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February 21, 2018

Thomas Friedlander, Chairman
Sudbury Conservation Commission
275 Old Lancaster Road
Sudbury, MA 01776

Re **Abbreviated Notice of Resource Area Delineation**
Sudbury- Hudson Transmission Reliability Project
MassDEP File No. NE 301-1227
NAA File No. P4304.1

Mr. Friedlander and Commissioners:

Nover-Armstrong Associates, Inc. (Nover-Armstrong) reviewed the Abbreviated Notice of Resource Area Delineation (ANRAD) application and associated plans and documents for wetland resource area delineation along the MBTA Right-of-Way (ROW) in Sudbury, Massachusetts (the Site). The site is located between the Hudson town line in the west and the Sudbury Substation off of Landham Road in the east; the ANRAD has been submitted by Eversource Energy in support of the Sudbury-Hudson Transmission Reliability Project.

Nover-Armstrong's work scope includes technical review of the submitted materials and plans provided in the ANRAD filing with respect to delineation of the inland Bank and bordering land subject to flooding (BLSF) boundary in accordance with the Massachusetts Wetlands Protection Act (Act), Massachusetts Wetland Regulations 310 CMR 10.00, Sudbury Wetlands Administration Bylaw and its Regulations (Bylaw).

Filing Documents Reviewed

- *ANRAD, Eversource Energy Sudbury-Hudson Transmission Reliability Project*, dated November 20, 2017 prepared by VHB, Inc. prepared for Eversource Energy.
 - WPA Form 4A
 - Wetland Delineation Report November 2017 with Appendices A – F.
- *Sudbury-Hudson Transmission Reliability Project, Sudbury, Massachusetts, Existing Conditions Plan for ANRAD Submittal*; (46 Sheets) dated October 18, 2017; Prepared by VHB, Inc., signed and stamped by James L. DiOrio, PLS, #32092.
- *Sudbury ANRAD – Updated Hop Brook Bordering Land Subject to Flooding Delineation*; (95 Sheets) dated January 23, 2018; Prepared by VHB, Inc.; with Appendices A – D.
- *Sudbury-Hudson Transmission Reliability Project, Sudbury, Massachusetts, Existing Conditions Plan for ANRAD Submittal*; (Sheets 28 - 36) dated October 18, 2017 revised January 30, 2018; Prepared by VHB, Inc., signed and stamped by Russell J. Bousquet, PLS, #35389.

Review Summary and General Comment

At this time, the Applicant has not provided sufficient information to describe the site and the wetland resource areas identified in the Act and Bylaw. This review provides technical comments on the submitted materials and recommends additional information be requested in order to adequately delineate and confirm the wetland resource area boundaries.

Wetland resource area boundaries identified in the ANRAD include Bank, 200-foot RA (mean annual high water boundary), bordering vegetated wetland (BVW), isolated vegetated wetland (IVW) and vernal pools. These boundaries are being evaluated on the ground by David Burke, the Conservation Commission's wetland peer review consultant, who will provide a separate report with findings and recommendations. Nover-Armstrong's role is to provide technical support for the Bank and BLSF boundary peer review only and is working closely with Mr. Burke.

As a result of our review of the ANRAD Plans, we recommend stationing be added to the Plans so that locations within this large Site can be easily referenced without the use of flag numbers which are hard to see and find when referenced by others.

Bordering Land Subject to Flooding (BLSF)

The Massachusetts Wetlands Protection Act (WPA) Regulations definition of BLSF in 310 CMR 10.57 (2)(a)(1) *is an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. BLSF extends from the banks of these waterways and water bodies; where a BVW occurs, it extends from said wetland.*

310 CMR 10.57 (2)(a)(3) further states that *the boundary of BLSF is the estimated lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm and the boundary is to be determined by reference to the most recently available flood profile data prepared under the NFIP by FEMA. This boundary shall be presumed accurate and may be rebutted and overcome only by credible evidenced from a registered professional engineer or other professional competent in such matters.*

According to the November 20, 2017 original ANRAD submission, VHB utilized FEMA's Flood Insurance Study (FIS) for Middlesex County, Massachusetts, revised July 6, 2016 and on-site existing topography to identify the BLSF. On-site existing topography consisted of a combination of mapping by Eastern Technologies, Inc. based on aerial photography dated February 22, 2013 augmented by on-the-ground survey by VHB from 2015 and 2017. During this process, VHB identified a discrepancy between the FEMA FIS and existing conditions topography along Hop Brook between Union Avenue and Landham Road; as a result the BLSF boundary in this area was not shown on the ANRAD Plans.

