COMMUNITY HAZARD HANDBOOK

HOWARD COUNTY OFFICE OF EMERGENCY MANAGEMENT

TABLE OF CONTENTS

PREPAREDNESS BEGINS WITH KNOWLEDGE.

The Hazard Identification and Risk Assessment (HIRA) is a comprehensive analysis of manmade and natural hazards which could impact Howard County, Maryland. The initial HIRA was developed between the years 2014 and 2015 to serve as a foundational document for emergency preparedness planning efforts within Howard County. Development of the HIRA was led by the Howard County Office of Emergency Management (OEM). The HIRA reflects a whole community approach to risk assessment involving local government stakeholders, private-sector partners, and private citizens.This Community Hazard Handbook is based on the 2020 HIRA update.

HOWARD COUNTY HAZARD CATEGORIES:

MANMADE HAZARDS

- ACTIVE ASSAILANT
- BIOLOGICAL HAZARD
- CHEMICAL HAZARD
- CIVIL UNREST
- CYBER HAZARD
- DAM FAILURE
- EMERGING/RE-EMERGING INFECTIOUS DISEASE
- EXPLOSIVES HAZARD
- NUCLEAR BLAST
- RADIOLOGICAL HAZARD
- STRUCTURE FIRE
- TRANSPORTATION HAZARD
- UTILITY DISRUPTION

NATURAL HAZARDS

- DROUGHT
- EARTHQUAKE
- FLOOD
- HURRICANE/TROPICAL CYCLONE
- LIGHTNING
- PEST INFESTATION/ ZOONOTIC INFECTION
- SEVERE WINTER WEATHER
- SOLAR STORM
- TORNADO/WIND STORM
- WILDFIRE

RISK =
Likelihood + Consequence

HAZARD =
Any potential source or cause of harm or difficulty

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.

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 threat to your interests.

WHAT'S IN IT?

RISK OVERVIEW:
Risk, Likelihood, and Impact rankings paint a clear picture of how hazards compare with one another.

HAZARD PROFILES:
Hazard profiles describe the impacts each hazard may cause. 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.

KEY TERMINOLOGY

Communicating risk-related concepts can be challenging. Many of the terms used in risk assessment have colloquial meanings that confuse and distract from the intended message. The following definitions are established and expanded upon in the U.S. Department of Homeland Security (DHS) Risk Lexicon1 and will be used throughout the HIRA:

ASSET
A person, structure, facility, information, material, or process that has value.

CONSEQUENCE
The effect of an event, incident, or occurrence. Consequence in the HIRA includes impacts to property, health and safety, critical facilities, response capacity, the environment, the economy, and standard of living/quality of life. Analysis of consequence in the HIRA also incorporates the Warning Time and Duration of the hazard.

EMERGENCY LEVEL HAZARD EVENT
A hazard event that requires a response from at least two Howard County agencies or partners.

HAZARD
A potential source or cause of harm or difficulty. A hazard can be natural or manmade.

LIKELIHOOD
The conditional probability of observing a particular event in a given span of time.

MANMADE HAZARD
A hazard that originates in some way from human activity.

NATURAL HAZARD
A source of harm or difficulty created by a meteorological, environmental, or geological phenomenon.

RISK
The potential for an unwanted outcome resulting from an event. Risk is a function of the hazard likelihood and its associated consequences.

THREAT
An occurrence that has the potential to cause harm or difficulty. Unlike hazards, threats are always directed at an entity, asset, system, network, or geographic area. For the purpose of calculating risk, the threat of an intentional hazard is generally estimated as the likelihood of an attack.

VULNERABILITY
A physical feature or operational attribute that renders an entity, asset, system, network, or geographic area open to exploitation or susceptible to a given hazard. In calculating the risk of an intentional hazard, the common measurement of vulnerability is the likelihood that an attack is successful.

MORE INFORMATION
For the complete risk analysis, with full explanation and analysis of each of the risks, see the full HIRA, posted on 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.	11-30% chance of annual occurrence.	30+% chance of occurrence annually.

CONSEQUENCE FACTORS

IMPACT

Estimated effect of a single hazard event on property, health and 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	6-12 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	6-24 hours	Less than one week	More than one week

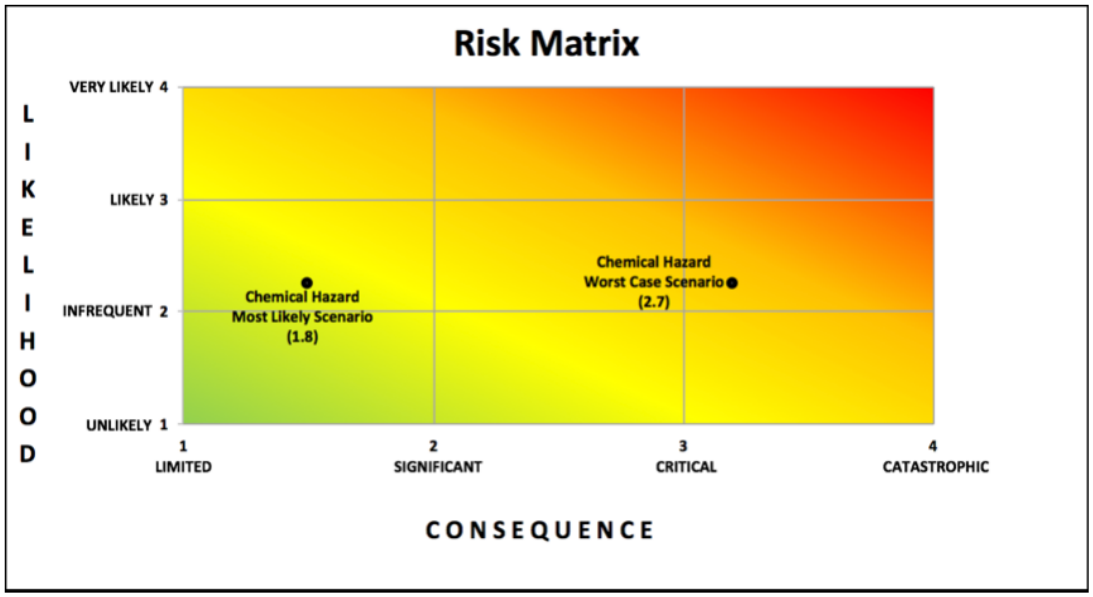
RISK SCORE WEIGHTING

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

RISK = LIKELIHOOD + CONSEQUENCE

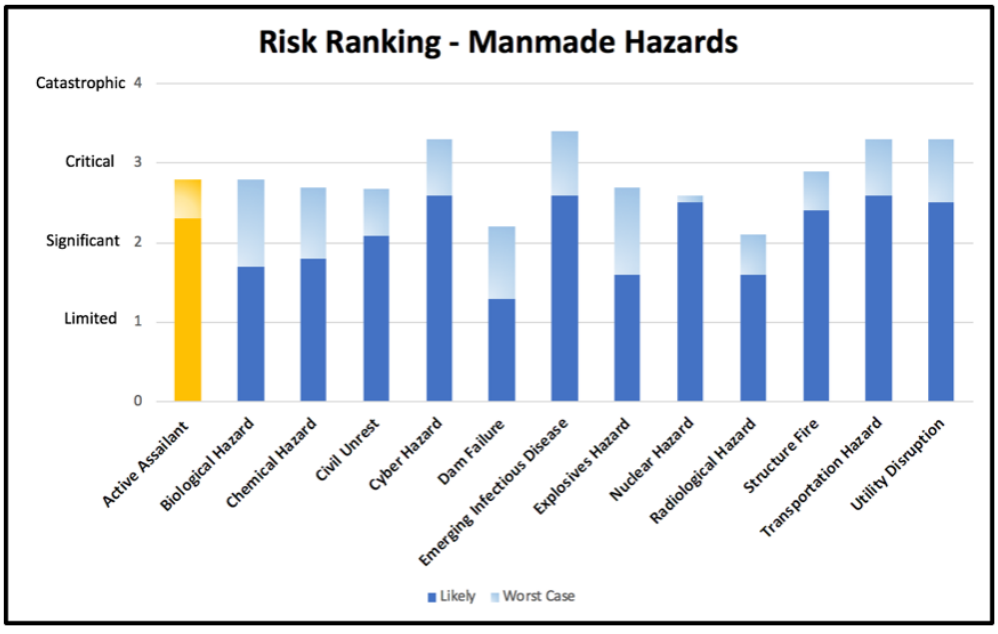
RISK MATRIX

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.



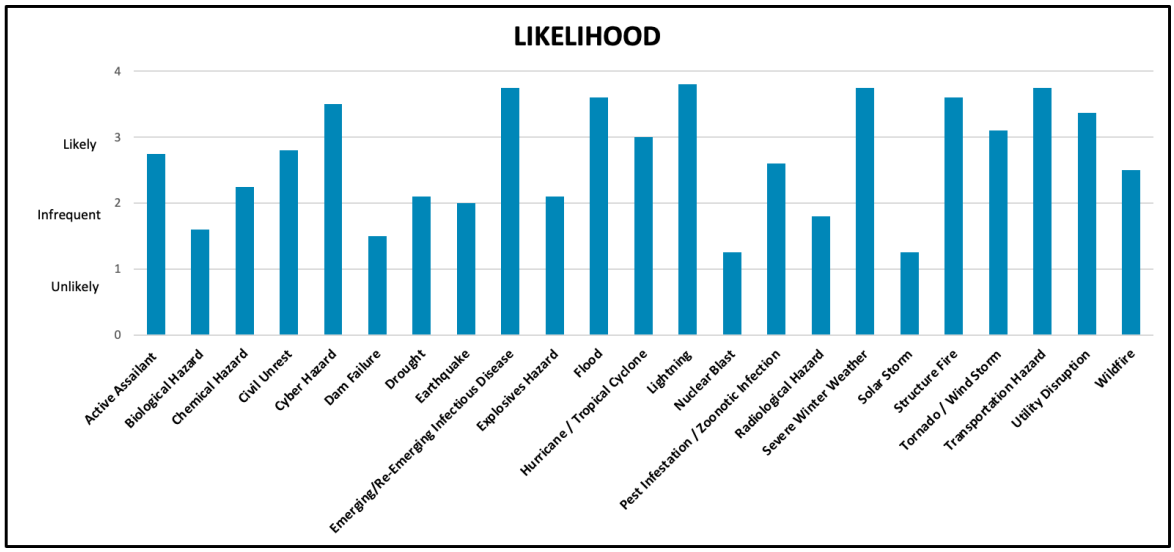
RISK RANKING

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. The Risk Ranking for each hazard profile is indicated in gold.



