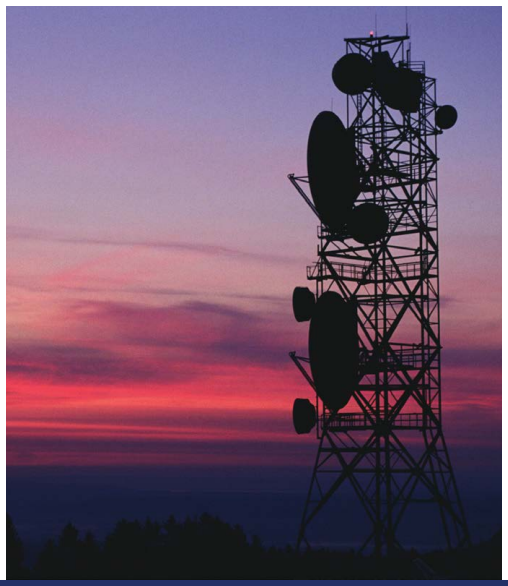
Community Hazard Handbook

HOWARD COUNTY OFFICE OF EMERGENCY MANAGEMENT



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Preparedness begins with knowledge.

The Community Hazard Handbook is a guide to understanding the 26 manmade and natural hazards that may pose a threat to Howard County. By providing a detailed look at each hazard's local likelihood and estimated impact, the Community Hazard Handbook is the first step toward building a prepared, informed, and resilient Howard County.

Howard County Hazard Categories:

NATURAL HAZARDS

- Animal/Plant Infestation
- Drought
- Earthquake
- Flood
- Hurricane/Tropical Storm
- Lightning
- Severe Winter Storm
- Solar Storm
- Tornado/Wind Storm
- Wildfire

ADVERSARIAL/ INTENTIONAL HAZARDS

- Active Assailant
- Biological Attack
- Chemical Attack
- Civil Unrest
- Cyber/Communications Infrastructure Attack
- Explosives
- Nuclear Blast
- Radiological Attack

TECHNOLOGICAL/ ACCIDENTAL HAZARDS

- Dam Failure
- Disease Epidemic/ Unintentional Biological Hazard
- Structure Fire
- Transportation Hazard
- Unintentional Chemical Substance Release/Hazmat
- Unintentional Cyber/ Communications Infrastructure Failure
- Unintentional Radiological Substance Release
- Utility Disruption

WHAT DOES RISK MEAN TO ME?

Risk is a value that incorporates the consequences of a given hazard and the likelihood that the hazard will occur. Risk can be used to compare hazards and prioritize preparedness efforts. Understanding the components of risk can help target your preparedness activities and improve the safety of your home or business in the event of a disaster.

RISK =
Likelihood + Consequence

HAZARD =
Any potential source or cause of harm or difficulty

HOW TO USE

When developing a preparedness plan for your home or business, it is important to set priorities that meet your unique preparedness goals. The Community Hazard Handbook is a detailed guide that compiles information from trusted data sources and reliable subject matter experts with local expertise. With limited resources and energy to devote to preparedness activities, this handbook can help you decide which hazards pose the greatest threats to your interests.

WHAT'S IN IT?

1. RISK OVERVIEW:
   Risk, Likelihood, and Impact rankings paint a clear picture of how hazards compare with one another.
2. HAZARD PROFILES:
   Hazard profiles describe what to expect should that hazard occur in your area. The information in these profiles can help you develop preparedness strategies that address the unique characteristics of each hazard.

MEASURING RISK

The Howard County Risk Tool converts hazard information into a set of numerical scores that allow for comparison across many natural and manmade hazard types. The Risk Tool reflects the components of risk outlined earlier in this section. Every hazard is assigned a numerical score in each of the four risk assessment categories: Likelihood, Impact, Warning Time, and Duration. Numerical scores range from 1 to 4 based on criteria that are defined in the Risk tool. The scores from each section are multiplied by the assigned weighting factor. Likelihood is weighted at 50% of the Risk Score. Consequence is made up of Impact (40%), Warning Time (5%), and Duration (5%) for a combined total of 50% of the Risk Score. Once multiplied by the weighting factor, the sum of the scores becomes the total Risk Score for the hazard.

CAUTION

Hazards are given a risk score for both the most-likely and worst-case scenarios. Because the likeliness of a worst-case scenario for each hazard is unknown, the likelihood factor remains constant for both the most-likely and worst-case scenario. The difference in the score therefore reflects variation in consequences.

The Howard County Risk Tool makes predictions based on historical data and subject matter expertise. Risk values are subject to change as the hazard environment evolves and new information becomes available.

MORE INFORMATION

For the complete risk analysis, with full explanation and analysis of each of the risks, see the full HIRA plan, posted at the Howard County Office of Emergency Management Website.

HOWARD COUNTY RISK TOOL

LIKELIHOOD FACTORS

LIKELIHOOD
Estimated chance of a single hazard event occurring in a given year based on historical incidence and trend forecasting.

UNLIKELY (1)	INFREQUENT (2)	LIKELY (3)	VERY LIKELY (4)
No documented occurrence. Less than 1% chance of annual occurrence.	1-10% chance of annual occurrence.	1-30% chance of annual occurrence.	30+% chance of occurrence annually.

CONSEQUENCE FACTORS

IMPACT
Estimated effect of a single hazard event on property, health & safety, critical facility functioning, response capacity, the environment, the economy, and standard of living.

LIMITED (1)	SIGNIFICANT (2)	CRITICAL (3)	CATASTROPHIC (4)
• Property damage is less than 5% of critical and non-critical infrastructure. • Injuries are manageable with existing resources, no fatalities. • Shutdown of critical facilities for less than 24 hours. • Local resources are adequate to support the response. • Little to no environmental impact. • Little to no economic impact. • Standard of living is only minimally disrupted.	• Property damage is 5-25% of critical and non- critical infrastructure. • Injuries are manageable, may include at least one death. • Critical facilities are down for 1-7 days. • Local and mutual aid resources are adequate to perform response, with limited or no state assistance. • Moderate environmental impact. • Moderate economic impact. • Standard of living is moderately affected.	• Property damage is between 26-50% of critical and non-critical infrastructure. • Multiple deaths and serious injuries are probable. • Shut down of critical facilities 1-4 weeks. • Local resources are expended and require sustained support from mutual aid partners and/or the state/federal government. • Serious environmental impact. • Serious economic impact. • Standard of living is seriously affected.	• Property damage is severe, greater than 50% of critical and non-critical infrastructure affected. • Multiple deaths and serious injuries exceed jurisdiction response capacity. • Shut down of critical facilities will be more than one month. • Response capacity is overwhelmed and requires significant and long lasting state and federal government support. • Severe environmental impact. • Severe economic impact. • Standard of living is extremely impacted and may not be fully recoverable.

WARNING TIME
Estimated time of awareness prior to the onset of the hazard event.

VERY LONG (1)	LONG (2)	MODERATE (3)	SHORT (4)
More than 24 hours	12-24 hours	Six-12 hours	Less than six hours

DURATION
Estimated time from onset to conclusion of the hazard event.

SHORT (1)	MODERATE (2)	LONG (3)	VERY LONG (4)
Less than six hours	Six-24 hours	Less than one week	More than one week

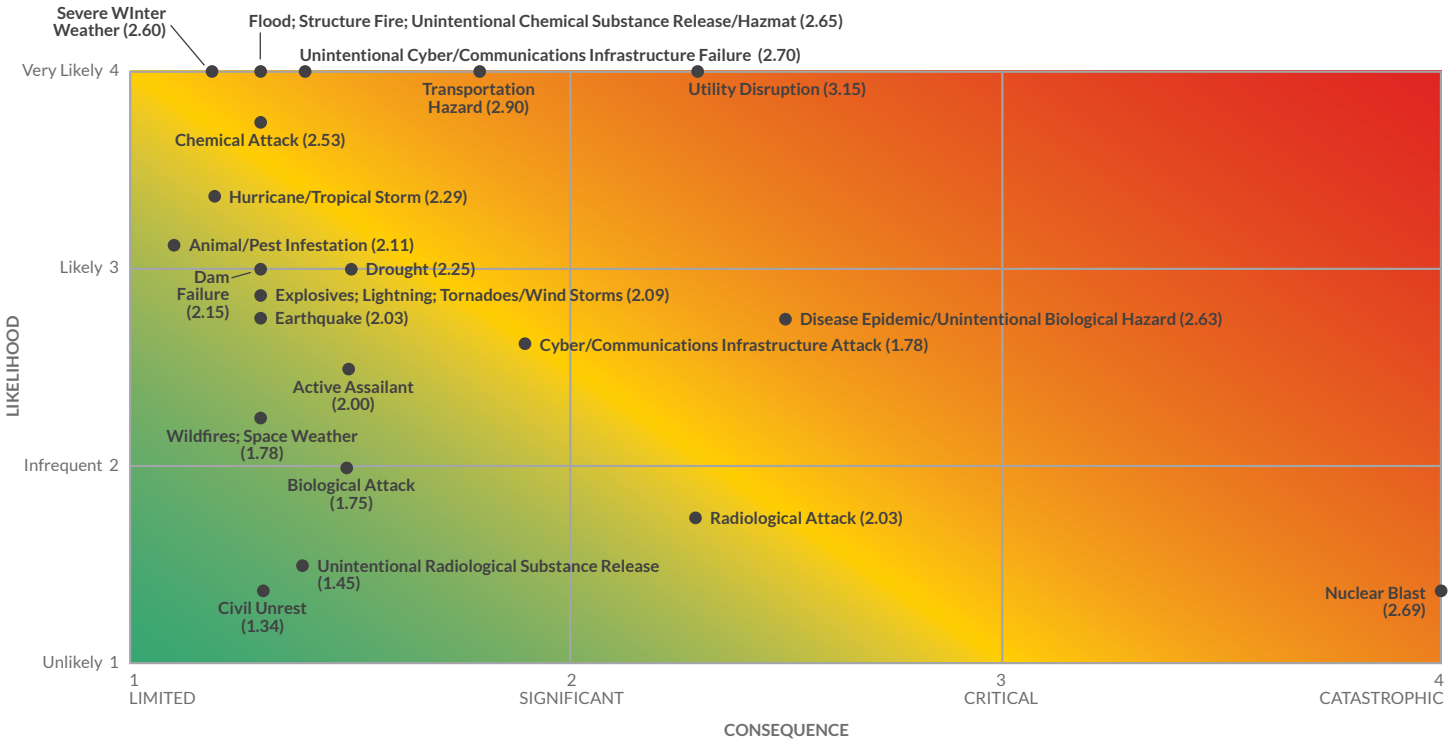
RISK SCORE WEIGHTING

LIKELIHOOD	IMPACT	WARNING TIME	DURATION
[50%]	[40%]	[5%]	[5%]
			

