

STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: February 27, 2017

AT (OFFICE): NHPUC

FROM: Randy Knepper
Director – Safety Division

SUBJECT: Docket No. DE 15-460, DE 15-461, DE 15-462 and DE 15-463
Northern Pass Transmission Project
Northern Pass Transmission, LLC (NPT) and
Public Service Company of New Hampshire d/b/a Eversource Energy (ESE)
**Staff Recommendation #1 regarding
20 Licenses to Cross Public Waters and Lands**

TO: Debra Howland, Executive Director
Thomas Frantz, Director, Electric Division
Leszek Stachow, Assistant Director, Electric Division
Suzanne Amidon, Staff Attorney

cc: Robert Wyatt, Assistant Director, Safety Division

Public waters and lands crossings included in this recommendation

Table 1 Zone 1 - List of NPT and ESE Crossings

Staff Zone- Map #	Water/ Land Name	DE 15-460 NPT Water Crossing/ License	DE 15-461 NPT Land Crossing/ License	DE 15-462 ESE Water Crossing/ License	DE 15-463 ESE Land Crossing/ License	Totals
1-1	Halls Stream	Pittsburg	--	--	--	1
1-2	Connecticut River	Pittsburg	--	--	--	1
1-3	Nash Stream Forest	--	Stark	--	Stark	2
1-4	Percy State Forest	--	Stark	--	Stark	2
1-5	Upper Ammonoosuc	Stark	--	Stark	--	2
1-6	Cape Horn Forest	--	Northumberland		Northumberland	2
1-7	Otter Brook	Lancaster	--	Lancaster	--	2
1-7	Israel River	Lancaster	--	Lancaster	--	2
1-7	NHDOT RR	--	Lancaster	--	Lancaster	2
1-8	NHDOT RR	--	Dalton	--	Dalton	2
1-8	Johns River	Dalton	--	Dalton	--	2
Zone 1	Sub-Total Licenses	6 NPT Water	5 NPT Land	4 ESE Water	5 ESE Land	20

Staff Recommendation #1 for Zone 1 crossings

NPT filed petitions pursuant to RSA 371:17 in docket no. DE 15-460, DE 15-461, DE 15-462 and DE 15-463, for licenses to construct and maintain electric lines over, under and across public waters, lands and rails at 20 locations along the proposed path between Pittsburg and Dalton, New Hampshire (Zone 1). The proposed 320kV direct current high-voltage electric transmission line is referenced in the petitions as the DC Line. Other existing Eversource circuits along the project path that will require licenses to cross public waters or lands are identified by their assigned circuit numbers and operate at alternating current (AC).

The methodology used by Staff to determine how the analysis was performed is presented in the Overall Recommendation memorandum.

This Recommendation #1 is to provide the details examined that apply to Zone 1.

Within Zone 1 there is a single underground proposed installation of the public water crossing of the Connecticut River in Pittsburg. All 19 remaining crossings are overhead for land, public waters, and rails. The 20 crossings are sequentially labeled from, north to south. All mapping and data collection tables are presented in and follow the same sequence.

Table 2 gives pertinent information tables provided in this Staff Recommendation regarding overhead crossing information that has been reviewed or otherwise analyzed as appropriate.

