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 #4 regarding

19 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 4 - List of NPT and ESE Crossings

Staff Zone-	Water/ Land	DE 15-460 NPT Water	DE 15-461 NPT Land	DE 15-462 ESE Water	DE 15-463 ESE Land	Totals
Map #	Name	Crossing/ License	Crossing/ License	Crossing/ License	Crossing/ License	
4-20	Northern Rail Trail		Franklin		Franklin	2
4-20	NHDOT Land		Franklin		Franklin	2
4-20	Merrimack River	Franklin		Franklin	1	2
4-21	NHDOT RR		Canterbury		Canterbury	2
4-22	Turtle Pond	Concord		Concord (2)		3
4-23	Soucook River	Concord		Concord (2)		3
4-23	NHAG Land		Pembroke		Pembroke (2)	3
4-24	Suncook River	Pembroke				1
4-24	Bear Brook Park		Allenstown			1
Zone 4	Total Licenses	4 NPT Water	5 NPT Land	5 ESE Water	5 ESE Land	19

Staff Recommendation #4 for Zone 4 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 19 locations along the proposed path between Franklin and Allenstown, New Hampshire (Zone 4). The proposed 345kV alternating current high-voltage electric transmission line is referenced in the petitions as the 3120 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 #4 is to provide the details examined that apply to Zone 4.

Within Zone 4 there are no underground proposed installations. All 19 remaining crossings are overhead for land, public waters, and rails. The 19 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 4 AERIAL CROSSINGS												
Staff	f		Type Crossing				Staff	Clearance					
Zone- Map	Water/Land Name	Town	Land	Voltage/Type	NPT/ESE	Circuit	Calculated Clearance	Shown on Petition	Calculated Difference	Required Clearance	Span ft	Verification	
#			Rail				SAG 10	Profile		NESC			
#			Water										
4-20	Northern Rail Trail	Franklin	Rail	345kV/AC	NPT	3132	64	57	7	32.7	738.56	Adequate	
4-20	Northern Rail Trail	Franklin	Rail	115kV/AC	ESE	F139	58	56	2	28.1	444.68	Excellent	
4-20	NHDOT Land	Franklin	Land	345kV/AC	NPT	3132	53	48	5	20.8	738.56	Good	
4-20	NHDOT Land	Franklin	Land	115kV/AC	ESE	F139	64	62	2	16.1	503.02	Excellent	
4-20	Merrimack River	Franklin	Water	345kV/AC	NPT	3132	53	47	6	34.7	738.56	Good	
4-20	Merrimack River	Franklin	Water	115kV/AC	ESE	F139	56	55	1	30.1	503.02	Excellent	
4-21	NHDOT RR Concord Lincoln Line	Canterbury	Rail	345kV/AC	NPT	3132	81	77	4	32.7	631.40	Good	
4-21	NHDOT RR Concord Lincoln Line	Canterbury	Rail	115kV/AC	ESE	F139	81	80	1	28.1	638.29	Excellent	
4-22	Turtle Pond	Concord	Water	345kV/AC	NPT	3132	44	43	1	34.7	730.06	Excellent	
4-22	Turtle Pond	Concord	Water	34.5kV/AC	ESE	318	32	32	0	25.5	180.43	Excellent	
4-22	Turtle Pond	Concord	Water	115kV/AC	ESE	P145	33	33	0	30.1	531.20	Excellent	
4-23	Soucook River	Concord	Water	320kV/DC	NPT	3132	61	59	2	34.7	919.04	Excellent	
4-23	Soucook River	Concord	Water	115kV/AC	ESE	P145	62	59	3	30.1	1172.27	Excellent	
4-23	Soucook River	Concord	Water	115kV/AC	ESE	C189	35	33	2	30.1	1172.48	Excellent	
4-23	NHAG Land	Pembroke	Land	345kV/AC	NPT	3132	30	31	-1	20.8	799.56	Excellent	
4-23	NHAG Land	Pembroke	Land	115kV/AC	ESE	P145	31	29	2	16.1	1172.47	Excellent	
4-23	NHAG Land	Pembroke	Land	115kV/AC	ESE	C189	50	44	6	16.1	1172.47	Good	
4-24	Suncook River	Pembroke	Water	345kV/AC	NPT	3132	40	38	2	34.7	682.57	Excellent	
4-24	Bear Brook Park	Allenstown	Land	345kV/AC	NPT	3132	34	30	4	20.8	596.30	Good	

Refer to 5 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

DE 15-460, DE 15-461, DE 15-462, DE 15-463 Northern Pass Transmission Project Public Waters and Lands Crossings

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 4 has identified 19 public waters, rails, 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.

None are applicable for this zone.

Safety Division Specific Recommendations with any applicable conditions:

See individual crossing details listed within Tables A.4.20a.1, A.4.20a.2, A.4.20b.1, A.4.20b.2, A.4.20c.1, A.4.20c.2, A.4.21.1, A.4.21.2, A.4.22.1, A.4.22.2a, A.4.22.2b, A.4.23a.1, A.4.23a.2a, A.4.23a.2b, A.4.23b.1, A.4.23b.2a, A.4.23b.2b, A.4.24a.1, A.4.24b.1 located in Appendix A of Recommendation #4.

