



# Franklin County Emergency Management and Homeland Security

## Risk Assessment for Franklin County 2018

### *Executive Summary*



# Table of Contents

<b>Executive Summary .....</b>	<b>4</b>
<b>Section 1 - Risk Assessment.....</b>	<b>12</b>
<b>Concept and Purpose .....</b>	<b>12</b>
<b>Risk Assessment Concept.....</b>	<b>12</b>
<b>Threat and Hazard Identification .....</b>	<b>13</b>
<b>Purpose of the Risk Assessment.....</b>	<b>19</b>
<b>Vulnerability and Consequence Assessments.....</b>	<b>21</b>
<b>Probability Assessment.....</b>	<b>22</b>
<b>Risk Assessment Model.....</b>	<b>24</b>
<b>Risk Assessment Methodology .....</b>	<b>26</b>
<b>Threat and Hazard Scenarios .....</b>	<b>26</b>
<b>Risk Factors .....</b>	<b>28</b>
<b>Weighted Factors .....</b>	<b>35</b>
<b>Risk Scoring.....</b>	<b>36</b>
<b>Franklin County Scores.....</b>	<b>36</b>
<b>Uncertainty Analysis .....</b>	<b>38</b>
<b>Risk Management Taxonomy .....</b>	<b>40</b>
<b>Definitions .....</b>	<b>43</b>
<b>References .....</b>	<b>44</b>
<b>Section 2 – Franklin County Profile .....</b>	<b>46</b>
<b>History .....</b>	<b>46</b>
<b>Geography .....</b>	<b>47</b>
<b>Climate.....</b>	<b>47</b>
<b>Demographics .....</b>	<b>49</b>
<b>Land Use .....</b>	<b>50</b>
<b>Transportation .....</b>	<b>54</b>
<b>Economy.....</b>	<b>55</b>
<b>Government.....</b>	<b>56</b>
<b>Franklin County Cities, Villages, Townships.....</b>	<b>58</b>
<b>Critical Facilities .....</b>	<b>59</b>
<b>Major Events.....</b>	<b>60</b>
<b>References .....</b>	<b>61</b>
<b>Section 3 – Hazard Identification.....</b>	<b>62</b>
<b>Hazard Identification .....</b>	<b>62</b>
<b>Hazard Relationships.....</b>	<b>63</b>
<b>Types of Hazards.....</b>	<b>65</b>
<b>Ohio Hazards .....</b>	<b>65</b>
<b>Disasters and Declarations .....</b>	<b>66</b>

Ohio Declarations .....	69
History of Declared Disasters.....	70
References .....	72
Section 4 – Hazards.....	73
Tornadoes - #1 .....	73
Cyber-Threat - #2 .....	101
Infectious Diseases - #3.....	119
Flooding - #4 .....	141
Lone Wolf Terrorism- #5.....	176
Dam/ Levee Failure - #6 .....	193
Utility/Energy Interruption/Failure - #7 .....	213
Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) Terrorist Incident - #8.....	223
Severe Winter Weather: Snow, Ice, Extreme Cold - #9.....	241
Hazardous Material Incidents - #10 .....	261
Civil Disturbance - #11.....	270
Severe Summer Weather: Thunderstorms, Lightning, Wind and Hail - #12.....	280
Transportation Accident – Aircraft - #13 .....	303
Space Weather - #14 .....	317
Extreme Heat - #15.....	330
Earthquakes - #16.....	347
Invasive Species - #17.....	361
Air and Water Pollution/Contamination -#18.....	381
Drought - #19.....	394
Karst/Sinkhole- #20.....	409
Hazards Not Profiled.....	416
Appendix A .....	417

# Executive Summary

Franklin County Emergency Management and Homeland Security (FCEM&HS) is a local government agency in Franklin County, Ohio, responsible for coordinating county-wide emergency/disaster planning, education, warning, response, and recovery to minimize the adverse impact of disasters on people and property in the county. Performing a risk assessment for Franklin County provides FCEM&HS with the basis for planning and implementing measures to reduce the risks associated with the greatest threats and hazards confronting the county.

