

2022 Electric System Reliability Performance Report

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Executive Summary

This report describes the Snohomish County PUD's (District) electric system reliability from January 1, 2022, through December 31, 2022.

In February of 2017, the District retired the legacy Outage Reporting System (ORS) as the system of record when the new Outage Management System (OMS) was put into service. In conjunction with the adoption of OMS as the system of record, several significant changes occurred.

The number of outages recorded in 2017 and beyond increased as compared to previous years because outage records are automatically generated in OMS, rather than the manual process required by ORS. IEEE recognizes this phenomenon as typical and provides a calculation method for an 'uplift factor', described in IEEE Standard 1782, as a means of allowing a more accurate comparison of records prior to an OMS implementation, to post-OMS data. This 'uplift factor' has been applied to the data prior to OMS data. This will be the last year where the 'uplift factor' is used as in 2023 the previous five year data will be post 2017. Appendix C provides additional data on historical performance without the uplift factor applied.

Before OMS, manually tracking outages in ORS was suspended during declared major events, and high-level estimates of outages were used. Because of the ability to record all outages in OMS, the District has adopted the IEEE defined term, Major Event Day (MED). This allows outages occurring during non-routine conditions to be differentiated from daily operations. MEDs are defined in IEEE Guideline 1366 "Guide for Electric Power Distribution Reliability Indices."

In addition to tracking outages during non-routine conditions, the District now tracks planned outages, although neither planned outages nor those occurring on MEDs will be included in the District's SAIDI, SAIFI and CAIDI system indices, and are listed separately. This will allow these reliability indices to reflect reliability experienced under routine conditions to better reveal trends in daily operation, which could be skewed by major events or construction.

District customers lost power for an average of 137.7 minutes (SAIDI) in 2022 during routine operation. This is higher than the adjusted five-year average of 115.0 minutes. The average length of time required to restore power after an outage was 120.3 minutes (CAIDI) in 2022 during routine operation. This is higher than the adjusted five-year average of 102.2 minutes. District customers lost power an average of 1.14 times (SAIFI) in 2022 during routine operation. This is higher than the adjusted five-year average of 1.13 interruptions.

There were eight MEDs for the year, which occurred on February 21, November 04, November 05, November 06, November 07, November 08, November 29, and November 30.

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1 Background

1.1 Introduction

Understanding the causes of outages and developing methods or programs to reduce their rate of occurrence are two of the most important goals in the operation of any electric utility. This report identifies the causes of the outages in 2022 and their impacts on system reliability.

The District receives power from the Bonneville Power Administration (BPA) at three delivery points, the BPA Murray, SnoKing, and Snohomish substations. Transmission lines from those substations deliver power at 115 kV to 92 substations and switching stations in the District's service area. A typical distribution substation has four 12.47 kV circuits and serves an average of 4,000 customers. The District's service territory includes long circuits in the eastern and northern areas of the county, with high tree exposure through rural areas. These circuits experience relatively more outages. The urban and suburban areas in Everett and the south county area typically have shorter circuits and fewer outages.

1.2 Statistical indicators used

The District measures electric system reliability using indices defined by the Institute of Electrical and Electronics Engineers (IEEE). The definitions come from the current revision of IEEE Standard 1366- IEEE Guide for Electric Power Distribution Reliability Indices. The standard defines these indices as "sustained interruption indices," meaning a loss of service to one or more customers for more than five minutes. At present, the District defines an outage as a loss of service for one or more minutes.

SAIDI (System Average Interruption Duration Index)

This index measures the total duration of interruption for the average customer during a predefined period of time. It is commonly measured in customer minutes of interruption. Mathematically, this is calculated using the following equation:

$$\text{SAIDI} = \frac{\sum \text{Customer Interruption Durations}}{\text{Total Number of Customers Served}}$$

SAIDI can be calculated for any defined set of customers, such as all customers served from a specific circuit, all customers served from a specific substation, or for all District customers.

CAIDI (Customer Average Interruption Duration Index)

This index represents the average time required to restore service to customers after an interruption. Mathematically, this is calculated using the following equation:

$$\text{CAIDI} = \frac{\sum \text{Customer Interruption Durations}}{\text{Total Number of Customers Interrupted}}$$

CAIDI can also be calculated for any defined set of customers.

SAIFI (System Average Interruption Frequency Index)

This index indicates how often the average customer experiences a sustained interruption over a predefined period of time. Mathematically, this is calculated using the following equation:

$$\text{SAIFI} = \frac{\sum \text{Total Number of Customers Interrupted}}{\text{Total Number of Customers Served}}$$

Similar to SAIDI and CAIDI, SAIFI can be calculated for any defined set of customers.

MED (Major Event Day)

A Major Event Day is used to define a 24-hour period during which SAIDI exceeds a threshold, separating these statistics from those for typical day-to-day operations. This will prevent exceptional days from skewing statistics, allowing reliability analysis to be based on typical days. At the District, MEDs typically occur on snow or wind related days, causing significant tree related outages. The SAIDI threshold to distinguish a day as a MED is calculated using the equation:

$$\text{MED} = e^{(\alpha + 2.5\beta)}$$

Where α is the average of the logarithms of the daily non-zero SAIDI and β is the log-standard deviation of the daily SAIDI.

In 2022 the SAIDI threshold to distinguish a day as MED was found to be 13.23.

1.3 Record-keeping

Until February 2017, the District used a computerized Outage Reporting System (ORS) to manually record information on outages occurring during routine operations. The District's practice was not to record outages that occurred during major events. This was done to alleviate the need for time spent recording outages, so that efforts could be focused on restoration.

Starting in February 2017, the District switched to using an Outage Management System (OMS). OMS automatically creates outage records based on customer calls, prediction rules, and switching operations regardless of a major event, on all days of the year. The purpose of this change is to be more consistent and comprehensive in outage information recording. The effect of implementing this new system has been an increase in recorded SAIDI and SAIFI, as all customer outages are now accounted for automatically.

1.4 Change in record-keeping during non-routine operations

The District no longer excludes outages during major events from reliability calculations. Moving forward the MED threshold will be used to determine which outages are excluded from routine-operation statistics. MEDs will be included in their own category for record keeping.

2 System Reliability Statistics

2.1 Data for 2022

The tables below show the statistical data for outages in 2022, as well as average data for the five previous years. Refer to Section 1 for definitions of the terms SAIDI, CAIDI, and SAIFI.

The 2022 system SAIDI, CAIDI, and SAIFI values were higher than the five-year averages. There were eight MEDs in 2022. Outages that occurred during a MED, prearranged/planned outages, and outages caused by another utility were excluded from these numbers but are shown in their own row for reference.

Table 2-1: General Descriptive Data

Year	2022
System Customers	378,339
Area Served	2,200 square miles

Table 2-2: Outage Data for 2022

(Sustained Outage > 1 Minute)

	SAIDI	CAIDI	SAIFI	Customer Outages
Distribution	133.5	130.4	1.02	387,436
Transmission	4.2	35.0	0.12	45,526
Overall	137.7	120.3	1.14	432,962
Planned, MED, or External	866.4	735.6	1.18	445,621
Total	1004.1	432.4	2.32	878,583

Table 2-3: Five-Year Average Annual Outage Data for the Period 2017-2021 (Non-Adjusted)

(Sustained Outage > 1 Minute)

	SAIDI	CAIDI	SAIFI	Customer Outages
Distribution	104.0	105.5	0.99	357,839
Transmission	9.4	74.1	0.13	45,897
Overall	113.4	101.9	1.11	403,736
Planned, MED, or External	180.1	340.7	0.53	191,834
Total	293.5	178.8	1.64	595,570

Table 2-4: Five-Year Average Annual Outage Data for the Period 2017-2021 (Adjusted)

(Sustained Outage > 1 Minute)

	SAIDI	CAIDI	SAIFI	Customer Outages
Distribution	105.3	105.7	1.0	361,612
Transmission	9.6	74.9	0.13	46,428
Overall	114.9	102.2	1.12	408,040
Planned, MED, or External	180.1	340.7	0.53	191,834
Total	295	178.4	1.65	599,873

2.2 Effect of Major Event Days on the District

MEDs are days in which the daily system SAIDI exceeds a calculated threshold. These are independent of declared major events, which had been used in the past to separate extreme outage days. MEDs are identified to allow study of the system's daily operation, without being influenced by a few large events.

Beginning in 2017, the District implemented OMS, which captures all outage information, including Major Event Days. In 2022 the SAIDI threshold to distinguish a day as MED was found to be 13.23.

Table 2-5: Five-Year 2022 Major Event Days

Date	SAIDI	SAIFI	CAIDI
2022-02-21	17.6	0.05	327.6
2022-11-04	529	0.62	857.9
2022-11-05	107.7	0.09	1220.3
2022-11-06	51.1	0.04	1252.8
2022-11-07	16.2	0.02	749.4
2022-11-08	22	0.01	1991.7
2022-11-29	98.5	0.28	351.1
2022-11-30	18	0.04	493.4

3 The Transmission System

3.1 Introduction

A transmission outage is the operation of a 230 kV or 115 kV protective device that opens a circuit switcher or power circuit breaker due to a faulted transmission circuit element.

3.2 Outages

Of the twenty-eight (28) transmission system operations in 2022:

- Nine (9) resulted in sustained outages to District customers, which caused about thirty-two (32) million customer minutes of interruption (CMI). There were four (4) fewer line operations and about four (4) million less CMI than in 2021.
- The Jackson North Loop outage on September 03, 2022, with a CMI of about twenty five (25) thousand, was the only line trip with customer outages which occurred on a non-Major Event Day (MED). In 2021, there were five (5) more CMI outages on non-MED and about a million and half more CMIs than in 2022.
- November 04, 2022, a major event day, accounted for about 65% of the outages and 85% of all transmission CMIs in 2022.
- Automatic switching schemes operated in seventeen (17) of the transmission line operations, ten (10) of which were temporary and seven (7) were permanent faults. Of the seven (7) permanent faults where the line was auto-sectionalized, the total transmission CMI was reduced in five (5) cases. The permanent fault on the Delta-Stimson Crossing (D-SC) line trip #2 and Beverly Park-Paine Field Line on 11/04/22 are the two instances where the auto-sectionalizing scheme was not in service. For Delta-Stimson Crossing (D-SC) line trip #2, at the time of the event the auto-sectionalizing scheme at Quil Ceda substation had already transferred during the Delta-Stimson Crossing (D-SC) line trip #1 and for Beverly Park-Paine Field Line, the auto-sectionalizing scheme at Harbour Pointe was out of service at the time of the event due to the ongoing Bank 1 transformer and switchgear replacement project.
- Half of the line trips (14) were caused by trees and/or tree branches faulting the transmission line element. The cause of (13) outages was unknown, and one (1) event was caused by an airplane.

Table 3-1 provides the cause and Transmission CMI for each transmission line or substation automatic outage during 2022.

Table 3-1: Transmission Outages

Outage Number	Date	Line or Device	Substation(s)	Cause	CMI
1	01/03/2022	BPA Snohomish-Jackson (South) Line Trip	SNPD Snohomish, West Monroe, Woods Creek, Sultan, Wallace River, Goldbar	Tree	Momentary
2	01/06/2022	Swamp Creek-Brightwater Line Trip	Turner's Corner, York, Floral Hills	Tree	Momentary
3	03/07/2022	Delta-Stimson Crossing (D-M) Line Trip	North Marysville, Kellogg Marsh, Central Marysville	Unknown	Momentary
4	03/12/2022	Stimson Crossing-Camano Line Trip	Twin City, North Stanwood, North Camano, Sunset, South Camano	Unknown	Momentary
5	06/03/2022	Jackson South Loop Trip	SNPD Snohomish, West Monroe, Woods Creek, Sultan, Wallace River, Goldbar	Unknown	Momentary
6	07/19/2022	Brightwater-Snoking Line Trip	Park Ridge	Plane	Momentary
7	09/03/2022	Jackson North Loop Trip	<u>Momentary:</u> Lake Chaplain <u>Sustained:</u> Three Lakes	Tree	25,860
8	09/26/2022	Snoking-Swamp Creek Line (SK-SC) Trip	No tapped loads	Tree	NA
9	11/04/2022	Delta-Stimson Crossing (D-SC) Line Trip #1	Tulalip, Village, Quil Ceda	Unknown	Momentary
10	11/04/2022	Delta-Stimson Crossing (D-SC) Line Trip #2	<u>Sustained:</u> Tulalip, Village, Quil Ceda	Tree	3,090,713
11	11/04/2022	East Arlington-Oso Line Trip	<u>Sustained:</u> Oso	Tree	604,332
12	11/04/2022	Stimson Crossing-Camano Line Trip	<u>Momentary:</u> Twin City, North Stanwood <u>Sustained:</u> North Camano, Sunset, South Camano	Tree	10,568,235
13	11/04/2022	Lake Goodwin-North Stanwood Line Trip #1	No tapped loads	Unknown	N/A
14	11/04/2022	Lake Goodwin-North Stanwood Line Trip #2	No tapped loads	Tree	N/A
15	11/04/2022	Beverly Park-Paine Field Line Trip	<u>Momentary:</u> Casino, Picnic Point <u>Sustained:</u> Harbour Pointe, Mukilteo	Tree	11,012,195
16	11/04/2022	East Arlington-Stimson Crossing Line Trip	<u>Momentary:</u> Portage, Lake Goodwin <u>Sustained:</u> Eagle Creek Bank 2	Unknown	491,152
17	11/04/2022	BPA Murray-East Arlington Line Trip	No tapped loads	Unknown	NA
18	11/04/2022	Swamp Creek-Beverly Park (BP-SC) Line Trip	Polaris, Martha Lake, Mariner, Silver Lake	Unknown	Momentary
19	11/04/2022	BPA Murray-Snohomish (FDR 5) Line Trip #1	Granite Falls, Hartford, East Marysville, Frontier, Lake Stevens, Bunk Foss	Unknown	Momentary

Outage Number	Date	Line or Device	Substation(s)	Cause	CMI
20	11/04/2022	BPA Murray-Snohomish (FDR 5) Line Trip #2	<u>Momentary:</u> Granite Falls, East Marysville, Frontier, Lake Stevens, Bunk Foss <u>Sustained:</u> Hartford	Tree	2,055,280
21	11/04/2022	Halls Lake-Snoking1 (SK-HL#1) Line Trip	Brier, Thrashers Corner	Unknown	Momentary
22	11/17/2022	Jackson North Loop Trip	Three Lakes, Lake Chaplain	Unknown	Momentary
23	11/29/2022	Halls Lake-Paine Field Line Trip	<u>Momentary:</u> Lake Serene, Gibson <u>Sustained:</u> Keelers, Meadowdale, Lynnwood, Maplewood, Perrinville	Tree	2,735,253
24	11/29/2022	Jackson North Loop Trip	Three Lakes, Lake Chaplain	Tree	Momentary
25	11/29/2022	Halls Lake-Ballinger Line Trip	Ballinger, Richmond Park, Westgate	Unknown	Momentary
26	11/29/2022	Halls Lake-Five Corners Line Trip #1	Five Corners, Maplewood, Perrinville, Lynnwood	Unknown	Momentary
27	11/29/2022	Halls Lake-Five Corners Line Trip #2	<u>Momentary:</u> Lynnwood <u>Sustained:</u> Five Corners, Maplewood, Perrinville	Tree	1,124,835
28	11/30/2022	Halls Lake-BPA Snoking2 (SK-HL#2) Line Trip	Mountlake, Canyon Park, Fitzgerald	Tree	Momentary

Transmission Outage Summaries:

