Public Service of New Hampshire
Seacoast Reliability Project

2019 Pre-Construction
Eelgrass Monitoring Results
Durham to Newington, NH

Presented To:
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1.0 Introduction

Eversource Energy is constructing a new 115 kilovolt transmission line between their existing Madbury and Portsmouth substations to enhance the electric reliability in the seacoast region. On January 31, 2019, the NH Site Evaluation Committee (SEC) approved a permit application from Eversource for the Seacoast Reliability Project (SRP), located in the Towns of Madbury, Durham, and Newington, as well as the City of Portsmouth, in Strafford and Rockingham Counties, New Hampshire. The SRP transmission line will be approximately 12.9 miles long, including a 0.9 mile crossing under Little Bay.

Eversource has designed the SRP to avoid environmental impacts where possible, however, temporary impacts to estuarine benthic habitat are unavoidable in Little Bay due to the proposal to bury the three submarine cables between 3.5 and 5 feet in the substrates via jet plow. The submarine cable crossing will directly impact a corridor approximately 100 feet wide along the 0.9 mile cable route. The cable crossing lies within a charted Cable Area approximately 1,000 feet wide.

The SEC Certificate of Site and Facility includes a number of conditions recommended by DES. DES Condition 41 addresses eelgrass surveys and states:

41. Eelgrass Survey: To assess the impact of work associated with laying cable in Little Bay on eelgrass, the Applicant shall conduct an eelgrass survey in the Little Bay estuary the summer before construction commences and, if directed by NHDES, approximately one year after work is completed. At least ninety (90) days prior to the scheduled date for conducting the pre- construction survey, the Applicant shall submit a plan describing

- how, when and where the survey will be conducted;
- how results will be assessed to determine impact on eelgrass;
- how and when results will be reported to NHDES;
- mitigation measures that will be implemented based on eelgrass impacts and recovery; and
- when the data will be provided to NHDES in a geodatabase that NHDES can use to update its current eelgrass GIS coverage.

The Applicant shall then implement the approved plan. To the maximum extent practicable, the methodology for conducting the survey shall be consistent with recent surveys conducted for the Piscataqua River Estuaries Program (PREP). Results of the pre-construction survey shall be submitted to NHDES no less than thirty (30) days prior to the scheduled cable installation date and shall be approved by NHDES prior to cable installation in Little Bay. A report comparing the pre to post- construction survey results shall be submitted to NHDES for approval no more than ninety {90) days after the post-construction survey is completed. Modifications to this condition may be allowed at the discretion of NHDES.

No known eelgrass (*Zostera marina*) beds have been documented in the project area since 2012, but the SRP has agreed to conduct additional monitoring immediately before, and potentially the year after, the cable installation. The following text and plans describe the existing conditions, construction activities, and plans for pre- and post-construction monitoring of the cable crossing area for eelgrass.

2.0 Eelgrass in the Great Bay Estuary

Eelgrass is the most widespread aquatic vegetation in the Great Bay system, and provides significant habitat function both biologically and physically (Thayer et al. 1984; Jones 2000). In the Great Bay system, the plants create a three-dimensional structure on an otherwise flat substrate. This structure provides refuge, settlement surfaces, and feeding opportunities for numerous invertebrates and finfishes. Invertebrates, including lobsters, and finfishes, including winter flounder, have been documented as using eelgrass beds as breeding or nursery grounds. Plant growth is typically greatest from May through August (Nedeau 2004). Light penetration, or water clarity, is a critical factor in controlling the depth at which eelgrass can survive (Morrison et al. 2008) and can be affected by phytoplankton, suspended sediments, and colored dissolved organic matter.