This 2018 Franklin County Risk Assessment, funded by Pre-Disaster Mitigation funds administered through the Ohio Emergency Management Agency (OEMA), is a detailed study of the hazards most likely to impact Franklin County. Nineteen threats and hazards – dangerous events such as winter storms, floods and terrorist attacks – were analyzed and ranked according to the potential risk they pose.

**PURPOSE:** The purpose of the 2018 Franklin County Risk Assessment is to enhance the County’s decision-making process in regards to homeland security and emergency management by providing decision-makers with risk-based information that differentiates various decision options under consideration. Thus, the primary users of the Risk Assessment are those within the County who are responsible for managing the risks related to natural disasters, technological failures and man-made acts of terrorism.

The U.S. DHS publication titled “DHS Risk Lexicon, September 2010”, defines risk as the “potential for an unwanted outcome resulting from an incident, event, or occurrence, as determined by its likelihood and the associated consequences”. Risk assessment is described as the “product or process which collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making.”<sup>1</sup>

In summary, an assessment of the community’s threats, hazards, and risks provides the basis for planning and implementing measures to reduce the negative consequences of a disaster or catastrophic event. Directly eliminating threats or hazards is usually very difficult or even impossible. Risk reduction is more likely to be achieved by either addressing the community’s vulnerabilities to the threats and hazards or by controlling their associated risks by strengthening the community’s prevention, protection, mitigation, response, and recovery capabilities.

**METHODOLOGY:** FCEM&HS worked over an extended period to collect and assess information related to 20 potential natural, technological and human-caused threats and hazards that may occur in the future. A workgroup of representatives within the county estimated the risks posed by these threats and hazards according to a pre-determined risk

---

<sup>1</sup> “DHS Risk Lexicon,” Department of Homeland Security Risk Steering Committee, last modified September 2010 <http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf>

scoring methodology based on the probability of occurrence and associated negative consequences. The relative risk scoring methodology does not calculate absolute risk values; rather, it is a more user-friendly screening tool for estimating the level of risk that can be used to support planning and decision-making efforts. The information used to estimate the likelihood that each threat or hazard might occur included:

- A Likelihood of Occurrence Factor: The frequency at which an event has happened in the past or may happen in the future based on available intelligence.
- A Special Circumstance Factor: A condition or factor expected to have some bearing on the occurrence of a particular threat or hazard (i.e., mitigation efforts which decrease the number of homes in a floodplain, acts of terrorism directed at particular infrastructure sites, etc.).

Should the threat or hazard occur, the information used to estimate the resulting negative consequences included:

- Loss of Life Factor: The number of likely fatalities in the impacted area.
- Injury Factor: The number of likely casualties in the impacted area requiring hospitalization/outpatient care.
- Relocation Factor: The number of people likely to be relocated from their homes.
- Property Damage Factor: The amount of property damage expected in an impacted area.
- Economic Impact Factor: The potential total economic impact of the event including any loss in commerce, employment incomes, as well as reconstruction and recovery costs.
- Speed of Onset Factor: The length of warning time that may be expected prior to the impact of the event.

**Table 1: Weight Factors**

Factor	Weight
Likelihood of Occurrence	15
Special Circumstance	10
Loss of Life	30
Injuries	25
Property Damage	15
Economic Impact	15
Relocation	10
Speed of Onset	10

In addition, weighted factors were used by the Workgroup to reflect the relative importance they assigned to each of the above likelihood and consequence factors. For ease of comparison the Total Weighted Score will be used in all references to ranking.

**THREAT AND HAZARD IDENTIFICATION:** In response to the events of September 11, 2001, federal guidance regarding risk assessments has emphasized the need for local governments to add the threat of terrorist acts to the list of hazards evaluated as part of the risk assessment process. The FCEM&HS Workgroup assessed three terrorist events: a

CBRNE (chemical, biological, radiological, nuclear, explosive) attack where an improvised explosive device (IED) was detonated at a sporting event, a school shooting conducted by a “lone-wolf” terrorist, and a cyber-intrusion attack that successfully disrupted the power grid for a prolonged period. These types of events are referred to as “low probability, high consequence” events because 1) the likely occurrence of any one of these terrorist attacks within Franklin County is low in comparison to natural disasters and technological failures and 2) should any of these events occur, the consequences could be catastrophic.

