

3. RISK ASSESSMENT

Identifying hazards

At the first meeting of the Planning Committee, participants reviewed the list of hazards from the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009* and the hazards listed in the *Illinois Natural Hazard Mitigation Plan, 2013*. The *Illinois Natural Hazard Mitigation Plan, 2013* addressed the Tornado hazard when discussing Severe Storms, so the Planning Committee agreed that Tornadoes should be incorporated into Severe Storms. The *Illinois Natural Hazard Mitigation Plan, 2013* also added a hazard profile for Influenza Pandemic, and at the request of the Rock Island County Health Department, the hazard was added to the plan update. At the recommendation of staff, the Dam or Levee Failure hazard was divided into two separate hazards. This was done because the structures, where they are located and how a failure would affect the planning area are very different. The hazards addressed in this plan compared to the 2009 plan is shown in Table 3-1.

**Table 3-1
Hazards Addressed in Plan**

2009 Hazards	Updated Plan Hazards
Dam or Levee Failure	Dam Failure
Drought	Drought
Earthquake	Earthquake
Expansive Soils	Expansive Soils
Extreme Heat	Extreme Heat
Flash Flood	Flash Flooding
Hazardous Materials	Grass, Field or Woodland Fire
Landslide	Hazardous Materials Incident
Land Subsidence	Influenza Pandemic
Radiological Incident	Landslides
River Flood	Land Subsidence
Severe Storms (Wind, Hail, Thunderstorm, Lightning)	Levee Failure
Severe Winter Storms	Radiological Incident
Tornado	River Flooding
Wildfire	Severe Storms Combined (Includes Tornado)
	Severe Winter Storms

Hazards of Avalanche, Coastal Erosion, Coastal Storm, Hurricane, Tsunami, and Volcano were eliminated from further consideration because of local geography and weather conditions.

Profiling Hazards

The hazard profiles were restructured to reflect the structure in the Illinois Hazard Mitigation Plan (look up year) as part of the plan update. Each hazard profile contains information required under FEMA regulations and include: a definition is given, and general description of how the

hazard may occur within the planning area, historical occurrences, probability of future events/occurrences, the vulnerability of the planning area in future occurrences, severity of effects, warning time, and the duration of an event and recovery time when applicable. The hazard profiles are provided for the entire Rock Island County planning area. Effects of hazards to specific jurisdictions may vary depending on the hazard, and those effects are addressed generally within the hazard profile with any information specific to the jurisdiction discussed in their jurisdictional profile.

Prioritizing Hazards

Following review of the hazard profiles, the Planning Committee utilized the *Illinois Natural Hazard Mitigation Plan, 2013* rating process to prioritize hazards for each jurisdiction and the planning area. This method scores historical occurrence, vulnerability, severity of impact, current population, and projected population growth to 2019 in low, medium, and high values. Historical Occurrence/Probability, Vulnerability, and Severity of Impact had higher point values (Low = 6, Medium = 12, High = 18) than current and projected populations (Low = 1, Medium = 2, High = 3). American Community Survey (ACS) 2014 population estimates were used as current population, and ESRI Community Analyst projects were used for population projections for each community. The hazard scoring definitions can be found in Appendix 3-1. The use of a different scoring methodology may explain changes in scores and changes in priority order from the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009*.

Representatives of the participating jurisdictions on the Planning Committee were asked score all of the profiled hazards from the perspective of their own communities. The total scores for each hazard for each participating jurisdictions are in Table 3-1. The five highest scoring hazards for each jurisdiction are highlighted. Each jurisdiction's hazard scores can be found in Appendix 3-2.

