

**STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION**

DE 07-071

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

Petition for License to Construct and Maintain Electric Lines and a Fiber Optic Communications Cable Over and Across the Public Waters of the Piscataquog River in Deering, Glen Lake in Goffstown, the South Branch of the Piscataquog River in Goffstown, the North Branch of the Piscataquog River in Goffstown and New Boston, the Contoocook River in Hillsborough and Deering, Beards Brook in Hillsborough, and Daniels Lake in Weare

Order *Nisi* Granting License

ORDER NO. 24,772

June 29, 2007

On June 6, 2007, Public Service Company of New Hampshire (PSNH or Company) filed a petition with the Commission pursuant to RSA 371:17 for a license to construct and maintain electric and fiber optic communications lines at eleven locations¹ for purposes of rebuilding a 115 kilovolt (kV) transmission line designated as F-162. PSNH states that the new crossings are required to relieve an overload on the F-162 line between the Greggs Substation in Goffstown and the Jackman Substation in Hillsborough, caused by the loss of the Vermont Yankee 345/115kV autotransformer and a reduction in rating of the F-162 115kV line. The rebuild of the F-162 115kV line and the ten new crossings would allow PSNH to meet the reasonable requirements of service to the public in western New Hampshire, according to the Company. PSNH revised its petition on June 11, 2007.

¹ One location in Hillsborough and Deering where the new F-162 115kV line would cross both the Contoocook River and Beards Brook within the same pole-to-pole span has been combined into one crossing design for the purposes of this petition.

The crossings would be constructed over the rivers and in the locations as follows:

(1) Piscataquog River² in Deering, (2) Glen Lake in Goffstown, (3) the south branch of the Piscataquog River in Goffstown, (4) the north branch of the Piscataquog River in Goffstown and New Boston, (5) the Contoocook River in Hillsborough and Deering, (6) Beards Brook in Hillsborough and (7) Daniels Lake in Weare.

According to the petition, the published resistance value for the conductor used in the 115kV transmission line from the Greggs Substation to the Jackman Substation was found to be incorrect, reducing the current-carrying capability of the line and resulting in its overload under contingency conditions requiring customer load shedding in excess of PSNH system design guidelines. PSNH states that resolution of the reliability problem requires that the Company rebuild the F-162 line for its entire length requiring the ten water crossings in its petition.

The Company states that, with the exception of the west side of Glen Lake in Goffstown where PSNH owns the land, PSNH owns 100-foot wide easements for its lines and facilities on both sides of the public water bodies at all of the proposed crossing locations. According to the petition, each of the crossings would be constructed within the limits of those easements or on PSNH property. The new crossings would be constructed at locations described in the document identified as Attachment B, incorporated herein by reference. Because PSNH either owns the abutting property or has existing easements, PSNH states there are no abutters to either side of the crossings.

As planned, the construction of the crossings will consist of either two-pole laminated wood tangent structures (Type RAX), three-pole laminated wood dead-end angle structures

² This crossing was referenced as Beaver Pond when previously licensed in *Public Service Co. of N.H.*, 61 NH PUC 61 (1976).

(Type DA), or three-pole laminated wood angle structures (Type RC-3).

As designed by PSNH, the two-pole tangent structures will be H frame construction with one or two X braces for strength as required. The phase conductors will be horizontally configured at 13 feet, 4 inches down from the top of the pole, with 14 feet between the conductors. The static wire and fiber optic cable will be mounted on each pole of the structure at 12 feet, 7 inches above the phase conductors, and 7 feet horizontally offset to the phase conductors.

According to PSNH's plan, the three-pole dead-end angle structures will be X braced and spaced 14 feet apart with each of the phase conductors terminating at 10 feet, 4 inches from the top of the pole, which results in conductor spacing of 14 feet in the horizontal plane. The static wire and the fiber optic cable will be mounted on their own cross arm 7 feet horizontally offset from the phase conductors (centered between them) and 9 feet, 4 inches above the phase conductors.

Finally, , the three-pole angle structure will also be spaced at 14 feet with each of the phase conductors terminating on an insulator string on each pole that is 12 feet down from the top of the pole, resulting in conductor spacing of 14 feet in the horizontal plane at the point of connection.