Table A.4.20a.1 Appendix A

Public Water/Land Crossing Name: Northern Rail Trail, Franklin, NH for NPT

PIUC Done 4 Crount 33132 PIUC None 9 A CREATER CONTINUES AND Number 20 Conductor Type ACSM PIUC None Lappwing PLOT None 120 Conductor Type ACSM PIUC None Lappwing Pattioner (MPT, ESE) NPT Code Name Lappwing Pattioner Line List # (for Parcells traversed) 7075 Conductor Size 1590 kcm Pattioner (MPT, ESE) NPT Code Name Lappwing Pattioner Line List # (for Parcells traversed) 7075 Conductor Size 1590 kcm Pattioner Consignation Overhead Starding 44/77 Pablic Consignation Advisor Pattioner (MPT, ESE) AND Conductor Nortonal Separation 26 New Pattioner (MPT, ESE) And Consignation Pattioner (MPT, ESE) And Conductor Netrola Separation 26 New Pattioner (MPT, ESE) And Conductor Netrola Separation 26 New Pattioner (MPT, ESE) And Conductor Netrola Separation 27 New Pattioner (MPT, ESE) And Conductor Netrola Separation 27 New Pattioner (MPT, ESE) And Conductor Netrola Separation 27 New Pattioner (MPT, ESE) And Conductor Netrola Separation 27 New Pattioner (MPT, ESE) And Conductor Netrola Separation 27 New Pattioner (MPT, ESE) And Conductor Netrola Separation 27 New Pattioner (MPT, ESE) And Conductor Netrola Separationer (MPT	General Information			Technical Information			
Pattioner (MPT, ESE) Pettioner (MPT, ESE) Pettioner Une List # (for Percels traversed) Pettioner United Wilder Way Width Pettioner United Wilder Way W	PUC Docket Number		DE 15-461	Voltage	345 kV		
Entitioner (NPT, ESF) PROTISIONER IN LIST (FO Percel's traversed) PROTISIONER IN LIST (FO PERCEL'S AND PERC	PUC Zone		4	Circuit	3132		
Pattioner Line List # (for Parcels traversed)	PUC Map Number		20	Conductor Type	ACSR		
Crossing Circuit Configuration Overhead Stranding (1577) Public Crossing Pyre (Water(Land) Land Conductor Horizontal Separation 26 Previous Public Crossing Lecense Issued by PUC No Conductor Structure Separation 0 Relocated SE Crossing (New)MorNA) NA Cable Weight (Lis/Fr) 2 Regist of Way Writh 225 feet 1988. As Pole Number 3132-4 Number of Circuits within ROW 1 new(AC), 2 existing 8 Back Structure Height 990 Foreign Utilities within ROW None Back Ground Elevation (Ft) 297-58 Total Structure/Poles/Manholes 2 Back Conductor Height 64-5 Fast Structure Separation 7 State Listed Public Waters (Yes/No/Not Applicable) Not Applicable Forward Pole Number 33132-5 Forward Structure Height 85 FOUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail] Forward Structure Height 85 Forward Conductor Height 95-5 Forward Conductor Fleiby 95-5 Forward Conductor Height 95-5 Forward Conductor Height 95-5 Forward Conductor Fleiby 95-5 Forw	Petitioner (NPT, ESE)		NPT	Code Name	Lapwing		
Public Crossing Type (Water/Land) Previous Public Crossing (Irces/No/Na) Replicated ESE Crossing (Yes/No/Na) Replicated Estated Estate	Petitioner Line List # (for Pard	cels traversed)	7075	Conductor Size	1590 kcmil		
Previous Public Crossing (Ver/No/NA) Robusted ESE Crossing (Yes/No/NA) Robusted Establishment (Incompany) R	Crossing Circuit Configuration	ı	Overhead	Stranding	45/7		
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First Structure Identification State Listed Public Waters (Yes/No/Not Applicable) Not Applicable Forward Pole Number 3132-5 Last Structure Identification 3132-5 PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail] Not Applicable Forward Ground Elevation Not Applicable Forward Ground Elevation Span (Feet) Not Applicable Forward Ground Elevation Span (Feet) Not Applicable Forward Ground Elevation Span (Feet) Not Applicable Forward Conductor Height Sps. Span (Feet) Not Applicable Forward Conductor Height Sps. Span (Feet) Not Applicable Forward Conductor Elevation Max Tension NESC Heavy lbs. 11,400 Max Operating Temp (F) 285 Calc'd Clearance (SAG 10) 64 Clearance Shown on Profile S7 Req'd Clearance (NESC) 32.7 Crossing Comments, Conclusions, Conditions, and Staff Recommendation This NPT crossing traverses State—owned land in this section of Franklin, NH. The land is managed by the NH DOT, Bureau of Rail and Transit. In response to a NH PUC Staff inquiry, the NH DOT provided comments that noted the NH DRED has managed the rail trail through this area for more than ten years. The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of recreation activities includic snowmobiling, cross country sking, walking, biking, etc. In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel. Condusions The proposed gubbic land crossing will not substantially affect the public rights on this land, nor will the proposed reconfiguration of the utility infrastructure across this parcel. The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recretational use by the public. That the Commission grant the lic	Foreign Utilities within ROW		None	Back Ground Elevation (Ft)	297.58		
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Span (Feet) 738.56	only) [Does Not apply to Wat	er or Rail]	Not Applicable	Forward Conductor Height	59.5		
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managed the rail trail through this area for more than ten years. The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of recreation activities includic snowmobiling, cross country skiing, walking, hiking, biking, etc In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel. Conclusions The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands. The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public. That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition. The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC. Staff Reccommended Conditions applied to		_					
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from the SEC. Staff Reccommended Conditions applied to	Staff Recommendation						
from the SEC. Staff Reccommended Conditions applied to							
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Staff Reccommended Conditions applied to		The license for this public	land crossing is contingent	upon the Northern Pass Project receiving a	Certificate of Site and Facility		
Conditions applied to		from the SEC.					
Conditions applied to							
	Staff Reccommended						
License	Conditions applied to						
	License						

Table A.4.20a.2 Appendix A

Public Water/Land Crossing Name: Northern Rail Trail, Franklin, NH for ESE

rcels traversed)	DE 15-463 4 20	Technical Information Voltage Circuit	115 kV
rrels traversed)	4		
rcels traversed)			F139
rcels traversed)		Conductor Type	ACSR
rcels traversed)	ESE	Code Name	Drake
	7075	Conductor Size	795 kcmil
on	Overhead	Stranding	26/7
·/Land)	Land	Conductor Horizontal Separation	0
ense Issued by PUC	No	Conductor Vertical Separation	12
/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
7.107.11.17		U , , ,	F139-282
OW			94.5
		Š	318.69
		` '	57
		*	375.69
			F139-281
			105
			270.44
,	Not Applicable		67.5
		·	337.94
			444.68
		· · · · ·	9,000
		-	285
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	58
		Clearance Shown on Profile	56
		Reg'd Clearance (NESC)	28.1
		· · · · · · · · · · · · · · · · · · ·	
of Rail and Transit. In resp managed the rail trail thro The Northern Rail Trail foll including snowmobiling, of In response to Staff's inqui existing facilities across as the proposed reconfigurat The proposed public land of crossing substantially affect The proposed design for the recreational use by the pu	conse to a NH PUC Staff include this area for more that lows the rail corridor through this area for more that lows the rail corridor through the cross country skiing, walking, NH DOT informed Staff they cross the NH DOT protion of the utility infrastructorssing will not substantiated the fuctional use and sail in soverhead crossing of public.	quiry, the NH DOT provided comments that an ten years. Igh these parcels and is used for a variety on the provided comments that graph these parcels and is used for a variety on the provided provided that Eversource has been a responsible properties. NH DOT does not foresee any necture across this parcel. In ally affect the public rights on this land, nor fety in these public lands. In the public lands meets or exceeds NESC requirers.	of recreation activities artner in maintaining its gative impacts related to will the proposed
The license for this public Facility from the SEC.	land crossing is contingent	t upon the Northern Pass Project receiving	a Certificate of Site and
	Isions, Conditions, and Staff This ESE crossing traverses of Rail and Transit. In responsed the rail trail through the Northern Rail Trail folincluding snowmobiling, on the Northern Rail Trail folincluding snowmobilities across as the proposed reconfigurate The proposed design for the P	None holes 2 holes F139-282 Yes/No/Not Applicable) Not Applicable F139-281 Crossing for License (Land atter or Rail] Isions, Conditions, and Staff Recommendation This ESE crossing traverses State-owned land in this of Rail and Transit. In response to a NH PUC Staff in managed the rail trail through this area for more that The Northern Rail Trail follows the rail corridor throuincluding snowmobiling, cross country skiing, walking. In response to Staff's inquiry, NH DOT informed Staff existing facilities across as they cross the NH DOT preceded the proposed reconfiguration of the utility infrastructorssing substantially affect the fuctional use and sate the proposed design for this overhead crossing of precreational use by the public. That the Commission grant the license to construct, across the public lands identified in the petition.	OW 1 new(AC), 2 existing None Back Structure Height None None Back Ground Elevation (Ft) None Back Conductor Height 1 F139-282 Back Conductor Elev. at Pole Proward Pole Number F139-281 Forward Pole Number F139-281 Forward Structure Height Forward Conductor Height Forward Conductor Height Forward Conductor Height Forward Conductor Elev. at Pole Span (Feet) Max Tension NESC Heavy lbs. Max Operating Temp (°F) Calc'd Horiz. Tension@MaxTemp Calc'd Horiz. Tension@MaxTemp Calc'd Horiz. Tension@MaxTemp Calc'd Clearance (SAG 10) Clearance Shown on Profile Req'd Clearance (NESC) Island Transit. In response to a NH PUC Staff inquiry, the NH DOT provided comments that managed the rail trail through this area for more than ten years. The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of including snowmobiling, cross country skiing, walking, hiking, biking, etc In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible pexisting facilities across as they cross the NH DOT properties. NH DOT does not foresee any net the proposed reconfiguration of the utility infrastructure across this parcel. The proposed polic land crossing will not substantially affect the public lands. The proposed design for this overhead crossing of public lands meets or exceeds NESC requirer recreational use by the public. That the Commission grant the license to construct, maintain and operate the electric and comacross the public lands identified in the petition.