RISK = LIKELIHOOD + CONSEQUENCE

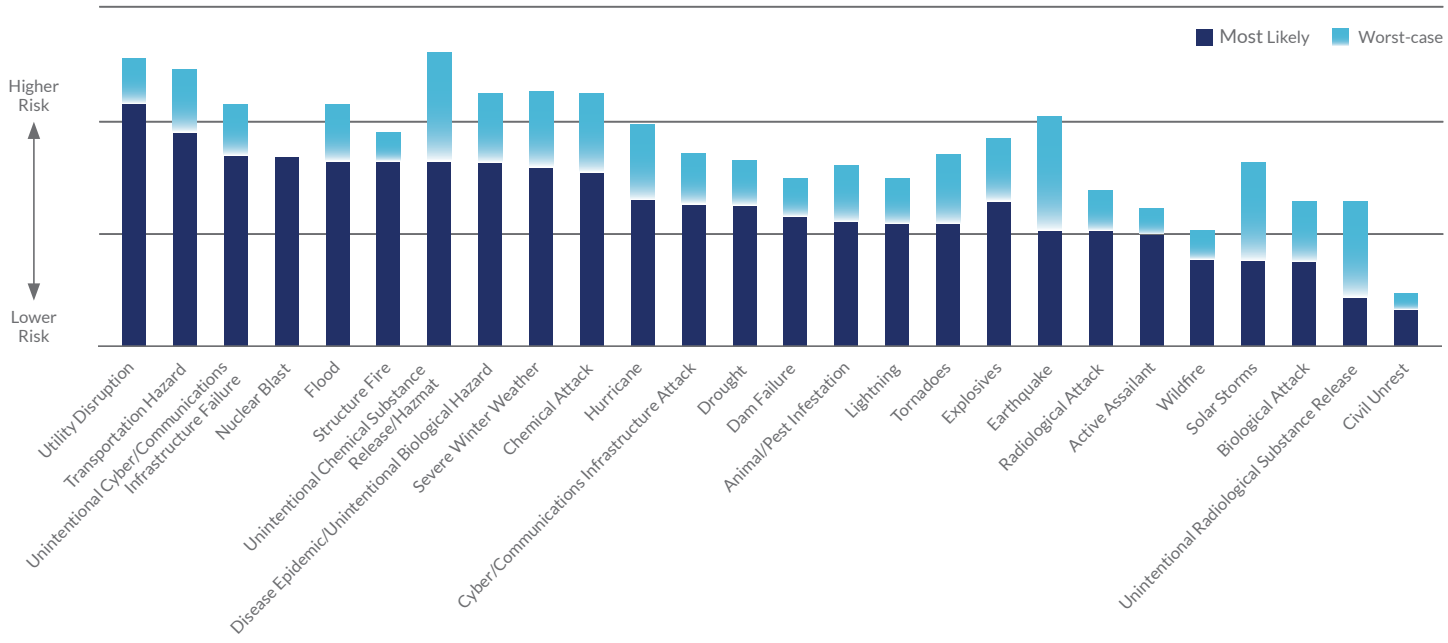
RISK MATRIX

The Risk Matrix section contains a graphical illustration of the hazard and its associated Likely and Worst-Case risk. The Risk Matrix demonstrates Likelihood on the graph's Y axis and Consequence on the graph's X axis with the numerical risk score assigned to each hazard in parentheses. The matrix below combines all of the hazards into one chart.



RISK RANKING

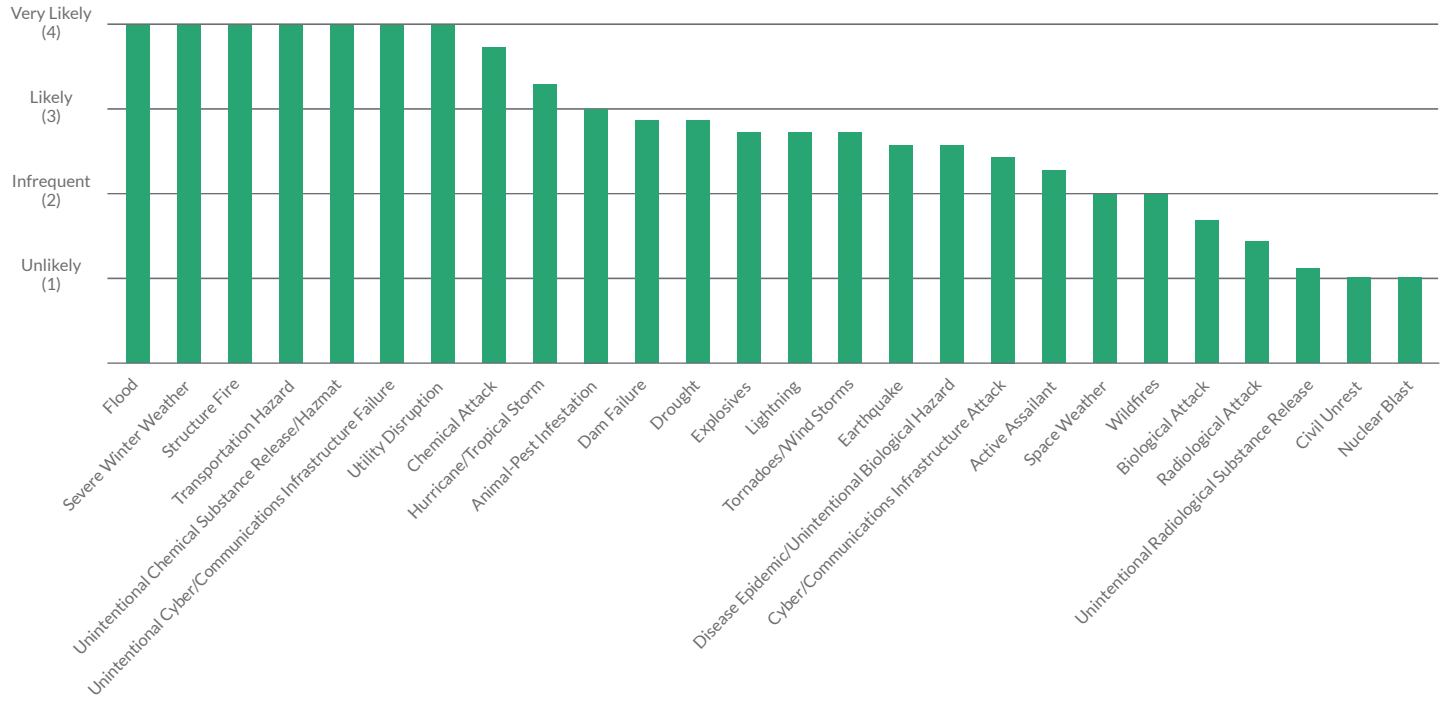
The Risk Ranking section contains a graphical representation of the Likely and Worst-Case risk scores for each hazard. The hazards are organized from highest risk to lowest risk based on Likely risk score. Worst-Case risk score is demonstrated by a light-blue extension above each risk bar. Where no Worst-Case bar is visible, Worst-Case risk is equivalent to Likely risk.



LIKELIHOOD RANKING

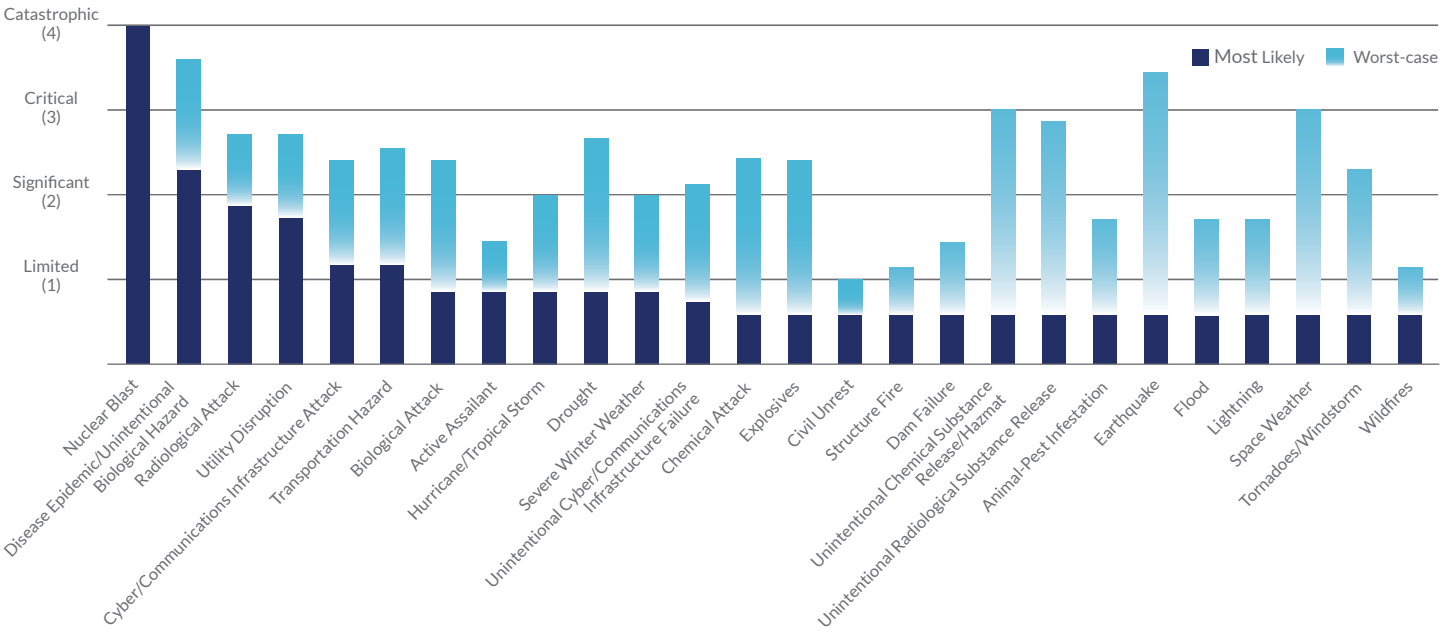
The Likelihood chart lists hazards by the anticipated future annual likelihood of the hazard's occurrence. Very Likely = 30%+ chance of annual occurrence. Likely = 11-30% chance of annual occurrence. Infrequent = 1-10% chance of annual occurrence. Unlikely = Less than 1% chance of annual occurrence.

The likelihood that a hazard will occur does not differentiate between Likely and Worst-Case.



IMPACT RANKING

The Total Impact chart lists hazards by Total Impact Score. Total Impact is a combined measure that includes impact to property, health & safety, critical facilities, response capacity, the environment, and the economy.



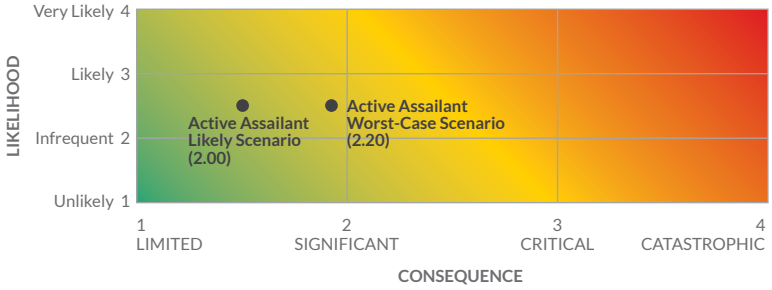
ACTIVE ASSAILANT

An Active Assailant hazard refers to an individual actively engaged in killing or attempting to kill people in a confined or populated area. Active Assailant hazards, occasionally referred to as active killers, active shooters, or active threats, are typically characterized by the assailant's intent to kill with no pattern or method to their selection of victims. Typically, Active Assailants use firearms and work alone. However, an Active Assailant hazard can involve multiple shooters and/or weapons other than firearms.

HAS IT HAPPENED LOCALLY?

There has been one Active Assailant hazard event in Howard County during the reviewed time period (1964-2014). A single assailant brought a concealed shotgun and several crude explosives into The Mall in Columbia on January 25th, 2014. The shooter opened fire in a second-story retail store, killing two employees, striking a third person in the foot, and ultimately taking his own life. The assailant did not know any of the victims prior to the attack.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of an Active Assailant hazard in Howard County. In the most likely Active Assailant hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Limited-Significant**.

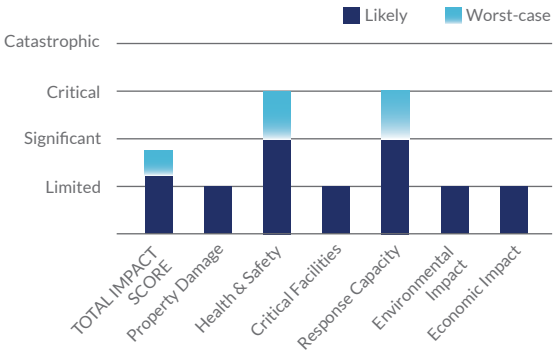
LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Limited-Significant
Risk Score	2.00	2.20
Risk Ranking (High to Low)	Ranked #11 of 16 man-made hazards.	

DID YOU KNOW?

- 98% of Active Assailant incidents are carried out by a single assailant.
- Nearly half of Active Assailant attacks occur in commercial facilities such as office buildings, factories, malls, or other retail locations. Another 29% of Active Assailant incidents occur in schools.