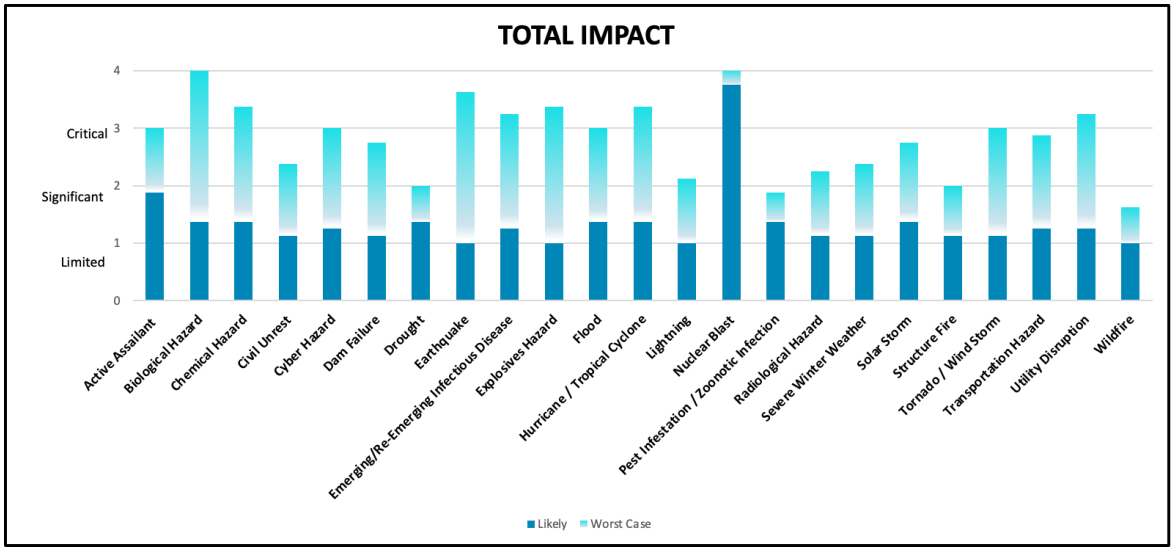
LIKELIHOOD RANKING

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.



MANMADE HAZARDS

A hazard that originates in some way from human activity.

ACTIVE ASSAILANT

An Active Assailant refers to an individual actively engaged in killing or attempting to kill people in a confined and populated area. In most cases, active assailants use firearm(s) and have no pattern or method to their selection of victims, which creates an unpredictable and quickly evolving situation that can result in loss of life and injury. Other active assailant attack methods may also include bladed weapons, vehicles, and improvised explosive devices. Active shooters are considered active assailants.

HAS IT HAPPENED LOCALLY?

There has been one Active Assailant event in Howard County during the reviewed time period (1964-2019). 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.

WHAT IS THE ONGOING RISK?

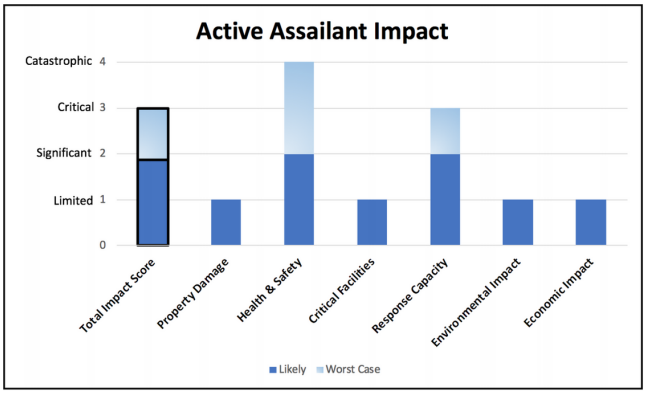
There is an expected 1-30% **Chance of Annual Occurrence** of an Active Assailant scenario in Howard County. In the most likely Active Assailant scenario, the **Total Impact is considered Limited-Significant.** In the worst-case scenario, the **Total Impact is considered Critical.**

DID YOU KNOW?

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

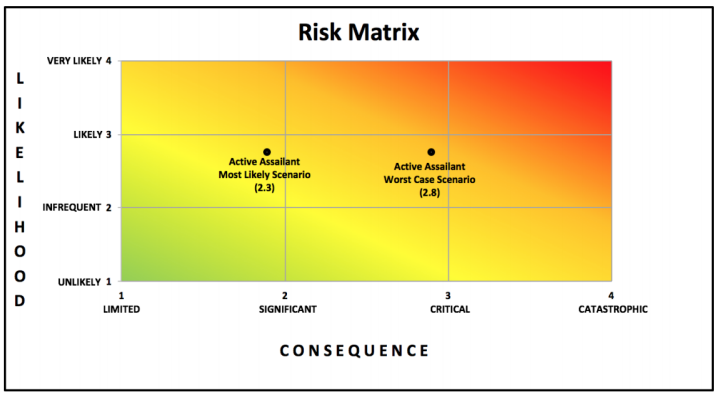
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- U.S. Dept. of Homeland Security
- New York City Police Dept.
- Federal Bureau of Investigation



Active Assailant Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.75 Infrequent-Likely		50%
CONSEQUENCE	Impact	1.8 Limited-Significant	3 Critical	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	1 Short	5%
TOTAL RISK SCORE		2.3	2.8	



BIOLOGICAL HAZARD

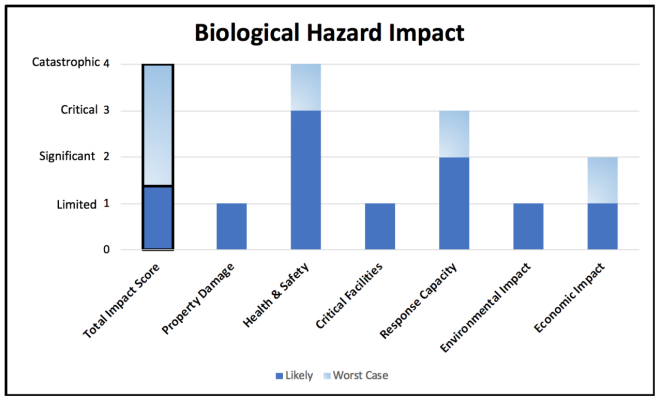
A Biological Hazard can be intentional or unintentional. An intentional Biological Hazard (Attack) is the intentional release of a pathogen (disease causing agent) or biotoxin (poisonous substance produced by a living organism) against humans, plants, or animals. An unintentional Biological Hazard can result from the natural spread of infectious disease or from the accidental release of biological agents from health care facilities, research institutions, or industrial operations. The accidental release of harmful biological agents may occur if these agents are not stored correctly, if safety controls malfunction, or if safety procedures are not followed.

HAS IT HAPPENED LOCALLY?

There have been zero confirmed Biological Attack Hazard events between 2014-2019. From 2014 to 2019, there were 88 reports of unintentional Biological Hazards, 16 of these investigations were considered hazard events. Suspicious powders and substances are frequently reported as Biological Hazards.

WHAT IS THE ONGOING RISK?

There is an expected **1-10% Chance of Annual Occurrence** of a Biological Hazard in Howard County. In the most likely Biological Hazard, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, **the Total Impact is considered Catastrophic**.

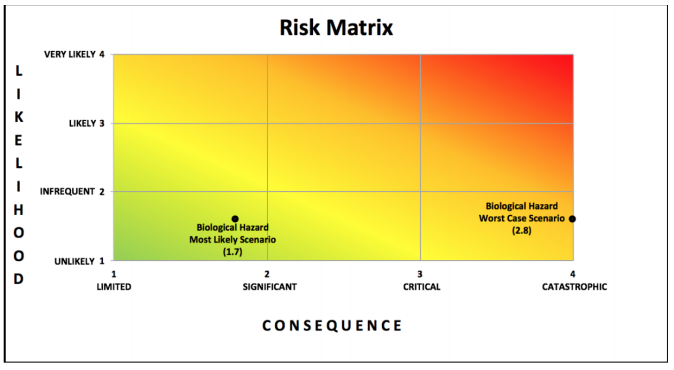


DID YOU KNOW?

- 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 Hazard in recent history was the 2001 Anthrax attacks.

Biological Hazard Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	1.6 Unlikely-Infrequent		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	4 Catastrophic	40%
	Warning Time	4 Short	4 Short	5%
	Duration	4 Very Long	4 Very Long	5%
TOTAL RISK SCORE		**1.7**	**2.8**	



FOR MORE INFORMATION:

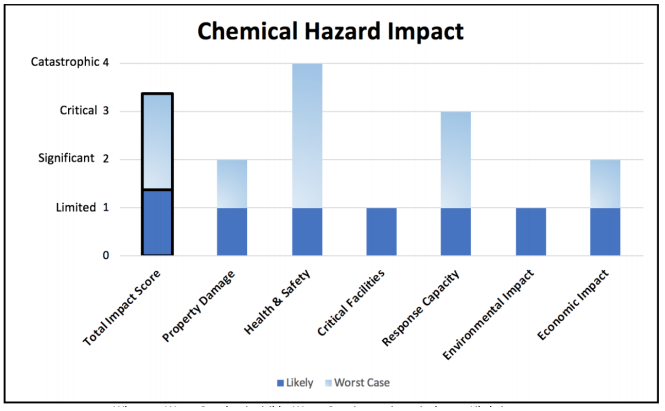
- Howard County Hazard Identification and Risk Assessment
- Centers for Disease Control and Prevention
- U.S. Department of Homeland Security
- Ready.gov

CHEMICAL HAZARD

An intentional Chemical Hazard (Attack) is defined as the spreading of toxic chemicals with the intent to do harm. A wide variety of chemicals could be made, stolen, or otherwise acquired for use in an attack. Industrial chemical plants or the vehicles used to transport chemicals could also be sabotaged. An unintentional Chemical Substance Release, or Hazmat event 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. Hazardous chemicals are used in various industries, and accidental exposure to these chemicals may occur if they are not stored correctly, if safety control malfunction, or if safety procedures are not followed.

HAS IT HAPPENED LOCALLY?

There have been five small-scale Chemical Attack Hazard events in Howard County between 2004-2019. There have been 478 Unintentional Chemical Substance Release/Hazmat responses involving chemical release, chemical reaction, or toxic conditions in Howard County during the reviewed time period. This totals to an estimated 438 Chemical Hazard events in Howard County from 2004-2019. A large percentage of Unintentional Chemical Substance Release/Hazmat events in Howard County involve hydrocarbon spills such as oil, gasoline, or diesel fuel. Unintentional Chemical Substance Release/Hazmat hazards are also common in a household setting and typically involve the accidental release of mercury or other household chemicals.

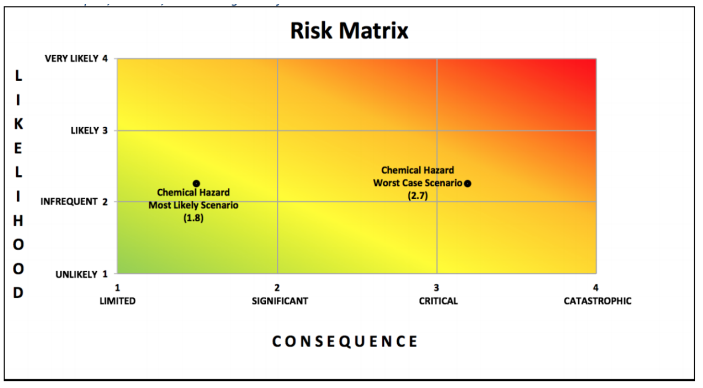


WHAT IS THE ONGOING RISK?

There is an expected **1-30% Chance of Annual Occurrence** of a Chemical Hazard in Howard County. In the most likely Chemical Hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Critical-Catastopohic**.

Chemical Hazard Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.25 Infrequent-Likely		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	3.3 Critical-Catastrophic	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	2 Moderate	5%
TOTAL RISK SCORE		1.8	2.7	



DID YOU KNOW?

