

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

DE 21-004

2021 Least Cost Integrated Resource Plan

Report on Wires and Non-Wire Solutions to Address Reliability in the Bellows Falls Area

NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-1

Date of Response: 8/5/22
Respondent: Anthony Strabone

REQUEST:

On Bates page 003 of the Report, Liberty states that: “Because the Company’s analysis is based on historical data, the effect of planned improvements in the Bellows Falls area are not captured.” If Liberty is considering Non-Wires Alternatives (NWAs) as part of its long-term goals, why did the Company not document the long-term effects of each option under consideration?

RESPONSE:

For solutions 1 through 3, the Company included estimates of each option’s long-term effects, which included estimates of increased reliability post-construction and estimates of the cost per interruption, based on historical information available. For solutions 4 through 6, however, the Company does not have historical information available and thus does not have the basis on which to provide the estimated reliability impacts.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-2

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

According to the Report on Bates page 003, there is an “Inability to perform the necessary system reconfiguration to isolate system faults and reduce the number of customers impacted during an event.” Please explain this in more detail: how the Company has coped until now; and how each option under consideration will alleviate this problem.

RESPONSE:

The 12L1 and 12L2 circuits are largely radial. Should a mainline fault occur on the vast majority of either circuit, the downstream customers will be out for the duration due to the inability to provide an alternate source through circuit reconfiguration. The purpose of any of the six options is to provide another source of energy to supply customers that have been affected by an upstream mainline fault. As currently constructed, the only option the Company has to cope with mainline faults is to limit the number of customers impacted by utilizing an upstream overhead switch or by lifting taps as close to the fault as feasible. Due to the lack of an additional source, all downstream customers will be without power until whatever repairs have been made that are needed to safely reenergize the affected area.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-3

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

The Report (Bates page 003) states that six solutions were identified to address the reliability issue. Please explain who identified the solutions and using what criteria. Has the Company adopted a formal business process to review all NWA possibilities? If the Company used the DAS-16 Guidelines found on Bates page 313 of the Appendices to the LCIRP, please provide detail concerning how the Distribution Project Evaluation was applied in the case of each option.

RESPONSE:

As stated on Bates 003 of the Report, the Company completed a solution assessment on one of its worst-performing areas in reliability, Bellows Falls. The main problem affecting reliability in the Bellows Falls area is outage duration. Due to the largely radial nature of both the 12L1 and 12L2 circuits, the inability to perform necessary system reconfiguration should a mainline fault occur, leaves all downstream customers without power for the duration of the outage.

The Company's planning engineer, Michael Cooper, identified the solutions to the assessment, which was to provide an alternate source of energy to supply customers that may be affected by an upstream mainline fault. As described in Appendix D of the Company's January 15, 2021, initial filing (Bates 317), feasible Traditional and Non-Wires Solutions are developed by considering technical, economic, environmental, regulatory, reliability, and scheduling factors. The Company would develop a range of possible Traditional, Non-Wires, and Hybrid Solutions or Options based on experience. The Non-Wires Solutions should have sufficient scale and acceptable costs to avoid, defer, economically reduce, or modify the scope and cost of the Traditional Solution. The feasibility of a specific Non-Wires Solution plan depends on the installed and expected mix of end uses and whether the Non-Wires Solution can be operational in time to avoid significant expenses for the Traditional Solution. A hybrid Solution includes both Traditional and Non-Wires Solutions. For this analysis, the Company's Non-wires solution options included battery energy storage systems (BESS), or behind-the-meter battery storage solutions. These solutions would address the issue of providing an alternate source of energy and would draw upon the Company's experience with battery storage.

Yes, the Company has adopted DAS-016 as the formal business process to review all NWA possibilities. Utilizing the guidelines in DAS-016, these non-wires solutions were initially evaluated utilizing the flow chart on Bates 315 of the LCIRP. The solutions to this issue are required sooner than 24 months, are not based on asset condition, and the traditional solutions were not less than \$500k. Non-wires solutions were then identified, evaluated, and ranked against traditional solutions in the analysis workbook (Bates 319–321 of the LCIRP).

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-4

Date of Response: 8/5/22
Respondent: Anthony Strabone

REQUEST:

Please furnish the referenced report and cost estimates for battery storage for options 5 and 6 (Bates page 003) drawn up by the Company's consultant.

RESPONSE:

The Empire District Electric Company, a Liberty affiliate of Granite State Electric, is working with Burns and MacDonald to investigate battery storage in Liberty's Central Region. The Company contacted the consultant to discuss battery options for New Hampshire. The chart below contains the cost estimates provided by the consultant that the Company used in preparing the cost estimates for options 5 and 6. The report referenced was prepared for the Empire District in Missouri, not New Hampshire, however, the below estimates were based on industry costs, not geographic area.

BESS Costs	Average Load	Max Load
BESS Power, kW	2,500	5,000
BESS Discharge Duration, hrs	4	4
BESS Energy, kWh	10,000	20,000
EPC Cost, \$	\$ 4,480,000	\$ 7,980,000
Interconnection Assumption \$	\$ 500,000	\$ 500,000
Owner Cost, \$	\$ 1,000,000	\$ 1,696,000
Total Capital Cost, \$	\$ 5,980,000	\$ 10,176,000
Annual O&M Cost, \$	\$ 87,500	\$ 175,000

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-5

Date of Response: 8/5/22
Respondent: Heather Tebbetts

REQUEST:

On Bates page 004 the Report, it states that “It is important to note that all of the traditional wires solutions scored higher than any non-wires solution. This is due to the current estimated reliability impact performance that the batteries can potentially provide as opposed to a traditional wires solution.” (a) Does that mean that the reliability of batteries is severely impaired when compared to traditional wires? (b) If so, and given that this is an investigation into solutions for reliability, why is Liberty investigating NWAs? (c) Why isn’t the Company exploring a combination of NWAs such as solar and battery storage, etc. which might increase reliability? And (d) Why is the Company not considering multiple technologies via a portfolio solution in a holistic and integrated manner?

RESPONSE:

- (a) No, that does not mean that the reliability of batteries is severely impaired when compared to traditional wires. Batteries do not address the issue of reliability; they provide power to the customer while the damage to the system is being repaired. The wires alternative proposed within the June 1, 2022, report provides an alternative path to restore customers’ electricity. The battery solution does not provide an alternative path for energy to flow, therefore batteries will not provide increased reliability to customers on a radial distribution circuit.
- (b) Liberty agreed in DE 19-120 to provide a grid needs assessment in its January 14, 2021, filing and, from that list, the Company worked to provide a portfolio of solutions that included traditional and non-wires solutions in its June 1, 2022, report.
- (c) Liberty originally proposed a microgrid in January 2021 in this docket to address a loss of supply. Liberty continued to evaluate the ongoing issues in the Bellows Falls area and determined that the original proposed microgrid solution would only provide an appropriate solution for scenarios which could potentially only occur 430 hours a year, or less than 5% of the year. Liberty Utilities initiated the report, filed on June 1, 2022, which described the overall reliability issues and the multiple solutions which were analyzed, including three different options for battery solutions, which all proved to be cost prohibitive. Liberty believes that there is a combination of traditional and NWAs

which can work together to provide customer benefit, however in this case, it is not optimal.

