

# **Eversource 115-kV Wood Pole and Shield Wire Replacements 2020-2023 – Revision 1**

Planning Advisory Committee Meeting

December 19, 2019

Revisions to the December 19, 2019 Presentation

# Agenda

- Project Background
  - Transmission system inventory data
- Project Drivers
  - Wood Pole Replacements
    - Inspections, Criteria, Results
  - Shield Wire Replacements
    - Hardware Issues, Planned Remediation
- Scope Summary by Region
- Conclusion

# Project Background

- Eversource manages ~4,000 circuit miles of overhead transmission lines including ~3,400 structure miles
  - Nearly 40% of all transmission in New England
  - Eversource maintains over 20,000 115-kV structures
- Inspections show significant signs of age-related degradation on our wood poles
- Multiple lines have experienced shield wire failures due to aging shield wire materials
  - Failing galvanized high strength steel and copperweld shield wire types
- This presentation covers wood pole and associated shield wire replacement projects on Eversource's 115-kV lines planned from 2020 through 2023
  - Any projects not included (e.g. lattice structure replacements, copper conductor replacements) will be brought to PAC on an individual basis

# Project Drivers – Wood Pole Asset Condition

- Inspections have indicated significant degradation and decreased load carrying capacity of wood 115-kV structures
- Replacing the structures with light duty steel pole equivalents resolves multiple structural issues, hardware issues, and supports safe and reliable operation
- Structure Inspections:
  - Foot Patrol – line crews walk/drive along line to observe general condition of structures above ground level and general ROW conditions
  - Structure Ground Line – specialized crews excavate ~18” below grade at each structure to determine subsurface integrity of pole and apply treatment as necessary
  - High Resolution Aerial – entire system flown with detail hover review at most structures resulting in high resolution photos
  - Thermography – infra-red camera (typically on helicopter) observes line for hot-spots
  - Comprehensive Drone – combines foot patrol and high resolution aerial aspects of inspection

# Project Drivers – Wood Pole Asset Condition (continued)

## Asset Condition Inspection Grading & Project Scoping

- Structures are graded in accordance with EPRI Guidelines
  - *A: Nominal Defect – No Action Required*
  - *B: Minimal Defect – Monitor Degradation*
  - *C: Moderate Defect – Repair or Replace under next maintenance*
  - *D: Severe Defect – Repair, Reinforce, or Replace immediately*
- Replace C and D structures in one mobilization
  - Other structures (A/B) may be replaced during scope due to engineering requirements and to minimize costs and environmental impacts
- Engineering provides training to inspectors on appropriate grading criteria
  - Field inspectors provide structure grade while in field and observe the entire structure
  - Results are reviewed by engineering team and field operations

# Project Drivers – Wood Pole Asset Condition (continued)

## Typical Wood Pole Degradation within Eversource (ES) System



Line 1000  
Str 7619  
Pole Crack



Line 1080  
Str 6351  
Pole Crack & Woodpecker Holes



Line 1161  
Str 40079  
Deep Pole Top Rot



# Project Drivers – Wood Pole Asset Condition (continued)

## Typical Wood Pole Degradation within ES System



Line K174 Str 119  
Pole Base Splitting



Line 1421 Str 32008  
Cross Arm Splitting



Line K105 Str 95  
Deep Woodpecker Hole

# Project Drivers – Wood Pole Asset Condition (continued)

- Engineering analysis identified structures which are projected to be loaded beyond their design capabilities considering the National Electrical Safety Code at the time of construction
- Age of structures and wood deterioration must also be considered
- These structures were identified on 2 lines (K174 & M127) in New Hampshire and represent 1.5% of the structures to be replaced as part of this program