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

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- U.S. Department of Homeland Security
- Ready.gov
- Centers for Disease Control and Prevention

CIVIL UNREST

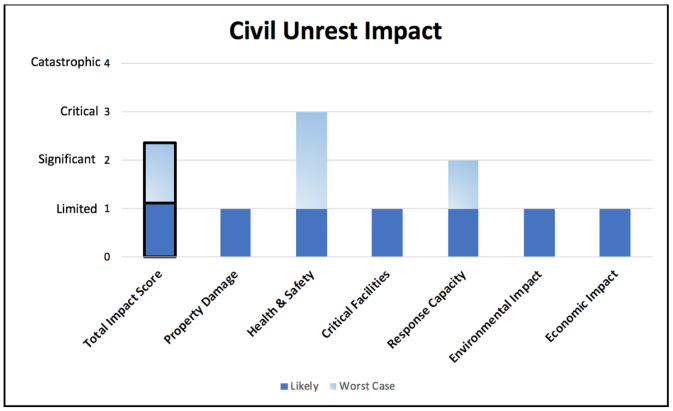
Civil Unrest occurs when public disorder has the potential to cause damage or harm. Civil Unrest is often the result of ideological conflict and may include protests, riots, demonstrations, civil disobedience, and other forms of public obstruction. Not all displays of Civil Unrest are Civil Unrest Hazards. 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 events in Howard County during the reviewed time period (1996-2019). Howard County has experienced unruly crowds associated with concerts or gatherings, but none of these situations have escalated beyond control.

WHAT IS THE ONGOING RISK?

There is an expected 1-30% **Chance of Annual Occurrence** of a Civil Unrest scenario 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 Significant-Critical**.



DID YOU KNOW?

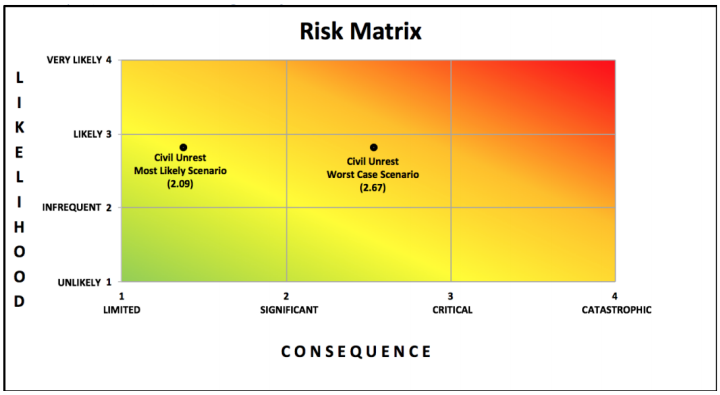
- Howard County's Emergency Operations Center was activated to coordinate resources in response to the 2015 Civil Unrest in Baltimore City.
- The scale of Civil Unrest could range from a small hazard taking up less than a city block to a large riot that occupies several square miles.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- Federal Emergency Management Agency

Civil Unrest Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.8 Infrequent-Likely		50%
CONSEQUENCE	Impact	1.1 Limited	2.3 Significant-Critical	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	3 Long	5%
TOTAL RISK SCORE		**2.09**	**2.67**	



Please note, the scores for the various hazards were submitted by our subject matter experts in August 2019. In light of the COVID-19 pandemic and nationwide civil unrest spanning from March 2020 to present at the time of publishing the HIRA (July 2020), subject matter experts were asked to incorporate additional feedback or update scores if applicable. These updates were incorporated into the 2020 version. The HIRA will be updated annually for these scores in order to provide the most accurate data for Howard County.

CYBER HAZARD

A Cyber Hazard (Attack) is an intentional disruption or manipulation of the information and communication systems used to collect, filter, process, create, and distribute data. A Cyber Attack may seek to impact data or physical infrastructure. DHS defines a Cyber Security Attack where there were: 1. Attempts (either failed or successful) to gain unauthorized access to a system or its data; 2. Unwanted disruption or denial of service; 3. The unauthorized use of a system for the processing or storage of data; and, 4. Changes to system hardware, firmware, or software characteristics without the owner's knowledge, instruction, or consent.

HAS IT HAPPENED LOCALLY?

There has never been a successful emergency-level attack on Government Cyber/Communications Infrastructure in Howard County (2009-2019). However, Howard County experiences frequent Cyber Hazard events that result in user impact, loss of access to information systems, and the need to repair or replace hardware or software. There have been more than 3,000 minor damaging Cyber Hazard events in Howard County each year.

WHAT IS THE ONGOING RISK?

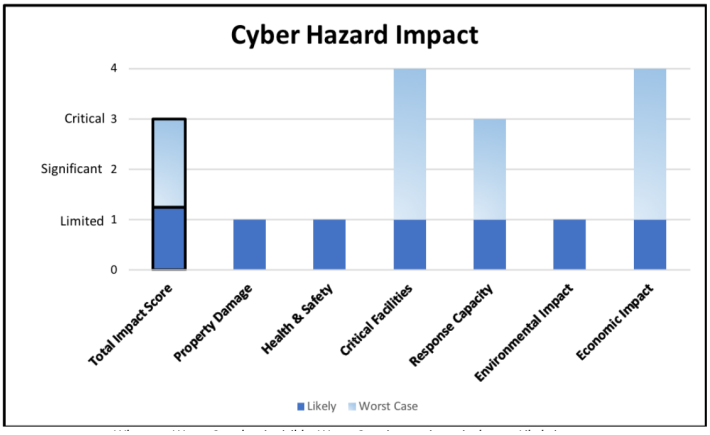
There is an expected **11-30% Chance of Annual Occurrence** of a Cyber Hazard in Howard County. In the most likely Cyber Hazard scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Critical**.

DID YOU KNOW?

- The initial Cyber Attack may only take a few minutes. However, it can take hours, days, or even weeks to identify and control the hazard.
- Cyber Attacks can impact any location 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.

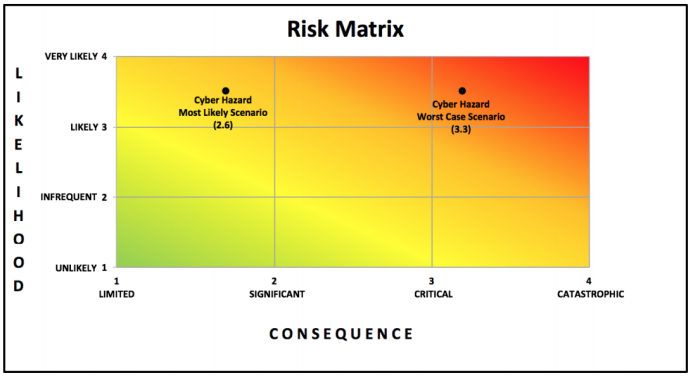
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- Federal Emergency Management Agency



Cyber Hazard Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.5 Likely-Very Likely		50%
CONSEQUENCE	Impact	1.25 Limited-Significant	3 Critical	40%
	Warning Time	4 Short	4 Short	5%
	Duration	3 Long	4 Very Long	5%
TOTAL RISK SCORE		**2.6**	**3.3**	



DAM FAILURE

A Dam Failure occurs when some or all of a dam's water-retaining barrier becomes damaged causing the uncontrolled release of water downstream and can lead to rapid flooding of downstream land. A Dam Failure can be the result of a design or construction error, insufficient maintenance, human error, or internal erosion. Dam Failures can also occur as the result of an intentional attack or as a cascading effect of natural hazards such as flooding, earthquakes, or geological instability.

HAS IT HAPPENED LOCALLY?

There have been three confirmed Dam Failure events in Howard County during the reviewed time period (1999-2019). 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.

WHAT IS THE ONGOING RISK?

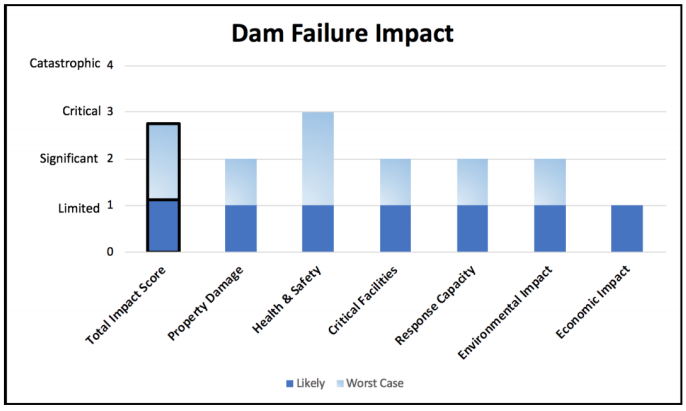
There is an expected **0-10% Chance of Annual Occurrence** of a Dam Failure in Howard County. In the most likely Dam Failure scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

DID YOU KNOW?

- Howard County has over 2,000 small earthen dams on ponds, streams, and minor bodies of water.
- Most of the recognized dams in Howard County are relatively small earthen impoundments created for either flood control or recreation. However, the Columbia Gateway, Centennial Park, Holly House Meadows, Lake Elkhorn, and Oakhurst Section 1 Dams are classified as high hazard dams. An additional 21 dams are classified as Significant Hazard dams.

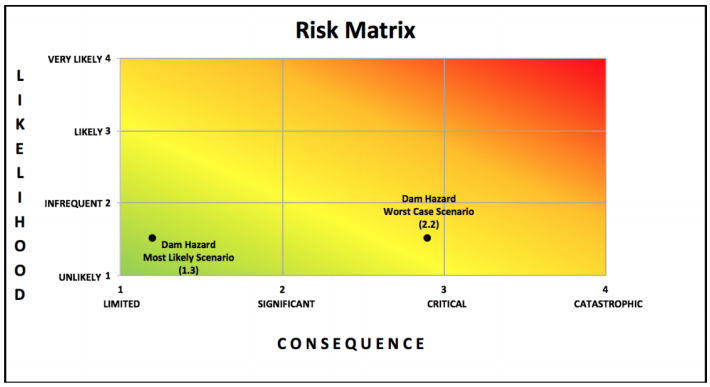
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- Maryland Dept. of the Environment
- Federal Emergency Management Agency



Dam Failure Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	1.5 Unlikely-Infrequent		50%
CONSEQUENCE	Impact	1.1 Limited	2.7 Significant-Critical	40%
	Warning Time	3 Moderate	4 Short	5%
	Duration	1 Short	4 Very Long	5%
TOTAL RISK SCORE		**1.3**	**2.2**	

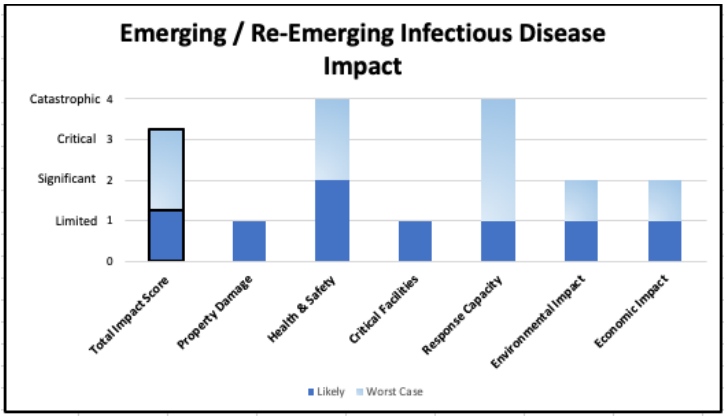


EMERGING/RE-EMERGING INFECTIOUS DISEASE

Emerging/Re-emerging Infectious Disease refers to an infectious disease that has newly appeared in a population or has existed but is rapidly increasing in incidence or geographic range in the near future. Emerging infectious diseases can be caused by previously undetected or unknown infectious agents or pathogens and can occur in the form of an outbreak, cluster, epidemic, or pandemic.

