

The total damages reported in the NCDC for the five events listed were \$219,000. Damages to structures and equipment resulting from a fire that occurred when lightning struck a barn and two other agricultural buildings accounted for \$200,000 of the total amount.

#### Future Development

Current population and development trends for the unincorporated area of Jasper County are not likely to substantially impact vulnerability to lightning.

### **Tornado Vulnerability**

#### Overview

Planning Significance: Moderate. Jasper County is located in the eastern edge of the area referred to as "Tornado Alley," the area of the United States in which tornadoes are most frequent. Tornado damages range from minor damage (minor roof damage, broken glass in doors and windows) to total destruction. Injuries range from injuries that can be self treated or treated at hospital and released to death.

People living in manufactured homes (mobile homes) are particularly vulnerable to extreme winds, particularly if building codes do not cover manufactured homes. Older homes in deteriorating condition are also vulnerable. There are 4,593 housing units located in unincorporated areas of the County. 1,010 of these homes are located in townships with a median age built of 1939. These counties are Mariposa, Malaka, Hickory Grove, Mound Prairie, and Buena Vista. No information was available on the number of homes needing rehabilitation.

#### Potential Losses to Existing Development

To estimate vulnerability to tornadoes, the HMPC decided to consider the impacts of an F2 tornado. Several factors impact the severity of damage, including: wind speed, time on the ground, length/width of the cell, population density, building density, age and construction of buildings, and time of day. Three scenarios were considered.

First, an F2/EF2 with wind speed of approximately 132 mph and a length of 6.65 miles and width of 413 feet in the general unincorporated area of the county. A tornado of this magnitude would result in severe damage/partial collapse of single family residences. The second was an F2/EF2 tornado with a wind speed of approximately 132 mph occurring in one of the unincorporated towns. The third was an F2/EF2 with a wind speed of 132 miles an hour impacting the County Courthouse, Courthouse Annex, County Attorney's Office, and Archive Building or the Law Enforcement/Emergency Operations Center or the Public Works Maintenance Building.

Estimates were based on the default values for the FEMA Tornado BCA Module found in FEMA Benefit-Cost Analysis Reengineering (BCA) Tornado Safe Room Module, Version 4.0, dated September 2008.

According to housing data for Jasper County Townships the housing density per square mile ranges from 21 units/sq. mi. in Newton Township to 3 units/sq. mi. in Mariposa Township, with a medium of 6 units/sq. mi. for the unincorporated areas of the county. The average household size for the unincorporated areas is 2.8. Given the low density of housing units in the unincorporated areas, a single F2 tornado would impact few units.

For purposes of estimating the impact on the unincorporated areas, the HMPC agreed to use 6 housing units and 17 residents. To estimate potential damages, the HMPC used an average square footage of 1500 sq. ft. and a replacement value of \$95.00 per square foot and 60 to 80% of the structure damaged.

<b>Jasper County Tornado Damage Single-Family Home</b>			
<b>Number of Structure</b>	<b>Value of Structure</b>	<b>Percent of Damage</b>	<b>Estimated Damage</b>
2	285,000	80	228,000
2	285,000	70	199,500
2	285,000	60	171,000
Total Damages			598,500

The following table shows an estimate of the number and cost of injuries.

<b>Jasper County Tornado Cost of Injury One and Two Single Family Residence</b>			
<b>Injury Severity Level</b>	<b>Number of People</b>	<b>Injury \$ Value (Per Person)</b>	<b>Total \$ Value</b>
Fatal	0	0	0
Hospitalized	1.7	1,088,000	0
Treat & Release	3.4	90,000	306,000
Self Treat	4.08	12,000	48,960
Total \$ Value			2,204,560
Source: FEMA BCAR, Tornado Safe Room Module, Single Family, Appendix E, 2008			

The HMPC identified five unincorporated communities: Newburg in Hickory Grove Township, Killduff in Buena Vista Township, Galesburg in Elk Creek Township, Ira in Independence Township, and Vandalia in Des Moines Township. Because of the area of these communities, the HMPC agreed all of the structures would be damaged. To estimate the damages, the committee used an average 1500 square foot residence with a replacement value of \$95.00/sq. ft.. An average of 60% of the replacement cost (\$85,000) was used.