ACTIVE ASSAILANT IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- U.S. Dept. of Homeland Security dhs.gov/xlibrary/assets/active_shooter_booklet.pdf
- New York City Police Dept nyc.gov/html/nypd/downloads/pdf/counterterrorism/ActiveShooter.pdf
- Federal Bureau of Investigation leb.fbi.gov/2014/january/active-shooter-events-from-2000-to-2012

ANIMAL/PEST INFESTATION

Pest Infestation is the state of being invaded or overrun by harmful plants or animals. Common pests include insects (bed bugs, cockroaches, termites, ants, flies, mosquitoes, fleas) and rodents (rats, mice). Plants, such as invasive algae, can also be pests.

HAS IT HAPPENED LOCALLY?

There have been no documented animal/pest infestation events in Howard County that required the activation of the Emergency Operations Center.

WHAT IS THE ONGOING RISK?

There is an expected **11-30%+ Annual Likelihood** of an Animal/Pest Infestation hazard in Howard County. In the most likely Animal/Pest Infestation scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant**.

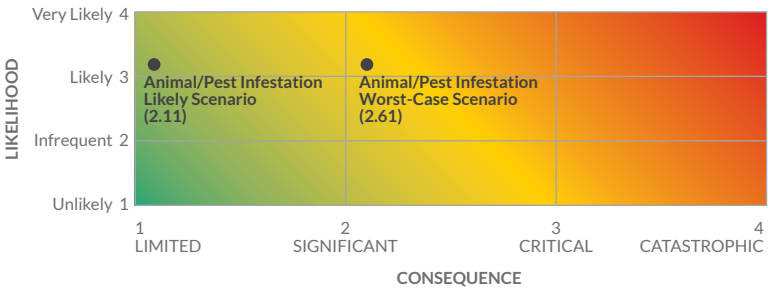
DID YOU KNOW?

- Worldwide, more than 20% of all food is lost to rodents.
- Rodents are associated with about 60 different diseases worldwide.
- In the Northeast United States, bed bugs can breed up to three generations per year.
- In 2015, an algae-produced toxin killed a number of fish in Maryland's Middle River.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Centers for Disease Control and Prevention cdc.gov/nceh/ehs/elearn/ipm.htm
- Environmental Protection Agency epa.gov/rodenticides/identify-and-prevent-rodent-infestations

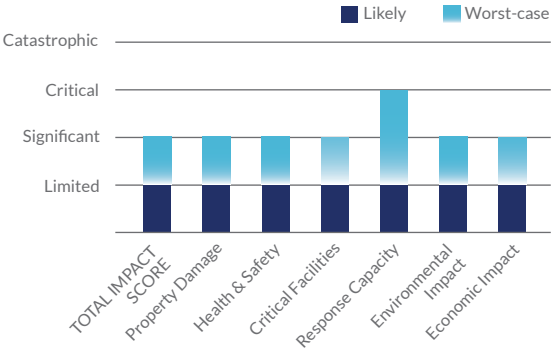
RISK MATRIX



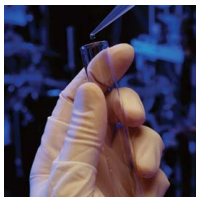
LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 11-30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Significant
Risk Score	2.11	2.61
Risk Ranking (High to Low)	Ranked #5 of 10 natural hazards.	

ANIMAL/PEST INFESTATION IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



BIOLOGICAL ATTACK

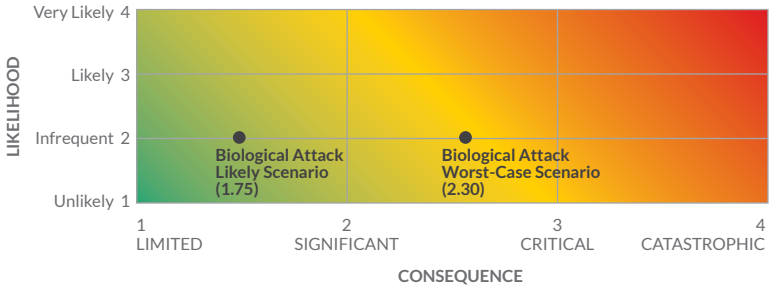


A Biological Attack is an intentional release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. Biological agents can be introduced and spread through a population by air, direct contact, water, or food. Although biological agents are not easy to grow and maintain, once introduced to a population they can be challenging to detect.

HAS IT HAPPENED LOCALLY?

There have been zero confirmed Biological Attack hazard events in Howard County during the reviewed time period (1996-2014). Emergency responders in Howard County were called out to 17 biological hazard incidents between 2008 and 2013. None of these incidents were confirmed as legitimate Biological Attack hazards.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **1-10% Annual Likelihood** of a Biological Attack hazard in Howard County. In the most likely Biological Attack hazard, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

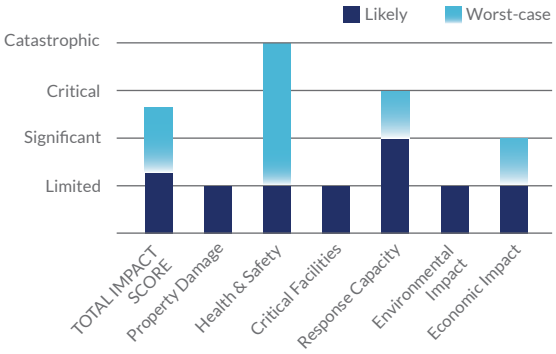
LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent 1-10% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	1.75	2.30
Risk Ranking (High to Low)	Ranked #14 of 16 man-made hazards.	

DID YOU KNOW?

- A biological disease agent can be delivered in a variety of ways, ranging from delivery of an agent through the mail to discreet introduction into air, food, or water.
- The most prominent example of a Biological Attack in recent history was the 2001 Anthrax attacks.

BIOLOGICAL ATTACK IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Centers for Disease Control and Prevention, emergency.cdc.gov/bioterrorism/overview.asp
- U.S. Department of Homeland Security dhs.gov/biological-attack-what-it
- Ready.gov ready.gov/biological-threats

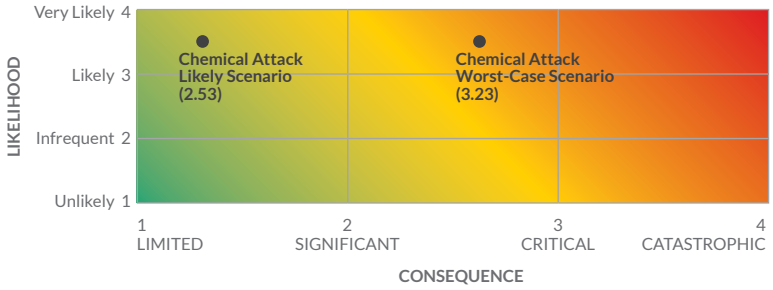
CHEMICAL ATTACK

A Chemical Attack is the intentional release of potentially harmful chemicals into the environment. Agents used in a Chemical Attack include poisonous vapors, aerosols, liquids, and solids that have toxic effects on people, animals, or plants (chemicals used to create Explosives hazards are profiled separately).

HAS IT HAPPENED LOCALLY?

There have been four small-scale Chemical Attack hazard events in Howard County during the reviewed time period (2004-2014). All Howard County Chemical Attacks in recent history have been minor incidents. Local Chemical Attack hazards include a caustic powder thrown at an individual and the use of a chemical agent to destroy a yard and property.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **11-30+% Annual Likelihood** of a Chemical Attack hazard in Howard County. In the most likely Chemical Attack hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

LOCAL RISK OVERVIEW		
Future Likelihood	Likely-Very Likely 11-30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.53	3.23
Risk Ranking (High to Low)	Ranked #8 of 16 man-made hazards.	

DID YOU KNOW?

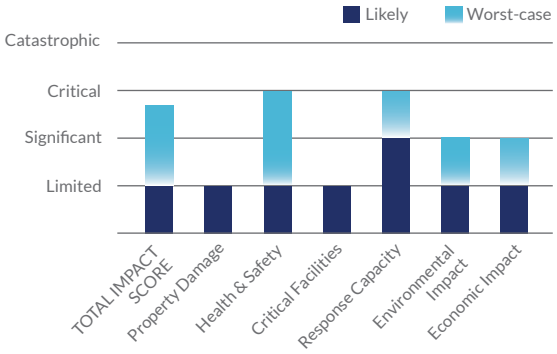
- Most health effects from a Chemical Attack occur in the minutes immediately following the attack.
- Inhalation or skin absorption of many chemical agents can cause permanent health problems or death.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- U.S. Department of Homeland Security
  dhs.gov/chemical-attack-fact-sheet
- Ready.gov
  ready.gov/chemical-threats
- Centers for Disease Control and Prevention
  emergency.cdc.gov/chemical

CHEMICAL ATTACK IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



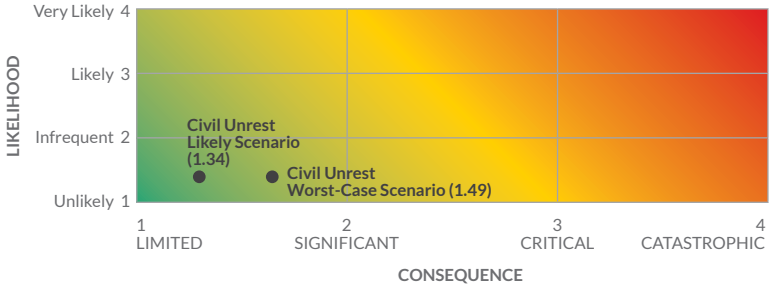
CIVIL UNREST

A Civil Unrest hazard occurs when public disorder has the potential to cause damage or harm. Civil Unrest is often the result of ideological conflict and may include protests, riots, demonstrations, civil disobedience, and other forms of public obstruction. Although many expressions of civil unrest are safe and legal, a Civil Unrest hazard occurs when the level of public disorder becomes a threat to health, safety, and property.

HAS IT HAPPENED LOCALLY?

There have been no Civil Unrest hazard events in Howard County during the reviewed time period (1996-2014). Howard County has experienced unruly crowds associated with concerts or gatherings, but none of these situations has escalated beyond control.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **<1-10% Annual Likelihood** of a Civil Unrest hazard in Howard County. In the most likely Civil Unrest scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Limited-Significant**.

LOCAL RISK OVERVIEW		
Future Likelihood	Unlikely-Infrequent <1-10% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Limited-Significant
Risk Score	1.34	1.49
Risk Ranking (High to Low)	Ranked #16 of 16 man-made hazards.	

DID YOU KNOW?

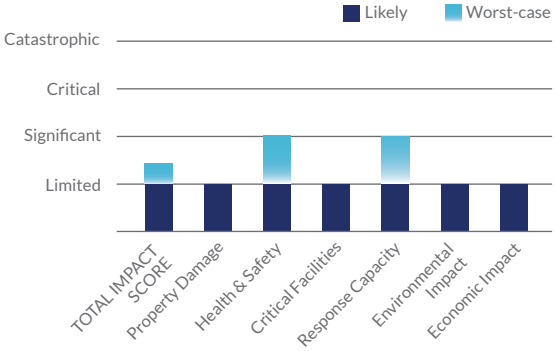
- Howard County's Emergency Operations Center was activated to coordinate resources in response to the 2015 Civil Unrest in Baltimore City.
- The scale of Civil Unrest could range from a small hazard taking up less than a city block to a large riot that occupies several square miles.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Federal Emergency Management Agency usfa.fema.gov/downloads/pdf/publications/fa-142.pdf

CIVIL UNREST IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



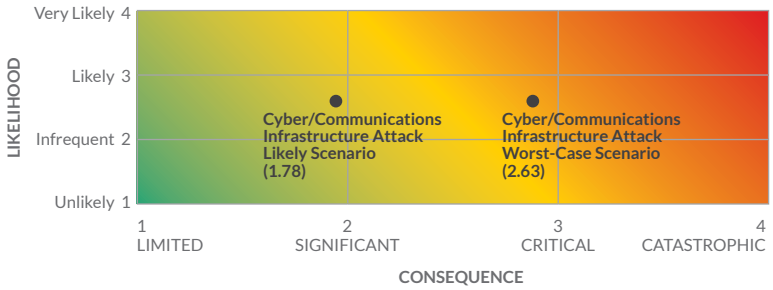
CYBER/COMMUNICATIONS INFRASTRUCTURE ATTACK

A Cyber/Communications Infrastructure Attack is an intentional disruption or manipulation of the information and communication systems used to collect, filter, process, create, and distribute data. A Cyber/Communications Infrastructure Attack may seek to impact data or physical infrastructure.