1. **01/03/2022 BPA Snohomish-Jackson (South) Line Trip:** The line experienced a temporary single line-to-ground (A-G) fault due to a falling tree. All breakers tripped, reclosed successfully and held. The auto-sectionalizing scheme at Sultan substation operated correctly. SNPD Snohomish, West Monroe, Woods Creek, Sultan, Wallace River, and Goldbar substations all experienced momentary outages.
2. **01/06/2022 Swamp Creek-Brightwater Line Trip:** The line experienced a temporary single line-to-ground (C-G) fault due to a falling tree. All breakers tripped, reclosed successfully and held. The auto-sectionalizing scheme at Floral Hills substation operated correctly and transferred to Swamp Creek-BPA Snoking line. Turner's Corner, Floral Hills, and York substations all experienced momentary outages.
3. **03/07/2022 Delta-Stimson Crossing (D-M) Line Trip:** The line experienced a temporary single line-to-ground (A-G) fault. The root cause of this fault is unknown. All breakers tripped, reclosed successfully and held. North Marysville, Kellogg Marsh, and Central Marysville experienced momentary outages.
4. **03/12/2022 Stimson Crossing-Camano Line Trip:** The line experienced a temporary line-to-line (A-C) fault. The root cause of this fault is unknown. All breakers tripped, reclosed successfully and held. Twin City, North Stanwood, Camano, Sunset, and South Camano all experienced momentary outages.
5. **06/03/2022 Jackson South Loop Trip:** The line experienced a temporary double line-to-ground (BC-G) fault. The root cause of this fault is unknown. All breakers tripped, reclosed successfully and held. The auto-sectionalizing scheme at Sultan substation operated correctly. SNPD Snohomish, West Monroe, Woods Creek, Sultan, Wallace River, and Goldbar substations all experienced momentary outages.
6. **07/19/2022 Brightwater-Snoking Line Trip:** The line experienced a temporary line-to-line (A-B) fault, caused when an experimental plane crash-landed, hitting power lines on its way down. All breakers tripped, reclosed successfully, and held. Park Ridge substation experienced a momentary outage.
7. **09/03/2022 Jackson North Loop Trip:** The line experienced a permanent line-to-line (A-B) tree fault. The auto-sectionalizing schemes at Three Lakes and Lake Chaplain substations operated correctly. Lake Chaplain substation experienced a momentary outage and Three Lakes substation experienced a sustained outage of 6 minutes.
8. **09/26/2022 Snoking-Swamp Creek Line (SK-SC) Trip:** The line experienced a permanent line-to-line (A-C) tree fault. PUD Major Yards crew was doing brush cutting and cut the guy wire which caused the pole and lines to lean into a tree. There are no tapped loads and no auto-sectionalizing schemes on this line. The line was back in-service about 2 hours and 31 minutes later after fault inception.
9. **11/04/2022 Delta-Stimson Crossing (D-SC) Line Trip #1:** The line experienced a temporary line-to-line (A-C) fault during the day's windstorm event. All breakers tripped, reclosed successfully, and held. The auto-sectionalizing scheme at Quil Ceda operated correctly and transferred Quil Ceda onto the parallel D-M line. Quil Ceda, Tulalip, and Village substations all experienced momentary outages.
10. **11/04/2022 Delta-Stimson Crossing (D-SC) Line Trip #2:** The line experienced a permanent line-to-line (A-C) tree fault during the day's windstorm event. The Village auto-sectionalizing scheme was not in service at the time of the event, so service to Village was restored from the Stimson Crossing end of the line after a 32 minutes outage. Quil Ceda, which had previously been auto-transferred onto the adjacent (D-M) Line when the (D-SC) line tripped earlier the same night, didn't experience an interruption but had to be de-energized for 57 minutes to repair a burnt-up conductor. Tulalip experienced a 1,275 minute outage as a result of the trip.
11. **11/04/2022 East Arlington-Oso Line Trip:** The line experienced a permanent three phase (3LG) tree fault during the day's major wind event. The East Arlington terminal tripped to lockout and the line was restored the following day. A sustained outage occurred at Oso substation (1,334 minutes).
12. **11/04/2022 Stimson Crossing-Camano Line Trip:** The line experienced a permanent line-to-line (A-C) tree fault during the day's major windstorm event. The North Stanwood auto-sectionalizing scheme operated correctly and the Stimson Crossing-North Stanwood section of the line was automatically restored. After the line was initially fully restored the following morning, the North Stanwood-South Camano section of the line had to be de-energized again to fix a leaning pole. Twin City and North Stanwood experienced momentary outages and North Camano (732 minutes), Sunset (1,170 minutes) and South Camano (1,170 minutes) experienced extended outages.

13. **11/04/2022 Lake Goodwin-North Stanwood Line Trip #1:** The line experienced a temporary line-to-line (A-B) fault during the day's major windstorm event. The breaker tripped, reclosed successfully and held. No outages occurred because the line was unloaded at the time of the event.
14. **11/04/2022 Lake Goodwin-North Stanwood Line Trip #2:** The line experienced a permanent line-to-line (A-C) tree fault during the day's major windstorm event. The line was restored a week later as more inspection had to be performed to check for suspected conductor damage. No customer service interruptions were incurred, as the Lake Goodwin-North Stanwood Line was unloaded at the time of the event.
15. **11/04/2022 Beverly Park-Paine Field Line Trip:** The line experienced a permanent line-to-line (A-C) tree fault during the day's major windstorm event. The auto-sectionalizing scheme at Picnic Point operated correctly, enabling the automatic restoration of the Beverly Park-Picnic Point section of the line. The auto-sectionalizing scheme at Harbour Pointe was out of service at the time of the event due to the ongoing Bank 1 transformer and switchgear replacement project and SCADA control of the Harbour Pointe line switches was not available. Picnic Point and Casino substations experienced momentary outages and Harbour Pointe Bank 2 (944 minutes) and Mukilteo (1800 minutes for feeders 12-129 and 12-600, 1000 minutes for feeder 12-128 and 1,068 minutes for 12-4523) experienced extended outages.
16. **11/04/2022 East Arlington-Stimson Crossing Line Trip:** The line experienced a temporary line-to-line (A-B) fault that evolved into a three phase (3LG) fault during that day's major windstorm event. The Portage auto-sectionalizing scheme operated correctly and Stimson breakers auto-reclosed and the East Arlington lead breaker did as well, but the follower breaker, which was de-energized on its bus side, did not. This led to an extended outage (53 minutes) of the Eagle Creek Bank 2 and the Navy Jim Creek line, due to breakers having tripped earlier during the East Arlington-Oso line trip to lockout. Momentary outages occurred at Lake Goodwin and Portage substations.
17. **11/04/2022 BPA Murray-East Arlington Line Trip:** The line experienced a temporary double line-to-ground (AC-G) fault during the day's major wind storm event. This trip occurred within less than a second after the trip of the Stimson Crossing-East Arlington line, therefore the East Arlington terminal of the BPA Murray-East Arlington Line didn't trip, given that the Stimson Crossing-East Arlington line is the only other source to that substation. The East Arlington breaker was also open at the time of the event, having tripped to lockout following a permanent fault on the East Arlington-Oso line earlier the same night. The BPA Murray-East Arlington Line does not feed any tapped load, however, because that line was the only source to East Arlington at the time of the event, Eagle Creek Bank 1 experienced a momentary outage (Eagle Creek Bank 2 and the Navy Jim Creek Line experienced a more sustained outage as a result of the Stimson Crossing-East Arlington line trip which occurred almost simultaneously).
18. **11/04/2022 Swamp Creek-Beverly Park (BP-SC) Line Trip:** The line experienced a temporary three phase (ABC) fault during the day's major windstorm event. All breakers tripped, reclosed successfully, and held. The auto-sectionalizing scheme at Mariner substation correctly operated. Momentary outages occurred at Polaris, Martha Lake, Mariner, and Silver Lake Substations.
19. **11/04/2022 BPA Murray-Snohomish (FDR 5) Line Trip #1:** The line experienced a temporary line-to-line (A-C) fault during the day's major windstorm event. All breakers tripped, reclosed successfully, and held. The auto-sectionalizing scheme at East Marysville correctly operated. Momentary outages occurred at Bunk Foss, Lake Stevens, Frontier, East Marysville, Hartford, and Granite Falls Substations.
20. **11/04/2022 BPA Murray-Snohomish (FDR 5) Line Trip #2:** The line experienced a permanent line-to-line (A-C) fault during the day's major windstorm event because of a large tree in the line between Hartford and Granite Falls substations. This sustained fault resulted in a momentary outage at Bunk Foss, Lake Stevens, Frontier, East Marysville, and Granite Falls Substations. The Auto-Sectionalizing schemes isolated the faulted section, which feeds Hartford substation, resulting in an extended outage (458 minutes).
21. **11/04/2022 Halls Lake-Snoking1 (SK-HL#1) Line Trip:** The line experienced a temporary line-to-line (A-B) fault, which evolved into a three phase (ABC) fault during that day's major windstorm event. All breakers tripped, reclosed successfully, and held. The auto-sectionalizing scheme at Thrashers Corner correctly operated. Momentary outages occurred at Thrashers Corner and Brier Substations.

22. **11/17/2022 Jackson North Loop Trip:** The line experienced a temporary line-to-line (A-B) fault. The root cause of the fault is unknown. The fault caused momentary outages at Lake Chaplain and Three Lakes substations.
23. **11/29/2022 Halls Lake-Paine Field Line Trip:** The line experienced a permanent line-to-line (A-B) tree fault during that day's snowstorm event. The Paine Field-Lake Serene section of the line was automatically restored after the Lake Serene auto-sectionalizing scheme operated, and the remaining section of the line was manually restored via SCADA. At the time of the event, the line was being used to feed the Maplewood-Lynnwood section of the Halls Lake-Five Corners Line, which had tripped to lockout about an hour-and-a-half earlier the same night. This permanent fault resulted in extended outages at Keelers and Meadowdale (12 minutes each), while Gibson and Lake Serene substations only experienced momentary outages. Maplewood and Perrinville, which were being fed by the Halls Lake-Paine Field line through Lynnwood substation at the time of this event because the Halls Lake-Five Corners Line had previously tripped to lockout, experienced an additional 291 minutes outage and Lynnwood an additional 12 minutes as well.
24. **11/29/2022 BPA Snohomish-Jackson Hydro (North Loop) Line Trip:** The line experienced a permanent line-to-line (A-C) fault due to a tree in the line. The auto-sectionalizing schemes at Lake Chaplain and Three Lakes operated correctly. The fault resulted in a momentary outage at Lake Chaplain and Three Lakes Substations.
25. **11/29/2022 Halls Lake-Ballinger Line Trip:** The line experienced a temporary single line-to-ground (B-G) fault. The root cause of the fault is unknown. With successful reclosing, the Ballinger and Westgate auto-sectionalizing schemes did not operate. This temporary fault resulted in a momentary outage at Ballinger, Westgate, and Richmond Park substations.
26. **11/29/2022 Halls Lake-Five Corners Line Trip #1:** The line experienced a temporary line-to-line (A-C) fault. The root cause of the fault is unknown. With successful reclosing, the Maplewood and Lynnwood auto-sectionalizing schemes did not operate for this temporary fault. The temporary fault resulted in a momentary outage at Five Corners, Maplewood, Perrinville, and Lynnwood substations.
27. **11/29/2022 Halls Lake-Five Corners Line Trip #2:** The line experienced a permanent single line-to-ground (B-G) tree fault. The reclosing attempts failed and locked-out. The Maplewood and Lynnwood auto-sectionalizing schemes operated correctly. This permanent fault resulted in an extended outage (75 minutes) at Five Corners substation, Maplewood substation, Perrinville substations.
28. **11/30/2022 Halls Lake-BPA Snoking2 (SK-HL#2) Line Trip:** The line experienced a temporary single line-to-ground (C-G) fault caused by a tree. The Mountlake auto-sectionalizing scheme operated correctly. The temporary fault resulted in a momentary outage at Fitzgerald, Canyon Park and Mountlake substations.

4 The Distribution System

4.1 Introduction

This section describes outages on the District 12.47 kV distribution system. These outages are more frequent and involve fewer customers per event than most transmission system outages. While the number of outages are somewhat balanced between trees, animals, and equipment failures, most of the outage minutes are due to outages caused by trees and motor vehicle accidents. Animal and equipment failures often involve distribution transformers and affect a small number of customers. Damage caused by trees and motor vehicles is less discriminating and can affect infrastructure such as feeders and large branch circuits, which have larger customer impacts.

4.2 System Performance

4.2.1 Outage Causes

Figures 4-1 and 4-2 show the count of distribution outages by cause for 2022 and the average for the five-year period of 2017-2021. In 2022, 2,697 distribution outages were recorded during routine operation, compared to the five-year average of 2,593 annual outages. The percentages shown in Figures 4-1 and 4-2 are percentages of the total number of outages in each period. The District started tracking planned outages in 2017.

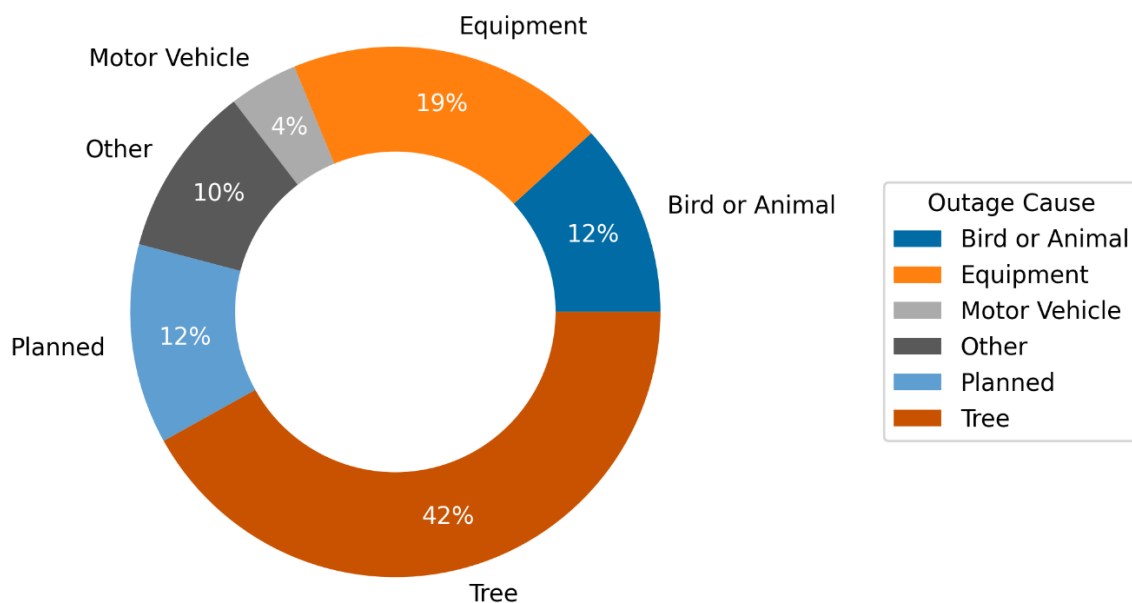


Figure 4-1: 2022 Distribution Outages by Cause

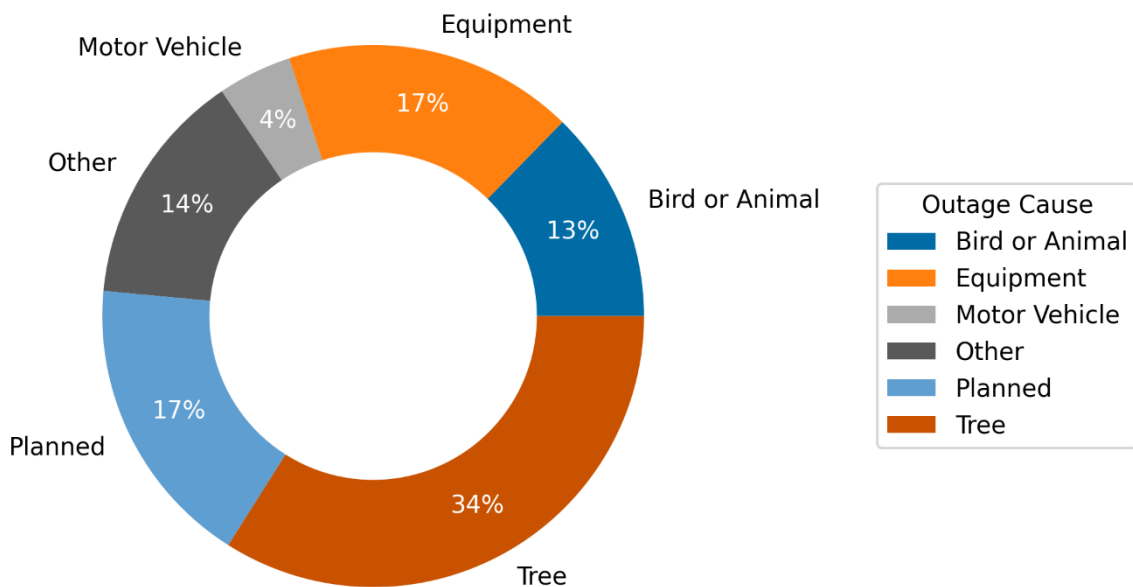


Figure 4-2: Five-Year Average Distribution Outages by Cause (2017-2021)

Figures 4-3 and 4-4 show the 2022 and five-year average percent of customer outage minutes by cause. District customers lost power for a combined total of 50,558,653 minutes in 2022 due to distribution outages, compared to the five-year average of 37,935,469 uplifted minutes. Both the number of outages and the customer minutes of outage are important parameters for planning effective outage impact reduction measures.