TABLE 2 ZONE 1 AERIAL CROSSINGS

Staff	Water/Land Name	Town	Type Crossing	Voltage/Type	NPT/ESE	Circuit	Staff Calculated Clearance SAG 10	Clearance Shown on Petition Profile	Calculated Difference	Required Clearance NESC	Span ft	Verification
Zone-Map			Land									
#			Rail Water									
1-1	Halls Stream	Pittsburg	Water	320kV/DC	NPT	3270 3271	54	53	1	35.7	812.48	Excellent
1-3	Nash Stream Forest	Stark	Land	320kV/DC	NPT	3270 3271	43	33	10	21.7	712.08	Adequate
1-3	Nash Stream Forest	Stark	Land	115kV/AC	ESE	O154	30	24	6	16.1	506.73	Good
1-4	Percy State Forest	Stark	Land	320kV/DC	NPT	3270 3271	34	33	1	21.7	591.52	Excellent
1-4	Percy State Forest	Stark	Land	115kV/AC	ESE	O154	37	27	10	16.1	607.97	Adequate
1-5	Upper Ammonoosuc	Stark	Water	320kV/DC	NPT	3270 3271	41	39	2	35.7	548.00	Excellent
1-5	Upper Ammonoosuc	Stark	Water	115kV/AC	ESE	O154	38	37	1	30.1	537.83	Excellent
1-6	Cape Horn Forest	Northumberland	Land	320kV/DC	NPT	3270 3271	30	30	0	21.7	442.57	Excellent
1-6	Cape Horn Forest	Northumberland	Land	115kV/AC	ESE	D142	27	24	3	16.1	481.43	Excellent
1-7	Otter Brook	Lancaster	Water	320kV/DC	NPT	3270 3271	41	38	3	35.7	833.52	Excellent
1-7	Otter Brook	Lancaster	Water	115kV/AC	ESE	D142	39	35	4	30.1	824.05	Good
1-7	Israel River	Lancaster	Water	320kV/DC	NPT	3270 3271	41	38	3	35.7	833.52	Excellent
1-7	Israel River	Lancaster	Water	115kV/AC	ESE	D142	39	35	4	30.1	824.05	Good
1-7	NHDOT RR Groveton Branch	Lancaster	Rail	320kV/DC	NPT	3270 3271	45	44	1	33.7	559.75	Excellent
1-7	NHDOT RR Groveton Branch	Lancaster	Rail	115kV/AC	ESE	D142	47	46	1	28.1	537.04	Excellent
1-8	NHDOT RR Mountain Div Rail Line	Dalton	Rail	320kV/DC	NPT	3270 3271	59	57	2	33.7	605.02	Excellent
1-8	NHDOT RR Mountain Div Rail Line	Dalton	Rail	34.5kV/AC	ESE	348X	42	42	0	23.5	183.01	Excellent
1-8	Johns River	Dalton	Water	320kV/DC	NPT	3270 3271	52	51	1	35.7	700.57	Excellent
1-8	Johns River	Dalton	Water	34.5kV/AC	ESE	348X	31	30	1	25.5	213.33	Excellent

Refer to 8 detailed PUC generated single-page maps using its GIS mapping software specific to each crossing location. Each detailed map depicted all circuits, (proposed and existing including those that will be relocated and those that will remain in place). Support structures, Support structure identifications, support structure heights, ROW widths, proper orientation of circuits, dimensions of spans, parcel information known as line lists (which emanated from NPT and ESE’s petitions) are all depicted. Typical elevation views within the Right of Way are shown including cross sections within the ROW are taken from Forward NH Plans located at www.northernpass.us/towns.htm. In addition to the above geographical information was also depicted such as roads, buildings, rivers, trees, neighborhoods, bridges, and town lines.

Refer to Appendix A for single-page tables of information specific to each crossing, with a comments, conclusions, conditions and recommendations. Staff designated Zone 1 has identified 20 public waters and lands crossings that will require licenses. Specific technical and information relevant to the crossing are identified in each Appendix A table.

Existing license(s) and permissions previously granted by the PUC for these locations

See Attachments A1, A2 or A3 of the Overall Recommendation for licenses previously granted. NPT and ESE petitions were for the new DC transmission line and only for relocated ESE transmission lines. ESE did not include licenses for those existing transmission lines that were not being altered.

Existing Circuits where ESE does not have a license.

In examining the eight locations Staff found 2 locations where existing licenses were never issued:

1. Johns River, Dalton - Q195 Circuit 115kV - PUC detailed map 8
2. Johns River, Dalton - X178 Circuit 115kV - PUC detailed map 8

Staff recommends ESE be required to submit petitions for granting of these licenses.

Safety Division Specific Recommendations with any applicable conditions:

See individual crossing details listed within Tables A.1.1.1, A.1.2.1, A.1.3.1, A.1.3.2, A.1.4.1, A.1.4.2, A.1.5.1, A.1.6.1, A.1.6.2, A.1.7a.1, A.1.7a.2, A.1.7b.1, A.1.7b.2, A.1.7c.1, A.1.7c.2 A1.8a.1, A.8.1a.2, A.1.8b.1, and A.1.8b.2 located in Appendix A of Recommendation #1.