A supplemental ANRAD submission was made by VHB dated January 23, 2018, addressing the Hop Brook flood plain discrepancy. VHB reported that the BLSF delineation between Union Avenue and Landham Road did not match the 100-year flood plain as shown on the Flood Insurance Rate Map (FIRM), dated July 7, 2014. This was because VHB's on-site elevations were higher than the 100-year floodplain shown on the FIRM. VHB obtained the current FEMA Flood Insurance Study dated July 6, 2016, an older FEMA Flood Insurance Study dated 2010, and the hydrologic and hydraulic calculations for Hop Brook completed by Howard, Needles Tammen and Bergendorf (HNTB) in 1979. Based on this information VHB concluded that the BLSF delineation between River Station 0 and 700 should use the 2016 FEMA FIS; between River Station 700 and 1900 should use the Base Flood Elevation (BFE) calculated by HNTB in 1979; and, between River Station 1900 and up should use the 2016 FEMA FIS, which reflects the same elevations as the 1979 HNTB Study and 2010 FEMA FIS. Nover-Armstrong Associates, reviewed VHB's evaluation and found this to be a reasonable and conservative approach.

Nover-Armstrong personnel, during site visits in July, September, and December 2017 and February 2018, observed the surface water elevation at the Hop Brook (east) bridge to be above the bottom of the Bridge's steel girders. In order to compare existing seasonal surface water elevations with the FEMA mapping, we recommend that the Commission request that the Applicant provide the current water surface elevation. If this current conditions data is not available, we recommend that the Commission request that the Applicant obtain the water surface elevation at both Hop Brook bridge locations. The elevation of the top of the bridge girders should be surveyed and the location of the survey point and elevation should be provided to allow the Conservation Commission to monitor changes in water surface elevation, measured from this location point as the season progresses.

The BLSF boundary depicted on the most current ANRAD plans appears in most areas, with the exception of Hop Brook east, to be shown running within an individual set of contours consistent with the identified FEMA Flood Elevation. It appears that a significant amount of the Site's topography is based on aerial survey and it is not clear which areas are located by on-the-ground survey. Therefore, the ANRAD plans are not at a level of accuracy adequate to confirm the BLSF boundary shown. Nover-Armstrong recommends that when all concerns have been addressed, the Commission ONLY approve the BLSF elevation specific to the location, NOT the boundary as shown on the final ANRAD plans. We recommend that VHB provide more information / detail as to where the on-the ground survey was performed.

The BLSF elevation and boundary identified at the eastern Hop Brook Bridge, elevation 123.0, appears in places to be consistent with edge of water as observed on both December 4, 2017 and February 15, 2018 and in other areas, such as flags DW-88 and 89 as well as CW-9 and 13 for example, the observed edge of water is at the wetland flag, above the designated BLSF boundary. Similarly, Flag AW 176 at the Hop Brook (west) Bridge appears to be at the water's edge from field observation, however the ANRAD Plan shows it six feet north of the apex of the BLSF line, indicating that the topography, wetland flags and/or BLSF Boundary may not be shown correctly.

The July 7, 2014 FIRM provided by VHB in the submission dated January 23, 2018 shows FEMA Floodway on the map but it is not included on the ANRAD Plans. Nover-Armstrong recommends that the Hop Brook and Dudley Brook FEMA Floodway be shown on the ANRAD Plans.

