

SEPTEMBER 23-24, 2022

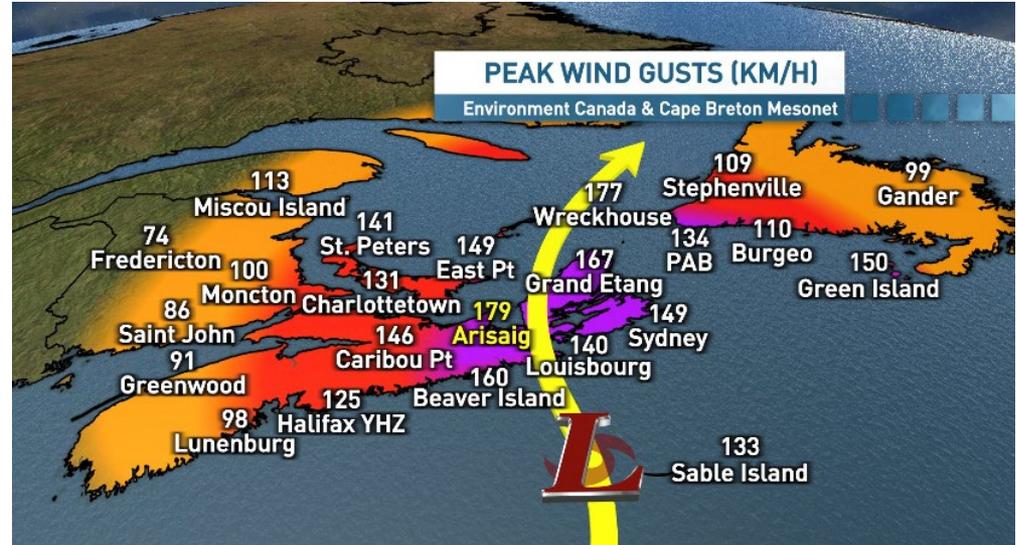
STORM OUTAGE ANALYSIS REPORT

METHODOLOGY

- The report assigns the temperature and wind data based on the highest observed speeds that occurred during the event.
- Full accounting of hourly weather data is provided as an appendix for the eight representative stations used.
- The map in the provincial highlights slide is divided into NS Power operational depot boundaries.
- Provincial highlights in slides 6-8 illustrate outages with the largest CHI impact and overall customer impact. These are intended to give an indication of the overall event impacts and restoration process.
- “Unique Customer Impacts” refers to the total number of unique customers who experienced an outage during the event. A customer who experienced a power outage twice during an event counts as a single unique customer in this tally. “Total Customer Impacts” refers to the total number of customers impacted during an event. A customer who experienced a power outage twice during an event is counted twice in this tally.
- Following the direction of NS Power’s weather consultant, the data needed for this report to present a useful analysis typically requires an examination of eight representative stations. This provides a view of the magnitude, as well as the timing of the strong winds during an impactful storm event. Since this analysis also involves forecast verification, the same list of trusted, high-quality stations is used to ensure results are aligned and benchmarked with the proper historical context. This is also a practical meteorological rationale to focus on the impact and magnitude of an overall event as opposed to the wind speed and gusts at specific sites. Wind speeds and gusts vary significantly due to local effects and conditions such as, but not limited to, shelter from trees, exposed hilltop, sheltered valleys, or coastal wind effects (i.e. stations located on coastline observe winds that do not extend inland). This site-specific information is useful when determining potential local wind enhancements and how to mitigate; however, it historically has limited added value in the province-wide analysis undertaken by NS Power to date.

SECTION 1: WEATHER EVENT SUMMARY

- Hurricane Fiona brought an extended period of extreme winds and heavy rain to Nova Scotia as Sept 23 and 24, 2022.
- The historic storm caused significant and widespread damage to NSPI's transmission and distribution system and at the height of the storm approximately 405,000 customers (across the province) lost power.
- At landfall, Fiona retained significant strength and was equivalent to a Category 2 hurricane.
- A very large wind field of 100+ km/h gusts extended more than 220 km to the west of the storm center.
- The central pressure of 931 hPa reported during landfall was the lowest pressure reported for any storm in Canadian history.
- Wind gusts above 100 km/h persisted for 4 hours in Metro, 8 hours in Cape Breton East and up to 13 hours in the Northeast.
- Areas along both the Atlantic Coast and Northumberland Strait experienced extreme prolonged winds resulting in unprecedented damage to poles and wire. Uprooted trees from outside cleared rights of way tore down power lines.



- Fiona impacted an area almost double in size to that of Dorian in 2019. This resulted in extraordinary damage to trees and electrical equipment in impacted areas throughout the province. It is the 10th costliest extreme natural disaster to occur in Canada and among the most intense and damaging storms in Canadian history.
- Significant coordination and partnership occurred throughout restoration with the Provincial Emergency Management Office (EMO), Department of Natural Resources and Renewables and the Canadian Armed Forces. Satellite Emergency Operation Centres were set up in Truro and Sydney and additional large-scale staging areas for crews were established at the Pictou Wellness Centre and the Mayflower Mall.
- Large trees from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. In some cases, tree diameters exceeded 3-4 feet and required heavy equipment, cranes and hours of work to be removed. Cases of uprooted tree diameter exceeding 5ft were recorded.
- NS Power invests \$20 - 25 million on average each year in tree trimming and clearing rights of way of trees, totaling approx. \$100M over the last five years.

SECTION 2: WIND OBSERVATIONS

High winds impact trees, causing them to fall onto power lines, and can also damage equipment.

Region	Forecast (24Hr Prior)		Actuals					
	Precipitation	Wind Gust (km/h)	Weather Station	Temp (°C)	Weather Observation	Sustained Wind (km/h)	Max Wind Gust (km/h)*	Wind Direction (Degrees)
Annapolis Valley (V)	Rain	90	Greenwood	9	Rain	69	91	280
South Shore (SS)	Rain	90	Yarmouth	10	Rain	50	81	330
Northern Nova Scotia (N)	Rain	130	Nappan/Debert	10	Rain	67	91	340
Northeast (NE)	Rain	140	Caribou Pt.	13	Rain	102	133	360
Metro (M)	Rain	125	Halifax Airport	10	Rain	76	111	340
Eastern Shore (ES)	Rain	140	Beaver Is.	12	Rain	126	150	360
CB West (CBW)	Rain	130	Grand Étang	15	Rain	91	139	90
CB East (CBE)	Rain	140	Sydney	12	Rain	96	141	150