HAS IT HAPPENED LOCALLY?

There has been one emergency-level Emerging/Re-Emerging Infectious Disease event in Howard County during the reviewed time period (1994-2019), 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. In January 2020, the Centers for Disease Control (CDC) began responding to a pandemic of respiratory disease spreading from person-to-person caused by a novel (new) coronavirus. The disease was named "coronavirus disease 2019" (abbreviated "COVID-19") and continues to pose a serious public health risk at the time of this publication. The Federal Government continues to work with state, local, tribal, and territorial partners, as well as public health partners, to respond to this pandemic.



WHAT IS THE ONGOING RISK?

There is an expected 11-30% **Chance of Annual Occurrence** of an Emerging/Re-emerging Infectious Disease event in Howard County. In the most likely Emerging/Re-emerging Infectious Diseases scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Critical-Catastrophic**.

Emerging / Re-Emerging Infectious Disease Risk Profile

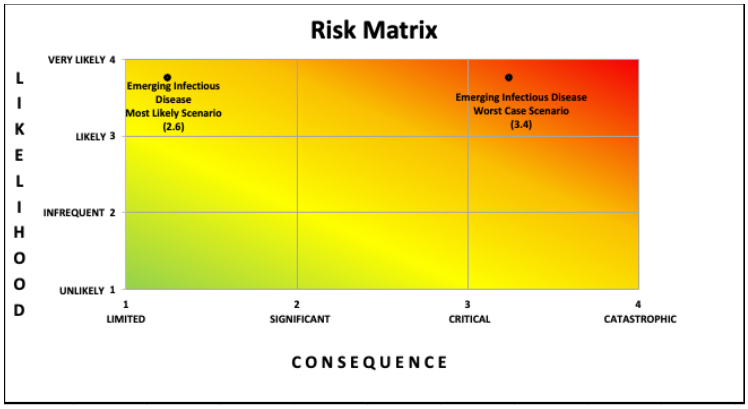
	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.75 Likely-Very Likely		50%
CONSEQUENCE	Impact	1.25 Limited-Significant	3.25 Critical-Catastrophic	40%
	Warning Time	1 Very Long	1 Very Long	5%
	Duration	4 Very Long	4 Very Long	5%
	TOTAL RISK SCORE	**2.6**	**3.4**	

DID YOU KNOW?

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

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- Centers for Disease Control and Prevention
- Ready.gov



Please note, the scores for the various hazards were submitted by OEM's subject matter experts in August 2019. In light of the COVID-19 pandemic and nationwide civil unrest spanning from March 2020 to present at the time of publishing the HIRA (July 2020), subject matter experts were asked to incorporate additional feedback or update scores if applicable. These updates were incorporated into the 2020 version. The HIRA will be updated annually for these scores in order to provide the most accurate data for Howard County.

EXPLOSIVES HAZARD

An Explosives Hazard (Attack) occurs when an explosive device is intentionally used to cause harm to people, property, operational capacity, or the environment. There are also controlled explosions which are the deliberate detonation of an explosive device under strictly controlled circumstances. Controlled explosions are often work related.

HAS IT HAPPENED LOCALLY?

There have been zero successful Explosives Hazard (Attack) events in Howard County during the reviewed time period (2000-2019). However, there were 22 responses to confirmed Explosives threats in Howard County between 2000 and 2019, although all were disarmed prior to their detonation. From 2000-2019, there was an estimated total of 20 incidents that were considered Explosives Hazard events.

WHAT IS THE ONGOING RISK?

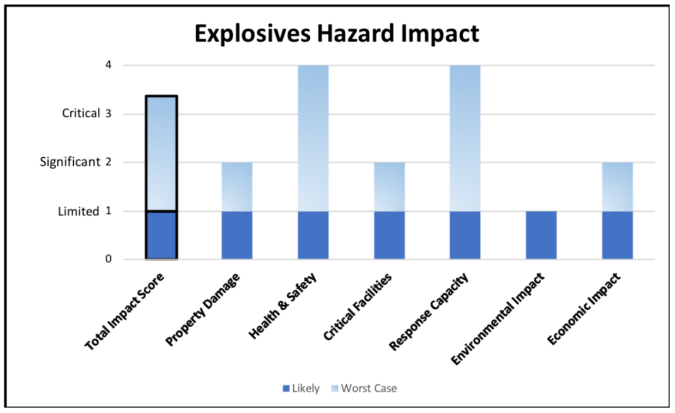
There is an expected **1-10% Chance of Annual Occurrence** of an Explosives Hazard in Howard County. In the most likely Explosives Hazard scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Critical-Catastrophic**.

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 Hazard is typically instantaneous. However, it can take several hours to ensure that the area of the attack is safe.

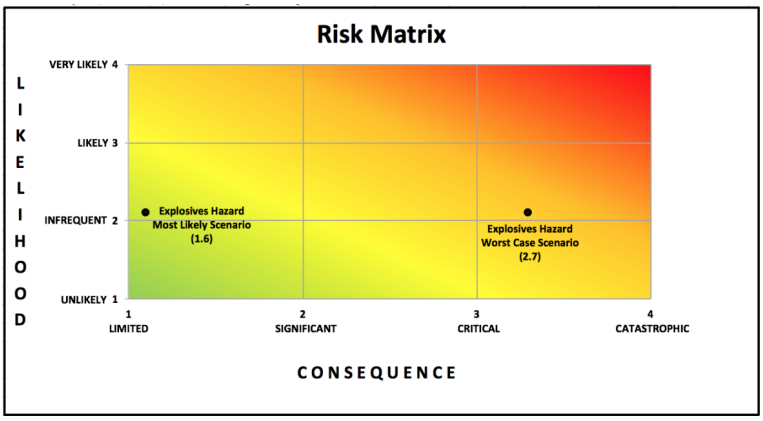
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- U.S. Department of Homeland Security
- Ready.gov



Explosives Hazard Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.1 Infrequent		50%
CONSEQUENCE	Impact	1 Limited	3.3 Critical-Catastrophic	40%
	Warning Time	2 Long	4 Short	5%
	Duration	1 Short	3 Long	5%
TOTAL RISK SCORE		**1.6**	**2.7**	



NUCLEAR BLAST

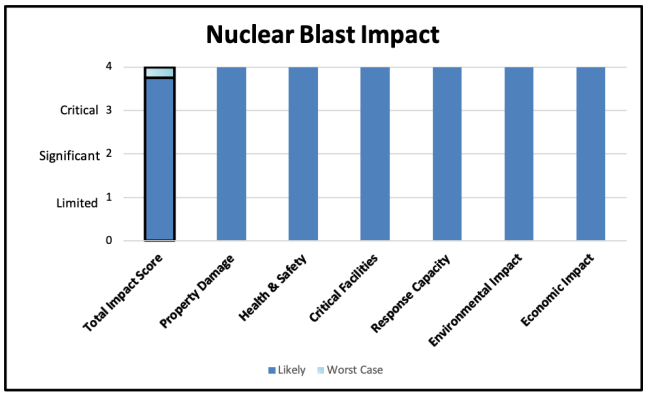
A Nuclear Blast is hazardous in many distinct ways. A Nuclear Blast results in a large fireball that vaporizes everything within the immediate blast area and carries it upward. Light and heat radiate outward from the explosion, and an electromagnetic pulse is emitted during the first few seconds of the blast. A blast wave generates overpressure and propagates rapidly out from the epicenter. Prompt radiation levels are high near the epicenter during the first minute of the explosion but decrease rapidly with time and distance. As the debris cloud cools, dust-like particles of radioactive material are dispersed by the wind and drop back to earth as fallout.

HAS IT HAPPENED LOCALLY?

There has never been a Nuclear Blast in Howard County (1945-2019).

WHAT IS THE ONGOING RISK?

There is an expected **0-1% Chance of Annual Occurrence** of a Nuclear Blast in Howard County. In the most likely Nuclear Blast scenario, the **Total Impact is considered Critical-Catastrophic**. In the worst-case scenario, the **Total Impact is considered Catastrophic**.



DID YOU KNOW?

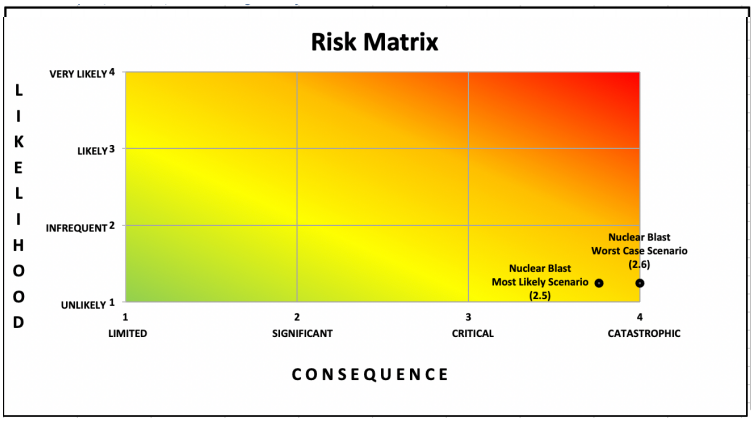
- The electromagnetic pulse (EMP) emitted by a Nuclear Blast can easily span across several states.
- A large Nuclear Blast can cause/result in radioactive contamination that remains hazardous for up to 10 years.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- U.S. Department of Health and Human Services
- Ready.gov
- Centers for Disease Control and Prevention

Nuclear Blast Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	1.25 Unlikely-Infrequent		50%
CONSEQUENCE	Impact	3.7 Critical-Catastrophic	4 Catastrophic	40%
CONSEQUENCE	Warning Time	4 Short	4 Short	5%
CONSEQUENCE	Duration	4 Very Long	4 Very Long	5%
TOTAL RISK SCORE		**2.5**	**2.6**	



RADIOLOGICAL HAZARD

An intentional Radiological Hazard occurs when a population is intentionally exposed to radiation through a non-nuclear mechanism. A Radiological Hazard may take the form of a radiological exposure device (RED) or a radiological dispersal device (RDD), also known as a dirty bomb. An unintentional radiological substance release may occur when radiation is accidentally discharged into the environment as the result of a nuclear power plant accident, a transportation accident, or a workplace incident.

HAS IT HAPPENED LOCALLY?

There have been zero Radiological Hazard events in Howard County during the reviewed time period (1996-2019). There were two unintentional Radiological Hazard events during the reviewed time period.

WHAT IS THE ONGOING RISK?

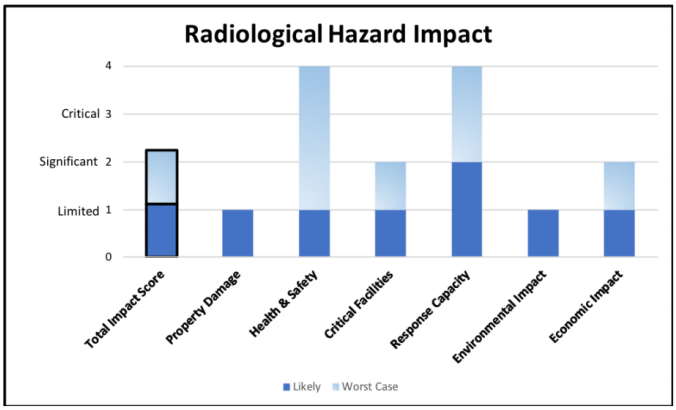
There is an expected **1-10% Chance of Annual Occurrence** of a Radiological Hazard in Howard County. In the most likely Radiological scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant-Critical**.

