PAPUC

REVIEW OF THE RELIABILITY OF THE METROPOLITAN EDISON COMPANY'S LYNNVILLE CIRCUIT

BUREAU OF TECHNICAL UTILITY SERVICES

OCTOBER 2023

Attachment

Table of Contents:

Section I: Introduction

Purpose

The purpose of this report is to summarize the findings of the Public Utility Commission's (Commission) Bureau of Technical Utility Services' (TUS) review into reliability improvement efforts by the Metropolitan Edison Company (Met-Ed) on the Lynnville 00737-1 12kv line (Lynnville Circuit). Met-Ed is a Commission-jurisdictional electric distribution company (EDC). This report was prepared pursuant to the Commission Order entered March 15, 2023 (March Order).[1] The March Order directed TUS to review the outages on the Lynnville Circuit, including those caused by off-right-of-way trees, and to issue a report within nine months of entry of the March Order. The report was to provide any findings or recommendations for improving the electric distribution service rendered to the Complainants noted in the March Order.

Background

TUS notes that the Lynnville Circuit has appeared on the list of worst-performing 5% of circuits (WPCs), as identified by Met-Ed in its quarterly reliability reports, in multiple quarters in 2022, 2021, 2020, 2017, and 2016.[2] Met-Ed submitted documentation of 46 power outages at the Complainants' service addresses from January 2018 through September 2022. Of the 46 outages, four were caused by line or equipment failure, four were caused by unknown reasons, two were caused by right-of-way trees, 35 were caused by off right-of-way (OROW) trees, and one was a forced outage.[3]

The TUS Electric Reliability Engineer, Harry Bidelspach (TUS Engineer), made two field trips to the Lynnville Circuit area to review the line conditions and ascertain the pertinent facts.

The first field trip was conducted on March 24, 2023. The TUS Engineer took photos, which are attached as Appendix A. Please note that the captions above each photo in Appendix A contain important information. As noted in Section II below, the Lynnville Circuit is in a heavily wooded area and has been in service for multiple decades with some equipment appearing to be at or past its useful life. The area that the Linville Circuit is located in is largely

[1] *See, Thomas & Elizabeth Bierkamp, et al., v. Metropolitan Edison Company*, at Docket Nos. C-2019-3015097, et al.
[2] Large EDCs (those with 100,000 or more customers) must report detailed reliability information on the worst performing 5% of the circuits in the EDC's system. *See,* 52 Pa. Code § § 57.195(e)(3)-(4).
[3] The September 14, 2022, transcript exhibits at Docket No. C-2019-3015097 contained detailed information on the outages.

wooded and the Linville Circuit has many line sections in difficult-to-access terrain, i.e., the poles and conductors are located in a right-of-way (ROW) that is not easily accessible from the nearest state or local road. The TUS Engineer determined that vegetation management within the ROW appears to be for the most part in accordance with Met-Ed's Vegetation Management policies. However, those policies allow for branches to overhang conductors in certain circumstances. Met-Ed's tree trimming specifications allow for overhang for lower-voltage conductors with the branches trimmed at least 10 feet from the conductors. See, for example, Figures 6, 7, and 9 in Appendix A, and Figure 11 in Appendix B. The TUS Engineer noted that the wooded conditions along Sousley Road, with the allowable vegetation overhang, could present potential issues due to the overhanging limbs from the OROW trees that can easily be broken off and fall onto lines.

The second field trip to the Lynnville Circuit by the TUS Engineer was conducted on May 16, 2023, and was in coordination with representatives from Met-Ed. The inspection included questions and answers as well as a "Ride-A-Long" during which sections of the Lynnville Circuit were viewed. Met-Ed engineering staff noted that the difficult terrain and the relatively small number of customers served by the Lynnville Circuit sections in those remote areas may make any significant upgrades or relocations problematic in terms of a cost-benefit calculation.