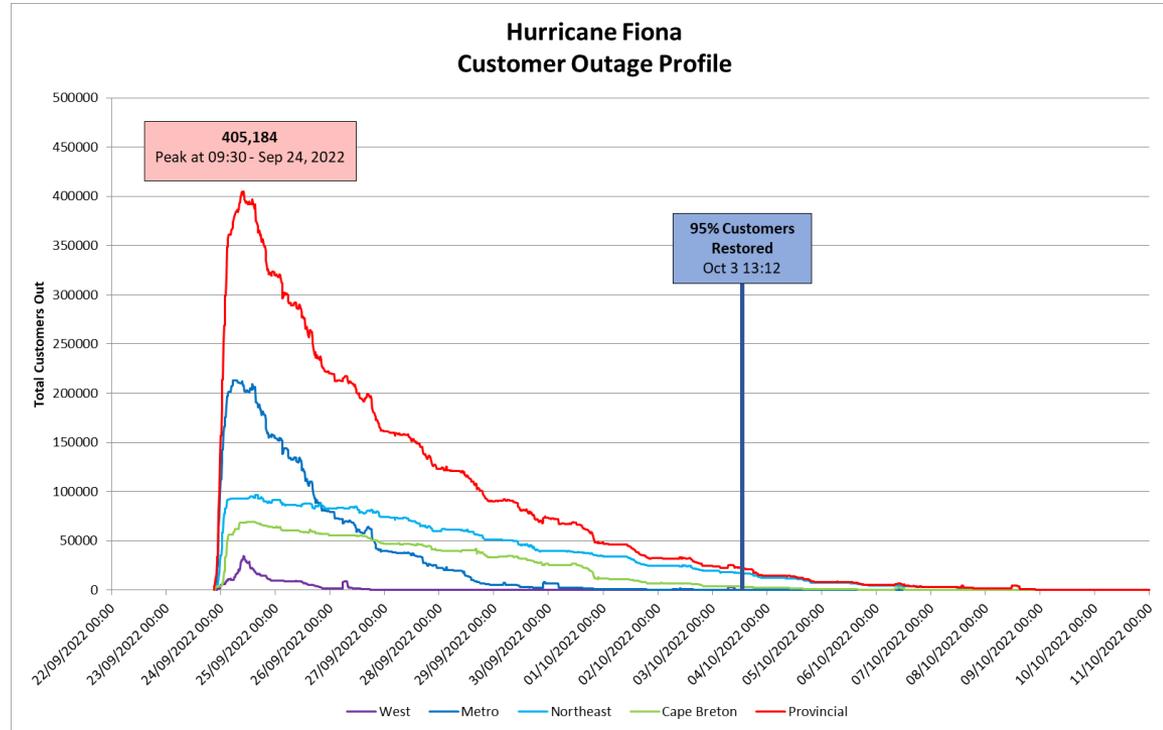


*Gust values are taken from the representative Environment Canada stations in each of the eight weather regions. Their recorded results are sampled once per hour and may not reflect the highest actual gust throughout the entire hour. The location of some stations may also not capture locally higher gusts along coasts or other exposed areas. Certain additional stations in these regions reported even higher gusts than noted above, such as Arisaig recording a gust of 179km/h.

SECTION 3: OUTAGE SUMMARY

Outage Restoration Profile:

Metric	Result
Unique Customers Impacted	424,486
Customer Interruptions	752,391
Total Customer Hours	30,744,918
Event Start Time	23/09/2022 20:48
Event End Time*	08/10/2022 19:00
Main Regions Impacted	Metro, NE, N, ES, CB

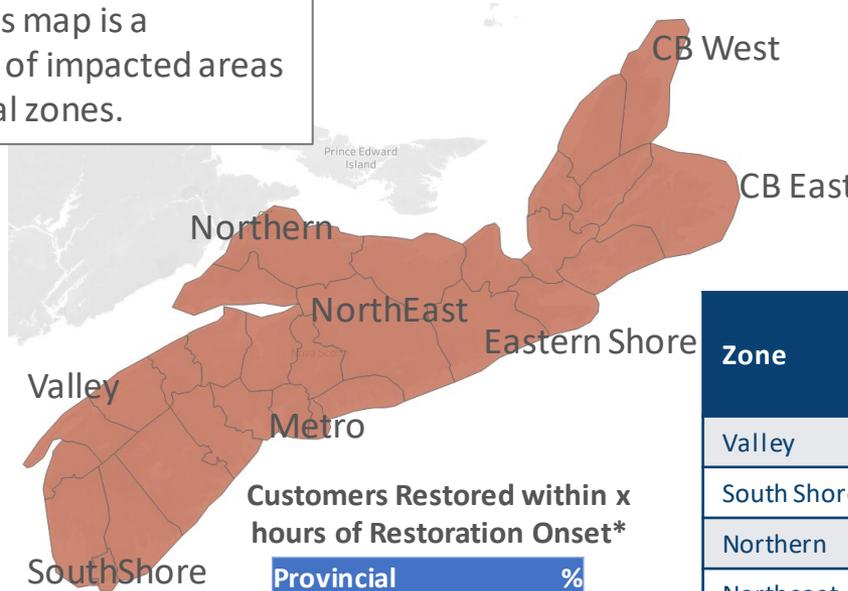


Restoration began once winds fell below safe levels at 12:00 PM 24/09/2022 and continued throughout the event until the last customer was restored at 16:46 on 10/10/2022. Outages due to wind gusts and damaged trees and equipment continued to occur for days after the storm. 95% of impacted customers were restored by the afternoon of Oct 3rd.

*Event End Time is noted as the beginning time of the final outage attributable to the storm event. Combined with the start time, these two times provide the bounds of the outage events included in storm analysis. As shown in the graph above, restoration of customers continues beyond event end time.

SECTION 4: PROVINCIAL IMPACT SUMMARY

This map presents a geospatial view of the overall impact to the province by customer hours of impact (CHI). This map is a symbolized view of impacted areas by 8 geographical zones.



Legend (CHI)

- Red >50,000
- Orange >25,000
- Yellow >10,000
- Green <10,000

Customers Restored within x hours of Restoration Onset*

Provincial	%
Within 6 Hrs	16.90%
Within 12 Hrs	25.51%
Within 24 Hrs	34.83%
Within 48 Hrs	51.85%

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

*This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of storm restoration, rather than the start of their individual outage.

** 99.89% of customers were restored prior to the end of the storm period. Average restoration time for the storm was just over 100hrs.

Nova Scotia experienced the most severe hurricane force wind weather event on record across the province on Sep 23 and 24, 2022. Fiona made landfall equivalent to a Category 2 hurricane with peak gusts over 150 km/h, destroying power lines and uprooting trees. Northeast NS experienced 13 consecutive hours with gusts over 100 km/h.

