

STATE OF NEW HAMPSHIRE

Inter-Department Communication

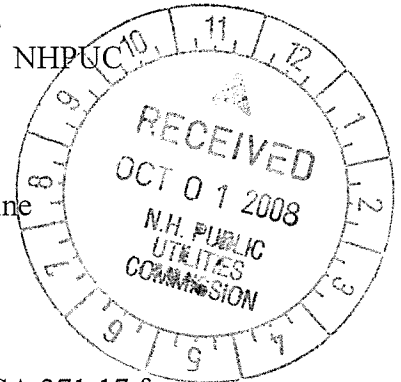
DATE: 01 October 2008

AT (OFFICE): NHPUC

FROM: Tom Frantz, Director – Electric Division

SUBJECT: DE 08-112: PSNH Petition under RSA 371:17 for T-198 line

TO: Chairman Getz, Commissioners Below and Morrison
Executive Director Howland



On September 12, 2008, PSNH filed a petition with the Commission under RSA 371:17 for a license to construct fiber optic cable and to maintain electric lines and a fiber optic communications cable at 13 locations over and across the following public waters in New Hampshire: the South Branch of the Ashuelot River in Troy and Swanzey; the Ashuelot River in Swanzey and Keene; and at 2 locations over and across public lands of the State of New Hampshire in Keene and Troy. On September 30, PSNH filed a written response to certain Staff inquiries. PSNH requests that the petition be approved by order nisi in an expeditious manner due to reliability concerns.

PSNH states that the crossings are part of PSNH's T-198 line, a line that runs between PSNH's Monadnock substation in Troy and PSNH's Emerald Street substation in Keene. The T-198 line was installed originally in 1962 and is, according to PSNH, the T-198 line is an integral part of PSNH's transmission system as well as the overall transmission grid in New England. According to PSNH, due to oversight by PSNH or the application of other crossing criteria, only one existing crossing, the Ashuelot River in Swanzey, was previously licensed by the Commission. The instant petition will result in licenses to all other crossings as well as the license for fiber optic cable at the crossing locations. PSNH states that upgrading the reliability and capacity of its communications system by adding the fiber optic cable at these crossings is an important component of a regional reliability project, the "Monadnock Reliability Upgrades." The fiber optic cable will contribute to the protection of the new Fitzwilliam substation; however, the approval is considered an interim measure as a rebuild of the T-198 transmission line is under study.

Staff employed the Liberty Consulting Group (Liberty) to review PSNH's petition. Liberty filed a memo electronically with Staff in which Liberty discusses its review of the PSNH petition. Liberty stated that "PSNH provided sufficient information and data to justify licensing of the existing unlicensed electrical crossings, relicensing the existing licensed crossing, and construction of the new communication crossings." Liberty also stated that "the new and existing facilities will be properly constructed, operated, and maintained" and that "[i]f the proposed facilities are constructed, operated, and maintained as proposed in its filing, PSNH will provide safe and reliable service to the public based on sound engineering standards as specified in the 2007 edition of the National Electrical Code." Liberty further recommended that Staff

should recommend approval of PSNH's petition to the Commission based on PSNH meeting the following four conditions:

1. That all reconstruction of 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;
2. That PSNH maintains and operates these crossings in conformance with the National Electrical Safety Code;
3. That PSNH submit the pending agreement to the Commission for crossing state acquired railroad property in Keene when it is approved by the New Hampshire Department of Transportation; and
4. That PSNH notify the Commission should a renewal term not be approved by the State or if the State revokes the Agreement.

Staff reviewed Liberty's recommendation and the PSNH petition and recommends that the Commission approve the filing expeditiously on an order *nisi* basis with the conditions recommended by Liberty. Liberty's review and recommendation is attached to this memo.

Please contact me if you have any questions concerning this recommendation or PSNH's petition.

DATE: September 16, 2008

FROM: Michael D. Cannata, Jr. - Senior Consultant
The Liberty Consulting Group

SUBJECT: DE 08-112: Petition by Public Service Company of New Hampshire, Inc. for a License to Construct and Maintain Electric Lines and a Fiber Optic Communication Cable Over and Across Public Waters of the South Branch of the Ashuelot River in Troy and Swanzey, New Hampshire, the Ashuelot River in Swanzey and Keene, New Hampshire, and State Acquired Railroad Property in Keene and Troy, New Hampshire

TO: Thomas C. Frantz – Director, Electric Division
New Hampshire Public Utilities Commission

On September 12, 2008 Public Service Company of New Hampshire (PSNH) filed a petition with the Commission under RSA 371:17 for a license to construct and maintain electric lines and a fiber optic communications cable over and across public waters of the South Branch of the Ashuelot River in Troy and Swanzey, New Hampshire, the Ashuelot River in Swanzey and Keene, New Hampshire, and across state acquired railroad property in Keene and Troy, New Hampshire.

