class of contaminants that falls under regulatory jurisdiction. The disturbance and potential mobilization of legacy pesticides, both within the *biologically active benthic zone and to the water column, is a potentially significant exposure pathway that should have been addressed.*

Response:
We concur that the absence of organochlorine pesticides from the analytical protocol, given that it is a standard part of the RIM protocol, was a potential data gap in the evaluation. Sediments were tested for these pesticides a second round of sampling in May 2017. The report entitled *Supplemental Characterization of Sediment Quality along Little Bay Crossing (Normandeau 2017)* provides the results.

The supplemental investigation, which consisted of resampling at all 12 sample locations, did not show any detections of organochlorine pesticides. Therefore, it can be concluded there is no potential concern related to residual pesticides in sediment subject to mobilization.

<u>Issue 4: Additional sediment parameters</u>

Dur-GI-24

<u>*Famely p. 6 and 7*</u>*. The Sediment Quality Report lists the constituents of potential concern for sediments as the parameters required by the USACE Regional Implementation Manual (RIM), plus a selection of other contaminants (total petroleum hydrocarbons, dioxins/furans, perfluoro compounds) in response to regional concerns. The list of contaminants analyzed by the Applicant is incomplete for two reasons: the list excludes some contaminants required by the RIM, and it excludes some other contaminants that are of particular concern for Little Bay. These omissions represent data gaps in the SRP evaluation that inhibit the complete assessment of potential ecological risks from exposure to reworked and suspended sediments due to SRP cable burial activities*

Response:
The Applicant disagrees that the initial sampling list was incomplete, but to address reviewer concerns, has conducted additional sampling, the results of which are provided in the report entitled *Supplemental Characterization of Sediment Quality Along Little Bay Crossing* for a full discussion. See Issue 3 above for contaminants required by the RIM (i.e. pesticides). This additional information demonstrates that these parameters are not expected to contribute to potential ecological risk from exposures to sediment except as noted and therefore have been sufficiently evaluated.

Dur-GI-25

<u>*Famely p.7 and 8*</u>*. … the Applicant omitted the following contaminants which could occur and potentially impact benthic and aquatic organisms, if released - from its list of parameters analyzed in Little Bay sediment cores:*

- *Herbicides, because they have potentially been introduced historically to Little Bay via storm water runoff*
- *Nitrogen, because it is listed as a source of impairment for Little Bay, Adams Point, and Great Bay in New Hampshire's 2012 §303(d)[1] Clean Water Act list of water quality limited segments. Additionally, recent studies demonstrated that resuspension of sediments leads to a release of nitrogen to the water column in concentrations that suggest desorption from resuspended particles. Quantification of this release is critical given the §303(d) listing and current efforts to limit nitrogen input to Little Bay.*

- *Enterococcus bacteria, because it is listed as a source of impairment for Little Bay, Adams Point, and Great Bay in New Hampshire's 2012 §303(d)[12] Clean Water Act list of water quality limited segments.*
- *Pathogens (e.g. Clostridium pe1fringens and Vibrio), because of potential impacts to shell-fishing and oyster aquaculture if mobilized from sediments under certain enabling conditions.*
- *Fecal coliform, because it is list d as a source of impairment for Little Bay, Adams Point, and Great Bay in New Hampshire's 2012 §303(d)[13] Clean Water Act list of water quality limited segments.*

Response:

Of these parameters, none are listed in the RIM cited by the commenter as the proper evaluation framework. While we understand community concerns about releases of potentially harmful contaminants present in sediment, except for nitrogen, it is not at all likely that sediment mobilization could result in adverse impacts, which is why they were not considered for evaluation. In summary, the absence of these parameters is not at all likely to be a data gap or to "hide" a potential problem.