DID YOU KNOW?

- REDs have extremely localized effects and may only impact those who are in physical contact or extremely close proximity to the device.
- The area affected by a RDD explosion may range from less than a city block to several square miles.

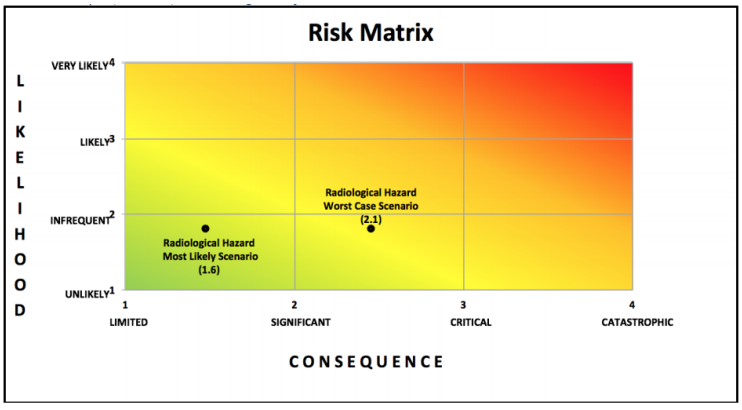
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- U.S. Department of Homeland Security
- Ready.gov
- Centers for Disease Control and Prevention



Radiological Hazard Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	1.8 Unlikely-Infrequent		50%
CONSEQUENCE	Impact	1.1 Limited	2.25 Significant-Critical	40%
	Warning Time	4 Short	4 Short	5%
	Duration	2 Moderate	3 Long	5%
TOTAL RISK SCORE		**1.6**	**2.1**	



STRUCTURE FIRE

A Structure Fire is an uncontrolled fire involving a building or structure. Structure Fires can occur in a residential, commercial, or industrial setting. Fires can easily spread from one structure to others nearby, and the size of a structure fire hazard is constantly evolving, until contained. Structure Fires can be intentional or unintentional, but the origin of the fire is often unknown until after the hazard has been brought under control.

HAS IT HAPPENED LOCALLY?

There have been 3,468 Structure Fire responses in Howard County during the reviewed time period (2008-2019). The large majority of Structure Fires that occur in the County are residential and cooking-related. In 1999, a six-alarm fire destroyed multiple businesses in downtown Ellicott City.

WHAT IS THE ONGOING RISK?

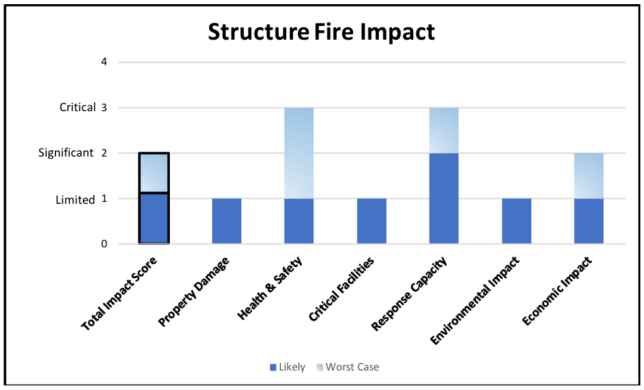
There is an expected 100% **Chance of Annual Occurrence** of a Structure Fire in Howard County. In the most likely Structure Fire scenario, **the Total Impact is considered Limited**. In the worst- case scenario, **the Total Impact is considered Significant**.

DID YOU KNOW?

- Fires may impact 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 2,000 degrees Fahrenheit.

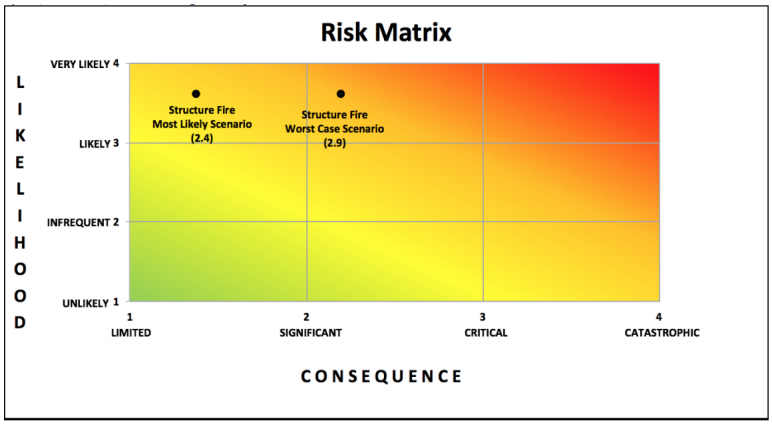
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- U.S. Fire Administration
- National Fire Protection Association
- Ready.gov



Structure Fire Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.6 Likely- Very Likely		50%
CONSEQUENCE	Impact	1.1 Limited	2 Significant	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	2 Moderate	5%
TOTAL RISK SCORE		**2.4**	**2.9**	



TRANSPORTATION HAZARD

A Transportation Hazard can involve road vehicles, trains, airplanes, or boats, and the characteristics of the hazard depend greatly on the vehicles involved. The hazard may involve one vehicle or many vehicles. Although a Transportation Hazard event can occur nearly anywhere, affected areas are typically in close proximity to roadways, railways, or other locations with high levels of vehicle traffic areas. Because dangerous substances are often moved from one place to another via truck, train, or ship, Transportation Hazards can involve the release of hazardous materials including combustible, explosive, radiological, biological, or otherwise toxic substances.

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 between 2008-2013. There were over 182 Transportation Hazard responses conducted by the Howard County Department of Fire and Rescue Services between 2014-2019. In total, there were a combined 1,928 Transportation Hazard events during the review period of 2008-2019.

WHAT IS THE ONGOING RISK?

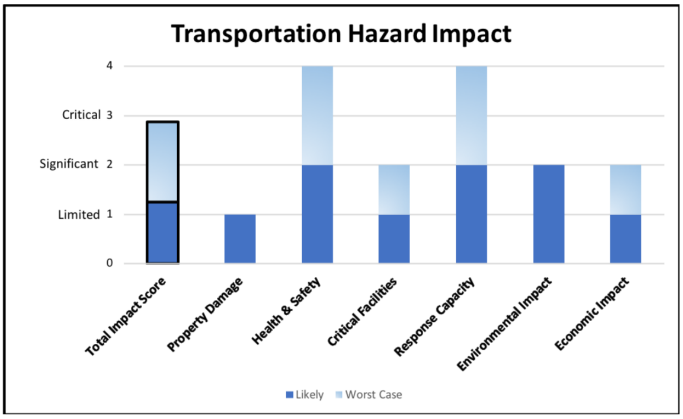
There is an expected 100% **Chance of Annual Occurrence** of a Transportation Hazard in Howard County. In the most likely Transportation Hazard scenario, **the Total Impact is considered Limited-Significant**. In the worst-case scenario, **the Total Impact is considered Significant-Critical**.

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.
- Transportation Hazards involving water vehicles are unlikely in Howard County. There are no large bodies of water in the County and the small lakes and reservoirs within the planning area do not allow motorized water vehicles.

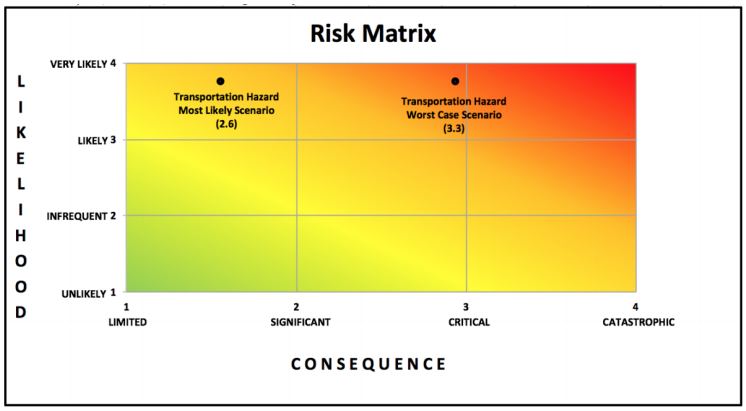
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Transportation Safety Board
- U.S. Department of Transportation Bureau of Transportation Statistics



Transportation Hazard Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.75 Likely- Very Likely		50%
CONSEQUENCE	Impact	1.2 Limited-Significant	2.8 Significant-Critical	40%
	Warning Time	4 Short	4 Short	5%
	Duration	2 Moderate	3 Long	5%
TOTAL RISK SCORE		**2.6**	**3.3**	



UTILITY DISRUPTION

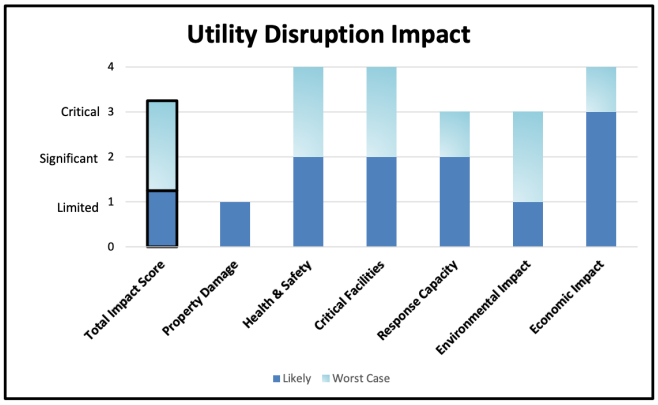
Utility Disruptions can involve gas lines, water lines, wastewater systems, or electrical infrastructure. The area affected by a Utility Disruption can range from one block to dozens of square miles. It is rare to have any advanced warning of a Utility Disruption, although disruptions may be anticipated prior to extreme weather events. A Utility Disruption can occur nearly anywhere utility infrastructure exists. Utility Disruptions can be intentional, unintentional, or occur as a cascading effect of another hazard.

HAS IT HAPPENED LOCALLY?

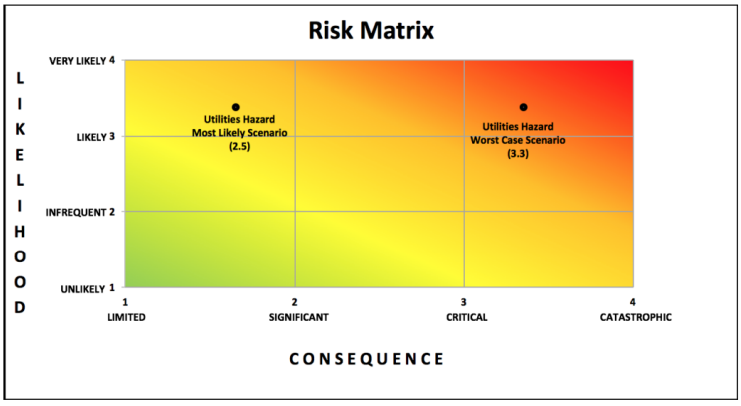
There have been 16 notable Utility Disruption events in Howard County during the reviewed time period (2008-2019). The majority of Utility Disruptions in Howard County have been the result of extreme weather such as Hurricane Sandy and the 2018 Wind Storm.

WHAT IS THE ONGOING RISK?