Over 1,500 field resources were mobilized to restore power in affected areas, including the largest pre-storm staging in NS Power history. Significant coordination with municipal, provincial, and federal counterparts through the provincial Emergency Management Office (EMO), Department of Natural Resources and Renewables and the Canadian Armed Forces.

Satellite EOCs were setup in Truro and Sydney and additional large-scale staging areas for crews were established at the Pictou Wellness Centre and the Mayflower Mall.

Zone	Customer Interruptions (CI)*	Unique Customers Impacted	Customer Hours of Interruptions (CHI)
Valley	57,806	38,587	665,634
South Shore	59,459	28,400	635,356
Northern	41,974	22,154	2,391,604
Northeast	127,683	64,177	9,035,083
Metro	331,481	196,862	9,027,322
Eastern Shore	7,311	5,772	599,697
CB West	4,273	4,165	78,834
CB East	122,404	64,369	8,311,389
Total	752,391	424,486	30,744,918

*Customers Impacted (CI) reflects total not unique impacted

*Wind gusts shown are those at or preceding the event.
Higher gusts occurring after the event onset would impact crew's ability to restore.

SECTION 4: PROVINCIAL HIGHLIGHTS

High winds brought trees and lines into contact or damaged equipment. Large trees, often from outside cleared rights of way, were uprooted or snapped, tearing down power line infrastructure. NS Power invests \$20–25 million on average each year in tree trimming and clearing rights-of-way of trees and vegetation.



Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust* (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Valley	9/23/2022 23:31	Greenwood	10	43	61**	330	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, opening the recloser.	1070	40.86
South Shore	9/24/2022 00:36	Yarmouth	10	48	70**	340	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, opening the recloser.	1528	34.27
Northern	9/23/2022 23:27	Nappan/Debert	10	46	61***	360	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, opening the recloser.	2457	76.81
Northeast	9/23/2022 22:52	Caribou Pt.	12	61	82	10	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, opening the protective device.	1606	138.17
Metro	9/23/2022 23:52	Halifax Airport	10	48	80	350	Tree Contacts	Falling Trees	High winds caused trees to damage conductor and tear down poles, opening the recloser.	2091	107.16
Eastern Shore	9/24/2022 00:16	Beaver Island	12	126	150	360	Tree Contacts	Falling Trees	Extreme winds and gusts caused trees to land on primary lines, opening the recloser.	543	206.87
CB West	9/24/2022 01:11	Grand Étang	15	65	87	10	Tree Contacts	Falling Trees	High winds caused trees to damage conductor and tear down poles, opening the recloser.	904	46.23
CB East	9/24/2022 02:22	Sydney Airport	18	72	122	110	Adverse Weather	Wind	High winds and gusts caused extensive damage to all feeders from 11S substation, ultimately opening the substation recloser.	5565	225.07

**The highest gusts and damage in these zones occurred in the eastern end of the regions closer to Metro. The two representative stations (especially Yarmouth) are located farther west in the regions and may not have observed the highest gusts experienced.

***Gusts for the Northern region are recorded at a representative station significantly inland from the Northumberland Strait and farther West than the areas of greatest damage. Based on other observations in the general area (stations at Caribou Pt., Charlottetown, and Moncton all recorded gusts above 100 km/h) coastal areas of the region were likely subject to higher gusts than the representative station indicates. In addition, recorded results are sampled once per hour and may not reflect the highest actual gust throughout the entire hour.

SECTION 4: PROVINCIAL HIGHLIGHTS – TOP 5 EVENTS BY CUSTOMERS IMPACTED

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Metro	9/24/2022 04:29	Halifax Airport	10	80	111	310	Adverse Weather	Wind	High winds and extreme gusts caused a tree to land on the primary line, opening the recloser.	5298	16.74
Metro	9/29/2022 14:23	Halifax Airport	18	6	111	330	Adverse Weather	Wind	Emergency repairs to a damaged cutout due to extreme winds and gusts in days preceding.	4556	0.25
Metro	9/23/2022 23:58	Halifax Airport	10	48	80	350	Adverse Weather	Wind	High winds caused trees to land on the primary lines, opening the recloser.	4232	27.18
Metro	9/25/2022 03:24	Halifax Airport	10	30	111	250	Adverse Weather	Wind	High winds and extreme gusts caused trees to land on the primary lines, opening the recloser.	4231	2.18
Metro	9/24/2022 04:24	Halifax Airport	10	80	111	310	Adverse Weather	Wind	High winds and extreme gusts caused trees to land on the primary lines, opening the recloser.	4157	13.48

SECTION 4: PROVINCIAL HIGHLIGHTS – TOP 5 EVENTS BY DURATION

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Northeast	9/24/2022 00:40	Caribou Pt.	13	69	89	360	Tree Contacts	Falling Trees	High winds caused trees to land on the line, bringing down the customer's line between poles and to the house.	1	397.35
Northeast	9/24/2022 00:09	Caribou Pt.	13	69	89	360	Tree Contacts	Falling Trees	High winds caused trees to land on the line, bringing down the customer's line to the house.	3	396.36
Northeast	9/24/2022 00:09	Caribou Pt.	13	69	89	360	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, bringing down the customer's line to the house.	1	395.82
Northeast	9/24/2022 00:09	Caribou Pt.	13	69	89	360	Tree Contacts	Falling Trees	High winds caused trees to damage conductor and tear down poles, bringing down the customer's line to the house.	4	395.58
Northeast	9/24/2022 00:27	Caribou Pt.	13	69	89	360	Tree Contacts	Falling Trees	High winds caused trees to land on the line, opening the transformer fuse.	1	395.31

During the initial restoration phase of Hurricane Fiona, NS Power's restoration hierarchy was implemented to prioritize critical infrastructure as established by the provincial EMO. This approach ensured that critical infrastructure such as water pumping and sewer stations, fuel stations, and critical emergency services were prioritized for restoration, but did contribute to a slower pace of overall customer restoration during the early stages of the event. Following EMO priorities, crews were focused on outage events impacting larger customer counts and then continued into smaller outage events.



SECTION 4: ZONE SUMMARY IMPACT SUMMARY – VALLEY

The Valley region experienced winds near forecast and exceeded warning levels during the event. Peak gusts recorded at Greenwood were 91km/h. High winds contributed to tree contacts, particularly in the Eastern Valley.