Met-Ed shared information about FirstEnergy Transmission Department upgrades to the transmission line that supplies the Lynnville Substation and possible implications to the Lynnville Circuit.[4] However, it was reiterated by Met-Ed staff that moving line sections from OROW to accessible locations is in some locations is nearly impossible and in others very cost prohibitive.

Section II: Findings

After investigation of the complaints, review of available information, and the two site visits to the area in question, including one with Met-Ed personnel, the TUS Engineer has determined that:

1. Met-Ed has made substantial efforts to improve service reliability to the Lynnville Circuit and specifically the line section(s) impacting the Complainants. The following improvements to the Lynnville Circuit were verified by the TUS Engineer:

    a. Vegetation management has been conducted in accordance with the schedule specified within Met-Ed's Biennial Inspection, and Maintenance Plans (I&M Plans). The applicable I&M Plans were those covering the following time periods: January 1, 2021, through December 31, 2022, and January 1, 2023 through December 31, 2024.[5]

[4] The other FirstEnergy Companies are Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company.
[5] All EDC I&M Plans can be found at Docket No. M-2009-2094773.

b. Met-Ed has added several switches at strategic locations along the Lynnville Circuit with the intention of reducing the impact of interruptions to the Lynnville Circuit and customers, specifically those located along the Sousley Road tap.

c. It was observed that there were several recent pole replacements made along the Lynnville Circuit.

d. Recent switch additions are of Vacuum Circuit Recloser-style construction and most contain controls and interfaces for remote operations and or monitoring. The addition of "Trip Saver-Style devices" was also noted.

e. Met-Ed is continuing efforts to improve the service on the Lynnville Circuit by adhering to the I&M Plan currently in effect. Met-Ed is conducting circuit upgrades and pole replacements as identified.

2. The Lynnville Circuit is in a rural area that serves a mostly wooded area with some agricultural land. The initial section of the Lynnville Circuit from the Lynnville substation and for several miles runs concurrently with the 69kV line that serves the Lynnville Distribution substation and the right-of-way is very well maintained and free of vegetation. This portion of the Lynnville Circuit, while located off of the roadway, appears to be assessable with little to moderate efforts. Since the line is collinear with the 69kV substation supply, it is robustly constructed and should be less affected by normal weather issues. During the May 16, 2023 field trip, Met-Ed staff noted that in addition to these attributes, that 69kV line is under planning and scheduled to be rebuilt soon.

3. The Lynnville Circuit can be served (fed) via two alternatives. What appears to be the primary feed is a tie located near the Lynnville Substation. The feed is a tie switch near the southwest end of the Lynnville Circuit from a distribution circuit out of the Hamburg Substation. The choices concerning the use of these alternate sources are highly dependent on the time of year and loading considerations. The possibility of splitting the Lynnville Circuit during those times and conditions is of course a solution to any outage occurrence as determined by Met-Ed operations. The addition of sectionalizing devices has improved use of these restoration methods.

4. It appears that, based on the age of the infrastructure on the Lynnville Circuit and the previous installation design philosophy, much of the primary circuit is located a significant distance from accessible roadways, including the primary 3-phase line section as well as 2-phase and single-phase line sections. The Lynnville Circuit appears to be quite old and much of it may well have been constructed during the 1940s, 1950s and 1960s, and thus many of the poles of that vintage are possibly chestnut wood. TUS found that the poles showed extreme signs of their age externally. However, the poles should maintain sufficient strength, as American Chestnut wood tends to resist internal decay better than most other varieties and is often considered on par with cedar and redwood varieties. While American Chestnut

poles are exceptionally durable, they do fall victim to insect attack, which is often quite visible and easily detected with today's pole inspection techniques. In accordance with this, Met-Ed has shown great progress in inspection, remediation, and replacement of poles as evidenced in its most recent Annual Asset Optimization Plan (AAOP).[6]

5. There are several sections of the Lynnville Circuit that are operated at 4.8kV and served via stepdown transformers. Several of these transformers are newer pad-mount variety, while many are pole-top mounted. It is noted that 4.8kV delta systems sometimes have difficulty in obtaining proper fault clearing. Thus, some of these issues may be seen by those line sections operating at 4.8kV on the Lynnville Circuit's Sousley Road Tap.