The line to which facilities will be added is the T-198 115kV line. This existing line runs between the PSNH Monadnock substation in Troy, New Hampshire and the PSNH Emerald Street substation in Keene, New Hampshire. PSNH states that the line had been previously constructed to meet the reasonable needs of the public. PSNH further states that the T-198 line is an integral part of its transmission system and the overall New England transmission grid and is required to continue to meet the reasonable requirements of service to the public.

PSNH states that 10 of the 11¹ existing water crossings and both crossings of public lands have not been previously licensed due either to oversight or application of other crossing licensing criteria at the time of original construction. The new fiber optic All Dielectric Self Supported (ADSS) communications cable is required to upgrade the reliability and capacity of the communications systems used in its electric system operations primarily to protect the new Fitzwilliam Substation. The addition of the ADSS cable and the licensing of previously unlicensed crossings will allow PSNH to meet the reasonable requirements of service to the public in the western region of New Hampshire and be in compliance with statutory obligations. PSNH also stated that the new ADSS facilities may be interim in nature as the rebuild of the entire T-198 115kV line is currently under study as a part of an upgrade to the western area of the state.

In support of its petition, PSNH has supplied locational geographic maps and plan and profile drawings for all water crossings as Exhibits 1 and 2 in Appendices A through K, for both

¹ There are actually 13 water crossings as two crossing locations have two water crossings each. One single water crossing is licensed.

crossings of public lands as Exhibit 3 in Appendices A and K, previous license information as Table 1, and construction details of the various structure types used as Figures 1, 2, 3, and 4. PSNH also filed a determination of the normal flood level for all water crossings of the Ashuelot River and the South Branch of the Ashuelot River performed by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts as Appendix L, and an agreement awaiting execution between PSNH and the New Hampshire Department of Transportation – Bureau of Rail and Transit (NHDOT) and an easement from NHDOT as Appendix M for the two crossings of public lands. PSNH states that both railroad crossings were previously permitted by license agreements with the previous owner, the Boston and Maine Railroad. PSNH further states that it constructed a geographical overlay which showed that the proposed project is not in the Special Wind Region as depicted in the National Electrical Safety Code, ANSI C2-2007 (NESC), Figure 250-2(e).

PSNH states that it has permanent easements for its lines and facilities on both sides at each public water body and public land crossing location². PSNH also states that the installation methods used to install the ADSS cable on the existing structures will avoid any impacts to jurisdictional wetlands in the areas of the crossings so that no wetland permits will be required from the New Hampshire Department of Environmental Services (NHDES). In addition, PSNH states that it contacted the Federal Aviation Administration (FAA) because of the proximity of the facilities to the Dillant-Hopkins Airport in Keene. The FAA does not require a Notice of Proposed Construction review as the new facilities are being built under beneath existing structures and will therefore not impact air navigation.

Commission Staff requested that the Liberty Consulting Group (Liberty) review PSNH's petition. Liberty reviewed the petition and associated technical information filed by PSNH in support of its petition.

- Liberty found that PSNH provided sufficient information and data to justify licensing of the existing unlicensed electrical crossings, relicensing the existing licensed crossing, and construction of the new communications crossings.
- Liberty found that PSNH assures the Commission that the new and existing facilities will be properly constructed, operated, and maintained in accordance with the requirements of the NESC, ANSI C2-2007.
- Liberty concluded that if the proposed facilities are constructed, operated, and maintained as proposed in its filing, PSNH will provide safe and reliable service to the public based on sound engineering standards as specified in the 2007 edition of the National Electrical Code.

Liberty recommends that Staff recommend approval of PSNH's petition to the Commission.

Liberty further recommends that the Commission include the following conditions on PSNH.

- Require that all reconstruction of 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.

² The proposed agreement to cross state acquired railroad property in Keene, New Hampshire has an initial term of 10 years. Subsequent 10 year periods require State approval. Additionally, the State may revoke the agreement for any reason at any time.

- Require that PSNH maintains and operates these crossings in conformance with the National Electrical Safety Code.
- Require that PSNH submit the pending agreement to the Commission for crossing state acquired railroad property in Keene, New Hampshire when approved by NHDOT.
- Require that PSNH notify the Commission should a renewal term not be approved by the State or if the State revokes the agreement.

Liberty has attached its detailed report on this matter to this memo.

Please contact me if you have any questions or would like to discuss this matter. I can be reached at (603) 463-5540.

Liberty Review of the 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 South Branch of the Ashuelot River in Troy and Swanzey, New Hampshire, the Ashuelot River in Swanzey and Keene, New Hampshire, and State Acquired Railroad Property in Keene and Troy, New Hampshire

September 16, 2008

Review Summary

On September 12, 2008 Public Service Company of New Hampshire (PSNH) filed a petition with the Commission under RSA 371:17 for a license to construct and maintain electric lines and a fiber optic communications cable over and across public waters of the South Branch of the Ashuelot River in Troy and Swanzey, New Hampshire, the Ashuelot River in Swanzey and Keene, New Hampshire, and across state acquired railroad property in Keene and Troy, New Hampshire.

