Allegheny County
Department of Emergency Services
Division of Emergency Management

Threat and Hazard Identification and Risk Assessment (THIRA)
2022

THIRA OVERVIEW

The THIRA is a three-step risk assessment completed every three years. It helps answer the following questions:
- What threats and hazards can affect our community?
- If they occurred, what impacts would those threats and hazards have on our community?
- Based on those impacts, what capabilities should our community have?

The THIRA helps communities understand their risks and determine the level of capability they need in order to address those risks. The outputs from this process lay the foundation for determining a community's capability gaps during the SPR process.

The THIRA follows a three-step process, as described in *Comprehensive Preparedness Guide 201, Third Edition*:

1. **Identify Threats and Hazards**. Based on a combination of experience, forecasting, subject matter expertise, and other available resources, develop a list of threats and hazards that could affect the community. When deciding what threats or hazards to include in the THIRA, communities consider only those that challenge the community's ability to deliver at least one core capability more than any other incident; the THIRA is not intended to include less challenging threats and hazards.
2. **Give Threats and Hazards Context.** Describe the threats and hazards identified in Step 1, showing how they may affect the community and create challenges in performing the core capabilities. Identify the impacts a threat or hazard may have on a community.
3. **Establish Capability Targets.** Using the impacts described in Step 2, determine the level of capability that the community plans to achieve over time in order to manage the threats and hazards it faces. Using standardized language, create capability targets for each of the core capabilities based on this desired level of capability by identifying impacts, objectives, and timeframe metrics. A core capability is comprised of several functional areas in which a community may have a gap. Each required standardized target addresses one or more functional areas.

This report contains two sections:
- **THIRA Steps 1 and 2: Threats, Hazards, and Context**
  - Identified threats and hazards
  - Context descriptions
  - Standardized impacts
  - Non-standardized impacts
- **THIRA Step 3: Capability Targets**
  - Standardized capability targets
  - Maximum requirements

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THIRA STEP 1 AND 2: THREATS, HAZARDS, AND CONTEXT

Winter Storm

Category: Naturally Occurring   **Terrorism:**   No

Location and Extent:

Winter storms are regional events that affect most of Pennsylvania on an annual basis. In many cases, surrounding states and even the larger northeastern U.S. region are affected. As such, every county in the Commonwealth, including Allegheny, is subject to severe winter storms. Winter storms begin as low-pressure systems that move through Pennsylvania either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called Nor'easters. The effects of these storms can sometimes last for weeks, bringing several inches or even feet of snow and ice and cold temperatures. From 1981-2010, annual snowfall in Allegheny County averaged between 21 and 30 inches. This is a reduction in average annual snowfall from the previous twenty-year average annual snowfall observation of between 30 and 40 inches.

Range of Magnitude:

Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called nor'easters. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or cause disruption to traffic, communications, electric power, or other utilities.

A winter storm can adversely affect roadways, utilities, business activities, and can cause frostbite or loss of life. These storms may include one or more of the following weather events:

- **Heavy Snowstorm:** Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
- **Sleet Storm:** Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
- **Ice Storm:** Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.) as it strikes them, causing slippery surfaces and damage from the sheer weight of ice accumulation.
- **Blizzard:** Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.

- **Severe Blizzard:** Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

Any of the above events can result in the closing of major or secondary roads, particularly in rural locations, stranded motorists, transportation accidents, loss of utility services, and depletion of oil heating supplies. Environmental impacts often include damage to shrubbery and trees due to heavy snow loading, ice build-up and/or high winds which can break limbs or even bring down large trees. Gradual melting of snow and ice provides excellent groundwater recharge. However, high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

Past Occurrence:

Allegheny County and the Commonwealth of Pennsylvania have a long history of severe winter weather. The worst winter storm on record occurred on March 12-13, 1993. This blizzard, often called "the Storm of the Century," stretched from Canada to the Gulf of Mexico but was worst in the Eastern United States, including all of Pennsylvania. This storm caused widespread blackout conditions; snowfall totals ranged from twelve inches in Philadelphia to 20 inches in Harrisburg and Scranton to 24 inches in the Pittsburgh area. This event garnered a Presidential Emergency Declaration; the overall damage estimate for all states in this event was $6.6 billion. This event was the third-largest snowstorm on record for the Pittsburgh weather station with a snowfall of 25.3 inches.

In the winter of 1993-1994, the state was hit by a series of protracted winter storms. The severity and nature of these storms combined with accompanying record-breaking frigid temperatures posed a major threat to the lives, safety and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals and nursing homes.

One of these devastating winter storms occurred in early January 1994 with record snowfall depths in many areas of the Commonwealth, strong winds, and sleet/freezing rains. Numerous storm-related power outages were reported and as many as 600,000 residents were without electricity, in some cases for several days at a time. A ravaging ice storm followed which closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PPL Corporation stated that this was the worst winter storm in the history of the company; related damage-repair costs exceeded $5,000,000.

Serious power supply shortages continued through mid-January because of record cold temperatures at many places, causing sporadic power generation outages across the Commonwealth. The entire Pennsylvania-New Jersey-Maryland grid and its partners in the District of Columbia, New York and Virginia experienced 15-30 minute rolling blackouts, threatening the lives of people and the safety of the facilities in which they resided. Power and fuel shortages affecting Pennsylvania and the East Coast power grid system required the

Governor to recommend power conservation measures be taken by all commercial, residential and industrial power consumers.