**Table 3-2
Jurisdictional Hazard Profile Scores**

Jurisdiction	Dam Failure	Drought	Earthquake	Expansive Soils	Extreme Heat	Flash Flooding	Grass, Field, or Woodland Fire	Hazardous Materials	Influenza Pandemic	Landslides	Land Subsidence	Levee Failure	Radiological Incident	River Flooding	Severe Storms Combined	Severe Winter Storm
Rock Island County	20	32	21	21	39	51	21	45	39	27	33	51	33	51	45	45
Andalusia	23	35	23	23	41	47	23	29	41	23	23	47	23	47	53	47
Carbon Cliff	21	39	21	21	27	45	21	21	39	21	33	21	27	39	45	51
Coal Valley	22	34	28	22	34	34	22	28	40	34	34	22	22	34	58	52
Cordova	21	21	21	21	39	21	21	45	39	21	21	21	45	21	39	39
East Moline	22	28	22	22	40	40	22	46	40	28	28	40	22	34	46	46
Hampton	34	40	34	22	46	40	28	40	40	22	22	28	46	46	58	52
Hillsdale	20	20	20	20	32	38	38	20	38	20	20	44	26	44	32	38
Milan	21	21	21	21	27	45	21	45	39	21	21	45	21	33	57	39
Moline	23	29	23	23	35	35	23	29	41	23	29	23	23	35	47	35
Moline CSD	23	29	23	23	47	35	23	59	41	23	29	23	23	35	59	59
Orion CSD	21	21	21	21	27	27	21	21	39	21	21	21	21	21	57	45
Port Byron	23	35	35	23	41	23	41	23	41	23	23	29	47	41	41	47
Rapids City	38	26	20	20	26	32	20	32	38	20	20	20	20	38	50	38
Reynolds	21	21	21	21	21	21	27	21	39	21	21	21	21	21	39	39
Rock Island	22	28	22	22	40	34	22	52	40	22	22	46	22	34	46	40
Silvis	21	21	21	21	33	33	21	27	39	21	21	21	21	21	57	57

The scores for each category for each hazard from participating jurisdictions were averaged to yield a score for that hazard for the planning area. Average scores that fell between 6-9 were Low, 10-14 were Medium, and 15-18 were High. The whole county's current and projected populations were used and scored by the *Illinois Natural Hazard Mitigation Plan, 2013* criteria. Table 3-2 shows the planning area hazard scores. Hazards with the top three scores have been highlighted. Due to ties in scores, there are eight priority hazards for the planning area.

**Table 3-3
Planning Area Hazard Scores**

	Dam Failure	Drought	Earthquake	Expansive Soils	Extreme Heat	Flash Flooding	Grass, Field, or Woodland Fire	Hazardous Materials	Influenza Pandemic	Landslides	Land Subsidence	Levee Failure	Radiological Incident	River Flooding	Severe Storms Combined	Severe Winter Storm
Historical/Probability	6	12	6	6	18	12	6	6	6	6	6	6	6	12	18	18
Vulnerability	6	6	6	6	12	12	6	12	12	6	6	12	6	6	18	18
Severity of Impact	6	6	6	6	6	6	6	12	18	6	6	12	12	12	12	12
Current Population	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Projected Population	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	21	27	21	21	39	33	21	33	39	21	21	33	27	33	51	51

Due to the change in scoring methodology, the scores between the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009* and the update do not present a fair comparison; however the results of the ranking between the 2009 plan and the update place the hazards in a similar priority order.

Table 3-4
Planning Area Hazard Scores Comparisons

	2009 Scores	Updated Scores	Previous Rank	Updated Rank
Dam Failure	10.59	21	14	11
Drought	16.00	27	10	9
Earthquake	17.53	21	9	11
Expansive Soils	8.65	21	15	11
Extreme Heat	23.47	39	4	3
Flash Flooding	19.88	33	7	5
Grass, Field or Woodland Fire	15.88	21	11	11
Hazardous Materials	22.76	33	6	5
Influenza Pandemic	NA	39	NA	3
Landslides	10.29	21	13	11
Land Subsidence	11.00	21	12	11
Levee Failure	NA	33	NA	5
Radiological Incident	18.59	27	8	9
River Flooding	22.76	33	5	5
Severe Storms Combined	32.06	51	1	1
Severe Winter Storms	29.76	51	2	1

The results of the hazard scoring and initial numerical ranking were presented to the Planning Committee for review and discussion. Descriptions of priority groupings from the 2009 plan were reviewed and kept, relabeling them as High, Medium, and Low Priority:

- **High Priority** – Hazards with a higher likelihood of occurrence and unacceptable consequences. They are candidates for immediate focus in mitigation and for eliminating unacceptable risk factors.
- **Medium Priority** – Hazards that should be addressed but have a lower priority or are longer term in focus. For the Medium Priority, emphasis is on risk reduction.
- **Low Priority** – Hazards that have a less significant level of risk, for which baseline protection is adequate, or are considered to be largely beyond the scope of local mitigation efforts.

