

## **Chapter 3:**

# **Risk Assessment**

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury and property damage resulting from natural hazards. It is important to understand how much of the community can be affected and what the impact would be on those areas by assessing the vulnerability of people, buildings and infrastructure to these hazards.

## **Risk Assessment Process**

For planning purposes, the Core Group developed the Brown County Hazard Analysis to determine the scope and impact of hazards on Brown County. The Core Group determined there were seven natural hazards that would be the primary focus of the plan. The hazards include flooding, tornadoes, severe thunderstorms, severe winter storms, earthquakes, mudslides and drought. As such, a risk assessment was completed for each identified hazard and was subject to hazard-specific data available. The four steps in completing a risk assessment are as follows:

### **Hazard Identification**

This step deals with identifying the hazards that are most likely to affect the community, the probability of the event occurring and the impact that hazard would have on a geographic area. The Brown County Hazard Analysis was used in identifying hazards. Geographic Information Systems (GIS) were utilized for mapping floodplain areas, and identifying critical facilities and infrastructure.

### **Profile Hazard Events**

A hazard event is a specific occurrence of a particular type of hazard. To profile hazard events, historical information was gathered regarding flooding, tornadoes, severe storms and droughts in Brown County. Historic weather events recorded by the National Weather Service between the periods of 1961 through December 2003 provided the most detailed information regarding recent hazard events occurring in Brown County.

### **Inventory Assets**

The third step in completing a risk assessment combines hazard identification with the areas exposed to a hazard. Infrastructure, Critical and Essential Facilities are all included as assets.

### **Estimate Losses**

The final step in the risk assessment process is to estimate the human and economic losses associated with a natural disaster within a geographic area.

Conducting a risk assessment is a key component to helping communities identify and prioritize mitigation activities to reduce losses from identified hazards.

## Critical, Essential Facilities & Infrastructure

Critical Facilities are defined as locations necessary to coordinate response activities. These include emergency operations centers, 911 communication centers, police and fire stations, public works facilities, sewer and water plants, hazardous materials facilities and hospitals. These are facilities that, if damaged, could cause serious secondary impacts.

Facilities that are vital to the continued delivery of key government services, or that may significantly impact the public's ability to recover from an emergency, are referred to as Essential Facilities. Government buildings, law enforcement centers, jails, corrections centers and schools are a few examples of Essential Facilities.

Infrastructure generally refers to services necessary to respond to and recover from the hazard such as power lines, gas lines, bridges, highways, roads, railroads and airports.

## Risk Assessment Methodology

In developing a comprehensive overview of natural hazards in Brown County, the Core Group committee analyzed six natural hazard events: flooding, tornadoes, thunderstorms, winter storms, earthquakes and drought. The hazards were rated against six factors affecting the associated risk to the community. Each factor was rated on a scale from 0-5 with specific benchmarks associated with each level. Each hazard was assessed as to where it fits on each rating scale and assigned a score for the individual factor, with 5 being the most severe. Adding the factor scores, the hazards can then be compared with each other by factor scores and total scores. The higher the score, the greater the potential risk to the community.

### Factors

**History.** Based on historical data the hazard is rated on the number of times it has happened.

**Area Affected.** How much of the county would be directly impacted?

**Forecast/Predictability.** Can the event be predicted ahead of time? Two things to consider are: how far in advance can the event be predicted and how accurate as to time and location.

**Preparedness.** Can preparation for the event reduce human and economic impact, and the amount of resources required?

**Human Impact.** Does the event require shelter, evacuation or other protective measures for the population?

**Economic Impact.** What is the amount of damage to private and public property, and how much business would be interrupted. The three variables are scored individually and the three scores averaged to get a total economic impact score.

## **Benchmarks**

### **History**

Definition: When and how often has the event happened?

- 5 – Once a year or more
- 4 – Once every 10 years
- 3 – Once every 50 years
- 2 – Once every 100 years
- 1 – Less than once in 100 years
- 0 – Has never happened

### **Area Affected**

Definition: How much of the county would be directly impacted by the event?  
(Impacted as to potential threat to life, property and business interruption.)

- 5 – Entire county
- 4 – 75% of county
- 3 – 50% of county
- 2 – Multi-jurisdictions
- 1 – One jurisdiction
- 0 – One neighborhood

### **Forecast/Predictability**

Definition: Can the event be accurately predicted as to time and location before happening?

- 5 – Cannot predict
- 4 – Predictable only moments before event, cannot predict location
- 3 – Can predict hours ahead, cannot predict location
- 2 – Can predict hours ahead, location can be predicted
- 1 – Can predict days ahead, not accurate as to specific time and location
- 0 – Can accurately predict as to time and location days before event occurs

### **Preparedness**

Definition: Can preparation for the event reduce human and economic impact?

