

# Hazard Risk Analysis

## *Power and Water Outages*

Power Outages  
Water Outages

### **Power and Water Outages**

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This section discusses power and water outages. Power and water outages can be caused by both natural events and by humans.

#### **Power Outages**

##### **Definition**

Power and telecommunication outages often happen during bad weather, like heavy winds, ice or snow storms. Many communities in the country have access to electricity, and because of Canada's climate and geography electricity is useful, and sometimes necessary, for maintaining heat, cooking facilities, and providing water.

##### **Discussion**

The areas most vulnerable to power outage in Canada are: rural areas, areas of heavy concentrations of population, and areas with severe winter conditions. Outages can happen when hydroelectric poles are damaged and fail, or when electrical lines are cut because of wind, snow, or when trees and other debris land on them. Power outages can also happen during landslides, avalanches, and earthquakes, and frequently occur as a result of accidents. As well, equipment failure in a substation or a transformer or the overuse of electrical power can cause brownouts, reduced electrical capacity or power outages.

Other causes of power outages include lightning, defective equipment, and certain human activities. On average, around 75% of all customer outage incidents and 85-90% of all customer outage hours were due to distribution system problems (over a five-year period).

Many dairy farmers depend on electricity for milking cows, and other farmers depend for the survival of animals, such as pigs and chickens, during the winter months. Greenhouse farmers also depend on electricity to maintain their crops. Many commercial and industrial operations would experience economic loss if they had prolonged power outages, especially in the winter,

Most communities today are dependent on telecommunications, so any outages of high speed cable networks, wireless communication networks, or telephone service could quickly shut down businesses and affect emergency response services.

Cable faults happen when a cable (which could be underground) gets damaged, leading to a breakdown in the electrical system. Cable faults are costly to repair and difficult to locate. Underground cable systems tend to have less outages than above-ground cable systems, however, underground cable breakdowns typically take much longer to fix than above-ground systems. The time it takes to find a fault and repair it will usually take between 8–48 hours or longer.

### It Happened Here...

On January 13, 2021 the blowing wind, which was strong enough to wake many up overnight near the coast, at one point topped 100 km/h in Victoria and the eastern Fraser Valley. Gusts hit 91 km/h at Vancouver International Airport; the highest recorded at the airport in January since 2007. It left 212,000 without power at the storm's peak.

On September 11, 2019 a lightning strike likely caused a massive power outage overnight in the Northern and Central Interior regions of British Columbia. At its peak, around 124,000 customers were without power, including most of Prince George.

On September 10, 2019 the damage from Hurricane Dorian in the Maritimes left tens of thousands of homes and businesses without power for days, some for up to a week. Almost 400 Canadian military troops and reservists, stationed in Yarmouth, Bridgewater, Amherst, Port Hawkesbury, Sydney and Halifax, continued to assist power crews in clearing trees and removing debris.

On November 22, 2013, a State of Emergency was declared in the Attawapiskat First Nation of Ontario. A bad winter storm from Nov 18-19 had caused a power outage in the community. In the aftermath of the power outage (Nov 22), a community member lit emergency candles for light, and accidentally started a fire. The fire caused severe damage to a residential building and left 80 people without shelter.

In late August 2011, Iqaluit faced days of rolling power outages when two turbines at the city's power plant broke down. All schools were closed as were many businesses.

On August 14, 2003 at 4:11pm the community of Attawapiskat, Ontario (population 1,000) lost power along with an estimated 10 million people in Ontario and 45 million people in the U.S. in what is now known as the Northeast Blackout. The power remained out for days and a state of emergency was declared.

In January 1998 a huge ice storm hit eastern Ontario, Quebec and New Brunswick resulting in power outages and a state of emergency being declared. Notre-Dame-de-Bonsecours, Quebec (population 275) lies in the area known as the Triangle of Darkness that remained without electricity for weeks. At least 25 people died, primarily from hypothermia. Many animals also perished as farmers were no longer able to provide water or adequate ventilation in their barns.

**Power Outages** - Natural and Human-caused

Hazard Rating				
High Risk		<input type="checkbox"/>	Low Risk	
		<input type="checkbox"/>	Need More Info	
		<input type="checkbox"/>	Not Applicable	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Yes	No	Need More	Not Applicable	<b>FACTORS</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Extreme weather events such as ice storms, windstorms and hurricanes can cause outages. Does your community experience extreme weather events (Refer to section on Atmospheric hazards)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Earthquakes can cause power outages. Is your community at risk for earthquakes? (Refer to section on Earthquakes)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Trees falling on exposed power lines can cause outages, and older trees tend to fall more regularly. Are the power lines in/near your community in close proximity to trees?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Construction equipment can make contact with above-ground power lines (known as overhead power lines) and/or uncover underground wires, which can then cause power outages. Does your community regularly have a lot of construction happening near or around it?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lightning can cause outages when or if it strikes power equipment. Does your community regularly experience lightning? (Refer to section on Atmospheric hazards)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mudslides, landslides, and snow slides can cause power outages. These events occur on slopes. Is your community's power lines/equipment located on and/or near slopes such as hills or mountains?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Flooding can damage power equipment. Is your community at risk for flooding? (Refer to section on Flooding)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Forest, wildland, and wildland urban interface fires can damage power equipment. Is your community susceptible to forest, wildland and wildland urban interface fires? (Refer to section on Flooding)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Heat waves can result in people using too much power, resulting in power failures and outages. Is your community at risk for heat waves? (Refer to section on Atmospheric hazards)

**Water Outages**

**Definition**

Water outages are situations when a community loses access to water.