Eelgrass distribution in Little Bay has varied tremendously in the last 4 decades. In 1980, eelgrass beds were found throughout Little Bay, covering the entire length of the shallow subtidal zones along both sides of the upper bay from Adams Point to Fox Point (Jones 2000). It was completely absent from Little Bay in 1991 (Jones 2000). Short (2013) reported that it was essentially absent from Little Bay from 2007 through 2010, and his reports indicate it was absent from upper Little Bay since the annual surveys began in 2002. In 2011 and 2012, eelgrass was recorded in Welsh Cove and along the eastern shoreline from the point north of Welsh Cove nearly to Fox Point (south and north of the cable route, respectively). Short (2013) stated that the eelgrass observed was likely the result of a seedset. In 2013, Barker found that eelgrass was absent from both Welsh Cove and the eastern side of Little Bay, and it has not been recorded in either area or elsewhere in upper Little Bay since (Barker 2014, Short 2016a, Short 2016b, Barker 2017, Barker 2018).

On October 14, 2013, Normandeau Associates conducted a towed underwater video survey along transects within and south of the mapped cable area where eelgrass had been reported in 2012 (Normandeau 2016). One transect extended across the bay to the western shoreline. No attached eelgrass was observed on any of the five transects. In addition, because water clarity was good, the field crew was able to observe that eelgrass was absent to the shoreline in Welsh Cove. Other incidental observations by Normandeau biologists during shellfish surveys in September 2014 did not find eelgrass on the western tidal flats within the cable corridor.

3.0 Potential Impacts to Eelgrass

Installation of cables across Little Bay could have three potential mechanisms for impacting eelgrass, if it is present in the area: direct loss of eelgrass in the construction footprint; reduction of primary production from reduced light as a result of increased suspended sediments (i.e., suspended sediment plume); and sedimentation on existing eelgrass (i.e., settlement of sediments suspended by construction) .

Direct Loss

Eelgrass plants within the construction path would be directly impacted by the jet plow. The width of the jet plow is approximately 15 feet, including the plow blade (13 inches), and the sled runners on either side (approximately 12 inches). Because the passage of the plow disturbs sediments, we have conservatively assumed that eelgrass within the entire 15 foot path of the jet plow would be directly impacted during construction.

Reduced Water Clarity

Suspended sediment plume modeling conducted by RPS (2016, 2017) predicted that the duration of potentially reduced light at any given location in Little Bay during the installation of the SRP cables will be measured in minutes to hours and that the highest suspended sediment concentrations would be found in the immediate vicinity of the jet plow. Water clarity is a major factor affecting the depth to which eelgrass can thrive in an estuary. Prolonged periods of unusually high turbidity or suspended sediment loads can effectively reduce light penetration. In a mesocosm study, Short et al. (1993) found that after five months eelgrass maintained under reduced light conditions exhibited a logarithmic decline in shoot density and biomass productivity, a far longer period than the duration of the plume from cable installation. Thus, if eelgrass were present in the area where the plume occurs, the duration of exposure would be too short to have a measurable effect on productivity. In addition, installation of the cables will occur in September-October, well after eelgrass productivity and biomass in the Great Bay system have peaked; as a result, any reduction in irradiance would have a smaller effect on annual productivity than were this to take place during the peak growing period (mid-summer).

Sedimentation

RPS (2016, 2017) predicted that resettlement of sediments suspended into the water column from the installation would occur predominantly in the vicinity of the cable route although deposition of less than 1 mm could extend beyond the area shown on Figure 1. Brodersen et al. (2017) examined the effects of settlement of sediment particles on eelgrass blades from a repeated exposure to highly concentrated levels of suspended sediments for several days to simulate a dredging operation. The authors found that coating the blades with sediments could reduce production either through reduced irradiance or by interfering with gas exchange through an increase in the diffusive boundary layer. While it is possible this effect could result from installation of the SRP cables, it is unlikely given that the plume will be very short-lived and localized, and resetteled sediments would only accumulate sufficiently to affect eelgrass in the immediate vicinity of the cable installation.

On the east shore, 21 transects were spaced approximately 16 m (50 feet) apart (Figure 2). The transects were centered around the cable corridor, and extended approximately 160 m (500 feet) to the north and south of the cable route to include areas that could potentially experience some deposition as well as nearby reference areas. The transects were approximately perpendicular to the shoreline and parallel to each other. Three transects were conducted the full length of the project corridor, one along each cable route from the east to the west shore to determine if any new eelgrass was present (Figure 2). Because eelgrass had not been observed in the channel in Little Bay by PREP, the video surveys for all other transects ended at approximately the 25 foot contour.