The record cold conditions resulted in numerous water-main breaks and interruptions of service to thousands of municipal and city water customers throughout the Commonwealth. Additionally, the extreme cold in conjunction with accumulations of frozen precipitation resulted in acute shortages of road salt. As a result, trucks were dispatched to haul salt from New York to expedite deliveries to Pennsylvania Department of Transportation storage sites.

Another more recent event to hit Allegheny County was in February of 2010. The Pittsburgh Tribune reported that, "Road crews were having trouble keeping up with all the snow. PennDOT said portions of the Parkway West inbound, the Parkway North outbound and Route 19 in both directions were closed after several accidents. The Port Authority ordered all of its drivers to pull to the side of the road shortly after 9 p.m. because of 'worsening and very dangerous conditions,' spokesman Jim Ritchie said. Allegheny Power was reporting more than 6,800 customers without power last night. Some 4,000 Duquesne Light customers in Beaver and Allegheny counties also were without service." The February 2010 storm was one of the top 5 ever for the Pittsburgh area – total accumulation neared 22 inches for the event.

Finally, the Eastern Region Headquarters of NOAA maintains snowfall records since 1884 for the Pittsburgh weather station:
- The largest snowstorm on record was a storm dropping over 27 inches of snow on November 24-26, 1950.
- The greatest single-day snowfall was on March 13, 1993, with 23.6 inches.
- The year with the greatest depth of snow on the ground was on January 22, 1978 with 26 inches. This year also included the longest period with at least one inch of snow on the ground (64 days).

Other snowfall records can be viewed online at: https://www.weather.gov/pbz/tsnow (NOAA, 2020).

Future Occurrence:

Winter storms are a regular, annual occurrence in Pennsylvania and should be considered highly likely. Based on the 30-year mean from 1981-2010, NOAA provides the following frequencies of heavy snowfalls at the Pittsburgh weather station:
- Snowfalls of 16 inches or more: once in 15 years
- Snowfalls of 13-15 inches or more: once in 5 years
- Snowfalls of 8-12 inches or more: once every two years
- Snowfalls of 5 inches or more: twice a year.

Changing weather patterns have made certain types of disasters more frequent and extreme. Precipitation levels are expected to rise in Allegheny County by more than two times by 2050 (Climate Central, 2019). Further, the number of very cold days annually is increasing each year. Cold temperatures combined with increased precipitation creates conditions conducive for winter weather. As these external conditions continue to change, they may impact the

occurrence level of winter storms in the County. The probability of future winter storms can be considered highly likely according to the Risk Factor Methodology

Vulnerability Assessment:

Based on the information available, all communities in Allegheny County are essentially equally vulnerable to the direct impacts of winter storms. Snowfall is expected and normal in wintertime. Residents of the mountainous areas of the County may be more susceptible, especially when emergency medical assistance is required. In addition, the more rural areas of the County are susceptible to isolation caused by winter storms. Areas that are heavily wooded can make emergency response to these areas difficult when roadways are blocked by downed trees and wires.

Vulnerability to the effects of winter storms on buildings is also dependent on the age of the building type, construction material used and condition of the structure. In Allegheny County, 58.3% of the occupied housing units were constructed prior to 1960 with 29.7% constructed prior to 1939. These older structures may be more prone to damage with severe winter storm events.

All structures and infrastructure in Allegheny County will be exposed to heavy snow and ice. Yet, because all of Pennsylvania has adopted and enforced the 2015 International Building Code (IBC) under the Uniform Construction Code (UCC), building yet to be constructed will be able to withstand the weight of heavy snow or ice.

Cyber Preparedness/Cyber Terrorism

Category: Adversarial/Man Made   **Terrorism:**   Yes

Location and Extent:

The term "terrorism" refers to intentional, criminal, malicious acts, but the functional definition of terrorism can be interpreted in many ways. Officially, terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR §0.85).

Cyberterrorism is the use of the Internet to conduct violent acts that result in, or threaten, the loss of life or significant bodily harm, in order to achieve political or ideological gains through threat or intimidation. Acts of deliberate, large-scale disruption of computer networks, especially of personal computers attached to the Internet by means of tools such as computer viruses, computer worms, phishing, malicious software, hardware methods, programming scripts can all be forms of internet terrorism.

Range of Magnitude:

The severity of a cyber terrorism attack depends on the methods used and the motivation of the attacker. As the Internet becomes more pervasive, individuals or groups can use the anonymity afforded by cyberspace to threaten other individuals, specific groups (with membership based, for example, on ethnicity or belief), communities and entire countries, without the inherent threat of identification, capture, injury, or death of the attacker that being physically present would bring. Many groups such as Anonymous, use tools such as denial-of-service attacks to attack and censor groups which oppose them, creating many concerns for freedom and respect for differences of thought.

Past Occurrence:

Many cyber-attacks may go unreported, there have been prominent attacks in the Pittsburgh/Allegheny County area:

On June 27, 2017 the Heritage Valley Health System was affected by a cyber security incident. The incident is widespread and is affecting the entire health system including satellite and community locations. The incident was identified as the same ransomware attack that affected a number of organizations globally. It was not until Monday, July 2, 2017 that the Heritage Valley Health System announced that all acute, ambulatory and ancillary care services have been restored at its medical neighborhoods and satellite community locations, following a cyber security incident that impacted the entire Health System on Tuesday, June 27.