- Herbicides – While herbicides are doubtless used and present in the watershed, these are not usually considered in sediment quality evaluations because (a) they are relatively soluble, mobile, degradable and tend not to accumulate in sediment, and (b) they have low specific aquatic toxicities relative to residual concentrations. To present a potential issue from remobilization, concentrations would have to be very high, for which there is no indication (clearly harmful concentrations are typically only observed near herbicide manufacturing facilities). Herbicides are not known, or expected to be an issue at Little Bay.
- Enterococcus bacteria and fecal coliform bacteria. These microorganisms are directly related to recent human waste discharges, and are indeed a widespread problem wherever human waste enters the water. However, the microorganisms are short-lived, are found in the water column and have no affinity for settling in sediment. It would be extremely unlikely that sediment disturbance would in any way adversely affect or worsen any current level of impairment.
- Pathogenic bacteria like Clostridium and Vibrio are also associated with human waste. Neither one, however, has been cited in existing water quality evaluations in Great Bay. While Clostridium does have long-lived forms that can persist in sediment, as typically seen where sewage sludges and settling solids accumulate, there is no evidence that such wastes are present, or that the oyster aquaculture industry is currently affected by this issue, and there is no reason to suspect that the sediment underlying the water column would be an additional source of these anthropogenic bacteria.
- Nitrogen is of concern as a nutrient that can cause undesirable eutrophication. The Great Bay system is indeed impaired due to nutrient inputs from upland sources. As the commenter notes, nitrogen biogeochemistry is such that there is interaction between sediment and overlying water. The processes are complex, and not easily evaluated, and there is no simple way to estimate the effect of sediment nitrogen on the water column nitrogen content. That said, we agree that disturbed sediment could contribute to water column nutrient loads.

To fully document this issue, sediment sampling for total nitrogen was conducted in May 2017 at the 12 sampling locations as described in the Supplemental Characterization of Sediment Quality along Little Bay Crossing (Normandeau 2017) to evaluate the potential contribution of nitrogen to the system. Samples were analyzed for total nitrogen, defined as the sum of organic nitrogen and ammonia-nitrogen (reported together as Total Kjeldahl Nitrogen) and nitrate-nitrite nitrogen.

Based on the results, nitrogen in sediment in the Cable Area is present as organic nitrogen (reported as Total Kjeldahl nitrogen which is the sum of organic nitrogen and ammonium nitrogen). This is consistent with typical sediments, which usually contain >90% organic nitrogen. Nitrogen stores, especially in the ammonium form present in deeper sediments not subject to ongoing water/sediment flux may be remobilized to the water column during disturbance. These increases in organic nitrogen and ammonium are expected to be short-lived as the system reequilibrates and the nitrogen reenters the sediment sink. Overall this released nitrogen would account for only a small percentage of the total nitrogen concentrations in the sediment As the nutrient criteria for nitrogen in Great Bay are based on long term exposure values (and are based on a 5-year average), short-term increases in surface water nitrogen concentrations from sediment disturbance are unlikely to adversely affect the attainment status for nutrients in Little Bay.

Issue 5: Water Column Impacts

Dur-GI-26

Famely p. 3. *Further, because the proposed cable burial method will mobilize sediments to the water column, RIM would require a Tier II evaluation of compliance with state water quality standards using sediment concentrations and a numerical mixing model, as well as an evaluation of potential bioaccumulation for non-polar organic contaminants. If these numerical evaluations indicated potential risk, the RIM would then require a standard elutriate toxicity test. If Tier II analyses were inconclusive, further analysis would be required (such as water column and sediment toxicity tests, sediment bioaccumulation tests, long term bioassays and bioaccumulation tests, and risk modeling).*

Response:

Water quality impacts are indeed a key objective of the RIM Tier II evaluation just as described. However, we note that the evaluation of the pre-mobilization sediment against conservative screening criteria demonstrate that the reported contaminant levels are not elevated enough to trigger any adverse effects, so additional tiers of evaluation, would be unnecessary. That said, we acknowledge that the link between sediment concentrations and potential water quality impacts could be demonstrated more rigorously. To evaluate this possibility, Step 1 (“Evaluation for compliance with Water Quality Criteria”) of Tier II of the RIM manual has been conducted and is described in the report entitled Supplemental Characterization of Sediment Quality Along Little Bay Crossing.