Outage Summary:

Customers Impacted: 57,806

Customer hours of interruption: 665,634

Full Restoration*: 356.6 Hours

*elapsed time from first outage event to restoration of last event

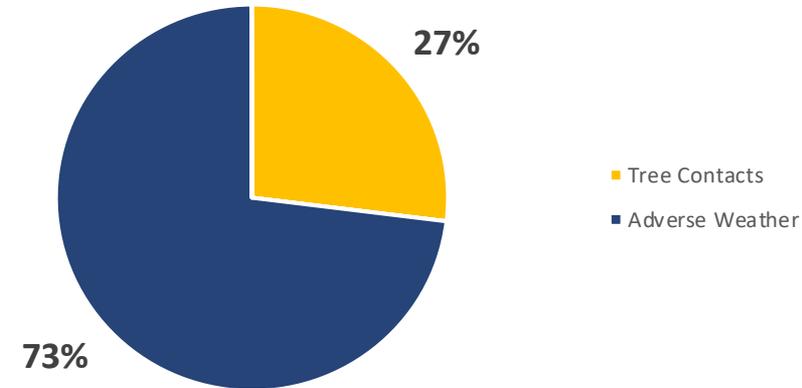
Customers Restored within X hours of Restoration Start

Valley	%
Within 6 Hrs	60.66%
Within 12 Hrs	70.01%
Within 24 Hrs	76.50%
Within 48 Hrs	89.97%

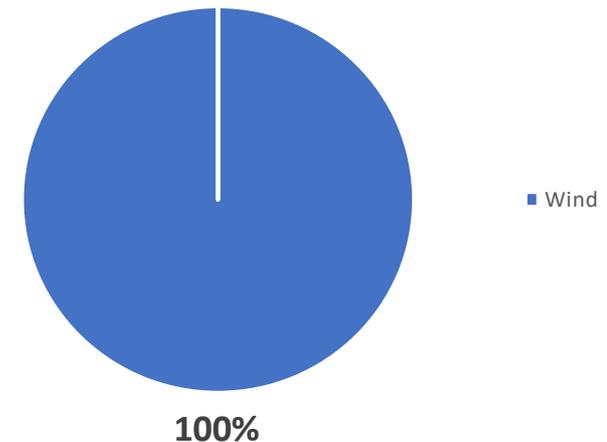
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of the restoration, rather than the start of their individual outage. Average restoration time for this region was 33.21 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

Cause of Outages (CHI)



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – VALLEY TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Valley	9/24/2022 16:37	Greenwood	13	37	91	280	Tree Contacts	Falling Trees	High winds caused trees to make contact with the line, breaking the service pole to the customer's property.	1	186.75
Valley	9/25/2022 07:51	Greenwood	9	13	91	240	Tree Contacts	Falling Trees	High winds caused trees to make contact with the line, breaking two poles.	1	177.48

Customer Impact

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Valley	9/24/2022 16:34	Greenwood	13	37	91	280	Tree Contacts	Falling Trees	High winds caused trees to make contact with the primary line, opening the recloser.	3165	0.33
Valley	9/24/2022 08:46	Greenwood	9	44	76	290	Adverse Weather	Wind	High winds caused a pole to break.	2071	18.08



Large trees, often from outside cleared rights of way, were uprooted or snapped, tearing down power line infrastructure. NS Power invests \$20 - 25 million on average each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE SUMMARY IMPACT SUMMARY – SOUTH SHORE

Peak winds in the South Shore region were below forecast but did reach warning levels during the event. Areas nearer to Metro were closer to the extent of the 100 km/h wind field and likely experienced higher winds than those recorded at the Yarmouth station. Tree contacts and adverse weather were the leading outage causes.

Outage Summary:

Customers Impacted: 59,459

Customer hours of interruption: 635,356

Full Restoration*: 351.2 Hours

*elapsed time from first outage event to restoration of last event

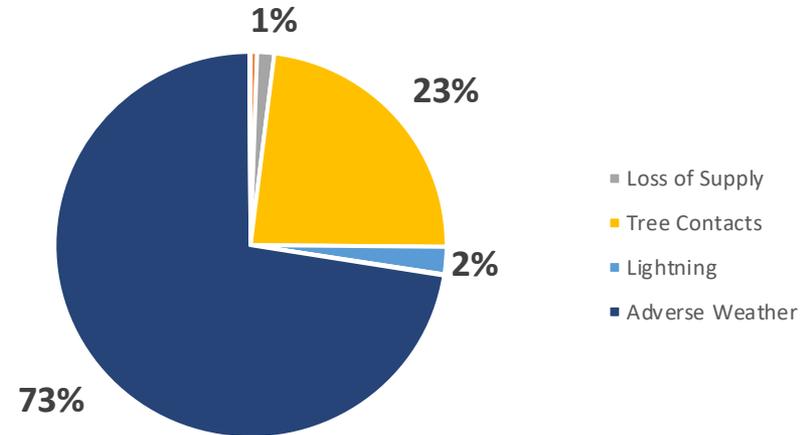
Customers Restored within X hours of Restoration Start

South Shore	%
Within 6 Hrs	49.99%
Within 12 Hrs	51.88%
Within 24 Hrs	58.28%
Within 48 Hrs	83.48%

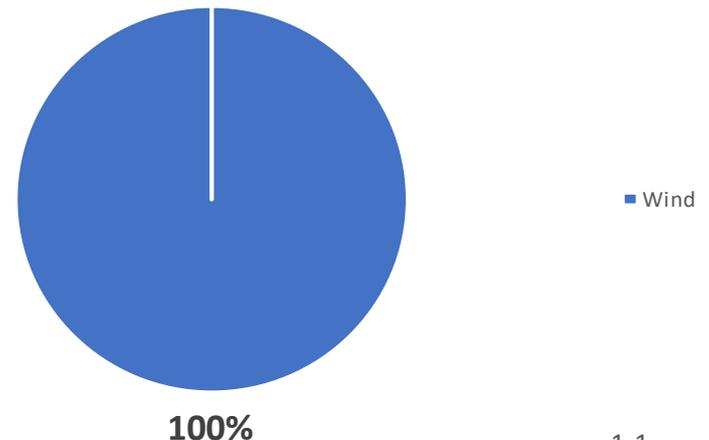
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of restoration, rather than the start of their individual outage. Average restoration time for this region was 28.49 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

Cause of Outages (CHI)



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – SOUTH SHORE TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
South Shore	9/24/2022 01:33	Yarmouth	10	50	74	330	Adverse Weather	Wind	High winds caused trees to land on primary line, bringing down the line.	210	157.44
South Shore	9/24/2022 01:33	Yarmouth	10	50	74	330	Tree Contacts	Falling Trees	High winds caused a tree to land on the line, opening a transformer fuse.	1	136.78

Customer Impact

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
South Shore	9/24/2022 02:02	Yarmouth	10	50	81	330	Tree Contacts	Broken Branch	High winds caused trees to damage conductor and tear down poles, opening the recloser.	1987	54.2
South Shore	9/24/2022 07:25	Yarmouth	10	50	81	330	Tree Contacts	Falling Trees	High winds caused trees to land on the primary line, opening the recloser.	1923	3.53

Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20 - 25 million each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE IMPACT SUMMARY – NORTHERN

Peak winds recorded at the representative station for the Northern region were below forecast but recorded peak gusts were above warning levels. However, the representative station for this region is located inland and likely did not experience the extreme winds noted along the Northumberland Strait**. Wind and tree contacts with powerlines had the largest impact in this region.