WPXI-TV (NBC) was forced offline this week in an apparent cyberattack against the parent company, according to a report from NBC News in June of 2021.

Vantage Healthcare Network, Inc., a vendor of Allegheny Health Network, was the victim of a ransomware cyber-attack in October of 2021 which may have compromised patient personal and security data.

In mid-December of 2021, Ultimate Kronos Group, a human resources management company, notified its clients that there was a ransomware security breach. Allegheny Health Network uses the company for its payroll, scheduling and other services.

Future Occurrence:

As technology becomes more and more integrated into society, new vulnerabilities and security threats are opened up on these complex networks that we have set up. If an intruder was to gain access to these networks, they have the potential to threaten entire communities or economic systems. There is no certainty for what events will take place in the future, which is why it is important that there are systems build to adapt to the changing environment.

The most apparent cyberterrorism threat in our near future will involve the state of remote work during the COVID-19 pandemic. Companies cannot expect that every home office is up to date and secure so they must adopt a zero-trust policy from home devices. This means that they must assume corporate resources and unsecured devices are sharing the same space and they must act accordingly.

Vulnerability Assessment:

The rise of cryptocurrency has sparked some additional threats in the realm of security. Cyber Criminals are now hijacking home computers and company networks in order to mine certain cryptocurrencies such as bitcoin. This mining process requires an immense amount of computer processing power which can cripple a business' network and lead to severe downtime if the issue is not resolved.

Hacking has become less complex as hacking communities have greatly diffused their knowledge through the Internet. Blogs and communities have hugely contributed to information sharing: beginners could benefit from older hackers' knowledge and advice.

Furthermore, hacking is cheaper than ever: before the cloud computing era, in order to spam or scam one needed a dedicated server, skills in server management, network configuration, and maintenance, knowledge of Internet service provider standards, etc. By comparison, a mail software-as-a-service is a scalable, inexpensive, bulk, and transactional e-mail-sending service for marketing purposes and could be easily set up for spam. Cloud computing could be helpful for a cybercriminal as a way to leverage his or her attack, in terms of brute-forcing a password, improving the reach of a botnet, or facilitating a spamming campaign.

Flood, Flash Flood, Ice Jam

Category: Naturally Occurring   **Terrorism:**   No

Location and Extent:

A flood is a natural event for streams and rivers. Floodplains are lowlands adjacent to rivers, streams and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. However, in assessing the potential spatial extent of flooding it is important to know that a floodplain associated with a flood that has a 10 percent chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2% annual chance of occurring.

Allegheny County has FEMA effective Flood Insurance Rate Maps and a Countywide Flood Insurance Study. This study was conducted as a part of FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) process and went effective on September 26, 2014. The purpose of the Risk MAP program is to assist communities nationwide to assess flood risk, encourage mitigation planning, and to strengthen local ability to make informed decisions about risk reduction. Individual map panels can be obtained from the FEMA Map Service Center (http://www.msc.fema.gov). These maps can be used to identify the expected spatial extent and elevation of flooding from a 1% and 0.2% annual chance event.

One hundred nineteen of the 130 communities in Allegheny County have determined SFHAs. The communities without SFHAs include the boroughs of: Ben Avon Heights, Braddock Hills, Chalfant, Dormont, East Pittsburgh, Edgewood, Forest Hills, Mount Oliver, Pennsbury Village, West View, and Wilkinsburg. Allegheny County is located in the Ohio, Monongahela, Lower Allegheny, and Youghiogheny River Basins. Overbank flooding of the Monongahela River, including backwater flooding from the Allegheny River, is the principal flooding problem in Allegheny County. Allegheny County has been, and remains, one of the great industrial areas in the U.S., due in large part to the accessibility of major waterways for transportation of coal, steel, and other products. As such, substantial development took place and industrial facilities were situated in the 1-percent-annual-chance floodplain, which has led to many buildings being flooded. In addition to riverine flooding, there are many tributaries in the County that have experienced flash flooding and present flash flood hazards. The following streams and creeks and their associated tributaries present a recurring flood threat.

- Northwest Sector - Pine Creek, Girty's Run, Brush Creek, and Little Sewickley Creek
- Northeast Sector - Bull Creek, Deer Creek, Lowries Run and Rawlins Run
- East Sector - Plum Creek, Turtle Creek and Dirty Camp Run / Pitcairn
- Southeast Sector – Sawmill Run, Streets Run, Crooked Run, Long Run, and Peters Creek
- Southwest Sector - Chartiers Creek, Robinson Run, Moon Run, McLaughlin Run, Montour Run and Campbells Run

Range of Magnitude:

Floods are considered hazards when people and property are affected. Most injuries and deaths from flooding happen when people are swept away by flood currents and most property damage results from inundation by sediment-filled water. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious developed areas.

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover and rate of snowmelt. Water runoff is greater in areas with steep slopes and little to no vegetative ground cover. Since the County has mountainous terrain, this can contribute to more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems.