The results indicate that except for copper there is no potential for exceedance of acute water quality criteria unless the suspended sediment (SS) concentration is well above 1,000 mg/L. Copper, due to its low acute toxicity value, theoretically could result in a water quality exceedance upon 100% dissolution when SS concentrations exceed 430 mg/L for an hour or more.

Review of the revised sediment dispersion model output provides value for maximum time integrated excess suspended solids for the jet plow and hand jetted segments. As noted in the report, the likely dissolution of sediment copper is orders of magnitude less than the 100% dissolution assumed by the RIM mass balance model, indicating any actual impact is exceedingly unlikely.

No other contaminants could result in water quality concerns. Therefore, it can be concluded that acute water quality impacts due to toxic contaminants contained in the sediment are not a concern for the project.

Dur-GI-27

Famely p. 4 *The State of New Hampshire has established surface water quality standards not only for the parameters assessed in the SRP Application for Water Quality Certification (Benthic*

Deposits [1703.08] and Turbidity [1703.11]) but also for bacteria, nutrients, metals, semi-volatile organic compounds (including PAHs), pesticides, and PCBs. Although the Applicant measured some of these contaminants in sediments (see also critique of sediment compositing plan), no modeling of potential water column concentrations was performed. The SRP Application for Water Quality Certification incorrectly assumed that no pollutant loading analysis was necessary because "the project proposes no increase in impervious surfaces and thus no changes in pollutant loading," ignoring the fact that the installation will mobilize historically buried sediments (to which pollutants could be adsorbed, suspended as particulates, and subsequently dissolved) to the water column.

Response:

The commenter is correct that there are water quality standards for additional parameters beyond those evaluated in the sediment. However, considering the RIM, recommended by the commenter, these are not normally a part of an evaluation of this sort, in large part because of the absence of a clear nexus between sediment and surface water. The list of evaluated contaminants (including organochlorine pesticides which were analyzed in a supplemental evaluation) is consistent with RIM dredging evaluation guidance.

However, we do acknowledge that the evaluation could better demonstrate that sediment contaminant concentrations, as low as they are, do not present a threat to water quality upon mobilization, as demonstrated by the USACE mass balance model as specified in Tier II, Step 1 of the RIM (See discussion in Dur-GI-26).

Dur-GI-28

Famely p 4 and 5 … Little Bay and surrounding waterbodies (Adams Point and Great Bay) are on New Hampshire's 2012 §303(d)[3] Clean Water Act list of water quality limited segments. The parameters upon which these impairment listings are based include:

- *Light Attenuation Coefficient*
- *pH*
- *Dissolved Oxygen*
- *Nitrogen (Total)*
- *Enterococcus*
- *Fecal Coliform*
- *Polychlorinated biphenyls*
- *Dioxin (including 2,3,7,8-TCDD)*
- *Mercury*

Because these waterbodies are currently being regulated on these parameters, the Applicant should demonstrate that SRP installation activities will not cause further impairment from construction-related sediment suspension.

Response:

As noted in the previous response, polychlorinated biphenyls (PCBs), dioxins, and mercury were already considered in the evaluation. As shown in the RIM Tier II water quality model presented above, even if mobilized during the activity, the observed concentrations would have no adverse impact.

Of the other causes of 303(d) impairment in the Great Bay system only nitrogen (a eutrophication causing nutrient) could reasonably present a nexus between sediment nitrogen content and the water column. The contribution of sediment nitrogen to the water column was discussed in Section 2.4 which demonstrated that nitrogen released from any sediment suspended as part of the activity would not affect nutrient status on the time scales of concern (see Dur-GI-26).