Outage Summary:

Customers Impacted: 41,974

Customer hours of interruption: 2,391,604

Full Restoration*: 352.9 Hours

*elapsed time from first outage event to restoration of last event

Customers Restored within X hours of Restoration Start

Northern	%
Within 6 Hrs	5.06%
Within 12 Hrs	6.79%
Within 24 Hrs	14.80%
Within 48 Hrs	24.77%

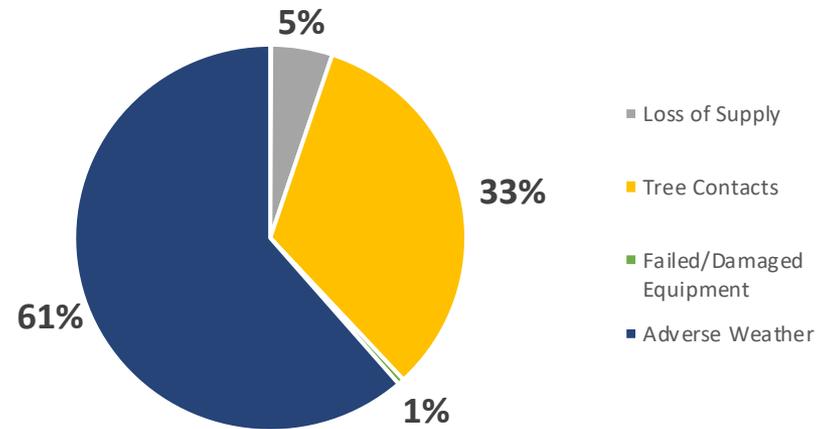
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of restoration, rather than the start of their individual outage. Average restoration time for this region was 117.28 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

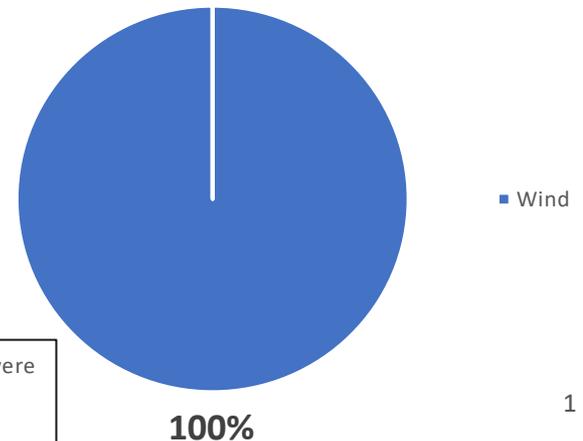
**Stations at Caribou Pt., Charlottetown, and Moncton all recorded gusts above the Northern Station indicating that coastal areas of the region were harder hit than the representative station indicates.

***Failed/Damaged Equipment leading to outages during this event were influenced by the acute effects of the prevailing weather conditions leading to premature failure.

Cause of Outages (CHI)***



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – NORTHERN TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Northern	9/24/2022 01:26	Nappan/Debert	10	57	78	350	Tree Contacts	Falling Trees	High winds caused trees to land on the line, bringing down the customer's line between poles and to the house.	2	327.34
Northern	9/24/2022 01:26	Nappan/Debert	10	57	78	350	Adverse Weather	Wind	High winds caused trees to land on customer's serveline.	2	327.31

Customer Impact

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Northern	9/23/2022 23:27	Nappan/Debert	10	46	61	360	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, opening the recloser.	2457	76.81
Northern	9/24/2022 01:50	Nappan/Debert	10	57	78	350	Adverse Weather	Wind	High winds caused trees to damage conductor and tear down poles, opening the recloser	2122	14.56

Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20 - 25 million each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE IMPACT SUMMARY – NORTHEAST

Winds in the Northeast region exceeded 130 km/h during the event. Some other stations in this region recorded even higher gusts. 13 consecutive hours of gusts over 100 km/h were observed. Adverse Weather was the largest single contributor to customer impact, which also includes contact from trees. A further third of outages were due to tree contacts.

Outage Summary:

Customers Impacted: 127,683

Customer hours of interruption: 9,035,083

Full Restoration*: 403.5 Hours

*elapsed time from first outage event to restoration of last event

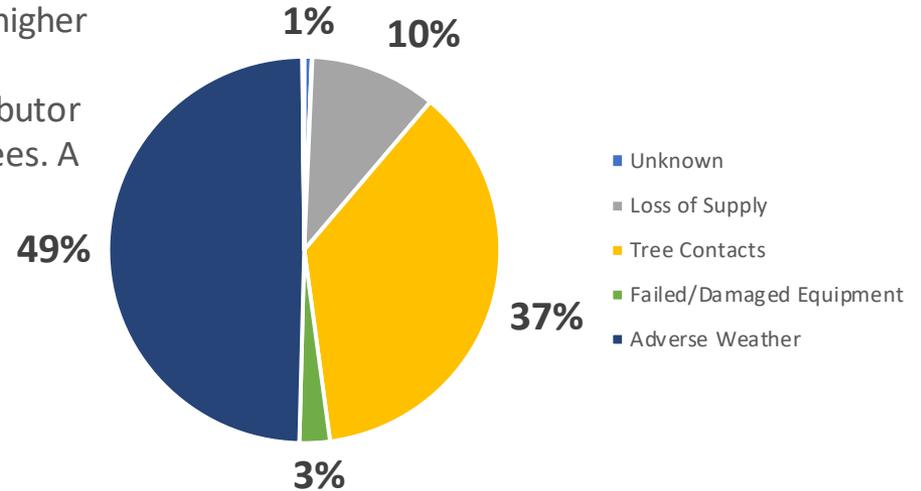
Customers Restored within X hours of Restoration Start

Northeast	%
Within 6 Hrs	0.93%
Within 12 Hrs	3.55%
Within 24 Hrs	8.97%
Within 48 Hrs	18.45%