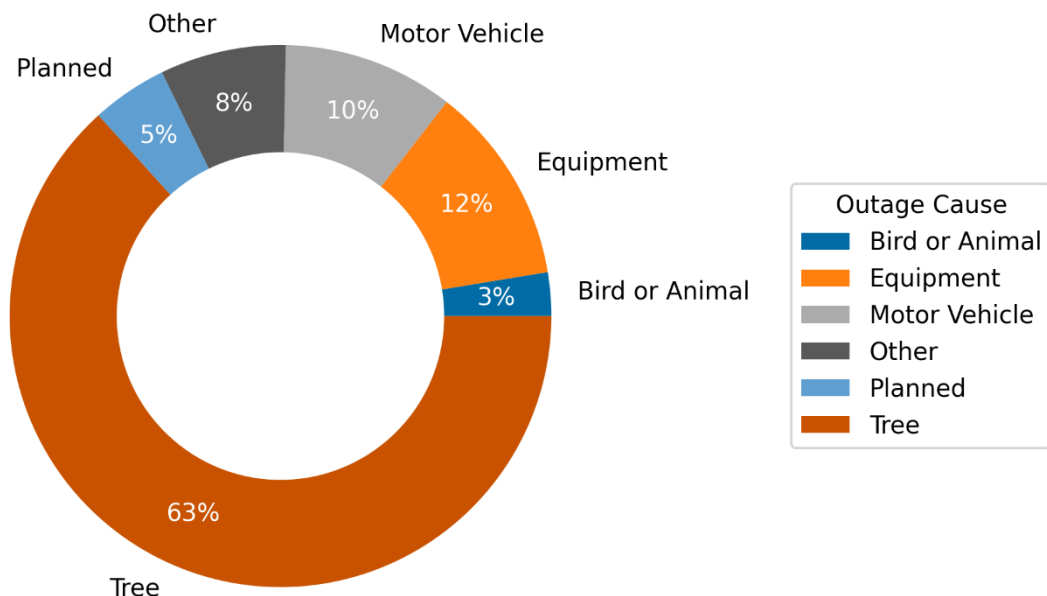


Figure 4-3: 2022 Distribution Outage Minutes by Cause

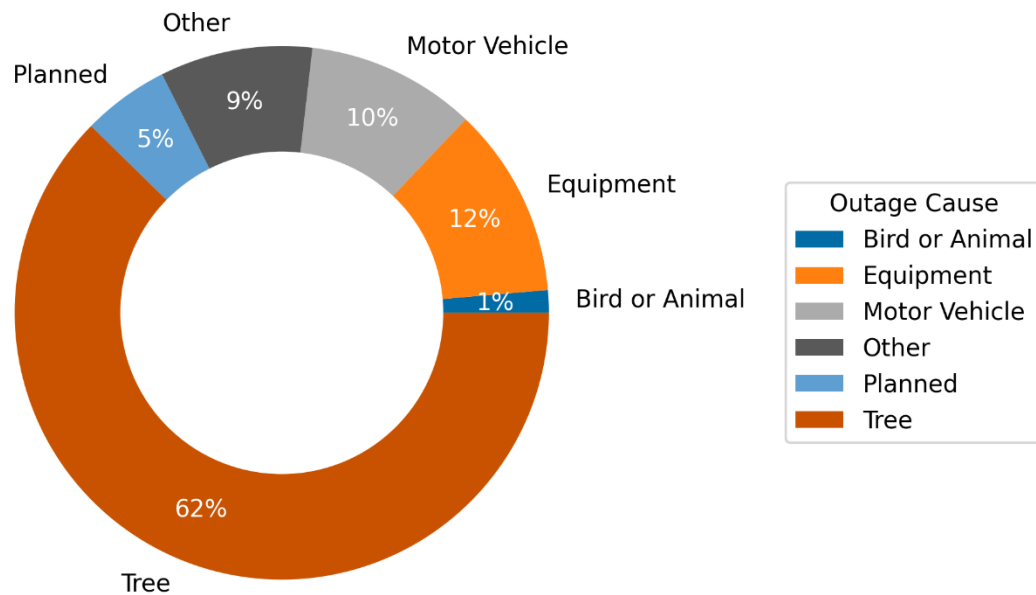


Figure 4-4: Five-Year Average Distribution Outage Minutes by Cause (2017-2021)

4.2.2 Explanation of Equipment Failure Category

Equipment failures may include any component of the distribution system, from primary overhead conductors, to fuses, transformers, insulators, and secondary service conductors. Figure 4-5 (blue bars) shows the number of recorded equipment failures by category during 2022. The ten most common types of equipment failure accounted for 603 outages in 2022. For comparison, Figure 4-5 (orange bars) shows the five-year average of the number of equipment failures for each category.

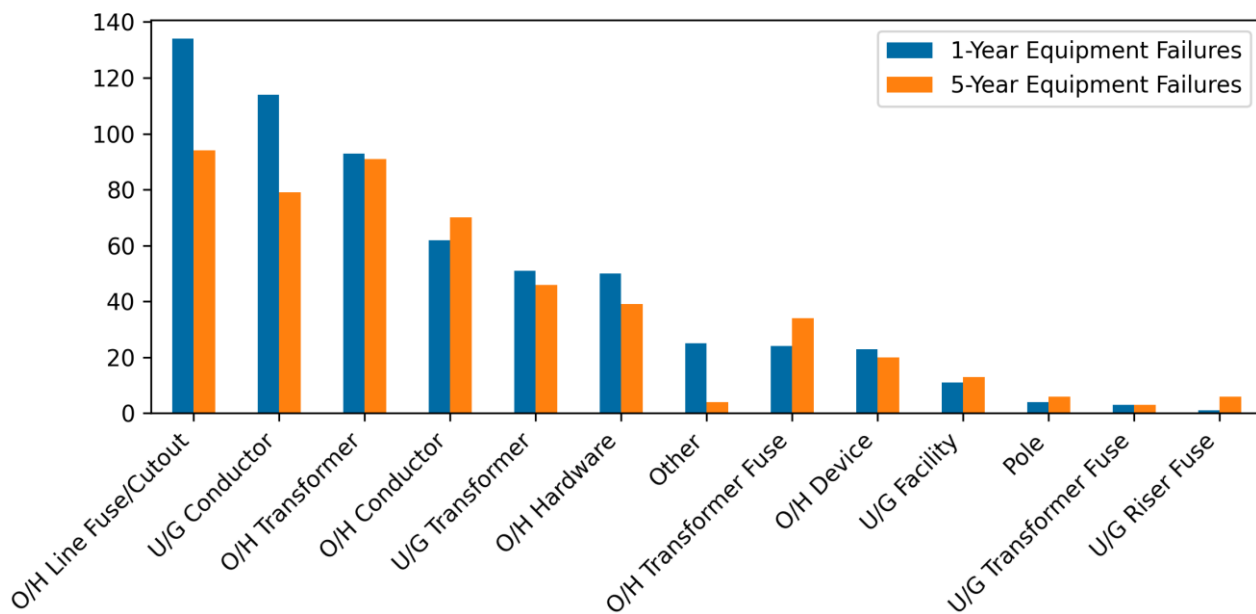


Figure 4-5: 2022 Equipment Failures

4.3 Urban, Suburban, Rural Classifications

IEEE Standard 1782 defines circuits as urban (greater than 150 customers per mile), suburban (between 150 and 50 customers per mile) and rural (less than 50 customers per mile). Classifying circuits indicates how susceptible those circuits are to having an outage. Shorter circuits are less likely to have an outage, due to less available exposure to faults. Conversely, longer circuits have more conductor, and thus are more likely to be damaged. To compare similar circuits, circuits are identified by performance based on circuit length. This table does not include outages that occurred during declared major events or planned outages.

Table 4-1: Circuit Classification Data

Classification (# of circuits)	Average Circuit Length	Average Number of Customers	Customers per Mile	Average SAIDI	Average SAIFI	# of Outages
Urban (45)	6.9 miles	1,341	198.6	57.3	0.52	167
Suburban (184)	13.2 miles	1,195	95.0	64.6	0.68	983
Rural (102)	32.2 miles	833	27.4	315.4	2.17	1598

4.4 Reliability Improvement Priority

Before 2017, the System Planning and Protection department used the “20 Worst Circuits” annually to target circuits for reliability improvements. This method had flaws. Typically, the same circuits would show up year after year due to their circuit length, rather than their relative reliability. There were also circuits on the list that had experienced no distribution outages, with all outage minutes caused by transmission outages. While valuable to know, that measure was irrelevant, as no distribution improvements would improve the reliability of the circuit. In 2017, an objective metric to help prioritize feeders for reliability work was developed comparing SAIDI normalized by circuit length and SAIFI. The metric is based on distribution outages only, allowing results to guide engineers to help decide which distribution changes should be prioritized to improve reliability. For this list, the circuit SAIDI and SAIFI were based on the number of customers on their original circuit. The OMS system has a design flaw when counting CMI for outages that involve multiple circuits. This happens when a breaker opens while a circuit is picking up a second circuit. This causes highly inaccurate reliability statistics for circuits with this type of outage. This should reduce the impact of the OMS design flaw on our reliability statistics.

$$rank(d, f) = \frac{d - \mu_d}{\sigma_d} + \frac{f - \mu_f}{\sigma_f}$$

Where 'd' is the circuit SAIDI divided by the circuit length, 'f' is the circuit SAIFI, 'μ' is the mean, and 'σ' is the standard deviation

Table 4-2: Circuit Reliability Improvement Priority for 2022

Rank	Feeder	Substation	Length	SAIFI	SAIDI	Incident Count	Customers	Score
1	12-2035	Lake Chaplain	4.5	4	524	4	2	9.82
2	12-2515	North Mountain	34.4	5.52	2447.2	33	463	8.04
3	12-0554	Goldbar	64	6.36	3869.9	91	2032	8.02
4	12-5004	Sultan	8.2	4	725	4	0	7.96
5	12-1533	South Camano	36.4	6.6	783.7	52	1071	5.6
6	12-3092	Stimson Crossing	5.8	1.5	460.7	3	248	5.26
7	12-0555	Goldbar	22.5	2.06	1547.8	36	769	4.99
8	12-1594	Sultan	26.3	3.55	1286.2	13	381	4.9
9	12-5373	Cedar Valley	7.1	2	441.4	4	992	4.48
10	12-0587	Clearview	60.4	6.13	637.5	23	1665	4.47
11	12-0092	Perrinville	9.2	3.51	370.1	8	768	4.28
12	12-1310	Oso	12.1	2.85	508.7	4	144	3.84
13	12-2725	20th Ave	6	2.01	303.9	3	1003	3.74
14	12-0101	Everett	1.9	1	118	1	439	3.68
15	12-0134	Mountlake	4.8	0.81	302.6	7	946	3.58
16	12-0726	Lynnwood	7	2.02	304.4	7	861	3.27
17	12-0634	West Monroe	22	3.24	568.1	10	339	3.08
18	12-2899	Gibson	5.6	1.18	280.4	3	980	3
19	12-0380	Lake Goodwin	43.3	3.49	880.9	25	1266	2.92
20	12-3093	Stimson Crossing	12.5	3.06	295.5	8	262	2.78

Appendix A

District Outage Management System

These tables include outages that occurred on both the transmission system and on the distribution system. They do not include outages that occurred during declared major events and do not have an uplift factor applied to previous years.

Table A-1: Substation Metrics

This table shows the substation reliability metrics for 2022 and the previous five year average.

Substation	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
20th Ave	2022	2,492	10	465,048	186.6	1.74	107.2
20th Ave	2017-2021	2,452	10	103,374	42.4	0.86	49
52nd St	2022	3,556	22	350,023	98.4	1.06	93.2
52nd St	2017-2021	3,486	16	151,360	43.4	0.39	110.4
Alderwood	2022	3,229	10	32,871	10.2	0.04	278.6
Alderwood	2017-2021	4,113	13.4	150,136	36.3	0.51	71.3
Ballinger	2022	3,817	19	266,452	69.8	0.73	95.7
Ballinger	2017-2021	3,687	18.8	283,397	76.6	0.87	88.5
Brier	2022	5,907	32	434,506	73.6	0.84	87.9
Brier	2017-2021	5,793	27.2	608,132	104.8	1.49	70.2
Bunk Foss	2022	2,296	17	23,106	10.1	0.18	56.5
Bunk Foss	2017-2021	2,242	28	139,342	61.9	0.83	75
Canyon Park	2022	5,370	30	144,642	26.9	0.53	50.6
Canyon Park	2017-2021	5,088	23.6	284,836	56.1	0.71	79.1
Cascade	2022	10,368	9	1,695,443	163.5	0.88	185.3
Cascade	2017-2021	9,711	9	342,568	36.1	0.48	75.3
Casino	2022	3,785	9	20,737	5.5	0.03	164.6
Casino	2017-2021	3,810	12	279,208	73.1	0.47	154.5
Cedar Valley	2022	2,418	7	498,777	206.3	1.57	131.2
Cedar Valley	2017-2021	2,108	2.6	63,109	29	0.42	68.3
Central Marysville	2022	5,456	27	442,827	81.2	1.44	56.5
Central Marysville	2017-2021	5,357	19.6	60,523	11.2	0.11	100.7
Clearview	2022	4,841	69	1,242,911	256.4	3.53	72.7
Clearview	2017-2021	4,733	94	1,460,080	308.7	2.86	108
Delta	2022	1,192	8	8,395	7	0.09	80
Delta	2017-2021	1,055	9.8	30,712	28.5	0.45	63.7
Eagle Creek	2022	9,189	124	2,205,368	240	1.88	127.4
Eagle Creek	2017-2021	8,673	137.6	1,889,944	220.3	2.05	107.3
East Marysville	2022	11,678	39	1,455,687	124.7	1.04	119.7
East Marysville	2017-2021	10,936	32	573,867	53.1	0.56	94.1

Substation	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Edgecomb	2022	3,831	25	192,492	50.2	0.38	134
Edgecomb	2017-2021	3,528	25.2	281,228	80.2	0.83	96.7
Esperance	2022	6,129	30	110,479	18	0.09	200.5
Esperance	2017-2021	5,944	18.4	171,160	28.6	0.24	118.9
Everett	2022	5,463	23	309,087	56.6	0.52	109.3
Everett	2017-2021	5,100	17.8	231,538	45	0.44	103
Fitzgerald	2022	1,166	3	35,298	30.3	0.44	69.2
Fitzgerald	2017-2021	1,098	2.6	52,139	47.8	0.77	61.9
Five Corners	2022	5,593	23	372,116	66.5	1.01	65.6
Five Corners	2017-2021	5,509	19.4	90,517	16.4	0.23	70.6
Floral Hills	2022	8,804	31	233,179	26.5	0.94	28.3
Floral Hills	2017-2021	8,416	35.8	594,121	70.3	0.61	115.9
Fobes	2022	4,706	26	112,906	24	0.18	131.7
Fobes	2017-2021	4,561	30.2	230,192	50.5	0.69	73.6
Frontier	2022	7,741	25	219,167	28.3	0.54	52.4
Frontier	2017-2021	7,424	24.8	372,889	49.9	0.85	58.6
Gibson	2022	7,331	28	778,179	106.1	0.47	226.3
Gibson	2017-2021	6,802	27.4	299,854	44.8	0.61	73.8
Glenwood	2022	5,621	26	358,972	63.9	0.89	72
Glenwood	2017-2021	5,568	25	256,040	46.1	0.91	50.8
Goldbar	2022	2,802	127	9,246,327	3299.9	5.91	558.7
Goldbar	2017-2021	2,731	71.2	1,719,952	628.9	2.49	252.7
Granite Falls	2022	7,040	121	1,790,862	254.4	1.51	168
Granite Falls	2017-2021	6,604	128.6	2,461,503	368.2	2.35	156.8
Harbour Pointe	2022	5,108	7	58,177	11.4	0.04	321.4
Harbour Pointe	2017-2021	5,062	6.6	124,874	24.7	0.37	66.4
Hardeson	2022	0	0	0	0	0	0
Hardeson	2017-2021	32	0.2	199	6.2	0.01	496.5
Hartford	2022	4,468	76	801,286	179.3	1.83	98.1
Hartford	2017-2021	4,107	72.2	845,650	203.9	1.33	153.5
Hilton Lake	2022	6,752	17	555,632	82.3	1.3	63.3
Hilton Lake	2017-2021	6,600	18.8	499,488	75.8	1.12	67.5
Kellogg Marsh	2022	5,397	16	287,829	45.8	0.5	91.8
Kellogg Marsh	2017-2021	5,287	17.8	215,665	39.8	0.42	95.4
Lake Chaplain	2022	644	23	790,349	1227.2	9.75	125.9
Lake Chaplain	2017-2021	575	21.6	349,141	610.2	5.74	106.4
Lake Goodwin	2022	5,301	103	1,937,531	365.5	3.29	111.2
Lake Goodwin	2017-2021	5,120	90.8	1,107,447	216.2	2.04	105.9
Lake Serene	2022	6,167	12	13,744	2.2	0.02	137.4
Lake Serene	2017-2021	6,077	17	277,674	45.2	0.47	95.5
Lake Stevens	2022	7,857	35	321,977	41	0.61	67.4
Lake Stevens	2017-2021	7,005	46	748,642	103.6	0.92	112.4