In Allegheny County there are seasonal differences in how floods are caused. A measurable amount of precipitation occurs around 160 to 165 days a year in Allegheny County. In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snowpack throughout contributing watersheds. Summer floods have occurred from intense rainfall on previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time that can result in flash flood events, when the velocity of floodwaters has the potential to amplify the impacts of a flood event.

Winter floods have also resulted from runoff of intense rainfall on frozen ground, and, on rare occasions, local flooding has been exacerbated by ice jams in rivers. Ice jam floods, as mentioned in the previous section, occur on rivers that are totally or partially frozen. A rise in stream stage will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur. Ice jams are particularly an issue on the Youghiogheny River and Pine Creek.

Flood effects can be volume or force related. Major floods along larger streams having wide floodplains tend to result in large-scale inundations. This causes widespread damage through soaking and silt deposits in homes, businesses, and industrial plants. In hilly regions where runoff paths are steep, flash floods may be prevalent. Flash floods are short in duration and usually occur in a somewhat localized area. In these floods, the velocity rather than the volume of water causes flood damages. Torrents of water can rush down minor hillside gullies at 30-50 miles per hour, carrying trees, debris, and rocks. These floods are often unpredictable and, particularly if they occur at night, can cause major panic and loss of life. Frozen surfaces can more than double normal runoff velocities, particularly in small drainage areas. This causes flash floods which can be compounded by ice and debris jams in channels and culverts. Obstructions within the floodplain such as bridges and undersized culverts can also increase flooding.

Past Occurrence:

Allegheny County has a long history of flooding problems. Since the Allegheny, Monongahela, and Ohio Rivers, along with a large number of their tributaries, are located in Allegheny County, the County has suffered damage from numerous major overbank floods and localized flash flooding. In addition to an historic pattern of development occurring in the floodplain, Allegheny County has steep slopes that allow fast runoff from storms, which exacerbates flooding conditions. There are also several bridges and culverts that get blocked with debris and cause backup flooding during a large storm.

The Youghiogheny River and Pine Creek have also experienced localized flooding problems due to ice jams. Because of the shallow water and prominent sandbar conditions, the Youghiogheny River has caused flooding in the Boston area of Elizabeth Township and major ice flow damage in the McKeesport area (municipal docks). Just upstream from Boston (in the Coulter area), a massive sandbar can stop flowing ice and cause ice jams. After a period of time, large ice floes will break out of the jam and move downstream where they will again jam at the railroad bridge between Boston and McKeesport. At each jam, water will back up causing shore flooding, and as the jams start to break up and move downstream, they can cause damage to anything built near the shores. Pine Creek flows from North Park Lake through Hampton Township, Shaler Township, the Borough of Etna and Millvale and into the Allegheny River. On its path to the river, it runs along Route 8 with numerous crossings under Route 8. When ice forms in this stream, it can jam at the numerous turns or narrow spots, causing shoreline flooding.

Future Occurrence:

In Allegheny County, flooding occurs commonly and can occur during any season of the year. Therefore, the future occurrence of floods in Allegheny County can be characterized as highly likely as defined by the Risk Factor Methodology probability criteria.

Changing weather patterns have made many types of disasters more frequent and extreme. As frequent and intense rainfalls increase, more severe flooding is being seen in many areas across the State. In general, hazardous precipitation events are increasing in this region. This can also lead to higher instances of flash flooding and river overflow.

Vulnerability Assessment:

Allegheny County is vulnerable to flooding that causes loss of lives, property damage, and road closures. For purposes of assessing vulnerability, the County focused on community assets that are located in the 1%-annual-chance floodplain. While greater and smaller floods are possible, information about the extent and depths for this floodplain is available for all municipalities countywide, thus providing a consistent basis for analysis.

Flood events are also a major cause for road closures in the County and its municipalities. Affected areas of roadway may vary from a few feet for only a few hours (as in the case of flash flooding) to several hundred feet for a few days (as in the case of riverine flooding). Road

closures limit accessibility to certain areas of the County, which in turn delays the provision of emergency services to the residents in those areas. In addition, despite posted signs warning drivers to stay out of floodwaters, inevitably there are individuals who must be rescued from their cars that become stranded in floodwaters.

Other concerns during a flood include the safety of mobile homes and trailers, as they are typically lightweight and unanchored, and of hazardous material facilities.

Pandemic and Infectious Disease

Category: Naturally Occurring   **Terrorism:**   No

Location and Extent:

Pandemic is defined as a disease affecting or attacking the population of an extensive region, including several countries, and/or continent(s). It is further described as extensively epidemic. Generally, pandemic diseases cause sudden, pervasive illness in all age groups on a global scale. Infectious diseases are also highly virulent but are not spread person-to-person.

Pandemic and infectious disease events cover a wide geographical area and can affect large populations, potentially including the entire population of the county. The exact size and extent of an infected population is dependent upon how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in denser areas where there are large concentrations of people. The transmission rate of infectious disease will depend on the mode of transmission of a given illness. Pandemic events can also occur after other natural disasters, particularly floods, when there is the potential for bacteria to grow and contaminate water (PA SHMP, 2018).