- (d) The Company proposed grid modernization solutions in this filing and believes that the report filed does include holistic and integrated solutions to issues on our system.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-6

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

On Bates page 004 of the Report, it is asserted that “To provide the most reliable service, creating 3-phase circuit ties is the appropriate course of action. This installation will also provide a greater footprint of 3-phase primary for future distributed generation installations. By the Company’s estimation, this will improve circuit outage duration (“Ckaidi”) for reportable customer interruptions in this region by approximately 6%.” Please explain how the Company arrived at the 6% number and what does it indicate relative to current reportable customer interruptions.

RESPONSE:

The Company compiled a list of main-line outages that occurred on the 12L1 and 12L2 circuits for the past five years, whose outage metrics would possibly benefit from a second source of energy. These metrics were averaged for the customers interrupted and customer minutes interrupted over that time span. Since the work would not necessarily prevent an outage from occurring, the Company cannot assume a change in customers interrupted. However, the Company does assume an improvement in customer minutes interrupted due to the creation of an additional source of energy, allowing for system reconfiguration. The Company estimates a 30% improvement to customer minutes interrupted for the included zones of protection. These figures are then compared against the overall circuit reliability metrics. This calculation showed an improvement of 6% in customer minutes interrupted for outages utilizing PUC criteria and a 12% improvement for all outages.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-7

Date of Response: 8/5/22
Respondent: Anthony Strabone
Michael Cooper

REQUEST:

On Bates page 005, the Report states that the Company intends to implement distribution automation once the 3-phase circuit tie has been constructed to modernize the circuits and greatly improve the customer experience. Does that mean that, irrespective of the option under consideration, the circuit tie will go ahead to facilitate distribution automation? If so, then why is this under consideration as an NWA? Isn't this part of hardening/better control of the existing infrastructure?

RESPONSE:

No, the circuit tie will not go ahead irrespective of the options under consideration, unless the circuit tie is ultimately selected as the least cost option.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-8

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

On Bates page 005, the Report states that "Once the NWS [non-wires solutions] candidates were initially identified by Liberty..." Please explain how the candidates were selected, who took part in the decision and what parameters were established in order to gauge suitability.

RESPONSE:

Please see the Company's response to RR 1-3.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-9

Date of Response: 8/5/22
Respondent: Heather Tebbetts

REQUEST:

Bates page 005 of the Report states that “[T]he analysis of NWS should consider utility system benefits including, but not limited to, avoided distribution capacity costs, avoided energy costs, and avoided transmission costs. The analysis was to also include an evaluation of the demand reduction potential associated with energy efficiency and load curtailment, as well as other NWSs.” Why did this analysis not form part of the initial screening of candidates?

RESPONSE:

The problem identified was reliability and avoided costs do not provide any benefits to reliability issues on the system. Had the identified problem been capacity-related, avoided costs would have been part of the initial screening.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-10

Date of Response: 8/5/22
Respondent: Heather Tebbetts

REQUEST:

According to the Report on Bates page 005, “The Company filed an NWS on January 14, 2021, which included the building of a microgrid to manage the potential loss of supply in the Bellows Falls area with the assumption that the full analysis would be filed on July 14, 2021, or six months after the initial filing . . .” Why did the Company consider a microgrid? Which of the NWA options anticipated a microgrid? Were NWA proposals to specify the use of a microgrid and if so, why?

RESPONSE:

The microgrid proposed on January 14, 2021, was an NWS the Company considered to address the potential of a loss of a supply line from National Grid. None of the options presented in the June 1, 2022, report include a microgrid. The batteries proposed may or may not be charged by the grid. The Company did not further evaluate a battery solution due to the high cost of the solution and as such did not determine if the batteries would charge from the grid or a renewable resource.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-11

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

According to the Report, Bates page 005, “The NWS proposed on January 14, 2021, would not have addressed reliability issues in the area, it would only have addressed the loss of a supply line from Liberty’s transmission provider, National Grid.” Given that this project was primarily to address system reliability, how was it that a reliability driven project was simply addressing a loss of supply from a partner utility?

RESPONSE:

The NWS project proposed on January 14, 2021, would not have addressed reliability in the Bellows Falls area. The NWS solution provided peak load reduction and loss of source to the Michael Ave. substation.

During the period of October 2021 to February 2022, the Company re-evaluated the issues affecting the Bellows Falls area. It was determined that mainline outages for the 12L1 and 12L2 circuits occur more often than a loss of source to Michael Ave. Substation. With this consideration, Liberty shifted its least cost solution assessment to improving overall customer reliability as opposed to a loss of source.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-12

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

Please furnish a copy of the Bellows Falls situation report dated May 2, 2022 as referenced on page 005 of the Report.

RESPONSE:

Please see Attachment RR 1-12.



Bellows Falls Reliability Report 2022

Docket No. DE 21-004

May 2, 2022





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Section 1: Bellows Falls Area Assessment

The Bellows Falls area of Liberty's service territory is rural and residential, with a few small commercial town centers. It was historically supplied from a hydro generating plant developed at Bellows Falls on the Connecticut River by New England Power Company. The area contains two small load centers connected by a long circuit branch running along the Connecticut River. The two substations in the Bellows Falls area are Michael Ave 40 and Vilas Bridge 34. Michael Ave supplies approximately 1,736 customers via the 40L1 and 40L3 circuits. Vilas Bridge supplies approximately 3,757 customers via the 12L1 and 12L2 circuits. The following table shows a breakdown of the substations' supply, circuits, customer count, circuit miles, as well as circuit percent of the total area served in Bellows Falls.