Substation	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Lynnwood	2022	4,717	35	421,883	89.4	1.01	88.6
Lynnwood	2017-2021	4,924	26.2	142,230	28.9	0.33	88.6
Maplewood	2022	4,414	34	837,640	189.8	1.25	151.6
Maplewood	2017-2021	4,397	22.6	155,382	35.4	0.33	108.1
Mariner	2022	5,391	16	144,381	26.8	0.52	51.2
Mariner	2017-2021	5,003	11.2	86,905	17	0.25	68.7
Martha Lake	2022	6,450	22	410,939	63.7	0.38	166.1
Martha Lake	2017-2021	5,875	25	520,918	88.1	1.19	74
Meadowdale	2022	4,995	29	391,955	78.5	0.59	133.9
Meadowdale	2017-2021	4,891	22.4	175,770	35.9	0.66	54.2
Mountlake	2022	6,301	39	405,212	64.3	0.2	318.6
Mountlake	2017-2021	6,679	40	254,903	38.5	0.44	87.9
Mukilteo	2022	4,341	23	228,777	52.7	1.06	49.9
Mukilteo	2017-2021	4,315	17.2	186,002	43.1	0.57	75.9
Murphy'S Corner	2022	4,713	20	441,357	93.6	1.28	73
Murphy'S Corner	2017-2021	4,622	9.4	185,111	40.2	0.45	88.4
North Alderwood	2022	0	0	0	0	0	0
North Alderwood	2017-2021	800	2	24,879	34.2	0.29	118.2
North Camano	2022	3,009	38	1,066,843	354.6	2.67	132.6
North Camano	2017-2021	2,910	39	404,425	137.6	1.41	97.3
North Creek	2022	7,197	5	44,897	6.2	0.04	152.7
North Creek	2017-2021	7,017	14	193,871	27.7	0.32	87.4
North Marysville	2022	2,866	11	52,385	18.3	1.16	15.8
North Marysville	2017-2021	2,805	10.6	40,187	14.4	0.19	75.6
North Mountain	2022	1,928	50	1,498,886	777.4	1.95	399.3
North Mountain	2017-2021	1,875	68.8	1,296,608	692.1	4.2	165
North Stanwood	2022	7,290	93	1,525,466	209.3	1.66	125.7
North Stanwood	2017-2021	6,770	95.2	1,394,120	207	1.58	131
Norton Ave	2022	3,308	8	7,896	2.4	0.01	192.6
Norton Ave	2017-2021	3,117	6	40,722	13.1	0.16	83.4
Olivia Park	2022	4,822	13	116,360	24.1	0.13	184.7
Olivia Park	2017-2021	4,579	14	86,129	18.8	0.38	49.9
Oso	2022	453	11	282,134	622.8	6.54	95.3
Oso	2017-2021	392	14	125,251	299.3	2.14	139.8
Paine Field	2022	8,793	23	351,873	40	0.68	59
Paine Field	2017-2021	8,566	19.8	359,673	41.9	0.47	90
Park Ridge	2022	4,987	29	363,942	73	0.49	149
Park Ridge	2017-2021	4,735	27.6	260,254	54.3	0.54	100.1
Perrinville	2022	4,576	35	253,163	55.3	0.77	72
Perrinville	2017-2021	4,445	25.8	244,080	54.4	0.87	62.5
Picnic Point	2022	3,842	43	219,336	57.1	0.43	133
Picnic Point	2017-2021	3,760	27.6	317,278	84.3	0.71	118.8

Substation	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Pinehurst	2022	6,758	27	125,964	18.6	0.4	47
Pinehurst	2017-2021	6,735	37.8	553,788	82.1	0.92	89
Polaris	2022	4,308	13	53,813	12.5	0.06	221.5
Polaris	2017-2021	3,993	8.8	89,227	21	0.38	55.7
Portage	2022	2,389	29	586,331	245.4	1.93	127.4
Portage	2017-2021	2,599	34.6	337,791	130.1	1.84	70.7
Quil Ceda	2022	2,859	29	475,147	166.2	1.51	110.2
Quil Ceda	2017-2021	2,835	34.8	486,795	170.5	1.52	112.1
Richmond Park	2022	3,474	37	474,353	136.5	1.31	103.9
Richmond Park	2017-2021	3,114	26.2	234,266	76.6	0.51	150.2
Silver Lake	2022	6,191	12	26,785	4.3	0.05	82.9
Silver Lake	2017-2021	6,139	19.6	367,928	60	0.72	82.8
Smokey Point	2022	5,080	16	396,286	78	0.84	92.4
Smokey Point	2017-2021	3,966	14	299,616	71.9	1.11	65.1
Snohomish	2022	3,137	33	212,338	67.7	0.95	71
Snohomish	2017-2021	3,087	31.6	217,290	70.4	1.09	64.8
South Camano	2022	3,880	100	1,575,126	406	3.11	130.4
South Camano	2017-2021	3,754	68.6	1,560,475	415.4	2.85	145.8
Stimson Crossing	2022	1,868	38	594,208	314.5	2.17	145.1
Stimson Crossing	2017-2021	1,838	32.2	514,404	279.2	2.85	97.9
Sultan	2022	3,075	69	1,570,555	508.9	2.09	243.7
Sultan	2017-2021	3,225	49.8	1,142,728	367	3.23	113.7
Sunset	2022	4,034	61	993,458	246.3	2.44	100.8
Sunset	2017-2021	3,916	58.6	1,144,203	291.8	2.81	103.7
Tenth Street	2022	4,289	13	502,765	117.2	0.7	167.1
Tenth Street	2017-2021	4,153	14	226,921	54.9	0.5	109.1
Thrashers Corner	2022	6,894	16	133,716	19.4	0.5	38.7
Thrashers Corner	2017-2021	6,460	16	369,681	54.8	0.38	143.4
Three Lakes	2022	4,310	101	1,395,889	323.9	3.73	86.8
Three Lakes	2017-2021	4,212	112.8	1,724,655	403.7	3.87	104.2
Tulalip	2022	2,243	20	94,185	42	0.28	150.7
Tulalip	2017-2021	2,290	25.4	413,043	180.3	1.43	125.7
Turners Corner	2022	2,503	46	256,527	102.5	1.17	87.6
Turners Corner	2017-2021	2,471	46.8	434,837	175.6	1.17	150.5
Village	2022	2,139	33	198,596	92.8	0.92	100.7
Village	2017-2021	2,089	23.2	185,487	87.3	0.96	90.7
Wallace River	2022	1,807	21	398,337	220.4	1.02	215.7
Wallace River	2017-2021	1,186	17.8	152,569	134.4	0.77	173.7
Waterfront	2022	3,086	7	4,382	1.4	0.01	182.6
Waterfront	2017-2021	3,074	9.2	129,240	42	0.49	85.7
West Monroe	2022	7,779	45	805,629	103.6	0.61	169.6
West Monroe	2017-2021	7,280	44.6	387,976	53.5	0.46	117.1

Substation	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Westgate	2022	4,239	24	276,191	65.2	0.65	99.7
Westgate	2017-2021	4,141	19	198,491	37	0.39	95.9
Woods Creek	2022	6,094	87	2,151,959	353.1	2.75	128.5
Woods Creek	2017-2021	5,665	100.2	2,082,157	361.7	2.44	148
York	2022	5,958	33	351,181	58.9	1.09	54.3
York	2017-2021	5,843	36.2	780,441	132.2	2.08	63.5

Table A-2: Circuit Metrics

This table shows the circuit reliability metrics for 2022 and the previous five year average.

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
20th Ave	12-1493	2022	33	0	0	0	0	0
20th Ave	12-1493	2017-2021	29	0	0	0	0	0
20th Ave	12-1494	2022	6	0	0	0	0	0
20th Ave	12-1494	2017-2021	4	0	0	0	0	0
20th Ave	12-1495	2022	17	0	0	0	0	0
20th Ave	12-1495	2017-2021	18	0.8	940	55.4	0.9	61.6
20th Ave	12-1496	2022	62	0	0	0	0	0
20th Ave	12-1496	2017-2021	16	0.8	5,022	218.4	2.07	105.5
20th Ave	12-2723	2022	598	5	8,303	13.8	0.1	143.2
20th Ave	12-2723	2017-2021	604	3.4	1,401	2.4	0.04	63.6
20th Ave	12-2724	2022	411	1	1,410	3.4	0.03	100.7
20th Ave	12-2724	2017-2021	403	0.4	63	0.2	0	44.7
20th Ave	12-2725	2022	979	3	455,275	453.9	4.25	106.8
20th Ave	12-2725	2017-2021	993	1.6	23,988	24.8	0.44	56.2
20th Ave	12-2726	2022	388	1	60	0.2	0.01	15
20th Ave	12-2726	2017-2021	399	2.8	45,430	120.1	2.22	54.1
20th Ave	12-6026	2022	0	0	0	0	0	0
20th Ave	12-6026	2017-2021	0	0	0	0	0	0
52nd St	12-0183	2022	616	2	38,319	61.9	1.01	61.5
52nd St	12-0183	2017-2021	610	3.4	25,950	44.9	0.9	49.8
52nd St	12-0184	2022	1,283	8	67,117	52.1	1.02	51
52nd St	12-0184	2017-2021	1,279	2.4	24,886	19.4	0.13	150.2
52nd St	12-0185	2022	722	6	37,287	51.6	1.03	50.1
52nd St	12-0185	2017-2021	753	4.6	92,555	129.5	0.85	151.6
52nd St	12-0186	2022	920	6	207,300	224.8	1.16	193.4
52nd St	12-0186	2017-2021	952	5.6	7,969	8.8	0.07	129.7
Alderwood	12-0116	2022	591	2	7,938	9.8	0.02	529.2
Alderwood	12-0116	2017-2021	617	2	1,937	3	0.01	363.5
Alderwood	12-0117	2022	1,405	3	17,596	12.9	0.02	651.7
Alderwood	12-0117	2017-2021	766	2	17,741	12.7	0.26	48.1
Alderwood	12-0132	2022	304	2	6,278	20.7	0.2	101.3
Alderwood	12-0132	2017-2021	1,593	5.2	99,272	68.4	0.69	99.1
Alderwood	12-0141	2022	966	3	1,059	1.1	0.01	75.6
Alderwood	12-0141	2017-2021	943	4.2	31,186	33.3	0.67	49.4
Ballinger	12-0258	2022	481	5	49,153	103	0.19	546.1
Ballinger	12-0258	2017-2021	484	4.8	38,420	80.6	1.58	51.1
Ballinger	12-0259	2022	716	2	1,969	2.8	0.03	98.4
Ballinger	12-0259	2017-2021	704	2.8	63,808	89.6	1.06	84.5
Ballinger	12-0260	2022	1,134	4	1,858	1.6	0.01	206.4

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Ballinger	12-0260	2017-2021	1,114	5.4	17,813	16.1	0.29	55.1
Ballinger	12-0261	2022	1,383	8	213,472	144.1	1.8	80.1
Ballinger	12-0261	2017-2021	1,383	5.8	163,356	118	0.99	118.9
Ballinger	12-5578	2022	1	0	0	0	0	0
Ballinger	12-5578	2017-2021	1	0	0	0	0	0
Brier	12-0501	2022	1,813	3	66,086	37.3	0.1	377.6
Brier	12-0501	2017-2021	1,825	7.2	169,647	94.9	1.41	67.2
Brier	12-0502	2022	1,155	7	97,446	83.3	1.22	68.5
Brier	12-0502	2017-2021	1,111	4.8	53,767	48.1	0.5	96.7
Brier	12-0503	2022	1,479	10	199,897	135.2	1.06	127.6
Brier	12-0503	2017-2021	1,485	7	223,880	154.6	2.49	62
Brier	12-0504	2022	1,459	12	71,077	47.8	1.2	40
Brier	12-0504	2017-2021	1,431	8	157,993	110.4	1.09	101.5
Bunk Foss	12-4111	2022	780	4	958	1.2	0.01	159.7
Bunk Foss	12-4111	2017-2021	782	6.4	20,712	27.2	0.62	43.7
Bunk Foss	12-4112	2022	676	7	4,836	7.1	0.03	268.7
Bunk Foss	12-4112	2017-2021	711	6.8	8,155	12.3	0.42	29.1
Bunk Foss	12-4113	2022	461	2	863	1.8	0.01	123.3
Bunk Foss	12-4113	2017-2021	490	5.4	51,911	113.2	0.96	117.7
Bunk Foss	12-4114	2022	369	4	16,449	44.5	1.02	43.5
Bunk Foss	12-4114	2017-2021	402	9.4	58,564	160.9	1.82	88.3
Canyon Park	12-1093	2022	1,150	5	42,983	35.6	1.37	25.9
Canyon Park	12-1093	2017-2021	1,218	6.8	38,631	37.3	0.34	111.1
Canyon Park	12-1094	2022	1,184	7	4,622	3.9	0.04	90.6
Canyon Park	12-1094	2017-2021	1,209	4.4	29,801	25.2	0.79	32.1
Canyon Park	12-1095	2022	1,515	16	65,644	43	0.24	180.8
Canyon Park	12-1095	2017-2021	1,447	8.2	148,315	101.6	1.22	83.6
Canyon Park	12-1096	2022	1,094	1	31,200	28.4	0.71	40
Canyon Park	12-1096	2017-2021	1,036	2.6	62,305	58.4	0.46	127.7
Canyon Park	12-3488	2022	340	1	193	0.6	0	193
Canyon Park	12-3488	2017-2021	98	1.6	5,783	14.9	0.22	69.1
Cascade	12-2087	2022	2,309	0	0	0	0	0
Cascade	12-2087	2017-2021	1,712	2.4	3,743	1.9	0.24	7.8
Cascade	12-2088	2022	2,967	6	1,098,384	369.5	0.78	476.3
Cascade	12-2088	2017-2021	3,961	3.6	75,218	26.8	0.28	94.2
Cascade	12-2089	2022	1,972	2	596,635	293.3	3.36	87.2
Cascade	12-2089	2017-2021	1,912	1	7,113	3.9	0.03	122.2
Cascade	12-2090	2022	2,921	1	424	0.1	0	424
Cascade	12-2090	2017-2021	2,904	1.8	6,739	2.7	0.02	145
Casino	12-0308	2022	939	2	5,324	5.7	0.04	133.1
Casino	12-0308	2017-2021	1,046	3.6	42,475	45.2	0.69	65.5
Casino	12-0309	2022	385	1	480	1.2	0	480