Allegheny County is primarily concerned with three diseases with pandemic and infectious potential: West Nile Virus, influenza and coronavirus. West Nile Virus is a vector-borne disease that can cause headache, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and, in its most serious form, death. The virus spreads via mosquito bite and is aided by warm temperatures and wet climates conducive to mosquito breeding. West Nile Virus has been detected in all 67 counties throughout Pennsylvania at least once in the past 10 years. The virus is highly temporal with most cases occurring between April and October (DEP-WNCP, 2020). Coronavirus is an illness caused by a virus that can spread from person to person. It is a new coronavirus that has spread throughout the world, and symptoms range from mild, or no symptoms, to severe illness that can lead to death (CDC, 2020).

Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. H5N1 did not reach pandemic proportions in the United States, but the Commonwealth began actively planning for an occurrence of an influenza pandemic. As stated in the Pennsylvania Department of Health (DOH) Influenza Pandemic Response Plan, "an influenza pandemic is inevitable and will probably give little warning" (PA DOH, 2005). Influenza, also known as "the flu", is a contagious disease that is caused by the influenza virus and most commonly attacks the respiratory tract in humans. Influenza is considered to have pandemic potential if it is novel, meaning that people have no immunity to it, virulent, meaning that it causes deaths in normally healthy individuals, and easily transmittable from person-to-person

Different strands of influenza mutate over time and replace older stands of the virus and thus have drastically different effects. The H1N1 virus, colloquially known as swine flu, is of particular concern. This virus was first detected in people in the United States in April 2009. On June 11, 2009, the world health organization signaled that a pandemic of 2009 H1N1 flu was underway (CDC, 2009). Avian influenza, also known as bird flu, infects birds. A recent strain, H5N1, has caused particular concern due to its ability to pass from wild birds to poultry then on to people. This virus has killed more than half of the people infected with it, although the avian flu is less like to infect humans.

During the Hazard Mitigation Plan Update process, a novel coronavirus spread into a worldwide pandemic. Named COVID-19, this type of coronavirus is a new virus that causes respiratory illness and is extremely contagious. Flu like in nature, symptoms of the virus include fever, cough, shortness of breath, and diarrhea. This virus became a great concern due to its high rates of transmission, in addition to so little being known about it. People were advised to practice social distancing; only leaving the house for essentials like grocery shopping, and no gathering even in small groups. Even when going on walks, people should remain six feet apart to slow the spread of transmission (PA DOH, 2020b).

Range of Magnitude:

The magnitude of a pandemic or infectious disease threat in the Allegheny County will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. In the case of West Nile Virus, slightly less than 80% of cases are clinically asymptomatic. Approximately 20% of cases result in mild infection, called West Nile Fever, lasting two to seven days. However, one in 150 cases result in severe neurological disease or death. Since the appearance of West Nile Virus in Pennsylvania in 2000, the worst year statewide was 2003 when 237 Pennsylvanians were infected with the virus and 9 people died. The worst years in Allegheny County were 2002 with 22 human infections, 2003 with ten human infections, and 2005 with six human infections (DEP-WNCP, 2020). The virus is typically more serious in older adults.

Pandemic influenza is more easily transmitted from person-to-person than West Nile, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined (see Table 4.3.6-3). The severity of illness from the 2009-10 H1N1 influenza flu virus varied, with the gravest cases occurring mainly among those considered at high risk. High risk populations considered more vulnerable include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. Most people infected with H1N1 in 2009 recovered without needing medical treatment, and this flu strain is now included in flu shots. According to the CDC, about 70% of those who hospitalized with the 2009 H1N1 flu virus in the United States belonged to a high risk group (CDC, 2009). This pattern is expected to continue with future novel flu strains.

The magnitude of a pandemic may be exacerbated by the fact that an influenza pandemic will cause outbreaks across the United States, limiting the ability to transfer assistance from one

jurisdiction to another. Additionally, effective preventative and therapeutic measures, including vaccines and other medications, will likely be in short supply or will not be available.

The 1918 Spanish flu pandemic remains the worst case pandemic event on record both in Pennsylvania and worldwide. While mortality figures were probably under-reported, in the first month of the pandemic alone, 8,000 Pennsylvanians died from the flu or its complications (US DHHS, 2010). As the densest city in the Commonwealth, Philadelphia was particularly hurt from this event.

It is believed that the coronavirus originated in an open-air market in the Wuhan province of China in November 2019. Shortly afterwards, the virus began to spread to nearby countries like Japan and South Korea. By March 2020, the virus had reached almost every country worldwide, with the most cases in the US. At first, people were mostly concerned with people who might be infected due to recent travel. However, community infections soon began to crop up in many cities and towns. This led to a statewide shutdown of schools and businesses and the cancellation of large events for Spring and Summer 2020. Only life sustaining services were permitted to remain open, including medical facilities, pharmacies, and grocery stores. People were advised to remain home as much as possible in attempt to slow the transmission of COVID-19. State health officials note that the virus has infected all age ranges at about the same rate, and that no age group can be considered more or less vulnerable to infection.

Past Occurrence:

West Nile Virus arrived in the United States in 1999 and was first detected in Pennsylvania in 2000 when mosquito pools, dead birds, and/ or horses in 19 counties tested positive for the virus. Since then, the number of positive counties, human cases, and West Nile deaths has fluctuated with the temperature and precipitation each year.

While West Nile Virus occurrences are fairly recent, the United States Department of Health and Human Services estimates that influenza pandemics have occurred for at least 300 years at unpredictable intervals. There have been several pandemic influenza outbreaks over the past 100 years.