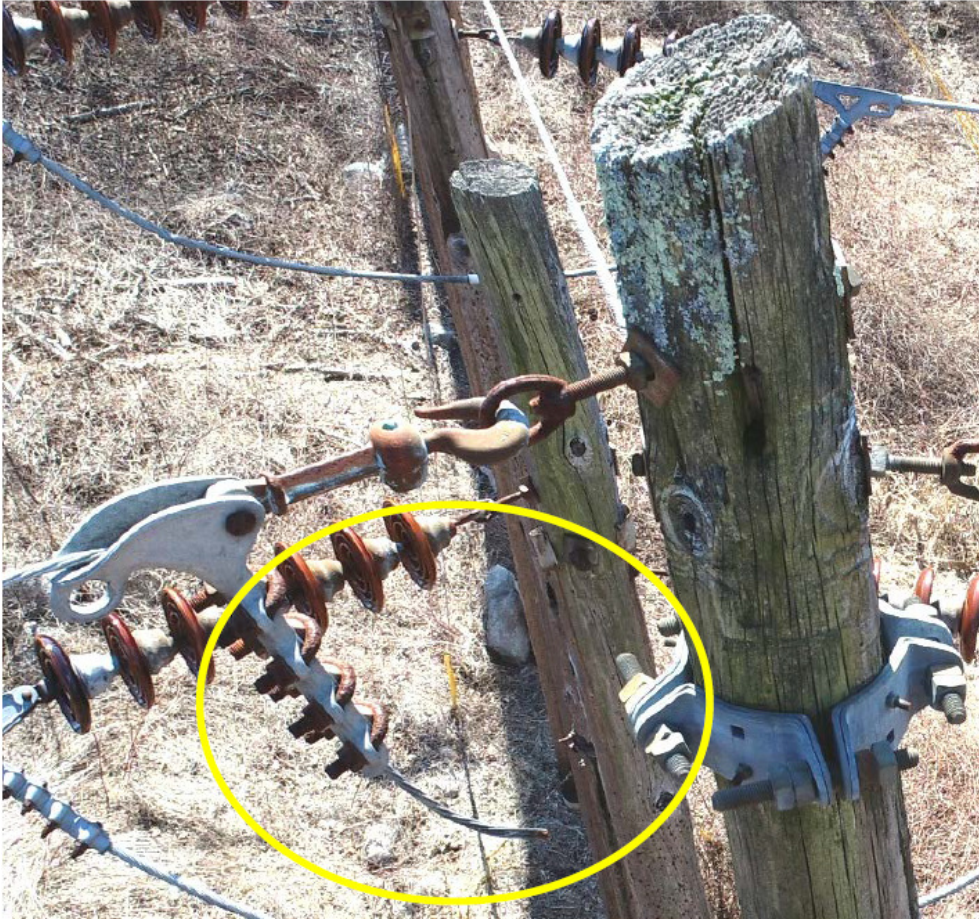


# Project Drivers – Shield Wire Asset Condition

- Existing structures currently handling galvanized high strength steel and copperweld shield wire, as well as other obsolete shield wire material
- Issues associated with existing steel and copperweld:
  - System is currently experiencing hardware failures due to aging
  - These material types are outdated in the industry
    - When they do fail, replacement hardware is difficult to find
- Fiber Installation Drivers:
  - Up-to-date and readily available hardware
  - Similar cost to a like-for-like shield wire replacement
  - Fiber will not only shield the lines, but increase communication and reliability within the Eversource system
- Addressing shield wire issues when replacing structures is more efficient than addressing these issues through separate projects