Light attenuation, pH and dissolved oxygen are dependent on biological activity and nutrient loading to the system and are mid- to long-term biological processes. While temporary spikes in oxygen demand (resulting in depressed oxygen content), or an increase in the light attenuation coefficient could occur, these would be the result of short-term spikes when disturbed suspended sediment is present and would quickly revert to normal conditions once the sediment settled out.

Issue 6: Potential Impacts to Oysters

Dur-GI-29

Famely p.8 The Natural Resource Impact Assessment concludes that there will be no impact from suspended sediments to oysters in natural and restored beds or in aquaculture because exposure to suspended sediments would be too low to elicit any effects, and because sedimentation in the vicinity of the oyster beds and aquaculture areas would be ≤0.5 mm. These conclusions were based on the findings in Wilber and Clarke (2001)[14]. The Applicant should re-examine potential impacts to oysters considering both the model sensitivity analysis (recommended by M. Shultz, Woods Hole Group) and in light of more recent literature review[15] by the same authors. The assessment of potential impacts due to excess turbidity and sedimentation should focus especially on sensitive life stages.

Response:

The Project has reviewed the paper cited by WHG (Wilber and Clark, 2015)

- The researchers found that sedimentation of 1-2 mm on an oyster reef can inhibit larval settlement. This is not a concern as a result of the cable burial because of the timing of the installation, which will occur after the natural settlement period for oyster larvae in Great Bay, and because the deposition at the closest oyster reef south of Furber Strait is predicted as essentially 0.
- The researchers also found no significant effects on hemocyte activities, plasma protein, condition index, or disease progression on oysters exposed to up to 1 g/L of suspended clay particles for 40 days. Given that the plume from the cable installation is predicted to dissipate within hours of installation, these data support the premise that no adverse effects to oysters will occur as a result.

While the findings in Wilber and Clarke are certainly useful in evaluating potential impacts from jet plowing, the paper is focused on impacts from dredging projects, that typically have a much longer duration than will occur during the cable installation. Dredging often requires keeping the dredge in one area, exposing the same resources continuously, which will not be the case with the cable installation.

DUR-GI-30

Famely p.8. Additionally, the mobilization of sediments to the water column could expose oysters to various chemical and bacterial constituents which could have adverse effects on sensitive life stages or on commercially viable stocks. These potential impacts need to be reviewed in order to *ensure the ecological health of oyster (and other shellfish) populations/stocks as well as to safeguard against potential public health issues*

Response:

As noted in responses to previous comments, release of contaminants from sediment suspended due to the activity would not be expected to have adverse effects on oyster beds because the suspended sediments do not contain any contaminants at concentrations that could materially affect the oysters, nor would they be expected to be a source of additional bacterial constituents.

Issue 7: Assessment of Life-cycle Impacts of the Cable Burial

Dur-GI-31

Famely p.9 The Sediment Dispersion Modeling report and the derivative impact assessment documents focus on the potential impacts of SRP construction in Little Bay. Based on the various critiques of these assessments presented in this preliminary analysis and in the preliminary analyses of M. Shultz (Woods Hole Group) and M. Dacey (Geolnsight), it is my opinion that cable installation impacts have not been sufficiently addressed by the Applicant because there are significant gaps in data and analyses in the Applicant's evaluation of cable installation impacts. In addition, the other components of the project that are lacking in quantitative impact analysis are:

- *Removal of sections of existing out of service cables from Little Bay prior to SRP construction*
- *Excavation of SRP cables from Little Bay during project service life for repair and maintenance*
- *Removal of SRP cables from Little Bay at their end of service life*

The assessment of the cumulative life cycle impacts of the SRP cable burial in Little Bay is incomplete because it ignores these activities which "will necessarily disturb sediments and suspend them into the water column". The Applicant should discuss the methods, timing, and spatial extent of these activities, and quantitatively assess their impacts because the SRP impact assessments are inadequate in their absence.