Table A.4.20b.1 Appendix A

Public Water/Land Crossing Name: NHDOT (Vacant) Land, Franklin, NH for NPT

General Information				Technical Information	
PUC Docket Number		DE 15-461		Voltage	345 kV
PUC Zone		4		Circuit	3132
PUC Map Number		20		Conductor Type	ACSR
Petitioner (NPT, ESE)		NPT		Code Name	Lapwing
Petitioner Line List # (for Par	cels traversed)	7076		Conductor Size	1590 kcmil
Crossing Circuit Configuratio	n	Overhead		Stranding	45/7
Public Crossing Type (Water)	/Land)	Land		Conductor Horizontal Separation	
Previous Public Crossing Lice	nse Issued by PUC	No		Conductor Vertical Separation	
Relocated ESE Crossing (Yes/	'No/NA)	Yes		Cable Weight (Lbs/Ft)	1.792
Right of Way Width		225 feet		Back Pole Number	3132-4
Number of Circuits within RC	DW .	1 new(AC), 2 existing		Back Structure Height	90
Foreign Utilities within ROW		None		Back Ground Elevation (Ft)	297.58
Total Structures/Poles/Manh	noles	2		Back Conductor Height	65.0
First Structure Identification		3132-4		Back Conductor Elev. at Pole	362.58
State Listed Public Waters (Y	es/No/Not Applicable)	Not Applicable		Forward Pole Number	3132-5
Last Structure Identification		3132-5		Forward Structure Height	85
PUC Approximate Length of	crossing for License (Land	213 feet		Forward Ground Elevation	282.19
only) [Does Not apply to Wat	ter or Rail]	213 1661		Forward Conductor Height	60.0
				Forward Conductor Elev. at Pole	342.19
				Span (Feet)	738.56
				Max Tension NESC Heavy lbs.	11,400
				Max Operating Temp (°F)	285
				Calc'd Horiz.Tension@MaxTemp	4,025
				Calc'd. Clearance (SAG 10)	53
				Clearance Shown on Profile	48
				Req'd Clearance (NESC)	20.8
Crossing Comments, Conclus	sions, Conditions, and Staf	f Recommendation			
Comments	In response to Staff's inquexisting facilities across as the proposed reconfigurat The Northern Rail Trail foll including snowmobiling, of to the public's use of this particles are proposed public land crossing substantially affect the proposed design for the proposed d	iry, NH DOT informed Stathey cross the NH DOT pion of the utility infrastruows the rail corridor throcos country skiing, walk property as a result of the crossing will not substant the fuctional use and shis overhead crossing of pilic.	aff the prope uctur ough king, h e pro tially safety	these parcels and is used for a variety or niking, biking, etc NH DOT does not for posed project. affect the public rights on this land, nor	rtner in maintaining its sative impacts related to f recreation activities resee any negative impacts will the proposed
Staff Recommendation Staff Reccommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site a Facility from the SEC. commended				

Table A.4.20b.2 Appendix A

Public Water/Land Crossing Name: NHDOT (Vacant) Land, Franklin, NH for ESE

General Information				Technical Information	
PUC Docket Number		DE 15-463		Voltage	115 kV
PUC Zone		4		Circuit	F139
PUC Map Number		20		Conductor Type	ACSR
Petitioner (NPT, ESE)		ESE		Code Name	Drake
Petitioner Line List # (for Par	cels traversed)	7076		Conductor Size	795 kcmil
Crossing Circuit Configuratio	n	Overhead		Stranding	26/7
Public Crossing Type (Water)	/Land)	Land		Conductor Horizontal Separation	
Previous Public Crossing Lice	nse Issued by PUC	No		Conductor Vertical Separation	
Relocated ESE Crossing (Yes/	'No/NA)	Yes		Cable Weight (Lbs/Ft)	1.094
Right of Way Width		225 feet		Back Pole Number	F139-281
Number of Circuits within RC	DW .	1 new(AC), 2 existing		Back Structure Height	105
Foreign Utilities within ROW		None		Back Ground Elevation (Ft)	270.44
Total Structures/Poles/Manh	noles	2		Back Conductor Height	67.5
First Structure Identification		F139-282		Back Conductor Elev. at Pole	337.94
State Listed Public Waters (Y	'es/No/Not Applicable)	Not Applicable		Forward Pole Number	F139-280
Last Structure Identification		F139-280		Forward Structure Height	92.5
PUC Approximate Length of	,	200 feet		Forward Ground Elevation	282.84
only) [Does Not apply to Wa	ter or Rail]	200 1000		Forward Conductor Height	55.02
				Forward Conductor Elev. at Pole	337.86
				Span (Feet)	444.68
				Max Tension NESC Heavy lbs.	9,000
				Max Operating Temp (°F)	285
				Calc'd Horiz.Tension@MaxTemp	2,381
				Calc'd. Clearance (SAG 10)	64
				Clearance Shown on Profile	62
				Req'd Clearance (NESC)	16.1
Crossing Comments, Conclu	sions, Conditions, and Staf	f Recommendation			
Comments Conclusions	NH DOT. In response to Staff's inquiexisting facilities across as the proposed reconfigurat. The Northern Rail Trail foll including snowmobiling, on the public's use of this particular of the proposed public land crossing substantially affects.	iry, NH DOT informed Stathey cross the NH DOT pion of the utility infrastruows the rail corridor threcores country skiing, walk property as a result of the crossing will not substant at the fuctional use and so	aff that prope ucture ough king, h e pro tially safety	these parcels and is used for a variety o niking, biking, etc NH DOT does not for posed project. affect the public rights on this land, nor	rtner in maintaining its gative impacts related to f recreation activities esee any negative impacts will the proposed
Staff Recommendation Staff Reccommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site a Facility from the SEC. mended				

Table A.4.20c.1 Appendix A

Public Water/Land Crossing Name: Merrimack River, Franklin, NH for NPT

General Information			Technical Information	
PUC Docket Number		DE 15-460	Voltage	345 kV
PUC Zone		4	Circuit	3132
PUC Map Number		20	Conductor Type	ACSR
Petitioner (NPT, ESE)		NPT	Code Name	Lapwing
Petitioner Line List # (for Pa	rcels traversed)	7077	Conductor Size	1590 kmcil
Crossing Circuit Configuration	on	Overhead	Stranding	45/7
Public Crossing Type (Water		Water	Conductor Horizontal Separation	26
	ense Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes	, , , , ,	Yes	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	, -, ,	225 feet	Back Pole Number	3132-4
Number of Circuits within R	OW	1 new(AC), 2 existing	Back Structure Height	90
Foreign Utilities within ROV		None	Back Ground Elevation (Ft)	297.58
Total Structures/Poles/Man		2	Back Conductor Height	64.5
First Structure Identification		3132-4	Back Conductor Elev. at Pole	362.08
State Listed Public Waters (Yes	Forward Pole Number	3132-5
Last Structure Identification		3132-5	Forward Structure Height	85
PUC Approximate Length of			Forward Ground Elevation	282.19
only) [Does Not apply to Wa	,	Not Applicable	Forward Conductor Height	59.5
,, i= 111			Forward Conductor Elev. at Pole	341.69
			Span (Feet)	738.56
			Max Tension NESC Heavy lbs.	11,400
			Max Operating Temp (°F)	285
			Calc'd Horiz.Tension@MaxTemp	4,025
			Calc'd. Clearance (SAG 10)	53
			Clearance Shown on Profile	47
			Reg'd Clearance (NESC)	34.7
			ned a cicarance (NESC)	34.7
Crossing Comments Conclu	usions, Conditions, and Staff	Recommendation		
Comments	elevations that are based of 100-year flood elevation for The design incorporates N	on information contained in this portion of the river. ESC minimum required cle	above the water, the engineering design inc n flood insurance rate maps provided by FEI arance above the water for these open supp tule 232.C.1 requirement (6.24 feet) brings t	MA. The design uses the oly conductors, using 100-
Conclusions	crossing substantially affect	t the fuctional use and saf		
	expected recreational use	by the public.	cross public waters meets or exceeds NESC	
Staff Recommendation	That the Commission grant across the public waters id	•	maintain and operate the electric and comm	nunication lines over and
Staff Reccommended Conditions applied to	The license for this public of Facility from the SEC.	water crossing is continger	nt upon the Northern Pass Project receiving	a Certificate of Site and
License				

