

4.3.16 Utility Interruption

A utility interruption could include power failure, potable water service outage, telecommunications infrastructure failure, natural gas infrastructure failure, or sewer infrastructure failure. For the purpose of this plan, utility interruption focuses on power failure, because it is the major cause of utility failure and has had widespread impacts on the county. A power failure is defined as any interruption or loss of electrical service from disruption of power transmission caused by accident, sabotage, natural hazards, or equipment failure. A significant power failure is defined as any incident of a long duration that would require the involvement of the local or Commonwealth emergency management organizations to coordinate provision of food, water, heating, cooling, and shelter. Interruptions in other basic utilities (such as data/telecommunications, water, natural gas, or sewer) can have a detrimental impact on Dauphin County. Utilities that employ aboveground wiring (power and data/telecommunications) are vulnerable to the effects of other hazards, such as high wind, heavy snow, ice, rain, and vehicular accidents. Effects of other hazards are explained in detail in Sections 4.3.6 (Flood, Flash Flood, and Ice Jams), 4.3.14 (Tornado and Windstorms), 4.3.15 (Transportation Accidents), and 4.3.18 (Winter Storm).

This section describes the location and extent, range of magnitude, past occurrence, future occurrence, and vulnerability assessment for the utility interruption hazard for the Dauphin County Hazard Mitigation Plan (HMP).

4.3.16.1 Location and Extent

Utility interruptions occur throughout Dauphin County; however, they are usually of small scale and short duration. These interruptions are primarily power failures and are often a secondary impact of another hazard event. For example, severe thunderstorms or winter storms could bring down power lines and cause widespread disruptions in electricity service. Strong heat waves may result in rolling blackouts causing loss of power for an extended period. Local outages may be caused by traffic accidents or wind damage.

Local companies, such as PPL, which provide electricity to Dauphin County are capable of handling minor interruptions (Section 4 of this plan describes other utilities in the county). Interruptions are possible anywhere utility service has been installed. Some utility facilities are especially vulnerable. For instance, potable water interruption is possible when water intakes and water control facilities are located in the 1 percent annual chance floodplain and a flood may seriously impair water service. Section 4.3.6 provides more detail on possible flood impacts.

4.3.16.2 Range of Magnitude

Generally speaking, the most severe utility interruptions are regional power outages. Regional loss of power affects lighting; heating, ventilation, and air conditioning (HVAC) and other support equipment; communications; fire and security systems; and refrigerators, which can in turn cause loss of water and sewer service, and food spoilage. These effects are especially severe for individuals with functional needs and the elderly.

At a minimum, power outages can cause short-term disruption in the orderly functioning of businesses, government operations, and private citizen functions and activities. Examples of everyday functions that would be affected by power outages include traffic signals, elevators, and retail sales. A worst-case scenario for utility interruption in Dauphin County would be a countywide power outage during winter months, forcing the evacuation of vulnerable populations.

Sabotage also plays a role in some utility outages. Sabotage may be the direct result of a malicious attack against utilities or may be the secondary effect of the theft of copper wiring. The U.S. Department of Energy (DOE) published a report in October 2010 titled “An Updated Assessment of Copper Wire Theft from Electric Utilities,” in which the DOE Office of Electricity Delivery and Energy Reliability reported that United States-based utilities suffer copper thefts costing several million dollars annually (DOE 2010). The estimated minutes of outages experienced by utilities nationwide as a result of copper theft were 456,000 or about 7,600 hours (American Public Power Association [APPA] 2012).

4.3.16.3 Past Occurrence

Every year, Dauphin County is susceptible to minor utility interruptions either through technological failure or as the result of inclement weather. Table 4.3.16-1 below shows major utility interruptions in the county since 2002. In all, over 12 incidents were reported, including downed utility lines from 2002 to July 2020. Events that simply included downed trees and power lines are not listed in Table 4.3.16-1.

Table 4.3.16-1: Utility Interruptions from 2002–2020

Dates of Event	Event Type	Losses / Impacts
November 13, 2003	High Wind	Strong winds caused more than 80,000 persons were without power across all of Pennsylvania.
June 27, 2006	Flash Flood	Heavy rains caused flooding, roads and bridges closed. 7,800 residences were damaged, including damaged utilities, loss of power, and over 275,000 voluntary evacuations orders were given.
December 15, 2007	Winter Storm	A significant winter storm affected much of central Pennsylvania. There was over 64,000 power outages and 25,000 outages were in Dauphin County, many in the Hershey and Harrisburg areas.
March 8, 2008	High Wind	High winds downed numerous trees and utility lines, leaving several customers without power.
December 31, 2008	High Wind	High winds knocked down several trees, large branches, and power lines across the county, over 1,000 PPL customers were without power.
January 6, 2009	Thunderstorm Winds	Freezing rain resulted in a significant ice accumulation across central Pennsylvania. The ice caused sporadic power outages and brought down several tree limbs.
January 27, 2009	Winter Storm	Heavy snow, sleet, and freezing rain caused sporadic power outages in the region
February 12, 2009	High Wind	High winds caused isolated power outages. The Public Utility Commission reported that utility crews restored power to over 400,000 customers.
August 28, 2011	Strong Wind	The strong winds downed trees and utility wires, leaving thousands of residents without power.
June 29, 2012	Thunderstorm Wind	High winds caused power outages. PPL reported about 7,000 people without power.
October 29, 2012	High Wind	High winds knocked down several trees and utility wires, resulting in approximately 10,000 power outages.
February 2014	Winter Storms	Winter storm event impacted over 2,200 Met Ed and PPL customers. The storm resulted in a Governor’s Proclamation of Emergency.
July 8, 2014	Thunderstorm Wind	Damaging winds caused localized structural damage and thousands of power outages.