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Casino	12-0309	2017-2021	398	1	24,119	64.5	0.11	565.7
Casino	12-0310	2022	1,198	2	651	0.5	0.01	72.3
Casino	12-0310	2017-2021	1,215	3.4	63,918	53.3	0.19	285
Casino	12-0311	2022	1,262	4	14,282	11.3	0.06	187.9
Casino	12-0311	2017-2021	1,283	4	148,697	118.2	0.7	167.8
Cedar Valley	12-5372	2022	1,107	2	38,292	34	1.33	25.5
Cedar Valley	12-5372	2017-2021	1,042	0.4	2,181	2	0.01	242.4
Cedar Valley	12-5373	2022	993	4	437,877	441.4	2	220.5
Cedar Valley	12-5373	2017-2021	960	1.6	34,461	35.3	0.46	76.2
Cedar Valley	12-5374	2022	12	0	0	0	0	0
Cedar Valley	12-5374	2017-2021	4	0	0	0	0	0
Cedar Valley	12-5375	2022	143	1	22,608	75.9	1.05	72
Cedar Valley	12-5375	2017-2021	100	0.4	301	47.3	0.44	107.1
Cedar Valley	12-5376	2022	1	0	0	0	0	0
Cedar Valley	12-5376	2017-2021	1	0	0	0	0	0
Central Marysville	12-1419	2022	1,164	7	186,066	159	2.01	79.2
Central Marysville	12-1419	2017-2021	1,189	3	14,595	12.7	0.1	125.5
Central Marysville	12-1420	2022	1,306	7	17,580	13.5	0.1	135.2
Central Marysville	12-1420	2017-2021	1,289	5.6	5,116	4	0.03	134.7
Central Marysville	12-1421	2022	1,616	6	231,493	142.9	3.3	43.3
Central Marysville	12-1421	2017-2021	1,649	5.2	21,366	13.4	0.07	182.5
Central Marysville	12-1422	2022	1,348	7	7,688	5.7	0.02	334.3
Central Marysville	12-1422	2017-2021	1,312	5.8	19,446	14.5	0.25	58.8
Clearview	12-0584	2022	1,578	23	490,751	309.4	2.75	112.5
Clearview	12-0584	2017-2021	2,177	13.4	181,363	192.6	1.84	104.6
Clearview	12-0585	2022	1,114	16	44,761	40	0.46	87.3
Clearview	12-0585	2017-2021	1,264	16.8	81,824	73.3	0.44	167.1
Clearview	12-0586	2022	467	7	84,981	181.6	4.21	43.1
Clearview	12-0586	2017-2021	1,710	23.4	261,006	225.3	2.66	84.6
Clearview	12-0587	2022	1,653	23	622,418	372.9	6.14	60.7
Clearview	12-0587	2017-2021	1,811	40.4	935,888	555.1	4.94	112.4
Delta	12-3653	2022	86	3	5,361	33.5	0.61	55.3
Delta	12-3653	2017-2021	92	6.2	19,265	229	1.34	171.1
Delta	12-3654	2022	16	0	0	0	0	0
Delta	12-3654	2017-2021	18	0	0	0	0	0
Delta	12-3655	2022	210	2	701	3.3	0.02	175.2
Delta	12-3655	2017-2021	214	1.6	309	1.5	0.02	86
Delta	12-3656	2022	825	3	2,333	2.9	0	583.3
Delta	12-3656	2017-2021	722	1.6	10,439	15	0.49	30.6
Delta	12-3657	2022	19	0	0	0	0	0
Delta	12-3657	2017-2021	8	0.4	699	36.8	0.19	194.2
Eagle Creek	12-0986	2022	1,113	3	6,721	5.7	0.05	124.2

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Eagle Creek	12-0986	2017-2021	1,171	3.8	94,743	85.4	1.41	60.6
Eagle Creek	12-0987	2022	802	1	69	0.1	0	69
Eagle Creek	12-0987	2017-2021	632	2.4	16,039	21.4	0.5	42.7
Eagle Creek	12-0988	2022	1,631	38	349,008	213.2	2.97	71.7
Eagle Creek	12-0988	2017-2021	1,714	33.2	493,093	317.4	3.29	96.6
Eagle Creek	12-0989	2022	954	6	164,617	171.7	1.34	128.3
Eagle Creek	12-0989	2017-2021	992	5	39,638	41.7	1.11	37.7
Eagle Creek	12-2617	2022	1,528	33	1,177,400	765.5	4.37	175.4
Eagle Creek	12-2617	2017-2021	1,624	39	804,047	535.1	4.17	128.3
Eagle Creek	12-2618	2022	930	31	420,125	446.9	4.47	100.1
Eagle Creek	12-2618	2017-2021	1,208	35.6	328,102	334.9	2.06	162.8
Eagle Creek	12-2619	2022	1,642	12	87,428	52	0.12	439.3
Eagle Creek	12-2619	2017-2021	1,527	18.2	114,212	73.8	0.84	88
Eagle Creek	12-2620	2022	419	0	0	0	0	0
Eagle Creek	12-2620	2017-2021	413	0.4	69	0.2	0	172.2
East Marysville	12-0002	2022	690	15	60,398	86.7	0.37	234.1
East Marysville	12-0002	2017-2021	791	11.8	109,895	162.5	0.68	238.9
East Marysville	12-0037	2022	1,791	10	392,607	215	5.12	42
East Marysville	12-0037	2017-2021	1,664	7.2	127,204	73.8	1.05	70.6
East Marysville	12-0038	2022	2,198	7	978,811	428.7	1.05	409.9
East Marysville	12-0038	2017-2021	1,624	4.8	139,653	83.7	1.1	75.9
East Marysville	12-0070	2022	2,069	2	7,274	3.5	0.05	72.7
East Marysville	12-0070	2017-2021	2,008	3.2	29,100	14.4	0.2	70.5
East Marysville	12-0115	2022	1,379	3	13,654	9.9	0.04	223.8
East Marysville	12-0115	2017-2021	1,379	0.6	587	0.4	0	293.6
East Marysville	12-5203	2022	1,512	0	0	0	0	0
East Marysville	12-5203	2017-2021	1,489	0.8	571	0.4	0	357.2
East Marysville	12-5204	2022	1,858	2	2,943	1.6	0	420.4
East Marysville	12-5204	2017-2021	1,736	3.6	166,859	95.4	0.85	111.6
Edgecomb	12-4831	2022	459	2	4,360	17.6	1.87	9.4
Edgecomb	12-4831	2017-2021	221	1.2	23,951	52.1	0.5	104.4
Edgecomb	12-4832	2022	1,585	8	16,513	10.2	0.03	384
Edgecomb	12-4832	2017-2021	1,462	8.6	39,564	26.7	0.67	40.1
Edgecomb	12-4833	2022	1,346	3	24,402	17	0.03	610.1
Edgecomb	12-4833	2017-2021	1,347	3.8	92,748	69.2	0.66	104.4
Edgecomb	12-4834	2022	434	12	147,217	332.3	2.01	165.4
Edgecomb	12-4834	2017-2021	484	11.6	124,965	299	1.99	149.9
Esperance	12-0687	2022	1,647	5	1,780	1.1	0.01	178
Esperance	12-0687	2017-2021	1,667	3	1,295	0.8	0.01	114.2
Esperance	12-0688	2022	1,165	5	10,684	9.3	0.15	61.1
Esperance	12-0688	2017-2021	1,186	3.6	40,290	34.8	0.52	67.3
Esperance	12-0689	2022	1,314	13	39,839	31.5	0.1	304.1

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Esperance	12-0689	2017-2021	1,266	6.4	96,400	75	0.53	141.6
Esperance	12-1597	2022	1,894	7	58,176	27.7	0.11	247.6
Esperance	12-1597	2017-2021	1,610	5.4	33,176	17.7	0.08	222.3
Everett	12-0100	2022	377	3	69,768	184.6	2.1	88.1
Everett	12-0100	2017-2021	409	1.8	5,311	14.2	0.21	67.7
Everett	12-0101	2022	440	1	51,802	118	1	118
Everett	12-0101	2017-2021	267	1.8	37,146	180.1	0.95	190.3
Everett	12-0112	2022	975	9	129,083	132.5	1.28	103.3
Everett	12-0112	2017-2021	857	7	104,278	110.1	0.98	112.3
Everett	12-0113	2022	362	4	7,774	21.6	0.19	111.1
Everett	12-0113	2017-2021	408	1.8	13,993	38.7	0.43	90.2
Everett	12-0118	2022	1,334	2	2,992	2.2	0.02	136
Everett	12-0118	2017-2021	1,369	2.6	34,861	26.2	0.44	59.7
Everett	12-0119	2022	1,117	4	47,668	42.1	0.23	186.9
Everett	12-0119	2017-2021	1,162	1.4	5,278	4.8	0.06	76.5
Everett	12-0121	2022	406	0	0	0	0	0
Everett	12-0121	2017-2021	225	0.4	2,135	6.5	0.04	149.3
Everett	12-0122	2022	402	0	0	0	0	0
Everett	12-0122	2017-2021	367	1	28,536	84.5	0.61	138.6
Everett	12-3700	2022	0	0	0	0	0	0
Everett	12-3700	2017-2021	0	0	0	0	0	0
Everett	12-3701	2022	0	0	0	0	0	0
Everett	12-3701	2017-2021	0	0	0	0	0	0
Everett	12-3702	2022	29	0	0	0	0	0
Everett	12-3702	2017-2021	22	0	0	0	0	0
Fitzgerald	12-5508	2022	818	3	35,298	42.7	0.62	69.2
Fitzgerald	12-5508	2017-2021	769	2.2	49,163	60.5	0.96	62.9
Fitzgerald	12-5509	2022	7	0	0	0	0	0
Fitzgerald	12-5509	2017-2021	10	0	0	0	0	0
Fitzgerald	12-5510	2022	257	0	0	0	0	0
Fitzgerald	12-5510	2017-2021	114	0.4	2,976	11.6	0.24	48.6
Fitzgerald	12-5511	2022	33	0	0	0	0	0
Fitzgerald	12-5511	2017-2021	4	0	0	0	0	0
Five Corners	12-1282	2022	1,067	8	361,004	334	5.2	64.3
Five Corners	12-1282	2017-2021	1,082	5	17,587	16.9	0.08	206.9
Five Corners	12-1283	2022	1,802	3	1,276	0.7	0	212.7
Five Corners	12-1283	2017-2021	1,739	5.4	60,031	33.7	0.43	77.9
Five Corners	12-1284	2022	904	2	5,221	5.7	0.03	180
Five Corners	12-1284	2017-2021	881	1.4	254	0.3	0	115.4
Five Corners	12-1285	2022	1,791	10	4,615	2.6	0.01	200.7
Five Corners	12-1285	2017-2021	1,797	7.6	12,646	7.1	0.24	29.6
Floral Hills	12-2062	2022	1,138	7	59,949	52.8	2.1	25.1

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Floral Hills	12-2062	2017-2021	1,174	11.8	353,739	311.9	2.66	117.1
Floral Hills	12-2063	2022	2,898	10	2,633	0.9	0.01	119.7
Floral Hills	12-2063	2017-2021	2,523	9.8	71,162	25.2	0.14	180.9
Floral Hills	12-2064	2022	1,819	7	40,706	21.6	0.09	233.9
Floral Hills	12-2064	2017-2021	1,621	7.4	51,137	29.8	0.11	265.1
Floral Hills	12-2065	2022	2,808	7	129,891	46	2.01	22.9
Floral Hills	12-2065	2017-2021	2,673	6.8	118,083	43	0.55	78
Fobes	12-0398	2022	1,975	7	9,578	4.8	0.03	191.6
Fobes	12-0398	2017-2021	1,876	9.6	46,205	23.9	0.44	53.9
Fobes	12-0399	2022	957	4	51,350	53.9	0.13	417.5
Fobes	12-0399	2017-2021	1,031	7.2	48,901	52.1	0.7	74.8
Fobes	12-0400	2022	1,221	6	2,630	2.1	0.01	292.2
Fobes	12-0400	2017-2021	1,232	8.6	110,433	93.1	1.23	75.9
Fobes	12-0401	2022	519	9	49,348	94.5	1.29	73.1
Fobes	12-0401	2017-2021	561	4.8	24,654	47.9	0.34	140.3
Frontier	12-0533	2022	1,931	12	204,285	102.6	2.08	49.4
Frontier	12-0533	2017-2021	1,249	7.8	65,362	35.8	0.47	76.3
Frontier	12-0534	2022	1,420	2	305	0.2	0	76.2
Frontier	12-0534	2017-2021	1,518	7.4	66,110	46.1	1.63	28.3
Frontier	12-0535	2022	2,626	4	5,787	2.2	0	445.2
Frontier	12-0535	2017-2021	2,550	5.6	106,446	41.1	0.41	100.7
Frontier	12-0536	2022	1,680	7	8,790	5.2	0.02	293
Frontier	12-0536	2017-2021	1,622	4	134,971	81.7	1.24	65.7
Gibson	12-2897	2022	3,070	14	365,580	117.1	0.64	182.4
Gibson	12-2897	2017-2021	2,660	10.6	149,934	53.1	0.69	77.5
Gibson	12-2898	2022	1,808	5	10,721	5.9	0.03	206.2
Gibson	12-2898	2017-2021	1,491	7.2	83,033	52.1	0.61	85.1
Gibson	12-2899	2022	987	3	274,796	280.4	1.19	235.3
Gibson	12-2899	2017-2021	925	2.2	3,669	3.7	0.26	14.4
Gibson	12-2900	2022	1,355	6	127,082	91.2	0.15	591.1
Gibson	12-2900	2017-2021	1,319	7.4	63,218	50.2	0.68	73.9
Glenwood	12-0592	2022	1,118	11	192,196	179.3	2.12	84.6
Glenwood	12-0592	2017-2021	1,092	7	94,745	87.1	1.02	85
Glenwood	12-0593	2022	1,015	5	4,902	4.7	0.02	233.4
Glenwood	12-0593	2017-2021	1,053	6.8	30,495	29.6	0.64	46.4
Glenwood	12-0594	2022	2,511	9	146,727	58.4	1.05	55.5
Glenwood	12-0594	2017-2021	2,451	10.6	124,831	51	1.31	38.9
Glenwood	12-0595	2022	978	1	15,147	15.8	0.05	297
Glenwood	12-0595	2017-2021	973	0.6	5,969	6.8	0.09	74.3
Goldbar	12-0554	2022	2,013	91	7,863,641	3869.9	6.36	608.3
Goldbar	12-0554	2017-2021	2,093	45	1,377,750	695.5	2.76	251.8
Goldbar	12-0555	2022	765	36	1,382,686	1798	4.71	381.6

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Goldbar	12-0555	2017-2021	795	14.6	133,902	182.1	1.04	174.4
Granite Falls	12-0808	2022	607	10	8,411	13.6	0.07	182.8
Granite Falls	12-0808	2017-2021	583	14.6	127,524	223.5	1.16	192
Granite Falls	12-0809	2022	1,311	25	435,015	330.8	2.57	128.5
Granite Falls	12-0809	2017-2021	1,363	19.4	381,162	301.8	2.22	136.2
Granite Falls	12-0810	2022	1,084	34	568,677	519.3	2.35	221.3
Granite Falls	12-0810	2017-2021	1,244	38.4	960,992	896.7	5.52	162.4
Granite Falls	12-0811	2022	867	13	52,930	60.7	0.28	219.6
Granite Falls	12-0811	2017-2021	907	8.8	44,238	38.4	0.21	187
Granite Falls	12-4612	2022	457	5	101,262	219.7	1.02	214.5
Granite Falls	12-4612	2017-2021	495	3.4	7,187	16.2	0.25	64.9
Granite Falls	12-4613	2022	949	7	46,974	48.7	0.19	259.5
Granite Falls	12-4613	2017-2021	667	9.8	45,558	69.7	0.69	101.5
Granite Falls	12-4614	2022	317	1	4,218	13.2	0.18	74
Granite Falls	12-4614	2017-2021	282	2.4	7,751	27.4	0.34	81
Granite Falls	12-4615	2022	1,389	26	573,375	412.8	2.67	154.6
Granite Falls	12-4615	2017-2021	1,404	31.6	887,009	677.3	4.12	164.3
Harbour Pointe	12-2277	2022	1,274	1	10,674	9	0.01	1186
Harbour Pointe	12-2277	2017-2021	1,284	1.8	56,478	61.3	0.94	65.2
Harbour Pointe	12-2278	2022	624	1	0	0	0	0
Harbour Pointe	12-2278	2017-2021	623	0.2	6,760	10.9	0.06	178.8
Harbour Pointe	12-2279	2022	553	1	294	0.5	0.01	98
Harbour Pointe	12-2279	2017-2021	574	2	699	1.3	0.01	158.8
Harbour Pointe	12-2280	2022	635	3	10,309	16.2	0.07	224.1
Harbour Pointe	12-2280	2017-2021	631	1	1,256	2.2	0.01	160.6
Harbour Pointe	12-4674	2022	697	1	36,900	45.7	0.15	300
Harbour Pointe	12-4674	2017-2021	826	0.6	24,633	29.9	0.64	47
Harbour Pointe	12-4675	2022	286	0	0	0	0	0
Harbour Pointe	12-4675	2017-2021	327	0.2	2,043	6.2	0.03	232.1
Harbour Pointe	12-4676	2022	0	0	0	0	0	0
Harbour Pointe	12-4676	2017-2021	0	0	0	0	0	0
Harbour Pointe	12-4677	2022	829	0	0	0	0	0
Harbour Pointe	12-4677	2017-2021	861	0.8	33,005	39.8	0.42	95.8
Hardeson	12-4556	2022	0	0	0	0	0	0
Hardeson	12-4556	2017-2021	0	0	0	0	0	0
Hardeson	12-4557	2022	7	0	0	0	0	0
Hardeson	12-4557	2017-2021	1	0	0	0	0	0
Hardeson	12-4558	2022	10	0	0	0	0	0
Hardeson	12-4558	2017-2021	14	0	0	0	0	0
Hardeson	12-4559	2022	27	0	0	0	0	0
Hardeson	12-4559	2017-2021	28	0.2	199	9	0.02	496.5
Hartford	12-3117	2022	971	29	304,962	311.2	2.57	121.3