On the west shore, a total of six additional transects spaced approximately 16 m (50 feet) apart were laid parallel to the full crossing transects to the north and to the south of the corridor (Figure 2). Normandeau biologists also conducted visual inspections the tidal flats on the east and west sides of the cable route.

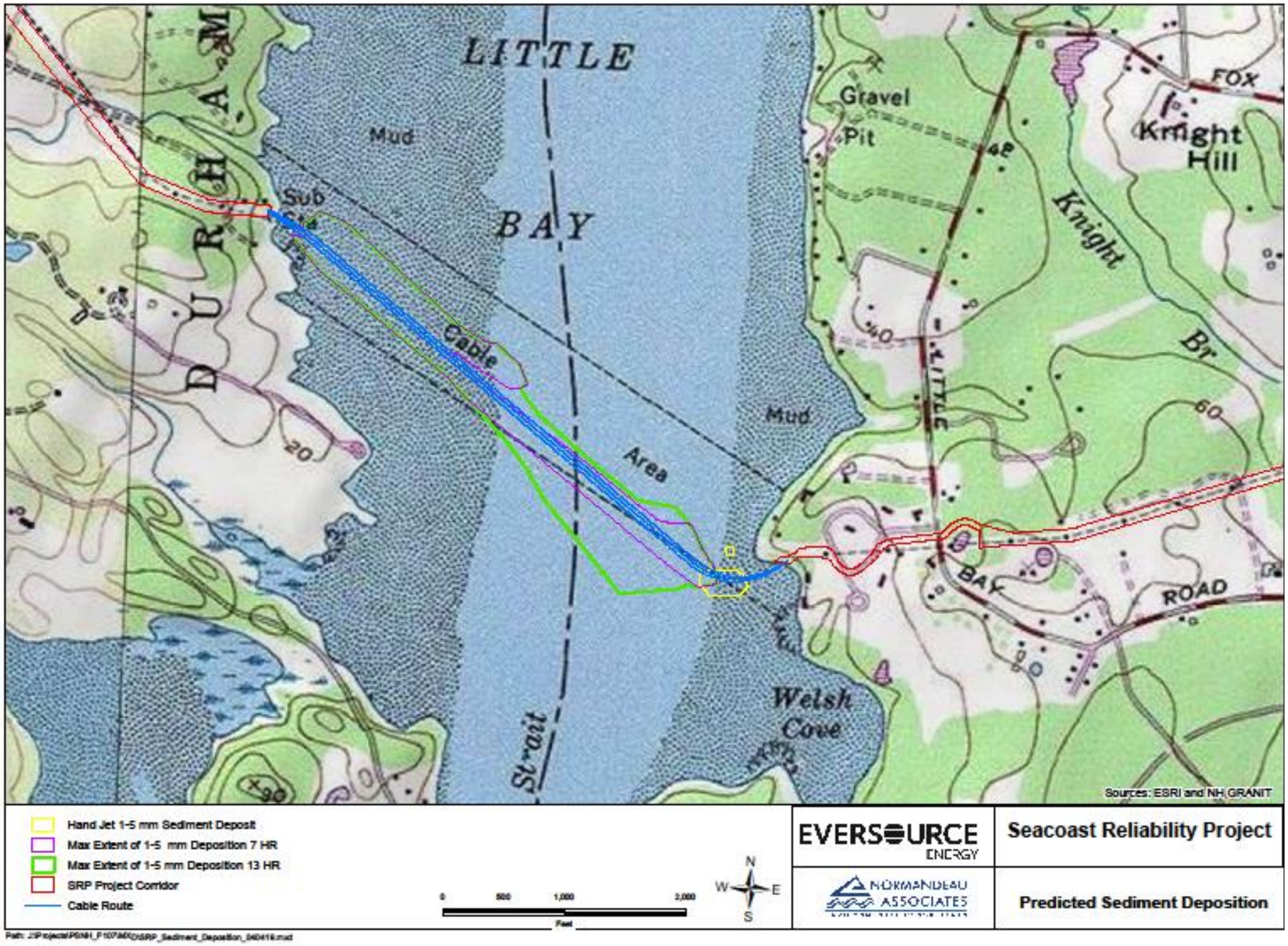

Figure 1. Area predicted to experience redeposition of sediments suspended during jet plowing or hand jetting.