Deaths occurred in the United States as a result of the Spanish Flu, Asian flu, and Hong Kong Flu outbreaks. The Spanish Flu claimed 500,000 lives in the United States, and there were 350,000 cases in Pennsylvania – 150,000 were in Philadelphia alone. Most deaths resulting from the Asian flu occurred between September 1957 and March 1958; there were about 70,000 deaths in the United States and approximately 15% of the population of Pennsylvania was affected. The first cases of the Hong Kong Flu in the U.S. were detected in September of 1968 with deaths peaking between December 1968 and January 1969 (Global Security, 2009). In the 2009/2010 flu season, when H1N1 was a primary concern. The World Health Organization declared a pandemic in June 2009.

Confirmed flu cases have been on the rise in Allegheny County over the past few years. According to the Pennsylvania Department of Health (DOH), there were 13,694 confirmed cases in Allegheny County the most recent influenza season from September 2019 to March 2020 (PA DOH, 2020a).

The CDC marked the 2014-2015 flu season as severe, with approximately 710,000 hospitalizations. The CDC does not track national deaths in adults, but the organization reported 148 pediatric deaths from influenza. The 2017-2018 flu season was another severe season. The CDC reported that the H3N2 flu, along with other strains including H1N1, led to more cases, doctors' visits, hospital visits, and deaths than previous flu seasons. The CDC also noted that the flu became widespread in all states and jurisdictions at the same time. In January 2018, approximately halfway through the flu season, 37 pediatric deaths were reported. The CDC estimated that 34 million Americans were affected by the flu (CDC, 2018).
Flu Cases

The COVID-19 outbreak began in China in November 2019. The virus reached the US in late February 2020, and most counties in Pennsylvania were affected by March 2020. As of November 4th, the county had 16,210 confirmed cases and 437 deaths related to COVID-19 (ACHD, 2020d). These numbers are expected to continue to increase. While those who tested positive are isolating in their homes, county officials urge the entire population to isolate and act as if the virus is everywhere. In response to the impact of the outbreak all non-essential businesses were closed through mid-summer 2020, and while many businesses have re-opened, they have done so with many restrictions as of November 2020.

Future Occurrence:

Future occurrences of pandemic are unclear. For example, instances of the West Nile Virus have been generally decreasing due to aggressive planning and eradication efforts, but some scientists suggest that as global temperatures rise and extreme weather conditions increase due to climate change, the range of the virus in the United States will grow (Paz, 2015).

As with West Nile Virus, the precise timing of pandemic influenza is uncertain, but occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. This emergence of a novel virus is the first step toward a pandemic.

Future pandemics may also emerge from other diseases, especially invasive pathogens that Pennsylvanians do not have natural immunity to, as we have seen with COVID-19. The COVID-19 pandemic has shown that occurrences of pandemic can be unpredictable, with unknown impact. It takes just one occurrence to have a major impact. Therefore, while future occurrences of pandemic are unclear, if a pandemic event is to occur it can be anticipated that it will be impactful.

Vulnerability Assessment:

In general, municipalities that are more densely populated are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction has some vulnerability to pandemic and infectious disease threats. Colleges and universities with

large residential student populations may also be more vulnerable, as a pandemic is more likely to spread through human contact in these settings.

There are some occupation-specific risks that may make some employees more vulnerable, though. For example, those working in direct patient care situations are more likely to be exposed to a pandemic disease; similarly, county employees working outdoors for extended periods of time in the warm months may be more vulnerable to West Nile Virus.

There are no true environmental impacts of pandemics and infectious disease threats, but there will be significant economic and social costs beyond the possibility of disease-related deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism occur within the business community, and these contribute to social and economic disruption. On a national scale, the Congressional Budget Office Estimates that a severe pandemic could cost the US economy more than $600 million, or 5% of the Gross Domestic Product (US DHHS 2005). Social and economic disruptions could be temporary but may be amplified in today's closely interrelated and interdependent systems of trade and commerce. Social disruption may be greatest when rates of absenteeism impair essential services, such as power, transportation, and communications.

Municipal losses in a pandemic or infectious disease outbreak stem from lost wages and productivity, not losses to buildings or land. Losses are difficult to estimate because the exact rates of absenteeism and cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms. For historical context, though, the Asian and Hong Kong Flu pandemics killed over 1.5 million people worldwide and caused an estimated $32 billion loss due to lost productivity and medical expenses (Smith, 2004). With Pennsylvania's economy so integral to the national economy, economic losses from a pandemic or infectious disease threat could be significant.

It is expected that there will be immense losses due to the COVID-19 pandemic. Thousands of individuals were laid off across the commonwealth at non-essential businesses were forced to close. In just one week, over three million Americans filed for unemployment; the greatest amount ever (Long & Fowers, 2020). There is specific concern for those who worked in service and hospitality industries. Construction projects and other businesses are in limbo, while many others decide to permanently close. However, the commonwealth and the federal government are releasing relief packages for individuals and businesses. The ACHD complied a growing list with links to medical information, relief packages, and other resources. It is currently unknown how COVID-19 will change the county.

