Transportation
Land Development
Environmental
Energy
Services

Docket No. _____
Exh. TDI-JAN-11a

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Memorandum

To: TDI-NE / New England Clean Power Link Project File

Date: November 26, 2014

Project No.: 57666.00

From: Meddie J. Perry, CGWP

Re: Criteria 2 & 3 – Water Supply Preliminary Assessment

VHB has prepared this memorandum to address Act 250 criteria 2 and 3, as incorporated into Section 248 review for the TDI-NE New England Clean Power Link Project ("Project"), regarding water supply (§ 6086(a)(2)), and burden on existing water supplies (§ 6086(a)(3)).

I. SUMMARY OF PROJECT WATER SUPPLY REVIEW CONSIDERATIONS:

The New England Clean Power Link ("NECPL") Project is an electric transmission line that will run from the Canadian border at Alburg, Vermont to Ludlow, Vermont along underwater and overland routes. The transmission line will be comprised of two approximately 5-inch diameter cables that will be solid-state dielectric and thus will contain no fluids or gases.

The proposed underwater portion of the transmission line, approximately 98 miles in length, will be buried to a target depth of three to four feet in the bed of Lake Champlain (except where water depths are greater than 150 feet, where the cables will be placed on the Lake bottom and allowed to self-bury in sediment). In areas where there are obstacles to burial (e.g. existing infrastructure, bedrock), protective coverings will be installed, where feasible.

The proposed overland portion of the transmission line, approximately 56 miles in length, will be buried approximately four feet underground in a five-foot deep by four-foot wide trench within existing public (state and town) road and railroad rights-of-way.

As discussed below, VHB has evaluated the overland and underwater portions of the project to determine the availability of sufficient water supply for the project and the potential for the project to cause an unreasonable burden to existing water supplies.

II. CRITERIA 2: SUFFICIENCY OF WATER SUPPLY (10 V.S.A. §6086(a)(2)).

Sufficient water will be available for the Project.

The Project will involve temporary and very limited water usage. During construction of the overland portion, small amounts of water usage may be necessary for dust suppression, in accordance with the EPSC Plan, and incidental washing of equipment. During underwater construction within Lake Champlain, the jet-plow installation device will use water for the hydraulic jet that will create the temporary trench for laying the cable; the use of water for the jet would merely involve re-circulating water within the Lake in a non-consumptive manner.

Once operational, there will be no ongoing water use associated with the Project.

Considering the limited and temporary water usage needed, the Project will ensure that reasonable efforts have been made to ensure conserve water.

The construction-phase water needs for dust control and equipment washing will be supplied by Project contractors from approved sources, such as purchasing and hauling bulk water from nearby public community water systems. Ample water is available for this need.

Ostensibly, sufficient water is available within Lake Champlain to be recirculated through the hydraulic jet needed for underwater construction of the Project.

III. CRITERIA 3: BURDEN ON EXISTING WATER SUPPLIES (10 V.S.A. §6086(a)(3)).

The Project is not expected to cause any adverse impacts to existing water supplies. The Project, once completed, will be a solid-state cable that will not involve the use of any fluids or substances that could affect water quality. Because the Project, once it is operational, will not use water or have a potential to affect water supplies, this evaluation focuses on the Project construction phase. Construction of the Project both in the underwater and overland portions has been designed to avoid causing adverse impacts to water supplies such as intakes within Lake Champlain, wells, and springs.

A. Underwater Portion

Lake Champlain is used as a source of water for various public water systems as well as for private users. The Project will cross through one source protection area ("SPA") designated by the Water Supply Division of the Vermont Department of Environmental Conservation ("DEC") for a Vermont public water supply intake, and will pass through the same general portions of the Lake as ten other Vermont public water supply systems that use Lake intakes for raw water which is subsequently treated for potable usage (see Public Water Supply Map Series, Attachment). The Project also will pass in the vicinity of some private intakes, such as summer camps that obtain water from the Lake.