# Project Drivers – Shield Wire Asset Condition (continued)

## Typical Shield Wire Degradation within ES System

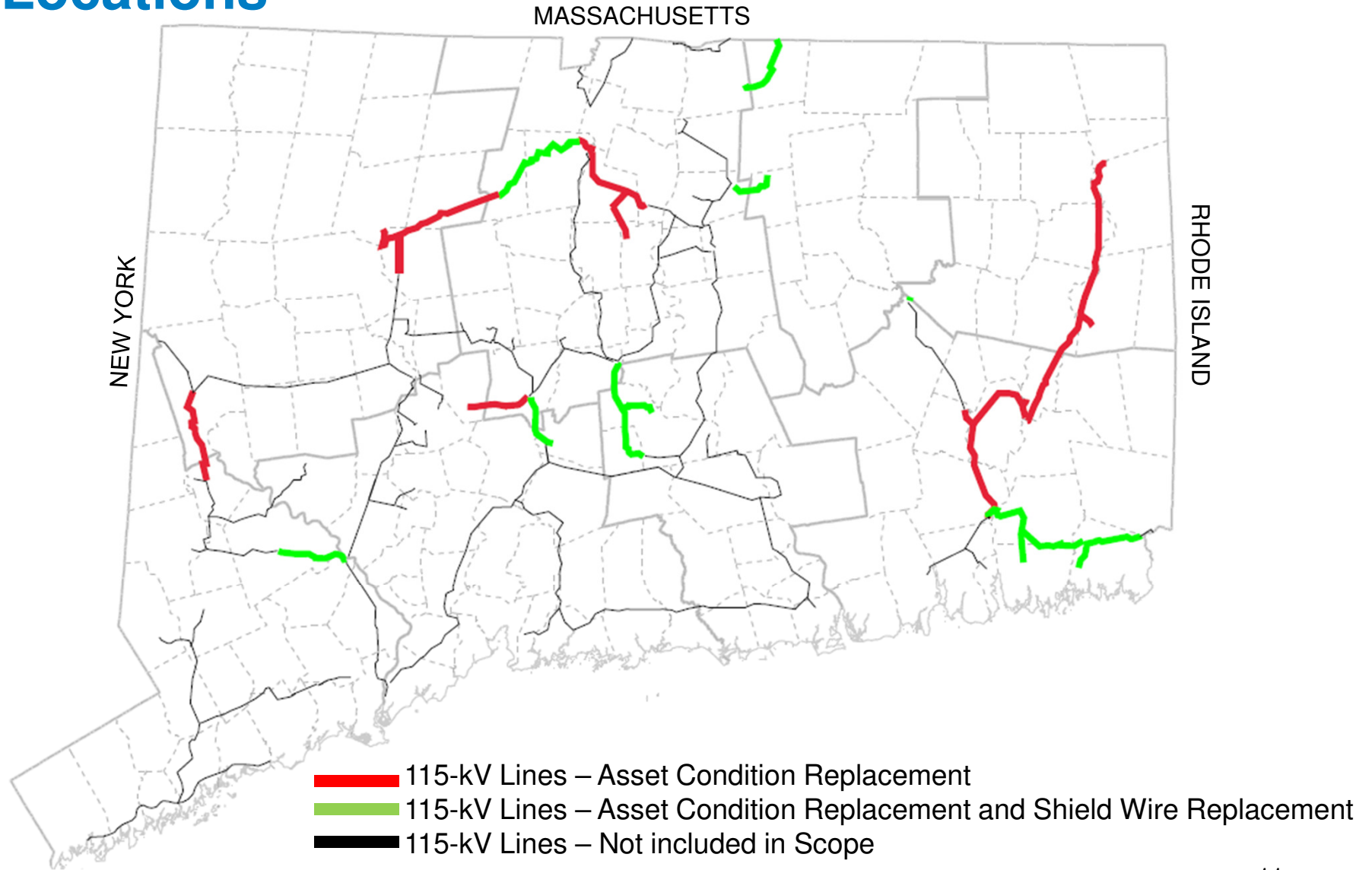


Line 1410  
Broken Static Wire



Line 1756  
Rusting and Pitting on  
Shield wire & Hardware

# Connecticut 115-kV Geographic Locations



# Connecticut 115-kV Scope Summary

Line	Qty	Cost (\$M)
1000	40	\$ 12.40
1042	19	\$ 6.08
1043*	13	\$ 5.39
1080	78	\$ 24.18
1208	32	\$ 8.96
1232*	18	\$ 6.70
1256*	36	\$ 10.64
1280*†	40	\$ 12.00
1410*†	37	\$ 13.00
1465*	13	\$ 8.77
1505	27	\$ 7.10
1607	28	\$ 7.62
1618*	17	\$ 9.77
1732*	18	\$ 7.90
1751	43	\$ 10.75
1756†	71	\$ 15.00
1765*	42	\$ 14.70
1766*	53	\$ 16.60
1910	26	\$ 10.30
<b>TOTALS</b>	<b>651</b>	<b>\$ 204.86</b>

CT Total Cost of Projects:  
**\$205M** (-25% / +50%)