Response:

Removal of sections of the existing cables – see proposed Cable Removal Plan.

Maintenance and repair of SRP cables – See below.
Removal of SRP cables at end of service –
It is not anticipated that the Applicant will decommission the new 115 kV Line F107. The Independent System Operator-New England ("ISO-NE") has determined that the Line F107 is needed in order for the electric transmission system to continue to operate reliably. Once constructed, the new Line F107 will form an integral part of the electric transmission system and become a baseline element in ISO-NE's planning studies. Transmission lines of this nature must remain operational and, thus, are typically rebuilt or repaired, as needed, and remain in service If, hypothetically, ISO-NE determined that Line F107 was no longer needed and the Applicant determined that Line Fl07 needed to be decommissioned or the line needed to be repaired or replaced to remain in service all work would be completed under USACE and NHDES permits and consultation. The proposed submarine cables are designed and intended to have an extended service life of 40 years or more without the need for repair, maintenance or replacement. In the rare event of a cable failure or maintenance this work is generally concentrated to the local area of failure and the repair technique and procedure would depend on the location of the maintenance, condition of the cable and condition of the

surrounding environment. Eversource would work with USACE, NHDES and any other applicable agency to determine the appropriate procedure and mitigation.

Issue 8: Water Quality Monitoring Plan

Dur-GI-32

Famely p.9 The water quality monitoring plan (the Monitoring Plan) presented in the Little Bay Environmental Monitoring Plan (Appendix D of SRP "Application/or Water Quality Certification") is inadequate because it is predicated on unsubstantiated assumptions, is too permissive in its definition of what conditions constitute a water quality violation, and does not provide a framework for real-time adaptive management of water quality during construction activities.

The Applicant proposes to implement a mixing zone because the construction activities are expected to cause exceedances of the water quality criterion for turbidity (increases greater than 10 NTU above background). The Monitoring Plan asserts that the proposed mixing zone "complies with all Minimum Criteria established in Env-W q 1707 .02" but does not present evidence to substantiate this claim. Although some of this information may be presented in various other parts of the SRP application, the relevant information should be summarized (at minimum) in the Application for Water Quality Certification to substantiate the claim that the proposed mixing zone:

a) Meets the criteria in Env-Wq 1703.03(c)(1);
b) Does not interfere with biological communities or populations of indigenous species;
c) Does not result in the accumulation of pollutants in the sediments or biota;
d) Allows a zone of passage for swimming and drifting organisms;
e) Does not interfere with existing and designated uses of the surface water;
f) Does not impinge upon spawning grounds and/or nursery areas of any indigenous aquatic species;
g) Does not result in the mortality of any plants, animals, humans, or aquatic life within the mixing zone;
h) Does not exceed the chronic toxicity value of 1.0 TUc at the mixing zone boundary; and
i) Does not result in an overlap with another mixing zone.

The Monitoring 'Plan lists the following procedures for the determination of compliance with the turbidity criterion based on field monitoring of turbidity 1,000 ft. up-current and 1,000 ft. down-current of the construction activity:

• The three water column measurements collected at each impact and each reference station will be averaged for each hour
• Average values at an impact station will be compared to the range of reference station averages for that hour
• If average turbidity at any impact station exceeds the highest reference station value by <10 NTUs at a given time, the difference between values will be considered to be insignificant
• If average turbidity at any impact station exceeds the highest reference station value by more than 10 NTUs for that particular hour, but does not exceed the highest reference station value the following hour, then the exceedance is considered to be insignificant