The static wire and the fiber optic cable will be connected to the outer and center poles at 11½ feet and 11 feet, respectively, directly above the phase conductor point of interconnection on the poles resulting in an approximate offset of 6 feet, 4 inches, the length of the insulator string.³ The structure number, structure type and height, crossing span length, and geographic

³ The actual vertical distance to the conductor is slightly greater depending on the adjacent span length and pole height which changes insulator sag.

placement relative to the crossing are shown in the document identified as Attachment C, incorporated herein by reference.

PSNH investigated a multitude of weather and loading conditions for its design. The conditions investigated include the National Electrical Safety Code (NESC), American National Standards Institute (ANSI) C2-2007 Heavy Load Conditions (0 degrees F, 4 pounds per square foot wind loading, and ½ inch radial ice), minus 20 degrees F ambient temperature, and 285 degrees F conductor temperature. PSNH used these design conditions and all possible combinations to determine the minimum clearance of the conductors to the water surfaces of the crossings.

To determine the minimum distances between the phase conductors, the static wire conductor and the fiber optic cable, PSNH assumed the phase conductors were at 30 degrees Fahrenheit with no ice, and the static wire and the fiber optic cable above were at 30 degrees Fahrenheit with an extreme ice loading of one inch radial ice. The three-phase conductors will be 1590 MCM 45/7 ACSR conductors, constructed in a horizontal configuration with 14 feet between them. The plans provide that the static wire (or ground conductor) will be a 7#8 Alumoweld conductor and will be bracket-mounted on the structures and poles as describe in Figures 1, 2, and 3. The fiber optic cable will be bracket-mounted on the structures and poles in the same manner as the static wire. The phase conductors will be tensioned to 10,000 pounds and the static wire and fiber optic cable will be tensioned to 3,600 pounds. All conductors, wires, and cables will be sagged to NESC, ANSI C2-2007 Heavy Load Conditions.

PSNH used the 100-year flood levels in the Federal Emergency Management Agency (FEMA) flood insurance rate maps at all locations in its design. PSNH stated that it used the

100-year flood for water elevations because the normal flood level or ten-year flood levels required by the NESC are not available, and because the 100-year flood level will be well above the 10-year flood elevation.

PSNH said that the maximum sag for the phase conductors occurs at their maximum operating temperature of 285 degrees Fahrenheit. PSNH calculated the water surface areas, the size of which determines NESC minimum clearance requirements, according to NESC Table 232-1, Note 19 and using the surface area of a one-mile section of the water body. The calculated water surface areas ranged from 10 acres to 140 acres. NESC Table 232-1 requires a minimum water surface clearance of 22.1 feet for water surface areas of less than 20 acres, and a minimum water surface clearance of 30.1 feet for water surface areas of 20 acres to 200 acres when adjusted by NESC Rule 232.C.1.a for circuits operating at 115kV.

For static wires and fiber optic cables that meet Rule 230C1, the minimum clearance required by Table 232-1 to the water surface is 17.5 feet for water surface areas of less than 20 acres and 25.5 feet for water surface areas of 20 acres to 200 acres. According to PSNH's calculations, the maximum sag of the neutral conductor and the fiber optic cable will never exceed these clearance requirements as they are located above the phase conductors and will never sag to levels near the phase conductors. The 100-year flood elevations, calculated water surface areas, clearance requirements, and minimum clearance for the phase conductors, static wire, and the fiber optic cable are shown in the document identified as Attachment D, incorporated herein by reference.

PSNH determined that the minimum vertical distance between the static wire or the fiber optic cable and the phase conductors occurs when the phase conductors are at a temperature of

30 degrees and have no ice, and the static wire or fiber optic cable is at 30 degrees with an extreme ice loading of 1 inch radial ice. The plans provide for additional clearance to the phase conductors because the static wire and fiber optic cable are not located directly above the phase conductors, and are offset with 6 feet, 4 inches to 7 feet lateral displacement. NESC Table 236-5, Section 2a requires that the minimum vertical distance between the phase conductors and the static wire or fiber optic cable be 36.9 inches or just over 3.0 feet for circuits operating at 115kV when adjusted by NESC Rule 235C.2.a.1. According to PSNH's plan, the minimum vertical clearances between the phase conductors and the static wire or the fiber optic cable exceed the NESC requirements and are depicted in the document identified as Attachment E, incorporated herein by reference.