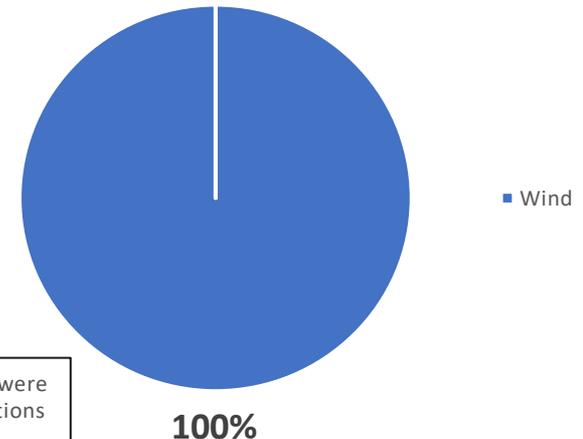
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of restoration, rather than the start of their individual outage. Average restoration time for this region was 148.38 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

Cause of Outages (CHI)**



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – NORTHEAST TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

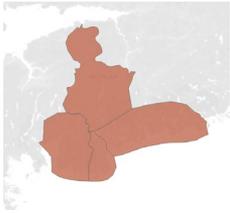
Duration

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Northeast	9/24/2022 00:40	Caribou Pt.	13	69	89	360	Tree Contacts	Falling Trees	High winds caused trees to land on the line, bringing down the customer's line between poles and to the house.	1	397.35
Northeast	9/24/2022 00:09	Caribou Pt.	13	69	89	360	Tree Contacts	Falling Trees	High winds caused trees to land on the line, bringing down the customer's line to the house.	3	396.36

Customer Impact

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Northeast	9/23/2022 23:20	Caribou Pt.	12	61	82	10	Adverse Weather	Wind	High winds caused trees to land on primary lines, breaking poles and bringing down lines between poles.	2663	93.51
Northeast	9/24/2022 00:33	Caribou Pt.	12	61	82	10	Adverse Weather	Wind	High winds caused trees to land on primary lines, breaking poles near the substation. Protection device was opened as a result.	2370	91.71

Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20 - 25 million each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE SUMMARY IMPACT SUMMARY – METRO

Peak gusts in Metro were below forecast but reached over 110km/h during the event. Gusts approaching 125 km/h were recorded at other stations in the region. Adverse weather and tree contacts were the leading causes of outages in the region.

Outage Summary:

Customers Impacted: 331,481

Customer hours of interruption: 9,027,322

Full Restoration*: 374.1 Hours

*elapsed time from first outage event to restoration of last event

Customers Restored within X hours of Restoration Start

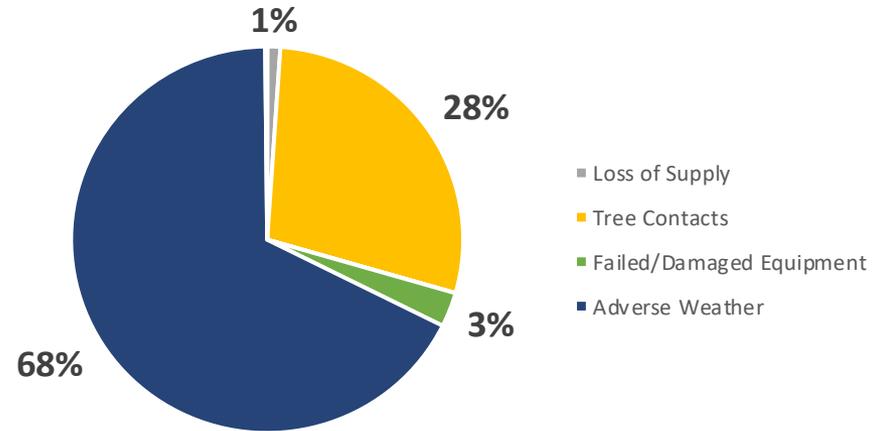
Metro	%
Within 6 Hrs	15.47%
Within 12 Hrs	30.20%
Within 24 Hrs	44.11%
Within 48 Hrs	67.92%

This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of restoration, rather than the start of their individual outage. Average restoration time for this region was 68.86 hours.

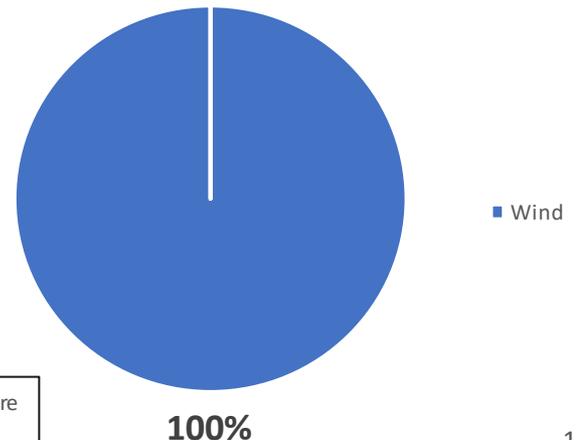
During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

**Failed/Damaged Equipment leading to outages during this event were influenced by the acute effects of the prevailing weather conditions leading to premature failure.

Cause of Outages (CHI)**



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – METRO TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Metro	9/23/2022 23:18	Halifax Airport	10	48	80	350	Adverse Weather	Wind	High winds caused trees to land on primary line, opening the switch.	6	323.36
Metro	9/23/2022 23:26	Halifax Airport	10	48	80	350	Tree Contacts	Falling Trees	High winds caused a tree to land on the line to customer's house.	1	250.22

Customer Impact

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Metro	9/24/2022 04:29	Halifax Airport	10	80	111	310	Adverse Weather	Wind	High winds and extreme gusts caused a tree to land on primary line, opening the recloser.	5298	16.74
Metro	9/29/2022 14:23	Halifax Airport	18	6	111	330	Adverse Weather	Wind	Emergency repairs to a damaged cutout due to extreme winds and gusts in days preceding.	4556	0.25



Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20 - 25 million each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE SUMMARY IMPACT SUMMARY – EASTERN SHORE

Peak winds along the Eastern Shore were above both forecast and warning levels, reaching a peak of 150km/h and sustained winds over 125 km/h. This region recorded 10 hours of gusts above 100 km/h. Adverse Weather and Tree Contacts were the cause of nearly all outage impacts.