Table 1: Preliminary Inventory of Active Public Water Sources & Source Protection Areas Near[1] or Overlapping the Proposed Project Transmission Line: Underwater Portion					
Water System Name and Town	**WSID#**	**Water System Type [2]**	**Water Source(s)**	**Distance from Line to Sources** [3]	**Notes**
Alburg Village (Alburg)	5136	PCWS	Lake Intake	6,800′	Project is at least 3,900′ outside of SPA.
Bow and Arrow MHP (North Hero)	5642	TNC	Lake Intake	8,600′	No SPA shown in ANR GIS. [4]
Grand Isle Fire District 4 (Grand Isle)	5139	PCWS	Lake Intake	5,300′	Project is at least 2,800′ outside of SPA.
Grand Isle Consolidated Water District (Grand Isle)	20614	PCWS	Shallow Intake Deep Intake	2,000′ 100′	Project passes through SPA and is close to the Deep Intake. Intakes are also shared with VT ANR (Fish Hatchery). Public water system can operate solely using Shallow Intake during project construction, according to operator. Fish Hatchery uses Deep Intake continuously, according to facility engineer.
Burlington Public Works, Water Division (Burlington)	5053	PCWS	Primary Backup Backup	15,000′ 13,000′ 12,500′	Project is at least 15,000′ outside of SPA.
Champlain Water District (South Burlington)	5092	PCWS	North & South	16,000′	Project is at least 9,700′ outside of SPA. Intakes are located within Shelburne Bay whereas the Project is in the Broad Lake.
West Wind (Charlotte)	5557	PCWS	Lake Intake	5,600′	Project is at least 3,100′ outside of SPA.
Thompson Point Association (Charlotte)	8274	TNC	Lake Intake	800′	No SPA shown in ANR GIS. [4] 15 gpm approved yield.
Basin Harbor Club (Ferrisburgh)	1033	TNC	Lake Intake	2,100′	No SPA shown in ANR GIS. [4]
Vergennes-Panton Water District (Panton)	5010	PCWS	Lake Intake	5,300′	Project is at least 3,600′ outside of SPA.
Tri-Town Water District (Addison)	5001	PCWS	Lake Intake	1,950′	Project is at least 1,300′ outside of SPA.

Table 1: Preliminary Inventory of Active Public Water Sources & Source Protection Areas Near[1] or Overlapping the Proposed Project Transmission Line: Underwater Portion

Water System Name and Town	WSID#	Water System Type [2]	Water Source(s)	Distance from Line to Sources [3]	Notes

Water Systems are listed in the table in the order that the Project passes near them, from north to south.

[1] This table includes all Lake public water sources in Vermont for which the Project passes through a Source Protection Area; and also includes Lake public water sources in Vermont for which the Project is outside a SPA, or no SPA exists, and the intake is within a direct line-of sight from the Project. Intakes that are separated from the Project by causeways, islands, peninsulas, or other land masses are not considered to have any potential impact from the Project.

[2] PCWS = Public Community Water System; NTNC = Public Non-Transient, Non-Community Water System, TNC = Public Transient, Non-Community Water System

[3] Estimates of distance from proposed NECPL cable alignment to water intakes, based on ANR GIS information. Distances indicated are the shortest unobstructed straight-line routes from Project to intakes.

[4] TNC water systems are encouraged, but not required, to develop SPAs and SPPs. Therefore these systems may not have any SPA.

Placement of the cable is being designed to avoid conflicts with existing underwater infrastructure such as water system intakes and pipes. The locations of all Vermont public water system lake intakes have been mapped by the Vermont ANR, and are to be avoided by the Project. Pre-construction reconnaissance including a side scan sonar analysis and bottom sampling of the lake, in addition to observation during installation, will also be performed to verify the mapped intake locations, in order to ensure that the cable is placed where it does not interfere with existing public or private intakes and other infrastructure.

Additionally, the Project is designed not to cause suspension of sediment from the lake bottom in a manner that would adversely affect the quality of potable water being produced by public community water systems, or that would impair the ability of water system intakes to operate when needed. Based on the selected technology, the disturbance of Lake sediment in any given area would be very short-lived and sediment would settle rapidly. HDR has modeled sediment suspension, transport, and water quality effects that could be caused by the jet-plow and shear-plow that would be used to install the underwater cable, to determine the degree and extent of elevated suspended solids that could temporarily occur during Project construction. The modeling evaluated water quality associated with sediment suspension, and addressed potential sediment-related pollutants including total suspended solids, phosphorus, and metals (As, Cd, Cu, Pb, Ni, Zn, Hg, and Ag). As a factor of safety, the modeling was based on use of a jet plow, even in deep water areas where the NECPL cable is proposed

to be placed on the Lake bottom for self-burial. The modeling results indicated that levels of these metals in the Lake water will always remain far below the respective drinking water standards during Project construction. Results of the modeling also indicated that elevated levels of suspended solids would be very short-lived. Areas where suspended solids concentrations would significantly exceed baseline levels would not extend more than approximately 200 feet from either side of the location of cable installation (no drinking water standards apply to total suspended solids or phosphorus, and levels of those two parameters are predicted to return to baseline within a matter of hours following cable installation).