The line to which facilities will be added is the T-198 115kV line. This existing line runs between the PSNH Monadnock substation in Troy, New Hampshire and the PSNH Emerald Street substation in Keene, New Hampshire. PSNH states that the line had been previously constructed to meet the reasonable needs of the public. PSNH further states that the T-198 line is an integral part of its transmission system and the overall New England transmission grid and is required to continue to meet the reasonable requirements of service to the public.

PSNH states that 10 of the 11¹ existing water crossings and both crossings of public lands have not been previously licensed due either to oversight or application of other crossing licensing criteria at the time of original construction. The new fiber optic All Dielectric Self Supported (ADSS) communications cable is required to upgrade the reliability and capacity of the communications systems used in its electric system operations primarily to protect the new Fitzwilliam Substation. The addition of the ADSS cable and the licensing of previously unlicensed crossings will allow PSNH to meet the reasonable requirements of service to the public in the western region of New Hampshire and be in compliance with statutory obligations. PSNH also stated that the new ADSS facilities may be interim in nature as the rebuild of the entire T-198 115kV line is currently under study as a part of an upgrade to the western area of the state.

In support of its petition, PSNH has supplied locational geographic maps and plan and profile drawings for all water crossings as Exhibits 1 and 2 in Appendices A through K, for both crossings of public lands as Exhibit 3 in Appendices A and K, previous license information as Table 1, and construction details of the various structure types used as Figures 1, 2, 3, and 4. PSNH also filed a determination of the normal flood level for all water crossings of the Ashuelot River and the South Branch of the Ashuelot River performed by ENSR Environmental

¹ There are actually 13 water crossings as two crossing locations have two water crossings each. One single water crossing is licensed.

Consultants (ENSR) of Westford, Massachusetts as Appendix L, and an agreement awaiting execution between PSNH and the New Hampshire Department of Transportation – Bureau of Rail and Transit (NHDOT) and an easement from NHDOT as Appendix M for the two crossings of public lands. PSNH states that both railroad crossings were previously permitted by license agreements with the previous owner, the Boston and Maine Railroad. PSNH further states that it constructed a geographic overlay which showed that the proposed project is not in the Special Wind Region as depicted in the National Electrical Safety Code, ANSI C2-2007 (NESC), Figure 250-2(e). PSNH Table 1, related appendix and exhibit identification for the current petition, and previous crossing licence information is shown in Attachment A to this report.

The existing crossings and new crossings that will be constructed are at locations described in Attachment B to this report.

The construction of the crossings will consist of either two pole tangent structures (Types A and D) depicted in Figure 1, three pole angle structures (Type C) shown in Figure 2, three pole dead end angle structures (Type DA) shown in Figure 3, or two pole tangent structures (Types A3, D3, and RA) shown in Figure 4. As designed by PSNH and depicted in Figures 1 through 4, the phase conductors will be horizontally configured with two horizontally configured static wires above the phase conductors and a single ADSS cable attached to one pole below the phase conductors. Dimensions between the phase conductors, static wires, and the ADSS cable are also depicted in Figures 1 through 4. The structure number, structure type and height, crossing span length, and geographic placement relative to the crossing are shown in Attachment C to this report.

PSNH investigated a multitude of weather and loading conditions for its design. The design condition that produced the maximum sag for the phase conductors was operation at 285 degrees F. The design condition that produced the maximum sag for the ADSS cable was the NESC Heavy Load Condition temperature (0 degrees F) and ice thickness (½ inch radial ice) but without wind. PSNH used these design conditions to determine the minimum clearance of the phase conductors and the ADSS cable to the water surfaces of the crossings, to land surfaces, to other utility structures, and to the acquired railroad property². To determine the minimum distances between the phase conductors and the ADSS communication cable, PSNH assumed the phase conductors were at 285 degrees F and the ADSS cable was at 90 degrees F. To determine the minimum distances between the phase conductors and the static wires, PSNH assumed the phase conductors were at 30 degrees F without ice and that the static wires were at 30 degrees F with ½ inch of radial ice.

The ADSS communication cable meets the definition of the NESC of fiber optic cable – supply which is a fiber cable located in the supply space of the overhead facilities as stated in the NESC definitions and NESC Rule 230F1b. Based on NESC Rule 230F1b, fiber optic supply cables that are entirely dielectric shall have the same clearance from communications facilities as required for a neutral conductor meeting NESC Rule 230E1.

² Static wire clearances were not determined as they are always less than phase conductors or equal to the ADSS cable under these conditions. The static wires are installed well above the phase wires and ADSS cable and will never sag below the phase wires or SDSS cable. The ADSS cable is installed below the phase wires.

The three phase conductors are 477 MCM 26/7 ACSR conductors, constructed in a horizontal configuration as described in Figures 1 through 4. The static wires are two 7#8 Alumoweld conductors and will be bracket mounted on the structures and poles and the ADSS communication cable will be a 24 fiber 0.643 inch single cable that is bracket mounted on the structures and poles in the manner also described in Figures 1 through 4. The phase conductors are tensioned to 4,000 pounds at NESC Heavy Load Conditions (0 degrees F, ½ inch radial ice, and 4 pounds per square foot perpendicular wind loading). Similarly, the static wires will be tensioned to 3,500 pounds at NESC Heavy Load Conditions. The ADSS communication cable will be tensioned to 350 pounds at 60 degrees F and no wind to match the phase conductor sag at that temperature.