HAS IT HAPPENED LOCALLY?

There has never been a successful emergency-level attack on Government Cyber/Communications Infrastructure in Howard County. However, Howard County experiences frequent attacks that result in user impact, loss of access to information systems, and the need to repair or replace hardware or software. There are more than 3,000 minor damaging Cyber/Communications Infrastructure Attacks in Howard County each year.

RISK MATRIX



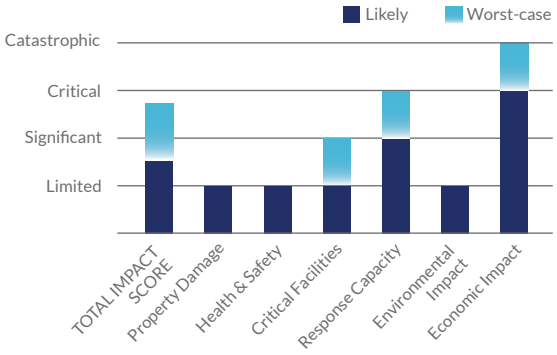
WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of a Cyber/Communications Infrastructure Attack hazard in Howard County. In the most likely Cyber/Communications Infrastructure Attack scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.26	2.71
Risk Ranking (High to Low)	Ranked #9 of 16 man-made hazards.	

CYBER/COMMUNICATIONS INFRASTRUCTURE ATTACK IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



DID YOU KNOW?

- The initial Cyber/Communications Infrastructure Attack may only take several minutes. However, it can take hours, days, or even weeks to identify and control the hazard.
- Cyber/Communications Infrastructure Attack hazards can impact anywhere from a single computer to data networks spreading across the entire country.
- General phishing attacks, searches for protected data, and system exploits allowing the entry of harmful software may take place thousands of times each day.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Federal Emergency Management Agency ready.gov/cyber-attack
- Federal Emergency Management Agency fema.gov/pdf/government/grant/hsgp/fy09_hsgp_cyber.pdf

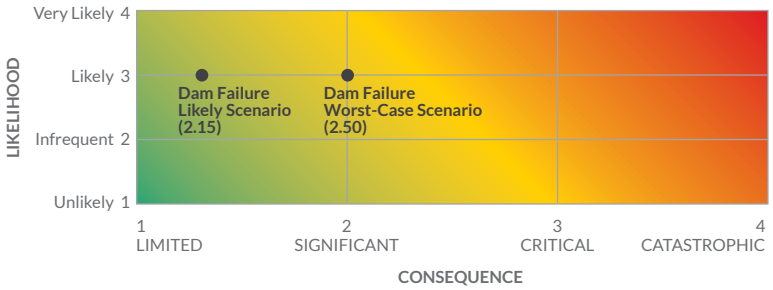
DAM FAILURE

A Dam Failure hazard occurs when part or all of a dam's water-retaining barrier becomes damaged causing the uncontrolled release of water downstream. A Dam Failure can be the result of a design or construction error, insufficient maintenance, human error, or internal erosion.

HAS IT HAPPENED LOCALLY?

There have been three confirmed Dam Failure hazard events in Howard County during the reviewed time period (1999-2014). All have been relatively minor incidents. In 2006, a low-hazard earthen dam retaining a stormwater management pond in Columbia experienced a barrel pipe collapse. The total cost to replace the pipe outlet and repair the damage was $208,000.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **11-30% Annual Likelihood** of a Dam Failure hazard in Howard County. In the most likely Dam Failure hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Limited-Significant**.

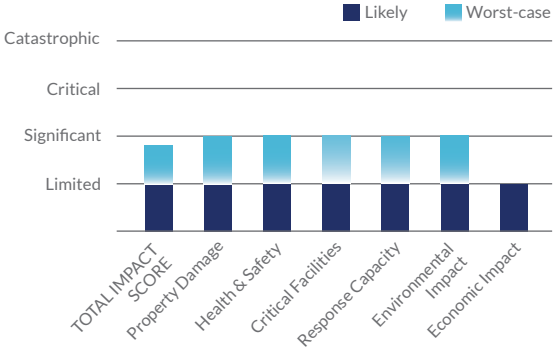
LOCAL RISK OVERVIEW		
Future Likelihood	Likely 11-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Limited-Significant
Risk Score	2.15	2.50
Risk Ranking (High to Low)	Ranked #10 of 16 man-made hazards.	

DID YOU KNOW?

- Howard County has over 2,000 small earthen dams on ponds, streams, and minor bodies of water.
- Of the recognized dams in Howard County, only seven are rated as Significant Hazard or High Hazard dams.

DAM FAILURE IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Maryland Dept. of the Environment mde.maryland.gov/damsafety
- Federal Emergency Management Agency fema.gov/dam-safety

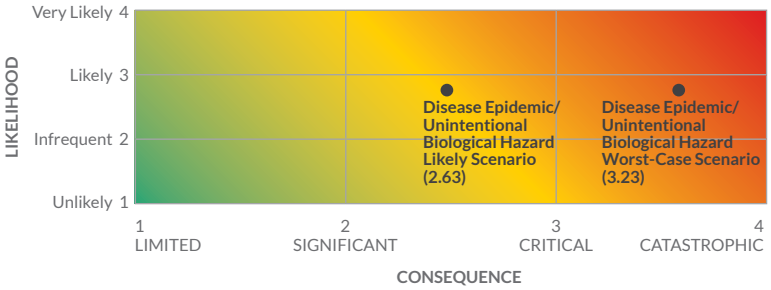
DISEASE EPIDEMIC/ UNINTENTIONAL BIOLOGICAL HAZARD

A Disease Epidemic/Unintentional Biological Hazard is the natural or inadvertent spread of potentially harmful viruses, bacteria, parasites, or other biological disease-causing agents. Disease Epidemic/Unintentional Biological Hazards can result from the natural spread of infectious disease or from the accidental release of biological agents from health care facilities, research institutions, and industrial operations.

HAS IT HAPPENED LOCALLY?

There has been one emergency-level Disease Epidemic/ Unintentional Biological Hazard event in Howard County during the reviewed time period (1994-2016), the H1N1 outbreak in 2009. During that outbreak, 40,001 Howard County residents received the H1N1 vaccination at drive-through vaccination points, flu clinics, schools, and community centers. In late 2014, Howard County engaged in a public messaging effort to promote understanding of the Ebola virus threat. A similar effort was undertaken in 2016 for the global Zika epidemic.

RISK MATRIX



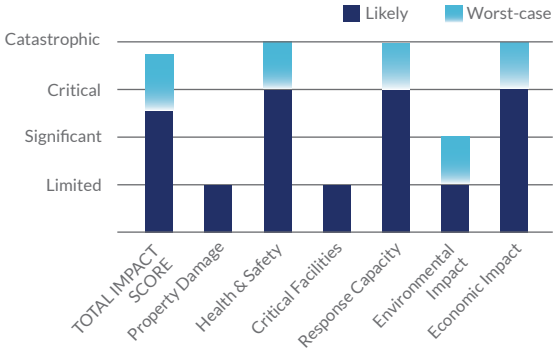
WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of a Disease Epidemic/ Unintentional Biological Hazard in Howard County. In the most likely Disease Epidemic/Unintentional Biological Hazard scenario, the **Total Impact is considered Significant-Critical**. In the worst-case scenario, the **Total Impact is considered Critical-Catastrophic**.

LOCAL RISK OVERVIEW		
Future Likelihood	Frequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Significant-Critical	Critical-Catastrophic
Risk Score	2.63	3.23
Risk Ranking (High to Low)	Ranked #7 of 16 man-made hazards.	

DISEASE EPIDEMIC/UNINTENTIONAL BIOLOGICAL HAZARD IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



DID YOU KNOW?

- Howard County has 12 Points of Distribution (PODS) for vaccines during a disease epidemic.
- Howard County does not have any hospitals with biocontainment units.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Centers for Disease Control and Prevention emergency.cdc.gov/recentincidents/?s_cid=cdc_homepage_topmenu_004
- Ready.gov, ready.gov/pandemic

DROUGHT

A drought is a condition of moisture deficit sufficient to have an adverse effect on vegetation, animals, and humans over a sizeable area. It usually refers to a period of below-normal rainfall, but drought can also be caused by drying bores or lakes or anything that reduces the amount of liquid water available.

HAS IT HAPPENED LOCALLY?

According to federal databases, Howard County has experienced 13 drought events from 1950 to 2011. All 13 events occurred between 1995 and 2007.

WHAT IS THE ONGOING RISK?

There is an expected **11-30% Annual Likelihood** of a drought hazard in Howard County. In the most likely Drought hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

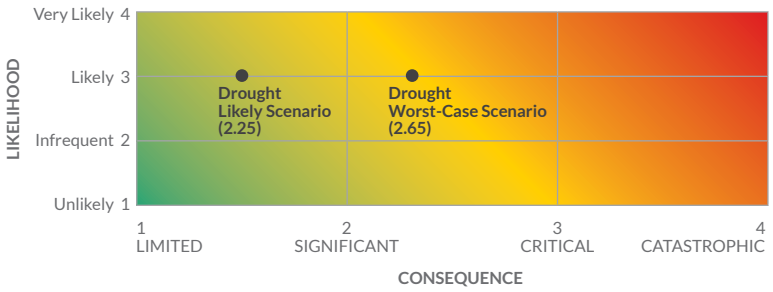
DID YOU KNOW?

- The hazard has a uniform probability of occurrence across the entire County.
- Most of California has been mired in a severe drought since 2011.
- Maryland suffered drought conditions in 2001-2002 when Maryland had the driest October-February on record.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- United States Geological Service md.water.usgs.gov/drought/define.html
- National Integrated Drought Information System drought.gov

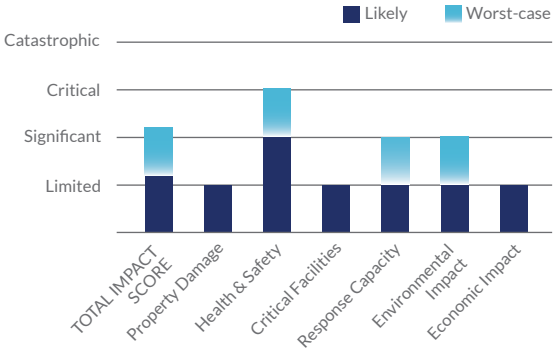
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Likely-Very Likely 11-30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.25	2.65
Risk Ranking (High to Low)	Ranked #4 of 10 natural hazards.	

DROUGHT IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



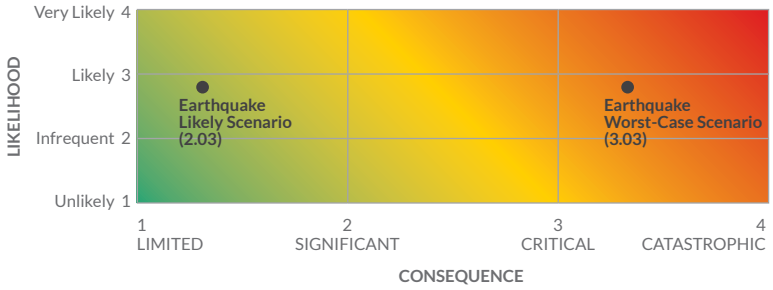
EARTHQUAKE

An earthquake is a sudden release of energy from the earth's crust that creates seismic waves. Tectonic plates become stuck, thus putting a strain on the ground. When the strain becomes so great that rocks give way, fault lines occur. At the earth's surface, earthquakes may manifest themselves by a shaking or displacement of the ground.

HAS IT HAPPENED LOCALLY?