Bank Boundary

There should be two bank boundaries depicted on the ANRAD plans. The WPA Regulations definition of Bank in 310 CMR 10.58 (2)(a)(1) *is the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a BVW and adjacent flood plain, or in their absence it occurs between a water body and an upland.*

310 CMR 10.58 (2)(c) further states that *the upper boundary of Bank is the first observable break in the slope or the mean annual flood level whichever is lower. The lower boundary of Bank is the mean annual low flow level.*

The definition of Bank in the Sudbury Bylaw Article XXII Wetlands Administration -Section 9 differs from the WPA Regulations. *The term "bank" includes the land area which normally abuts and confines a water body; the lower boundary being the mean annual low flow level, and the upper boundary being the first observable break in the slope or the mean annual flood level whichever is higher.*

Section 2.5 Mean Annual High Water of the Sudbury Regulations states: *The Mean Annual High Water line shall be based on the change from predominantly aquatic due to prolonged presence of water to predominantly terrestrial characteristics. The majority of perennial streams in Sudbury are low-gradient with low flow, where the use of mainly bankfull indicators to determine mean annual high water (or “bankfull” under the WPA) does not reflect the true lateral extent of the mean annual flow channel of the river.*

Bank exists in numerous locations along this linear project location including at all culvert structures carrying intermittent and perennial stream flow.¹ Review of the ANRAD plans indicates that the Applicant has generally identified bank upstream and downstream of these culvert locations and have flagged the Bank boundary. Mr. Burke will be evaluating these numerous locations of bank boundary during his site visits and will be providing comment. It is important to identify bank in these locations for potential future culvert replacement and improvement activities.

Hop Brook (west)

The Hop Brook (west) Bank delineation is shown on the ANRAD Plans bordering the bridge abutments, then projecting with a similar width and in the same general direction two flags beyond the abutments to the north and one flag beyond to the south. During Nover-Armstrong’s December 4, 2017 and February 15, 2018 site visits, Hop Brook’s water surface was observed to extend well beyond the narrow bridge channel shown on the ANRAD Plan and Bank flags located in the field to the east and west on both the south (upgradient) and north (downgradient) sides of the railroad platform. The water surface continuously extended to Flag AW 184 in the southeast quadrant, Flag BW 110 in the northeast, Flags AW 171 in the southwest and BW 100 in the northwest quadrant at the time of the December and February field visits, in areas identified on the Plans as BVW. 2017 MassGIS aerial photographs show these inundated areas, however field observation provides greater clarity.

It appears from site inspections in July and September 2017, that the current delineation of Bank shown on the ANRAD Plan is an approximation of Hop Brook’s mean annual low flow level in a poorly defined low flow channel. It should be noted that during those summer/fall field visits, Hop Brook’s surface waters extended beyond the flagged Banks as well, along the edge of the MBTA railroad embankments. The areas beyond the mean annual low flow level at the western Hop Brook Bridge crossing are inundated for significant portions of the year on an annual basis, contain predominantly aquatic vegetation which dies off seasonally, have a low gradient and a poorly defined low-flow channel. The water in these areas exhibits a continuous connection to the water in the low flow stream channel. The first observable break in slope appears to be the railroad platform toe of slope.

It is Nover-Armstrong’s opinion that significant portions of the Hop Brook (west) bridge approach embankments constitute “Bank” and the Applicant should review the current delineation. It is critical that the Bank delineation be accurate as Hop Brook is a designated Coldwater Fishery pursuant to 314 CMR 4.00, therefore its Banks are significant to wildlife habitat and fisheries and are considered critical areas under the Act.

Hop Brook (east):

Review of MassGIS and USGS aerial photographs, as well as site inspections, reveal that Hop Brook, in the area downgradient of the eastern bridge crossing, consists of braided, poorly defined low flow stream channels meandering within the confines of a broad Bank system. Although the ANRAD identifies that Bank is present on the east only to Bank flag CB-29 in the vicinity of Wetland flag CW-24, the aerial

¹ According to 310 CMR 10.04, a stream means a body of running water, including brooks and creeks, which move in a definite channel in the ground due to hydraulic gradient, and which flows within, into or out of an Area Subject to Protection under M.G.L. c. 131, sec. 40. A portion of a stream may flow through a culvert or beneath a bridge.

photographs indicate that the braided stream system may extend almost to Landham Road, including an area of perennial stream flowing into the system at Wetland flag CB-4. Nover-Armstrong recommends that this broader area be reviewed for areas which may qualify as Bank under the Act and/or Bylaw.