Table 1: Bellows Falls Substation Data

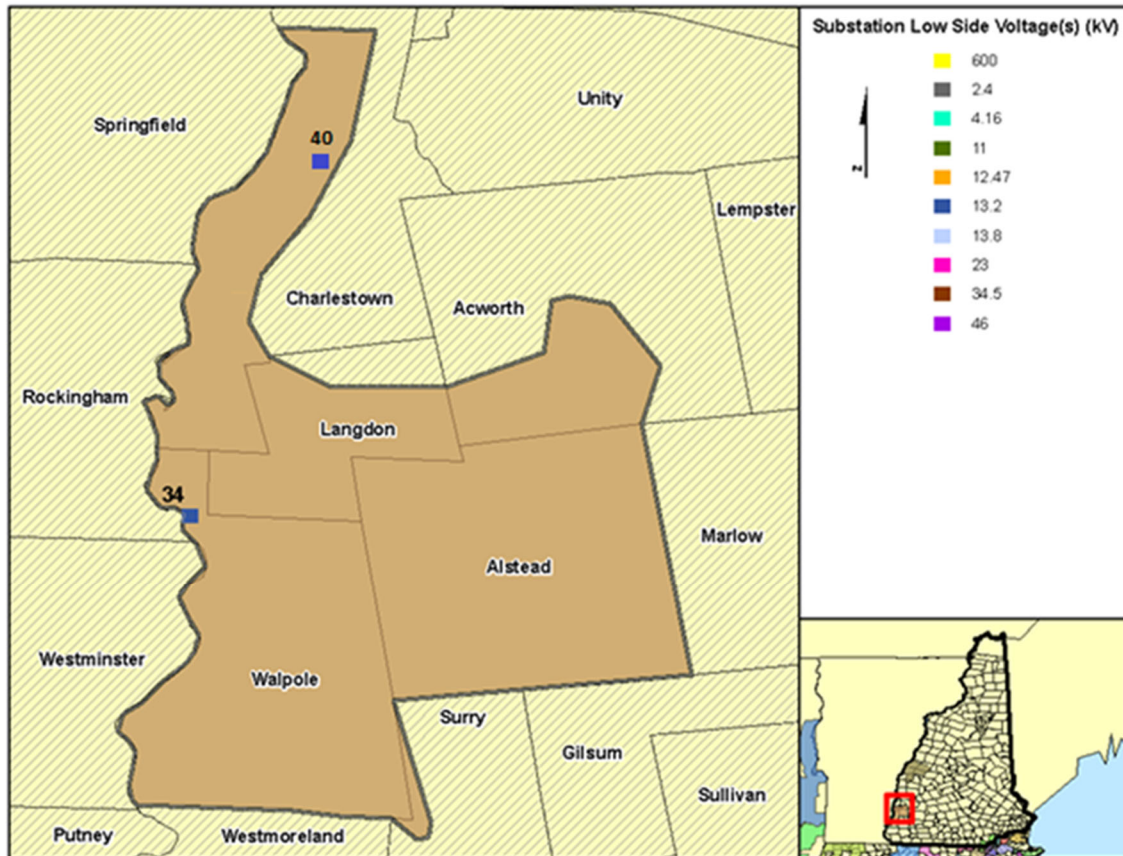
Supply	Alternate supply	Substation	Circuit	Customers	Circuit Length Miles	% of Area
4402	4401	Vilas Bridge (NGrid)	12L1	2471	128	54.74%
			12L2	1286	60	25.77%
W-149S	None	Michael Ave	40L1	544	15	6.22%
			40L3	1192	31	13.27%
			Total	5493	234	100.00%

Vilas Bridge 34 is a National Grid-owned and operated substation in Rockingham, Vermont. This substation sits across the Connecticut River from Walpole, New Hampshire. The two circuits from Vilas Bridge feed the towns of Walpole, Langdon, Alstead, Acworth, Westmoreland, Surry, and Marlow. These two circuits have one tie with each other close to the beginning of each circuit. The 12L1 shares the one tie with the 40L3. The 40L1 and 40L3 out of Michael Ave Substation have acceptable reliability and have multiple circuit ties to one another to aid in restoration switching should a main line fault occur.



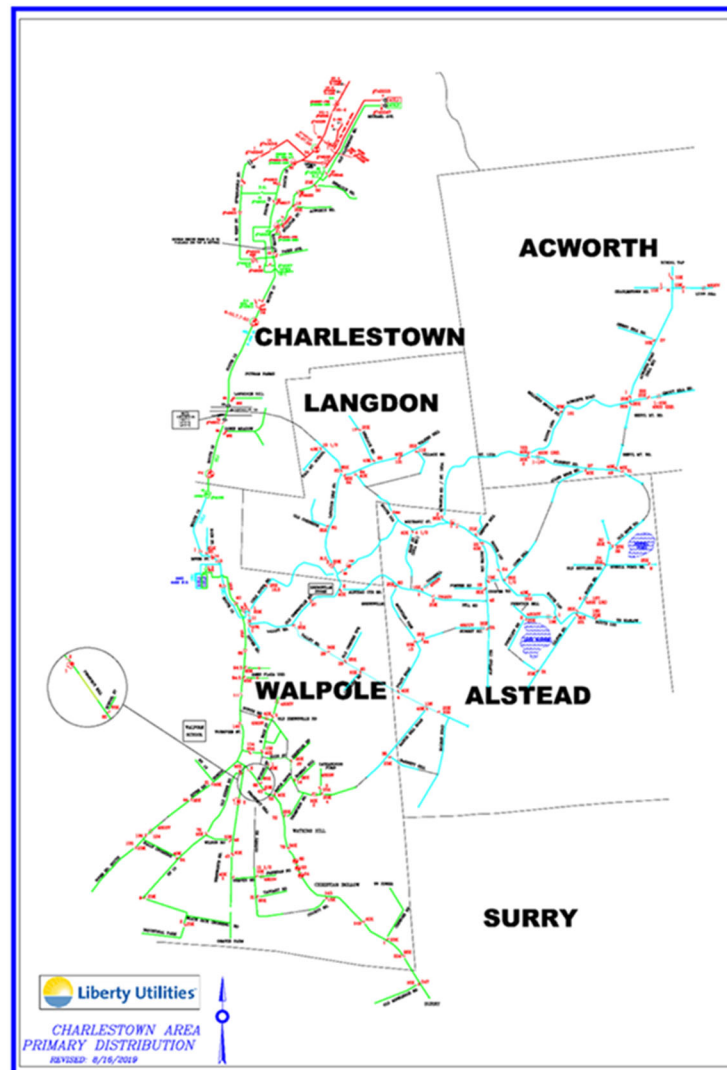
The following map shows the footprint of the areas served by the 12L1 and 12L2 (Vilas Bridge 34) and the 40L1 and 40L2 (Michael Ave 40).

Figure 1: Bellows Falls Geographical Map



The map below depicts the primary distribution of the Bellows Falls area. The 40L1 and 40L3 fed from the Michael Ave substation are to the north in red and green. The 12L1 and 12L2 are the central and southern portions in blue and green. The 12L1 and 12L2 cover a much greater portion of the territory versus the 40L1 and 40L3.

Figure 2: Bellows Falls 13.2 kV Distribution System



The 12L1 and 12L2 circuits are largely radial and single phase. Outage duration ultimately depends on the damage caused. For example, an outage caused by a tree limb contacting the overhead wires and causing a line fuse to operate will have a shorter restoration time than an outage caused by a fallen tree that has broken poles and has damaged the overhead wires and equipment. Without the ability to conduct isolation and restoration switching for a mainline fault, the entire customer base beyond the protective device upstream of the fault would be without

power for the duration of the repairs. Historically, the 12L1 and 12L2 circuits have had a higher number of outages as compared to other circuits due to the landscape being thickly wooded. The Company has completed some reconductoring in the area and installed pole top reclosers and cutout mounted reclosers to address reliability issues in the area.