• If average turbidity at any impact station exceeds the highest reference station value by more than 10 NTUs for two consecutive hours, then further evaluation will be required These procedures for the determination of compliance with the turbidity criterion are too permissive in their design and are not grounded in an understanding of the potential impacts of SRP construction or the regulations. The Monitoring Plan proposes that turbidity will be measured at the near-surface, mid-depth, and near-bottom. It is reasonable to monitor these three strata in the water column because many factors (including temperature, salinity, currents, sediment particle size) can influence where suspended sediments migrate in the water column after initial entrainment. What is unreasonable, however, is that the Applicant intends to average these three measurements for comparison to similar water column averages from the reference stations. Averaging both dilutes the signal in the impact area and ignores the very different assemblages of organisms that may be exposed to the turbidity plume during construction. In addition, the Applicant proposes that the determination of significance should be based solely on the duration of exceedance - an exceedance lasting less than 2 hours is judged to be insignificant. This determination is not appropriate because Env-W q 1708.09 does not allow for a determination of significance based on duration. The State regulations regarding the determination of significance assert that an activity is significant if it is "projected to use20% or more of the remaining assimilative capacity for a water quality parameter". Thus, the Applicant should base the determination of significance on an assessment of assimilative capacity for Little Bay.

The Applicant's Monitoring Plan allows for further permissiveness in the determination of significance because turbidity exceedances of more than 1 0 NTU above background for more than 2 hours are not automatically judged to be significant, but rather will be passed along to the regulatory agencies for comparison to the range of available historical data (for Fall months) from the CICEET buoy[16] in Great Bay. Judgment of the significance of water quality criterion exceedances should not be based on post-hoc data analysis by regulatory agencies. These determinations are regulated under the New Hampshire Surface Water Quality Regulations (Env-Wq 1700), promulgated by the NHDES, and the Applicant should present an analysis of remaining assimilative capacity rather than proposing alternative methods for these determinations. Finally, the Monitoring Plan asserts that it is not feasible to stop and re-start jet plow operations without risking additional sediment disturbance, and therefore the results of the water quality monitoring for the first installation will inform adjustments to subsequent installations. This argument is flawed because it is entirely within the contractor's control to adjust the water pressure and rate of advancement of the jet plow during installation[17]. Thus, the Monitoring Plan should be modified such that it allows for real-time adaptive management of the jet plow operation in response to ongoing turbidity monitoring. Instead of a turbidity criterion exceedance triggering further post-hoc comparisons, any exceedance should trigger real-time management measures to reduce turbidity in addition to post-hoc analysis to inform subsequent installation parameters.

The Applicant should revise and expand the proposed water quality monitoring plan in order to ensure that all anticipated impacts from the project are documented and evaluated against the appropriate criteria. The plan should expand the duration of pre- and post-disturbance monitoring. Because of the high variability in ambient turbidity presented by the Applicant, it is important to know what the conditions are more than just one hour before commencing construction. Because the sediment plume can remain suspended in the water column, and this suspension may be influenced by environmental conditions, it is important to confirm the model's prediction that the plume dissipates two hours after termination of construction by extending post-disturbance monitoring until downstream turbidity is not significantly different from upstream (reference) turbidity. Most importantly, turbidity should not be the only parameter *monitored during construction. In order to effectively detect and manage potential impacts, the Applicant should design the monitoring plan to account for all parameters under the jurisdiction of the State of New Hampshire surface water quality standards (New Hampshire Code of Administrative Rules, Chapter Env-W q 1700) as well as the parameters listed as limiting factors on New Hampshire's 2012 §303(d) listings for Little Bay and adjoining segments.*

Response:

The Little Bay Environmental Monitoring Plan has been revised to respond to the revised sediment dispersion modeling results and cable design and installation refinements. Please see also the Applicant's response to CP-DES 15.