Using these priority definitions, the Planning Committee agreed on the following priority rankings:

**Table 3-5
Adjusted Rankings Based on Priority Definitions**

2009 Plan		Updated Plan	
First Third		High	
1	Severe Storms Combined	1	Severe Storms Combined
2	Severe Winter Storms	1	Severe Winter Storms
3	Tornado	3	Extreme Heat
4	Extreme Heat	3	Influenza Pandemic
5	River Flood	5	River Flooding
6	Hazardous Materials Incident	5	Hazardous Materials Incident
Second Third		5	Flash Flooding
7	Flash Flood	5	Levee Failure
	Drought	Medium	
8	Radiological Incident	9	Drought
Last Third		9	Radiological Incident
10	Landslide	Low	
11	Dam Failure	11	Land Subsidence
12	Expansive Soils	11	Landslide
13	Land Subsidence	11	Earthquake
14	Earthquake	11	Dam Failure
15	Wildfire	11	Grass, Field or Woodland Fire
		11	Expansive Soils

These final priority rankings and the hazard scores are repeated on the hazard profile worksheets.

When levees were taken out of the dam failure profile and addressed separately, it raised the hazard ranking of levee failure and lowered the ranking of dam failure. A levee failure poses a much greater threat to people and property in the planning area, as is described in the hazard profile.

Influenza Pandemic hazard, due to the number of people potentially affected, was scored and remains a High Priority Hazard. Due to the number of High Priority hazards and the potential threat they pose, the Planning Committee chose to focus mitigation on High Priority Hazards. However, individual participating jurisdictions may have scored the hazards differently from the planning area averages based on local knowledge of community characteristics and vulnerabilities. This will be analyzed further in the Multi-Jurisdictional Risk Assessment section.

Hazard Profiles

Dam Failure

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score
6	6	6	2	1	21

A dam is a barrier constructed across a watercourse in order to store, control, or divert water. Dams are usually constructed of earth, rock, concrete, or mine tailings. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet, with one acre-foot being the volume of water that covers one acre of land to a depth of one foot. Due to topography, even a small dam may have a reservoir containing many acre-feet of water. A dam failure is the collapse, breach, or other failure of a dam that causes downstream flooding. Another type of failure occurs when erosion through the dam foundation occurs. Both overtopping or erosion dam failure result in a high velocity or debris-heavy water that rushes downstream, causing damage within its path. In addition to natural events causing dam failure, improper design, improper maintenance, negligent operation, or failure of upstream dams may also lead to dam failures.

The United State Army Corps of Engineers National Inventory of Dams consists of dams that meet any of the following criteria: high or significant hazard classification; equal to or exceed 25 feet in height and exceed 15 acre-feet in storage; or equal to or exceed 50 acre-feet storage and exceed 6 feet in height. Dams are classified into three categories based on the potential risk to people and property should a failure occur. The classification may change over time because of development downstream from the dam since its construction. Older dams may not have been built to the standards of its new classification. Below are the hazard classifications defined by Illinois Department of Natural Resources.

- **High Hazard (Class I)** – Located where failure has a high probability for causing loss of life or substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.
- **Significant Hazard (Class II)** – Located where failure has a moderate probability for causing loss of life or may cause substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.
- **Low Hazard (Class III)** – Located where failure has a low probability for causing loss of life or may cause substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.

Dam hazard potential classifications have nothing to do with the material condition of a dam, only the potential for death or destruction due to the size of the dam, the size of the impoundment, and the characteristics of the area downstream of the dam. The Illinois Department of Natural Resources Office of Water Resources oversees the state's dam safety program through permitting and inspection of dams. According to the *IDNR Dam Safety Program 2014 Report Card for Illinois Infrastructure*, a review of a representative sample of

dam inspection reports indicated that permitted and inspected dams are in generally good condition.