<b>Jasper County Tornado Damage Single-Family Residence</b>			
<b>Community</b>	<b>Number of Buildings</b>	<b>Average Damage (\$)</b>	<b>Total Estimated Damage (\$)</b>
Newburg	18	85,000	1,530,000
Kilduff	24	85,000	2,040,000
Galesburg	19	85,000	1,615,000
Ira	18	85,000	1,530,000
Vandalia	26	85,000	2,210,000

The estimated number of injuries in each of the unincorporated communities and the cost of injuries for estimated wind speed of 132 mph is shown below.

<b>Jasper County Tornado Injuries Unincorporated Communities</b>					
<b>Community</b>	<b>Population</b>	<b>Self Treat</b>	<b>Treat &amp; Release</b>	<b>Hospitalized</b>	<b>Fatal</b>
Newburg	42	10	8	4	0
Killduff	77	18	15	7	1
Galesburg	51	12	10	5	1
Ira	61	14	12	6	1
Vandalia	63	15	12	6	1

<b>Jasper County Tornado Cost of Injuries Unincorporated Communities</b>					
<b>Community</b>	<b>Self Treat (\$)</b>	<b>Treat &amp; Release (\$)</b>	<b>Hospitalized (\$)</b>	<b>Fatal (\$)</b>	<b>Total (\$)</b>
Newburg	120,000	720,000	4,352,000	0	16,816,000
Killduff	216,000	1,350,000	7,616,000	5,800,000	32,442,000
Galesburg	144,000	900,000	5,440,000	5,800,000	23,920,000
Ira	168,000	1,080,000	6,528,000	5,800,000	25,224,000
Vandalia	180,000	1,080,000	6,528,000	5,800,000	25,326,000

Source: FEMA BCAR, Tornado Safe Room Module, Single-Family, Appendix E, 2008

A tornado occurring in the City of Newton could cause substantial damage to identified Jasper County critical facilities. The table below estimates the structural costs. The FEMA BCAR document indicates an F2/EF2 Tornado with wind speeds between 131 and 146 mph would result in severe damage and partial collapse. The type damage that could be sustained by institutional buildings would include broken glass in doors and windows, large sections of the roof structure removed, and the collapse of exterior walls. For wind speeds between 131 and 147, the HMPC estimated building damage at approximately 50% of the replacement cost.

<b>Jasper County Tornado Damage Courthouse Area - Newton, Iowa</b>		
<b>Asset</b>	<b>Replacement Value (\$)</b>	<b>Estimated Damage (\$)</b>
Courthouse	9,511,567	4,755,783
Courthouse Annex	3,827,826	1,913,913
County Attorney's Office	406,000	203,000
Archive Building	98,595	49,297
Total Estimated Damage		6,921,993

The estimated number and cost of injuries for the Courthouse Area are shown below. This estimate is based on the number of employees. The HMPC noted that this does not include people doing business in county offices located in these buildings.

<b>Jasper County Tornado Injuries Courthouse Area - Newton, Iowa</b>				
<b>Asset</b>	<b>Self Treat</b>	<b>Treat &amp; Release</b>	<b>Hospitalized</b>	<b>Fatal</b>
Courthouse	5	5	5	3
Courthouse Annex	5	5	5	3
County Attorney's Office	1	1	1	0
Archive Building	0	0	0	0
Total	11	11	11	6

Source: FEMA BCAR, Tornado Safe Room Module, Institutional Buildings, Appendix E, 2008