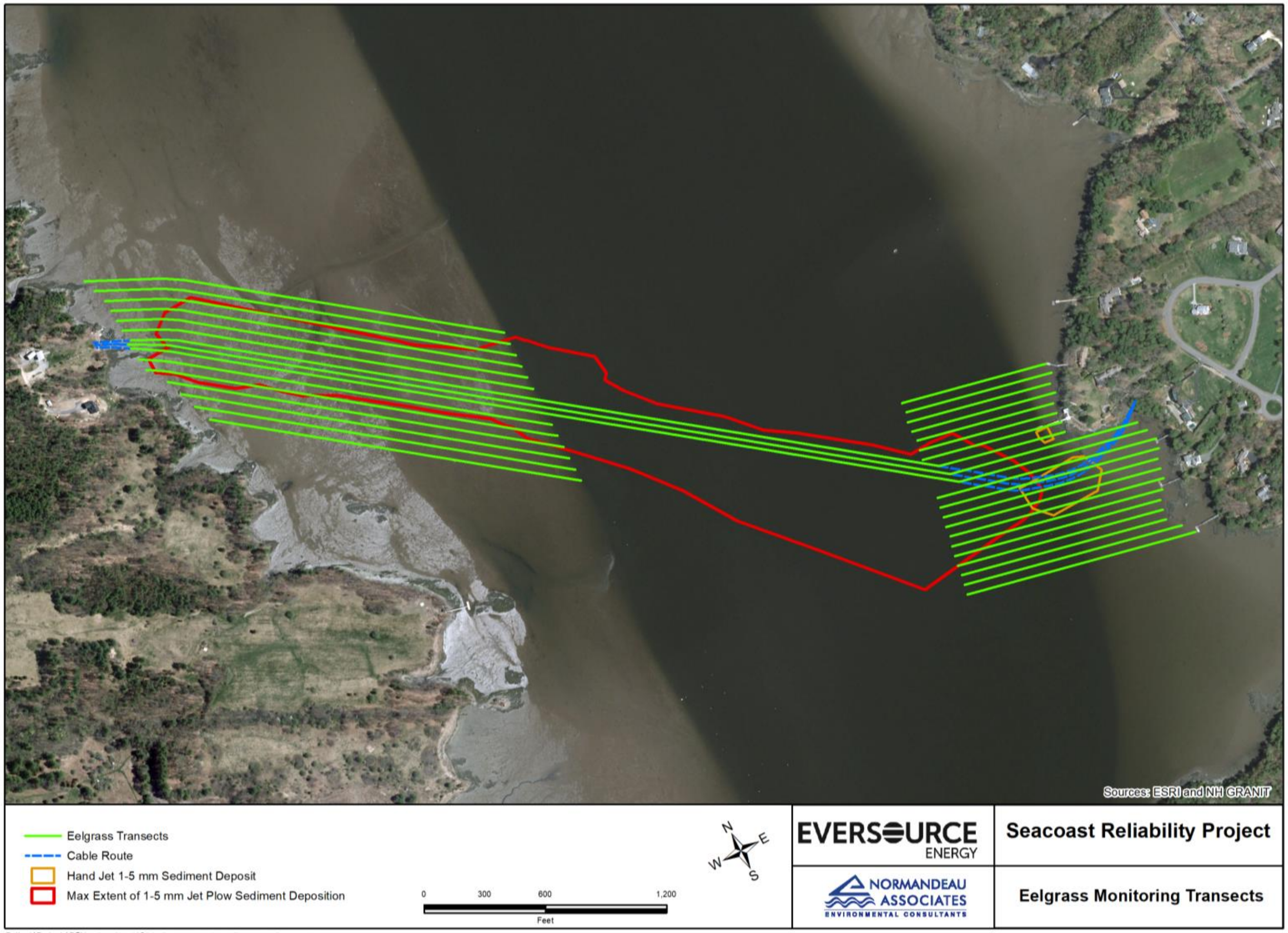

Figure 2. Location of 2019 pre-construction transects.