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Hartford	12-3117	2017-2021	992	32.8	570,128	596.5	3.77	158
Hartford	12-3118	2022	476	10	43,127	90.2	1.26	71.5
Hartford	12-3118	2017-2021	998	8	65,840	171.5	2.13	80.5
Hartford	12-3119	2022	818	9	16,108	19.5	0.1	201.4
Hartford	12-3119	2017-2021	924	8.6	51,102	63.4	0.21	308.1
Hartford	12-3120	2022	1,436	24	373,688	241.2	2.85	84.6
Hartford	12-3120	2017-2021	1,322	19.6	133,593	106.4	0.66	160.2
Hartford	12-3327	2022	633	4	63,401	105.1	0.92	114
Hartford	12-3327	2017-2021	584	3.2	24,986	40.3	0.14	294.1
Hilton Lake	12-0497	2022	1,378	1	25,575	18	0.05	341
Hilton Lake	12-0497	2017-2021	1,398	6	209,729	149.5	1.52	98.6
Hilton Lake	12-0498	2022	877	4	163,555	186.5	2.07	90.3
Hilton Lake	12-0498	2017-2021	784	1.2	30,807	37.3	0.81	46.2
Hilton Lake	12-0499	2022	2,342	4	125,980	53.8	1.05	51.3
Hilton Lake	12-0499	2017-2021	2,274	7.6	152,710	66.2	0.91	72.3
Hilton Lake	12-0500	2022	2,105	8	240,522	114.1	2.1	54.3
Hilton Lake	12-0500	2017-2021	2,080	4	106,243	51.1	1.21	42.4
Kellogg Marsh	12-0904	2022	1,170	3	664	0.6	0	221.3
Kellogg Marsh	12-0904	2017-2021	1,163	2.4	14,440	12.4	0.1	122.8
Kellogg Marsh	12-0905	2022	2,070	8	150,794	52.7	1.06	49.7
Kellogg Marsh	12-0905	2017-2021	2,095	9.4	113,954	53.1	0.73	73.1
Kellogg Marsh	12-0906	2022	1,182	4	135,362	114	0.4	286.8
Kellogg Marsh	12-0906	2017-2021	1,202	4.4	53,194	45.2	0.31	147.5
Kellogg Marsh	12-0907	2022	939	1	1,009	1.1	0	504.5
Kellogg Marsh	12-0907	2017-2021	868	1.6	34,078	38.5	0.27	143
Lake Chaplain	12-2034	2022	98	1	18,870	188.7	1.02	185
Lake Chaplain	12-2034	2017-2021	98	3.4	38,938	549.6	5.88	93.5
Lake Chaplain	12-2035	2022	4	4	266,712	133356	2116	63
Lake Chaplain	12-2035	2017-2021	1	0.4	20	9	0.5	18
Lake Chaplain	12-2036	2022	496	18	504,767	929.6	3.58	259.4
Lake Chaplain	12-2036	2017-2021	504	17.8	310,183	656.8	6.08	107.9
Lake Goodwin	12-0379	2022	1,011	26	107,844	105.5	0.67	158.6
Lake Goodwin	12-0379	2017-2021	1,098	15.6	244,420	247.2	1.98	125
Lake Goodwin	12-0380	2022	1,256	25	1,115,277	880.9	6.5	135.6
Lake Goodwin	12-0380	2017-2021	1,267	23	229,076	190.4	2.13	89.5
Lake Goodwin	12-0381	2022	998	15	381,963	379.7	4.04	94.1
Lake Goodwin	12-0381	2017-2021	1,104	11.6	168,290	171.1	1.89	90.5
Lake Goodwin	12-0382	2022	912	14	175,603	192.5	2.22	86.7
Lake Goodwin	12-0382	2017-2021	1,007	15.4	252,498	278.9	3.27	85.3
Lake Goodwin	12-0383	2022	1,075	23	156,844	143.5	2.22	64.6
Lake Goodwin	12-0383	2017-2021	1,134	25	213,004	205.5	1.1	187.3
Lake Serene	12-0337	2022	1,234	2	393	0.3	0	196.5

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Lake Serene	12-0337	2017-2021	1,235	4.2	39,195	31.8	0.43	74
Lake Serene	12-0338	2022	1,365	4	8,640	6.3	0.04	163
Lake Serene	12-0338	2017-2021	1,310	1.4	76,399	56	0.4	138.6
Lake Serene	12-0339	2022	1,214	1	27	0	0	9
Lake Serene	12-0339	2017-2021	1,208	4.6	16,916	14	0.26	53.2
Lake Serene	12-0340	2022	2,375	3	3,070	1.7	0.01	122.8
Lake Serene	12-0340	2017-2021	2,396	6.8	145,164	61.5	0.64	96.3
Lake Serene	12-5205	2022	784	2	1,614	1.9	0.02	94.9
Lake Serene	12-5205	2017-2021	470	0	0	0	0	0
Lake Stevens	12-0124	2022	1,862	21	265,573	142.2	1.08	131.2
Lake Stevens	12-0124	2017-2021	1,913	31.2	694,631	380.4	3.35	113.6
Lake Stevens	12-0125	2022	2,523	12	54,842	21	1.03	20.5
Lake Stevens	12-0125	2017-2021	2,527	11	43,946	13.3	0.14	92.4
Lake Stevens	12-0273	2022	941	1	162	0.2	0	54
Lake Stevens	12-0273	2017-2021	283	1.4	464	0.8	0.01	142.1
Lake Stevens	12-0274	2022	2,327	1	1,400	0.6	0.03	20
Lake Stevens	12-0274	2017-2021	1,854	2.4	9,602	4.6	0.04	106.8
Lake Stevens	12-4034	2022	0	0	0	0	0	0
Lake Stevens	12-4034	2017-2021	0	0	0	0	0	0
Lynnwood	12-0724	2022	1,459	6	3,129	2.2	0.01	240.7
Lynnwood	12-0724	2017-2021	1,655	6.2	79,722	51.3	0.48	106.9
Lynnwood	12-0725	2022	825	8	85,802	103.6	1.03	100.6
Lynnwood	12-0725	2017-2021	864	8.4	28,388	34.7	0.51	68.1
Lynnwood	12-0726	2022	855	7	262,279	304.6	2.03	150
Lynnwood	12-0726	2017-2021	920	2.4	16,844	20.5	0.37	55.8
Lynnwood	12-0727	2022	1,293	8	6,576	5.1	0.01	548
Lynnwood	12-0727	2017-2021	1,307	8.4	16,711	13	0.1	129.1
Lynnwood	12-4867	2022	339	5	12,177	35.8	0.55	65.5
Lynnwood	12-4867	2017-2021	306	0.8	565	1.7	0.01	149.7
Maplewood	12-0343	2022	1,778	5	152,894	86	1.01	85.1
Maplewood	12-0343	2017-2021	1,748	5.2	105,951	60.5	0.53	115.1
Maplewood	12-0344	2022	1,045	8	6,992	6.7	0.02	304
Maplewood	12-0344	2017-2021	1,150	6.8	13,411	12.6	0.1	122.8
Maplewood	12-0345	2022	777	10	148,616	191.5	1.36	140.6
Maplewood	12-0345	2017-2021	765	5.8	17,727	23.2	0.13	175.3
Maplewood	12-0346	2022	808	10	22,129	27.4	0.13	204.9
Maplewood	12-0346	2017-2021	789	4.8	18,294	22.8	0.38	59.5
Mariner	12-3346	2022	247	0	0	0	0	0
Mariner	12-3346	2017-2021	252	0	0	0	0	0
Mariner	12-3347	2022	1,691	11	112,911	66	1.56	42.3
Mariner	12-3347	2017-2021	1,184	6	44,855	29.9	0.36	83.3
Mariner	12-3348	2022	1,344	1	368	0.3	0.01	46

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Mariner	12-3348	2017-2021	1,346	2	33,267	24.8	0.5	50.1
Mariner	12-3349	2022	699	0	0	0	0	0
Mariner	12-3349	2017-2021	719	1	258	0.4	0	100.4
Mariner	12-3391	2022	1,380	4	31,102	22.5	0.1	217.5
Mariner	12-3391	2017-2021	1,401	2.2	8,524	7	0.04	180.5
Martha Lake	12-0073	2022	3,425	5	70,299	29.9	0.09	324
Martha Lake	12-0073	2017-2021	3,011	9.6	350,847	104.5	1.53	68.5
Martha Lake	12-0074	2022	146	0	0	0	0	0
Martha Lake	12-0074	2017-2021	27	0.8	2,775	30.5	0.48	63.4
Martha Lake	12-0251	2022	1,202	5	193,899	157.3	1.01	155.2
Martha Lake	12-0251	2017-2021	939	6.2	52,971	49.6	1.34	37
Martha Lake	12-0466	2022	1,501	10	144,911	96.4	0.65	148.5
Martha Lake	12-0466	2017-2021	1,351	8.4	114,325	81.1	0.35	229.5
Martha Lake	12-5695	2022	1,331	2	1,830	1.4	0.02	57.2
Martha Lake	12-5695	2017-2021	765	0	0	0	0	0
Meadowdale	12-1837	2022	1,908	9	10,671	5.5	0.01	395.2
Meadowdale	12-1837	2017-2021	1,866	6.2	33,751	18	0.42	43.2
Meadowdale	12-1838	2022	1,325	2	12,315	9.3	0.05	181.1
Meadowdale	12-1838	2017-2021	1,307	3.8	37,565	28.8	0.65	44.5
Meadowdale	12-1839	2022	1,140	10	44,035	38.6	0.16	239.3
Meadowdale	12-1839	2017-2021	1,170	8	52,227	48.4	0.92	52.5
Meadowdale	12-1840	2022	571	7	143,722	250	3.17	78.9
Meadowdale	12-1840	2017-2021	567	4.4	52,227	92.2	1.09	84.4
Mountlake	12-0133	2022	1,583	13	11,119	6.5	0.14	46.7
Mountlake	12-0133	2017-2021	1,404	8.2	10,920	7.2	0.07	108.4
Mountlake	12-0134	2022	978	7	286,260	302.6	0.81	375.2
Mountlake	12-0134	2017-2021	1,759	6.6	36,499	24.6	0.67	36.8
Mountlake	12-0135	2022	1,724	6	10,746	6.5	0.04	173.3
Mountlake	12-0135	2017-2021	1,683	6.2	54,345	30.5	0.4	75.6
Mountlake	12-0136	2022	2,034	13	97,087	47.7	0.1	464.5
Mountlake	12-0136	2017-2021	2,042	19	153,139	75.4	0.54	138.8
Mukilteo	12-0128	2022	1,232	4	172,485	139.8	1.23	113.3
Mukilteo	12-0128	2017-2021	1,225	3.8	63,538	51.9	0.74	69.9
Mukilteo	12-0129	2022	959	4	18,028	18.8	0.04	462.3
Mukilteo	12-0129	2017-2021	966	5	45,309	47.3	0.32	149.1
Mukilteo	12-0600	2022	1,286	8	9,947	7.7	1.97	3.9
Mukilteo	12-0600	2017-2021	1,294	4.4	66,497	52.6	0.7	74.7
Mukilteo	12-4523	2022	861	7	28,317	33	0.57	57.8
Mukilteo	12-4523	2017-2021	851	4	10,659	12.4	0.41	30.1
Murphy'S Corner	12-1748	2022	1,911	5	108,804	56.9	2.1	27.1
Murphy'S Corner	12-1748	2017-2021	1,983	2.2	24,421	12.7	0.23	55.4
Murphy'S Corner	12-1749	2022	1,520	8	26,878	19.4	0.09	205.2

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Murphy'S Corner	12-1749	2017-2021	1,305	4.2	151,358	107.3	0.97	110.5
Murphy'S Corner	12-1750	2022	690	2	1,196	1.7	0.01	239.2
Murphy'S Corner	12-1750	2017-2021	703	1.8	9,094	13.3	0.41	32.7
Murphy'S Corner	12-1751	2022	581	5	304,479	314.5	1.97	159.9
Murphy'S Corner	12-1751	2017-2021	554	1.2	237	0.4	0	91.3
North Alderwood	12-0509	2022	621	0	0	0	0	0
North Alderwood	12-0509	2017-2021	411	1	8,890	21.8	0.15	150.1
North Alderwood	12-0510	2022	181	0	0	0	0	0
North Alderwood	12-0510	2017-2021	180	0.6	85	0.5	0.02	28.8
North Alderwood	12-0511	2022	167	0	0	0	0	0
North Alderwood	12-0511	2017-2021	95	0	0	0	0	0
North Alderwood	12-0512	2022	88	0	0	0	0	0
North Alderwood	12-0512	2017-2021	52	0.4	15,905	345.7	3.22	107.5
North Camano	12-0313	2022	944	14	298,899	315.3	2.11	149.5
North Camano	12-0313	2017-2021	931	13.2	113,376	124.4	1.41	88
North Camano	12-0314	2022	106	3	12,886	121.6	0.29	415.7
North Camano	12-0314	2017-2021	127	2.8	1,123	11.4	0.07	156
North Camano	12-0315	2022	505	7	44,869	88.8	2.06	43.2
North Camano	12-0315	2017-2021	496	10	140,897	284.5	2.42	117.5
North Camano	12-0316	2022	1,440	14	710,189	489.8	3.43	142.8
North Camano	12-0316	2017-2021	1,462	13	149,030	104.9	1.17	89.4
North Creek	12-1410	2022	1,781	2	3,102	1.7	0.03	68.9
North Creek	12-1410	2017-2021	1,769	4	60,312	42	0.32	130.8
North Creek	12-1411	2022	1,286	0	0	0	0	0
North Creek	12-1411	2017-2021	1,319	1.2	26,028	20	0.12	165.2
North Creek	12-1412	2022	1,661	3	41,795	25.2	0.15	167.9
North Creek	12-1412	2017-2021	1,467	5	97,289	63.9	1.01	63.4
North Creek	12-1413	2022	1,704	0	0	0	0	0
North Creek	12-1413	2017-2021	1,646	3	9,392	5.6	0.04	136.5
North Creek	12-3733	2022	728	0	0	0	0	0
North Creek	12-3733	2017-2021	723	0.8	851	1.3	0	305.3
North Marysville	12-0142	2022	294	2	2,559	8.8	0.07	121.9
North Marysville	12-0142	2017-2021	303	1	985	3.5	0.02	215.9
North Marysville	12-0143	2022	800	2	15,262	19.1	0.06	331.8
North Marysville	12-0143	2017-2021	823	0.4	22	0	0	54
North Marysville	12-0144	2022	1,088	4	13,311	12.2	2.93	4.2
North Marysville	12-0144	2017-2021	1,126	3	19,965	18.8	0.28	67.6
North Marysville	12-0254	2022	675	3	21,253	31	0.11	295.2
North Marysville	12-0254	2017-2021	670	6.2	19,215	29.9	0.36	83
North Mountain	12-2514	2022	1,459	17	125,744	86	0.23	375.4
North Mountain	12-2514	2017-2021	1,574	45.8	962,173	678.4	4.05	167.6
North Mountain	12-2515	2022	458	33	1,373,142	2965.7	7.38	401.6