According to the *Illinois Statewide Mitigation Plan – Rock Island County Flood Hazard Assessment* conducted by the Natural Hazard Research and Mitigation Group (NHRMC) at Southern Illinois University, Carbondale, Rock Island County has 11 dams, none of which were identified as significant hazard dams. Ten were identified as low hazard dams, and one was identified as less than low hazard.

Dam Name	Tributary	Hazard	EAP
Lake George Dam	Trib. Mississippi River	L	N
Stanrick Dam	Trib. Mill Creek	L	N
Donnelly Pond Dam	Trib. Coppers Creek	L	N
Mclaughlin Pond Dam	Trib. Mississippi River	L	N
Turkey Hollow Reservoir Dam	Fancy Creek	L	N
Arsenal Power Dam	Mississippi River	L	N
Moline Power Dam	Mississippi River	L	N
Sears	Rock	L	N
Steel	Rock	L	N
Valley Friends Dam	Trib. – Mississippi	L	NR
Hidden Lake Dam	Trib. – Hills Creek	B	N

H-High hazard dam, S-Significant hazard dam, L-Low hazard dam, B-Less than low hazard dam

Source: Illinois Statewide Mitigation Plan – Rock Island County Flood Hazard Assessment

However, The National Inventory of Dams shows 16 dams in Rock Island County. This includes two in Iowa that affect the Illinois side of the Mississippi River. Rock Island County has one high hazard, Hidden Lake Dam, located on Hills Creek outside of Andalusia. This dam was intentionally breached in 2000 with permission granted by Illinois Department of Natural Resources and no longer holds water. The map of dams is not included in this document at the suggestion of the Illinois Department of Natural Resources. While not classified, the information could pose a security risk if published on a map.

Dam Name	Tributary	Hazard	EAP
Lake George Dam	Trib. Mississippi River	High	Y
Stanrick Dam	Trib. Mill Creek	Low	N
Donnelly Pond Dam	Trib. Coppers Creek	Low	N
Mclaughlin Pond Dam	Trib. Mississippi River	Low	N
Turkey Hollow Reservoir Dam	Fancy Creek	Low	N
Arsenal Power Dam	Mississippi River	Low	Y
Moline Power Dam	Mississippi River	Low	Y
Sears	Rock	Low	NR
Steel	Rock	Low	NR
Valley Friends Lake Dam	Trib. – Mississippi	Low	N
Hidden Lake Dam**	Trib. – Hills Creek	High	Y
Tom Steele Dam	Trib. – Turkey Hollow Creek	High	Y
Meyer S Dam #1	Trib. – Mississippi River	Low	NR
Lock And Dam 14	Mississippi River	Low	Y
Lock And Dam 15	Mississippi River	Low	Y
Lock And Dam 16	Mississippi River	LOW	Y

** Intentionally breached 2000 Permit DS2000035

NR = Not Required

Probability. There has been one recorded dam failure within Rock Island County at Hidden Lake Dam, which was intentionally done with IL DNR permitting. With increased attention to sound design, quality construction, and continued maintenance and inspection, dam failure probability can be reduced. It is important to consider that by 2020, 85% of dams in the United States will be more than 50 years old, which is considered the design life of a dam. There is no risk assessment for dam failure in the *Illinois Natural Hazard Mitigation Plan, 2013*, nor is there a way to determine or evaluate the probability of dam failure in the state.

Magnitude and Severity. People and property along streams are most vulnerable. Facilities and lives considerable distances from the actual impoundment are not immune from the hazard. Depending on the size and volume of the impoundment as well as the channel characteristics, a flash flood can travel a significant distance.

The area affected following a dam failure would be limited to those areas in and near the floodplain. People and property outside the floodplain could also be affected depending on the proximity to the dam and the height above the normal stream level. There is a very limited risk to critical facilities that depends upon the downstream property, facilities, and infrastructure. For the federal dams listed, failure would primarily result in the loss of navigation pool and disruption to the navigation industry. Due to locations in the county and the low risk of hazard, services would not be severely affected. Scouring and erosion could have an immediate impact should a dam fail. Crop flooding, severe scouring and erosion around bridges could take place (similar to flash flooding) and could have agricultural and economic effects if damage would be extensive. Disruption to the navigation industry would also occur if a federal dam failed.