Public Water/Land Crossing Name: Halls Stream, Pittsburg, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	1	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	TBD	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	36
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	120 feet	Back Pole Number	HQ-1
Number of Circuits within ROW	1 new (DC)	Back Structure Height	120
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	1081.36
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	95.5
First Structure Identification	DC-HQ-1	Back Conductor Elev. at Pole	1176.86
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	DC-1
Last Structure Identification	DC-1	Forward Structure Height	90
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	1076.5
		Forward Conductor Height	65.5
		Forward Conductor Elev. at Pole	1142
		Span (Feet)	812.48
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	8,964
		Calc'd. Clearance (SAG 10)	54
		Clearance Shown on Profile	53
		Req'd Clearance (NESC)	35.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Halls Stream flows along the U.S.-Canadian border, but is no longer used to define the international border. Structure DC-HQ-1, as identified in this crossing, is owned by Hydro-Quebec and is located on the Canadian side of the U.S.-Canadian border.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (7.19 feet) brings the minimum clearance to 35.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Connecticut River, Pittsburg, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	2	Conductor diameter (cross sect)	2.25 in
Petitioner (NPT, ESE)	NPT	Manufacturer	ABB
Petitioner Line List # (for Parcels traversed)	161	Conductor Size	2500 sq mm
Crossing Circuit Configuration	Underground	Insulation	XLPE
Public Crossing Type (Water/Land)	Water	Conduit Diameter	8" HDPE
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Dia with Insulation	4.72 in
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	20.900
Right of Way Width	120 feet	Back Structure Receiver	HDD 03 Exit Points (a +b)
Number of Circuits within ROW	1 new (DC)	Estimated Depth Max	75 feet at max arc
Foreign Utilities within ROW	None	Radius of Directional Drill	1200 ft
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	NA
First Structure Identification	HDD 03 Entry Points (a +b)	Back Conductor Elev. at Pole	NA
State Listed Public Waters (Yes/No/Not Applicable)	Yes	First Structure Receiver	HDD 03 Entry Points (a +b)
Last Structure Identification	HDD 03 Exit Points (a +b)	Estimated Depth Arc	varies
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable (but 1003 feet including DOT ROW)	Forward Ground Elevation	NA
		Forward Conductor Height	NA
		Forward Conductor Elev. at Pole	NA
		Span (Feet)	1003
		Max Tension NESC Heavy lbs.	NA
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	NA
		Calc'd. Clearance (SAG 10)	NA
		Clearance Shown on Profile	55 feet
		Req'd Clearance (NESC)	No Engineering Standard
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
<p>Comments</p> <p>The Original Petition portrayed this crossing as a steep underground directional drill with a 25 foot minimum clearance to the Connecticut River. The November 2016 submittal changed the design from a tight radius to a larger sweeping radius of directional drill, resulting in an underground path of greater length.</p> <p>There is a town water main(12 inch diameter) within this NH DOT ROW.</p> <p>Each cable will have approximately the same radius and will be separated by approximately 5 ft to 20 ft. Communication cables that have 3 inch diameter HDPE will be attached to each positive and negative charge cable.</p>			
<p>Conclusions</p> <p>The proposed license petitioned for may be exercised without substantially affecting the public rights in the waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.</p> <p>This underground crossing design is being developed in accordance with the NH DOT Utility Maintenance Manual and will include comments received by the NH DOT during the design review process.</p>			
<p>Staff Recommendation</p> <p>That the Commission grant the license to construct, maintain and operate the electric lines, communication cable, and heat sensing cable under or across the public waters identified in the petition.</p>			
<p>Staff Recommended Conditions applied to License</p> <p>The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.</p> <p>Staff recommends HDPE as the conduit since it is readily fusible and many commercially available standards for tool requirements, heating calibration requirements and alignment parameters</p>			