Whereas the route of the NECPL cable is generally in the deep water portion of the Lake, and modeling indicates that the area where suspended sediment levels would temporarily be elevated would be localized within approximately 200 feet to either side around the cable site, most of the public water intakes are at least 800 feet from the Project work area, and thus would not entrain sediment or turbidity from Project construction.

Regarding private water intakes, such as those supplying summer camps, these water sources are typically located close to shore where they would be outside the area of temporarily suspended sediment from Project construction, and operate at low flow rates, so would not entrain sediment or turbidity from Project construction. VHB has contacted the Vermont DEC and the Vermont Department of Health for information about private water supplies in the vicinity of the Project, and based on communication with these Departments, is not aware of any intakes that are located where the Project would interfere with them. It should be noted that lake intakes are not an approved source of potable water for private systems in accordance with current Vermont regulations (VT Environmental Protection Rules, Chapter 1: Wastewater System and Potable Water Supply Rules).

As reflected in Table 1, the only public water intake located in close proximity to the cable route is one of the two intakes supplying the Grand Isle Consolidated Water District, which also supplies the Ed Weed Fish Culture Station ("Fish Hatchery") that is operated by the Vermont ANR. This water system's "Deep Intake" is approximately 180 feet below the normal water level and is shown on the Fish Hatchery engineering plans[1] as being located approximately 100 feet from the planned cable and may experience elevated levels of turbidity or suspended sediment for a few hours when the cable is installed. As directed by TDI-NE, VHB visited the site and has been coordinating with the water system and the Fish Hatchery regarding the exact location of the intakes,

[1] "Withdraw Pipe Plan - Vermont Fish Hatchery at Grand Isle – Sheet M-1" by Sargent, Webster, Crenshaw, and Folley (Project 88-309F).

operational practices, and the possibility of exclusive use of the second intake ("Shallow Intake") during construction to avoid issues with sediment affecting the water source. According to the operator of the Grand Isle Consolidated Water District, the public water system is able to operate exclusively using the Shallow Intake, which is approximately 2,000 feet from the Project, and would not be affected by Project construction.

According to the Fish Culture Station facility engineer, the Fish Hatchery requires nearly continuous use of water from the Deep Intake, and elevated turbidity levels would be of concern. The Fish Hatchery's facility engineer and fish culture specialist have indicated that placing the NECPL cable on the bottom for self-burial would be preferable to use of a jet plow or shear-plow, and that it may be acceptable for the NECPL cable to cross over the intake pipe from the Deep Intake (a 36-inch diameter high-density polyethylene pipe which is anchored with concrete saddles that have settled into the lake-bottom sediment). Therefore, TDI-NE will evaluate adjustments to the NECPL cable alignment, including potentially routing it east of the intake, so the Deep Intake is beyond the predicted zone where sediment and turbidity would be temporarily elevated during Project construction, while remaining in deep water (>150 feet) to allow placement of the NECPL cable on the bottom, to reduce the risk of an undue adverse effect to the Fish Hatchery's water supply. Pre-construction reconnaissance, as described above, will also be performed to verify the location of the intake.

Further, TDI-NE will notify all public water systems listed in Table 1, as well as the Fish Culture Station, at least three weeks prior to construction. Notification will be in writing and will include detailed information on the Project schedule, methods, predicted effects (if any) to sediment and turbidity, and contact information.

Based on the fact that Project construction activities will be planned to avoid conflicts with the locations of water intakes, will occur only for a short duration, and are not likely to mobilize significant amounts of sediment from the lake bottom in proximity to water intakes, it is not expected that the underwater portion of the Project will have any undue adverse effect on water sources.

B. Overland Portion

The Project is not expected to cause any adverse impacts to existing wells or springs, such as loss of yield or decreased water quality. During construction of the Project, the cables will be placed within a shallow trench that will be typically five feet deep and approximately four feet wide. If ledge is encountered, it will be removed by the most suitable technique, with preference for mechanical removal (i.e. excavating the rock with an excavator bucket and/or pneumatic hammer), rather than blasting. If mechanical

removal is not possible, then TDI-NE will evaluate alternatives, including a more shallow cable installation with enhanced concrete or steel cover protection, an increase in the amount of cover (if the changed topography is not problematic), or blasting, to achieve the standard depth. Blasting, if needed, would be conducted only to the extent necessary to remove rock to allow the cables to be buried. Any blasting that is performed will be conducted in a manner that conforms with industry standards and practices and will follow the blasting plan as described in the testimony of Jessome/Martin/Bagnato. This plan is intended to ensure that explosives are properly managed so that off-site blast impacts to existing water supplies will be avoided. This plan includes the use of pre- and post-blast surveys to document existing conditions and potential impacts to wells and structures that are in proximity to blasting areas, and the remediation of any damage should it occur.