PSNH used the New Hampshire Geographically Referenced Analysis and Information System (NH GRANIT) which references Federal Emergency Management Agency (FEMA) flood data in its design at all crossing locations to determine river bank overflow elevations. PSNH commissioned ENSR, a water resources technology expert to verify that river bank overflow elevations are representative of normal flood conditions as required by the NESC to be used in crossing design. By letter dated August 29, 2008, ENSR confirmed that river bank overflow observations were a conservative approximation for the normal flood level of the Ashuelot River and South Branch of the Ashuelot River.

Water surface areas, whose size determines NESC minimum clearance requirements were calculated according to NESC Table 232-1, Note 19, using the surface area of a one mile section of the water body. The resultant water surface areas ranged from 1.6 acres to 10.4 acres. Table 232-1.7a requires a minimum water surface clearance of 22.1 feet for water surface areas of less than 20 acres when adjusted by NESC Rule 232.C.1.a. for circuits operating at 115kV. For static wires and the ADSS communication cable that meets Rule 230E1, the minimum clearance required by Table 232-1.7a to the water surface is 17.5 feet for water surface areas of less than 20 acres. The maximum sag of the static wires will never exceed these clearance requirements as they are located well above and/or offset from the phase conductors and will never sag to levels near the phase conductors. The normal flood elevations, calculated water surface areas, water surface clearance requirements, and minimum water surface clearance for the phase conductors and the ADSS communication cable are shown in Attachment D and Attachment D-1 to this report respectively.

For phase conductors adjusted to a 115kV operating voltage by NESC Rule 232.C.1.a, the minimum clearance required by Table 232-1.2 to the land surface where truck traffic is present is 20.1 feet. For static wires and the ADSS communication cable that meets Rule 230E1, the minimum clearance required by Table 232-1.2 to the land surface is 15.5 feet. Similarly, for phase conductors adjusted to a 115kV operating voltage by NESC Rule 232.C.1.a, the minimum clearance required by Table 232-1.1 to railroads is 28.1 feet. For static wires and the ADSS communication cable that meets Rule 230E1, the minimum clearance required by Table 232-1.1 to railroads is 23.5 feet. The maximum sag of the static wires will never exceed these clearance requirements as they are located well above and/or offset from the phase conductors and will never sag to levels near the phase conductors. The land surface clearance requirements, and minimum land surface clearance for the phase conductors, the ADSS communication cable, and all clearances to railroads are shown in Attachment E, Attachment E-1, and Attachment E-2 to

this report respectively.

PSNH determined that the minimum distance between the static wires and the phase conductors occurs when the phase conductors are at a temperature of 30 degrees F and have no ice while the static wires are at 30 degrees F with an ice loading of ½ inch radial ice. NESC Table 235-6.2a requires that the minimum distance between the phase conductors and the static wires be 54.3 inches or 4.8 feet for circuits operating at 115kV when adjusted by NESC Rule 235C.2.a.1. Similarly, PSNH determined that the minimum distance between the ADSS communication cable and the phase conductors occurs when the phase conductors are at a temperature of 285 degrees F and the ADSS communication cable is at 90 degrees F. NESC Table 235-5.1b requires that the minimum distance between the phase conductors and the static wires be 40 inches or 3.3 feet. Note 10 states that there are no specified clearance requirements between fiber optic supply cables meeting Rule 230-F.1b and supply cables and conductors. The minimum expected vertical and horizontal clearances between the phase conductors and the ADSS communication cable are depicted in Attachment F and Attachment F-1 to this report respectively.

PSNH also determined that the minimum distance between the phase conductors and other utilities occurs when the phase conductors are at a temperature of 285 degrees F. NESC Table 233-1.4 requires that the minimum distance between the phase conductors and other utilities be 3.6 feet for circuits operating at 115kV when adjusted by NESC Rule 233C.2a. Similarly, PSNH determined that the minimum distance between the ADSS communication cable and other utilities occurs when the ADSS cable is at 30 degrees F with an ice loading of ½ inch radial ice. NESC Table 233-1.5 requires that the minimum distance between the ADSS communication cable that meets Rule 230-E1 and other utility supply conductors is 2.0 feet. The minimum expected clearances between the phase conductors and the ADSS communication cable are depicted in Attachment G and Attachment G-1 to this report respectively.

PSNH states that it has permanent easements for its lines and facilities on both sides at each public water body and public land crossing location³. PSNH also states that the installation methods used to install the ADSS cable on the existing structures will avoid any impacts to jurisdictional wetlands in the areas of the crossings so that no wetland permits will be required from the New Hampshire Department of Environmental Services (NHDES). In addition, PSNH states that it contacted the Federal Aviation Administration (FAA) because of the proximity of the facilities to the Dillant-Hopkins Airport in Keene. The FAA does not require a Notice of Proposed Construction review as the new facilities are being built under beneath existing structures and will therefore not impact air navigation.