Public Water/Land Crossing Name: Nash Stream Forest, Stark, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	3	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	12519	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150 feet	Back Pole Number	DC-396
Number of Circuits within ROW	2	Back Structure Height	85
Foreign Utilities within ROW	Yes, PNGTS	Back Ground Elevation (Ft)	1087.8
Total Structures/Poles/Manholes this circuit crossing	8	Back Conductor Height	61
First Structure Identification	DC-402	Back Conductor Elev. at Pole	1148.8
State Listed Public Waters (Yes/No/Not Applicable)	NA	Forward Pole Number	DC-397
Last Structure Identification	DC-395	Forward Structure Height	90
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	4,335 ft	Forward Ground Elevation	1072.6
		Forward Conductor Height	66
		Forward Conductor Elev. at Pole	1138.6
		Span (Feet)	712
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	8,500
		Calc'd. Clearance (SAG 10)	43
		Clearance Shown on Profile	33
		Req'd Clearance (NESC)	21.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Nash Stream Forest is State-owned land managed by the NH Department of Resources and Economic Development (DRED). This public land crossing follows existing Portland Natural Gas Transmission System (PNGTS) ROW across this parcel. This land is used recreationally for a variety of public uses including snowmobiling, ATV use, hiking, etc..		
	Comments from DRED related to the project's impact on this State-owned land were generally favorable. A possible negative impact to the public use of the land would be potential restricted access to popular trails during construction related to the project.		
	DRED did not comment on this particular parcel. Staff notes the property is likely used for recreational purposes and the design meets or exceeds NESC requirements for that type of use.		
Conclusions	Based on the comments received from DRED, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines and communication lines over and across the public land identified in the petition. NPT shall coordinate with DRED to minimize concerns of public access and use of public lands during construction of the transmission lines. NPT shall coordinate with PNGTS to minimize the effects of DC attenuation between the overhead DC circuit and ground beds used for corrosion control of the pipeline.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Nash Stream Forest, Stark, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV, AC
PUC Zone	1	Circuit	O154
PUC Map Number	3	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	12519	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	150 feet	Back Pole Number	O154-48
Number of Circuits within ROW	2	Back Structure Height	92.5
Foreign Utilities within ROW	Yes, PNGTS	Back Ground Elevation (Ft)	1037.52
Total Structures/Poles/Manholes this circuit crossing	8	Back Conductor Height	55.01
First Structure Identification	O154-49	Back Conductor Elev. at Pole	1092.53
State Listed Public Waters (Yes/No/Not Applicable)	NA	Forward Pole Number	O154-49
Last Structure Identification	O154-42	Forward Structure Height	80
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	4335 ft	Forward Ground Elevation	1066.12
		Forward Conductor Height	42.74
		Forward Conductor Elev. at Pole	1108.86
		Span (Feet)	506.73
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz. Tension@MaxTemp	2,391
		Calc'd. Clearance (SAG 10)	30
		Clearance Shown on Profile	24
		Req'd Clearance (NESC)	16.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
<p>Comments</p> <p>Nash Stream Forest is State-owned land managed by the NH Department of Resources and Economic Development (DRED). This public land crossing follows existing Portland Natural Gas Transmission System (PNGTS) ROW across this parcel. This land is used recreationally for a variety of public uses including snowmobiling, ATV use, hiking, etc..</p> <p>Comments from DRED related to the project's impact on this State-owned land were generally favorable. A possible negative impact to the public use of the land would be potential restricted access to popular trails during construction related to the project.</p> <p>DRED did not comment on this particular parcel. Staff notes the property is likely used for recreational purposes and the design meets or exceeds NESC requirements for that type of use.</p>			
<p>Conclusions</p> <p>Based on the comments received from DRED, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.</p> <p>The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).</p>			
<p>Staff Recommendation</p> <p>That the Commission grant the license to construct, maintain and operate the electric lines and communication lines over and across the public land identified in the petition.</p> <p>ESE shall coordinate with DRED to minimize concerns of public access and use of public lands during construction of the transmission lines.</p> <p>ESE shall coordinate with PNGTS to minimize the effects of AC attenuation between the overhead AC circuit and DC ground beds used for corrosion control of the pipeline.</p>			
<p>Staff Recommended Conditions applied to License</p> <p>The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.</p>			