Video recordings were made with a Sea-Drop 950 made by SeaViewer Underwater Video Systems with a topside LCD viewer, GPS overlay, and a digital video recorder using SD cards. The camera was attached to a weighted and balanced frame and towed alongside the vessel at the lowest speed possible (≤ 0.25 knots) providing optimal viewing of the substrate. The camera was generally kept approximately 2 feet off the bottom for an optimal viewing angle, which allows for a view window approximately 5 feet wide. Speed and direction was adjusted as needed to accommodate for drift caused by wind and currents. Normandeau field biologists monitored the video and adjusted the height of the camera off the seafloor, as depth and terrain varied, to maintain good visibility. Water depth, time and GPS coordinates and field accuracy was recorded at the start and stop of each transect.

Where eelgrass was detected, the latitude and longitude of each plant was recorded (degrees decicimal minutes). The linear extent and percent cover of any bed encountered would be documented from the video footage. The percent cover was estimated according to the density classes used in the Visual Guide for Eelgrass Percent Cover for Photointerpretation in Matso et al. (2018, Appendix A). The five density classes are not present (<10%), patchy (10-30%), half (30-60%), some bottom (60-90%) and dense (90-100%). Additional information on characteristics of the eelgrass bed such as presence of macroalagae, epiphytes and other organisms were noted. After completion of the transect surveys, the edges of any beds detected would have been approximated by multiple passes in different directions over the bed with the video camera.

Allvideos and still shots from each transect were reviewed in the office to confirm field observations and to clarify any questionable interpretations made during sampling. Coordinates were recorded for the the endpoints of all transects, and any eelgrass plants observed. The videos, photographs and ArcGIS data will be provided to DES for inclusion in their database.

4.0 Results

During the July 2019 survey, only scattered plants were noted in the project area indicating the absence of established patches or beds as defined by PREP (Matso et al, 2018). Individual plants were observed in 61 locations across most transects and one to three plants were noted in 2 locations.(Table 1; Figures 3 and 4). The plants were sparsely distributed along the transects and only rarely was more than one plant observed within several meters of another. The majority of the plants (45) were observed on the western tidal flats, and 18 plants were observed on the eastern side. All but one of the plants were observed between 0 and -2 feet (NGVD) of water; one plant occurred in approximately -12 feet of water. All were observed to be in good condition with little epiphytic cover. Of the plants noted, most appeared to be well rooted, although some on the west shore appeared less secured in the sediment with some rhizomes exposed. After completion of the video recordings, the field team traversed the flat on the west side (water depths approximately 2-4) to confirm the absence of clusters of plants that could be considered to be a bed. None were observed.

Assuming the video camera is surveying a 5-foot (1.5 meter) wide swath and the plants were conservatively spaced 6.5 feet (2 meters) apart, the average spacing of the plants is less than 1 stem/m^2. This would typically be considered less than 1% cover, or a trace amount. Based on the PREP density classes, eelgrass with less than 10% is considered “not present” (Matso et al. 2018).