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
North Mountain	12-2515	2017-2021	535	22.4	297,953	659.1	3.94	167.3
North Mountain	12-2516	2022	1	0	0	0	0	0
North Mountain	12-2516	2017-2021	2	0.2	52	26.2	0.2	131
North Stanwood	12-0996	2022	243	6	57,026	234.7	2.48	94.6
North Stanwood	12-0996	2017-2021	281	6.6	22,310	96.5	1.04	92.9
North Stanwood	12-0997	2022	702	10	62,093	87.7	1.18	74.6
North Stanwood	12-0997	2017-2021	744	11.2	101,124	150.5	2.12	70.9
North Stanwood	12-0998	2022	1,957	22	247,296	116.4	1.84	63.2
North Stanwood	12-0998	2017-2021	1,702	18	256,470	141.5	1.2	118
North Stanwood	12-0999	2022	2,008	33	699,988	347.6	1.42	244
North Stanwood	12-0999	2017-2021	2,205	29.2	572,716	290	2.37	122.2
North Stanwood	12-3204	2022	2,173	22	459,063	210.1	1.79	117.2
North Stanwood	12-3204	2017-2021	2,072	30.2	441,499	215.5	1.01	212.6
Norton Ave	12-0588	2022	64	0	0	0	0	0
Norton Ave	12-0588	2017-2021	73	0	0	0	0	0
Norton Ave	12-0589	2022	995	2	358	0.4	0.01	29.8
Norton Ave	12-0589	2017-2021	1,039	1.4	29,907	30.5	0.22	139
Norton Ave	12-0590	2022	1,219	2	5,215	4.3	0.01	434.6
Norton Ave	12-0590	2017-2021	1,284	2.6	2,553	2.2	0.22	9.8
Norton Ave	12-0591	2022	927	4	2,323	2.1	0.02	136.6
Norton Ave	12-0591	2017-2021	891	2	8,262	9.6	0.02	457
Olivia Park	12-2576	2022	1,483	3	31,368	19.8	0.08	253
Olivia Park	12-2576	2017-2021	1,434	2	14,711	10.2	0.42	23.9
Olivia Park	12-2577	2022	787	5	17,078	21.6	0.12	181.7
Olivia Park	12-2577	2017-2021	818	6	20,470	26.7	0.33	80.4
Olivia Park	12-2578	2022	1,047	1	4,830	4.6	0.07	69
Olivia Park	12-2578	2017-2021	1,061	2.2	17,719	19.2	0.27	71.8
Olivia Park	12-2579	2022	1,402	4	63,084	44.9	0.24	184.5
Olivia Park	12-2579	2017-2021	1,386	3.8	33,229	24.4	0.46	53.3
Oso	12-1309	2022	304	6	76,561	248.6	1.73	143.9
Oso	12-1309	2017-2021	232	8.6	30,241	117.2	1.37	85.9
Oso	12-1310	2022	142	4	117,043	812.8	11.31	71.8
Oso	12-1310	2017-2021	154	5	17,104	124.8	0.66	188.1
Paine Field	12-0385	2022	276	2	4,517	16.4	3.26	5
Paine Field	12-0385	2017-2021	286	0.8	355	1.4	0	309.5
Paine Field	12-0386	2022	115	1	404	3.6	0.01	404
Paine Field	12-0386	2017-2021	114	0.2	9	0.1	0	47
Paine Field	12-0387	2022	1,636	9	333,342	203.8	3.03	67.2
Paine Field	12-0387	2017-2021	1,681	6.4	28,988	17.8	0.42	42.1
Paine Field	12-0388	2022	686	2	191	0.2	0	95.5
Paine Field	12-0388	2017-2021	650	1.8	17,904	29.2	0.27	109
Paine Field	12-1729	2022	1,877	2	8,244	4.4	0.04	105.7

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Paine Field	12-1729	2017-2021	1,887	3.6	51,248	28.5	0.44	64.6
Paine Field	12-1730	2022	1,601	4	4,810	3	0.02	200.4
Paine Field	12-1730	2017-2021	1,623	4.2	130,355	81.4	0.95	86
Paine Field	12-1731	2022	2,336	1	184	0.1	0	92
Paine Field	12-1731	2017-2021	2,322	2.6	130,616	56.3	0.36	156.2
Paine Field	12-1732	2022	144	2	181	1.3	0.01	90.5
Paine Field	12-1732	2017-2021	145	0.2	197	1.4	0	329
Park Ridge	12-2319	2022	370	0	0	0	0	0
Park Ridge	12-2319	2017-2021	371	2.2	15,004	44	0.96	45.8
Park Ridge	12-2320	2022	835	5	158,375	183.7	1.04	176.8
Park Ridge	12-2320	2017-2021	781	4.4	19,252	24.2	0.3	81.1
Park Ridge	12-2321	2022	1,596	5	1,173	0.7	0	195.5
Park Ridge	12-2321	2017-2021	1,906	3	63,583	40	0.23	174.7
Park Ridge	12-2322	2022	1,071	14	42,415	39.9	0.18	219.8
Park Ridge	12-2322	2017-2021	913	13.4	88,372	86.4	0.91	94.7
Park Ridge	12-4183	2022	1,068	5	161,979	148.1	1.23	120.3
Park Ridge	12-4183	2017-2021	897	4.6	74,044	74.7	0.73	102.1
Perrinville	12-0092	2022	768	7	103,017	134.1	3.7	36.2
Perrinville	12-0092	2017-2021	759	5.4	62,723	82.3	1.78	46.2
Perrinville	12-0093	2022	1,202	9	68,925	56.4	0.19	292.1
Perrinville	12-0093	2017-2021	1,203	7.2	96,598	81.8	1.11	73.7
Perrinville	12-0126	2022	1,488	12	60,479	40.5	0.13	318.3
Perrinville	12-0126	2017-2021	1,391	8.8	54,623	36.8	0.5	73.4
Perrinville	12-0221	2022	1,091	7	20,742	19	0.22	85
Perrinville	12-0221	2017-2021	1,005	4.4	30,136	28	0.44	63.6
Picnic Point	12-1414	2022	679	18	102,341	150.5	0.6	250.8
Picnic Point	12-1414	2017-2021	708	8.6	108,085	160.9	1.31	122.5
Picnic Point	12-1415	2022	1,165	8	80,898	68.5	0.79	86.2
Picnic Point	12-1415	2017-2021	1,179	8	55,821	48.5	0.83	58.7
Picnic Point	12-1416	2022	1,426	11	25,412	17.5	0.18	97.4
Picnic Point	12-1416	2017-2021	1,405	8.2	87,571	61.5	0.25	247.7
Picnic Point	12-1417	2022	517	6	10,685	20.5	0.08	254.4
Picnic Point	12-1417	2017-2021	514	2.8	65,801	127.5	0.93	136.7
Pinehurst	12-0147	2022	796	9	44,560	55.9	1.1	51
Pinehurst	12-0147	2017-2021	833	4.4	26,086	32.8	0.44	74.4
Pinehurst	12-0148	2022	1,304	5	11,252	8.6	0.02	401.9
Pinehurst	12-0148	2017-2021	1,356	5.6	40,058	30.9	0.51	60
Pinehurst	12-0149	2022	1,740	3	67,754	38.9	1.01	38.7
Pinehurst	12-0149	2017-2021	1,766	7.4	157,548	90.9	0.86	106
Pinehurst	12-0220	2022	1,062	3	458	0.4	0.01	76.3
Pinehurst	12-0220	2017-2021	1,009	6	16,966	16.1	0.06	260.7
Pinehurst	12-3350	2022	1,850	7	1,940	1	0.01	92.4

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Pinehurst	12-3350	2017-2021	1,927	14.4	313,129	169.2	1.97	86.1
Polaris	12-4500	2022	564	1	692	1.2	0.01	173
Polaris	12-4500	2017-2021	444	1	9,495	18.2	0.51	35.5
Polaris	12-4501	2022	1,441	8	40,932	28.4	0.11	265.8
Polaris	12-4501	2017-2021	1,425	3.8	18,839	13.2	0.24	55.3
Polaris	12-4502	2022	1,332	2	10,510	6.8	0.05	134.7
Polaris	12-4502	2017-2021	1,979	3.2	52,631	29.4	0.49	59.5
Polaris	12-4503	2022	742	2	1,679	2.3	0.01	239.9
Polaris	12-4503	2017-2021	5	0.8	8,261	5.7	0.04	139.2
Portage	12-3502	2022	206	2	1,248	5.9	0.03	178.3
Portage	12-3502	2017-2021	194	3.8	7,726	42.1	2.78	15.1
Portage	12-3503	2022	270	6	52,746	195.4	2.91	67
Portage	12-3503	2017-2021	266	6.6	30,930	118.6	4.1	29
Portage	12-3504	2022	957	16	478,589	488.9	2.91	168.2
Portage	12-3504	2017-2021	1,129	19.8	254,621	262.6	2.08	126.1
Portage	12-3505	2022	1,085	5	53,748	58.9	1.05	55.8
Portage	12-3505	2017-2021	1,193	4.2	25,996	22.6	0.8	28.2
Quil Ceda	12-3177	2022	310	1	192	0.6	0	192
Quil Ceda	12-3177	2017-2021	348	1.2	790	2.5	0.03	79.3
Quil Ceda	12-3178	2022	1,348	18	280,916	208.4	0.53	396.2
Quil Ceda	12-3178	2017-2021	1,428	26.2	353,231	262.4	2.14	122.7
Quil Ceda	12-3179	2022	27	1	337	10.5	0.03	337
Quil Ceda	12-3179	2017-2021	33	0.4	1,121	43.1	0.55	78.7
Quil Ceda	12-3180	2022	1,147	9	193,702	167.3	3.11	53.8
Quil Ceda	12-3180	2017-2021	1,229	7	131,653	115.5	1.26	91.5
Richmond Park	12-0232	2022	821	8	205,028	249.1	2.03	122.6
Richmond Park	12-0232	2017-2021	822	8	69,752	85.8	0.71	121.2
Richmond Park	12-0233	2022	1,102	13	151,941	137.8	1.71	80.8
Richmond Park	12-0233	2017-2021	1,099	9.6	107,014	99.2	0.53	186.5
Richmond Park	12-2048	2022	647	7	97,361	123.1	1.06	116.5
Richmond Park	12-2048	2017-2021	370	2.8	17,405	48.9	0.57	86.4
Richmond Park	12-5217	2022	749	9	20,023	26.2	0.23	112.5
Richmond Park	12-5217	2017-2021	776	5.8	40,096	53.3	0.26	206.5
Silver Lake	12-0239	2022	1,728	3	1,993	1.2	0.03	45.3
Silver Lake	12-0239	2017-2021	1,678	3.4	49,202	28.8	0.43	67.3
Silver Lake	12-0240	2022	1,038	1	99	0.1	0	99
Silver Lake	12-0240	2017-2021	1,083	4.4	60,339	59.4	0.66	90.2
Silver Lake	12-0253	2022	1,736	5	1,211	0.7	0.01	60.6
Silver Lake	12-0253	2017-2021	1,747	9.2	221,614	130.2	1.62	80.5
Silver Lake	12-0267	2022	830	3	23,482	29.3	0.32	91
Silver Lake	12-0267	2017-2021	841	1.4	6,079	7.4	0.05	163.3
Silver Lake	12-0290	2022	850	0	0	0	0	0

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Silver Lake	12-0290	2017-2021	851	1.2	30,694	36.1	0.28	130.3
Smokey Point	12-1507	2022	387	3	57,363	144.5	2.11	68.6
Smokey Point	12-1507	2017-2021	421	2.4	11,821	32.4	0.72	44.8
Smokey Point	12-1508	2022	908	1	378	0.4	0.01	63
Smokey Point	12-1508	2017-2021	1,601	1	16,003	17.6	0.23	78.1
Smokey Point	12-1509	2022	1,764	6	203,534	114.1	1.09	104.4
Smokey Point	12-1509	2017-2021	1,466	8.2	85,413	55.9	1.32	42.4
Smokey Point	12-1510	2022	1,260	3	59,674	77.5	1.22	63.6
Smokey Point	12-1510	2017-2021	36	2	53,401	49.1	0.93	52.9
Smokey Point	12-5696	2022	33	0	0	0	0	0
Smokey Point	12-5696	2017-2021	25	0	0	0	0	0
Smokey Point	12-5697	2022	2	0	0	0	0	0
Smokey Point	12-5697	2017-2021	1	0	0	0	0	0
Smokey Point	12-5698	2022	1,206	3	75,337	60.3	0.45	134.3
Smokey Point	12-5698	2017-2021	722	0	0	0	0	0
Smokey Point	12-5699	2022	66	0	0	0	0	0
Smokey Point	12-5699	2017-2021	40	0	0	0	0	0
Snohomish	12-0103	2022	504	8	45,147	89.4	2.02	44.3
Snohomish	12-0103	2017-2021	508	2.6	38,763	77.3	1.36	56.9
Snohomish	12-0104	2022	575	9	49,208	84.5	1.83	46.2
Snohomish	12-0104	2017-2021	626	9.8	71,569	129	1.82	70.9
Snohomish	12-0123	2022	1,426	6	1,223	0.9	0.02	40.8
Snohomish	12-0123	2017-2021	1,522	5.6	9,075	6.3	0.04	143.8
Snohomish	12-0151	2022	615	10	116,760	188.3	1.41	133.1
Snohomish	12-0151	2017-2021	643	13.4	91,687	152.7	2.38	64.1
South Camano	12-1530	2022	689	24	280,804	402.3	3.76	107.1
South Camano	12-1530	2017-2021	691	17.4	300,943	449.6	3.96	113.5
South Camano	12-1531	2022	494	2	18,236	36.8	0.15	253.3
South Camano	12-1531	2017-2021	462	2.4	33,193	68.9	0.76	91.1
South Camano	12-1532	2022	1,600	22	436,760	270.4	1.43	188.7
South Camano	12-1532	2017-2021	1,597	19.4	552,725	350.2	1.97	177.4
South Camano	12-1533	2022	1,063	52	839,326	783.7	6.6	118.8
South Camano	12-1533	2017-2021	1,077	29.2	667,538	646	3.75	172.3
Stimson Crossing	12-3090	2022	44	0	0	0	0	0
Stimson Crossing	12-3090	2017-2021	46	1.2	1,587	36.3	0.62	58.2
Stimson Crossing	12-3091	2022	1,303	27	351,073	262.7	1.08	243.9
Stimson Crossing	12-3091	2017-2021	1,469	22.6	344,964	268.3	3	89.5
Stimson Crossing	12-3092	2022	250	3	165,719	668.2	7.41	90.2
Stimson Crossing	12-3092	2017-2021	281	2	79,743	319.4	4.03	79.3
Stimson Crossing	12-3093	2022	261	8	77,416	295.5	3.06	96.6
Stimson Crossing	12-3093	2017-2021	326	6.2	20,700	82.4	0.37	224.7
Sultan	12-1593	2022	576	18	99,117	160.9	1.57	102.4

