

**THE STATE OF NEW HAMPSHIRE  
BEFORE THE  
PUBLIC UTILITIES COMMISSION**

PETITION OF PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE FOR  
LICENSE TO CONSTRUCT AND MAINTAIN ELECTRIC LINES, STATIC WIRE  
AND FIBER OPTIC CABLE OVER AND ACROSS THE ANDROSCOGGIN RIVER  
IN THE CITY OF BERLIN, NEW HAMPSHIRE.

TO THE PUBLIC UTILITIES COMMISSION:

Public Service Company of New Hampshire ("PSNH"), a public utility engaged in the generation, transmission, distribution and sale of electricity in the State of New Hampshire, hereby petitions the Public Utilities Commission ("Commission"), pursuant to RSA 371:17, for a license to construct and maintain electric lines, static wire and fiber optic cable over and across the Androscoggin River in the City of Berlin, New Hampshire, and in support of its petition states as follows:

1. In order to meet the reasonable requirements of service to the public, PSNH has previously constructed and currently operates and maintains a 115 kV transmission line, designated as line Z177, which runs between PSNH's Smith Hydro Generation Station (Smith Hydro) in Berlin, New Hampshire, and PSNH's Berlin Eastside Substation, in Berlin, New Hampshire. The Z177 line is an integral part of the PSNH transmission system and the overall New England transmission grid. The Z177 line, as presently constructed, crosses the public waters of the Androscoggin River at two locations in the City of Berlin, New Hampshire, one over the Smith Hydro spillway on the Androscoggin, and the other over the Androscoggin River to the east of the spillway. The existing overhead transmission line crossings of the Z177 line have not been previously licensed by the Commission, due to either oversight or to the application of navigability or other crossing license criteria at the time of original construction<sup>1</sup>.

2. In order to continue to meet the reasonable requirements of service to the public, PSNH has determined it necessary to add a 115 kV line circuit breaker position at Berlin Eastside Substation for the Z177 line. This is required to improve the reliability of the Berlin area by limiting exposure of the 115 kV bus at Berlin Eastside Substation to Z177 line faults, and to faults within the Smith Hydro facility. In order to install the necessary protection and control schemes for the transmission line and new line circuit breaker, a fiber optic communication path is required between Smith Hydro and Berlin Eastside Substation. To do this, two new optical ground wire (OPGW) cables will be installed to replace the two existing 3#8 Copperweld static wires which run from Berlin Eastside Substation to Structure 1 outside Smith Hydro. On Structure 1 there will be a fiber optic splice can, and two new all-dielectric self supporting (ADSS) fiber optic cables will be installed from the splice point in an underbuilt configuration from

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<sup>1</sup> PSNH proposes that the Z177 line crossings of the Androscoggin River, with the fiber optic cable additions described herein, be fully licensed under this petition.

Structure 1 to the Smith Hydro control building to complete the fiber path (the existing static wires between Structure 1 and the Smith Hydro facility will remain in place). Installing the fiber optic cables on this portion of the Z177 line will allow PSNH to continue to provide reliable electric service to its customers in this area of the State. None of the Z177 line phase conductors will be changed or affected by this project. PSNH has established a tentative "in-service" date and a construction start date of not later than September, 2013, for this fiber optic cable project.

3. The Z177 line crosses the Androscoggin River at two spans on three structures. The existing Z177 line structures on the East and West sides of the crossings (Smith Hydro Substation Frame, Structure 1 and Structure 2) use horizontal type construction. All structures will remain in place and have been analyzed to ensure that they are capable of handling all required loads. This was determined through both field measurements of the poles and testing to check for structural soundness. The design of these structures has been based on NESC Grade B construction requirements.

4. The general location of the Z177 line Androscoggin River crossings are shown on the U.S. Geologic Survey location plan attached to this petition and marked as Exhibit 1.

5. The design and proposed construction of the crossings is shown on the attached Public Service of New Hampshire plan and profile drawing entitled "Z177 LINE (115 kV) CROSSING BETWEEN SMITH HYDRO-STATION & STR.1 & 2 ANDROSCOGGIN RIVER CROSSING, BERLIN, NEW HAMPSHIRE", marked as Exhibit 2. The required clearance calculations for the crossing are attached to this petition as Appendix A

6. The required technical information provided in this petition is based on the 2012 National Electrical Safety Code (NESC) C2-2012, which meets or exceeds requirements of the NESC C2-2002 required by the New Hampshire Code of Administrative Rules (Puc 306.01.b.1).

7. The Androscoggin River crossing locations are spanned using two round wood pole structures (Structures 1 and 2) as well as one existing steel lattice structure. Structure 1 is an existing Type DA structure. Structure 2 is an existing Type C running angle structure. The line ends on an existing steel lattice tower structure at Smith Hydro. A detail design specification for the Type DA and Type C structures are attached to this petition as FIGURE 1 and FIGURE 2, respectively. A detailed design drawing of the steel lattice structure at Smith Hydro is attached as FIGURE 3. As shown on FIGURE 1 and FIGURE 2, the three phase wires have a separation of 14' horizontally on the wood pole structures. As shown on FIGURE 3, the three phase wires have a separation of 11' horizontally. On the existing Type C structure the static wire is attached directly to the structure by a support bracket attached to the top of each pole, with the wire

approximately 12" below the top of the structure. On the Type DA structure the static wire is supported by a crossarm 12" from the top of the pole. On the steel lattice tower structure the shield wire is supported on the top member of the structure. Additionally, in order to allow the ADSS fiber optic cable to cross the river and meet all required clearances, the cables will be attached to an intermediate fiber optic stub pole Z177 Str. Comm. #1. This stub pole will be a 35 ft round wood pole (29 ft above ground, 6 ft embedment) with the fiber optic cables attached 1 ft below the top of the pole. This stub pole will be offset to the north of the Z177 centerline by 33'-0". The ADSS cable will attach directly to the turbine building at an elevation of 953.61 ft.