Table 1. Eelgrass location by Transect

Transect	Latitude	Longitude	Observation
5	43 05.9210	70 51.3426	Single plant
7	43 05.9124	70 51.4047	Possibly not rooted
8	43 06.1678	70 51.9093	Single plant
	43 06.1751	70 51.9219	Single plant
	43 06.1897	70 51.9490	Single plant
	43 06.1993	70 51.9645	Single plant
9	43 06.2766	70 52.1020	Single plant
	43 06.1602	70 51.9051	Possibly not rooted
10	43 06.1758	70 51.9408	Single plant
	43 06.1751	70 51.9389	Single plant
	43 06.1896	70 51.9689	Single plant
	43 06.1883	70 51.9656	Single plant
13	43 05.8517	70 51.3391	Single plant
	43 05.8479	70 51.3171	Single plant
	43 05.8485	70 51.3162	Single plant
	43 05.8475	70 51.3052	Single plant
	43 05.8464	70 51.3032	Single plant
14	43 05.8403	70 51.3205	Single plant
	43 05.8403	70 51.3214	Single plant
	43 05.8399	70 51.3381	Single plant
15	43 05.8324	70 51.3235	Single plant
16	43 05.8222	70 51.3296	Maybe 3 plants
18	43 05.8026	70 51.3088	Single plant
19	43 05.8021	70 51.3494	Single plant
	43 05.7992	70 51.3256	Single plant
20	43 05.7870	70 51.3310	Single plant
	43 05.7890	70 51.3429	Single plant
	43 05.7953	70 51.3675	Single plant
21	43 05.7833	70 51.3299	Single plant
22	43 06.3394	70 52.1013	Single plant
23	43 06.3436	70 52.1321	Single plant
	43 06.2722	70 51.9984	Single plant
	43 06.2563	70 51.9684	Single plant
	43 06.2470	70 51.9533	Single plant
24	43 06.2082	70 51.9050	Single plant
	43 06.2191	70 51.9238	Single plant
25	43 06.3276	70 52.1265	Single plant
	43 06.2121	70 51.9231	Single plant
26	43 06.1587	70 51.8558	Single plant
	43 06.1933	70 51.9132	Single plant
	43 06.2256	70 51.9668	Single plant
27	43 06.1913	70 51.9408	1-3 plants

(continued)

Table 1. (Continued)

Transect	Latitude	Longitude	Observation
28	43 06.1018	70 51.8386	Single plant
	43 06.1580	70 51.9412	Single plant
	43 06.2172	70 52.0333	Single plant
	43 06.2212	70 52.0381	Single plant
29	43 06.1826	70 51.9937	Single plant
	43 06.1725	70 51.9792	Single plant
	43 06.1649	70 51.9641	Single plant
	43 06.1407	70 51.9283	Single plant
30	43 06.1068	70 51.8809	Single plant
	43 06.1615	70 51.9742	Single plant
	43 06.1655	70 51.9820	Single plant
	43 06.1664	70 51.9842	Single plant
	43 06.1703	70 51.9959	Single plant
	43 06.2414	70 52.1130	Single plant
31	43 06.1731	70 52.0194	Single plant
	43 06.0747	70 51.8458	Single plant
32	43 06.1038	70 51.9070	Single plant
	43 06.1567	70 52.0007	Single plant
	43 06.2022	70 52.0789	Single plant
33	43 06.2029	70 52.1017	Single plant
	43 06.1458	70 51.9983	Single plant