The Allegheny County Health Department is charged with influenza surveillance and planning. The Health Department conducts proactive planning for influenza and other infectious diseases that will reduce overall vulnerability to future pandemic events (ACHD, 2020c). These services include:

- Health services and treatment
- Surveillance
- Immunization
- Laboratory identification

- Communications
- Emergency preparedness
- Distributing antiviral medications.

Utility Interruption

Category: Technological   **Terrorism:**   No

Location and Extent:

Utility interruptions include any impairment of the functioning of telecommunication, gas, electric, water, or waste networks. Interruptions or outages occur because of geomagnetic storms, fuel or resources shortage, electromagnetic pulses, information technology failures, transmission facility or linear utility accident, and major energy, power, or utility failure. The focus of utility interruptions as a hazard lies in fuel, energy, or utility failure. These kinds of interruptions rarely spontaneously occur on their own; this hazard is often secondary to other natural hazard event, particularly transportation crashes and incidents, lightning strikes, extreme heat or cold events, and coastal and winter storms.

Utility interruptions in Allegheny County occur regularly but are usually small-scale, localized incidents. Utility interruptions are possible anywhere there is utility service.

According to the 2018 5-year American Community Survey, in Allegheny County, 83.8% of housing units use utility gas as their heat source, followed by 13.8% of homes using electric heat (ACS 2014-2018). As a result, an interruption in either of those utilities could affect a significant number of residents. In addition, an increasing reliance on internet access and telecommunications could also impact a large number of residents at any given time.

Range of Magnitude:

The most severe utility interruptions will be regional or widespread power and telecommunications outages. With the loss of power, electrically powered equipment and systems will not be operational. Examples may include lighting; HVAC and ancillary support equipment; communication (i.e. public address systems, telephone, computer servers, and peripherals); ventilation systems; fire and security systems; refrigerators, sterilizers, trash compactors, office equipment; and medical equipment. This can cause food spoilage, loss of heat or air conditioning, basement flooding (sump pump failure), lack of light, loss of water (well pump failure), lack of phone service, or lack of internet service. However, this is most often a short-term nuisance rather than a catastrophic hazard.

The severity of a utility interruption can be compounded with extreme weather events, especially winter weather events. Interruptions can also be more severe for special needs populations that are dependent on electronic medical equipment. Utility interruptions can significantly hamper first responders in their efforts to provide aid in a compound disaster situation, especially with losses of telecommunications and wireless capabilities.

Telecommunications interruptions will also hinder first responders' efforts. Additionally, an internet outage could be crippling to the economy, as many companies and government entities process payments and invoices electronically rather than with physical checks.

In a possible worst-case scenario, a winter storm event causes widespread power outages, leaving citizens without heat in the midst of subzero temperatures. The power outage also means that elderly populations or others at risk of health problems due to the lack of heat are unable to call for assistance or leave their homes. Power lines are unable to be repaired because of the magnitude of the storm, and the power outage lasts for several days.

Past Occurrence:

Power outages in Allegheny County have been caused by winter storms, wind, vehicle accidents, and other factors. Utility interruptions are largely minor, routine events, but there have been Presidential and Gubernatorial Disaster Declarations in which a utility interruption was a major component of a disaster. For example, heavy snow in December 1974 led to widespread power outages in the Southwestern Counties, leading to a Gubernatorial Disaster Declaration. Additionally, the nation's gas shortage coupled with severe winter weather in January 1977 led to a President's Declaration of Emergency.

Future Occurrence:

Utility interruptions will continue to occur annually with minimal impact. Widespread utility interruption events usually occur approximately once every five years, usually as a secondary effect of an extreme weather event. These interruptions should be anticipated, and first responders should be prepared during severe weather events. Research by the National Oceanic and Atmospheric Administration (NOAA) suggests that climate change may cause more extreme storms in Pennsylvania (Frankson et. al., 2017).

Allegheny County is expected to see large increases in precipitation and numbers of very hot and very cold days (Climate Central, 2019). These factors can increase the occurrence of hazards such as flooding, hurricanes and tropical storms, landslides, tornados and windstorms, wildfires, and winter storms. Impacts from any of these hazards can lead to utility interruption on a range of scales.

Aging infrastructure also brings risk in the form of potential utility interruptions, particularly for places like Allegheny County with aging infrastructure. In many utility systems, significant portions of the equipment and facilities date from the growth periods of the 1950s and 1960s that followed World War II. As this equipment ages, it deteriorates from the constant wear and tear of service. Eventually the equipment reaches a point at which it will either fail on its own or as a result of outside forces (storms, loads it was designed to handle but no longer can, etc.). These failures cause service interruptions and can require expensive emergency repairs. In addition, as repairs have taken place along transmission routes, there is often a mix of new and old equipment along the line, as repair and not replacement is generally the choice made to resolve an issue. At the same time, though, the City of Pittsburgh is reinvesting in its power grid and other public facilities; the city is undertaking a grid security project to both cut water and

energy consumption by 2030 and create redundant systems that would be more resilient in a disaster situation (City of Pittsburgh, 2017).

The wholesale replacement of a system is not a feasible solution for utility companies. This would require the interruption of services while the replacement occurs, as well as accessing the existing system (which may lay under roads, private property, or other inconvenient places). Utility companies face the challenge of managing the issue of the aging infrastructure. They are tasked with reducing the effects of aging equipment while also controlling the deterioration of the existing system as much as possible. This balance will be tenuous as transmission equipment continues to age and break down. These breakdowns will likely lead to more frequent utility disruptions as time goes by.