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 NESC.

Conclusions and Recommendations

³ The proposed agreement to cross state acquired railroad property in Keene, New Hampshire has an initial term of 10 years. Subsequent 10 year periods require State approval. Additionally, the State may revoke the agreement for any reason at any time.

Liberty reviewed the petition and associated technical information filed by PSNH in support of its petition.

Liberty found that PSNH provided sufficient information and data to justify licensing of the existing unlicensed electrical crossings, relicensing the existing licensed crossing, and construction of the new communications crossings.

Liberty found that PSNH assures the Commission that the new and existing facilities will be properly constructed, operated, and maintained in accordance with the requirements of the NESC, ANSI C2-2007.

Liberty concluded that if the proposed facilities are constructed, operated, and maintained as proposed in its filing, PSNH will provide safe and reliable service to the public based on sound engineering standards as specified in the 2007 edition of the National Electrical Code.

Liberty recommends that Staff recommend approval of PSNH's petition to the Commission.

Liberty further recommends that Staff recommend that the Commission include the following conditions on PSNH.

Require that all reconstruction of 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.

Require that PSNH maintains and operates these crossings in conformance with the National Electrical Safety Code.

Require that PSNH submit the pending agreement to the Commission for crossing state acquired railroad property in Keene, New Hampshire when approved by NHDOT.

Require that PSNH notify the Commission should a renewal term not be approved by the State or if the State revokes the agreement.

Attachments

Attachment A – Correlation of Existing and Current Petition Information

Attachment B – Location Descriptions of Crossings

Attachment C – Structure and Span Information

Attachment D – Phase Wire water Clearance Information

Attachment D-1 – ADSS Cable Water Clearance Information

Attachment E – Phase Wire Land Clearance Information

Attachment E1 – ADSS Land Clearance Information

Attachment E-2 – Phase Wire and ADSS Cable Railroad Clearance Information
Attachment F – Minimum Clearance Between Conductors and Static Wires
Attachment F-1 – Minimum Clearance Between Conductors and ADSS Cable
Attachment G – Minimum Clearance Between Phase Conductors and Other Utilities
Attachment G-1 – Minimum Clearance Between ADSS Cable and Other Utilities

ATTACHMENTS

Docket No. DE 08-112

Attachment A

Correlation of Existing and Current Petition Information

Town	Water Body or Land Parcel	Former NHPUC Order No.	Former NHPUC Docket No.	Current Petition Appendix #	Current Petition Location Exhibit #	Current Petition Plan & Profile Exhibit #
Troy	South Branch Ashuelot River	Not Previously Licensed	N/A	A	A1	A2
	State Acquired Railroad Property	Not Previously Licensed	N/A	A	A1	A3
Swanzey	South Branch Ashuelot River	Not Previously Licensed	N/A	B	B1	B2
	South Branch Ashuelot River	Not Previously Licensed	N/A	C	C1	C2
	South Branch Ashuelot River	Not Previously Licensed	N/A	D	D1	D2
	South Branch Ashuelot River	Not Previously Licensed	N/A	E	E1	E2
	South Branch Ashuelot River	Not Previously Licensed	N/A	F	F1	F2
	South Branch Ashuelot River	Not Previously Licensed	N/A	G	G1	G2
	Ashuelot River	Not Previously Licensed	N/A	H	H1	H2
	Ashuelot River	Not Previously Licensed	N/A	I ¹	I1	I2
	Ashuelot River	21,873	DE 94-272	J	J1	J2
Keene	Ashuelot River	Not Previously Licensed	N/A	K ¹	K1	K2
	State Acquired Railroad Property	Not Previously Licensed	N/A	K	K1	K3

1 – These appendices include two water crossing locations.

Attachment B

Location Descriptions of Crossings

Current Petition Appendix #	Town	Water Body or Land Parcel	Current Petition Location Ex. #	Location Description
A	Troy	South Branch Ashuelot River	A1	On NH Highway Route 12, approximately 0.9 miles north of Old Whitcomb Road
A		State Acquired Railroad Property	A1	On NH Highway Route 12, approximately 0.9 miles north of Old Whitcomb Road
B	Swanzey	South Branch Ashuelot River	B1	On Flat Roof Mill Road, approximately 0.2 miles north of Oliver Hill Road
C		South Branch Ashuelot River	C1	On NH Highway Route 32, approximately 1.0 mile north of Talbot Hill Road
D		South Branch Ashuelot River	D1	On NH Highway Route 32, approximately 1.0 mile north of Talbot Hill Road
E		South Branch Ashuelot River	E1	Approximately 0.4 miles north of NH Highway Route 32 and approximately 0.25 miles east of Cresson Drive
F		South Branch Ashuelot River	F1	Approximately 0.5 miles north of NH Highway Route 32 and approximately 0.3 miles east of Cresson Drive
G		South Branch Ashuelot River	G1	Approximately 0.9 miles north of NH Highway Route 32 and approximately 0.2 miles east of Causeway Road
H		Ashuelot River	H1	Approximately 1.0 mile north of Wilson Pond and approximately 0.25 miles west of Airport Road
I ¹		Ashuelot River	I1	Approximately 1.0 mile north of Wilson Pond and approximately 0.25 miles west of Airport Road
J		Ashuelot River	J1	Approximately 0.3 miles south of Kirf Court and approximately 0.3 miles east of Matthews Road
K ¹	Keene	Ashuelot River	K1	Approximately 0.1 miles north of Winchester Street and 0.1 miles east of Pearl Street
K		State Acquired Railroad Property	K1	Approximately 0.35 miles east of Winchester Street and 0.15 miles north of NH Highway Route 10