8. Flood water elevations for the crossings were based on information contained in flood insurance rate maps obtained from FEMA. The flood elevation for this portion of the river is given on FEMA Map #3300290017B, Panel 17 of 20, effective date June 15, 1982. Table 232-1, note 18 of the NESC states that the minimum clearance over a water body must be based on a 10-yr flood elevation. For the purpose of the design of these crossings, the 100-yr flood elevation was used. It should be noted that the 100-year elevation would be well above the 10-year flood elevation. The FEMA map for this area has elevations based on the National Geodetic Vertical Datum of 1929 (NGVD 29). The current standard vertical datum for all surveys is the North American Vertical Datum of 1988 (NAVD 88). In order to convert the flood elevations given in the FEMA maps a conversion is required. According to the National Geodetic Survey (NGS), the difference between the NGVD 29 and NAVD 88 in Berlin, NH is -0.39041 ft. All elevations provided in this petition are based on the NAVD 88 datum.

9. Based on Table 232-1.7 of the NESC, for open supply conductors 750 V to 22 kV to ground, the minimum clearance to the water surface during normal flood level (100-yr flood for the purpose of this petition) for rivers suitable for sail boating is 28.5' (for waters 20-200 acres). NESC Rule 232.C.1.a states that an additional clearance of 1.6-ft or  $[(69.7 \text{ kV} - 22 \text{ kV}) \times 0.4]$  is needed for 115 kV, which brings the total required minimum clearance to 30.1', respectively. For overhead shield/surge protection wires and fiber optic cables that meet NESC Rule 230.E.1, and NESC Rule 230.F.1.b, respectively, the minimum clearance to the water surface at the normal flood level is 25.5' for waters 20-200 acres. As the static wires and OPGW are located above the phase wires at these crossings, this NESC minimum clearance requirement will always be met. Based on Table 232-1.2 of the NESC, for open supply conductors 750 V to 22 kV to ground, the minimum clearance to roads subject to truck traffic is 18.5'. With the additional 1.6' of clearance required for 115 kV, the total required clearance is 20.1'. The minimum clearance to roads subject to truck traffic for shield wires and fiber optic cables is 15.5'.

10. A total of three phase wires, two fiber optic cables (OPGW between Structure 1 and 2, ADSS between Structure 1 and Smith Hydro) and two static wires (also between Structure 1 and Smith Hydro) will span the water body. All three 266

ACSR 6/7 phase conductors were sagged using the NESC Heavy Loading (0 degrees F., 4 pounds per square foot wind loading, ½-inch radial ice) sag charts upon initial installation. The two new OPGW and two new ADSS cables will also be sagged using the NESC Heavy Loading (0 degrees F., 4 pounds per square foot wind loading, ½-inch radial ice) sag charts upon installation in the field. The 266 ACSR conductors were sagged using a maximum tension of 3,200 pounds. The existing 3#8 copperweld static wire was sagged using a maximum tension of 2,200 lbs. The new OPGW cables, which will be 24 fiber, will occupy the shield wire position and will be sagged using a maximum tension of 3,400 lbs. The new ADSS cables, which will also be 24 fiber, will be installed below the conductor position and will be sagged using a maximum tension of 1,000 lbs. The sags and clearances to the water surface of the proposed crossing wires and cables are provided in the attached Appendix A.

11. There will be no new crossing structures that need to be set inside of jurisdictional wetlands or other areas that require New Hampshire Department of Environmental Services (NHDES) permitting at the location of the crossings.

14. The proposed crossings will be maintained and operated by PSNH in accordance with the applicable requirements of the NESC.

15. PSNH owns the existing property where the Z177 line crosses the Androscoggin River on both sides of the river at each crossing. This project will be constructed within the limits of the PSNH-owned land.

16. PSNH submits that the license petitioned for herein may be exercised without substantially affecting the rights of the public in the public waters of the Androscoggin River. Minimum safe line clearances above all water surfaces and affected shorelines will be maintained at all times. The use and enjoyment by the public of the public waters of the Androscoggin River will not be diminished in any material respect as a result of the overhead line and cable crossings.

WHEREFORE, PSNH respectfully requests that the Commission:

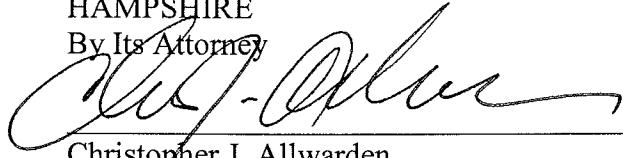
- a. Find that the license petitioned for herein may be exercised without substantially affecting the public rights in the public waters which are the subject of this Petition;
- b. Grant PSNH a license to construct and maintain electric lines and fiber optic cable over and across the public waters of the Androscoggin River as specified in the Petition; and
- c. Issue an Order Nisi and orders for its publication.

Dated at Manchester this 18<sup>th</sup> day of January, 2013.

Respectfully submitted,

PUBLIC SERVICE COMPANY OF NEW  
HAMPSHIRE

By Its Attorney

A handwritten signature in black ink, appearing to read "C. J. Allwarden", written over a horizontal line.

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