The following figures depict the 12L1 and 12L2 circuit maps. Figure 3 below separates each circuit by color, the 12L1 in red and the 12L2 in yellow.

Figure 3: 12L1 and 12L2 Circuit Map

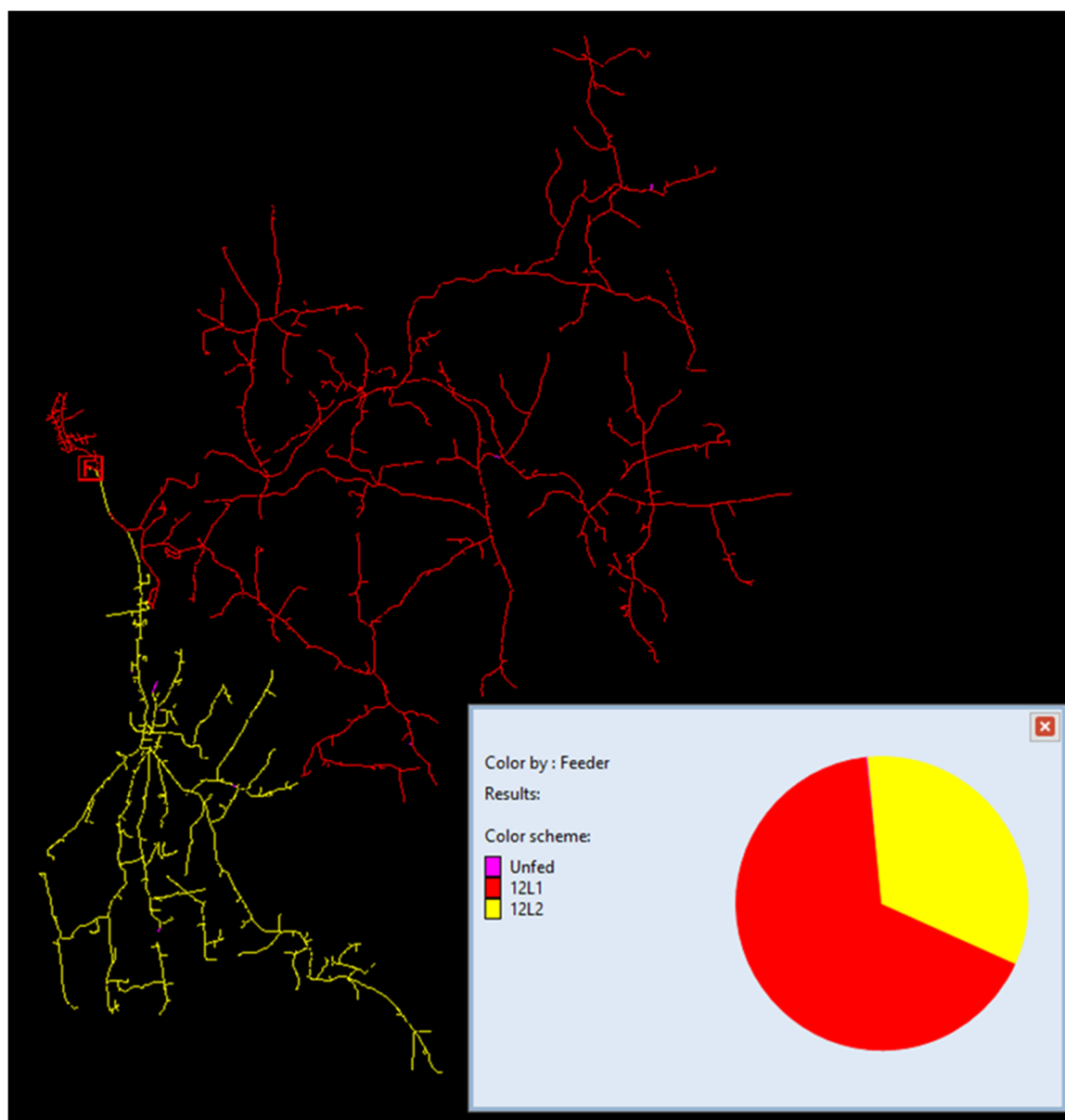
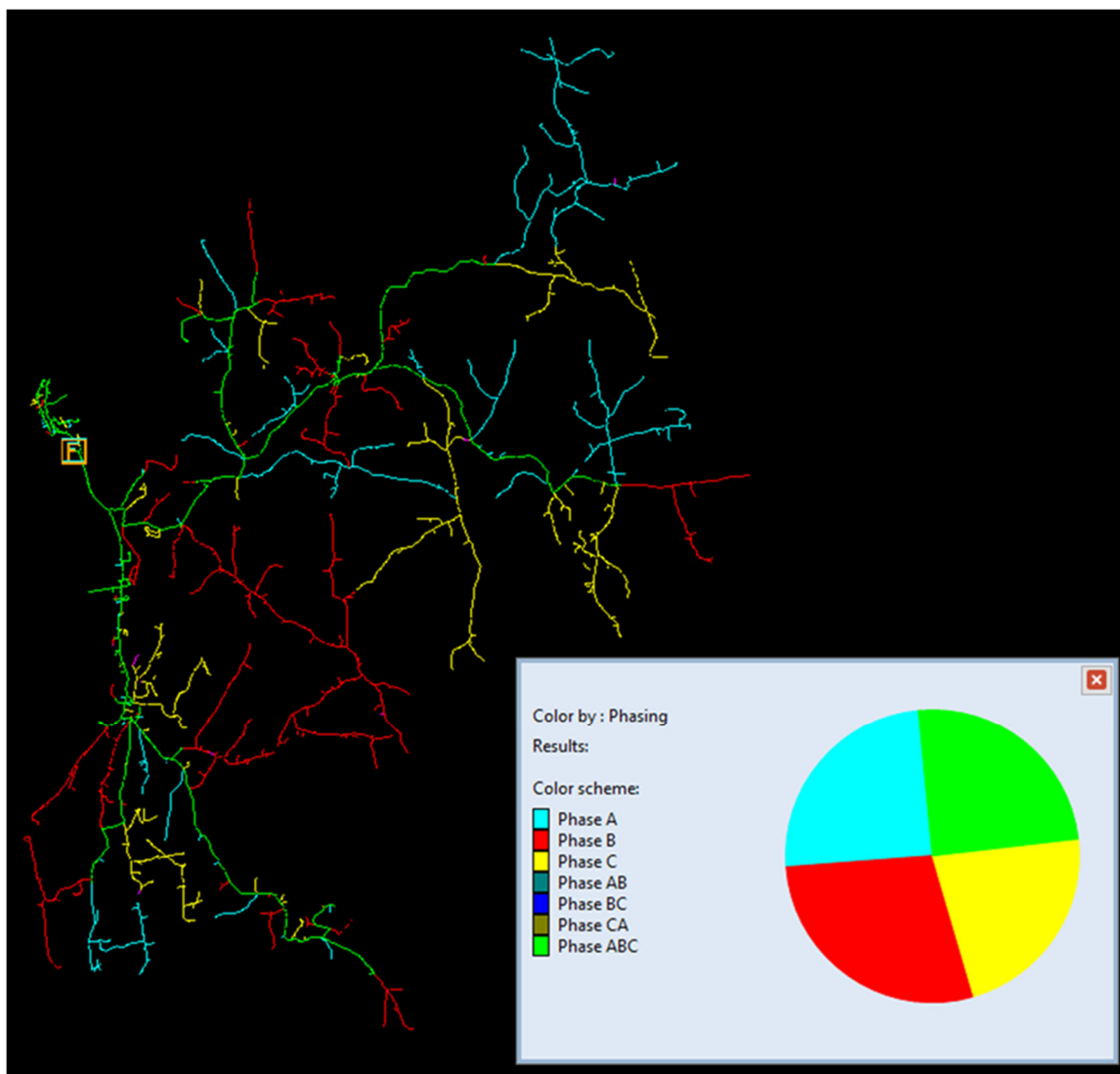