PSNH states that with the exception of the crossing of the Piscataquog River (previously referred to as Beaver Pond) in Deering, none of the other crossing structures would be set within jurisdictional wetlands or other areas that will require Department of Environmental Services (DES) permitting. PSNH says that the company will apply for the appropriate DES wetlands permits prior to the installation of any of the new structures associated with the crossing at this location. Additionally, PSNH states that in the event that wetlands permits are required to gain access to any of the other new crossing structures, such permits would be obtained prior to construction.

PSNH states that the use and enjoyment by the public of these waters will not be diminished in any material respect as a result of the proposed electric and communication line crossings. PSNH further attests that the construction of the crossing will be constructed, maintained, and operated in accordance with the requirements of the National Electrical Safety

Code, American National Standards Institute C2-2007.

RSA 371:17 provides that whenever it is necessary, in order to meet the reasonable requirements of service to the public, for a public utility to construct an electric line over, under or across any of the public waters of New Hampshire, it must seek Commission approval.

“Public waters,” as defined in RSA 371:17, means “all ponds of more than 10 acres, tidewater bodies, and such streams or portions thereof as the Commission may prescribe.” If we find that the requested line would not substantially affect the public’s rights in the affected public water bodies, we are required to grant the petition pursuant to RSA 371:20.

Based on the information presented by PSNH and Staff’s recommendation, we find these crossings necessary for PSNH to meet the reasonable requirements of reliable service to the public within PSNH’s authorized franchise area and that the requested license may be exercised without substantially affecting the public rights in the affected waters. We approve the petition on a *nisi* basis in order to provide any interested party the opportunity to submit comments on said petition or to request a hearing.

We will require PSNH to publish only this Order *Nisi* and not the Attachments. In its notice, PSNH shall instruct readers on how they may obtain the full order, including Attachments.

Based upon the foregoing, it is hereby

ORDERED *NISI*, that subject to the effective date below, PSNH is authorized, pursuant to RSA 371:17 *et seq.*, to construct, maintain and operate electric and communications lines over and across the public waters described in its petition and depicted in its table, figures,

appendices, and exhibits submitted June 6, 2007 and revised on June 11, 2007, and on file with this Commission; and it is

FURTHER ORDERED, that PSNH shall obtain all necessary permits and conform to all requirements of the New Hampshire Department of Environmental Services related to these crossings; and it is

FURTHER ORDERED, that PSNH shall file with the Commission a copy of all wetland and other permits it may obtain from the New Hampshire Department of Environmental Services as soon as it obtains such permits; and it is

FURTHER ORDERED, that all construction and future reconstruction to these approved crossings shall conform to the requirements of the National Electrical Safety Code and all other applicable safety standards in existence at that time; and it is

FURTHER ORDERED, that the PSNH maintains and operates these crossings in conformance with the National Electrical Safety Code; and it is

FURTHER ORDERED, that PSNH shall provide a copy of this order to the (i) Town Clerks of Deering, Goffstown, New Boston, Hillsborough, and Weare, (ii) New Hampshire Attorney General and the owners of the land bordering on said public waters at the location of the crossing, pursuant to RSA 371:19, (iii) pursuant to RSA 422-B:13, New Hampshire Department of Transportation and the Office of Secretary, U.S. Department of Commerce, and (iv) the New Hampshire Department of Environmental Services by first class mail, no later than July 10, 2007, and to be documented by affidavit filed with this office on or before July 20, 2007; and it is

FURTHER ORDERED, that PSNH shall cause a copy of this Order *Nisi* to be published once in a statewide newspaper of general circulation or of circulation in those portions of the state where operations are conducted, such publication to be no later than July 10, 2007 and to be documented by affidavit filed with this office on or before July 20, 2007; and it is

FURTHER ORDERED, that all persons interested in responding to this Order *Nisi* be notified that they may submit their comments or file a written request for a hearing which states the reason and basis for a hearing no later than July 16, 2007 for the Commission's consideration; and it is

FURTHER ORDERED, that any party interested in responding to such comments or request for hearing shall do so no later than July 19, 2007; and it is

FURTHER ORDERED, that this Order *Nisi* shall be effective July 23, 2007, unless PSNH fails to satisfy the publication obligation set forth above or the Commission provides otherwise in a supplemental order issued prior to the effective date.

By order of the Public Utilities Commission of New Hampshire this twenty-ninth day of June, 2007.