Historically, there has been no record of earthquakes with an epicenter in Howard County, except for a cluster of small earthquakes in 1993 in Allview Estates in Columbia, MD. The County has experienced minor shaking from earthquakes located outside of the region, most notably the August 2011 earthquake which had an epicenter in Central Virginia.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of an earthquake hazard in Howard County. In the most likely earthquake scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Critical-Catastrophic**.

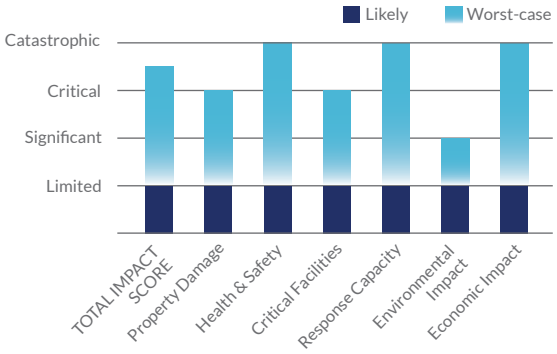
LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.25	2.65
Risk Ranking (High to Low)	Ranked #8 of 10 natural hazards.	

DID YOU KNOW?

- The 2011 Mineral, VA earthquake did not cause damage in Howard County, but did cause significant structure damage in nearby jurisdictions, including the District of Columbia.
- In the Atlantic Coastal Plain, it is now thought that earthquakes may be associated with nearly vertical faults that formed during the opening of the present Atlantic Ocean.

EARTHQUAKE IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- Maryland Geological Survey
  www.mgs.md.gov/geology/geohazards/earthquakes_and_maryland.html
- Ready.gov
  ready.gov/earthquakes

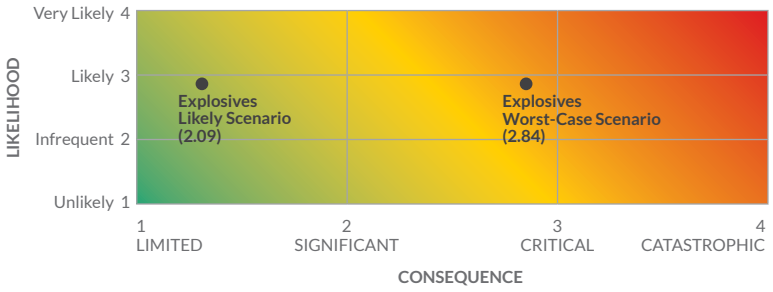
EXPLOSIVES

An Explosives hazard occurs when an explosive device is intentionally used to cause harm to people, property, operational capacity, or the environment.

HAS IT HAPPENED LOCALLY?

There have been zero successful Explosives attacks in Howard County during the reviewed time period (2000-2014). However, there were eight responses to confirmed Explosives threats in Howard County between 2010 and 2014, although all were disarmed prior to detonation. Between 1996 and 2014, County response agencies have responded to 47 calls for removal of explosive devices.

RISK MATRIX



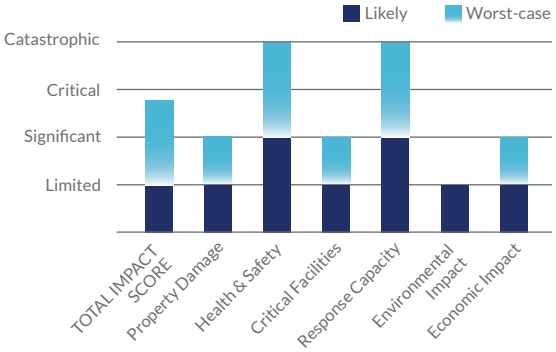
WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of an Explosives hazard in Howard County. In the most likely Explosives hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Significant-Critical
Risk Score	2.09	2.84
Risk Ranking (High to Low)	Ranked #11 of 16 man-made hazards.	

EXPLOSIVES IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



DID YOU KNOW?

- Depending on the explosive capacity, an Explosive device can directly impact an area anywhere from 40 feet to one mile from the source of the explosion.
- The onset of an Explosives attack hazard is typically instantaneous. However, it can take several hours to ensure that the area of the attack is safe.
- Terrorists detonated two Explosives at the 2013 Boston Marathon, killing three spectators and injuring 260.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- U.S. Department of Homeland Security
  dhs.gov/xlibrary/assets/prep_ied_fact_sheet.pdf
- Ready.gov
  ready.gov/explosions

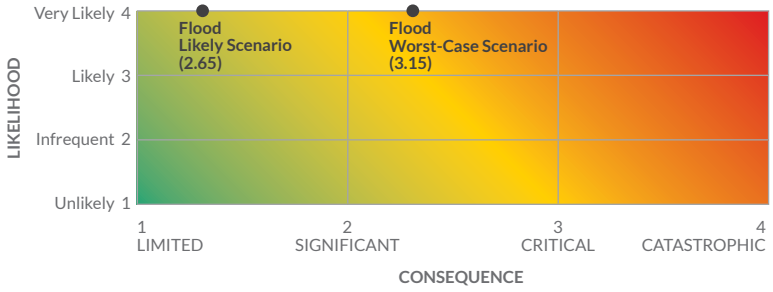
FLOOD

Flooding is defined as the accumulation of water that exceeds a physical barrier or collects in a low lying area that leads to the inundation of an area. Flooding typically results from large scale weather systems that generate prolonged or highly impactful rainfall. Other conditions such as winter snow thaws, over-saturated soil, ice jams breaking apart, and urbanization can cause flooding as well.

HAS IT HAPPENED LOCALLY?

Federal databases indicate that there were 55 flooding events in Howard County from 1996 to 2011. Not yet reflected in those databases is the most significant recent flooding event, occurring on July 30, 2016, when a strong storm dropped six inches of rain over Ellicott City over a span of two hours. Massive flooding caused extensive damage to businesses and homes on Main Street, Ellicott City.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **30%+ Annual Likelihood** of a Flood hazard in Howard County. In the most likely Flood hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

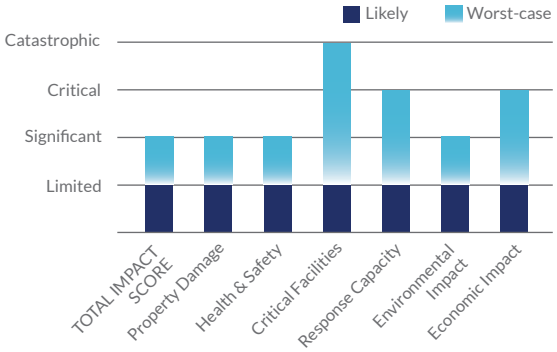
LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.65	3.15
Risk Ranking (High to Low)	Ranked #1 of 10 natural hazards.	

DID YOU KNOW?

- The July 2016 storm took two lives and caused at least $22.4 million in estimated damages. The storm caused extensive damage to 90 businesses and 107 homes.
- During the flood of 1868, witness reports say that the Patapsco River rose 30 feet in only 30 minutes.
- Flooding from Tropical Storm Agnes in 1972 caused $44.76 million (inflation adjusted) in property damage and is one of the most destructive flooding events in recent history.

FLOOD IMPACT

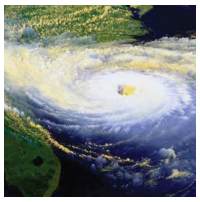
Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- National Oceanic and Atmospheric Administration
  nws.noaa.gov/floodsafety
- Ready.gov
  ready.gov/floods

HURRICANES/TROPICAL STORMS

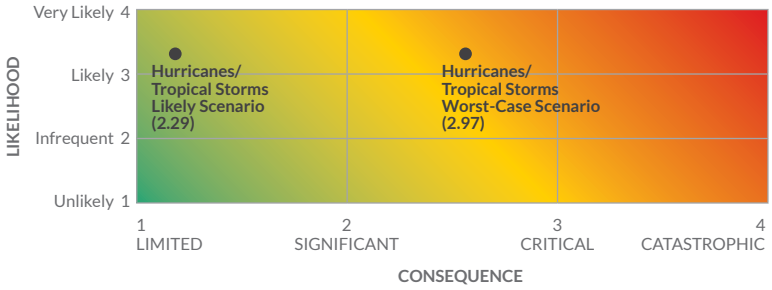


Hurricanes, tropical storms, and typhoons are collectively known as tropical cyclones. NOAA defines a tropical cyclone as a "warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center."

HAS IT HAPPENED LOCALLY?

According to federal databases, 13 named tropical cyclones passed close enough to impact Howard County between 1950 and 2008, only one of which reached hurricane strength. Since that data was collected, three other tropical storms have impacted Howard County (Irene and Lee in 2011 and Sandy in 2012).

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **11-30% Annual Likelihood** of a Hurricane/ Tropical Storm hazard in Howard County. In the most likely Hurricane/ Tropical Storm hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

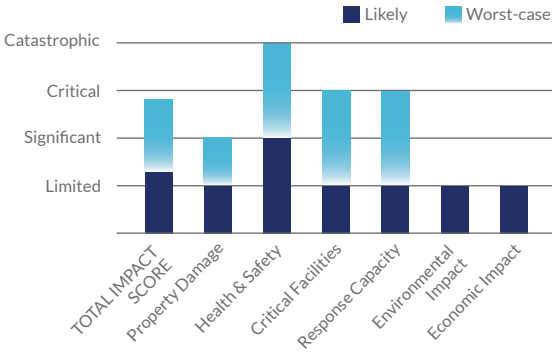
LOCAL RISK OVERVIEW		
Future Likelihood	Likely-Very Likely 11-30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.29	2.97
Risk Ranking (High to Low)	Ranked #3 of 10 natural hazards.	

DID YOU KNOW?

- A Hurricane requires a maximum sustained wind speed of 74 mph or higher. A storm with sustained winds between 39-73 mph is considered a Tropical Storm.
- Hurricane Sandy (2012) caused an estimated $5 million in property damage in Maryland.
- The right-front quadrant of the storm contains the highest winds, seas, and storm surge.

HURRICANES/TROPICAL STORMS IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- National Oceanic and Atmospheric Administration, nhc.noaa.gov
- Ready.gov, ready.gov/hurricanes

LIGHTNING

Lightning events are generated by atmospheric imbalance and turbulence due to a combination of conditions. Lightning, which occurs during all thunderstorms, can strike anywhere. Generated by the buildup of charged ions in a thundercloud, the discharge of a lightning bolt interacts with the best conducting object or surface on the ground.

HAS IT HAPPENED LOCALLY?

Federal databases identified seven significant lightning events in Howard County between 1994 and 2006. However, it is likely that additional events outside this period were not captured in the database.

WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of a lightning hazard in Howard County. In the most likely lightning scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant**.

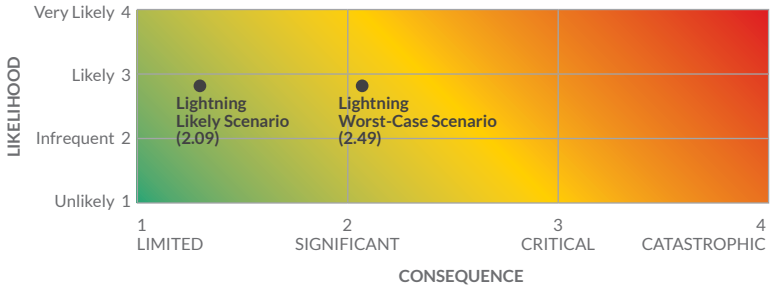
DID YOU KNOW?

- The lightning event causing extensive property damage in Howard County occurred on August 3, 2002, when the County was hit with over 1000 lightning strikes and suffered more than $800,000 in property damage.
- The air in the channel of a lightning strike reaches temperatures higher than 50,000 degrees Fahrenheit.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- National Oceanic and Atmospheric Administration spc.noaa.gov
- Ready.gov ready.gov/severe-weather

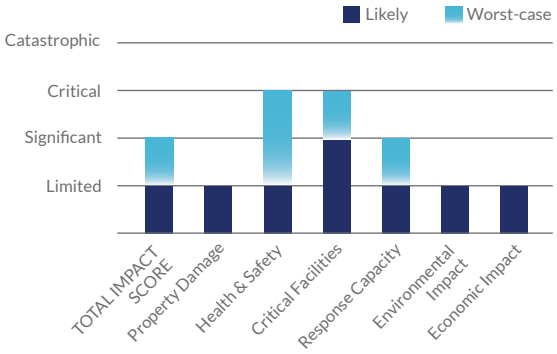
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Likely-Very Likely 11-30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Significant
Risk Score	2.09	2.49
Risk Ranking (High to Low)	Ranked #6 of 10 natural hazards.	