Franklin County has historically devoted considerable resources to addressing natural disasters. However, since the World Trade Center attacks on 9/11, the overall federal direction has been to place an increased emphasis on domestic and international acts of terrorism. Additionally, more recent events such as the Boston Marathon Bombing and many mass shootings including those in Chattanooga, Charleston, and Aurora have highlighted the rising trend of lone wolf terrorism wherein a terrorist act is perpetrated by one or two individuals acting outside the realm of an organized terrorist group. Cyber-attacks are also increasing with many different companies and governmental agencies targeted by terrorists and hackers in recent years. Thus, based on the need to provide added emphasis on acts of terrorism which would otherwise be overshadowed by frequently

occurring natural hazards, FCEM&HS chose a risk scoring methodology whereby 1) the likelihood factors outnumber the number of consequence factors and 2) the consequence factors are associated with slightly higher weighted factors. Figure 1 provides the risk ranking for the 20 threats and hazards evaluated by the Workgroup. The higher the numerical order for a threat or hazard, the greater the relative risk based on the total weighted score. The hazards in order of greatest risk are as follows:

Figure 1: Franklin County Ranked Hazards

1. Tornadoes
2. Cyber-Threat
3. Infectious Diseases
4. Flooding
5. Lone-Wolf Terrorist Incident
6. Dam/ Levee Failure
7. Utility/Energy Interruptions or Failures
8. Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) Terrorist Incident
9. Severe Winter Weather
10. Hazardous Material Incident
11. Civil Disturbance
12. Severe Summer Weather
13. Transportation Accident – Aircraft
14. Space Weather
15. Extreme Heat
16. Earthquakes
17. Invasive Species
18. Air and Water Pollution/Contamination
19. Drought
20. Karst/ Sinkhole

**No. 1: Tornadoes** are nature’s most violent windstorms – even weak ones can cause significant damage and fatalities. A tornado is defined as a rotating column of air, in contact with the surface, pendant from a cumuliform cloud, and often visible as a funnel cloud and/or circulating debris/dust at the ground. According to the National Climactic Data Center, 32 tornadic events

were reported in Franklin County from January 1950 through December 2017, all of which were rated F3 (or EF3) and under.

**No. 2: Cyber-Threat** is the possibility of a malicious attempt to damage or disrupt a computer network or system. A sharp increase in the number of cyber incidents involving government and corporate computer networks has caused the United States and Franklin County to launch initiatives to combat cyber threats. Many of the initiatives have focused on protecting critical infrastructure command and control systems, preventing access to sensitive government information, and thwarting acts of fraud and theft targeting business financial systems.

**No. 3: Infectious Diseases** are illnesses caused by the entrance into the body of harmful microbial organisms which grow and multiply. The diseases of most concern to the health and welfare of communities are those that are communicable. Communicable diseases are caused by microorganisms such as bacteria, viruses and parasites and are transmitted from an infected person/animal and/or contaminated food or water source to another person or animal. Franklin County is susceptible to many common infectious diseases, such as seasonal flu, as well as diseases that are newly emerged or re-emerging, such as H5N1 Influenza (avian flu).

**No. 4: Flooding** occurs in many forms, from naturally occurring to human-induced. Common to all flooding is the accumulation of too much water in too little time in too small a place. From 1950 to December 2017, 116 flood and flash flood events were reported in Franklin County according to the NOAA National Climactic Data Center Storm Events Database. From 1999 to 2017 Franklin County was subject to many different types of flooding and received as many as 10 flood warnings in a single year. Flash flooding is the deadliest form of flooding in the United States.