**Discussion**

Water outages can occur due to a number of causes including street work (construction), pump failures, earthquakes, and flooding. Another cause of water outages is a lack of power. Water outages can create a variety of problems including the lack of sanitary facilities, lack of firefighting capabilities, and lack of coolant in water-cooled equipment. Hospitals and health care facilities are very dependent upon water.

Approximately 74% of potable water in Canada comes from surface supply while 26% comes from groundwater. With increasing concerns regarding the long-term availability of fresh water as a result of climate change and human activity, the Prairie Provinces may face increasing risks of water outages.

### It Happened Here...

In October 22, 2020, hundreds of people were evacuated from a remote First Nation in northwestern Ontario due to a water crisis, the community's chief said Wednesday, accusing the federal and provincial governments of “dehumanizing” inaction. An oily sheen was discovered in the Neskantaga First Nation water reservoir earlier in the week, forcing its water plant to shut down until test results come back. “There's not a drop of any water going to any building in this community. Not to the nursing station, not the school,” he said. “That's what people don't get. There's absolutely no water going to anywhere.”

On March 28, 2018, a water main break in downtown Weyburn overnight caused havoc across the city, as residents woke up without water. The lack of water resulted in school closures and the water from the main break impacted driving conditions in downtown as streets had ice along the surface as a result of the water.

On Feb 18, 2014 the water pump at the Potlotek First Nation (Cape Breton, Nova Scotia). The incident left 550 residents without water, and many people had to melt snow for keeping up basic hygiene until the pump was fixed. During the time without water, many residents became ill with the flu, largely due to a lack of adequate sanitation.

Running water was fully restored to the community of Sagkeeng First Nation, after intermittent service left hundreds of residents without water in April 2014. The thawing of the frozen ground was believed to have resulted in pipes shifting and breaking.

A snowstorm on May 4, 2010 knocked out power to several water pumps around 6 am in the community of Cardiff, Ontario (population 1100). The community was without running water for 5 hours.

A frozen waterline disrupted water service to the community of Dalles First Nation, Ontario (population 330). Fourteen elderly and children were evacuated to hotels while band council members worked with contractors to restore service to the 28 affected homes.

**Water Outage** - Natural Human-caused

Hazard Rating				High Risk	<input type="checkbox"/>	Low Risk	<input type="checkbox"/>	Need More Info	<input type="checkbox"/>	Not Applicable	<input type="checkbox"/>
Yes	No	Need More	Not Applicable	FACTORS							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Most utilities are experiencing failure with pipes made out of gray cast iron due to their brittleness. Pipe failure can cause water outages. Is your community's water supplied through gray cast iron pipes?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Old pipes fail more frequently. Are the pipes that supply your community's water old?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pipes can freeze when the temperature stays below 0°C over several days. Does your community experience temperatures that stay below 0°C for several days at a time?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pipes are more likely to freeze if they are located in areas that are exposed to freezing temperatures, such as outside or unheated areas indoors. Does your community use pipes throughout the year that are located outside, along exterior walls, in basements, or in garages?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Power outages can cause water outages if pumps or other equipment cannot operate. Is your community at risk for power outages and does it rely on pumps and electrically-powered equipment to supply water (Refer to the previous section on Power Outages)?							

## References

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- American Red Cross. (n.d.). [\*Preventing & thawing frozen pipes.\*](#)
- Attawapiskat First Nation. (2013). [\*Attawapiskat declares state of emergency.\*](#)
- BC Hydro (2011). [\*Integrated resource plan. Appendix 1A: Glossary and abbreviations.\*](#)
- Boothby, L. (2019, September 11). [\*Lightning strike suspected cause of massive power outage in parts of B.C.\*](#) City News.
- Burns, A. & Thompson, N. (2020, October 22). [\*Hundreds evacuated as a new water crisis hits Ont. First Nation facing country's longest boil-water advisory.\*](#) CTV News.
- Chang, S. E., McDaniels, T. L., Mikawoz, J., & Peterson, K. (2006). Infrastructure failure interdependencies in extreme events: Power outage consequences in the 1998 ice storm. *Natural Hazards*, 41(2), 337-358. <https://doi.org/10.1007/s11069-006-9039-4>
- Eichenberger, J.C. (2005). [\*IWA Water Balance in Canada – “How are we doing?” \[Conference Proceedings\] Leakage 2005.\*](#)
- [\*Frozen pipes create water woes at Sagkeeng First Nation.\*](#) (2014, April 12). CBC News.
- Makar, J.M. & Kleiner, Y. (2010). [\*Maintaining water pipeline integrity.\*](#) Natural Resource Council Canada.
- National Energy Council. (2004). [\*A compendium of electric reliability frameworks.\*](#)
- [\*Potlotek First Nation without water for 2 days.\*](#) (2014 February 19). CBC News.
- [\*Power restored to more than 140,000 homes after BC windstorm.\*](#) (2021, January 13). CBC News.
- Prentiss, M. (2019, September 10). [\*Days without power: Over 100,000 outages persist in Maritimes after Dorian.\*](#) CBC News.
- Wilson, S. (2018, March 28). [\*Water outage forcing cancellations.\*](#) Discover Weyburn.com
- Windeyer, C. (2011, August 29). [\*Iqaluit faces rolling blackouts as power plant sputters.\*](#) Nunatsiaq News.