LIGHTING IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



NUCLEAR BLAST

A nuclear blast is the result of a device that uses a nuclear reaction to create an explosion far more powerful than that of conventional explosives. When nuclear weapons or improvised nuclear devices (INDs) explode, they give off energy in the form of a blast wave, intense light, heat, and radiation.

HAS IT HAPPENED LOCALLY?

There has never been a Nuclear Blast hazard in Howard County (1945-2014).

WHAT IS THE ONGOING RISK?

There is an expected **<1-10% Annual Likelihood** of a Nuclear Blast hazard in Howard County. In the most likely Nuclear Blast scenario, the **Total Impact is considered Catastrophic**. In the worst-case scenario, the **Total Impact is considered Catastrophic**.

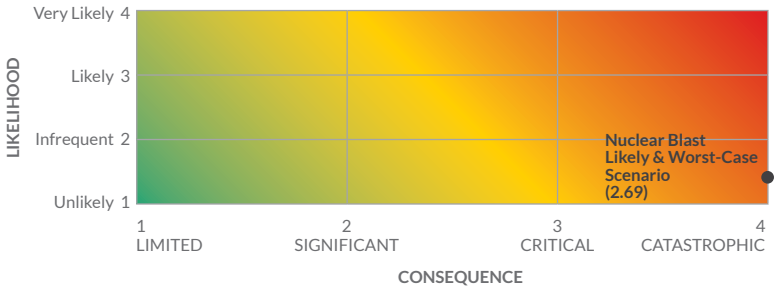
DID YOU KNOW?

- The electromagnetic pulse (EMP) emitted by a Nuclear Blast can easily span across states.
- A large Nuclear Blast can cause/result in radioactive contamination that remains hazardous for up to 10 years.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- U.S. Department of Health and Human Services
  remm.nlm.gov/nuclearexplosion.htm
- Ready.gov
  ready.gov/nuclear-blast
- Centers for Disease Control and Prevention
  cdc.gov/cdcgrandrounds/archives/2010/03-march.htm

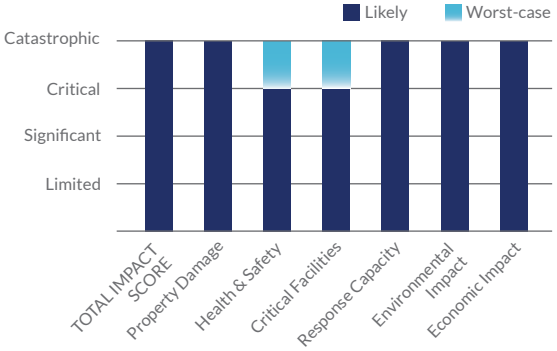
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Unlikely-Infrequent <1-10% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Catastrophic	Catastrophic
Risk Score	2.69	2.69
Risk Ranking (High to Low)	Ranked #4 of 16 man-made hazards.	

NUCLEAR BLAST IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



RADIOLOGICAL ATTACK

A Radiological Attack hazard occurs when a population is intentionally exposed to radiation through a non-nuclear mechanism (nuclear weapon hazards are profiled separately). A Radiological Attack may take the form of a radiological exposure device (RED) or a radiological dispersal device (also known as a dirty bomb or RDD).

HAS IT HAPPENED LOCALLY?

There have been zero Radiological Attack hazard events in Howard County during the reviewed time period (1996-2014).

WHAT IS THE ONGOING RISK?

There is an expected **<1-10% Annual Likelihood** of a Radiological Attack hazard in Howard County. In the most likely Radiological Attack scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

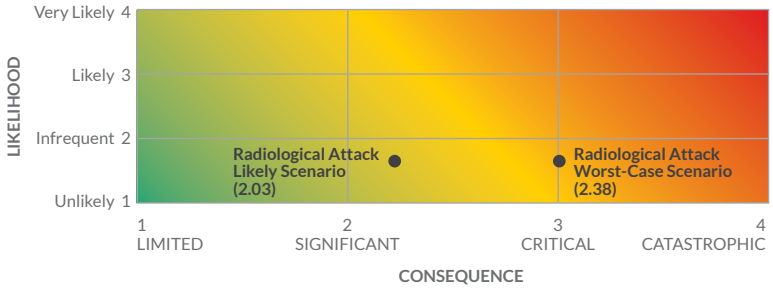
DID YOU KNOW?

- Radiological exposure devices (REDs) have extremely localized effects and may only affect people who are in physical contact or extremely close proximity to the device.
- The area affected by a Radiological dispersal devices (RDD) explosion may range from less than a city block to several square miles.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- U.S. Department of Homeland Security dhs.gov/xlibrary/assets/prep_radiological_fact_sheet.pdf
- Ready.gov ready.gov/radiological-dispersion-device-rdd
- Centers for Disease Control and Prevention cdc.gov/cdcgrandrounds/archives/2010/03-march.htm

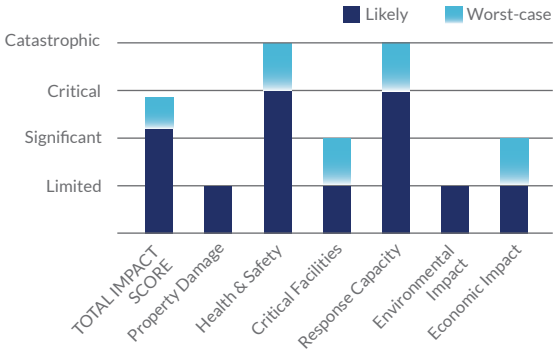
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Unlikely-Infrequent <1-10% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.03	2.38
Risk Ranking (High to Low)	Ranked #12 of 16 man-made hazards.	

RADIOLOGICAL ATTACK IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



SEVERE WINTER WEATHER

A winter storm is a weather event that produces forms of precipitation caused by cold temperatures, such as snow, sleet, ice, and/or freezing rain, while ground temperatures are cold enough to cause precipitation to freeze. Windy conditions may also be present during a winter storm.

HAS IT HAPPENED LOCALLY?

The Federal databases reports Howard County has experienced 93 severe winter storm events between 1969 and 2011. Of the 93 severe winter events, only seven resulted in property damage.

WHAT IS THE ONGOING RISK?

There is an expected **30+% Annual Likelihood** of a Severe Winter Weather hazard in Howard County. In the most likely Severe Winter Weather scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

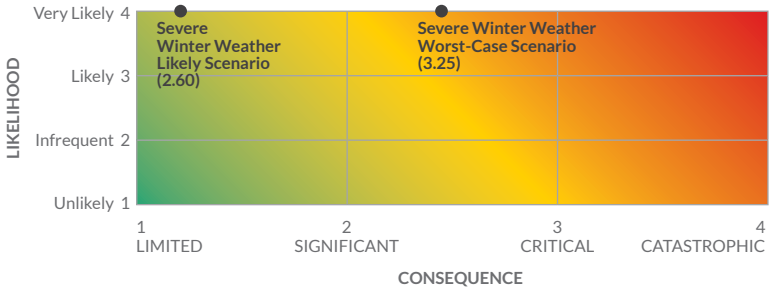
DID YOU KNOW?

- The average annual snowfall for Howard County ranges from 20-27 inches.
- Howard County experiences on average 5.5 winter storm events per year.
- Howard County has 1,025 miles of roadway that must be plowed during winter storms.
- According to the National Weather Service, the Blizzard of January 2016 resulted in the highest reported snowfall in Howard County (28.8 inches) for any two-day event in recorded history.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- National Oceanic and Atmospheric Administration nws.noaa.gov/os/winter/
- Ready.gov ready.gov/winter-weather

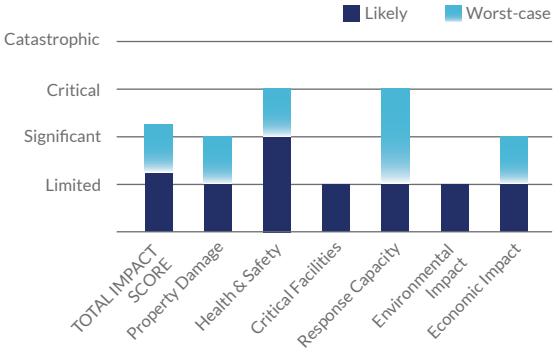
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30%+ chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.6	3.25
Risk Ranking (High to Low)	Ranked #2 of 10 natural hazards.	

SEVERE WINTER WEATHER IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



SPACE WEATHER

Space Weather describes the conditions in space that affect Earth and its technological systems. Space Weather is a consequence of the behavior of the Sun, the nature of Earth's magnetic field and atmosphere, and our location in the solar system. The active elements of space weather are particles, electromagnetic energy, and magnetic field, rather than the more commonly known weather contributors of water, temperature, and air.

HAS IT HAPPENED LOCALLY?

There have been no notable occurrences of Space Weather significantly impacting Howard County.

WHAT IS THE ONGOING RISK?

There is an expected **1-30% chance** of a Space Weather hazard in Howard County. In the most likely Space Weather scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Limited-Significant**.

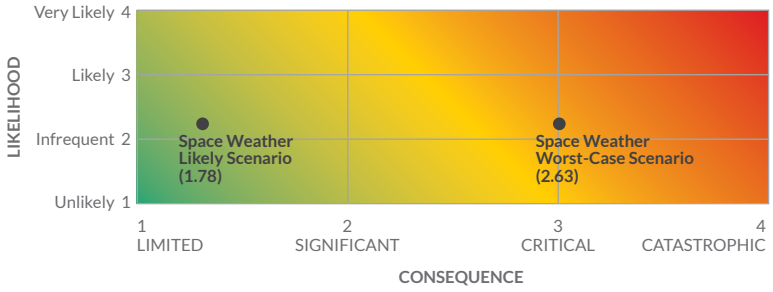
DID YOU KNOW?

- A solar storm in 1859, known as the "Carrington Event," was one of the strongest coronal mass ejections in recorded history. Telegraph systems failed across Europe and North America.
- In 1972, a solar storm knocked out long-distance phone communications across the United States.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- National Oceanic and Atmospheric Administration
  swpc.noaa.gov
- Ready.gov
  ready.gov/space-weather

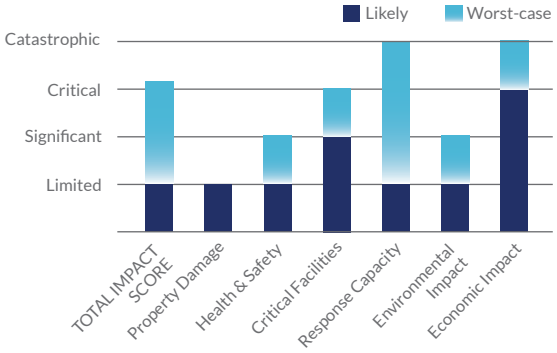
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Critical-Catastrophic
Risk Score	1.78	2.63
Risk Ranking (High to Low)	Ranked #10 of 10 natural hazards.	

SPACE WEATHER IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



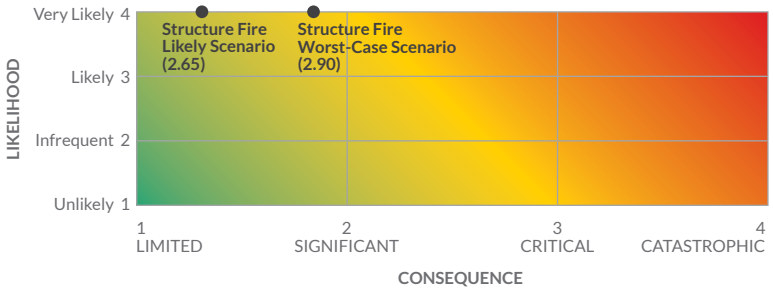
STRUCTURE FIRE

A Structure Fire hazard is an uncontrolled fire involving any building or structure. Structure Fires can occur in a residential, commercial, or industrial setting. Fires can easily spread from one structure to another, and the size of a Structure Fire hazard is constantly evolving.