Public Water/Land Crossing Name: Percy State Forest, Stark for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	4	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	Custom
Petitioner Line List # (for Parcels traversed)	12547	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	No	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150 feet	Back Pole Number	DC-419
Number of Circuits within ROW	2	Back Structure Height	115
Foreign Utilities within ROW	Yes, PNGTS	Back Ground Elevation (Ft)	1256.51
Total Structures/Poles/Manholes this circuit crossing	4	Back Conductor Height	63.86
First Structure Identification	DC-419	Back Conductor Elev. at Pole	1320.37
State Listed Public Waters (Yes/No/Not Applicable)	NA	Forward Pole Number	DC-420
Last Structure Identification	DC-416	Forward Structure Height	110
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	1892 ft	Forward Ground Elevation	1278.54
		Forward Conductor Height	58.87
		Forward Conductor Elev. at Pole	1337.41
		Span (Feet)	591.52
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz. Tension@MaxTemp	7,800
		Calc'd. Clearance (SAG 10)	34
		Clearance Shown on Profile	33
		Req'd Clearance (NESC)	21.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Percy State Forest is State-owned land managed by the NH Department of Resources and Economic Development (DRED). This public land crossing follows existing Portland Natural Gas Transmission System (PNGTS) ROW across this parcel. This land is used recreationally for a variety of public uses including snowmobiling, ATV use, hiking, etc..		
	Comments from DRED related to the project's impact on this State-owned land were generally favorable. A possible negative impact to the public use of the land would be potential restricted access to popular trails during construction related to the project.		
	DRED did not comment on this particular parcel. Staff notes the property is likely used for recreational purposes and the design meets or exceeds NESC requirements for that type of use.		
Conclusions	Based on the comments received from DRED, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines and communication lines over and across the public land identified in the petition. NPT shall coordinate with DRED to minimize concerns of public access and use of public lands during construction of the transmission lines. NPT shall coordinate with PNGTS to minimize the effects of DC attenuation between the overhead DC circuit and ground beds used for corrosion control of the pipeline.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Percy State Forest, Stark for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV, AC
PUC Zone	1	Circuit	O154
PUC Map Number	4	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	12547	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1,094
Right of Way Width	150 feet	Back Pole Number	O154-66
Number of Circuits within ROW	2	Back Structure Height	88
Foreign Utilities within ROW	Yes, PNGTS	Back Ground Elevation (Ft)	1249
Total Structures/Poles/Manholes this circuit crossing	4	Back Conductor Height	50.73
First Structure Identification	O154-66	Back Conductor Elev. at Pole	1299.73
State Listed Public Waters (Yes/No/Not Applicable)	NA	Forward Pole Number	O154-67
Last Structure Identification	O154-63	Forward Structure Height	97
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	2631 ft	Forward Ground Elevation	1282
		Forward Conductor Height	59.54
		Forward Conductor Elev. at Pole	1341.54
		Span (Feet)	607.97
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,616
		Calc'd. Clearance (SAG 10)	37
		Clearance Shown on Profile	27
		Req'd Clearance (NESC)	16.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Percy State Forest is State-owned land managed by the NH Department of Resources and Economic Development (DRED). This public land crossing follows existing Portland Natural Gas Transmission System (PNGTS) ROW across this parcel. This land is used recreationally for a variety of public uses including snowmobiling, ATV use, hiking, etc..		
	Comments from DRED related to the project's impact on this State-owned land were generally favorable. A possible negative impact to the public use of the land would be potential restricted access to popular trails during construction related to the project.		
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Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines and communication lines over and across the public land identified in the petition.		
	ESE shall coordinate with DRED to minimize concerns of public access and use of public lands during construction of the transmission lines.		
	ESE shall coordinate with PNGTS to minimize the effects of AC attenuation between the overhead AC circuit and DC ground beds used for corrosion control of the pipeline.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Upper Ammonoosuc River, Stark NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	5	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	12556	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	No	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150 feet	Back Pole Number	DC-434
Number of Circuits within ROW	2	Back Structure Height	100
Foreign Utilities within ROW	Yes, PNGTS	Back Ground Elevation (Ft)	934
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	49.5
First Structure Identification	DC-435	Back Conductor Elev. at Pole	983.63
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	DC-435
Last Structure Identification	DC-434	Forward Structure Height	100
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	548 ft	Forward Ground Elevation	946.49
		Forward Conductor Height	49.5
		Forward Conductor Elev. at Pole	995.99
		Span (Feet)	548
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	41
		Clearance Shown on Profile	39
		Req'd Clearance (NESC)	35.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Upper Ammonoosic River flows through the town of Stark and is used recreationally for fishing, as well as for canoe and kayak enthusiasts.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (7.19 feet) brings the minimum clearance to 35.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines and communication cables over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Upper Ammonoosuc River, Stark NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV, AC
PUC Zone	1	Circuit	O154
PUC Map Number	5	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	12556	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	150 feet	Back Pole Number	O154-81
Number of Circuits within ROW	2	Back Structure Height	88
Foreign Utilities within ROW	Yes, PNGTS	Back Ground Elevation (Ft)	934.2
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	50.5
First Structure Identification	O154-82	Back Conductor Elev. at Pole	984.7
State Listed Public Waters (Yes/No/Not Applicable)		Forward Pole Number	O154-82
Last Structure Identification	O154-81	Forward Structure Height	92.5
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	538 ft	Forward Ground Elevation	936.92
		Forward Conductor Height	55
		Forward Conductor Elev. at Pole	991.92
		Span (Feet)	537.83
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,465
		Calc'd. Clearance (SAG 10)	38
		Clearance Shown on Profile	37
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Upper Ammonoosic River flows through the town of Stark and is used recreationally for fishing, as well as for canoe and kayak enthusiasts.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Cape Horn State Forest, Northumberland for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	6	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	Custom
Petitioner Line List # (for Parcels traversed)	2030, 2034, 2037	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	No	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150 feet	Back Pole Number	DC-486
Number of Circuits within ROW	2	Back Structure Height	80
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	1384.31
Total Structures/Poles/Manholes this circuit crossing	20	Back Conductor Height	56
First Structure Identification	DC-486	Back Conductor Elev. at Pole	1440.31
State Listed Public Waters (Yes/No/Not Applicable)	NA	Forward Pole Number	DC-487
Last Structure Identification	DC-505	Forward Structure Height	80
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	12,609 ft	Forward Ground Elevation	1072.6
		Forward Conductor Height	303.27
		Forward Conductor Elev. at Pole	1375.87
		Span (Feet)	442.57
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	6,642
		Calc'd. Clearance (SAG 10)	30
		Clearance Shown on Profile	30
		Req'd Clearance (NESC)	21.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Cape Horn Forest is State-owned land managed by the NH Department of Resources and Economic Development (DRED). This public land crossing follows existing Portland Natural Gas Transmission System (PNGTS) ROW across this parcel. This land is used recreationally for a variety of public uses including snowmobiling, ATV use, hiking, etc..		
	Comments from DRED related to the project's impact on this State-owned land were generally favorable. A possible negative impact to the public use of the land would be potential restricted access to popular trails during construction related to the project.		
	DRED did not comment on this particular parcel. Staff notes the property is likely used for recreational purposes and the design meets or exceeds NESC requirements for that type of use.		
Conclusions	Based on the comments received from DRED, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines and communication lines over and across the public land identified in the petition. NPT shall coordinate with DRED to minimize concerns of public access and use of public lands during construction of the transmission lines. NPT shall coordinate with PNGTS to minimize the effects of DC attenuation between the overhead DC circuit and ground beds used for corrosion control of the pipeline.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Cape Horn State Forest, Northumberland for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV, AC
PUC Zone	1	Circuit	D142
PUC Map Number	6	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	2030, 2034, 2037	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	150 feet	Back Pole Number	D142-322
Number of Circuits within ROW	2	Back Structure Height	88
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	1383.82
Total Structures/Poles/Manholes this circuit crossing	22	Back Conductor Height	50.5
First Structure Identification	DC-142-323	Back Conductor Elev. at Pole	1434.32
State Listed Public Waters (Yes/No/Not Applicable)		Forward Pole Number	D-142-323
Last Structure Identification	DC-142-343	Forward Structure Height	97
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	12,561 ft	Forward Ground Elevation	1320.44
		Forward Conductor Height	59.5
		Forward Conductor Elev. at Pole	1379.94
		Span (Feet)	481.43
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,384
		Calc'd. Clearance (SAG 10)	27
		Clearance Shown on Profile	24
		Req'd Clearance (NESC)	16.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Cape Horn Forest is State-owned land managed by the NH Department of Resources and Economic Development (DRED). This public land crossing follows existing Portland Natural Gas Transmission System (PNGTS) ROW across this parcel. This land is used recreationally for a variety of public uses including snowmobiling, ATV use, hiking, etc..		
	Comments from DRED related to the project's impact on this State-owned land were generally favorable. A possible negative impact to the public use of the land would be potential restricted access to popular trails during construction related to the project.		
	DRED did not comment on this particular parcel. Staff notes the property is likely used for recreational purposes and the design meets or exceeds NESC requirements for that type of use.		
Conclusions	Based on the comments received from DRED, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines and communication lines over and across the public land identified in the petition.		
	ESE shall coordinate with DRED to minimize concerns of public access and use of public lands during construction of the transmission lines. ESE shall coordinate with PNGTS to minimize the effects of AC attenuation between the overhead AC circuit and DC ground beds used for corrosion control of the pipeline.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Otter Brook, Lancaster, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	7	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	2233, 2234	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2,769
Right of Way Width	150	Back Pole Number	DC-538
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	95
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	920
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	60.5
First Structure Identification	DC-536	Back Conductor Elev. at Pole	990.5
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	DC-539
Last Structure Identification	DC-537	Forward Structure Height	90
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	931.23
		Forward Conductor Height	65.5
		Forward Conductor Elev. at Pole	996.73
		Span (Feet)	833.52
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	41
		Clearance Shown on Profile	38
		Req'd Clearance (NESC)	35.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Otter Brook is used recreationally for fishing.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (7.19 feet) brings the minimum clearance to 35.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Otter Brook, Lancaster, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV, AC
PUC Zone	1	Circuit	D142
PUC Map Number	7	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	2233, 2234	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	150	Back Pole Number	D142-376
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	110.5
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	923.83
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	73
First Structure Identification	D142-375	Back Conductor Elev. at Pole	996.83
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	D-142-377
Last Structure Identification	D142-376	Forward Structure Height	80
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	972.18
		Forward Conductor Height	42.5
		Forward Conductor Elev. at Pole	1014.68
		Span (Feet)	537.04
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,971
		Calc'd. Clearance (SAG 10)	39
		Clearance Shown on Profile	35
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Otter Brook is used recreationally for fishing.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Israel River, Lancaster, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	7	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	2235	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150	Back Pole Number	DC-538
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	95
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	920
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	60.5
First Structure Identification	DC-538	Back Conductor Elev. at Pole	990.5
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	DC-539
Last Structure Identification	DC-539	Forward Structure Height	90
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	931.23
		Forward Conductor Height	65.5
		Forward Conductor Elev. at Pole	996.73
		Span (Feet)	833.52
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	41
		Clearance Shown on Profile	38
		Req'd Clearance (NESC)	35.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Israel River is used recreationally for fishing, as well as for kayak and canoe enthusiasts.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (7.19 feet) brings the minimum clearance to 35.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Israel River, Lancaster, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV, AC
PUC Zone	1	Circuit	D142
PUC Map Number	7	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	2236	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	150	Back Pole Number	D142-375
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	115
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	919.26
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	77.5
First Structure Identification	D142-375	Back Conductor Elev. at Pole	996.76
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	D-142-376
Last Structure Identification	D142-376	Forward Structure Height	110.5
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	923.83
		Forward Conductor Height	73
		Forward Conductor Elev. at Pole	996.83
		Span (Feet)	824.05
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,971
		Calc'd Clearance (SAG 10)	39
		Clearance Shown on Profile	35
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	Israel River is used recreationally for fishing, as well as for kayak and canoe enthusiasts.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NH Central Rail-Groveton Railroad, Lancaster, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	7	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	2235	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150	Back Pole Number	DC-539
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	90
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	931.23
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	65.5
First Structure Identification	DC-539	Back Conductor Elev. at Pole	996.73
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	DC-540
Last Structure Identification	DC-540	Forward Structure Height	70
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	977.89
		Forward Conductor Height	45.5
		Forward Conductor Elev. at Pole	1023.39
		Span (Feet)	559.75
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	45
		Clearance Shown on Profile	44
		Req'd Clearance (NESC)	33.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments			
<p>NH Central Rail-Groveton Branch is a State-owned railroad parcel managed by the NH Department of Transportation (NH DOT). This public land crossing will require a license from the NH PUC for the utility rights to cross the parcel.</p> <p>The NH DOT describes this railroad as an active, year-round freight line. NH DOT does not anticipate any negative impact from the proposed NPT project, notes a positive relationship with Eversource maintenance practices, and has no concerns with the relocation of the existing Eversource circuit within the ROW.</p> <p>NH DOT does not foresee any negative impacts of this project on the rights to the public in using this land. The NH DOT does not foresee any negative impact to the NH Central Rail-Groveton Branch related to the proposed NPT project.</p>			
Conclusions			
<p>Based on the comments received from the NH DOT, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.</p> <p>The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).</p>			
Staff Recommendation			
<p>That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public land identified in the petition.</p>			
Staff Recommended Conditions applied to License			
<p>The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.</p>			