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Sultan	12-1593	2017-2021	585	9.4	191,021	345.5	4.47	77.3
Sultan	12-1594	2022	379	13	490,061	1286.2	3.55	362.5
Sultan	12-1594	2017-2021	394	9.6	181,466	498.2	1.85	269.5
Sultan	12-1595	2022	1,444	31	822,818	566.3	1.95	290.4
Sultan	12-1595	2017-2021	2,128	24.8	705,812	478.3	4.11	116.5
Sultan	12-1596	2022	648	3	157,834	240.6	2.01	119.7
Sultan	12-1596	2017-2021	676	3.2	41,658	65.6	0.43	153.7
Sultan	12-5004	2022	0	4	725	0	0	0
Sultan	12-5004	2017-2021	1	2.6	354	0	0	0
Sunset	12-5208	2022	1,368	16	409,042	297.1	3.57	83.2
Sunset	12-5208	2017-2021	1,365	23.6	783,675	592.1	5.53	107.1
Sunset	12-5209	2022	705	12	190,031	267.6	0.51	524.9
Sunset	12-5209	2017-2021	741	9.2	140,561	202.8	2.01	100.8
Sunset	12-5210	2022	550	13	130,870	237.5	0.69	346.2
Sunset	12-5210	2017-2021	612	7.2	9,335	16.9	0.12	142.7
Sunset	12-5211	2022	336	9	4,763	14	0.18	79.4
Sunset	12-5211	2017-2021	335	4.6	50,320	150.6	0.49	305.6
Sunset	12-5212	2022	1,042	11	258,752	246.2	3.94	62.5
Sunset	12-5212	2017-2021	1,054	13.4	91,601	87.6	1.04	84.2
Tenth Street	12-0298	2022	1,015	1	585	0.6	0	117
Tenth Street	12-0298	2017-2021	1,075	2	9,005	8.9	0.21	41.9
Tenth Street	12-0299	2022	1,017	4	65,338	64.3	1.28	50.2
Tenth Street	12-0299	2017-2021	1,089	2.6	1,791	1.7	0.01	221.8
Tenth Street	12-0300	2022	1,558	7	436,298	280.4	1.09	256.8
Tenth Street	12-0300	2017-2021	1,398	6.8	194,080	143.1	1.05	135.8
Tenth Street	12-0301	2022	701	1	544	0.8	0.01	136
Tenth Street	12-0301	2017-2021	762	2.6	22,045	31.4	0.61	51.6
Tenth Street	12-0327	2022	0	0	0	0	0	0
Tenth Street	12-0327	2017-2021	0	0	0	0	0	0
Thrashers Corner	12-0275	2022	330	1	245	0.7	0	245
Thrashers Corner	12-0275	2017-2021	329	0.6	12,398	41.8	0.48	87.2
Thrashers Corner	12-0276	2022	1,121	2	6,058	5.3	0.06	86.5
Thrashers Corner	12-0276	2017-2021	1,122	5.6	57,635	52.8	0.8	66
Thrashers Corner	12-0277	2022	1,845	5	4,403	2.4	0.02	107.4
Thrashers Corner	12-0277	2017-2021	1,870	2	59,877	32.5	0.13	247.4
Thrashers Corner	12-0278	2022	1,482	4	118,288	79.7	2.2	36.2
Thrashers Corner	12-0278	2017-2021	2,566	2.6	220,620	148.9	0.46	321.1
Thrashers Corner	12-3304	2022	0	0	0	0	0	0
Thrashers Corner	12-3304	2017-2021	0	0	0	0	0	0
Thrashers Corner	12-3471	2022	80	0	0	0	0	0
Thrashers Corner	12-3471	2017-2021	82	0.8	9,042	112.6	2.5	45
Thrashers Corner	12-3472	2022	1,927	3	434	0.2	0	144.7

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Thrashers Corner	12-3472	2017-2021	1,470	3.6	9,048	6	0.24	25
Thrashers Corner	12-3473	2022	44	1	4,288	68.1	1.06	64
Thrashers Corner	12-3473	2017-2021	27	0.8	1,061	28.3	0.64	44.1
Thrashers Corner	12-3474	2022	11	0	0	0	0	0
Thrashers Corner	12-3474	2017-2021	12	0	0	0	0	0
Three Lakes	12-1818	2022	644	24	193,723	241.2	1.25	193.3
Three Lakes	12-1818	2017-2021	792	23.8	382,062	536.6	2.63	203.9
Three Lakes	12-1819	2022	1,172	18	381,547	324.2	3.73	86.8
Three Lakes	12-1819	2017-2021	1,241	21.2	214,862	188.1	3.29	57.2
Three Lakes	12-1820	2022	1,780	45	620,154	391	4.82	81.1
Three Lakes	12-1820	2017-2021	1,717	52.2	927,470	544.9	5.16	105.6
Three Lakes	12-1821	2022	739	14	200,465	270.5	4.09	66.1
Three Lakes	12-1821	2017-2021	812	15.6	200,261	279.7	2.82	99.2
Tulalip	12-0505	2022	271	4	36,370	152.2	0.9	168.4
Tulalip	12-0505	2017-2021	364	2.8	13,298	47.1	0.32	149.5
Tulalip	12-0506	2022	400	3	10,843	27	0.09	285.3
Tulalip	12-0506	2017-2021	429	3.2	11,481	28.8	0.62	46.3
Tulalip	12-0507	2022	1,047	3	9,432	8.9	0.09	103.6
Tulalip	12-0507	2017-2021	1,074	13.2	360,125	344.5	2.28	151.1
Tulalip	12-0508	2022	560	10	37,540	66.8	0.5	134.1
Tulalip	12-0508	2017-2021	616	6.2	28,139	51.5	1.02	50.3
Turners Corner	12-1428	2022	164	5	45,432	268.8	1.12	239.1
Turners Corner	12-1428	2017-2021	177	3.2	33,514	207.9	3.48	59.8
Turners Corner	12-1429	2022	604	19	65,901	108.7	1.29	84.6
Turners Corner	12-1429	2017-2021	1,111	9	64,744	109.1	0.3	363.9
Turners Corner	12-1430	2022	843	10	48,702	57.7	1.04	55.7
Turners Corner	12-1430	2017-2021	914	15.2	143,159	172.2	1.37	126
Turners Corner	12-1431	2022	840	12	96,492	114.9	1.29	88.9
Turners Corner	12-1431	2017-2021	897	16.8	191,918	231.2	1.2	193.3
Turners Corner	12-4310	2022	45	0	0	0	0	0
Turners Corner	12-4310	2017-2021	58	2.6	1,502	32.7	0.49	67.2
Village	12-4304	2022	404	8	10,926	27	0.26	103.1
Village	12-4304	2017-2021	432	3	23,032	58.7	0.37	159.3
Village	12-4305	2022	1,699	23	187,119	109.5	1.09	100.5
Village	12-4305	2017-2021	1,820	18	162,167	95.3	1.11	85.4
Village	12-4306	2022	4	0	0	0	0	0
Village	12-4306	2017-2021	5	0.8	112	28.1	0.4	70.2
Village	12-4307	2022	15	2	551	26.2	0.24	110.2
Village	12-4307	2017-2021	17	1.4	175	11	0.16	69.2
Wallace River	12-4485	2022	416	8	150,776	360.7	0.43	847.1
Wallace River	12-4485	2017-2021	469	9.8	92,323	226.1	1.16	194.7
Wallace River	12-4486	2022	0	0	0	0	0	0

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Wallace River	12-4486	2017-2021	1	0.4	16	15.8	0.4	39.5
Wallace River	12-4487	2022	1,157	13	247,561	178.4	1.2	148.3
Wallace River	12-4487	2017-2021	182	7.6	60,230	70.5	0.37	191.4
Waterfront	12-1842	2022	1,166	0	0	0	0	0
Waterfront	12-1842	2017-2021	1,209	3.8	112,968	98.2	1.16	84.4
Waterfront	12-1843	2022	896	0	0	0	0	0
Waterfront	12-1843	2017-2021	934	0.4	155	0.2	0	86.2
Waterfront	12-1846	2022	410	1	448	1.1	0.02	64
Waterfront	12-1846	2017-2021	456	1.8	5,654	13.8	0.07	194.6
Waterfront	12-1847	2022	605	6	3,934	6.5	0.03	231.4
Waterfront	12-1847	2017-2021	637	3.2	10,462	17.5	0.25	71
West Monroe	12-0631	2022	659	1	3,876	5.7	0.01	646
West Monroe	12-0631	2017-2021	663	2.2	4,882	7.5	0.24	31.1
West Monroe	12-0632	2022	1,536	11	9,157	5.9	0.05	115.9
West Monroe	12-0632	2017-2021	1,430	6.6	27,796	19.6	0.29	67.9
West Monroe	12-0633	2022	1,080	7	142,522	127.4	1.05	121.5
West Monroe	12-0633	2017-2021	831	7.6	52,468	62	0.53	117.6
West Monroe	12-0634	2022	337	10	192,581	568.1	3.24	175.4
West Monroe	12-0634	2017-2021	379	7.6	90,708	272	2.24	121.3
West Monroe	12-3360	2022	719	8	34,571	47.6	0.59	81.2
West Monroe	12-3360	2017-2021	663	11.6	106,024	157.6	1.42	111.1
West Monroe	12-3361	2022	1,094	3	65,858	60.3	1.04	58
West Monroe	12-3361	2017-2021	1,028	1.6	22,424	22.2	0.28	79.3
West Monroe	12-3362	2022	1,367	5	357,064	258.2	0.6	428.6
West Monroe	12-3362	2017-2021	1,301	4.4	64,908	49.8	0.19	267.6
West Monroe	12-3363	2022	869	0	0	0	0	0
West Monroe	12-3363	2017-2021	853	3	18,766	24	0.07	363.3
Westgate	12-0404	2022	802	4	88,532	110.7	1.03	107.6
Westgate	12-0404	2017-2021	906	4.8	45,766	57.1	0.74	77
Westgate	12-0405	2022	993	9	146,315	147.3	1.72	85.9
Westgate	12-0405	2017-2021	826	3.8	67,143	28	0.41	68.9
Westgate	12-0406	2022	1,452	3	17,139	11.8	0.04	306.1
Westgate	12-0406	2017-2021	1,331	5.8	79,286	54.8	0.45	122.4
Westgate	12-0407	2022	988	8	24,205	24.5	0.19	129.4
Westgate	12-0407	2017-2021	982	4.6	6,296	6.4	0.03	188.5
Woods Creek	12-1808	2022	1,900	30	907,069	478.9	4.37	109.7
Woods Creek	12-1808	2017-2021	1,998	38.4	1,051,145	559.9	3.43	163.4
Woods Creek	12-1809	2022	1,630	45	926,608	557.9	2.56	217.7
Woods Creek	12-1809	2017-2021	1,498	33.6	526,609	346.8	2.43	143
Woods Creek	12-1810	2022	1,291	6	93,132	69.1	1.08	63.8
Woods Creek	12-1810	2017-2021	995	9.6	111,093	97.2	0.78	123.9
Woods Creek	12-1811	2022	1,179	6	225,150	190.5	2.34	81.4

Substation	Circuit	Period	Customers	Outages	CMI	SAIDI	SAIFI	CAIDI
Woods Creek	12-1811	2017-2021	1,260	18.6	393,310	338.5	2.54	133.5
York	12-5392	2022	1,563	12	17,972	11.5	0.05	214
York	12-5392	2017-2021	1,539	8.6	104,158	67.6	1.27	53.3
York	12-5393	2022	1,853	2	1,960	1.1	0.08	13.2
York	12-5393	2017-2021	1,830	6.4	151,109	82.1	1.63	50.2
York	12-5394	2022	1,757	6	152,367	86.7	2.03	42.8
York	12-5394	2017-2021	1,561	6.4	222,320	127.6	1.83	69.6
York	12-5395	2022	777	13	178,882	229.9	3.44	66.7
York	12-5395	2017-2021	774	14.8	302,855	396.8	5.43	73.1

Appendix B

Historical Data: SAIDI, CAIDI, and SAIFI

No uplift factor was applied to these historical metrics.

Table B-1: SAIDI 1991 - 2022

Year	Distribution	Transmission	Overall	Excluded Outages	Overall (Everything)
1991	68.3	27.7	96	180	276
1992	95.3	5.5	101.4	82.3	183.7
1993	87.4	9.8	97.2	1136.2	1233.5
1994	60.2	41.5	101.7	9.2	110.9
1995	81.6	12.9	94.5	359.5	454
1996	52.1	8.5	60.6	60.7	121.1
1997	47.7	2.8	50.5	43.8	94.3
1998	47.9	24.3	72.2	40.4	112.6
1999	46.2	17.3	63.5	134.1	236.1
2000	52.5	3.1	55.6	147.3	219.4
2001	34.6	14.7	49.3	7.4	88.8
2002	32.4	21.8	54.2	25.5	89.8
2003	31.7	19.9	52.6	105.1	185.9
2004	35.9	4.2	40.1	237.8	287.2
2005	57.3	6.8	64.1	0	74.7
2006	50.6	17.7	68.3	567.2	684.2
2007	38.4	28.8	67.3	188.8	274.8
2008	41.6	8.4	50	33.8	97.2
2009	49.8	15.3	65.1	0	76.4
2010	69.1	10.9	79.9	34.2	114.1
2011	77.2	6.2	83.3	0	83.3
2012	63.2	8.4	71.6	44.2	115.9
2013	63.7	20.8	84.5	0	84.5
2014	90.3	21.8	112	116.9	228.9
2015	64.1	16.9	81	1312.1	1390.1
2016	57.5	2.1	59.6	77	136.6
2017	117.7	11.9	129.6	43.9	173.6
2018	86.9	5.4	92.4	172.5	264.9
2019	84.8	6.5	91.3	33.5	124.9
2020	107.1	16.5	123.6	139.1	262.6
2021	131.3	6.5	137.9	505	642.9
2022	133.5	4.2	137.7	866.4	1004.1
5-Year Average (2017-2021)	104	9.4	113.4	180.1	293.5

Table B-2: CAIDI 1991 - 2022

Year	Distribution	Transmission	Overall	Excluded Outages	Overall (Everything)
1991	91.0	62.0	80.0	175.0	124.0
1992	100.7	31.6	90.1	235.0	128.0
1993	93.4	38.7	81.7	1001.9	530.7
1994	78.8	163.0	99.9	96.5	99.6
1995	89.9	68.0	86.1	197.7	155.7
1996	81.0	48.7	74.1	84.0	78.7
1997	78.6	23.6	69.5	117.0	85.7
1998	77.8	74.8	76.8	98.8	83.5
1999	73.3	198.0	88.5	155.2	107.9
2000	97.0	44.4	90.9	132.2	118.9
2001	66.5	57.1	63.4	56.2	63.5
2002	66.4	149.8	85.6	94.8	87.4
2003	88.8	88.9	88.8	107.4	106.8
2004	75.1	35.6	67.3	286.5	157.0
2005	83.6	42.5	75.8	0.0	76.5
2006	94.7	54.7	79.7	301.5	217.3
2007	76.2	164.6	99.0	220.9	158.5
2008	86.6	47.0	75.8	148.7	73.0
2009	86.8	51.9	75.0	0.0	74.1
2010	106.4	68.2	98.9	141.4	108.7
2011	112.7	40.6	99.6	0.0	99.6
2012	101.8	33.4	82.0	108.2	190.2
2013	104.3	95.7	102.0	0.0	102.0
2014	117.8	70.4	104.2	338.4	205.8
2015	100.3	79.0	94.9	699.4	509.2
2016	106.2	27.7	96.4	160.4	124.2
2017	98.0	51.7	90.7	168.8	102.1
2018	106	78.7	103.9	236.5	163.6
2019	108.2	86.6	106.3	230.3	124.3
2020	105.2	114.5	106.4	261.9	155.2
2021	109.5	71.0	106.7	530.1	286.4
2022	130.4	35	120.3	735.6	432.4
5-Year Average (2017-2021)	105.5	74.1	101.9	340.7	178.8

Table B-3: SAIFI 1991 - 2022

Year	Distribution	Transmission	Overall	Excluded Outages	Overall (Everything)
1991	0.75	0.45	1.20	1.03	2.23
1992	0.95	0.17	1.13	0.35	1.48
1993	0.94	0.26	1.19	1.13	2.32
1994	0.76	0.26	1.02	0.10	1.11
1995	0.91	0.19	1.10	1.82	2.92
1996	0.64	0.17	0.82	0.72	1.54
1997	0.61	0.12	0.73	0.37	1.10
1998	0.62	0.32	0.94	0.41	1.35
1999	0.63	0.09	0.72	0.86	2.19
2000	0.54	0.07	0.61	1.11	1.85
2001	0.26	0.52	0.78	0.13	1.40
2002	0.49	0.15	0.63	0.27	1.03
2003	0.37	0.22	0.59	0.98	1.74
2004	0.47	0.12	0.58	0.83	1.52
2005	0.69	0.16	0.85	0.00	0.98
2006	0.53	0.33	0.86	1.88	3.15
2007	0.50	0.18	0.68	1.19	2.13
2008	0.48	0.18	0.66	0.23	1.35
2009	0.57	0.30	0.87	0.00	1.03
2010	0.65	0.16	0.81	0.24	1.05
2011	0.68	0.15	0.84	0.00	0.84
2012	0.62	0.25	0.87	0.41	1.28
2013	0.61	0.22	0.83	0.00	0.83
2014	0.77	0.31	1.08	0.35	1.47
2015	0.64	0.21	0.85	1.88	2.73
2016	0.55	0.08	0.63	0.48	1.11
2017	1.20	0.23	1.43	0.26	1.70
2018	0.82	0.07	0.89	0.73	1.62
2019	0.78	0.08	0.86	0.15	1.0
2020	1.02	0.14	1.16	0.53	1.69
2021	1.20	0.09	1.29	0.95	2.24
2022	1.02	0.12	1.14	1.18	2.32
5-Year Average (2017-2021)	0.99	0.13	1.11	0.53	1.64