<b>Jasper County Tornado Cost of Injuries Courthouse Area - Newton, Iowa</b>				
<b>Asset</b>	<b>Self Treat (\$)</b>	<b>Treat &amp; Release (\$)</b>	<b>Hospitalized (\$)</b>	<b>Fatal (\$)</b>
Courthouse	60,000	450,000	5,440,000	17,400,000
Courthouse Annex	60,000	450,000	5,440,000	17,400,000
County Attorney's Office	12,000	90,000	1,088,000	0
Archive Building	0	0	0	0
Total	132,000	990,000	11,968,000	34,800,000

Source: FEMA BCAR, Tornado Safe Room Module, Institutional Building, Appendix E, 2008

The table below shows the estimated damage and number and cost of injuries for an E2/EF2 Tornado with wind speeds of 131-146 for the Law Enforcement Center and Emergency Operations Center.

<b>Jasper County Tornado Damage 2300 Law Center Drive, Newton, Iowa</b>		
<b>Asset</b>	<b>Replacement Value (\$)</b>	<b>Estimated Damage (\$)</b>
Emergency Operations Center	400,000	200,000
Law Enforcement Center	8,226,485	4,113,242
Total Estimated Damage		4,312,242

<b>Jasper County Tornado Injuries 2300 Law Center Drive, Newton, Iowa</b>				
<b>Asset</b>	<b>Self Treat</b>	<b>Treat &amp; Release</b>	<b>Hospitalized</b>	<b>Fatal</b>
Emergency Operations Center	2	2	2	1
Law Enforcement Center	6	6	6	3
Total	8	8	8	4

Source: FEMA BCAR, Tornado Safe Room Module, Institutional Buildings, Appendix E, 2008

<b>Jasper County Tornado Cost of Injuries 2300 Law Center Drive, Newton, Iowa</b>				
<b>Asset</b>	<b>Self Treat (\$)</b>	<b>Treat &amp; Release (\$)</b>	<b>Hospitalized (\$)</b>	<b>Fatal (\$)</b>
Emergency Operations Center	24,000	180,000	2,176,000	5,800,000
Law Enforcement Center	72,000	540,000	6,528,000	17,400,000
Total	96,000	720,000	8,704,000	23,200,000

Source: FEMA BCAR, Tornado Safe Room Module, Institutional Buildings, Appendix E, 2008

Estimate of damages to the community center are based on the “small professional” building type. Although the community center is larger than 5,000 sq. ft., the other characteristics of building type more closely represent the community center than the institutional building characteristics. The HMPC used an estimate of 50% of replacement value. Below are damage estimate and injury tables.

<b>Jasper County Tornado Damages Community Center</b>		
<b>Asset</b>	<b>Replacement Value (\$)</b>	<b>Estimated Damages (\$)</b>
Community Center	1,041,000	520,500

<b>Jasper County Tornado Injuries Community Center</b>			
<b>Injury</b>	<b>Number of People</b>	<b>Injury \$ Value (Per Person)</b>	<b>Total \$ Value</b>
Self Treat	10	12,000	120,000
Treat and Release	25	90,000	2,250,000
Hospitalized	25	1,088,000	27,200,000
Fatal	15	5,800,000	87,000,000
Total \$ Value			116,570,000

Source: FEMA BCAR, Tornado Safe Room Module, Small Professional, Appendix E, 2008

A tornado with winds of 131-147 mph would result in severe damage to total collapse of the Maintenance Shop. Estimated damages and injuries were calculated at “worse case” level of total collapse. In the case of the maintenance shop, the loss of equipment and vehicles would exceed the cost of structural damages. Up to \$6.4 million of contents would be at risk.