HAS IT HAPPENED LOCALLY?

There have been 2,222 Structure Fire responses in Howard County during the reviewed time period (2008-2013). The large majority of Structure Fire hazards in Howard County are residential cooking-related fires. In 1999, a six-alarm fire destroyed multiple businesses in downtown Ellicott City. The fire took several hours to contain and caused over $1 million in damage.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **30%+ Annual Likelihood** of a Structure Fire hazard in Howard County. In the most likely Structure Fire hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Limited-Significant**.

LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30%+ chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Limited-Significant
Risk Score	2.65	2.90
Risk Ranking (High to Low)	Ranked #5 of 16 man-made hazards.	

DID YOU KNOW?

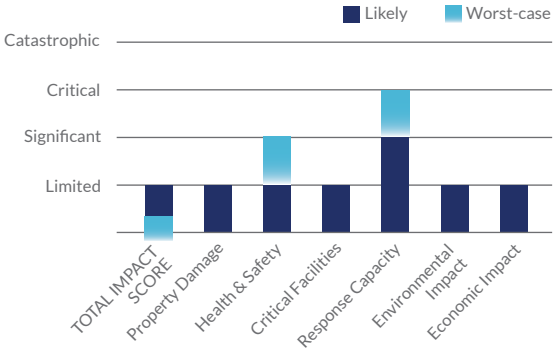
- Fires may affect vacant structures, residential homes, or highly populated commercial areas or apartment buildings.
- Home fire deaths in the United States have dropped 53 percent since 1977.
- Common temperatures in house fires in modern homes can reach up to 2000 degrees Fahrenheit.

FOR MORE INFORMATION:

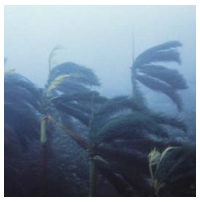
- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- U.S. Fire Administration usfa.fema.gov/data/statistics
- National Fire Protection Association, nfpa.org
- Ready.gov ready.gov/home-fires

STRUCTURE FIRE IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



TORNADOES/WIND STORMS

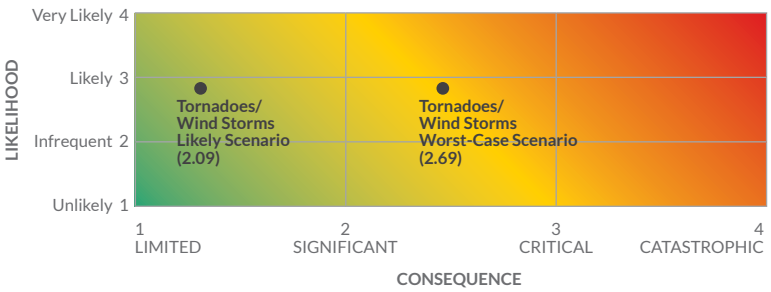


A tornado is a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud. Tornadoes are related to larger vortex formations, and therefore often form in convective cells such as thunderstorms or in the right forward quadrant of a hurricane, far from the hurricane eye. Straight-line wind storms (derechos) can also cause significant destruction.

HAS IT HAPPENED LOCALLY?

Federal databases report that nine tornadoes have occurred in Howard County between 1975 and 2011. The database indicates there were four F0s, three F1s, and two F2 tornadoes. The NCDC database reports that 115 thunderstorm wind events have occurred in Howard County between 1969 and 2011. Of the 115 events, six included winds of 60 knots (69 mph) or greater. A derecho with wind gusts of up to 80 mph passed through Howard County on June 29th, 2012. On June 21, 2016, an F0 tornado touched down in western Howard County. The tornado travelled nearly 13 miles and left a path of debris over 500 yards wide.

RISK MATRIX



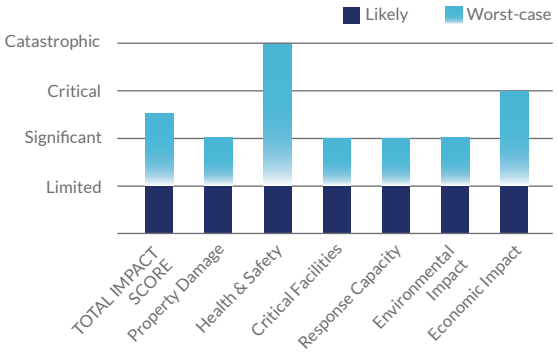
LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Significant
Risk Score	1	2.5
Risk Ranking (High to Low)	Ranked #7 of 10 natural hazards.	

WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of a Tornado/Wind Storm hazard in Howard County. In the most likely Tornado/Wind Storm scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant**.

TORNADOES/WIND STORMS IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



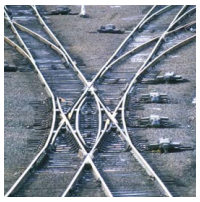
DID YOU KNOW?

- Howard County averages one tornado every four years.
- There have been zero tornado-related fatalities in Howard County since 1950.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- National Oceanic and Atmospheric Administration
  spc.noaa.gov
- Ready.gov
  ready.gov/tornadoes

TRANSPORTATION HAZARD

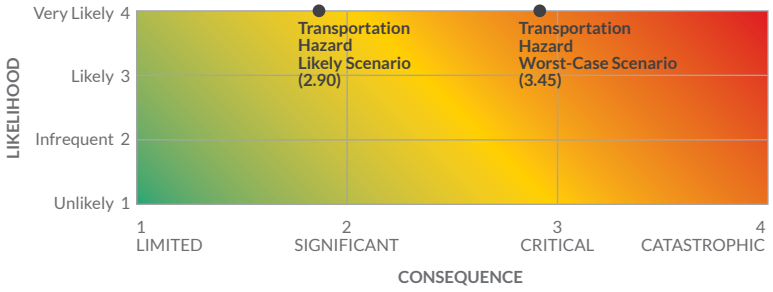


A Transportation Hazard occurs whenever a vehicle accident or collision has the potential to cause harm. The most common types of Transportation Hazards involve automobiles, trains, airplanes, or boats. A transportation hazard can involve one or multiple vehicles, and cascading effects may include the release of hazardous materials (profiled separately).

HAS IT HAPPENED LOCALLY?

There have been 786 Transportation Hazard responses requiring extrication or rescue and an additional 960 vehicle fire responses in Howard County during the reviewed time period (2008-2013). Most Transportation Hazards in Howard County involve a small number of passenger vehicles, and only a very small percentage of accidents involve fatalities.

RISK MATRIX



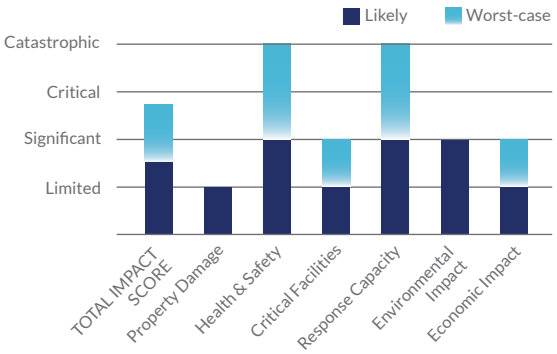
WHAT IS THE ONGOING RISK?

There is an expected **30%+ Annual Likelihood** of a Transportation Hazard in Howard County. In the most likely Transportation Hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30%+ chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant-Critical
Risk Score	2.90	3.45
Risk Ranking (High to Low)	Ranked #2 of 16 man-made hazards.	

TRANSPORTATION HAZARD IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



DID YOU KNOW?

- In 2012, a CSX train derailed in Ellicott City, fatally burying two bystanders. The derailment caused an estimated $2.2 million in damages.
- In 2004, a tanker truck fell onto Interstate 95 from the Interstate 895 overpass. The accident killed four and ignited a large fire.
- In 1962, a United Airlines flight broke apart in mid-air over Ellicott City after being hit by a flock of swans. All 17 passengers were killed.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- National Transportation Safety Board ntsb.gov/investigations/data/pages/data_stats.aspx
- U.S. Department of Transportation Bureau of Transportation Statistics www.rita.dot.gov/bts/data_and_statistics/index.html

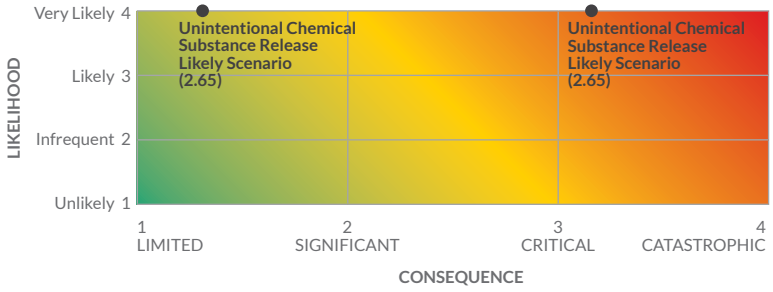
UNINTENTIONAL CHEMICAL SUBSTANCE RELEASE/HAZMAT

An Unintentional Chemical Substance Release/Hazmat hazard occurs when a chemical with the potential to cause harm is accidentally released into the environment. Hazardous materials come in the form of explosives, flammable and combustible substances, and poisons (biological hazards and radiological hazards are profiled separately).

HAS IT HAPPENED LOCALLY?

There have been 421 Unintentional Chemical Substance Release/Hazmat hazard responses involving chemical release, chemical reaction, or toxic conditions in Howard County during the reviewed time period (2008-2013). There were an additional 2,247 responses involving combustible/flammable liquid spills during this same time period, although this number includes minor leaks involving little contamination or damage.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **30+% Annual Likelihood** of an Unintentional Chemical Substance Release/Hazmat hazard in Howard County. In the most likely Unintentional Chemical Substance Release/Hazmat hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Critical-Catastrophic**.

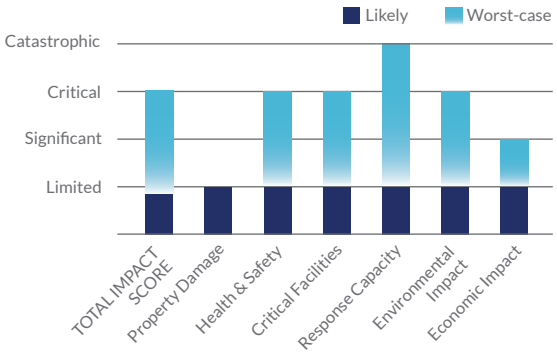
LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Critical-Catastrophic
Risk Score	2.65	3.60
Risk Ranking (High to Low)	Ranked #6 of 16 man-made hazards.	

DID YOU KNOW?

- Most health effects from an Unintentional Chemical Substance Release occur in the minutes immediately following the attack.
- A small-scale chemical release may not extend beyond the initial spill area, while a large release that introduces a hazardous chemical into the air or water can impact many square miles.

UNINTENTIONAL CHEMICAL SUBSTANCE RELEASE/HAZMAT IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- Ready.gov
  ready.gov/hazardous-materials-incidents
- Centers for Disease Control and Prevention
  cdc.gov/niosh/topics/chemical-safety

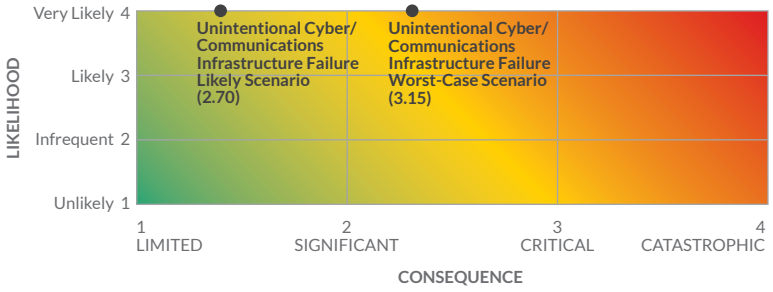
UNINTENTIONAL CYBER/ COMMUNICATIONS INFRASTRUCTURE FAILURE

An Unintentional Cyber/Communications Infrastructure Failure hazard occurs when an accidental disruption affects computerized data, information systems, or other communication systems. Unintentional failure may result from human error, infrastructure limitations, or the cascading effects of another hazard.