Warning Time. A dam failure can be immediate and catastrophic leaving little or no time to warn those downstream of the imminent hazard. With maintenance and monitoring, weak areas and possible failure points can be identified allowing time for evacuation and securing of the dam. Most dams are only inspected periodically, thus allowing problems to go undetected until a failure occurs. Due to the lack of advanced warning, failures from natural events such as earthquakes or landslides may be more severe than failures due to flood waters or rainfall. Dam failures most commonly occur when the spillway capacity is inadequate for the current flood or rainfall, and the water overtops the dam.

Duration. Response to the effects of a dam failure is extensive and requires wide-ranging recovery efforts for reconstruction of the original flood control structures.

Sources:	
2014 Report Card for Illinois Infrastructure Illinois Dam Safety Program: http://www.isasce.org/wp-content/uploads/2014/04/2014-Illinois-Dams-Final-Report.pdf	USACE National Inventory of Dams: http://geo.usace.army.mil/pgis/f?p=397:1:0
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
Association of State Dam Safety Officials	FEMA Multi-Hazard Identification and Risk Assessment 1997
Illinois Department of Natural Resources	

Drought

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

A drought is period of prolonged lack of precipitation for weeks, months, and/or years at a time that produces severe dry conditions.

There are three types of drought conditions:

- **Meteorological drought** – Refers to precipitation deficiency
- **Hydrological drought** – Refers to declining surface and groundwater supplies
- **Agricultural drought** – Refers to soil moisture deficiencies

Droughts can be spotty or widespread and last from weeks to a period of years. A prolonged drought can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. While droughts are generally associated with extreme heat, droughts can and do occur during cooler months. One measure of the magnitude of drought conditions is provided by the Palmer Drought Severity Index (PDSI), which provides a scale of differences from standard soil moisture conditions as follows:

Palmer Classifications	
4.0 or more	Extremely
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Mild drought
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

The National Drought Mitigation Center has a Drought Severity Classification system that takes into account the Palmer Drought Index, soil moisture, streamflow, and the Standardized Precipitation Index. It also looks at droughts as both short-term and long-term. Following is a table explaining the classification system and a graph showing droughts from 2000 until March 2015.

**Figure 3-1
U.S. Drought Monitor**

U.S. Drought Monitor Statistics Graph



Drought Severity Classification

Category	Description	Possible Impacts	Ranges				
			Palmer Drought Index	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Short and Long-term Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Some crop drought, short-term dryness slowing planting, growth of crops or pastures. Some soil drought, some ongoing water deficits, pastures or crops not fully recovered.	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures, streams, reservoirs, or wetlands, some water shortages developing or present, voluntary water-use restrictions requested.	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses begin, water shortages common, water restrictions imposed.	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
D3	Extreme Drought	Major crop/pasture losses, widespread water shortages or restrictions.	-4.0 to -4.9	3-5	3-5	-1.8 to -1.9	3-5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses, shortages of water in reservoirs, streams, and wells creating water emergencies.	-5.0 or less	0-2	0-2	-2.0 or less	0-2

Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-40 months. Additional indices used, mainly during the growing season, include the USDANASS Topsoil Moisture, Keetch-Byram Drought Index (KBDI), and NOAA/NOESDIS satellite Vegetation Health Indices. Indices used primarily during the snow season and in the West include snow water content, river basin precipitation, and the Surface Water Supply Index (SWSI). Other indicators include groundwater levels, reservoir storage, and pasture/range conditions.

Historical Occurrence. According to the National Climatic Data Center (NCDC), there have been 15 drought events since 1990. One recent drought event affecting Rock Island County began in June 2005 and continued through March 2006. The drought became severe to extreme in Northwest Illinois through July and into August, equaling or exceeded the dry conditions during the drought of 1988. By late July, much of the state was declared an agricultural disaster area. Agricultural yield reductions of 25-30% were reported along the Mississippi River Valley.