Table A.4.20c.2 Appendix A

Public Water/Land Crossing Name: Merrimack River, Franklin, NH for ESE

General Information			Technical Information	
PUC Docket Number		DE 15-462	Voltage	115 kV
PUC Zone		4	Circuit	F139
PUC Map Number		20	Conductor Type	ACSR
Petitioner (NPT, ESE)		ESE	Code Name	Drake
Petitioner Line List # (for Par	cels traversed)	7076	Conductor Size	795 kcmil
Crossing Circuit Configuratio	· · · · · · · · · · · · · · · · · · ·	Overhead	Stranding	26/7
Public Crossing Type (Water,		Water	Conductor Horizontal Separation	0
Previous Public Crossing Lice		Yes	Conductor Vertical Separation	12
Relocated ESE Crossing (Yes/	·	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	, ,	225 feet	Back Pole Number	F139-281
Number of Circuits within RC	OW	1 new(AC), 2 existing	Back Structure Height	105
Foreign Utilities within ROW	i .	None	Back Ground Elevation (Ft)	270.44
Total Structures/Poles/Manh	noles	2	Back Conductor Height	67.5
First Structure Identification		F139-281	Back Conductor Elev. at Pole	337.94
State Listed Public Waters (Y	'es/No/Not Applicable)	Yes	Forward Pole Number	F139-280
Last Structure Identification	·	F139-280	Forward Structure Height	92.5
PUC Approximate Length of	crossing for License (Land	Not Applicable	Forward Ground Elevation	282.84
only) [Does Not apply to Wa	ter or Rail]	пот Аррисаріе	Forward Conductor Height	55
			Forward Conductor Elev. at Pole	337.84
			Span (Feet)	503.02
			Max Tension NESC Heavy lbs.	9,000
			Max Operating Temp (°F)	285
			Calc'd Horiz.Tension@MaxTemp	2,381
			Calc'd. Clearance (SAG 10)	56
			Clearance Shown on Profile	55
			Req'd Clearance (NESC)	30.1
Crossing Comments, Conclu			onally for boating, canoe and kayaking, fish	
Comments	In order to determine the elevations that are based a 100-year flood elevation for the design incorporates N	minimum NESC clearance on information contained or this portion of the river ESC minimum required cl	above the water, the engineering design ir in flood insurance rate maps provided by F	ncorporates flood water EMA. The design uses the pply conductors, using 100-
Conclusions	crossing substantially affect	ct the fuctional use and sa	tially affect the public rights in these water fety in these public waters.	
	The the proposed design f expected recreational use	•	across public waters meets or exceeds NES	C requirements for the
Staff Recommendation	That the Commission gran across the public waters ic		maintain and operate the electric and com	munication lines over and
	The license for this public Facility from the SEC.	water crossing is continge	nt upon the Northern Pass Project receivin	g a Certificate of Site and
Staff Reccommended Conditions applied to License				

Table A.4.21.1 Appendix A

Public Water/Land Crossing Name: NH DOT, NH Rail-Concord/Lincoln Line, Canterbury, NH for NPT

General Information			Technical Information			
PUC Docket Number		DE 15-461	Voltage	345 kV		
PUC Zone		4	Circuit	3132		
PUC Map Number		21	Conductor Type	ACSR		
Petitioner (NPT, ESE)		NPT	Code Name	Lapwing		
Petitioner Line List # (for Pa	rcels traversed)	7616.1	Conductor Size	1590 kcmil		
Crossing Circuit Configuration	on .	Overhead	Stranding	45/7		
Public Crossing Type (Water		Land	Conductor Horizontal Separation	26		
	ense Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0		
Relocated ESE Crossing (Yes	, , , , ,	Yes	Cable Weight (Lbs/Ft)	1.792		
Right of Way Width		225 feet	Back Pole Number	3132-32		
Number of Circuits within R	OW	1 new(AC), 2 existing	Back Structure Height	110		
Foreign Utilities within ROW	/	None	Back Ground Elevation (Ft)	390.72		
Total Structures/Poles/Man		2	Back Conductor Height	84.5		
First Structure Identification		3132-32	Back Conductor Elev. at Pole	475.22		
State Listed Public Waters (Not Applicable	Forward Pole Number	3132-33		
Last Structure Identification		3132-33	Forward Structure Height	105		
PUC Approximate Length of			Forward Ground Elevation	441.05		
only) [Does Not apply to Wa	,	Not Applicable	Forward Conductor Height	79.5		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Forward Conductor Elev. at Pole	520.55		
			Span (Feet)	631.4		
			Max Tension NESC Heavy lbs.	11,400		
			Max Operating Temp (°F)	285		
			Calc'd Horiz.Tension@MaxTemp			
			Calc'd. Clearance (SAG 10)	81		
			Clearance Shown on Profile	77		
			Reg'd Clearance (NESC)	32.7		
Crossing Comments, Conclu	isions, Conditions, and Staff	Recommendation				
Conclusions	In response to Staff's inqui existing facilities across as proposed reconfiguration	ry, NH DOT informed Staff they cross the NH DOT pro of the utility infrastructure crossing will not substantia	that Eversource has been a responsible par operties. NH DOT does not foresee any neg- across this parcel.	rtner in maintaining its ative impacts related to the		
	recreational use by the pull	t the license to construct,	blic lands meets or exceeds NESC requirem			
Staff Recommendation	across the public lands identified in the petition. pmmendation					
The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certific Facility from the SEC. Staff Reccommended Conditions applied to License						

Table A.4.21.2 Appendix A

Public Water/Land Crossing Name: NH DOT, NH Rail-Concord/Lincoln Line, Canterbury, NH for ESE

General Information				Technical Information	
PUC Docket Number		DE 15-463		Voltage	115 kV
PUC Zone		4		Circuit	F139
PUC Map Number		21		Conductor Type	ACSR
Petitioner (NPT, ESE)		ESE		Code Name	Drake
Petitioner Line List # (for Parc	cels traversed)	7616.1		Conductor Size	795 kcmil
Crossing Circuit Configuration)	Overhead		Stranding	26/7
Public Crossing Type (Water/I	Land)	Land		Conductor Horizontal Separation	5
Previous Public Crossing Licer	nse Issued by PUC (Yes/No)	No		Conductor Vertical Separation	1.5 (Middle Phase)
Relocated ESE Crossing (Yes/N	No/NA)	Yes		Cable Weight (Lbs/Ft)	1.094
Right of Way Width		225 feet		Back Pole Number	F139-250
Number of Circuits within RO	W	1 new(AC), 2 existing		Back Structure Height	124
Foreign Utilities within ROW		None		Back Ground Elevation (Ft)	392.78
Total Structures/Poles/Manho	oles	2		Back Conductor Height	86.5
First Structure Identification		F139-250		Back Conductor Elev. at Pole	479.28
State Listed Public Waters (Ye	es/No/Not Applicable)	Not Applicable		Forward Pole Number	F139-249
Last Structure Identification		F139-249		Forward Structure Height	110.5
PUC Approximate Length of c	-	Not Applicable		Forward Ground Elevation	437.07
only) [Does Not apply to Wate	er or Rail]			Forward Conductor Height	73
				Forward Conductor Elev. at Pole	510.07
				Span (Feet)	638.29
				Max Tension NESC Heavy lbs.	9,000
				Max Operating Temp (°F)	285
				Calc'd Horiz.Tension@MaxTemp	2.
				Calc'd. Clearance (SAG 10)	81
				Clearance Shown on Profile	80
				Req'd Clearance (NESC)	28.1
	Bureau of Rail and Transit and Tilton.	and used by NH Rail-Conc	cord/	on of Canterbury, NH. The land is mana _l Lincoln Line as a seasonally active freight g this rail corridor, which is used for a va	rail line between Concord
Comments	activities including snowm In response to Staff's inqui			nowshoeing, etc t Eversource has been a responsible part	ner in maintaining its
	existing facilities across as proposed reconfiguration (•	•	ties. NH DOT does not foresee any nega oss this parcel.	tive impacts related to the
Conclusions	The proposed public land of substantially affect the fuc	_		Iffect the public rights on this land, nor w public lands.	vill the proposed crossing
	The proposed design for the recreational use by the pul		ublic	lands meets or exceeds NESC requireme	ents for the expected
Staff Recommendation	That the Commission grant across the public lands ide		, mair	ntain and operate the electric and comm	unication lines over and
The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certifica Facility from the SEC. Staff Reccommended Conditions applied to				Certificate of Site and	
License					