HAS IT HAPPENED LOCALLY?

There have been six emergency-level Unintentional Cyber/ Communications Infrastructure Failure hazards in Howard County during the reviewed time period (2009-2014). In 2013, while completing regular maintenance on the power supply, a radio tower was taken offline. Emergency response organizations in that tower area lost ability to communicate by radio (roughly 10% of Howard County). Police and Fire/Rescue were forced to use alternate communications methods. Radio was restored in less than two hours.

RISK MATRIX



WHAT IS THE ONGOING RISK?

There is an expected **30+% Annual Likelihood** of an Unintentional Cyber/Communications Infrastructure Failure hazard in Howard County. In the most likely Unintentional Cyber/Communications Infrastructure Failure hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Significant**.

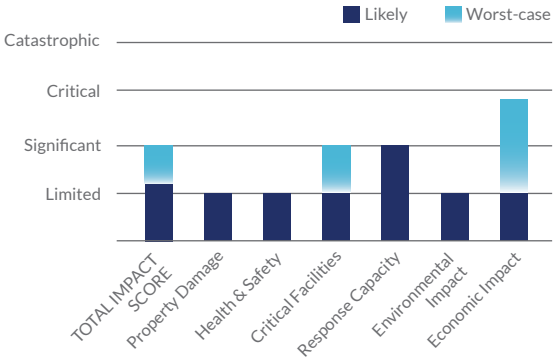
LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30+% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited-Significant	Significant
Risk Score	2.70	3.15
Risk Ranking (High to Low)	Ranked #3 of 16 man-made hazards.	

DID YOU KNOW?

- Failures can range from a single computer outage to a complete data network outage spanning multiple jurisdictions.
- Depending on the size and scope of the failure, the duration of an Unintentional Cyber/Communications Infrastructure Failure may range from several hours to several days.

UNINTENTIONAL CYBER/COMMUNICATIONS INFRASTRUCTURE FAILURE IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Ready.gov, ready.gov/cyber-attack
- U.S. Department of Homeland Security, dhs.gov/topic/cybersecurity

UNINTENTIONAL RADIOLOGICAL SUBSTANCE RELEASE

An Unintentional Radiological Substance Release hazard occurs when radiation is accidentally discharged into the environment. Unintentional Radiological Substance Release may occur as the result of a nuclear power plant accident, a transportation accident, or a workplace incident involving radioactive materials.

HAS IT HAPPENED LOCALLY?

There have been zero Unintentional Radiological Substance Release hazard events in Howard County during the reviewed time period (1996-2013).

WHAT IS THE ONGOING RISK?

There is an expected **<1-10% Annual Likelihood** of an Unintentional Radiological Substance Release hazard in Howard County. In the most likely Unintentional Radiological Substance Release hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Critical**.

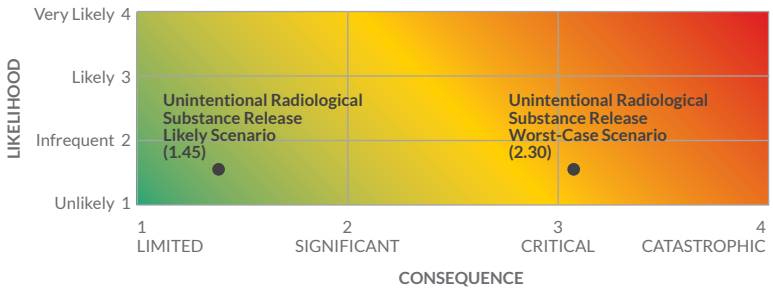
DID YOU KNOW?

- Workplace radiation incidents may occur in health care facilities, research institutions, and industrial operations if radiation sources are not stored correctly, safety controls malfunction, or safety procedures are not followed.
- Following a small release of radiological substances, it can take up to 12 hours to remove the hazard and decontaminate the environment.
- Peach Bottom Atomic Power Station in southern Pennsylvania and Calvert Cliffs Nuclear Power Plant in Calvert County are both close enough to impact Howard County in the event of a catastrophic failure.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment readyhoco.com/hazards
- Centers for Disease Control and Prevention emergency.cdc.gov/radiation/
- Environmental Protection Agency epa.gov/radiation

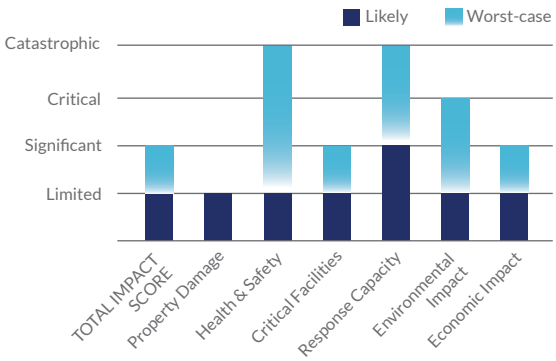
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Unlikely-Infrequent <1-10% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Critical
Risk Score	1.45	2.30
Risk Ranking (High to Low)	Ranked #15 of 16 man-made hazards.	

UNINTENTIONAL RADIOLOGICAL SUBSTANCE RELEASE IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



UTILITY DISRUPTION

A Utility Disruption hazard occurs when the disruption of the gas, water, or electrical infrastructure has the potential to cause harm. Utility Disruption hazards can be intentional, unintentional, or occur as a cascading effect of another hazard.

HAS IT HAPPENED LOCALLY?

There have been 15 emergency-level Utility Disruption hazard events in Howard County during the reviewed time period (2008-2014). The great majority of Utility Disruption hazards in Howard County have been the result of extreme weather.

WHAT IS THE ONGOING RISK?

There is an expected **30%+ Annual Likelihood** of a Utility Disruption hazard in Howard County. In the most likely Utility Disruption scenario, the **Total Impact is considered Significant**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

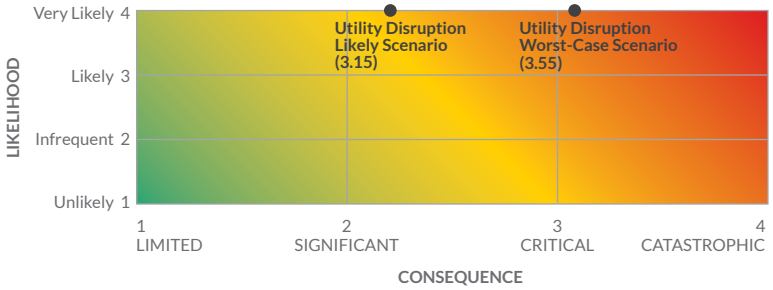
DID YOU KNOW?

- During Hurricane Sandy, a power outage at a water treatment plant resulted in the release of wastewater, threatening the health and environment downstream.
- Over 1 million Maryland residents lost power in the aftermath of Hurricane Isabel in 2003.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- Centers for Disease Control and Prevention
  emergency.cdc.gov/disasters/poweroutage
- Ready.gov
  ready.gov/blackouts

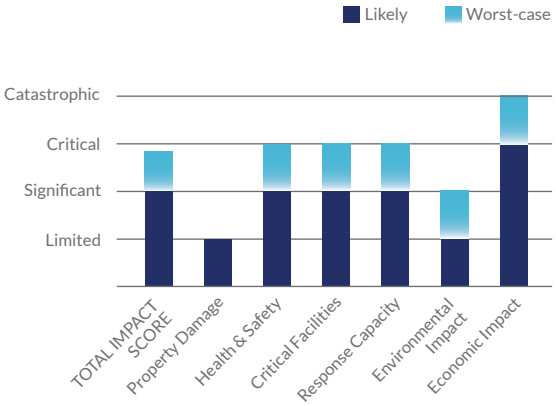
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Very Likely 30%+ chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Significant	Significant-Critical
Risk Score	3.15	3.55
Risk Ranking (High to Low)	Ranked #1 of 16 man-made hazards.	

UTILITY DISRUPTION IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact



WILDFIRE

Wildfires are uncontrolled forest, grassland, rangeland, or urban-interface fires which consume natural fuels and spread in response to the environment. Wildfires can be either a natural phenomenon or human-caused. The frequency and severity of wildfires depends on both weather and human activity.

HAS IT HAPPENED LOCALLY?

The Federal databases indicate there were no wildfire incidents between 1950 and 2011 within Howard County. According to the SHELDUS database, two wildfires caused several thousand dollars' worth of damage in 1963.

WHAT IS THE ONGOING RISK?

There is an expected **1-30% Annual Likelihood** of a Wildfire hazard in Howard County. In the most likely Wildfire scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Limited-Significant**.

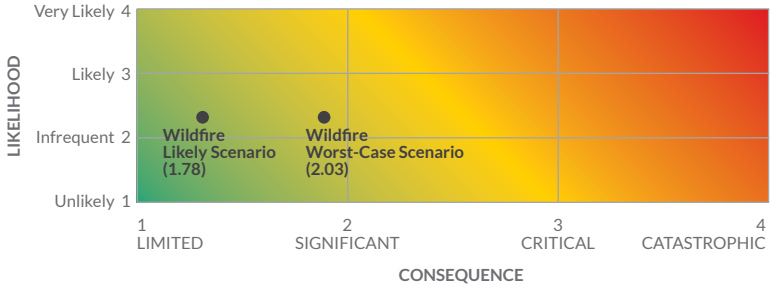
DID YOU KNOW?

- In Maryland, the greatest threat of wildfires occurs during the Spring season, in the months of March and April.
- The severity of Wildfires in Howard County has been historically very low, and the duration of wildfires has ranged from a matter of hours to several days.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
  readyhoco.com/hazards
- Centers for Disease Control
  cdc.gov/disasters/wildfires/index.html
- Ready.gov
  ready.gov/wildfires

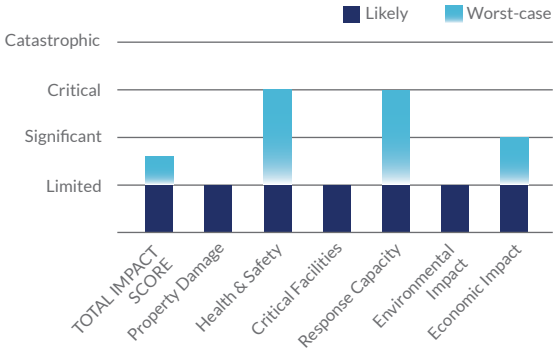
RISK MATRIX



LOCAL RISK OVERVIEW		
Future Likelihood	Infrequent-Likely 1-30% chance of annual occurrence	
Impact	MOST-LIKELY	WORST-CASE
	Limited	Limited-Significant
Risk Score	1.78	2.03
Risk Ranking (High to Low)	Ranked #9 of 10 natural hazards.	

WILDFIRE IMPACT

Where no Worst-Case bar is visible, Worst-Case impact is equivalent to Likely Impact

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ACKNOWLEDGEMENTS

The Office of Emergency Management would like to express our gratitude for the assistance received from our local emergency preparedness partners. Without their subject matter expertise, the Community Hazard Handbook would not have been possible.

HOWARD COUNTY GOVERNMENT STAKEHOLDERS

- Department of Fire & Rescue Services
- Police Department
- Health Department
- Department of Technology & Communications Services
- Department of Public Works
- Department of County Administration
- Department of Planning and Zoning
- Department of Inspections, Licenses, & Permits
- Department of Community Resources & Services
- Department of Recreation & Parks

PRIVATE-SECTOR PARTNERS

- Howard County General Hospital
- Johns Hopkins University Applied Physics Laboratory
- Towson University Regional Economic Studies Institute
- Howard County Economic Development Authority
- Columbia Association
- First Energy
- Baltimore Gas & Electric
- Sage Policy Group, Inc.
- University of Maryland Center for Health & Homeland Security

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