<b>Jasper County Tornado Damages Maintenance Shop</b>		
<b>Asset</b>	<b>Replacement Value (\$)</b>	<b>Estimated Damages (\$)</b>
Public Works - Road and Maintenance Shop	1,131,760	1,131,760

<b>Jasper County Tornado Injuries Maintenance Shop</b>			
<b>Injury</b>	<b>Number of People</b>	<b>Injury \$ Value (Per Person)</b>	<b>Total \$ Value</b>
Self Treat	6	12,000	72,000
Treat and Release	3	90,000	270,000
Hospitalized	3	1,088,000	3,264,000
Fatal	1	5,800,000	5,800,000
Total \$ Value			9,406,000
Source: FEMA BCAR, Tornado Safe Room Module, Metal Building, Appendix E, 2008			

#### Future Development

The population in the unincorporated areas of the county increased slightly between 2000 and 2004 and declined slightly between 2004 and 2008; therefore no increase in vulnerability to tornadoes is anticipated.

#### Wildfire Vulnerability

##### Overview

Planning Significance: Moderate. Older structures with electrical systems not built to fire codes are particularly vulnerable to fire. Senior citizens, age 65 and over, and children under the age of 5 have the greatest risk of fire death. However, due to the low population density in the unincorporated areas of the county, the HMPC felt risk of death and injury was low.

The committee agreed that in the unincorporated Jasper County, agricultural areas where CRP land is burned, rural areas where debris is burned and the wildland-urban interface areas are the most vulnerable. Of the 428,000 acres in farms, approximately 25% (107,000 acres) is woodland, land in houses, ponds, and non-crop and non-woodland pasture. An additional 11,108 acres is in conservation and recreational areas. This accounts for 25% of the county’s total area (467,000 acres).

##### Potential Losses to Existing Development

Three Jasper County fire departments reported rural fires to the Department of Natural Resources between 2005 and 2009. Nine incidents were reported in 2005, two in 2006, none in 2007 and 2008,

and twelve in 2009. One incident was attributed to an electrical transformer, five were debris/garbage burns that got out of control, two were controlled burns that got out of control, and no information was reported for the remaining fifteen. Reported property damage consisted of moderate damage to a barn and minor damage to a barn.

No damage estimates were available for wildfires in Jasper County. The HMPC was not aware of any residential structural damage or injuries due to wildfire.

#### Future Development

The population in the unincorporated areas of the county increased slightly between 2000 and 2004 and declined slightly between 2004 and 2008; therefore no increase in vulnerability to wildfire is anticipated.

### **Windstorm Vulnerability**

#### Overview

Planning Significance: Moderate. High winds can cause minor to major damage to homes and other buildings. Outdoor furniture, trash cans, yard debris, out buildings and other materials in the immediate vicinity of homes can become air borne missiles. Inadequately secured downspouts may be torn from buildings. Loose shingles or other building can fly off and, in addition to causing roof damage, may become flying debris. Tree branches may be broken off or trees may be downed and cause damage to homes and other structures. Windows may be broken.

People living in mobile homes, homes built prior to building codes, and homes in deteriorating condition are particularly vulnerable to high winds. People in automobiles and campgrounds are also at risk. Generally, injuries are minor. Although rare, as reported in the damage history, deaths can occur.

#### Potential Losses to Existing Development

The HMPC reviewed NCDL data from 1998-2008 for wind events that occurred in unincorporated areas of the county. The total reported property damages for this 10 year period equaled \$638,000 and total reported crop damages were \$149,000. The annual average for the unincorporated areas is \$63,800 in property damages and \$14,900 in crop damages.

The committee also considered damages to power lines and loss of power. They concluded that the loss of power due to high wind in the unincorporated areas would be less than 4 hours.

#### Future Development

The population in the unincorporated areas of the county increased slightly between 2000 and 2004 and declined slightly between 2004 and 2008; therefore no increase in vulnerability to wind events is anticipated.

### **Winter Storms Vulnerability**

#### Overview

Planning Significance: High. All of the unincorporated areas of the county are vulnerable to the effects of winter storm. The HMPC estimated 30 to 50% of the population and property and more than 50% of the geographical area could be impacted by a single event.