Section III: Recommendations

1. TUS notes that, as with any distribution circuit identified as a WPC, Met-Ed should continue to focus its efforts on reducing customer outages and improving the Lynnville Circuit's reliability. Met-Ed's end goal should be removing the Lynnville Circuit from the WPC list.

2. While the topography of the area serviced by the Lynnville Circuit line cannot be changed, increased effort and utilization of Met-Ed's Long-Term Infrastructure Improvement Plan (LTIIP) funding can be applied to add additional sectionalizing, further upgrade circuit switches, voltage enhancement and equipment automation where identified opportunities exist.

3. Wherever possible, relocation of lines from relatively inaccessible areas should be identified and pursued. This issue was discussed during the second site visit with Met-Ed personnel. Such efforts could be added to LTIIP projects. In accordance with this effort, TUS recommends that Met-Ed study the feasibility of relocating the Sousley Road Tap to a near-roadway location. TUS believes this could be justified under LTIIP projects and that relocation of that section of line could also shorten line length, eliminate some poles, and reduce exposure.

[6] AAOPs are required for EDCs that have an approved Distribution System Improvement Charge (DSIC), pursuant to 52 Pa. Code § 121.6 and must detail the actual DSIC-eligible infrastructure replaced or upgraded in the past year, as well as a projection for the infrastructure replacements for the next year. In order for an EDC to have a DSIC, it must have a Commission-approved Long-Term Infrastructure Improvement Plan (LTIIP), which details the eligible assets for improvement and/or replacement and the schedule for improvement/replacement, among other requirements. Met-Ed's current LTIIP was approved by a Commission Order entered January 16, 2020, at Docket No. P-2019-3012618. Pursuant to a May 18, 2020, Commission Secretarial Letter at Docket No. M-2009-2094773, Met-Ed in its AAOPs reports on the status of its pole replacements and improvements, and on the status of Met-Ed's backlog of pole replacements and repairs.

4. If relocation of main line sections from areas well off of the roadways is not feasible, and hence circuit section must remain difficult to access, then TUS recommends use of LTIIP funding to perform storm-hardening improvements on those line sections.

5. TUS recommends that Met-Ed review its Vegetation Management policies to consider including trimming specifications that eliminate overhang of vegetation, especially in areas prone to canopy tree coverage. TUS further encourages Met-Ed and other FirstEnergy companies to consider increasing Vegetation Management funding and efforts.

Section IV: Conclusion

It is believed that, based on the Met-Ed completed and planned reliability improvements for the Lynnville Circuit, the Complainants should experience a significant reduction in the number of service interruptions. The Complainants, however, should document any pertinent information connected to future outages dates, times, their actions and any observed Met-Ed actions and responses. Such information should be held until the complainants are satisfied that reasonable and continued efforts have been made by Met-Ed to reduce the number of outages. TUS will direct Met-Ed to provide annual updates on the performance of the Lynnville Circuit for at least the next three calendar years.

TUS notes that the very nature of an electric distribution circuit design will lend itself to momentary and sometimes extended outages. Also, given the topography of the area served by the Lynnville Circuit, it would be unrealistic to expect service free of momentary interruptions and occasional extended permanent outages. With this information in mind, it would be difficult for TUS to establish any numerical value of outages that should be expected by the customers.

TUS expects that the Lynnville Circuit should soon no longer appear on the WPC list. TUS expects Met-Ed to continue vegetation management in accordance with its criteria established within the stated I&M program and specifically its stated vegetation management program. In addition, TUS expects Met-Ed to pay particular attention to any future reported momentary outages and permanent outages that may indicate additional vegetation management efforts are needed and act upon those indicators.