- 5 – Cannot prepare
- 4 – Can only prepare to reduce human impact, cannot reduce economic impact
- 3 – Preparation difficult, many resources needed to reduce human and economic impact.
- 2 – Can prepare with additional resources to reduce human and economic impact
- 1 – Can prepare with available resources for reduction in human and economic impact
- 0 – Can be fully prepared

## Human Impact

Definition: Does the event require shelter, evacuation or other protective measures for the population in the area directly affected by the event?

- 5 – Total population in the area affected: shelter and/or evacuation or other protective measures required
- 4 – Shelter and/or evacuation or other protective measures required for 75% of the population involved
- 3 – Shelter and/or evacuation or other protective measures required for 50% of the population involved
- 2 – Shelter and/or evacuation or other protective measures required for less than 50% of the population involved.
- 1 – Minimal, in-place protective measures required
- 0 – No effect on the population

## Economic Impact

Definition: Three variables – average 3 scores for total economic score.

Amount of damage to **residential property** in area directly affected by event.

- 5 – Total destruction
- 4 – 75% damaged or destroyed
- 3 – 50% damaged or destroyed
- 2 – 25% damaged or destroyed
- 1 – 10% damaged or destroyed
- 0 – No damage

Amount of damage to **public property** in area directly affected by event.

- 5 – Total destruction
- 4 – 75% damaged or destroyed
- 3 – 50% damaged or destroyed
- 2 – 25% damaged or destroyed
- 1 – 10% damaged or destroyed
- 0 – No damage

Amount of **business interruption** in area directly affected by event.

- 5 – All business stopped
- 4 – 75% of business interrupted
- 3 – 50% of business interrupted
- 2 – 25% of business interrupted
- 1 – 10% of business interrupted
- 0 – Business not affected

## Scoring

Once raw scores were assigned for each hazard and benchmark, they were weighted on the following scale (100%):

History – 35%  
Area Affected – 5%  
Forecast/Predictability – 5%  
Preparedness – 5%  
Human Impact – 25%  
Economic Impact – 25% \*

\*Economic Impact was derived by averaging the three separate scores for impact to residential property, public property and business interruption.

## Hazard Risk Assessment Analysis

<b>Rank/Hazard</b>	<b>History</b> When and how often has the event happened?	<b>Area</b> How much of the county would be directly impacted?	<b>Prediction</b> Can the event be accurately predicted as to time and location?	<b>Preparation</b> Can you prepare to reduce human and economic impact?	<b>Human Impact</b> Protective measures required	<b>Economic Impact</b> Damage to property and business interruption?
<b>1 Flooding</b>	Happens once a year or more	Multi-communities but less than 50% of county	Riverine flooding can be predicted hours ahead, location can be predicted	Can prepare with additional resources to reduce human and economic impact	Protective measures required for 75% of the affected population	75 % damage or business interruption in the affected area.
<b>2 Tornado</b>	Funnel sighting once every three to five years	Multi-communities	Predictable only moments before, location cannot be predicted	Preparation difficult, many resources needed to reduce human and economic impact	Protective measures required for all the population in the affected area.	75% damage or business interrupted in the affected area.
<b>3 Winter Storms</b>	Happens once a year or more	The entire county could be affected	Can predict days ahead, cannot predict time or location	Can prepare with additional resources to reduce human and economic impact	Minimal in-place protective measures required	Less than 25% damage or business interrupted in the affected area
<b>4 Hail/ Thunderstorm</b>	Happens once a year or more	The entire county could be affected	Can predict hours ahead, cannot predict location	Can only prepare to reduce human impact, cannot prepare to reduce economic impact	Minimal in-place protective measures required	Less than 25% damage or business interrupted in the affected area
<b>5 Mudslides</b>	Happens every three to five years	Multi-communities	Can predict hours ahead, not accurate as to time and location	Can prepare with additional resources to reduce human and economic impact	Protective measures required for 75% of the affected population	Less than 25% damage or business interrupted in the affected area
<b>6 Earthquake</b>	Tremors about once every 10-50 years	Entire county could be affected	Cannot predict	Preparation difficult, many resources needed to reduce human and economic impact	Minimal in-place protective measures required	Less than 10% damage or business interrupted in area affected.

<b>7 Drought</b>	Happens once every 100 years	50% of the county could be affected	Can predict days ahead, not accurate as to time and location	Preparation difficult, many resources needed to reduce human and economic impact	Minimal in-place protective measures required	Less than 10% damage or business interrupted
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A complete copy of the Brown County Hazard Analysis can be found in Appendix D of this plan.