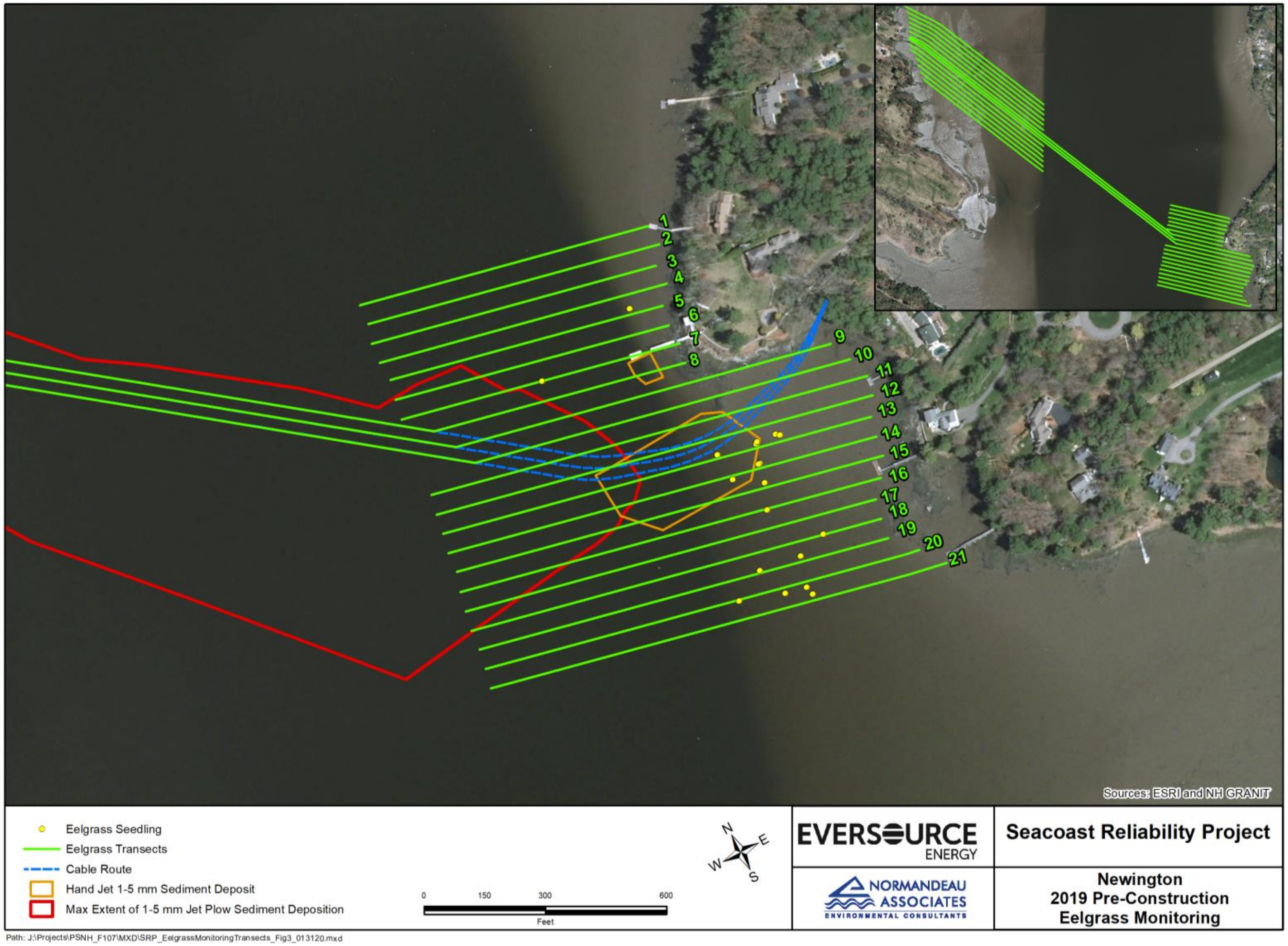

Figure 3. 2019 eelgrass survey results for project-specific transects for SRP, Durham shore.