TUS recommends utilization of LTIIP funds by Met-Ed, to remove circuit vulnerabilities caused by inaccessible right of way conditions and, wherever identified as feasible, relocate circuits to more accessible locations. TUS also recommends that Met-Ed increase storm hardening of existing circuit sections and especially those that may remain in inaccessible locations.

Appendix A

Figure 1: Single phase primary along Sousley Road. Note the tall, overhanging limbs from OROW trees.

Figure 2: Three-phase OROW line section of 737-1 12kV. Note the floor vegetation and difficult access.

Figure 3: Lynnville 737-1 12kV. Note the difficult terrain and adequate trimming.

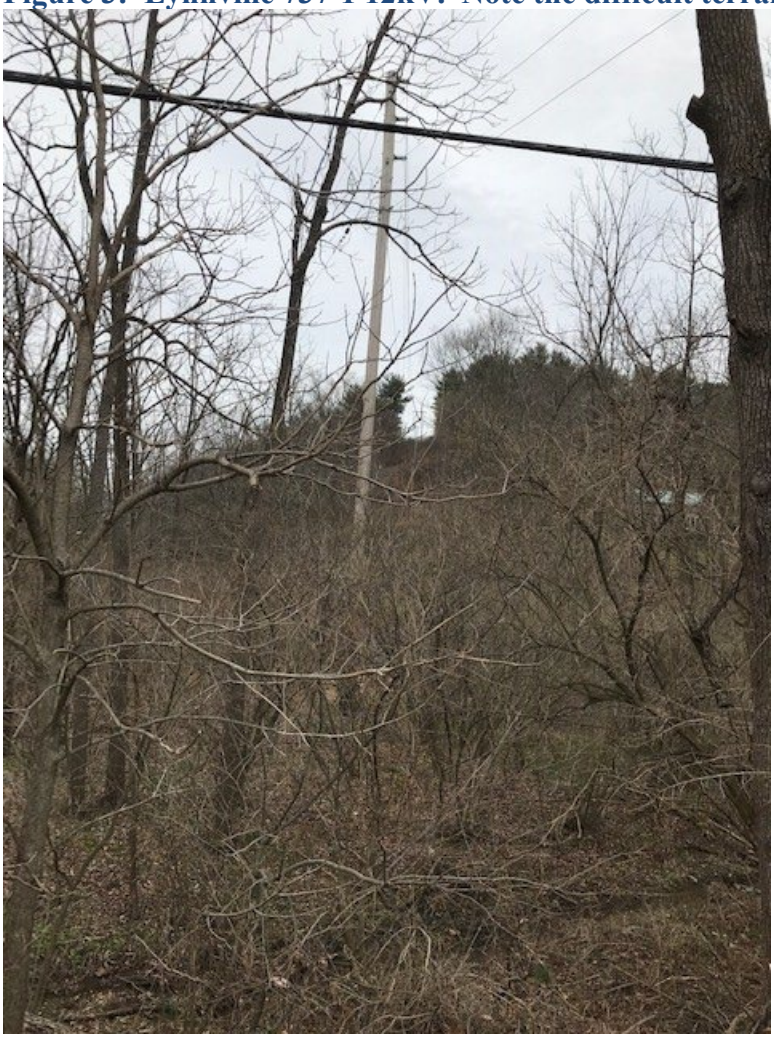


Figure 4: Lynnville 737-1 12kV OROW with adequate tree trimming.

Figure 5: Single-phase tap off of the two-phase tap that serves Sousley Rd. Note the two-phase location is South of Sousley Rd and predominantly forested and inaccessible.

Figure 6: Sousley Rd looking West. Note the very tall canopy trees and overhanging limbs. This area is trimmed in accordance with Met-Ed's Vegetation Management Policy, but over-hanging limbs are a possible issue.

Figure 7: Another view of Sousley Road looking West. Better view of situation.