Table A.4.22.1 Appendix A

Public Water/Land Crossing Name: Turtle Pond, Concord, NH, for NPT

General Information			Technical Information				
PUC Docket Number		DE 15-460	Voltage	345 kV			
PUC Zone		4	Circuit	3132			
PUC Map Number		22	Conductor Type	ACSR			
Petitioner (NPT, ESE)		NPT	Code Name	Lapwing			
Petitioner Line List # (for Par	cels traversed)	8076	Conductor Size	1590 kcmil			
Crossing Circuit Configuratio	'	Overhead	Stranding	45/7			
Public Crossing Type (Water)	Land)	Water	Conductor Horizontal Separation	26			
Previous Public Crossing Lice	nse Issued by PUC	Yes	Conductor Vertical Separation	0			
Relocated ESE Crossing (Yes/	No/NA)	Yes	Cable Weight (Lbs/Ft)	1.792			
Right of Way Width		257.5 feet	Back Pole Number	3132-115			
Number of Circuits within RC)W	1 new(AC), 3 existing	Back Structure Height	95			
Foreign Utilities within ROW		None	Back Ground Elevation (Ft)	317.12			
Total Structures/Poles/Manh	ioles	4	Back Conductor Height	69.5			
First Structure Identification		3123-112	Back Conductor Elev. at Pole	386.62			
State Listed Public Waters (Y	es/No/Not Applicable)	Yes	Forward Pole Number	3132-116			
Last Structure Identification		3132-117	Forward Structure Height	105			
PUC Approximate Length of	crossing for License (Land		Forward Ground Elevation	315.91			
only) [Does Not apply to Wat		Not Applicable	Forward Conductor Height	79.5			
,, t			Forward Conductor Elev. at Pole	395.41			
			Span (Feet)	730.06			
			Max Tension NESC Heavy lbs.	11,400			
			Max Operating Temp (°F)	285			
			Calc'd Horiz.Tension@MaxTemp	4,003			
			Calc'd. Clearance (SAG 10)	44			
			Clearance Shown on Profile	43			
			Reg'd Clearance (NESC)	34.7			
			in equation (mass)	•			
Crossing Comments, Conclu	sions Conditions and Staf	f Recommendation					
erossing comments, concide	nons, conditions, and star	T NCCOMMICHAGION					
	This section of Turtle Pond	lisused recreationally for	boating, canoe and kayaking, and fishing.				
	This section of further one	is used recreationally for	boating, cande and kayaking, and fishing.				
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water						
Comments	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 (6.24 feet) brings the minimum clearance to 34.7 feet.						
Conclusions		r crossing will not substan	tially affect the public rights in these water	s nor will the proposed			
				-, p p p			
	crossing substantially affect the fuctional use and safety in these public waters.						
	The the proposed design f	or this overhead crossing	across public waters meets or exceeds NES	C requirements for the			
	expected recreational use	•	,	1			
	,	, - r »					
	That the Commission gran	t the license to construct.	maintain and operate the electric and com	munication lines over and			
	across the public waters in	•	The second and com				
Staff Recommendation							
1							
ii .							
	The license for this public	water crossing is continge	nt upon the Northern Pass Project receiving	g a Certificate of Site and			
		water crossing is continge	nt upon the Northern Pass Project receiving	g a Certificate of Site and			
	The license for this public Facility from the SEC.	water crossing is continge	nt upon the Northern Pass Project receiving	g a Certificate of Site and			
Staff Reccommended		water crossing is continge	nt upon the Northern Pass Project receivin	g a Certificate of Site and			
Staff Reccommended Conditions applied to		water crossing is continge	nt upon the Northern Pass Project receivin	g a Certificate of Site and			
		water crossing is continge	nt upon the Northern Pass Project receivin	g a Certificate of Site and			
Conditions applied to		water crossing is continge	nt upon the Northern Pass Project receivin	g a Certificate of Site and			
Conditions applied to		water crossing is continge	nt upon the Northern Pass Project receivin	g a Certificate of Site and			

Table A.4.22.2a Appendix A

Public Water/Land Crossing Name: Turtle Pond, Concord, NH, for ESE

General Information			Technical Info	ormation	
PUC Docket Number		DE 15-462	Voltage		115 kV
PUC Zone		4	Circuit		P145
PUC Map Number		22	Conductor Ty	ne.	ACSR
Petitioner (NPT, ESE)		ESE	Code Name		Drake
Petitioner Line List # (for Pa	arcels traversed)	8076	Conductor Siz	P	795 kcmil
Crossing Circuit Configurati	'	Overhead	Stranding		26/7
Public Crossing Type (Wate		Water		rizontal Separation	0
	cense Issued by PUC (Yes/No)	Yes		rtical Separation	12
Relocated ESE Crossing (Ye		Yes	Cable Weight		1.094
Right of Way Width	-, ,	257.5 feet	Back Pole Nur	` ' '	P145-131
Number of Circuits within I	ROW	1 new(AC), 3 existing	Back Structure		79
Foreign Utilities within RO		None	Back Ground		321.77
Total Structures/Poles/Mai		6	Back Conduct	` '	41.5
First Structure Identificatio		P145-134		or Elev. at Pole	363.27
State Listed Public Waters		Yes	Forward Pole		P145-130
Last Structure Identification		P145-128	Forward Struc		88
	f crossing for License (Land only)		Forward Grou		317.39
[Does Not apply to Water of	- :	Not Applicable	Forward Cond		50.5
i de la constantina	· · · · ·			luctor Elev. at Pole	367.89
			Span (Feet)		531.2
				NESC Heavy lbs.	9,000
			Max Operatin	•	285
				ension@MaxTemp	2,448
			Calc'd. Cleara	nce (SAG 10)	33
				own on Profile	33
			Req'd Clearan	ice (NESC)	30.1
				·	
Crossing Comments, Concl	usions, Conditions, and Staff Reco	mmendation	•		
Comments	In order to determine the minimu that are based on information cor elevation for this portion of the rit The design incorporates NESC mir flood data (28.5 feet) plus the add	m NESC clearance above to ntained in flood insurance over. nimum required clearance	ne water, the enginate maps provided	neering design incorporal by FEMA. The design u	ductors, using 100-year
Conclusions	The proposed public water crossin substantially affect the fuctional u	ise and safety in these pub	ic waters.		
	The the proposed design for this or recreational use by the public.	overhead crossing across p	ıblic waters meets	or exceeds NESC requir	ements for the expected
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and acrothe public waters identified in the petition. If Recommendation				
Staff Reccommended	The license for this public water of from the SEC.	rossing is contingent upon	the Northern Pass	Project receiving a Certi	ficate of Site and Facility
Conditions applied to License					

Table A.4.22.2b Appendix A

Public Water/Land Crossing Name: Turtle Pond, Concord, NH, for ESE

General Information				Technical Information	
PUC Docket Number		DE 15-462		Voltage	34.5 kV
PUC Zone		4		Circuit	318
PUC Map Number		22		Conductor Type	ACSR
Petitioner (NPT, ESE)		NSE		Code Name	Penguin
Petitioner Line List # (for Pa	arcels traversed)	8076		Conductor Size	4/0 AWG 6/1
Crossing Circuit Configurati	,	Overhead		Stranding	1-Jun
	Public Crossing Type (Water/Land)			Conductor Horizontal Separation	5
Previous Public Crossing License Issued by PUC (Yes/No)		Water Yes		Conductor Vertical Separation	1.5 (Middle Phase)
Relocated ESE Crossing (Yes/No/NA)		Yes		Cable Weight (Lbs/Ft)	0.291
Right of Way Width	-,,	257.6 feet		Back Pole Number	318-58
Number of Circuits within F	ROW	1 new(AC), 3 existing		Back Structure Height	43
Foreign Utilities within RO\		None		Back Ground Elevation (Ft)	316.19
Total Structures/Poles/Mai		18	_	Back Conductor Height	35.5
First Structure Identificatio		318-52	_	Back Conductor Flev. at Pole	351.69
State Listed Public Waters		Yes		Forward Pole Number	318-57
Last Structure Identification		318-70		Forward Structure Height	43
	f crossing for License (Land only)			Forward Ground Elevation	315.79
[Does Not apply to Water of	- :	Not Applicable		Forward Conductor Height	35.5
i- 100 apply to water c				Forward Conductor Elev. at Pole	351.29
				Span (Feet)	180.43
			_	Max Tension NESC Heavy lbs.	3,000
			_	Max Operating Temp (°F)	120
				Calc'd Horiz.Tension@MaxTemp	470
				Calc'd. Clearance (SAG 10)	32
				Clearance Shown on Profile	32
				Reg'd Clearance (NESC)	25.5
				neq a crearance (need)	25.5
Crossing Comments Concl	usions, Conditions, and Staff Reco	mmendation			
Crossing Comments, Contra					
Comments	This section of Turtle Pond is used recreationally for boating, canoe and kayaking, and 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 the neutral wires, using 100-year flood data (25.5 feet). In this configuration, the neutral wires are located approximately 6 feet below the phase conductors.				
Conclusions	substantially affect the fuctional u	se and safety in these pub	olic wa		-
	recreational use by the public.			waters meets or exceeds NESC requir	
Staff Recommendation	That the Commission grant the lic the public waters identified in the		ın and	operate the electric and communicate	tion lines over and across
Staff Reccommended	The license for this public water of from the SEC.	rossing is contingent upon	the N	Iorthern Pass Project receiving a Certi	ificate of Site and Facility
Conditions applied to License					