Public Water/Land Crossing Name: NH Central Rail-Groveton Branch, Lancaster, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV, AC
PUC Zone	1	Circuit	D142
PUC Map Number	7	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	2236	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	12
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	150	Back Pole Number	D142-376
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	110.5
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	923.83
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	73
First Structure Identification	D142-376	Back Conductor Elev. at Pole	996.83
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	D-142-377
Last Structure Identification	D142-377	Forward Structure Height	80
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	972.18
		Forward Conductor Height	42.5
		Forward Conductor Elev. at Pole	1014.68
		Span (Feet)	537.04
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	47
		Clearance Shown on Profile	46
		Req'd Clearance (NESC)	28.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments			
NH Central Rail-Groveton Branch is a State-owned railroad parcel managed by the NH Department of Transportation (NH DOT). This public land crossing will require a license from the NH PUC for the utility rights to cross the parcel.			
The NH DOT describes this railroad as an active, year-round freight line. NH DOT does not anticipate any negative impact from the proposed NPT project, notes a positive relationship with Eversource maintenance practices, and has no concerns with the relocation of the existing Eversource circuit within the ROW.			
NH DOT does not foresee any negative impacts of this project on the rights to the public in using this land. The NH DOT does not foresee any negative impact to the NH Central Rail-Groveton Branch related to the proposed NPT project.			
Conclusions			
Based on the comments received from the NH DOT, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.			
The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).			
Staff Recommendation			
That the Commission grant the license to construct, maintain and operate the electric lines and communication cables over and across the public land identified in the petition.			
Staff Recommended Conditions applied to License			
The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.			