Thomas B. Getz
Chairman

Graham J. Morrison
Commissioner

Clifton C. Below
Commissioner

Attested by:

Debra A. Howland
Executive Director & Secretary

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NHPUC Order No. 24,772 - Attachment A

Correlation of Existing and Current Petition Information

Town	Water Body	Former NHPUC Order No.*	Former NHPUC Docket No.*	Current Petition Appendix #	Current Petition Plan & Profile Exhibit #	Current Petition Location Ex. #
Deering	Beaver Pond (Now Piscataquog River)	12,185	DE 76-5	A	1	2
Goffstown	Glen Lake	12,185	DE 76-5	B	3	4
	S. Branch Piscataquog River	12,185	DE 76-5	C	5	6
	N. Branch Piscataquog River	12,185	DE 76-5	D	7	8
Hillsborough/Deering	Contoocook River	12,185	DE 76-5	E	9	10
Hillsborough	Beards Brook	12,185	DE 76-5	E	9	10
	Beards Brook	12,185	DE 76-5	F	11	12
New Boston	N. Branch Piscataquog River	21,817	DE 84-272	G	13	14
	N. Branch Piscataquog River	21,817	DE 84-272	H	15	16
Weare	Daniels Lake	11,826	DE 75-88	I	17	18
	Daniels lake	18,369	DE 86-155	J	19	20

* - The existing self-supporting fiber optic cable (also known as an ADSS cable) was licensed by the Commission in Docket DE 98-100, Order No. 22,973 at all crossing locations.

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NHPUC Order No. 24,772 – Attachment B

Location Descriptions of Crossings

Current Petition Appendix #	Town	Water Body	Current Petition Location Ex. #	Location Description
A	Deering	Beaver Pond (Now Piscataquog River)	2	0.7 mi. SE of the intersection of Farrell Rd. & NH Route 149
B	Goffstown	Glen Lake	4	Intersection of NH Route 114 and Dan Little Brook
C		S. Branch Piscataquog River	6	0.3 mi. S of the intersection of Parker Road and NH route 114
D		N. Branch Piscataquog River	8	0.2 mi. west of the intersection of Parker Rd. and NH route 114 & 0.1 mi. S of NH Route 114
E	Hillsborough/Deering	Contoocook River	10	Confluence of the Contoocook River and Beards Brook
E	Hillsborough	Beards Brook	10	Confluence of the Contoocook River and Beards Brook
F		Beards Brook	12	0.15 mi. S of the intersection of Antrim Rd. and NH Route 9 just E of Antrim Rd.
G	New Boston	N. Branch Piscataquog River	14	0.3 mi. SE of the intersection of Parker Rd. and the N Branch of the Piscataquog River
H		N. Branch Piscataquog River	16	0.5 mi. SE of the intersection of Parker Rd. and the N Branch of the Piscataquog River
I	Weare	Daniels Lake	18	0.5 mi. N of the intersection of Twin Bridge Rd. and Wilson Lane and 0.1 mi. E of Wilson Lane
J		Daniels lake	20	0.5 mi. N of the intersection of Twin Bridge Rd. and Wilson Lane and 0.15 mi. E of Wilson Lane

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NHPUC Order No. 24,772 – Attachment C

Structure and Span Information

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Structure Type & Height (feet)	Span Length (feet)
A	Deering	Beaver Pond (Now Piscataquog River)	1	#158 – East #159 – West	DA – 70 RAX – 75	492.5
				#159 – East #160 – West	RAX – 75 RAX – 75	499.5
				#160 – East #161 – West	RAX – 75 RAX – 85	550.7
				#161 – East #162 – West	RAX – 85 RAX – 85	592.4
				#162 – East #163 – West	RAX – 85 RAX – 75	548.1
				#163 – East #164 – West	RAX – 75 DA – 75	463.2
B	Goffstown	Glen Lake	3	#3 – East #4 - West	RAX – 60 RAX - 75	478
C		S. Branch Piscataquog River	5	#37 – East #38 - West	RAX – 70 RAX - 70	452
D		N. Branch Piscataquog River	7	#40 – East #41 - West	RAX – 85 RAX - 90	435
E	Hillsborough/Deering	Contoocook River	9	#236 – East #237 - West	DA – 85 DA - 85	861
E	Hillsborough	Beards Brook	9	#236 – East #237 - West	DA – 85 DA - 85	861
F		Beards Brook	11	#241 – East #242 - West	RAX – 75 RAX - 80	524