Table A.4.23a.1 Appendix A

Public Water/Land Crossing Name: Soucook River, Concord, NH, for NPT

General Information			Technical Information	
PUC Docket Number		DE 15-460	Voltage	345 kV
PUC Zone		4	Circuit	3132
PUC Map Number		23	Conductor Type	ACSR
Petitioner (NPT, ESE)		NPT	Code Name	Lapwing
Petitioner Line List # (for Par	cels traversed)	8951	Conductor Size	1590 kcmil
Crossing Circuit Configuration	· · · · · · · · · · · · · · · · · · ·	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)		Water	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC (Yes/No)		No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)		NA NA	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	TNO/TNA/	265 feet	Back Pole Number	3132-159
Number of Circuits within R)\\/			
Foreign Utilities within ROW		1 new(AC), 2 existing	Back Structure Height	75
		Yes	Back Ground Elevation (Ft)	337.69
Total Structures/Poles/Man		2	Back Conductor Height	49.5
First Structure Identification		3132-159	Back Conductor Elev. at Pole	387.19
State Listed Public Waters (\	es/No/Not Applicable)	Yes	Forward Pole Number	3132-160
Last Structure Identification		3132-160	Forward Structure Height	90
PUC Approximate Length of		Not Applicable	Forward Ground Elevation	265.62
only) [Does Not apply to Wa	ter or Kailj		Forward Conductor Height	64.5
			Forward Conductor Elev. at Pole	330.12
			Span (Feet)	919.04
			Max Tension NESC Heavy lbs.	11,400
			Max Operating Temp (°F)	285
			Calc'd Horiz.Tension@MaxTemp	4,412
			Calc'd. Clearance (SAG 10)	61
			Clearance Shown on Profile	59
			Req'd Clearance (NESC)	34.7
Crossing Comments, Conclu	sions, Conditions, and Staff	Recommendation		
Comments	In order to determine the elevations that are based of 100-year flood elevation for The design incorporates N	minimum NESC clearance on information contained or this portion of the river ESC minimum required cle	above the water, the engineering design incing insurance rate maps provided by FEI above the water for these open supplement (6.24 feet) brings to	orporates flood water MA. The design uses the
Conclusions	crossing substantially affect	ct the fuctional use and sa	tially affect the public rights in these waters, fety in these public waters.	
	expected recreational use	by the public.	across public waters meets or exceeds NESC	•
Staff Recommendation	That the Commission gran across the public waters id		maintain and operate the electric and comm	nunication lines over and
Staff Reccommended	The license for this public Facility from the SEC.	water crossing is continge	nt upon the Northern Pass Project receiving	a Certificate of Site and
Conditions applied to License				

Table A.4.23a.2a Appendix A

Public Water/Land Crossing Name: Soucook River, Concord, NH, for ESE

General Information			Technical Information		
PUC Docket Number		DE 15-462	Voltage	115 kV	
PUC Zone		4	Circuit	C189	
PUC Map Number		23	Conductor Type	ACSR	
Petitioner (NPT, ESE)		ESE	Code Name	Lapwing	
Petitioner Line List # (for Par	cels traversed)	8951	Conductor Size	1590 kcmil	
Crossing Circuit Configuration		Overhead	Stranding	45/7	
Public Crossing Type (Water/Land)		Water	Conductor Horizontal Separation	0	
Previous Public Crossing License Issued by PUC (Yes/No)			Conductor Vertical Separation	12	
Relocated ESE Crossing (Yes/No/NA)		Yes		1.792	
	NO/NA)	No	Cable Weight (Lbs/Ft)		
Right of Way Width	NA/	265 feet	Back Pole Number	C189-32	
Number of Circuits within RC		1 new(AC), 2 existing	Back Structure Height	75	
Foreign Utilities within ROW		Yes	Back Ground Elevation (Ft)	339.6	
Total Structures/Poles/Manh	noles	2	Back Conductor Height	37.5	
First Structure Identification		C189-32	Back Conductor Elev. at Pole	377.1	
State Listed Public Waters (Y	es/No/Not Applicable)	Yes	Forward Pole Number	C189-31	
Last Structure Identification		C189-31	Forward Structure Height	95	
PUC Approximate Length of	,	Not Applicable	Forward Ground Elevation	269.1	
only) [Does Not apply to Wa	ter or Rail]	1: 1	Forward Conductor Height	57.5	
			Forward Conductor Elev. at Pole	326.6	
			Span (Feet)	1172.48	
			Max Tension NESC Heavy lbs.	11,400	
			Max Operating Temp (°F)	285	
			Calc'd Horiz.Tension@MaxTemp	4,792	
			Calc'd. Clearance (SAG 10)	35	
			Clearance Shown on Profile	33	
			Req'd Clearance (NESC)	30.1	
Crossing Comments, Conclus	sions, Conditions, and Staff	Recommendation			
Conclusions	In order to determine the elevations that are based of 100-year flood elevation for The design incorporates Ni year flood data (28.5 feet) 30.1 feet. The proposed public water	minimum NESC clearance on information contained or this portion of the river ESC minimum required clear plus the additional NESC or crossing will not substantiate on the substantial contains the s	rarance above the water for these open supplement (1.59 feet) brings to tially affect the public rights in these waters,	orporates flood water MA. The design uses the oly conductors, using 100- the minimum clearance to	
	crossing substantially affect the fuctional 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	waters identified in the pe		maintain and operate the electric lines over	and across the public	
Staff Reccommended Conditions applied to License	The license for this public v Facility from the SEC.	water crossing is continge	nt upon the Northern Pass Project receiving	a Certificate of Site and	

Table A.4.23a.2b Appendix A

Public Water/Land Crossing Name: Soucook River, Concord, NH, for ESE

		Technical Information		
	DE 15-462		115 kV	
		-	115 kV	
			ACSR	
PUC Map Number Petitioner (NPT, ESE)		71	Drake	
rcels traversed)			795 kcmil	
Crossing Circuit Configuration			26/7	
Public Crossing Type (Water/Land)		,	0	
Previous Public Crossing License Issued by PUC (Yes/No)			12	
Relocated ESE Crossing (Yes/No/NA)			1.094	
. ,	265 feet	Back Pole Number	P145-73	
OW	3	Back Structure Height	90	
I	Yes		328.53	
holes	2		52.5	
1	P145-73	Back Conductor Elev. at Pole	381.03	
Yes/No/Not Applicable)	Yes	Forward Pole Number	P145-72	
	P145-72	Forward Structure Height	105	
crossing for License (Land	Not Applicable	Forward Ground Elevation	268.89	
ater or Rail]	иот Аррисаріе	Forward Conductor Height	67.5	
		Forward Conductor Elev. at Pole	336.39	
		Span (Feet)	1172.27	
		Max Tension NESC Heavy lbs.	9,000	
		Max Operating Temp (°F)	285	
		Calc'd Horiz.Tension@MaxTemp	3,312	
		Calc'd. Clearance (SAG 10)	62	
		Clearance Shown on Profile	59	
		Req'd Clearance (NESC)	30.1	
isions, Conditions, and Staff	Recommendation			
This section of the Soucook River is used recreationally for canoe and kayaking, fishing and swimming. 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.				
crossing substantially affect. The the proposed design for	t the fuctional use and	safety in these public waters.		
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. The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and				
Facility from the SEC.		5		
	results of the Soucool In order to determine the elevations that are based to 100-year flood data (28.5 feet) 30.1 feet. The proposed public water crossing substantially affect. The the proposed design for expected recreational use. The license for this public waters id.	Overhead (/Land) (/Lan	DE 15-462 Voltage 4 Circuit 23 Conductor Type ESE Code Name Resels traversed) 8951 Conductor Size Conductor Size Conductor Size Conductor Vertical Separation Sack Structure Height Vertical Separation Forward Conductor Height Forward Pole Number Forward Pole Number Forward Pole Number Forward Ground Elevation Forward Conductor Height Forward Conductor Height Forward Ground Elevation Forward Conductor Height Forward Ground Elevation Forwar	