Figure 4 below provides the two circuits by phase. The Green color represents 3-phase circuit mainline for both the 12L1 and 12L2. There are no 3-phase ties between the 12L1 and 12L2. The limited number of single-phase circuit ties between 12L1 and 12L2 can result in increased customer restoration times should a main line permanent fault occur.

Figure 4: 12L1 and 12L2 Circuits by Phase



Section 2: Scope of Reliability Issues

As requested in the Commission's March 4, 2022, directing the Company to provide what measures Liberty has taken, or plans to take, to address certain reliability issues, the Company has identified reliability issues in the Bellows Falls area discussed further in this report, along with mitigation plans for 2022. The mitigation plans for 2022 are traditional wires solutions. The non-wires solution opportunities will be included in the Company's June 1, 2022, NWS Proposal Filing.

Reliability Issues Addressed in Report

- Outage counts
- Customer minutes interrupted
- Outage Causes

2022 Mitigation Plans

- Vegetation Management 12L2
- Reconductoring 12L2

Section 3: Problem Identification

Over 8% of Liberty's entire customer base is served from the 12L1 and 12L2 circuits, and these circuits account for approximately 68% of our Bellows Falls customers with the remaining 32% of the area customers being served by the 40L1 and 40L3 circuits. Although serving 8% of the Company's customer base, in 2021 the 12L1 and 12L2 circuits accounted for 20.87% of SAIFI and 40.86% of SAIDI system outage statistics, as provided in Table 5. The following table displays outage causes on the 12L1 and 12L2 for 2017 to 2021. The largest cause of outages for these circuits is vegetation-related, accounting for 62% of total incidents and 74% of total customer minutes interrupted (CMI).



Table 2 Outage Causes

<u>Incident Count</u>			<u>Customer Minutes Interrupted</u>		
Cause	12L1	12L2	Cause	12L1	12L2
Tree Fell	187	81	Tree Fell	4,234,376	2333193
Tree - Broken Limb	68	43	Tree - Broken Limb	952,467	340237
Animal	28	28	Vehicle	297,518	477952
Unknown	26	25	Device Failed	503,175	175361
Device Failed	30	16	Unknown	211,385	422053
Lightning	6	15	Deterioration	13,294	518573
Vehicle	11	8	Non-Company Activities	27,172	13248
Planned Outage	6	10	Insulation Failure - Cable	38,610	0
Deterioration	9	4	Animal	21,417	9851
Non-Company Activities	4	3	Lightning	2,002	24180
Vines	1	8	Planned Outage	4,963	3099
Tree Growth	1	1	Tree Growth	592	6336
Other Company Activities	1	0	Vines	410	0
Insulation Failure - Cable	1	0	Other Company Activities	1,014	0
Fire on Company Equip.	1	0	Fire on Company Equip.	374	0

The following table displays the Company's worst-performing circuits for the past five years. Note that the circuit statistics used for these measurements are a rolling five-year average (2017–2021), not individual year totals. As depicted in the table below, the 12L1 and 12L2 have been in the top five worst-performing circuits every year since 2018 with respect to CKAIDI (Circuit Average Interruption Duration Index). For CKAIFI (Circuit Average Interruption Frequency Index) the 12L1 and 12L2 have been in the top five worst-performing circuits numerous times over the last five years. The circuit labels in red denote that the circuit appeared the previous year, as well. A circuit on the worst-performing circuit list two years in a row is a "problem circuit," and three years in a row is a "chronic circuit." Both the 12L1 and 12L2 are chronic circuits for CKAIDI.



Table 3: Five Year Worst-Performing Circuits List

RANK	2017 WORST CKAIDI	2018 WORST CKAIDI	2019 WORST CKAIDI	2020 WORST CKAIDI	2021 WORST CKAIDI	2017 WORST CKAIFI	2018 WORST CKAIFI	2019 WORST CKAIFI	2020 WORST CKAIFI	2021 WORST CKAIFI
1	41-15H1	43-12L2	41-7L1	43-12L2	43-12L2	42-14L3	43-12L2	41-7L1	43-12L2	43-12L2
2	41-6L4	43-12L1	43-12L1	41-7L1	43-12L1	41-39L2	41-7L2	42-14L3	41-7L1	42-14L2
3	41-39L2	41-16L1	43-12L2	43-12L1	41-16L1	41-6L4	42-14L4	41-1L1	42-14L2	42-14L3
4	41-6L3	42-9L3	42-9L3	41-6L3	41-39L2	41-6L2	41-6L3	41-39L2	42-9L2	43-12L1
5	41-6L2	41-39L2	42-14L3	42-14L4	41-7L1	43-12L2	42-14L2	43-12L1	42-13L1	41-7L1

The table below is the current 2021 values for the worst-performing circuits. The 12L1 and 12L2 are on both CKAIDI and CKAIFI lists, and number one and two on CKAIDI by a wide margin. To give a full picture of the severity of this problem, the 12L2 circuit's CKAIDI is 363% of the Company's average circuit, and the 12L1 circuit's CKAIDI is 332% of the average circuit.

Table 4: 2021 Worst-Performing Circuits List CKAIDI and CKAIFI Values

RANK	2021		2021	
	Circuit	CKAIDI	Circuit	CKAIFI
1	43-12L2	415.86	43-12L2	1.91
2	43-12L1	379.89	42-14L2	1.36
3	41-16L1	181.09	42-14L3	1.34
4	41-39L2	171.04	43-12L1	1.31
5	41-7L1	170.13	41-7L1	1.29

The next table lists SAIDI and SAIFI from 2017 to 2021, as well as the combined contributions to those numbers from the 12L1 and 12L2. Though the 12L1 and 12L2 circuits account for 8% of Liberty's customer base, in the last five years they accounted for over 40% of SAIDI twice (2018 and 2021).