Vulnerability Assessment:

All jurisdictions are vulnerable on some level to utility interruptions, but because this hazard often occurs in conjunction with other hazards, jurisdictions that have been identified as more vulnerable to winter storms, windstorms, tornado, flooding, and other natural hazard events may be more vulnerable to a utility interruption.

Utility outages pose the greatest threat to special needs population in Allegheny County. Resources such as electricity, communications, gas, and water supply are critical to ensure the health, safety, and general welfare of the citizenry. All critical infrastructure is vulnerable to the effects of a power outage. The special needs population can be vulnerable to loss of heat or air conditioning during extreme heat; likewise, they can be vulnerable to periods of severe cold if they use electric heat and there is a power outage.

THIRA STEP 3: CAPABILITY TARGETS

Screening, Search, and Detention

Description:

Identify, discover, or locate threats and/or hazards through active and passive surveillance and search procedures. This may include the use of systematic examinations and assessments, bio surveillance, sensor technologies, or physical investigation and intelligence.

1. Screen cargo, conveyances, mail, baggage, and people using information-based and physical screening technology and processes.
2. Detect WMD, traditional, and emerging threats and hazards of concern using:
   a. A laboratory diagnostic capability and the capacity for food, agricultural (plant/animal), environmental, medical products, and clinical samples
   b. Bio surveillance systems
   c. CBRNE detection systems
   d. Trained healthcare, emergency medical, veterinary, and environmental laboratory professionals

Capability Targets:

Within (#) (time) of notice of a credible threat, conduct screening, search, and detection operations for (#) people requiring screening, including (#) people with access and functional needs (requiring screening).

Identified Threat and Hazards Related:

- Cyber Preparedness
- Pandemic and Infectious Disease

Economic Recovery

Description:

Return economic and business activities (including food and agriculture) to a healthy state and develop new business and employment opportunities that result in an economically viable community.

1. Conduct a preliminary assessment of economic issues and identify potential inhibitors to fostering stabilization of the affected communities.
2. Return affected area's economy within the specified timeframe in the recovery plan.
3. Ensure the community recovery and mitigation plan(s) incorporates economic revitalization and removes governmental inhibitors to post-disaster economic sustainability, while maintaining the civil rights of citizens.

Capability Targets:

Within (#) (time) of an incident, reopen (#) businesses closed due to the incident.

Identified Threat and Hazards Related:

- Winter Storm
- Cyber Preparedness
- Flood, Flash Flood, Ice Jam
- Pandemic and Infectious Disease
- Utility Interruption

Health and Social Services

Description:

Restore and improve health and social services capabilities and networks to promote the resilience, independence, health (including behavioral health), and well-being of the whole community.

1. Identify affected populations, groups, and key partners in short-term, intermediate, and long-term recovery.
2. Complete an assessment of community health and social service needs; prioritize these needs, including accessibility requirements, based on the whole community's input and participation in the recovery planning process; and develop a comprehensive recovery timeline.
3. Restore health care (including behavioral health), public health, and social services functions.
4. Restore and improve the resilience and sustainability of the health care system and social service capabilities and networks to promote the independence and well-being of community members in accordance with the specified recovery timeline.

Capability Targets:

Within (#) (time) of an incident, restore functions at (#) affected healthcare facilities and social service organizations.

Identified Threat and Hazards Related:

- Winter Storm
- Cyber Preparedness
- Flood, Flash Flood, Ice Jam
- Pandemic and Infectious Disease
- Utility Interruption

Housing

Description:

Implement housing solutions that effectively support the needs of the whole community and contribute to its sustainability and resilience.

1. Assess preliminary housing impacts and needs, identify currently available options for temporary housing, and plan for permanent housing.
2. Ensure community housing recovery plans continue to address interim housing needs, assess options for permanent housing, and define a timeline for achieving a resilient, accessible, and sustainable housing market.
3. Establish a resilient and sustainable housing market that meets the needs of the community, including the need for accessible housing within the specified timeframe in the recovery plan.

Capability Targets:

Within (#) (time) of an incident, (#) people requiring long-term housing, including (#) people with access and functional needs (requiring accessible long-term housing), find and secure long-term housing.

Identified Threat and Hazards Related:

- Winter Storm
- Flood, Flash Flood, Ice Jam
- Utility Interruption

Operational Coordination

Description:

Establish and maintain a unified and coordinated operational structure and process that appropriately integrates all critical stakeholders and supports the execution of Core Capabilities.

1. Mobilize all critical resources and establish command, control, and coordination structures within the affected community, in other coordinating bodies in surrounding communities, and across the Nation, and maintain as needed throughout the duration of an incident.
2. Enhance and maintain command, control, and coordination structures consistent with the National Incident Management System (NIMS) to meet basic human needs, stabilize the incident, and transition to recovery

Capability Targets:

Within (#) (time) of a potential or actual incident, establish and maintain a unified and coordinated operational structure and process across (#) jurisdictions affected and with (#) partner organizations involved in incident management. Maintain for (#) (time).

Identified Threat and Hazards Related:

- Winter Storm
- Cyber Preparedness
- Flood, Flash Flood, Ice Jam
- Pandemic and Infectious Disease
- Utility Interruption