In 2012, another severe drought occurred in Illinois, affecting a large majority of the state. The drought conditions intensified throughout the summer months and into early fall. Agricultural effects became evident in late July as hydrologic conditions continued to deteriorate. The statewide average precipitation total from June 21 to July 3 was 0.5 inches, only 28 percent of normal. It was the eighth driest June on record.

Probability. Drought is part of normal climate fluctuations. According to the National Drought Mitigation Center, periods of severe to extreme drought in the Upper Mississippi Basin occur cyclically, about once every ten years. Research and observations of the El Nino/La Nina climatic events are resulting in more predictable climatic forecasts. Currently, there is no prediction for drought in the area according to the U.S. Seasonal Drought Outlook. The most severe drought in recent years was 1988, when rainfall was 88 percent of normal. Droughts of this magnitude occur about once every 21 years. Historically, moderate to severe drought occurs about 17% of the time in Illinois.

Magnitude and Severity. Farmers are usually the first to feel the effects of drought due to effects on crops and livestock. Farmers also rely on wells for their water supply. Wells are vulnerable to droughts and may cause farmers to have limited water supplies or to dig deeper wells. Public water supplies are typically more robust to the effects of droughts, but are not immune to long-term drought conditions.

The *Illinois Natural Hazard Mitigation Plan, 2013* rated Rock Island County as High in their hazard scoring process. Few if any health effects to people occurred in the affected area because of secondary sources of water. Drought in the U.S. seldom results directly in the loss of life. Health effects would be more significant on livestock without auxiliary water supplies. Property losses would be limited to livestock and crops to the agricultural community. According to the NCDC, the estimated annual loss from drought events is \$1,217,937.06 for Rock Island County with total recorded losses of \$26,794,615.

Warning Time. Drought warning is based on a complex interaction of many different variables, water uses, and consumer needs. Drought warning is directly related to the ability to predict the occurrence of atmospheric conditions that produce the physical aspects of drought, primarily precipitation and temperature. There are so many variables that can affect the outcome of climatic interactions that it is difficult to predict a drought in advance. In fact, an area may already be in a drought before it is even recognized. While warning of the drought may not come until the drought is already occurring, the secondary effects of a drought may be predicted and warned against weeks in advance.

Duration. Generally, drought is associated with a sustained period (which differs for each drought impact) of significant below average water or moisture supply. Climatic variability can bring dry conditions to the region for up to years at a time.

Sources:	
National Climatic Data Center	http://www.ncdc.noaa.gov/stormevents/
National Drought Mitigation Center	http://drought.unl.edu/Home.aspx
National Weather Service	U.S. Seasonal Drought Outlook, 2014. Rich Tinker.
Rock Island County, Bi-State Regional Commission	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
State of Illinois, IEMA	<i>Illinois Natural Hazard Mitigation Plan, 2013</i>

Earthquake

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

An earthquake is any shaking or vibration of the earth caused by the sudden release of energy from the breaking and shifting of rock beneath the Earth's surface that may impose a direct threat on life and property. This shaking can cause damage to buildings and bridges and may lead to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods, and fires. The three general classes of earthquakes now recognized are tectonic, volcanic, and artificially produced.