1 – These appendices include two water crossing locations.

Structure and Span Information

Current Petition Appendix #	Town	Water Body or Land Parcel	Current Petition Plan & Profile Exhibit #	Structure # & Location	Structure Type & Height (feet)	Span Length (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	DA – 50,55,60 DA - 50	1000
A		State Acquired Railroad Property	A3	#29 – East #30 - West	DA – 50,55,60 DA - 50	1000
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	A – 55 D - 60	430
C		South Branch Ashuelot River	C2	#97 – East #98 - West	A – 60 RA - 85	515
D		South Branch Ashuelot River	D2	#99 – South #100 - North	DA – 65 A - 50	401
E		South Branch Ashuelot River	E2	#103 – South #104 - North	A – 50 A - 60	360
F		South Branch Ashuelot River	F2	#105 – South #106 - North	A – 55 A - 50	410
G		South Branch Ashuelot River	G2	#110 – South #111 - North	C – 60 A - 55	405
H ¹		Ashuelot River	H2	#121 – South #122 - North	A – 55 A - 55	420
I ²		Ashuelot River	I2	#122 – South #123 – North	A – 55 A - 55	420
				#123 – South #124 - North	A – 55 A - 50	430
J		Ashuelot River	J2	#130 – South #131 - North	A – 50 C - 50	361
K ²	Keene	Ashuelot River	K2	#150 – South #151 – North	C – 50 D3 – 70	368
				#151 – South #152 - North	D3 – 70 A3 - 60	360
K		State Acquired Railroad Property	K3	#146 – South #147 - North	DA – 65 D3 - 70	280

1 – Two water bodies exist at this crossing. The most limiting is presented.

2 – These appendices include two water crossing locations.

Attachment D

Phase Wire Water Clearance Information

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Normal Flood Elevation (feet)	Water Acreage (acres)	Phase Wire Water Clearance Required (feet)	Minimum Water Clearance (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	880.8	1.9	22.1	112.3
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	562.2	1.9	22.1	42.4
C		South Branch Ashuelot River	C2	#97 – East #98 - West	464.8	1.9	22.1	30.0
D		South Branch Ashuelot River	D2	#99 – South #100 - North	464.6	1.9	22.1	29.6
E		South Branch Ashuelot River	E2	#103 – South #104 - North	461.8	6.3	22.1	41.1
F		South Branch Ashuelot River	F2	#105 – South #106 - North	460.7	6.6	22.1	24.9
G		South Branch Ashuelot River	G2	#110 – South #111 - North	456.4	7.9	22.1	24.4
H ¹		Ashuelot River	H2	#121 – South #122 - North	456.0	10.4	22.1	26.4
I ²		Ashuelot River	I2	#122 – South #123 – North	460.2	1.6	22.1	27.4
				#123 – South #124 - North	459.6	1.6	22.1	23.2
J		Ashuelot River	J2	#130 – South #131 - North	460.1	9.3	22.1	23.8
K ²	Keene	Ashuelot River	K2	#150 – South #151 – North	469.1	2.4	22.1	35.3
				#151 – South #152 - North	465.8	2.4	22.1	33.6

1 – Two water bodies exist at this crossing. The most limiting is presented.

2 – These appendices include two water crossing locations.

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Normal Flood Elevation (feet)	Water Acreage (acres)	ADSS Cable Water Clearance Required (feet)	Minimum Water Clearance (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	880.8	1.9	17.5	98.8
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	562.2	1.9	17.5	38.6
C		South Branch Ashuelot River	C2	#97 – East #98 - West	464.8	1.9	17.5	27.4
D		South Branch Ashuelot River	D2	#99 – South #100 - North	464.6	1.9	17.5	22.8
E		South Branch Ashuelot River	E2	#103 – South #104 - North	461.8	6.3	17.5	36.5
F		South Branch Ashuelot River	F2	#105 – South #106 - North	460.7	6.6	17.5	20.5
G		South Branch Ashuelot River	G2	#110 – South #111 - North	456.4	7.9	17.5	20.6
H ²		Ashuelot River	H2	#121 – South #122 - North	456.0	10.4	17.5	22.9
I ³		Ashuelot River	I2	#122 – South #123 – North	460.2	1.6	17.5	23.6
				#123 – South #124 - North	459.6	1.6	17.5	19.7
J		Ashuelot River	J2	#130 – South #131 - North	460.1	9.3	17.5	20.6
K ³	Keene	Ashuelot River	K2	#150 – South #151 – North	469.1	2.4	17.5	31.5
				#151 – South #152 - North	465.8	2.4	17.5	30.0