**No. 5: Lone-Wolf Terrorist Incident** is defined by DHS as an individual motivated by extremist ideology to commit acts of criminal violence independent of any larger terrorist organization. In recent years, the United States has certainly seen an emerging threat from lone wolf terrorists. The Holocaust museum shooter, the Little Rock recruiting station, the Ft. Hood shooting, the attack on Representative Giffords in Tucson, the Boston Marathon bombing, the Emanuel African Methodist Episcopal Church in Charleston, the South Carolina Shooting as well as the shooting of 5 Marine Recruiters in Chattanooga, Tennessee clearly demonstrate the lone wolf phenomenon is gaining popularity amongst would be terrorists. Lone wolf attacks such as these are easy to execute, cost very little, and make headlines. This lone wolf threat is a great challenge to our first responders and therefore has been included in the Risk Assessment as a potential hazard to Franklin County.

**No. 6: Dam/ Levee Failure** is defined as an uncontrolled release of impounded water. A dam is defined as an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water. The causes of dam failures include overtopping caused by floods that exceed the capacity of the dam, deliberate acts of sabotage, structural failure of materials used in dam construction, movement and/or failure of the foundation supporting the dam, settlement and cracking of concrete or embankment dams, piping and internal erosion of soil in embankment dams, and inadequate maintenance and upkeep. Despite efforts to provide sufficient structural integrity and to perform inspection and maintenance, problems can develop that can lead to failure. While most dams have storage volumes small enough that failures would have little or no consequences, dams with large storage amounts could cause significant flooding downstream. The O'Shaughnessy Dam and the Hoover Dam are the two dams impacting Franklin County that are found on the Ohio EMA's list of the ten most potentially hazardous dams in the state, based on the possible catastrophic consequences should they fail.

A levee is any artificial barrier together with appurtenant works that will divert or restrain the flow of a stream or other body of water for the purpose of protecting an area from inundation by flood waters. Generally, a levee is subjected to water loading during a few days or weeks in a given year; unlike a dam that is retaining water most days in the same year. A levee breach results when a portion of the levee breaks away, providing an opening for water to flood the landward side of the structure. Such breaches can be caused by surface erosion due to water velocities, or they can be the result of subsurface actions. Levee overtopping is similar to dam overtopping in that the flood waters simply exceed the design capacity of the structure, thus flowing over the lowest crest of the system. Such overtopping can lead to erosion on the landward side which, subsequently, can lead to breaching. The National Levee Database lists the West Columbus Local Protection Project (LPP), Agg Rok Reach Levee, and King Ave Levee as the three levees in Franklin County.

**No. 7: Utility/Energy Interruptions or Failures** may involve electrical power, natural gas, public water and communications systems. These systems are vulnerable to natural hazards as well as intentional disruptions. Franklin County has experienced interruptions and failures of various kinds. Remnant winds of Hurricane Ike in 2008 caused over one-third of the county to lose power. The derecho on June 29, 2012 knocked out power to 720,000 Ohioans and was the most destructive and expensive storm in AEP Ohio history.

**No. 8: Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) Terrorist Incident** is defined as a violent act or an act dangerous to human life, in violation of the criminal laws of the U.S. or any segment, to

intimidate or coerce a government, the population or any segment thereof, in furtherance of political or social objectives. Specifically, a CBRNE event is one caused by the introduction of a Chemical, Biological, Radiological, Nuclear or Explosive utilized as a weapon. Franklin County has never been the victim of a direct terrorist attack, yet has a history of terrorist activity. This, along with the difficulties in predicting which U.S. cities are future targets and the potential impact of a terrorist attack on the county's population, property and economy, makes terrorism more of a "wild card" than other hazards and therefore more difficult to prioritize.

**No. 9: Severe Winter Weather** is classified as snow, ice and extremely cold conditions. Winter storms are events in which the dominant forms of precipitation occur only at cold temperatures. According to the NOAA National Climactic Data Center's Storm Events Database, there were reports of 94 winter weather events for Franklin County from January 1996 to December 2017.