Outage Summary:

Customers Impacted: 7,311

Customer hours of interruption: 599,697

Full Restoration*: 345.8 Hours

*elapsed time from first outage event to restoration of last event

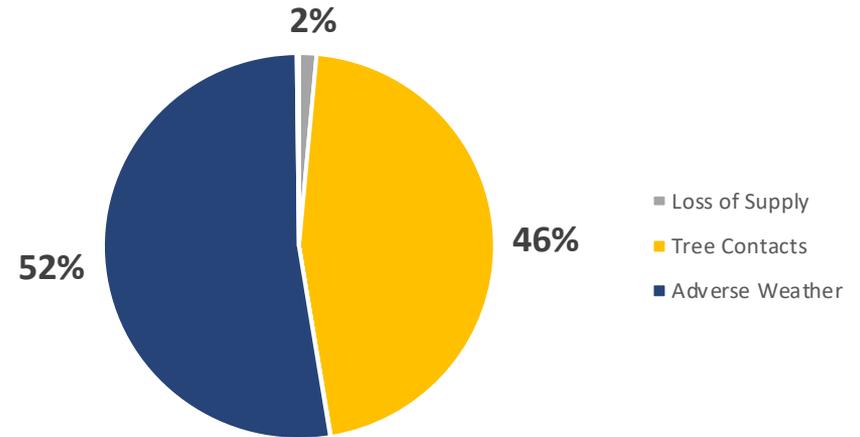
Customers Restored within X hours of Restoration Start

Eastern Shore%	
Within 6 Hrs	0.00%
Within 12 Hrs	20.01%
Within 24 Hrs	20.01%
Within 48 Hrs	20.11%

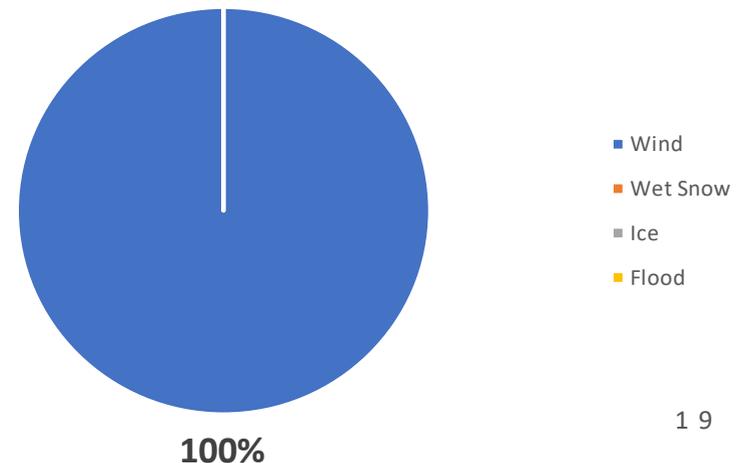
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of restoration, rather than the start of their individual outage. Average restoration time for this region was 125.27 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

Cause of Outages (CHI)



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – EASTERN SHORE TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Eastern Shore	9/24/2022 02:30	Beaver Island	13	109	150	340	Tree Contacts	Falling Trees	Extreme winds and gusts caused a tree to land on the service line to customer's house.	1	326.52
Eastern Shore	9/24/2022 02:30	Beaver Island	13	109	150	340	Tree Contacts	Falling Trees	Extreme winds and gusts caused trees to land on the primary line, opening the fuse.	3	325.25

Customer Impact

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Eastern Shore	9/24/2022 01:00	Beaver Island	12	121	150	350	Adverse Weather	Wind	Extreme winds and gusts caused trees to land on the primary lines, opening the protection device at the substation.	1409	17.81
Eastern Shore	9/23/2022 22:55	Beaver Island	13	93	122	20	Adverse Weather	Wind	High winds and extreme gusts caused trees to land on the primary lines, opening the recloser.	930	69.86

Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20- 25 million each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE IMPACT SUMMARY – CAPE BRETON WEST

Observed winds in this region were above both forecast and warning levels (16 hours above 80 km/h) during the event reaching a peak gust of 139 km/h. Adverse Weather was the cause of two-thirds of outage impacts in the region with the balance resulting from tree contacts.

Outage Summary:

Customers Impacted: 4,273

Customer hours of interruption: 78,834

Full Restoration*: 358.3 Hours

*elapsed time from first outage event to restoration of last event

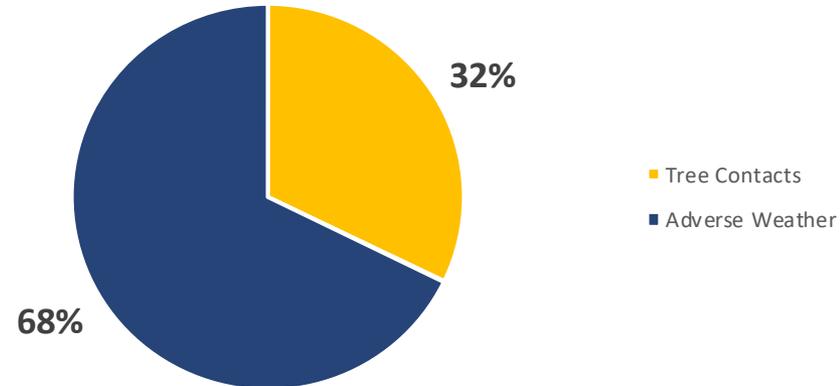
Customers Restored within X hours of Restoration Start

CB West	%
Within 6 Hrs	27.29%
Within 12 Hrs	42.08%
Within 24 Hrs	57.43%
Within 48 Hrs	84.25%

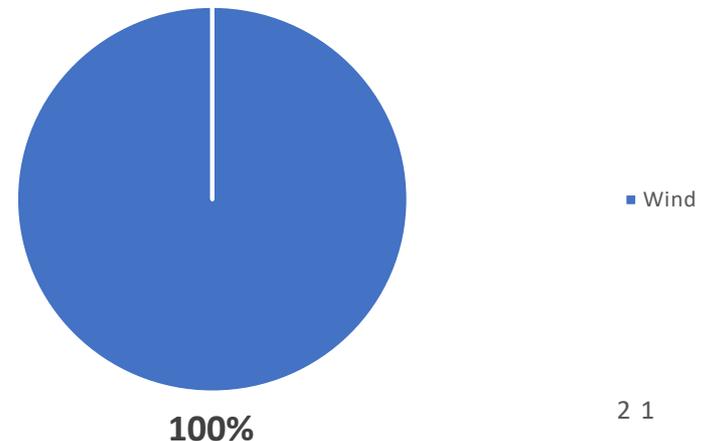
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of restoration, rather than the start of their individual outage. Average restoration time for this region was 40.51 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

Cause of Outages (CHI)



Adverse Weather Cause of Outage (CHI)



SECTION 4: ZONE IMPACT SUMMARY – CAPE BRETON WEST TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Cape Breton West	9/24/2022 11:20	Gr. Étang	13	65	139	210	Tree Contacts	Falling Trees	High winds and extreme gusts caused trees to land on primary line, opening the transformer fuse.	1	120.65
Cape Breton West	9/25/2022 18:22	Gr. Étang	11	83	139	260	Tree Contacts	Falling Trees	High winds and extreme gusts caused trees to land on customer's serviceline.	1	116.59

Customer Impact

Zone	Date/ Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Cape Breton West	9/24/2022 01:11	Gr. Étang	15	65	87	10	Tree Contacts	Falling Trees	High winds caused trees to land on the primary line, opening the transformer fuse.	963	96.18
Cape Breton West	9/24/2022 01:11	Gr. Étang	15	65	87	10	Tree Contacts	Falling Trees	High winds caused trees to damage conductor and tear down poles, opening the recloser.	904	46.23



Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20 - 25 million each year in tree trimming and clearing rights of way of trees.