Public Water/Land Crossing Name: Mountain Division Rail Line , Dalton, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	8	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	2819	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150	Back Pole Number	DC-620
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	90
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	974.8
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	65.5
First Structure Identification	DC-620	Back Conductor Elev. at Pole	1040.3
State Listed Public Waters (Yes/No/Not Applicable)	NA	Forward Pole Number	DC-621
Last Structure Identification	DC-621	Forward Structure Height	100
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	905.84
		Forward Conductor Height	75.5
		Forward Conductor Elev. at Pole	981.34
		Span (Feet)	605.02
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	59
		Clearance Shown on Profile	57
		Req'd Clearance (NESC)	33.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments			
<p>The Mountain Division Rail Line Dalton Branch is a State-owned railroad parcel managed by the NH Department of Transportation (NH DOT). This public land crossing will require a license from the NH PUC for the utility rights to cross the parcel.</p> <p>The NH DOT describes this railroad as an active, year-round freight line. NH DOT does not anticipate any negative impact from the proposed NPT project, notes a positive relationship with Eversource maintenance practices, and has no concerns with the relocation of the existing Eversource circuit within the ROW.</p> <p>NH DOT does not foresee any negative impacts of this project on the rights to the public in using this land. The NH DOT does not foresee any negative impact to the NH Central Rail-Dalton Branch related to the proposed NPT project.</p>			
Conclusions			
<p>Based on the comments received from the NH DOT, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.</p> <p>The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).</p>			
Staff Recommendation			
<p>That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public land identified in the petition.</p>			
Staff Recommended Conditions applied to License			
<p>The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.</p>			