The Project will cross through a number of SPAs designated by the Water Supply Division of the Vermont DEC, for public water supplies, and will pass in the vicinity of other public water supplies. These include nine public water systems using groundwater sources (see Table 2 below, and Public Water Supply Map Series in Attachment) that have either designated SPAs or public water sources within the immediate vicinity of the Project. The Project also will pass by various existing private water supplies, including drilled bedrock wells.

Table 2: Preliminary Inventory of Active Public Water Sources & Source Protection Areas Near[1] or Overlapping the Proposed Project Transmission Line: Overland Portion

Water System Name and Town	WSID#	Water System Type [2]	Water Source(s)	Distance from Line to Source(s) [3]	Notes
Benson Heights (Benson)	5570	PCWS	Bedrock Well	730 ft	Map sheets 4-5. Well has 2 gpm permitted yield, 700 ft deep.
Castleton Fire District 1 (Castleton)	5212	PCWS	Gravel Well	860 ft	Map sheets 17-18. Well has 461 gpm permitted yield, 30" diam., 35 ft deep. The FD has a second gravel well on opposite site of the river (project not within its SPA).
Fort Warren MHP (Castleton)	5213	PCWS	1 gravel well & 1 bedrock well	600 ft 800 ft	Map sheet 18. Well 1 – 14 gpm permitted yield, 6" diam., 27 ft deep open-ended casing gravel well. Well 2 – 352 ft deep bedrock well, 2 gpm driller's estimated yield.

Table 2: Preliminary Inventory of Active Public Water Sources & Source Protection Areas Near[1] or Overlapping the Proposed Project Transmission Line: Overland Portion

Water System Name and Town	WSID#	Water System Type [2]	Water Source(s)	Distance from Line to Source(s) [3]	Notes
West Rutland Town (West Rutland)	5244	PCWS	2 gravel wells	430 ft 540 ft	Map sheet 24. Well 1 – backup – 350 gpm permitted yield, 30" diam., 35 ft deep. Well 2 – primary – 350 gpm permitted yield, 18" diam., 31 ft deep, 4 ft screen.
Formula Ford/Sewards Sales and Service (Rutland)	20385	NTNC	Bedrock well	80 ft	Map sheet 28. 1 gpm permitted yield, 210 ft deep.
Coburn MHP (Clarendon)	5347	PCWS	Bedrock well	680 ft	Map sheet 29. 9 gpm permitted yield, 105 ft deep.
Automobile International Corp (Clarendon)	20349	TNC	Bedrock well	300 ft	Map sheet 30. No SPA shown in ANR GIS but well is near to project [4]
Whistle Stop Restaurant (Clarendon)	20706	TNC	Bedrock well	40 ft	Map sheet 32. No SPA shown in ANR GIS but well is near to project [4]
Combes Family Inn (Ludlow)	20598	TNC	Gravel well	130 ft	Map sheet 49. 805 ft deep. No SPA shown in ANR GIS but well is near to project [4]

Water Systems are listed in the table in the order that the Project passes near them, from north to south.

[1] This table includes all public water sources for which the Project passes through a Source Protection Area; and also includes public water sources for which no SPA exists and the Project cable alignment is within 300 feet of the water source.

[2] PCWS = Public Community Water System; NTNC = Public Non-Transient, Non-Community Water System, TNC = Public Transient, Non-Community Water System

[3] Estimates of distance from proposed NECPL cable alignment to wells, based on ANR GIS information.

[4] TNC water systems are encouraged, but not required, to develop SPAs and SPPs. Therefore these systems may not have any SPA. No SPA is required for a non-public system.

Relative to the depth of a typical drilled well (generally 200 to 400 feet), the four-to-five-foot depth of trenching and potential blasting is very small. Likewise, the width of the trench is only four feet, and thus minimizes the amount of blasting needed. Furthermore, the Project is located within existing road rights-of-way where earthwork

and grading has taken place previously, and thus will reduce the potential for disturbance to natural soils and geology.

Based on the facts that construction and blasting for the overland portion of the Project will not alter existing ground topography, will not increase impervious surfaces, will implement a blasting plan (including pre- and post-last surveys of nearby wells, and remediation, if needed), will be within existing maintained rights-of-way and is limited in extent, it is expected that the overland installation of the Project will have no undue adverse effect on water sources.

IV. Conclusions

Given the analyses described above, we conclude that the Project has sufficient water available for its needs and that the Project will not cause an unreasonable burden on existing water supplies, either during construction or during Project operations.