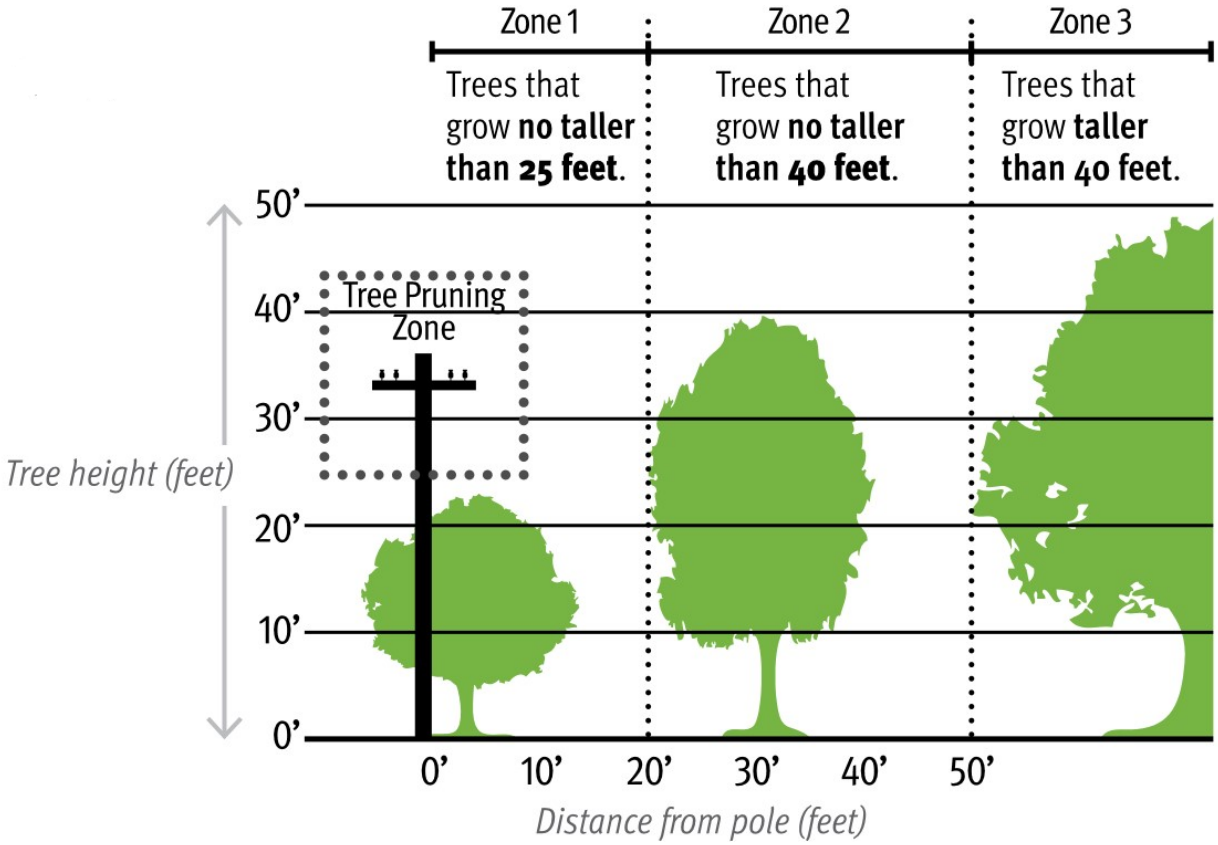
Figure 8: Sub-Transmission line that supplies the Lynnville Sub. Very good vegetation management.

Figure 9: Example of Met-Ed vegetation management near the tap for Sousley Road. Refer to Figure 11 in Appendix B for context.

Figure 10: Dual Circuit line section near the Lynnville Sub. The Sub Transmission Feeder in on the left and the Lynnville 737-1 12kV line is on the right. Note very well-maintained line tree trimming.

Appendix B

Figure 11: Met-Ed vegetation Planting Guide showing on left its pruning guide.



Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120
www.puc.pa.gov