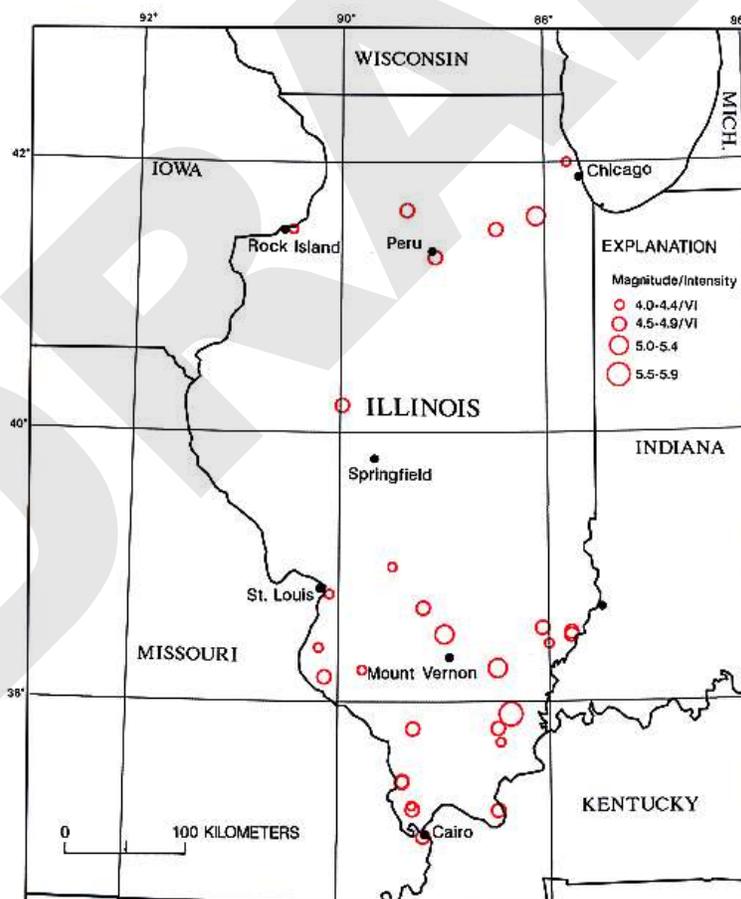
The effect of an earthquake on the surface of the Earth is called the intensity. The intensity scale takes into consideration responses such as people awakening, movement of furniture, and destruction. The scale that is currently used in the United States is the Modified Mercalli Intensity Scale, which was developed in 1931, and contains 12 levels of increasing intensity, ranked by observed effects.

Modified Mercalli Intensity Scale	
LEVEL	DEFINITION
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed, walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially-designed structures; well-designed frame structures thrown out of plumb. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially-designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: Iowa Geological Survey (<http://www.igsb.uiowa.edu/earthqua/MERCALLI.htm>)

Historical Occurrence. Over 360 small to moderate earthquakes are known to have occurred in Illinois during the past two centuries. Of these, 32 caused at least some damage. Rock Island County has had two instances of earthquakes, both with a magnitude between 3 to 3.9. The majority of the epicenters of these earthquakes have been located in the southern portions of Illinois and Missouri in an area known as the New Madrid Seismic Zone. The largest earthquakes occurring in Northern Illinois occurred in 1909 on May 26 and again on July 18. These were recorded at Intensity VII (MMI) with very strong perceived shaking and moderate damage. This was reported to be strong enough to knock down chimneys in Davenport, Iowa. Another earthquake was reported near Rock Island, Illinois November 12, 1934 with a 4.0 Richter magnitude or Intensity VI MMI (strong perceived shaking). According to historic information from the U.S. Geological Survey (USGS), bricks fell from chimneys and pendulum clocks stopped in Rock Island, Moline, and Davenport, Iowa. In Rock Island, a stucco cornice was dislodged from St. Joseph's School; some loose plaster was shaken from ceilings in the men's dormitory at Augustana College, and loose bricks were shaken from a few buildings. Since then, the state's most severe earthquake occurred in November 1968 with a Richter magnitude of 5.3, which produced some moderate damage in southern Illinois and St. Louis, Missouri 110 miles away.