Table 5: Five Year SAIDI and SAIFI Values

Year	SAIDI	12L1 and 12L2 SAIDI	% of Total	SAIFI	12L1 and 12L2 SAIFI	% of Total
2017	117.74	23.56	20.01%	0.91	0.13	13.85%
2018	121.79	49.31	40.49%	0.74	0.11	15.04%
2019	70.66	18.59	26.31%	0.61	0.09	15.01%
2020	104.75	16.97	16.20%	0.85	0.11	12.89%
2021	114.46	46.76	40.86%	0.69	0.14	20.87%



Below are CKAIDI and CKAIFI tables for the 12L1 and 12L2. The dotted line shows the portion of the total value that was vegetation-related. Outages caused by fallen trees can be large contributors to CKAIDI due to the level of damage and the time it takes to remove the tree and make repairs. Note that the 4-year cycle circuit vegetation trimming was conducted on the 12L1 in 2018, and on the 12L2 in 2017. CKAIDI and CKAIFI on the 12L1 showed some improvements to tree-related outages after trim cycle was conducted. The 12L1 is a much larger circuit, with twice the customers as the 12L2. The 12L2 circuit has tree-resistant wire from the Vilas Bridge substation up to where it branches off to the three-phase branches to the south. The 12L1 still has pockets of bare wire on the main line and is more radial than the 12L2.

Table 6: Five Year CKAIDI 12L1 and 12L2

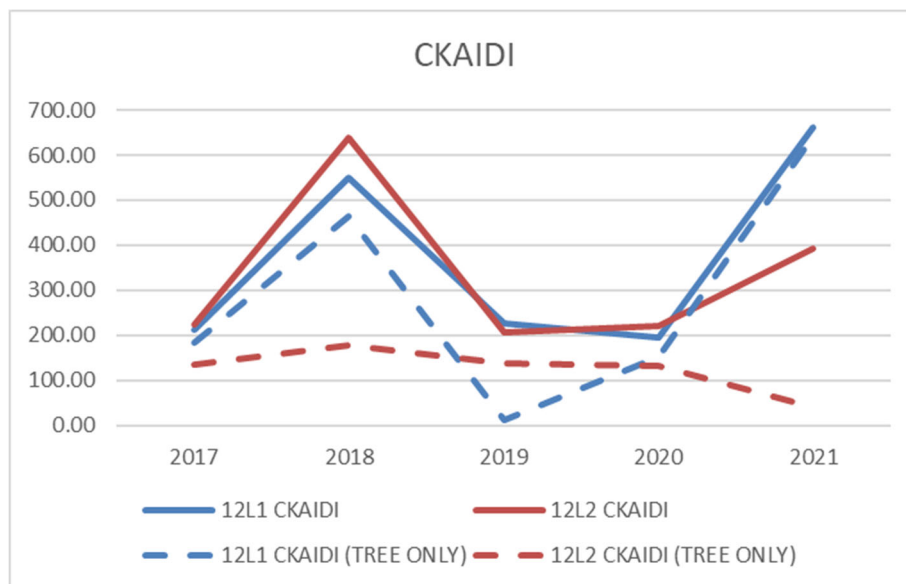
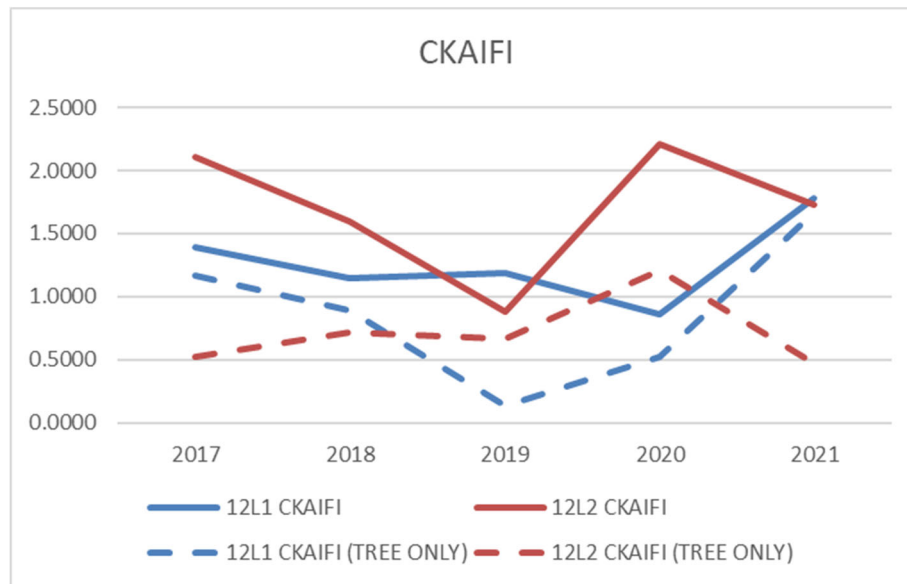