Table A.4.23b.1 Appendix A

Public Water/Land Crossing Name: NH Adjutant General Property, Pembroke, NH, for NPT

General Information				Technical Information	
PUC Docket Number		DE 15-461		Voltage	345 kV
PUC Zone		4		Circuit	3132
PUC Map Number		23		Conductor Type	ACSR
Petitioner (NPT, ESE)		NPT		Code Name	Lapwing
Petitioner Line List # (for Pare	cels traversed)	8954, 8957		Conductor Size	1590 kcmil
Crossing Circuit Configuration	•	Overhead		Stranding	45/7
Public Crossing Type (Water/Land)		Land		Conductor Horizontal Separation	26
Previous Public Crossing Lice		No		Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)		NA NA		Cable Weight (Lbs/Ft)	1.792
Right of Way Width	,	265 feet		Back Pole Number	3132-162
Number of Circuits within RC)W	1 new(AC), 2 existing		Back Structure Height	95
Foreign Utilities within ROW		Yes		Back Ground Elevation (Ft)	351.38
Total Structures/Poles/Manh	ioles	5		Back Conductor Height	70
First Structure Identification		3132-159		Back Conductor Elev. at Pole	421.38
State Listed Public Waters (Y	es/No/Not Applicable)	Not Applicable		Forward Pole Number	3132-163
Last Structure Identification	, pp. 100-01	3132-165		Forward Structure Height	95
PUC Approximate Length of o	crossing for License (Land			Forward Ground Elevation	346.4
only) [Does Not apply to Wat		3,672 feet		Forward Conductor Height	70
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•			Forward Conductor Elev. at Pole	416.4
				Span (Feet)	799.56
				Max Tension NESC Heavy lbs.	11,400
				Max Operating Temp (°F)	285
				Calc'd Horiz.Tension@MaxTemp	4,170
				Calc'd. Clearance (SAG 10)	30
				Clearance Shown on Profile	31
				Req'd Clearance (NESC)	20.8
Crossing Comments, Conclus	sions, Conditions, and Staff	Recommendation			
Comments Conclusions Staff Recommendation	General, and used by the NH National Guard Regional Training Institute. The National Guard is also proposing to build construct an Army National Guard Readiness Center on this property. The Adjutant General's response to Staff's inquiry was a generally favorable assessment of how Eversource has maintained its existing facilities within the easement across the property. The Adjutant General does not foresee the NPT project causing negative impacts or affects of the public to use the land. The existing easement provides public access to interior portions of the unrestricted State land, primarily for unsanctioned All-terrain vehicle usage within the easement area. The property is known to contain a number of rare, threatened and endangered species for which the Adjutant General's office manages the land use. The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands. The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public. That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.				
Staff Reccommended Conditions applied to License	The license for this public l Facility from the SEC.	land crossing is continge	ent u	oon the Northern Pass Project receiving a	a Certificate of Site and

Table A.4.23b.2a Appendix A

Public Water/Land Crossing Name: NH Adjutant General Property, Pembroke, NH, for ESE

General Information			Technical Information		
PUC Docket Number		DE 15-463	Voltage	115 kV	
PUC Zone		4	Circuit	P145	
PUC Map Number		23	Conductor Type	ACSR	
Petitioner (NPT, ESE)		ESE	Code Name	Drake	
Petitioner Line List # (for Parc	cels traversed)	8954, 8957	Conductor Size	795 kcmil	
Crossing Circuit Configuration	1	Overhead	Stranding	26/7	
Public Crossing Type (Water/	Land)	Land	Conductor Horizontal Separation		
Previous Public Crossing Licer	nse Issued by PUC (Yes/No)	Yes	Conductor Vertical Separation		
Relocated ESE Crossing (Yes/No/NA)		Yes	Cable Weight (Lbs/Ft)	1.094	
Right of Way Width		265 feet	Back Pole Number	P145-73	
Number of Circuits within RO	W	1 new(AC), 2 existing	Back Structure Height	90	
Foreign Utilities within ROW		Yes	Back Ground Elevation (Ft)	328.53	
Total Structures/Poles/Manh	oles	6	Back Conductor Height	52.5	
First Structure Identification	for for a 10 11 1	P145-73	Back Conductor Elev. at Pole	381.03	
State Listed Public Waters (Ye	es/No/Not Applicable)	Not Applicable	Forward Pole Number	P145-72	
Last Structure Identification		P145-66	Forward Structure Height	105	
PUC Approximate Length of c		3,672 feet	Forward Ground Elevation	268.89	
only) [Does Not apply to Wat	er or Kailj		Forward Conductor Height	67.5	
		-	Forward Conductor Elev. at Pole	336.39	
			Span (Feet)	1172.27	
		-	Max Tension NESC Heavy lbs. Max Operating Temp (°F)	9,000 285	
			Calc'd Horiz.Tension@MaxTemp	3,312	
			Calc'd. Clearance (SAG 10)	31	
			Clearance Shown on Profile	29	
			Req'd Clearance (NESC)	16.1	
			ned a cicarance (NESC)	10.1	
Crossing Comments, Conclus	ions Conditions and Staff	Recommendation			
crossing comments, conclus	,,				
Comments	This ESE crossing traverses State-owned land in this section of Pembroke, NH. The land is managed by the NH Adjutant General, and used by the NH National Guard Regional Training Institute. The National Guard is also proposing to build construct an Army National Guard Readiness Center on this property. The Adjutant General's response to Staff's inquiry was a generally favorable assessment of how Eversource has maintained its existing facilities within the easement across the property. The Adjutant General does not foresee the NPT project causing negative impacts or affects of the public to use the land. The existing easement provides public access to interior portions of the unrestricted State land, primarily for unsanctioned All-terrain vehicle usage within the easement area. The property is known to contain a number of rare, threatened and endangered species for which the Adjutant General's office manages the land use.				
	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands. The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.				
Staff Recommendation	That the Commission grant across the public lands ide	•	maintain and operate the electric and comn	nunication lines over and	
Staff Reccommended Conditions applied to	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.				
License					

Table A.4.23b.2b Appendix A

Public Water/Land Crossing Name: NH Adjutant General Property, Pembroke, NH, for ESE