Source: FEMA 2020, NOAA-NCEI 2020

4.3.16.4 Future Occurrence

Minor power failure (short outage events) may occur several times a year for any given area in the county, while major events (long, widespread outage events) take place once every few years. Power failures often occur during severe weather; therefore, they should be expected during those events. Based on the assumption that the

county will experience severe weather annually, in addition to outages from other causes, the future occurrence of utility interruptions in Dauphin County should be considered *highly likely*, as defined by the Risk Factor Methodology probability criteria.

4.3.16.5 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the identified hazard area. This section discusses the potential impact of the subsidence and sinkhole hazard on Dauphin County in the following subsections:

- Impact on (1) life, health, and safety; (2) general building stock; (3) economy; (4) environment; and (5) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will assist understanding of this hazard over time

Impact on Life, Health, and Safety

Utility interruptions most severely affect individuals with access and functional needs (such as children, the elderly, and individuals with special medical needs). Special medical equipment will not function without power. Likewise, a loss of air conditioning during periods of extreme heat or the loss of heating during extreme cold can be especially detrimental to those with medical needs, children, and the elderly. Table 4.3.16-2 shows the demographic change in children and the elderly from 2000 through 2018. The population under the age of 5, under 18, and 65 years and over have increased, as shown in Table 4.3.16-2. Data on individuals with special medical needs were not available.

Table 4.3.16-2. Demographic Trends for Vulnerable Populations

Vulnerable Population	2000 Census	2010 Census	2018 Census Estimate	2000 to 2018 Change
Children under 5 years	15,490	16,794	17,182	1,692
Under 18 years	61,113	62,215	61,753	640
65 years and over	35,844	35,841	44,262	8,418

Source: U.S. Census Bureau 2020

Impact on General Building Stock and Critical Facilities

All facility infrastructure considered critical are vulnerable to utility interruptions, especially the loss of power. The establishment of reliable backup power at these facilities is extremely important to continue to provide for the health, safety, and well-being of Dauphin County’s population.

Impact on the Economy

No data regarding economic impacts from utility interruptions in Dauphin County are available. However, utility interruptions can cause economic impacts stemming from lost income, spoiled food and other goods, costs to the owners or operators of the utility facilities, and costs to government and community service groups. Calculation of potential impacts of utility interruptions is heavily dependent on the number of rate-paying utility connections affected. The Federal Emergency Management Agency (FEMA) Benefit-Cost Analysis (BCA) Toolkit v.5.3.0 has standard values based on the daily cost per rate-paying connection. The daily cost per value is shown in Table 4.3.16-3.

Table 4.3.16-3. FEMA BCA Toolkit v5.3.0 Daily Standard Values of Utility Services

Utility	Daily Value (per connection/per day)
Electric	\$148.00
Potable Water	\$105.00
Wastewater	\$49.00

Source: FEMA 2017

Impact on the Environment

The most significant impact associated with utility interruptions occurs when the interruption involves a release of hazardous materials. This hazardous material may be released in a pipeline accident or when material is in transit. Section 4.3.5 (Environmental Hazards – Hazardous Materials Releases) includes a complete discussion on the impacts of a hazardous materials release. Pipelines carrying flammable materials also have the possibility of exploding or starting a fire (Pennsylvania Emergency Management Agency [PEMA] 2018).

A number of secondary impacts are associated with utility interruptions. First, interruptions could affect the ability of the government to function, especially if backup power generators or supply is inadequate or unavailable. Utility interruptions can also reduce the efficient and effective communication essential to first responders. Heating loss and severe cold can also impact the health and safety of at-risk populations like young children, the elderly, and individuals with disabilities (PEMA 2018).

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Dauphin County (further discussed in Section 2.4 of this HMP). Any areas of growth could be potentially impacted by the utility interruption hazard because the entire county is exposed and potentially vulnerable. An increase in development and population will increase demand for power supply and has the ability to increase the likelihood of utility interruption incidents.

Effect of Climate Change on Vulnerability

According to the Fourth National Climate Assessment, two climate change scenarios were modeled, and temperature change in the northeastern United States is estimated to increase between 3.98 - 5.09°F by 2036-2065 and between 5.27 - 9.11°F by 2071-2100. The annual mean temperature change in Pennsylvania is projected to increase between 5.9 - 6.3°F by 2041 - 2070. Some areas of the world may experience greater temperature changes than others. It is important to note that frequency estimates may not be an accurate representation of future conditions due to the unknown impacts of climate change (PEMA 2018).

Increased average temperatures, as a result of climate change, make the occurrence of extreme heat more likely. While increased average temperatures would make the occurrence of extreme cold less likely, some climatologists have suggested that warming in the Arctic could impact the position of the jet stream, allowing for more extreme cold weather events to occur. While some research supports this concept, others do not and the impact of climate change on cold weather events is not fully understood (Climate Central 2013). Extreme heat and cold result in greater strain on utilities, increasing the likelihood of utility interruption.

Climatologists expect an increase in the number and intensity of severe weather events. This will include wind events, such as hurricanes, tornadoes, and wind associated with thunderstorms, among other phenomena. More storms with higher winds will increase the chance that the utility infrastructure will be impacted by these storms.

Additionally, climatologists expect an increase in precipitation, which could come in the form of heavy downpours or winter weather thus causing additional utility interruptions. Increased risk of drought may also threaten water utilities.

Additional Data and Next Steps

For future plan updates, Dauphin County can track data on power outage events and obtain additional information on past and future events, particularly in terms of any injuries, deaths, shelter needs, pipe freeze incidents, and other impacts. These data will help to identify any concerns or trends for which mitigation measures should be developed or refined. In time, quantitative modeling of estimated power outage events may be feasible as data are gathered and improved.