G	New Boston	N. Branch Piscataquog River	13	#50 – East #51 - West	RAX – 65 RC3 - 70	439
H		N. Branch Piscataquog River	15	#52 – East #53 - West	RAX – 75 RAX - 75	579
I	Weare	Daniels Lake	17	#72 – East #73 - West	RAX – 80 RAX - 80	651
J		Daniels lake	19	#75 – East #76 - West	RAX – 75 DA - 65	463

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NHPUC Order No. 24,772 – Attachment D

Phase Wire Water* and Land** Clearance Information

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Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	100 Year FEMA Flood Elevation (feet)	Water Acreage (acres)	Phase Wire Clearance Required (feet)	Clearance (feet)
A	Deering	Beaver Pond (Now Piscataquog River)	1	#158 – East #159 – West	794	12	22.1	25.2
				#159 – East #160 – West	794	12	22.1	24.6
				#160 – East #161 – West	794	12	22.1	24.6
				#161 – East #162 – West	794	12	22.1	25.5
				#162 – East #163 – West	794	12	22.1	25.7
				#163 – East #164 – West	794	12	22.1	32.9
B	Goffstown	Glen Lake	3	#3 – East #4 - West	276	140	30.1	47.7
C		S. Branch Piscataquog River	5	#37 – East #38 - West	297	11	22.1	30.7
D		N. Branch Piscataquog River	7	#40 – East #41 - West	297	10	22.1	49.9
E	Hillsborough/ Deering	Contoocook River	9	#236 – East #237 - West	595	17	22.1	23.0
E	Hillsborough	Beards Brook	9	#236 – East	595	17	22.1	23.0

				#237 - West				
F		Beards Brook	11	#241 – East #242 - West	595	18.2	22.1	29.9
G	New Boston	N. Branch Piscataquog River	13	#50 – East #51 - West	298	12	22.1	28.9
H		N. Branch Piscataquog River	15	#52 – East #53 - West	298	12	22.1	28.4
I	Weare	Daniels Lake	17	#72 – East #73 - West	377	50	30.1	35.6
J		Daniels lake	19	#75 – East #76 - West	377	22	30.1	43.5

* - Static wire and OPGW cable clearance requirements are not shown. Clearance requirements for the static wire and the OPGW cable are always less than the phase wire under these conditions. The static wire and OPGW cable are installed well above the phase wires and will never sag within the minimum separation requirements of the phase conductors.

** - Clearance requirement for the phase conductors to land is 20.1 feet assuming that truck traffic is permissible per NESC Table 232-1 adjusted by NESC Rule 232C1.a for circuits operating at 115kV. PSNH designed this line to exceed this value at all land locations.

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NHPUC Order No. 24,772 – Attachment E

Minimum Vertical Clearance Between Conductors*

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Minimum Clearance Required (feet)	Clearance (feet)
A	Deering	Beaver Pond (Now Piscataquog River)	1	#158 – East #159 – West	3.0	7.3
				#159 – East #160 – West	3.0	11.2
				#160 – East #161 – West	3.0	11.3
				#161 – East #162 – West	3.0	10.5
				#162 – East #163 – West	3.0	11.2
				#163 – East #164 – West	3.0	7.5
B	Goffstown	Glen Lake	3	#3 – East #4 - West	3.0	11.1
C		S. Branch Piscataquog River	5	#37 – East #38 - West	3.0	9.8
D		N. Branch Piscataquog River	7	#40 – East #41 - West	3.0	10.1
E	Hillsborough/ Deering	Contoocook River	9	#236 – East #237 - West	3.0	9.5
E	Hillsborough	Beards Brook	9	#236 – East #237 - West	3.0	9.5
F		Beards Brook	11	#241 – East	3.0	9.5

				#242 - West		
G	New Boston	N. Branch Piscataquog River	13	#50 – East #51 - West	3.0	11.0
H		N. Branch Piscataquog River	15	#52 – East #53 - West	3.0	9.5
I	Weare	Daniels Lake	17	#72 – East #73 - West	3.0	7.1
J		Daniels lake	19	#75 – East #76 - West	3.0	7.0

* - Actual distance between conductors is greater due to horizontal offset of the static wire and fiber optic cable of 6-feet 4-inches to 7-feet 0-inches.