Issue 9: Electromagnetic Field Monitoring Plan

Dur-GI-33

Famely p.12 The Natural Resource Impact Assessment acknowledges that little is known about how benthic invertebrates respond to electromagnetic fields (EMFs), citing a BOEMRE (prepared by Normandeau) study[18] *on EMFs from submarine power cables. This BOEMRE study recommends monitoring EMF once the cable is powered in order to verify the modeled level of exposure and determine if any impacts have occurred, however an EMF monitoring plan is not included in any monitoring plans reviewed in the SEC application. The Applicant should follow its own consultant's published recommendations regarding monitoring the effectiveness of EMF mitigation measures, and design an EMF monitoring plan for the SRP accordingly.*

Response:

While EMF measurements are not necessarily a priority for this type of transmission project, Eversource has agreed to perform such measurements upon completion of the project. A plan for this monitoring has not been established for this project at this time, but can be provided when it is prepared with particular focus on the benthic beds for measurements.

Issue 10: Turbidity and TSS Data Used to Establish Ambient Range

Dur-GI-34

The SRP "Natural Resource Existing Conditions Report" (Existing Conditions Report) presents very large ranges for turbidity and total suspended solids (TSS) in the vicinity of the SRP planned cable installation corridor. These measurements need to be thoroughly vetted in order to develop an accurate and representative understanding of ambient water quality conditions in immediate and adjacent waterbodies, especially for the time of year of planned SRP construction (late Fall and early Winter). Although these turbidity and TSS measurements do not directly frame the threshold upon which to judge a water quality violation (the Environmental Monitoring Plan sets up turbidity monitoring up-current and down-current of the construction area), their accuracy is nonetheless important because Applicant has proposed a contingency for judging exceedance significance based on historical turbidity data.

The Existing Conditions Report presents turbidity data for Great Bay over four years (2009- 2013) from the months April- December, omitting data from January- March. Although mean turbidity is generally low, maximum values can exceed the mean by two orders of magnitude. These data are not representative of the expected conditions during SRP construction because they include Spring and Summer data, when no construction activity will take place. Further, factors such as precipitation, wind, waves, currents and ice scour can affect turbidity, but the Applicant does not present an *analysis correlating turbidity to any of these factors. Therefore, given the data presented by the Applicant, it would be impossible for a regulatory agency to judge the significance of a water quality exceedance in the short window of time between individual cable burials.*

The Existing Conditions Report also presents TSS data for Adams Point (Table 3.4-8), indicating that TSS was statistically higher during 2001-2008 than during 1974-1981. The standard deviations of these datasets were very high. Additionally, it has been reported19 that Winter (January- March) TSS data from Adams Point collected between approximately 2003 and 2014 are biased high due to the method of sampling. For these years, when the floating docks at Jackson Estuarine Lab were removed to prevent ice damage, TSS samples were collected via wading instead of by boat (in the channel). Investigators comparatively demonstrated that these nearshore data are not comparable to channel data (historically taken at end of pier or by boat) because wading samplers could not avoid the back eddies and shallow water resuspension. Therefore, some of the data presented in Table 3.4-8 are likely biased high and should not be relied upon to establish the ambient conditions for Little Bay without further investigation.

The Applicant should address this variability in greater detail and present an expected possible range of turbidity (or TSS) levels for the period of SRP construction in order to best anticipate potential impacts of additional suspended solids from construction. Also, the applicant should more thoroughly explain other factors affecting background turbidity levels (precipitation, wind, waves, currents, ice scour).

Response:

As referenced in CP-DES 15, Normandeau measured turbidity and TSS for the Fall of 2016 and in the Spring of 2017 to better define conditions at the site (see Revised Little Bay Environmental Monitoring Plan, Appendix A). Based on that information, we are using 20 mg/l TSS as a conservative surrogate for 10 NTUs to allow a comparison between the sediment dispersion modeling and DES's water quality criteria, but recognizing that the results are highly variable ($r = 0.34$) at low NTUs. See also the revised sediment dispersion modeling report for sensitivity analyses for some of the factors listed above (precipitation, wind, waves, and currents). Ice scour will not be a factor during the Fall installation period. For all of these variables, the proposed upgradient water quality monitoring stations during construction will provide the most reliable data for establishing background NTU conditions.