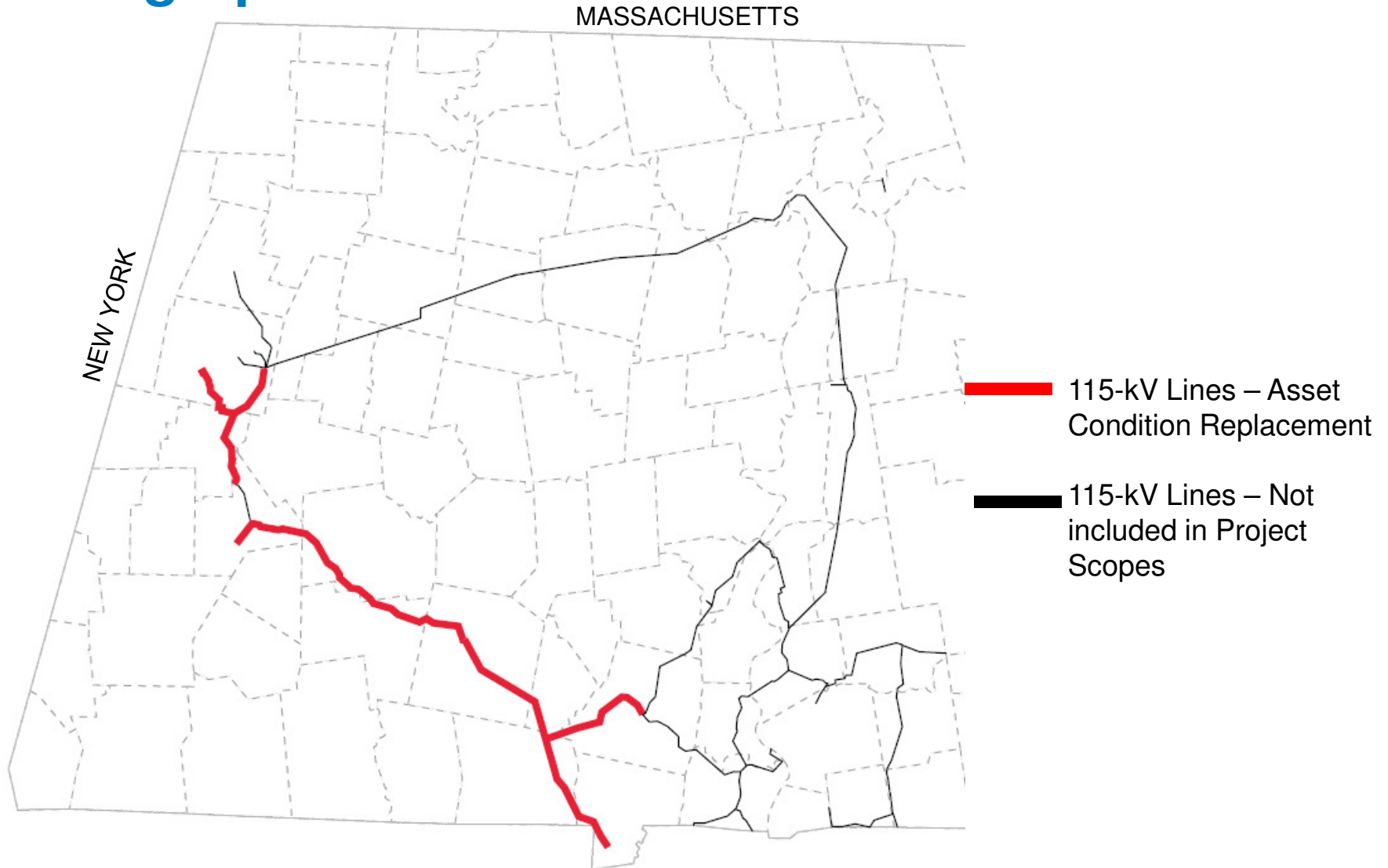
Notes

\* Lines with shield wire replacements

† Lines carried over from previous ISO-NE PAC presentation made on October 17, 2018. Some of these projects have expanded in scope since the 2018 presentation.



# Western Massachusetts 115-kV Geographic Locations





# Western Massachusetts and Multi-State Lines 115-kV Scope Summary

Line	Str Qty	Cost (\$M)
1161	76	\$ 17.10
1421	70	\$ 15.75
1512	48	\$ 10.80
<b>TOTAL</b>	<b>194</b>	<b>\$ 43.65</b>

WMA Total Cost of Projects:

**\$44M** (-25% / +50%)

Line	Qty	Cost (\$M)
1394*	15	\$ 7.07
1858*	33	\$ 11.34
1976*	17	\$ 7.47
<b>TOTAL</b>	<b>65</b>	<b>\$ 25.88</b>