SECTION 4: ZONE IMPACT SUMMARY – CAPE BRETON EAST

Observed winds in CB East region were slightly above forecast and significantly above warning levels. Peak winds recorded in Sydney reached 141 km/h including 6 consecutive hours of gusts above 120 km/h. Adverse weather and tree contacts were the leading causes of outages in this region.

Outage Summary:

Customers Impacted: 122,404

Customer hours of interruption: 8,311,389

Full Restoration*: 399.1 Hours

*elapsed time from first outage event to restoration of last event

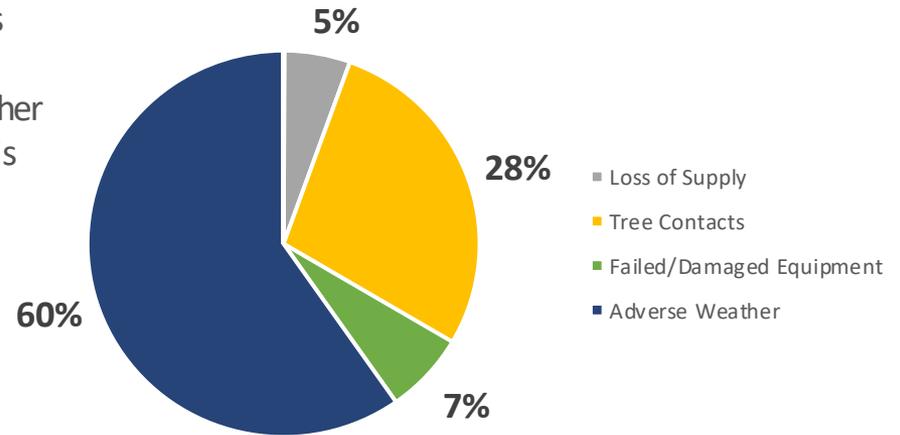
Customers Restored within X hours of Restoration Start

CB East	%
Within 6 Hrs	5.44%
Within 12 Hrs	8.07%
Within 24 Hrs	12.59%
Within 48 Hrs	19.86%

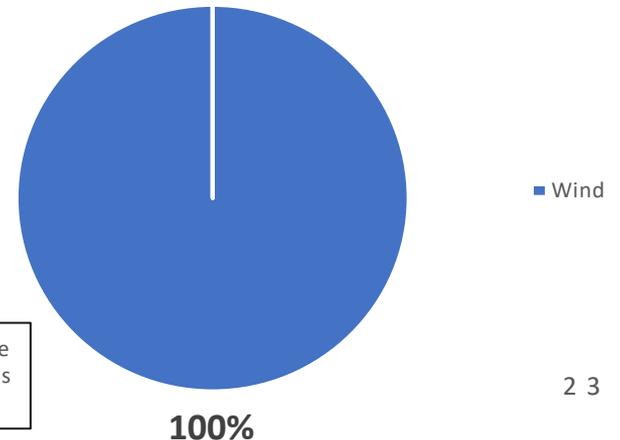
This table represents the percentage of customers restored within 6, 12, 24, or 48 hours of the start of the storm, rather than the start of their individual outage. Average restoration time for this region was 99.26 hours.

During the initial 24 hours of the storm, restoration was limited while crews were stood down due to extreme winds.

Cause of Outages (CHI)**



Adverse Weather Cause of Outage (CHI)



**Failed/Damaged Equipment leading to outages during this event were also influenced by the acute effects of the prevailing weather conditions leading to premature failure.

SECTION 4: ZONE IMPACT SUMMARY – CAPE BRETON EAST TOP TWO EVENTS BY DURATION & CUSTOMER IMPACT

Duration

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Cape Breton East	9/24/2022 01:54	Sydney Airport	19	67	94	100	Tree Contacts	Falling Trees	High winds caused trees to land on the primary lines, opening the transformer fuse.	2	333.44
Cape Breton East	9/24/2022 01:54	Sydney Airport	19	67	94	100	Tree Contacts	Falling Trees	High winds caused trees to land on the primary lines, bringing down the line.	1	333.41

Customer Impact

Zone	Date/Time	Weather Station	Temp (°C)	Wind (km/h)	Max Wind Gust (km/h)	Direction (Degrees)	Cause	Sub-Cause	Description	Customers Impacted	Duration (Hours)
Cape Breton East	9/24/2022 02:22	Sydney Airport	18	72	122	110	Adverse Weather	Wind	High winds and extreme gusts caused extensive damage to all feeders from 11S substation, ultimately opening the substation recloser.	5565	225.07
Cape Breton East	9/24/2022 01:16	Sydney Airport	19	67	94	100	Tree Contacts	Falling Trees	High winds caused trees to contact the primary line, opening the recloser.	1943	64.78



Large trees, often from outside cleared rights of way were uprooted or snapped, tearing down power line infrastructure. NS Power invests on average \$20 - 25 million each year in tree trimming and clearing rights of way of trees.

CEA DEFINITIONS

CI = Customer Interruptions

Total number of customers without power

CHI = Customer Hours of Interruption

Combination of customers and duration

SAIFI = Average Outage Frequency

Customer interruptions / # of customers

SAIDI = Average Outage Duration

Customer hours of interruption / # of customers

CAIDI = Average Outage Duration (for those interrupted)

Customer hours of interruption / # of customer interruptions

Adverse environment

Interruptions due to equipment being subjected to abnormal environmental conditions (e.g. Salt spray, contamination, humidity, corrosion, vibration, fire, or flooding)

Adverse weather

Interruptions resulting from weather conditions (e.g. Rain, ice storms, snow, winds, extreme ambient temperatures, freezing fog, or frost)

Defective equipment

Interruptions resulting from equipment failures

Foreign interference

Interruptions due to external contacts beyond the control of the utility (e.g. Birds, animals, vehicles, dig-ins, or other foreign objects)

Human element

Interruptions due to errors of utility staff in construction, maintenance, or operations

Lightning

Interruptions due to lightning strike on energized circuits

Loss of supply

Interruptions due to problem in the bulk electricity system (transmission)

Scheduled outage

Interruptions due to the planned disconnection for construction or maintenance purposes

Tree contacts

Interruptions caused by trees or tree limbs contacting energized circuits

Unknown/other

Interruptions with no apparent cause or reason identified that could have contributed to the outage