		Technical Information	
	DE 15-463	Voltage	115 kV
			C189
			ACSR
			Drake
rcels traversed)			795 kcmil
·	·		26/7
Crossing Circuit Configuration Public Crossing Type (Water/Land)		· ·	
Previous Public Crossing License Issued by PUC (Yes/No)			
, , , , , ,		·	1.094
, , , , , , , , , , , , , , , , , , ,			C189-32
OW			
			75
		` ,	339.6
			37.5
			377.1
			C189-31
	C189-25		95
	3,672 feet		269.1
ater or Kallj		-	57.5
			326.6
		1 1	1172.47
			9,000
			285
			3,312
		` ,	50
			44
		Req'd Clearance (NESC)	16.1
usions, Conditions, and Staff	Recommendation		
construct an Army National The Adjutant General's resits existing facilities within causing negative impacts of the existing easement proful All-terrain vehicle usage wendangered species for who the proposed public land of substantially affect the fuc	al Guard Readiness Center ponse to Staff's inquiry with easement across the profession of the public to uvides public access to intellight the easement area. In the Adjutant General crossing will not substantiational use and safety in the pis overhead crossing of public processing public	on this property. as a generally favorable assessment of how property. The Adjutant General does not fouse the land. rior portions of the unrestricted State land, The property is known to contain a number soffice manages the land use. ally affect the public rights on this land, nor ese public lands.	Eversource has maintained resee the NPT project primarily for unsanctioned of rare, threatened and will the proposed crossing
That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition. The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.			
R A T T	r/Land) lense Issued by PUC (Yes/No) s/No/NA) ROW W Inholes In (Yes/No/Not Applicable) In f crossing for License (Land ater or Rail) usions, Conditions, and Staff This ESE crossing traverses General, and used by the N construct an Army Nationa The Adjutant General's res its existing facilities within causing negative impacts of The existing easement pro All-terrain vehicle usage w endangered species for wi The proposed public land of substantially affect the fuc The proposed design for th recreational use by the pu That the Commission gran across the public lands ide	on Overhead r/Land) Land rense Issued by PUC (Yes/No) No s/No/NA) Yes (3 poles) 265 feet ROW 1 new(AC), 2 existing W Yes nholes 6 n C189-32 (Yes/No/Not Applicable) Not Applicable n C189-25 f crossing for License (Land ater or Rail] This ESE crossing traverses State-owned land in this General, and used by the NH National Guard Regiona construct an Army National Guard Readiness Center The Adjutant General's response to Staff's inquiry waits existing facilities within the easement across the causing negative impacts or affects of the public to ute and the cause of the public land crossing will not substantial substantially affect the fuctional use and safety in the The proposed design for this overhead crossing of purecreational use by the public. That the Commission grant the license to construct, across the public lands identified in the petition. The license for this public land crossing is contingent.	DE 15-463 4 Circuit 23 Conductor Type ESE Code Name roll Stranding r/Land) Land Conductor Horizontal Separation roll Cytes/No) No Conductor Horizontal Separation roll Cytes/No) No Conductor Vertical Separation syno, NA) Yes (3 poles) Cable Weight (Lbs/Ft) 265 feet Back Pole Number ROW 1 new(AC), 2 existing Back Structure Height V Yes Back Ground Elevation (Ft) sholes 6 Back Conductor Height To C189-32 Back Conductor Height To C189-32 Back Conductor Elev. at Pole Yes/No/Not Applicable) Not Applicable Forward Pole Number 1 n C189-32 Back Conductor Elev. at Pole Yes/No/Not Applicable) Forward Pole Number 1 n C189-35 Forward Structure Height Forward Conductor Elev. at Pole Yes/No/Not Applicable Forward Pole Number 1 n C189-36 Forward Structure Height Forward Conductor Elev. at Pole Yes/No/Not Applicable Forward Conductor Height Forward Conduct

Table A.4.24a.1 Appendix A

Public Water/Land Crossing Name: Suncook River, Pembroke, NH, for NPT

General Information				Technical Information	
PUC Docket Number		DE 15-460		Voltage	345 kV
PUC Zone		4		Circuit	3132
PUC Map Number		24		Conductor Type	ACSR
Petitioner (NPT, ESE)		NPT		Code Name	Lapwing
Petitioner Line List # (for Par	cels traversed)	8950		Conductor Size	1590 kcmil
Crossing Circuit Configuration	·	Overhead		Stranding	45/7
Public Crossing Type (Water	 			Conductor Horizontal Separation	
Previous Public Crossing Lice	'	Water No		Conductor Vertical Separation	
Relocated ESE Crossing (Yes/No/NA)		NA NA		Cable Weight (Lbs/Ft)	1.792
Right of Way Width	110/11/1	150 feet		Back Pole Number	3132-218
Number of Circuits within R	nw/	2		Back Structure Height	130
Foreign Utilities within ROW		None		Back Ground Elevation (Ft)	314.42
Total Structures/Poles/Man		3		Back Conductor Height	63.5
First Structure Identification		3132-218		Back Conductor Fley. at Pole	377.92
State Listed Public Waters (\		Yes		Forward Pole Number	3132-219
Last Structure Identification	ca, 140/1401 Applicable)	3132-220		Forward Structure Height	135
PUC Approximate Length of	crossing for License (Land	3132-220		Forward Ground Elevation	297.02
	- '	Not Applicable		Forward Ground Elevation Forward Conductor Height	68.5
only) [Does Not apply to Wa	ter or nailj			Forward Conductor Height Forward Conductor Elev. at Pole	365.52
				Span (Feet)	682.57
				Max Tension NESC Heavy lbs.	11,400
				Max Operating Temp (°F)	·
				Calc'd Horiz.Tension@MaxTemp	285 3,878
				Calc'd. Clearance (SAG 10)	,
				` ,	40
				Clearance Shown on Profile Req'd Clearance (NESC)	38 34.7
				Red a clearance (NESC)	34.7
		5			
crossing Comments, Conciu	sions, Conditions, and Staff	Recommendation			
Conclusions	This section of the Suncook River is used recreationally for canoe and kayaking and 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 (6.24 feet) brings the minimum clearance to 34.7 feet.				
	crossing substantially affect. The the proposed design for	t the fuctional use and	d safe	Ily affect the public rights in these waters by in these public waters. coss public waters meets or exceeds NESo	
Staff Recommendation	expected recreational use by the public. 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 Reccommended 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.				

Table A.4.24b.1 Appendix A

Public Water/Land Crossing Name: Bear Brook State Park, Allenstown, NH, for NPT

General Information			Technical Information		
PUC Docket Number		DE 15-461	Voltage	345 kV	
PUC Zone		4	Circuit	3132	
PUC Map Number			Conductor Type	ACSR	
Petitioner (NPT, ESE)		24 NPT	Code Name	Lapwing	
Petitioner Line List # (for Par	cels traversed)	9300	Conductor Size	1590 kcmil	
Crossing Circuit Configuration	,	Overhead	Stranding	45/7	
	Public Crossing Type (Water/Land)		Conductor Horizontal Separation		
Previous Public Crossing Lice		Land No	Conductor Vertical Separation		
Relocated ESE Crossing (Yes/	, , , , ,	NA	Cable Weight (Lbs/Ft)	1.792	
Right of Way Width	,	150 feet	Back Pole Number	3132-225	
Number of Circuits within RC	DW .	1 new (AC), 1 existing	Back Structure Height	125	
Foreign Utilities within ROW		None	Back Ground Elevation (Ft)	477.52	
Total Structures/Poles/Manh		9	Back Conductor Height	59	
First Structure Identification	.0.00	3132-218	Back Conductor Elev. at Pole	536.52	
State Listed Public Waters (Y	es/No/Not Applicable)	Not Applicable	Forward Pole Number	3132-226	
Last Structure Identification	, -, ,,,	3132-228	Forward Structure Height	145	
PUC Approximate Length of	crossing for License (Land		Forward Ground Elevation	465.68	
only) [Does Not apply to Wat	-	4,270 feet	Forward Conductor Height	79	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•		Forward Conductor Elev. at Pole	544.68	
			Span (Feet)	596.3	
			Max Tension NESC Heavy lbs.	11,400	
			Max Operating Temp (°F)	285	
			Calc'd Horiz.Tension@MaxTemp	3,618	
			Calc'd. Clearance (SAG 10)	34	
			Clearance Shown on Profile	30	
			Req'd Clearance (NESC)	20.8	
Comments	This NPT crossing traverses a section of State-owned land acrss Bear Brook State Park, in Allenstown, NH. The land is managed by the NH DRED. NH DRED did not respond to Staff's request for comments. However, based on comments from the NH DOT and the NH Adjutant General's office, Staff believes it is aafe to assume that Eversource has maintained its facilities within this easement in a responsible manner. Bear Brook State Park is used for a variety of recreation activities including snowmobiling, cross country skiing, walking, hiking, etc				
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands. The proposed design for this overhead crossing of public lands 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 lands identified in the petition.				
Staff Reccommended 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.				