There is an expected **11-30% Chance of Annual Occurrence** of a Utility Disruption in Howard County. In the most likely Utility Disruption scenario, **the Total Impact is considered Limited-Significant**. In the worst-case scenario, **the Total Impact is considered Critical-Catastrophic.**



Utility Disruption Risk Profile				
	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.37 Likely- Very Likely		50%
CONSEQUENCE	Impact	1.2 Limited-Significant	3.2 Critical-Catastrophic	40%
	Warning Time	4 Short	4 Short	5%
	Duration	3 Long	4 Very Long	5%
TOTAL RISK SCORE		2.5	3.3	



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
- Centers for Disease Control and Prevention
- Ready.gov

NATURAL HAZARDS

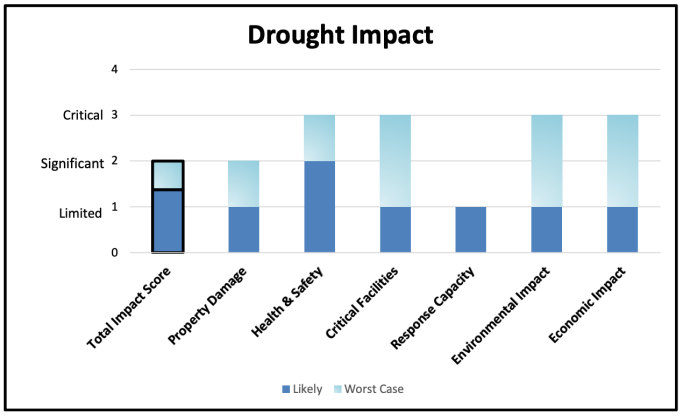
A source of harm or difficulty created by a meteorological, environmental, or geological phenomenon.

DROUGHT

According to the National Oceanic and Atmospheric Administration (NOAA), Drought is a complex phenomenon which is often difficult to monitor and define. A drought is a condition of moisture deficit sufficient to have an adverse effect on vegetation, animals, and humans over a sizable 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. Drought can impact many sectors of the economy and operates on many different time scales.

HAS IT HAPPENED LOCALLY?

Howard County has experienced 13 Drought events from 1950 to 2019. All 13 events occurred between 1995 and 2017. According to U.S. Drought Portal, since 2000, the longest duration of drought (from moderate, D1 to exceptional drought, D4) in Maryland lasted 48 weeks beginning on June 7th, 2016 and ending on May 2nd, 2017. The most intense period of drought occurred the week of October 4th, 2016 where the exceptional drought affected 52.13% of Maryland land.

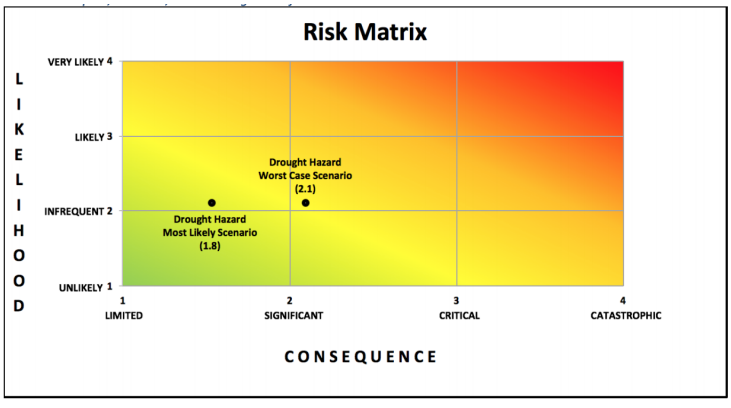


WHAT IS THE ONGOING RISK?

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

Drought Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.1 Infrequent-Likely		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	2 Significant	40%
	Warning Time	1 Very Long	1 Very Long	5%
	Duration	4 Very Long	4 Very Long	5%
TOTAL RISK SCORE		**1.8**	**2.1**	



DID YOU KNOW?

- Droughts have a uniform probability of occurrence across the entire county.
- Most of California has been stuck in a severe drought since 2011.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- United States Geological Service
- National Integrated Drought Information System

EARTHQUAKE

An Earthquake is a sudden release of energy from the earth's crust that creates seismic waves. Stress is created in the earth's crust from thermal variations, tectonic changes, and other forms of pressure. Weaknesses in the earth crust yield when the stresses exceed the friction along these crustal weaknesses, and an earthquake happens. At the earth's surface, earthquakes may manifest themselves by a shaking or displacement of the ground.

HAS IT HAPPENED LOCALLY?

Historically, there have been two recorded Earthquake events with an epicenter in Howard County. Additionally, there was a cluster of small earthquakes in 1993 in Allview Estates in Columbia, MD. In 2017, Howard County experienced two earthquakes. The first was an earthquake of 1.52 magnitude in Glenelg, Maryland. The second was an earthquake of 1.5 magnitude in Roxbury, Maryland. Including the recent earthquake data provided by the MGS, there has been 12 earthquake events in Howard County within the reviewed time period of 1990-2019.

WHAT IS THE ONGOING RISK?

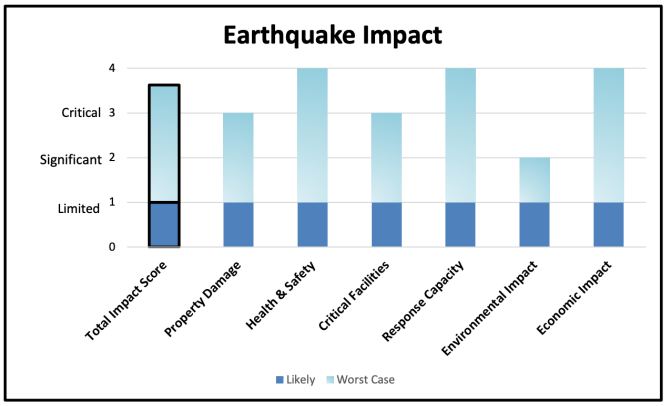
There is an expected **1-10% Chance of Annual Occurrence** of an Earthquake in Howard County. In the most likely Earthquake scenario, the **Total Impact is considered Limited.** In the worst-case scenario, the **Total Impact is considered Critical-Catastrophic.**

DID YOU KNOW?

- Data from the Maryland Geological Survey (MGS), indicates there have been 70 Earthquake events with epicenters in Maryland between 1758-2017.
- 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.

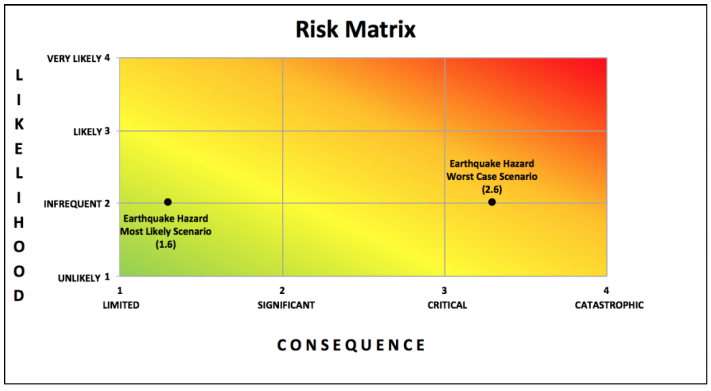
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- Maryland Geological Survey
- Ready.gov



Earthquake Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2 Infrequent		50%
CONSEQUENCE	Impact	1 Limited	3.6 Critical-Catastrophic	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	1 Short	5%
TOTAL RISK SCORE		**1.6**	**2.6**	



FLOOD

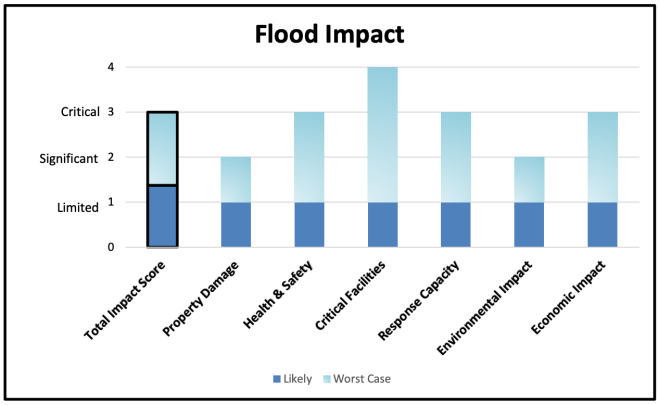
A Flood is defined as an accumulation of water that exceeds a physical barrier or collects in a low-lying area that leads to the inundation of an area. Flooding typically results from large scale weather systems that generate prolonged or highly impactful rainfall. Other conditions such as winter snow thaws, oversaturated soil, ice jams breaking apart, and urbanization can cause flooding as well. Howard County can be impacted by several types of flooding including Areal, Flash, and River.

HAS IT HAPPENED LOCALLY?

The National Climatic Data Center (NCDC) indicates that there were 78 Flood events in Howard County from 1996 to 2019. The two most significant Flash Flood events occurred on July 30, 2016, when a strong storm dropped six inches of rain over Ellicott City over a span of two hours, and then again on May 28, 2018. These events took three lives and caused extensive damage to businesses and homes in Historic Ellicott City.

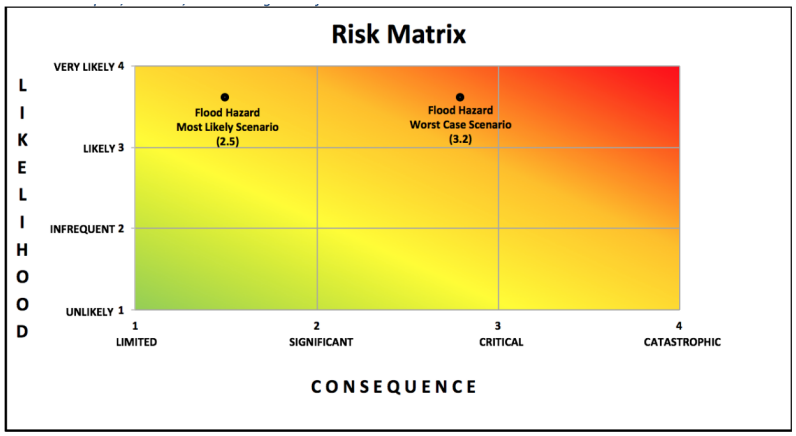
WHAT IS THE ONGOING RISK?

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



Flood Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.6 Likely-Very Likely		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	3 Critical	40%
	Warning Time	4 Short	1 Very Long	5%
	Duration	1 Short	3 Long	5%
TOTAL RISK SCORE		**2.5**	**3.2**	



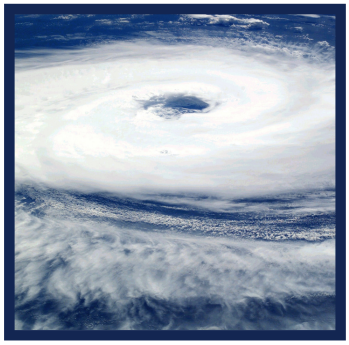
DID YOU KNOW?