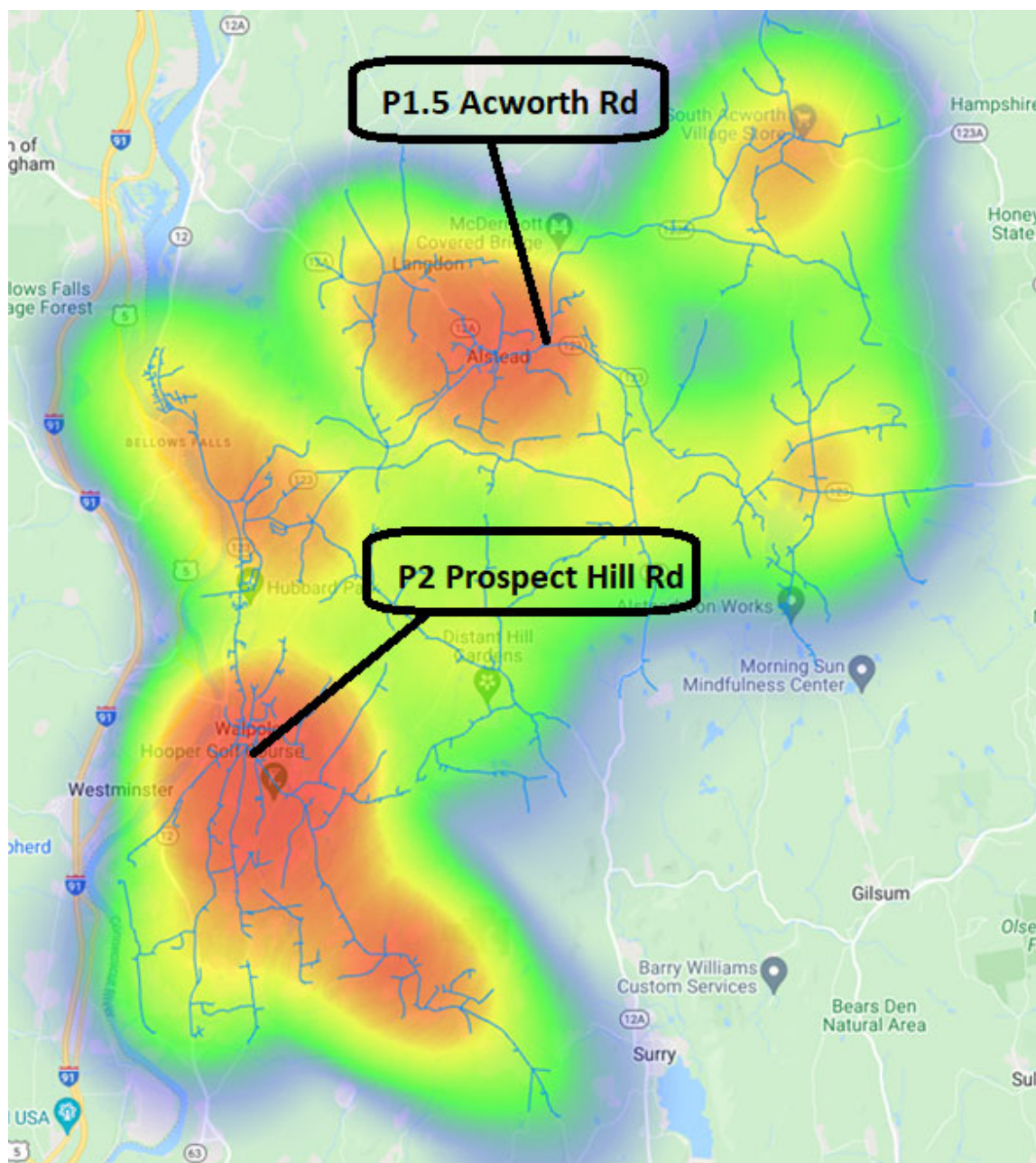
Table 7: Five Year CKAIDI 12L1 and 12L2



In the figure below, 2017 through 2021 outage data is plotted on a map utilizing the Hexagon platform that shows the pockets through a heatmap of poor performance in the Bellows Falls area. The heatmap below shows one large and dark pocket on 12L1 and one on the 12L2. The pocket on the 12L1 is fed from a pole top recloser at pole 1.5 Acworth Road., Alstead. The 12L2 area is fed from a pole top recloser at pole 2 Prospect Hill Road., Walpole. There have been multiple, and quite lengthy, outages at these two locations over the years. Both locations are radial and are still fed with bare primary conductor.



Figure 5: Five Year Outage Heatmap



Section 4: 2022 Mitigation

In 2022, the Company has two traditional solutions it is working toward to help mitigate the reliability issues in the Bellows Falls area. The first is the cycle trimming of the 12L2. This circuit is approximately 55 miles long and is the main focus of trimming for 2022.

The second traditional solution the Company is working towards in 2022 is reconductoring the 12L2. Bare mainline primary conductors are targeted for replacement with spacer cable. Spacer cable is installed in areas prone to tree outages that are too costly to rely on vegetation management practices alone to mitigate circuit lockouts. The application of spacer cable, a covered conductor resistant to tree-related outages, significantly improves mainline circuit performance during windy and stormy conditions as well as affording protection against incidental tree-conductor contact at the end of the trim cycle and contact resulting from branches falling from above the trim zone.

This project replaces primary overhead bare conductors with spacer cable in areas prone to tree contact. The scope of this strategy includes the replacement of at least 1.5 miles of bare wires on the 12L2 circuit along Watkins Hill Road in Walpole, which is considered a pocket of poor performance on this circuit.

Section 5: Conclusion

In conclusion, the Company has identified that the 12L1 and 12L2 circuits that serve the Bellows Falls area have low reliability, significant tree issues, and the inability to switch load during an outage due to the lack of circuit ties. As such, the Company is continuing to look at wires and non-wires solutions to address the reliability problems over the next 0–5 years.



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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-13

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

On Bates page 006 of the Report, it states that: “The Company has identified traditional wires solutions to mitigate the reliability issues in its plans for 2022, along with several NWS for future years.” Please clarify the meaning of this statement. Does this mean that the utility has adopted a piecemeal approach to the Bellows Falls issues? Has the Company considered making use of the US DOE recommendations concerning traceability in order to clearly identify the link between the immediate objectives, the technical requirements, and finally the optimal solutions that perhaps might serve to meet multiple objectives longer term?

RESPONSE:

The Company believes in a multi-faceted approach to solving the reliability issues in the Bellows Falls area. The Company is not aware of the US DOE recommendations concerning traceability and how the recommendations would be applied to analyze solutions to the reliability issues in the Bellows Falls area. The Company will consider utilizing US DOE recommendations concerning traceability and provide updated results should we move forward with that approach.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-14

Date of Response: 8/5/22
Respondent: Heather Tebbetts

REQUEST:

According to the statement on Bates page 006 of the Report: “Traditional wires solutions are focused on system reliability given the data presented in the Company’s May 2, 2022, report and, since they are wires solutions, there are no avoided costs associated with these projects.” Has Liberty performed cost-benefit studies for these three options, and has the Company identified the opportunity costs in each case as part of its evaluation?

RESPONSE:

Liberty has not performed a cost-benefit study for options 1 through 3 to determine avoided costs because these projects are traditional wires solutions.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-15

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

Would it be true to state that the Company was examining the options from a narrow single objective perspective as per the following on Bates page 006: “the Company did not analyze these cost reductions because the construction costs for solutions 5 and 6 are significantly higher than solutions 1 through 4.” Did the Company not consider solutions that were perhaps more expensive initially but enabled solution of multiple needs going forward?

RESPONSE:

Due to the cost of options 5 and 6 being double and quadruple the cost of the traditional wires solution, respectively, and the problem to be solved is reliability, not capacity, as described in RR 1-9, the full cost reductions related to capacity, energy, and transmission costs were not evaluated. The Company will continue to monitor the costs of these options for future consideration. The Company did not consider other solutions beyond the six options presented.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-16

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

Referring to the matrix on Table 3, Bates page 007, please explain the derivation of the risk values listed on the horizontal axis, and please explain the impact numbers of the vertical axis.

RESPONSE:

The risk values on the horizontal axis are derived from the frequency of outages per year(s). For instance, if the outages occur once a year or more, that is a 7, once every three to five years is a 5. The vertical axis values reference impact of the outage by considering values such as customers impacted or customer minutes impacted per event, and load at risk. Once these two values are realized, the Company can cross reference the matrix and find the reliability score.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-17

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

The Report on Bates page 007 states the following: “It does not address the need for a supplemental supply source to mitigate long-duration outages.” Does that mean that in fact the Company is seeking a solution for long duration outages and reliability? Would this suggest the need to consider the following: a standard solution approach or a portfolio solution approach or even a partnership solution approach? If so, please supply a copy of the system needs report and the NWA screening criteria.