The Hop Brook (east) Bank delineation is shown on the ANRAD Plans bordering the bridge abutments, projecting with a similar width and in the same general direction one flag beyond the abutments to the north and three flags beyond the southeast abutment. During Nover-Armstrong's December 4, 2017 and February 15, 2018 site visits, Hop Brook's water surface extended out beyond the narrow bridge channel to the east and west on both the north (upgradient) and south (downgradient) sides of the railroad platform. In both the southwest and northwest quadrants the areas abutting the railroad embankments are delineated as BVW on the ANRAD Plans, however field visits in summer, fall and winter have revealed that the areas adjacent to these embankments are inundated with water which is directly connected to the low flow stream channel. In these areas, the identified BVW is devoid of vegetation and consist of standing water alone. Nover Armstrong believes this area to be Land Under Water as defined at 310 CMR 10.56((2)), not BVW as defined at 310 CMR 10.55(2).

Similar to the western Hop Brook Bridge area, it appears from site inspections in July and September 2017, that the current delineation of Bank shown on the ANRAD Plan is an approximation of Hop Brook's mean annual low flow level in a poorly defined low flow channel. The areas beyond the mean annual low flow level at the eastern Hop Brook Bridge crossing are inundated for significant portions of the year on an annual basis, contain predominantly aquatic vegetation which dies off seasonally, have a low gradient and poorly defined low-flow channels. The Hop Brook surface water bordering the southeastern embankment, showed definite indication of unidirectional flow parallel to the railroad embankment. The water along the north and south sides of the MBTA Railroad platform exhibit a continuous connection to the water in the low flow stream channel. It is Nover-Armstrong's opinion that portions of the Hop Brook (east) bridge approach embankments constitute "Bank". The first observable break in slope appears to be the railroad platform toe of slope.

Recommendations

Based on our initial review of the ANRAD, Nover-Armstrong found that the boundaries of BLSF and Bank as depicted on the current ANRAD plans cannot not be confirmed at this time. We are recommending the following:

1. Additional documentation in support of the current resource boundary delineations or adjusted boundary delineations should be provided by the Applicant for review.
2. Stationing be added to the Plans so that locations within this large Site can be easily referenced without the use of flag numbers which are hard to see and find when referenced by others.
3. In order to compare existing seasonal surface water elevations with the FEMA mapping, the Commission it is recommended that the Applicant provide the current Hop Brook water surface elevation and datum. If this current conditions data is not available, the Commission should request that the Applicant obtain the water surface elevation at both Hop Brook bridge locations. The elevation of the top of the bridge girders should be surveyed and the location of the survey point and elevation should be provided to allow the Conservation Commission to monitor changes in water surface elevation, measured from this location point as the season progresses.
4. When all concerns have been addressed, the Commission ONLY approve BLSF elevations, NOT the boundary as shown on the plan prepared by using aerial topography.

5. The Applicant should provide information / detail as to where the on-the ground survey was performed.
6. The Hop Brook and Dudley Brook FEMA Floodway be shown on the ANRAD Plans.
7. The broader area of the braided stream system between the eastern Hop Brook Bridge and Landham Road be reviewed for areas within Site Location that qualify as Bank under the Act and/or Bylaw.
8. The area of Hop Brook Bridge (east) in the southwest and northwest quadrants, abutting the railroad embankments, which are identified on the ANRAD Plans as BVW, be reviewed as Land Under Water or Bank because they are devoid of vegetation and consist of standing water alone.

We will be available at the February 26, 2018 public meeting to discuss our findings and recommendations with the Commission.

Sincerely,
Nover-Armstrong Associates, Inc.



Ruth M. Geoffroy, AICP
Dir. of Environmental Permitting and Planning



Marta J. Nover
Principal