- During the Flood event of 1868, witness reports say that the Patapsco River rose 30 feet in only 30 minutes.
- The 2016 Flash Flooding Event caused extensive damages to 90 businesses and 107 homes and caused at least $22.4 million in estimated damages.
- 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.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Oceanic and Atmospheric Administration
- Ready.gov

HURRICANE/TROPICAL CYCLONE



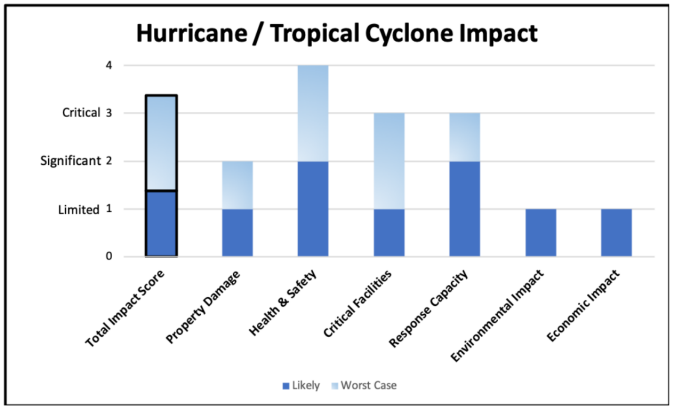
Hurricanes, tropical storms, and typhoons are collectively known as Tropical Cyclones. NOAA defines a Tropical Cyclone as a warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere.

HAS IT HAPPENED LOCALLY?

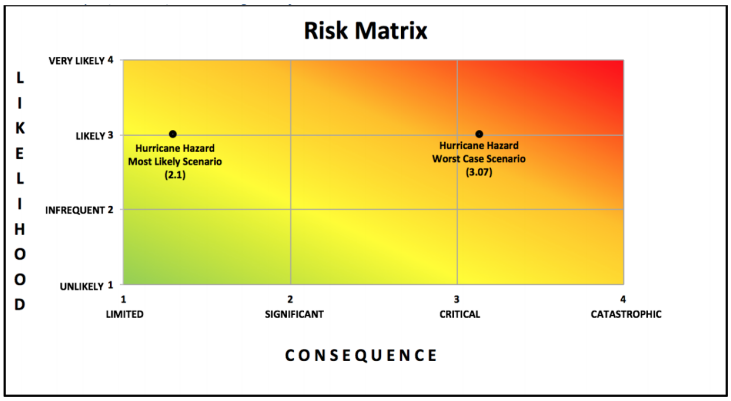
According to the National Climatic Data Center (NCDC) database, 13 named Tropical Cyclones passed close enough to impact Howard County between 1950 and 2019, only one of which reached hurricane strength. Since that data was collected, three other tropical storms have impacted Howard County (Irene and Lee in 2011 and Sandy in 2012) during the reporting period.

WHAT IS THE ONGOING RISK?

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



Hurricane/Tropical Cyclone Risk Profile				
	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3 Likely		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	3.3 Critical-Catastrophic	40%
	Warning Time	1 Very Long	1 Very Long	5%
	Duration	2 Moderate	4 Very Long	5%
TOTAL RISK SCORE		2.1	3.07	



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 and storm surge.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Oceanic and Atmospheric Administration
- Ready.gov

LIGHTNING

Lightning events are generated by atmospheric imbalance and turbulence due to a combination of conditions. 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. Lightning occurs during all thunderstorms and can strike anywhere.

HAS IT HAPPENED LOCALLY?

The National Climatic Data Center (NCDC) database identified six significant Lightning events in Howard County between 1994 and 2019. However, it is likely that additional events outside this period were not captured in the database.

WHAT IS THE ONGOING RISK?

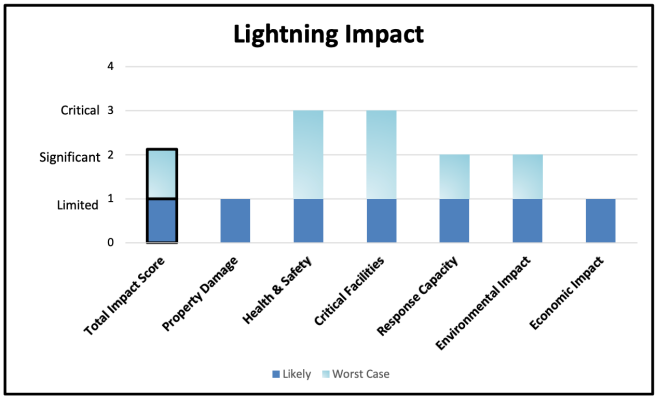
There is an expected **11-30% Chance of Annual occurrence** of a Lightning event in Howard County. In the most likely Lightning scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant**.

DID YOU KNOW?

- A Lightning event causing extensive property damage in Howard County occurred on August 3rd, 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.

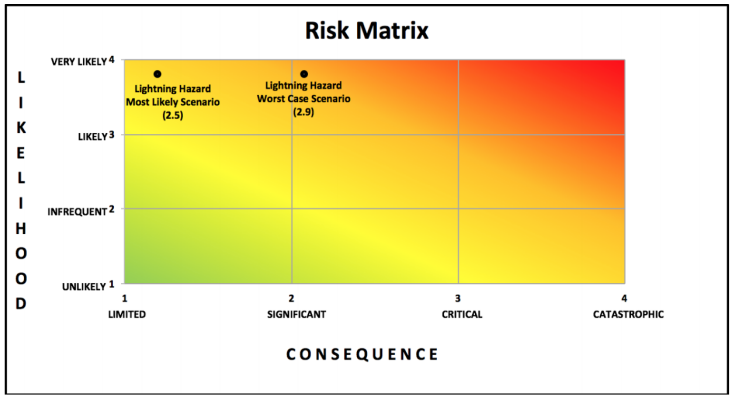
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Oceanic and Atmospheric Administration
- Ready.gov



Lightning Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.8 Likely-Very Likely		50%
CONSEQUENCE	Impact	1 Limited	2.1 Significant	40%
	Warning Time	3 Moderate	3 Moderate	5%
	Duration	1 Short	1 Short	5%
TOTAL RISK SCORE		2.5	2.9	



PEST INFESTATION/ZOONOTIC INFECTION

Pest Infestation is the occurrence of one or more pest species in an area or location where their numbers and impact are currently or potentially at intolerable levels. Pest infestations include vectors such as insects, birds, and rodents. Pest infestations can result in Zoonotic Infections, or those that spread between animals and people and caused disease. Examples of Zoonotic Diseases include, but are not limited to, animal influenza, avian influenza, and Lyme Disease.

HAS IT HAPPENED LOCALLY?

There have been no documented Pest Infestation/Zoonotic Infection events in Howard County that required the activation of the Emergency Operations Center (1964-2019).

WHAT IS THE ONGOING RISK?

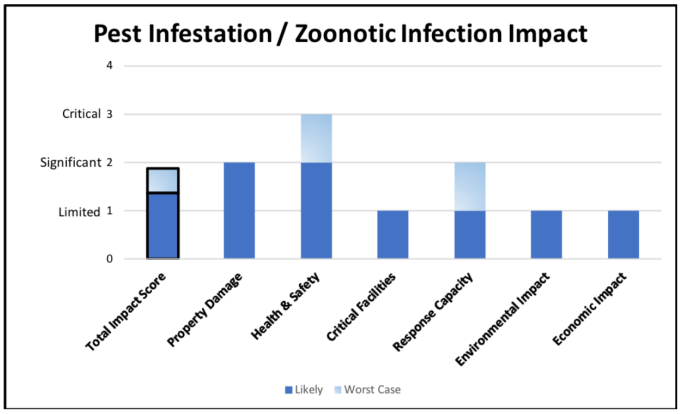
There is an expected **1-30%+ Chance of Annual Occurrence** of a Pest Infestation/Zoonotic Infection in Howard County. In the most likely Pest Infestation/Zoonotic Infection scenario, the **Total Impact is considered Limited-Significant**. In the worst-case scenario, the **Total Impact is considered Limited-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.

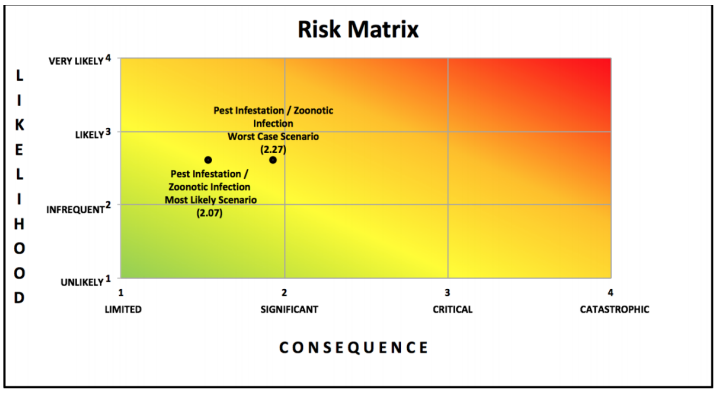
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- Centers for Disease Control and Prevention
- Environmental Protection Agency



Pest Infestation/Zoonotic Infection Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.6 Infrequent-Likely		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	1.8 Limited-Significant	40%
	Warning Time	1 Very Long	1 Very Long	5%
	Duration	4 Very Long	4 Very Long	5%
TOTAL RISK SCORE		**2.07**	**2.27**	



SEVERE WINTER WEATHER

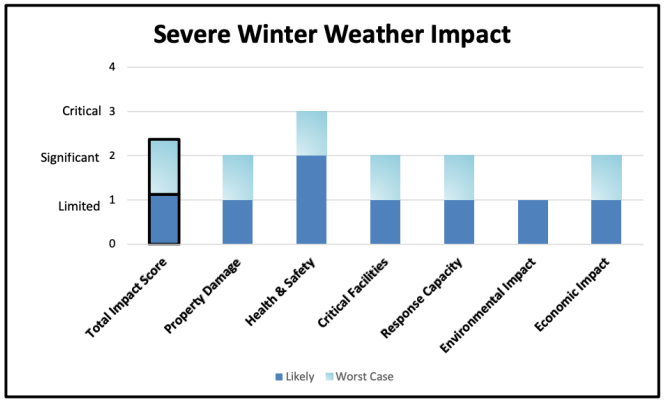
Severe Winter Weather refers to a weather event that produces forms of precipitation caused by cold temperatures, such as snow, sleet, ice, and freezing rain, while ground temperatures are cold enough to cause precipitation to stick/freeze. These hazards may be enhanced with the presence of windy conditions, which can lead to blizzard, whiteout conditions and drifting of snow. Additionally, these conditions have the potential to cause transportation hazard events.

HAS IT HAPPENED LOCALLY?

The National Climatic Data Center (NCDC) Database reports an estimated total of 114 Severe Winter Weather events in Howard County that occurred during the review period of 1950-2019.

WHAT IS THE ONGOING RISK?

There is an expected **11-30+% Chance of Annual Occurrence** of a Severe Winter Weather in Howard County. In the most likely Severe Winter Weather scenario, the **Total Impact is considered Limited**. In the worst-case scenario, the **Total Impact is considered Significant-Critical.**

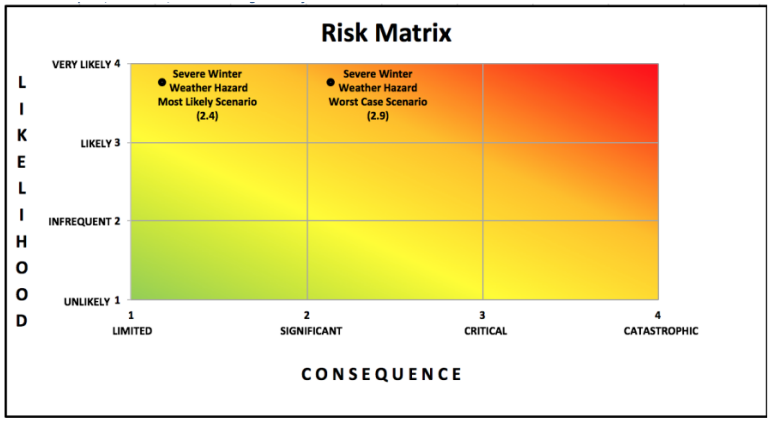


DID YOU KNOW?