RESPONSE:

Liberty’s proposed solution is intended to address long duration outages and improve reliability. The Bellows Falls main reliability issues originate from vegetation-related outages.

To reduce customer outages, Liberty is proposing a multifaceted approach. The Company utilizes a vegetation management program that regularly trims circuits on a four-year cycle. Liberty is also proposing to install tree-resistant wire. The final component of Liberty’s multifaceted approach is to install an infrastructure tie, which will provide Liberty a second source to feed customers and reduce outage times currently experienced on a radial circuit. Liberty included a “Grid Needs Assessment” as part of the January 14, 2021, LCIRP filing beginning on Bates 065. That assessment identified future needs in the Bellows Falls area. A further assessment of the Bellows Falls area was provided in the May 2, 2022, Bellows Falls Reliability Report filed in this docket. Finally, an analysis of solutions to address reliability in the Bellows Falls area, including NWS options, was provided in the June 2, 2022, Report on Wires and NonWire Solutions to Address Reliability in the Bellows Falls Area. The NWS screening criteria and evaluation of options utilized DAS-016, Guidelines for Analysis of Non-Wires Solutions found in Appendix D on Bates 313 of the LCIRP.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-18

Date of Response: 8/5/22
Respondent: Heather Tebbetts

REQUEST:

At the bottom of Bates page 007 of the Report, there is an analysis of the benefits of the circuit tie (line extension) relative to battery storage. Comparing Acworth Rd Tie line vs BTM Storage, it is clear that the costs are comparable at \$4.5 million approx. The Report makes clear that for the battery option the utility avoids the circuit tie costs, lower transmission costs are possible by dispatching battery power during peak shaving and that by charging during low energy costs and dispatching during high demands further savings may be possible. However, absent clear parameters required for the NWA options, it is difficult to determine whether any of the battery options would have the means to address a long outage. Please define the technical parameters required of the batteries.

RESPONSE:

The BTM storage option is based on Liberty's current residential battery pilot program. These batteries have a storage capacity to provide a supplemental source of power to the home for approximately 24–48 hours. The only technical parameters of the batteries that the Company has identified are the capacity and energy. Liberty does not have any further technical parameters for the batteries in the BTM Solution #3 at this time. If this battery solution is the least cost in the future, the Company will look to its current BTM program as a starting point for determining the technical parameters required of the batteries.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-19

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

Referring to Bates page 009 of the Report, the risk score associated with the first Solution #1 proposed project is 24. Please explain in detail how this is derived.

RESPONSE:

Reference the Risk Calculation Matrix on Bates 007. The customers affected by Solution #1 experienced outages ">Once in 1 yr," which gave a Likelihood score of 7. The average customer minutes interrupted (CMI) per outage was 28,549, which scores an Impact score of 2. Cross-referencing these two figures in the reliability matrix reveals a project score of 24.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-20

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

On Bates page 009 of the Report is Table 4. Please clarify the difference between No exclusion and Puc 307.07 Exclusion and derive the data provided.

RESPONSE:

In the report, the Company created tables to show each project's impact on outage frequency and duration, as well as a dollar value per change in customers interrupted and customer minutes interrupted. Using Puc 307.09(c), which excludes major event days, the Company also excludes Police/Fire request, customer-owned service outages, loss of supply, load shed, and planned outages from reliability statistics. The Company calculated only outages that are not excludable under PUC criteria. Under the "No Exclusion" column the Company totaled all outages regardless of possible exclusion to convey the full impact each project would have from a customer's perspective.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-21

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

Referring to Bates Page 010, Table 5, please indicate how the table is derived and how the risk score of 30 is determined.

RESPONSE:

Reference the Risk Calculation Matrix on Bates 007. The customers affected by Solution #2 experienced outages ">Once in 1 yr," which gave a Likelihood score of 7. The average customer minutes interrupted (CMI) per outage was 98,749, which scores an Impact score of 4. Cross-referencing these two figures in the reliability matrix reveals a project score of 37. The score of 30 was incorrect, this value should say 37.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-22

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

On Bates page 011, Solution #3, the Report states that “This tie not only is in the optimum location for both circuits but puts 3-phase primary throughout a much larger area which would give more opportunities for future distributed generation interconnection.” Why is the location optimal and why are more opportunities made available for distributed generation interconnection? Is this a desirable feature? If so, why not be considered as a fundamental requirement for provisioning?

RESPONSE:

The location of the proposed circuit tie is optimal because it is located downstream of two reclosers on the 12L1 and one recloser on the 12L2. This option encompasses multiple zones of protection and gives the most flexibility in regard to planned and emergency switching, restoration, as well as automation. The 12L1 and 12L2 circuits are radial except for a single front-end circuit tie with one another and are largely single phase. For the amount of territory these circuits encompass there is limited space for three-phase distributed generation interconnection as presently constructed. The addition of nine miles of three-phase creates more opportunity for distributed generation and is a secondary benefit for this option but is not the primary driver of such a project.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-23

Date of Response: 8/5/22
Respondent: Michael Cooper

REQUEST:

By reference to the tables 9-12 on Bates page 014 and onward, please explain in each case the origin of the evaluation criteria used and the determination of the weight factor.

RESPONSE:

In order to integrate NWS into the day-to-day planning process, the NWS Risk Assessment Evaluation process was designed to be a qualitative comparison of each NWS alternative.

The qualitative risk ranking approach, associated criteria used to evaluate the proposed solutions assesses reliability, feasibility, performance and environmental risk, and factor weighting approach originated from an effort between Liberty's engineering team and Liberty's consultant, CMG, to create a formal quantifiable approach to evaluating projects based on a holistic risk assessment analysis. The team analyzed each criterion and assigned a ranking based on experience. The workbook beginning on Bates 319 of the LCIRP in Appendix D is the result of this risk ranking process.

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NHPUC Record Requests - Set 1

Date Request Received: 7/15/22
Request No. RR 1-24

Date of Response: 8/5/22
Respondent: Heather Tebbetts

REQUEST:

On Bates page 016 of the Report, one finds the following: “Many would also create economic benefits by reducing the Company’s cost to operate the electric system on customers’ behalf. Those benefits have not been evaluated for this report and cannot be known with certainty at this time.” Is it not true that a full evaluation of the options would not only consider cost and increased reliability benefits but would also evaluate the additional benefits in terms of lower operating costs of the system, easier automation and controls etc.? Why did the analysis not look more broadly at each option from the perspective of the universe of possible outcomes and the additivity each solution would bring in the short and long run?

RESPONSE:

It is true that a full evaluation of the options would consider cost, increased reliability, and any additional benefits over time. The Company did not consider further items in its evaluation because these are proposals of options at this time. The Company will continue to evaluate options to address reliability in the Bellows Falls area, particularly after the near-term trimming is performed on the circuits, and will analyze each option more broadly.