1 - Static wire clearance requirements are not shown. Clearance requirements for the static wires to the water surface are always less than the phase wires or equal to the ADSS cable under these conditions. The static wires are installed well above the phase wires and ADSS cable and will never sag below the phase conductors or the ADSS cable. The ADSS cable is installed below the phase wires.

2 – Two water bodies exist at this crossing. The most limiting is presented.

3 – These appendices include two water crossing locations.

Attachment E

Phase Wire Land Clearance Information

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Phase Wire Land Clearance Required (feet)	Minimum Land Clearance (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	20.1	66.0
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	20.1	41.6
C		South Branch Ashuelot River	C2	#97 – East #98 - West	20.1	30.5
D		South Branch Ashuelot River	D2	#99 – South #100 - North	20.1	24.3
E		South Branch Ashuelot River	E2	#103 – South #104 - North	20.1	22.4
F		South Branch Ashuelot River	F2	#105 – South #106 - North	20.1	24.5
G		South Branch Ashuelot River	G2	#110 – South #111 - North	20.1	22.0
H ¹		Ashuelot River	H2	#121 – South #122 - North	20.1	23.7
I ²		Ashuelot River	I2	#122 – South #123 – North	20.1	24.2
				#123 – South #124 - North	20.1	24.3
J		Ashuelot River	J2	#130 – South #131 - North	20.1	24.4
K ²	Keene	Ashuelot River	K2	#150 – South #151 – North	20.1	36.5
				#151 – South #152 - North	20.1	33.6

1 – Two water bodies exist at this crossing. The most limiting is presented.

2 – These appendices include two water crossing locations.

Attachment E-1

ADSS Cable Land Clearance Information¹

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Phase Wire Land Clearance Required (feet)	Minimum Land Clearance (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	15.5	52.5
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	15.5	37.9
C		South Branch Ashuelot River	C2	#97 – East #98 - West	15.5	28.2
D		South Branch Ashuelot River	D2	#99 – South #100 - North	15.5	18.0
E		South Branch Ashuelot River	E2	#103 – South #104 - North	15.5	17.5
F		South Branch Ashuelot River	F2	#105 – South #106 - North	15.5	20.0
G		South Branch Ashuelot River	G2	#110 – South #111 - North	15.5	18.4
H ²		Ashuelot River	H2	#121 – South #122 - North	15.5	20.1
I ³		Ashuelot River	I2	#122 – South #123 – North	15.5	20.6
				#123 – South #124 - North	15.5	20.8
J		Ashuelot River	J2	#130 – South #131 - North	15.5	21.3
K ³	Keene	Ashuelot River	K2	#150 – South #151 – North	15.5	32.4
				#151 – South #152 - North	15.5	30.0

1 - Static wire clearance requirements are not shown. Clearance requirements for the static wires to the land surface are always less than the phase wires or equal to the ADSS cable under these conditions. The static wires are installed well above the phase wires and ADSS cable and will never sag below the phase conductors or the ADSS cable. The ADSS cable is installed below the phase wires.

2 – Two water bodies exist at this crossing. The most limiting is presented.

3 - These appendices include two water crossing locations.

Docket No. DE 08-112

Attachment E-2

Phase Wire and ADSS Cable Railroad Clearance Information¹

Current Petition Appendix #	Town	Land Parcel	Current Petition Plan & Profile Ex. #	Structure # & Location	Phase Wire RR Clearance Required (feet)	Minimum Phase Wire RR Clearance (feet)	ADSS Cable RR Clearance Required (feet)	Minimum ADSS Cable RR Clearance (feet)
A	Troy	State Acquired railroad Property	A3	#29 – East #30 - West	28.1	85.9	23.5	73.3
K	Keene	State Acquired Railroad Property	K3	#146 – South #147 – North	28.1	33.0	23.5	27.1

1 - Static wire clearance requirements are not shown. Clearance requirements for the static wires to the railroad surface are always less than the phase wires or equal to the ADSS cable under these conditions. The static wires are installed well above the phase wires and ADSS cable and will never sag below the phase conductors or the ADSS cable. The ADSS cable is installed below the phase wires.