Public Water/Land Crossing Name: Mountain Division Rail Line , Dalton, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	34.5 kV, AC
PUC Zone	1	Circuit	348X
PUC Map Number	8	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Penguin
Petitioner Line List # (for Parcels traversed)	2825, 2826	Conductor Size	4/0 AWG
Crossing Circuit Configuration	Overhead	Stranding	6/1
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	5
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	1.5
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	0.2911
Right of Way Width	150	Back Pole Number	348X-11
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	56.5
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	928.5
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	49
First Structure Identification	348X-13	Back Conductor Elev. at Pole	977.5
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	348X-12
Last Structure Identification	348X-17	Forward Structure Height	61
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	909.87
		Forward Conductor Height	53.5
		Forward Conductor Elev. at Pole	963.37
		Span (Feet)	183.01
		Max Tension NESC Heavy lbs.	3,000
		Max Operating Temp (°F)	120
		Calc'd Horiz.Tension@MaxTemp	512
		Calc'd Clearance (SAG 10)	42
		Clearance Shown on Profile	42
		Req'd Clearance (NESC)	23.5
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments			
<p>The Mountain Division Rail Line Dalton Branch is a State-owned railroad parcel managed by the NH Department of Transportation (NH DOT). This public land crossing will require a license from the NH PUC for the utility rights to cross the parcel.</p> <p>The NH DOT describes this railroad as an active, year-round freight line. NH DOT does not anticipate any negative impact from the proposed NPT project, notes a positive relationship with Eversource maintenance practices, and has no concerns with the relocation of the existing Eversource circuit within the ROW.</p> <p>NH DOT does not foresee any negative impacts of this project on the rights to the public in using this land. The NH DOT does not foresee any negative impact to the NH Central Rail-Dalton Branch related to the proposed NPT project.</p>			
Conclusions			
<p>Based on the comments received from the NH DOT, Staff believes the proposed license petitioned for may be exercised without substantially affecting the public rights in these public lands, nor will the proposed crossing substantially affect the functional use and safety in these public lands.</p> <p>The petition, appendices and other documents filed by the Company provide sufficient support showing that the design meets or exceeds the requirements of the 2012 National Electric Safety Code (NESC) C2-2012, consistent with Puc 306.01(b)(1).</p>			
Staff Recommendation			
<p>That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public land identified in the petition.</p>			
Staff Recommended Conditions applied to License			
<p>The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.</p>			

Public Water/Land Crossing Name: Johns River, Dalton, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	320 kV, DC
PUC Zone	1	Circuit	3720/3731
PUC Map Number	8	Conductor Type	AAAC
Petitioner (NPT, ESE)	NPT	Code Name	None
Petitioner Line List # (for Parcels traversed)	2825, 2826	Conductor Size	2933 kcmil
Crossing Circuit Configuration	Overhead	Stranding	91
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	28
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	NA
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2.769
Right of Way Width	150	Back Pole Number	DC-621
Number of Circuits within ROW	1 new (DC), 1 existing	Back Structure Height	100
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	905.95
Total Structures/Poles/Manholes this circuit crossing	2	Back Conductor Height	75.5
First Structure Identification	DC-622A	Back Conductor Elev. at Pole	981.45
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	DC-622
Last Structure Identification	DC-621	Forward Structure Height	110
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	868.75
		Forward Conductor Height	56
		Forward Conductor Elev. at Pole	924.75
		Span (Feet)	700.57
		Max Tension NESC Heavy lbs.	20,000
		Max Operating Temp (°F)	130
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd Clearance (SAG 10)	52
		Clearance Shown on Profile	51
		Req'd Clearance (NESC)	35.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments			
	Johns River is used recreationally for fishing, as well as for kayak and canoe enthusiasts.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (7.19 feet) brings the minimum clearance to 35.7 feet.		
Conclusions			
	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation			
	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License			
	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