- The average annual snowfall for Howard County ranges from 20-27 inches.
- Howard County experience an average of 5.5 Severe Winter Weather 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.

Severe Winter Weather Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.75 Likely-Very Likely		50%
CONSEQUENCE	Impact	1.1 Limited	2.3 Significant-Critical	40%
	Warning Time	2 Long	1 Very Long	5%
	Duration	1 Short	2 Moderate	5%
TOTAL RISK SCORE		2.4	2.9	



FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Oceanic and Atmospheric Administration
- Ready.gov

SOLAR STORM

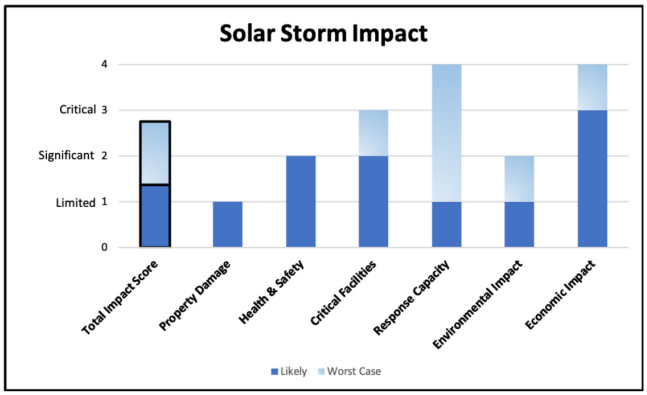
Solar Storms, also referred to as geomagnetic storms, are a type of Space Weather that result in a major disturbance of Earth's magnetosphere that occurs when there is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth. Space weather is generally divided into four components: solar flares, coronal mass ejections (CMEs), high speed solar wind, and solar energetic particles. Geomagnetic Storms are most relevant to Howard County and are classified under coronal mass ejections. These storms can cause disturbances in the electric power grid, which could negatively impact homes and businesses in the County.

HAS IT HAPPENED LOCALLY?

There have been no notable occurrences of Solar Storm events significantly impacting Howard County.

WHAT IS THE ONGOING RISK?

There is an expected **0-10% Chance of Annual Occurrence** of a Solar Storm event in Howard County. In the most likely Solar Storm scenario, the **Total Impact is considered Limited-Significant**. In the worst case scenario, the **Total Impact is considered Significant-Critical.**



DID YOU KNOW?

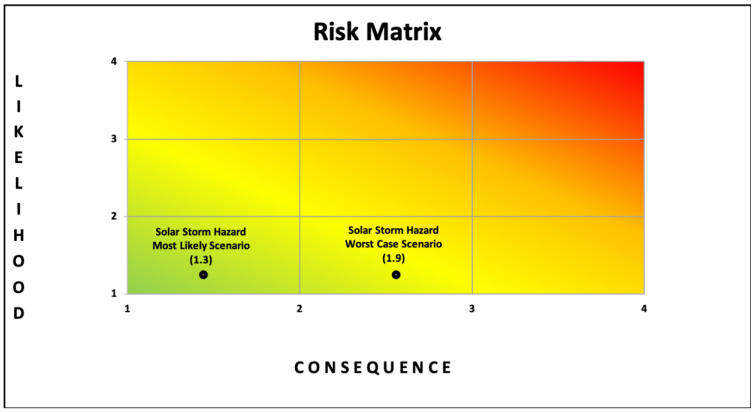
- A Solar Storm in 1859, known as the "Carrington Event," was one of the strongest coronal mass ejections in recorded history. Telegraph systems failed across Europe and North America.
- In 1972, a Solar Storm knocked out long-distance phone communications across the United States.

FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Oceanic and Atmospheric Administration
- Ready.gov

Solar Storm Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	1.25 Unlikely- Infrequent		50%
CONSEQUENCE	Impact	1.3 Limited-Significant	2.7 Significant-Critical	40%
	Warning Time	1 Very Long	1 Very Long	5%
	Duration	3 Long	3 Long	5%
TOTAL RISK SCORE		**1.3**	**1.9**	



TORNADO/WIND STORM

The following section discusses Wind Storms and Tornadoes. Wind Storms are discussed in two separate categories: thunderstorm winds and high wind events. Damaging winds are often called "straight-line" winds to differentiate the damage they cause from tornado damage. Most thunderstorm winds that cause damage at the ground are a result of outflow generated by a thunderstorm downdraft.

A tornado is a violently rotating column of air, suspended from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud. Most of the time, these vortices remain suspended in the atmosphere. When the lower tip of a vortex touches the earth, the tornado forms and often becomes a force of destruction.

HAS IT HAPPENED LOCALLY?

The National Climate Data Center (NCDC) database reports that 17 tornadoes have occurred in Howard County between 1975 and 2019. The database indicates there were eight EF0, seven EF1, and two EF2 tornadoes. The NCDC database reports that 115 (Thunderstorm) Wind Storm 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 traveled nearly 13 miles and left a path of debris over 500 yards wide.

WHAT IS THE ONGOING RISK?

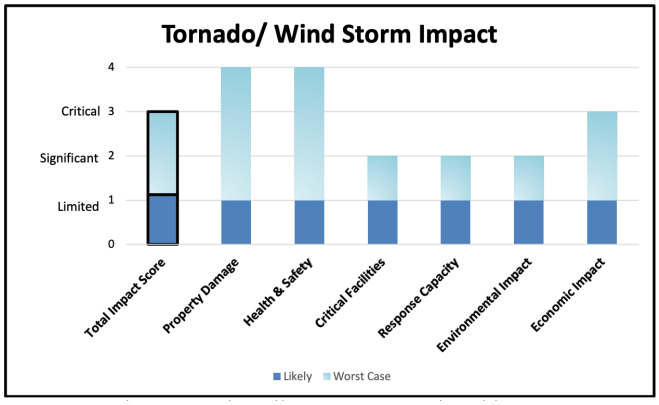
There is an expected **11-30% Chance of Annual Occurrence** of a Tornado/Wind Storm in Howard County. In the most likely Tornado/Wind Storm scenario, **the Total Impact is considered Limited**. In the worst-case scenario, **the Total Impact is considered Critical**.

DID YOU KNOW?

- Howard County averages one tornado every four years.
- There have been zero tornado-related fatalities in Howard County since 1950.
- Tornadoes can occur at any time, with the greatest frequency during the late spring and early summer months, and during late afternoon and early evening hours.

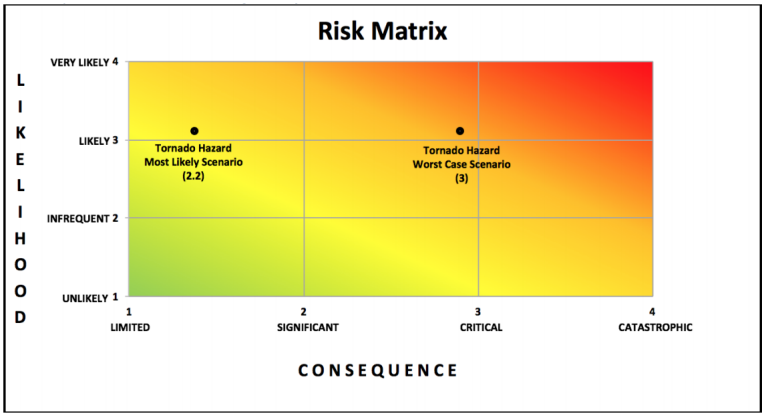
FOR MORE INFORMATION:

- Howard County Hazard Identification and Risk Assessment
- National Oceanic and Atmospheric Administration
- Ready.gov



Tornado/Wind Storm Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	3.1 Likely		50%
CONSEQUENCE	Impact	1.1 Limited	3 Critical	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	1 Short	5%
TOTAL RISK SCORE		**2.2**	**3**	



WILDFIRE

Wildfires are uncontrolled forest fires, grassland fires, rangeland, or urban-interface fires which consume natural fuels and spread in response to the environment. Wildfires can be either a natural phenomenon or manmade. The frequency and severity of wildfires depends on both weather and human activity. Wildfires can occur any month in Maryland, but peak in the spring and fall. During these seasons, deciduous trees are bare, allowing sunlight and wind to reach the ground and dry any available fuels. The relative humidity of the air is also lower and, combined with a breeze, creates the conditions for wildfires to spread rapidly.

HAS IT HAPPENED LOCALLY?

There is an estimated number of over 7,300 Wildfire events that have occurred in Howard County in the reviewed time period of 1995-2019.

WHAT IS THE ONGOING RISK?

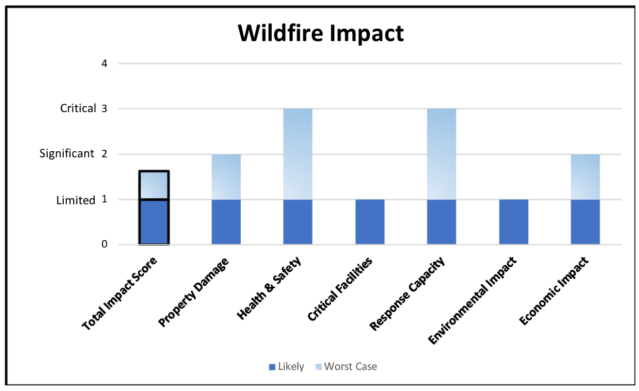
There is an expected 1-30% **Chance of Annual Occurrence** of a Wildfire in Howard County. In the most likely Wildfire scenario, **the Total Impact is considered Limited**. In the worst-case scenario, **the Total Impact is considered Limited-Significant**.

DID YOU KNOW?

• 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.

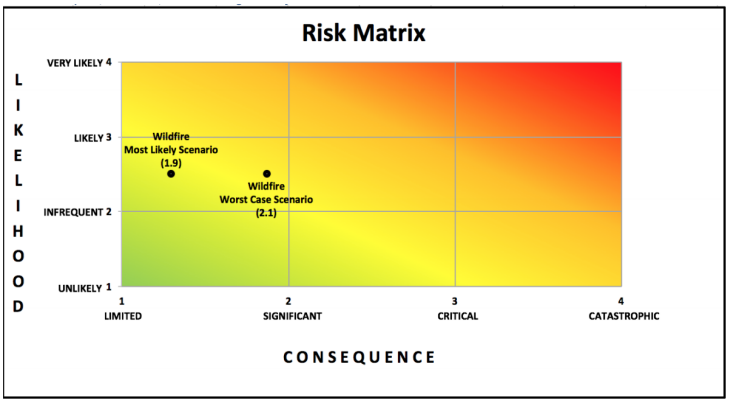
FOR MORE INFORMATION:

• Howard County Hazard Identification and Risk Assessment
• Centers for Disease Control
• Ready.gov



Wildfire Risk Profile

	Risk Assessment Category	Likely Hazard Scenario	Worst-Case Hazard Scenario	Weight
LIKELIHOOD	Likelihood	2.5 Infrequent-Likely		50%
CONSEQUENCE	Impact	1 Limited	1.6 Limited-Significant	40%
	Warning Time	4 Short	4 Short	5%
	Duration	1 Short	2 Moderate	5%
TOTAL RISK SCORE		**1.9**	**2.1**	



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 & Communication 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