Minimum Clearance Between Conductors and Static Wires

Current Petition Appendix #	Town	Water Body or Land Parcel	Current Petition Plan & Profile Ex. #	Structure # & Location	Minimum Clearance Required (feet)	Minimum Vertical Clearance (feet)	Minimum Horizontal Clearance (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	4.8	5.2	0.0
A		State Acquired Railroad Property	A3	#29 – East #30 - West	4.8	5.2	0.0
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	4.8	6.2	7.0
C		South Branch Ashuelot River	C2	#97 – East #98 - West	4.8	6.1	7.0
D		South Branch Ashuelot River	D2	#99 – South #100 - North	4.8	5.9	0.0
E		South Branch Ashuelot River	E2	#103 – South #104 - North	4.8	6.0	7.0
F		South Branch Ashuelot River	F2	#105 – South #106 - North	4.8	5.9	7.0
G		South Branch Ashuelot River	G2	#110 – South #111 - North	4.8	6.0	6.2
H ¹		Ashuelot River	H2	#121 – South #122 - North	4.8	5.9	7.0
I ²		Ashuelot River	I2	#122 – South #123 – North	4.8	5.9	7.0
				#123 – South #124 - North	4.8	6.0	7.0
J		Ashuelot River	J2	#130 – South #131 - North	4.8	6.0	6.2
K ²	Keene	Ashuelot River	K2	#150 – South #151 – North	4.8	7.2	6.2
				#151 – South #152 - North	4.8	10.8	7.0
K		State Acquired Railroad Property	K3	#146 – South #147 - North	4.8	6.0	0.0

1 – Two water bodies exist at this crossing. The most limiting is presented.

2 – These appendices include two water crossing locations.

Minimum Clearance Between Conductors and ADSS Cable

Current Petition Appendix #	Town	Water Body or Land Parcel	Current Petition Plan & Profile Ex. #	Structure # & Location	Minimum Clearance Required (feet)	Vertical Clearance (feet)	Horizontal Clearance (feet)
A	Troy	South Branch Ashuelot River	A2	#29 – East #30 - West	3.3	13.8	3.7
A		State Acquired Railroad Property	A3	#29 – East #30 - West	3.3	13.8	3.7
B	Swanzey	South Branch Ashuelot River	B2	#71 – East #72 - West	3.3	3.7	6.2
C		South Branch Ashuelot River	C2	#97 – East #98 - West	3.3	2.5	6.2
D		South Branch Ashuelot River	D2	#99 – South #100 - North	3.3	6.2	3.7
E		South Branch Ashuelot River	E2	#103 – South #104 - North	3.3	4.4	6.2
F		South Branch Ashuelot River	F2	#105 – South #106 - North	3.3	4.5	6.2
G		South Branch Ashuelot River	G2	#110 – South #111 - North	3.3	3.7	5.5
H ¹		Ashuelot River	H2	#121 – South #122 - North	3.3	3.5	6.2
I ²		Ashuelot River	I2	#122 – South #123 – North	3.3	3.5	6.2
				#123 – South #124 - North	3.3	3.4	6.2
J		Ashuelot River	J2	#130 – South #131 - North	3.3	3.1	5.5
K ²	Keene	Ashuelot River	K2	#150 – South #151 – North	3.3	3.7	5.5
				#151 – South #152 - North	3.3	3.6	6.2
K		State Acquired Railroad Property	K3	#146 – South #147 - North	3.3	7.3	3.7

1 – Two water bodies exist at this crossing. The most limiting is presented.

2 – These appendices include two water crossing locations.

Docket No. DE 08-112

Attachment G

Minimum Clearance Between Phase Conductors and Other Utilities

Current Petition Appendix #	Town	Other Utilities	Current Petition Plan & Profile Ex. #	Structure # & Location	Phase Wire Minimum Clearance Required (feet)	Phase Wire Minimum Clearance (feet)
A	Troy	Distribution Lines	A2	#29 – East #30 - West	3.6	59.3
C	Swanzey	Distribution Lines	C2	#97 – East #98 - West	3.6	25.0
K ¹	Keene	Distribution Lines	K2	#150 – South #151 – North	3.6	10.6
				#150 – South #151 - North	3.6	10.2 ²
				#151 – South #152 - North	3.6	9.6

1 – This appendix includes three distribution line crossing locations.

2 – This data point was obtained verbally from PSNH.

Docket No. DE 08-112

Attachment G-1

Minimum Clearance Between ADSS Cable and Other Utilities¹

Current Petition Appendix #	Town	Other Utilities	Current Petition Plan & Profile Ex. #	Structure # & Location	ADSS Cable Minimum Clearance Required (feet)	Minimum Clearance (feet)
A	Troy	Distribution Lines	A2	#29 – East #30 - West	2.0	45.9
C	Swanzey	Distribution Lines	C2	#97 – East #98 - West	2.0	23.5
K ²	Keene	Distribution Lines	K2	#150 – South #151 – North	2.0	6.4
				#150 – South #151 - North	2.0	6.2
				#151 – South #152 - North	2.0	5.4

1 - Static wire clearance requirements are not shown. Clearance requirements for the static wires to the other utilities are always less than the phase wires or equal to the ADSS cable under these conditions. The static wires are installed well above the phase wires and ADSS cable and will never sag below the phase conductors or the ADSS cable. The ADSS cable is installed below the phase wires.

2 – This appendix includes three distribution line crossing locations.