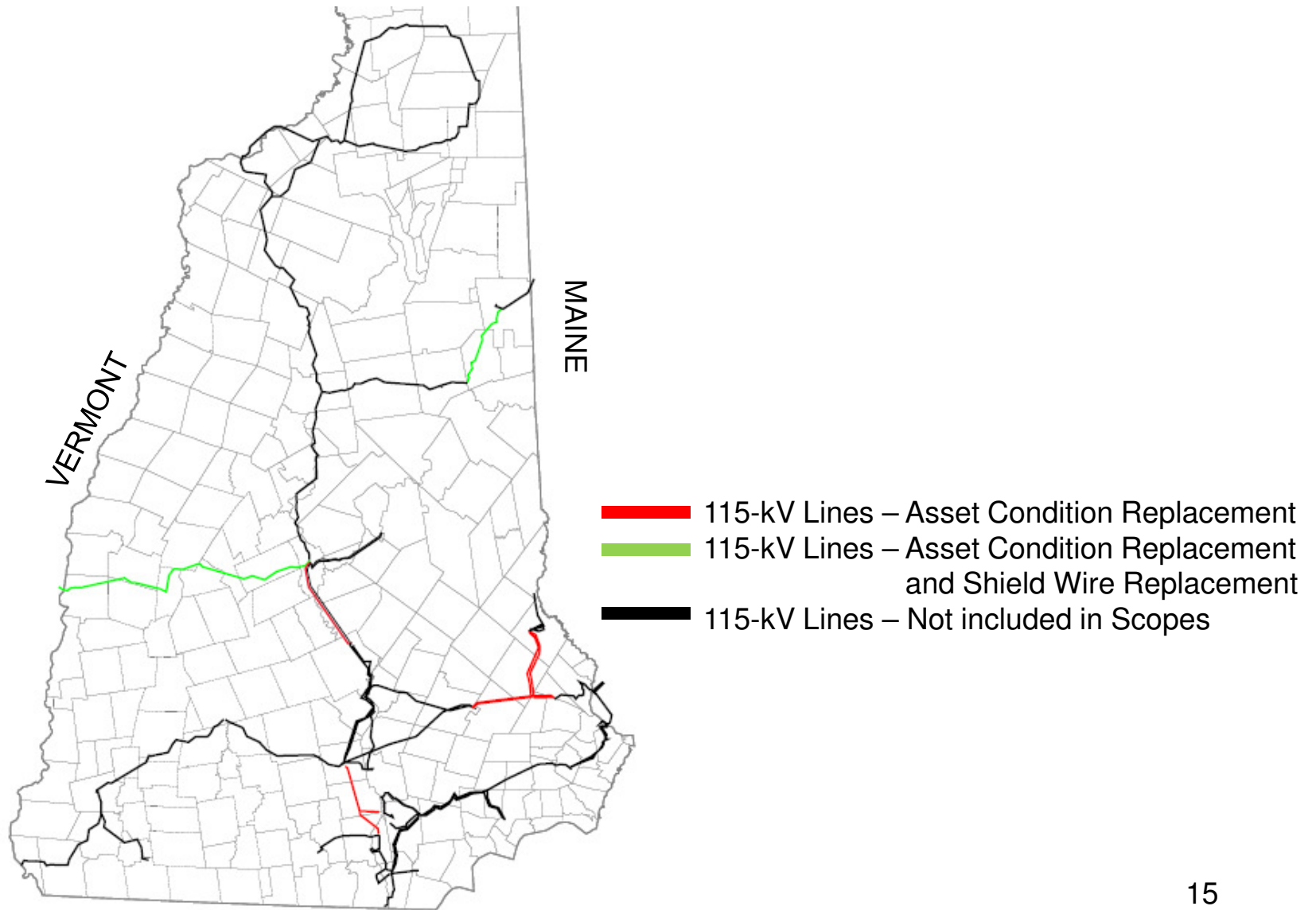
Multi-State Lines Total Cost of Projects:

**\$26M** (-25% / +50%)

Notes

\* Lines with shield wire replacements

# New Hampshire 115-kV Geographic Locations



# New Hampshire 115-kV Scope Summary

Line	Str Qty	Cost (\$M)
B143	32	\$ 7.41
C129	46	\$ 9.10
F139	39	\$ 8.00
G128	48	\$ 6.91
K105	32	\$ 6.08
K174*	55	\$ 14.74
L175	30	\$ 5.25
M127*	139	\$ 33.43
Y138*	28	\$ 8.49
<b>TOTAL</b>	<b>449</b>	<b>\$ 99.41</b>

Notes

\* Lines with shield wire replacements

NH Total Cost of Projects:

**\$99M (-25% / +50%)**

# Conclusion

## Service Territory

	Str Qty	Cost (\$M)
<i>CT</i>	651	\$ 204.86
<i>WMA</i>	194	\$ 43.65
<i>NH</i>	449	\$ 99.41
<i>Multi-State Lines</i>	65	\$ 25.88
<b>EVERSOURCE</b>	<b>1359</b>	<b>\$ 373.80</b>

- Eversource Total Cost of Projects: **\$374M** (-25% / +50%)

## Conclusion

- Inspections have indicated significant degradation of system-wide 115-kV wood poles
  - Replacing the structures resolves multiple structural and hardware issues to support safe and reliable operation
- System data and recent hardware failures show a need for shield wire replacements
  - Existing shield wire consists of outdated industry materials with associated replacement hardware that is now obsolete
  - Replacement with new OPGW allows for updated hardware, continued line shielding, and increased communication and reliability throughout the system
- All replacements and upgrades will be designed to meet current design criteria
- Proposed scope for 2020-2023 115-kV work is estimated at **\$374M** (-25% / +50%)