**No. 10: Hazardous Material Incident** is the release of a hazardous material from its container or package in a sufficient concentration to pose a threat. Hazardous materials may be explosive, flammable, combustible, corrosive, reactive, poisonous, biological, or radioactive, as well as solid, liquid or gaseous. As of May 2015, Franklin County has 764 facilities required to report their hazardous materials. Out of the 764 sites, 373 are Extremely Hazardous Substance (EHS) sites. The most common chemical for the EHS sites is sulfuric acid primarily found in batteries. In 2014 there were 279 spills in Franklin County reported to the Ohio EPA.

**No. 11: Civil Disturbance** is a planned or random uproar or disturbance of ordinary community life by persons choosing to ignore laws, often to bring attention to a cause, concern, or agenda. Franklin County has seen many types of civil disturbances through the years, from prison riots to university campus disturbances to political rallies.

**No. 12: Severe Summer Weather** is classified as thunderstorms, hail, lightning, and damaging wind. Each of these hazards has its own severity measure and often all four occur in one storm system, causing much more damage than each would have alone. According to the NOAA National Climactic Data Center's Storm Events Database, there were 436 strong/high/thunderstorm wind, and lightning events, as well as 212 hail events, for Franklin County from January 1950 to December 2017.

**No. 13: Transportation Accident – Aircraft** is defined as an occurrence associated with the operation of an aircraft which takes place between the times any person boards with the intent to fly and all persons have disembarked, in which a person is fatally or seriously injured, the aircraft sustains damage or structural failure, and/or the aircraft is missing or is

completely inaccessible. Franklin County has four operational airports, all located in densely populated areas. According to the National Transportation Safety Board, since 1982 there have been 92 aviation accidents in the Columbus, Ohio area.

**No. 14: Space Weather** includes major disturbances of Earth's magnetosphere that occur when there is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth. These storms result from variations in the solar wind that produce major changes in the currents, plasmas, and fields in Earth's magnetosphere. Space Weather can disrupt navigation systems such as the Global Navigation Satellite System (GNSS) and create harmful geomagnetic induced currents (GICs) in the power grid and pipelines. Generally, power outages due to space weather are very rare events, but evidence suggests that significant effects could occur.

**No. 15: Extreme Heat** events, or heat waves, are prolonged periods of excessively hot weather, which may be accompanied by high humidity. In 2012, three people died as a result of extreme heat in Ohio. From 2004-2013, the average number of heat related deaths per year exceeded all other weather related fatalities.

**No. 16: Earthquakes** are caused by the movement of the earth's crustal plates along faults. Franklin County is not located on a fault line, nor have any epicenters been located in Franklin County. Earthquakes occurring in other areas have been felt in Franklin County; however, no damage has been reported.

**No. 17: Invasive Species** are defined as any species that is not native to an ecosystem and whose introduction causes or is likely to cause harm to the economy, environment, or human health. An increasing threat of exotic diseases, such as the dangerous West Nile virus, exists because of increased transportation and encroachment of humans into previously remote ecosystems. Two events that have caused substantial economic and environmental damage in Ohio are the introduction of zebra mussels into waterways and the infestation of the emerald ash borer, responsible for killing ash trees.

**No. 18: Air and Water Pollution/Contamination** refers to the contamination of water, land or the air by substances that can adversely impact the environment and human health. Franklin County is subject to point and nonpoint water pollution of streams, as well as ground level ozone.

**No. 19: Drought** is defined as a prolonged period of abnormally dry weather, where the lack of sufficient precipitation causes a serious hydrologic imbalance with economic and/or social consequences. Franklin County is primarily impacted by drought relating to shortages in the water supply as

well as a decrease in overall water quality. Drought also greatly impacts land throughout the county that is utilized as cropland or pasture.

**No. 20: Karst** refers to a landform that develops on or in limestone, dolomite, or gypsum by dissolution and that is characterized by the presence of characteristic features such as sinkholes, underground (or internal) drainage through solution-enlarged fractures (joints), and caves. Sudden collapse of an underground cavern or opening of a sinkhole can cause surface subsidence that can severely damage or destroy any overlying structure such as a building, bridge, or highway. A sinkhole is a hole that forms in the Earth's surface as a result of the chemical weathering of carbonate rocks like limestone, as well as salt beds or rocks that can be severely weathered as water runs through them and erosion.