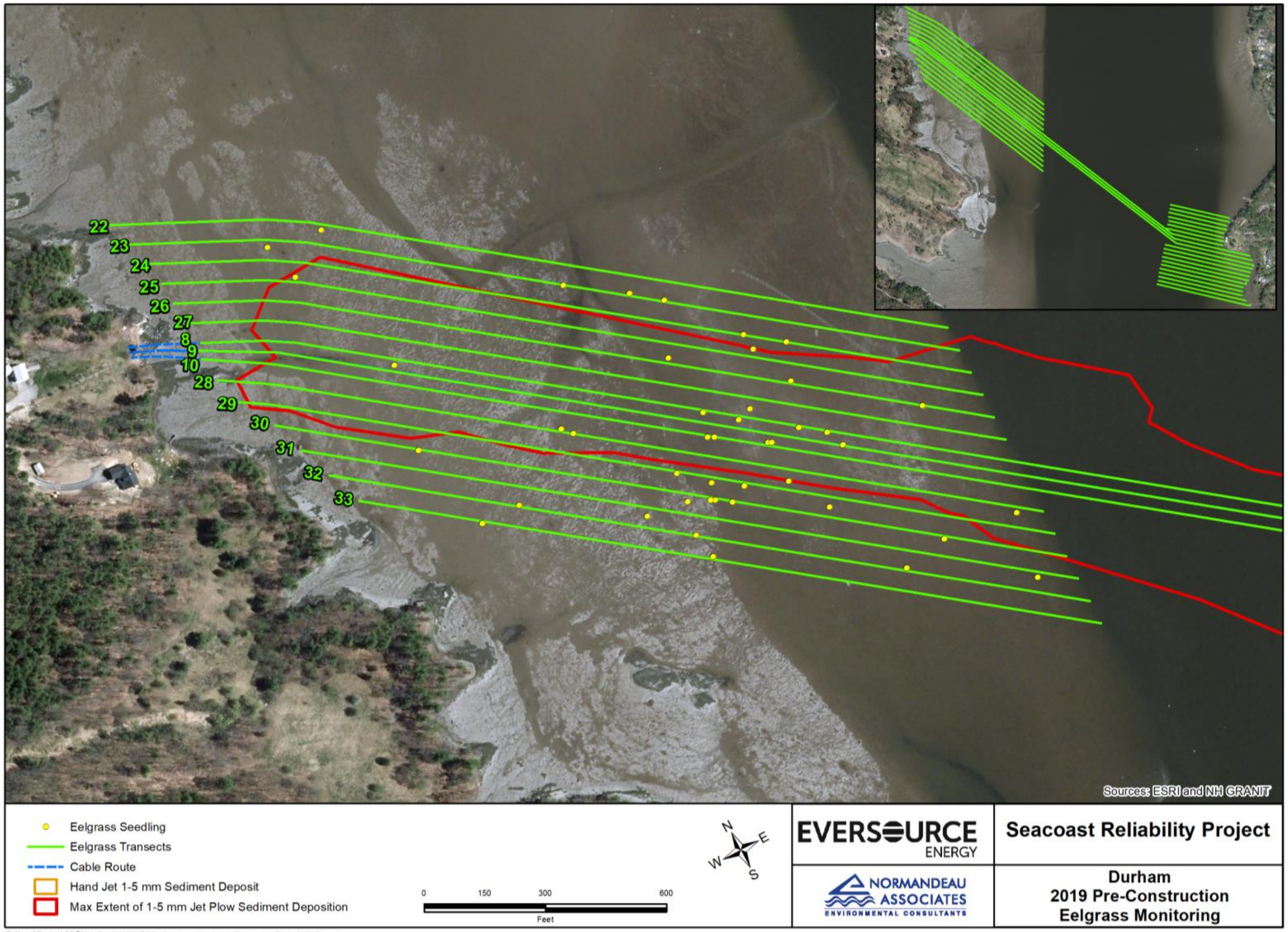

Figure 4. 2019 eelgrass survey results for project-specific transects for SRP, Newington shore.

It is likely that these solitary plants are seedlings from a seedset in 2018, similar to the event along the eastern side of upper Little Bay in 2011 reported by Short (2013). In that case, eelgrass disappeared again within 3 years. Expansion of an eelgrass bed through asexual reproduction (i.e., rhizome growth beyond the existing bed) is generally considered more successful than through seed dispersal because the rhizome structure of the bed itself adds stability. Nonetheless, even short-term eelgrass plants provide some ecological benefits.

5.0 Post-Construction Monitoring

Although rooted eelgrass was present in the Project vicinity during the SRP pre-construction surveys, the observed eelgrass seedlings were less than 1% cover and therefore did not qualify as a bed (10% cover according to PREP methodology (Matso et al. (2018)). PREP would classify eelgrass of the density observed as "not present." SRP did not conduct additional monitoring immediately following the jet plow installation because it was completed on November 7, 2019, well after eelgrass has senesced. The results from the PREP annual eelgrass surveys for 2018 and 2019 are not yet publicly available. Unless that mapping indicates eelgrass beds in the cable area, no further project-specific eelgrass monitoring is proposed.

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