Figure 3-2
Illinois State Geological Survey Earthquake Map of Illinois

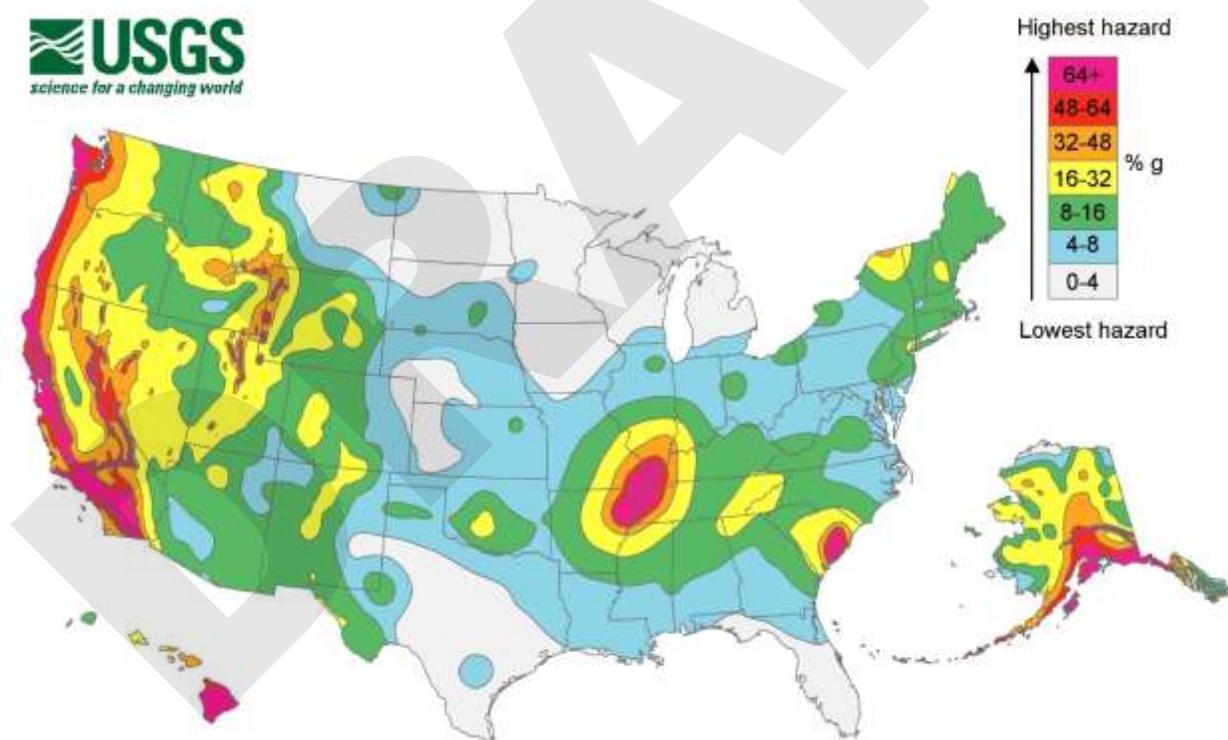


Source: Illinois State Geological Survey. Earthquake Maps.

Probability. Seismologists attempt to forecast earthquake size and frequency based on data from previous events. In the New Madrid Seismic Zone, which is outside of the State of Illinois in Missouri, the forecast is based on a network of seismographs that have been monitoring events in the area for about 30+ years. But major (> magnitude 7) earthquakes have left evidence of four 1811-1812 New Madrid type earthquake events in the past 2,000 years, and the last strong event (6+) was in 1895. New probabilities from USGS suggest there is a 7 to 10% chance of a repeat of 1811-1812 type events in the next 50 years and a 25 to 40% chance of events greater than magnitude 6 in the next 50 years. A magnitude 6.5 in New Madrid would create an Intensity 4 effect in northern Illinois and Iowa resulting in little or no damage.

Magnitude and Severity. Estimated effects of a 6.5 Richter magnitude earthquake in the New Madrid Seismic Zone suggest the county could possibly experience trembling buildings, some broken dishes, and cracked windows; however, the more likely possibility is to experience vibrations similar to the passing of a heavy truck, rattling of dishes, creaking of walls, and swinging of suspended objects. The *Illinois Natural Hazard Mitigation Plan, 2013* rated Rock Island County at an Elevated level.

Figure 3-3
U.S. Geological Survey 2008 Hazard Map



Source: U.S. Geological Survey. Seismic Hazard Maps and Data. 2008 Hazard Map.

Warning Time. Earthquake forecasting is an inexact science, even in areas that are well monitored with instruments, such as California's San Andreas Fault Zone. Scientists are only able to present probabilities of ranges of magnitudes over a span of decades.

Duration. Due to the limited effects to Illinois, response to the occurrence of an earthquake would likely be in support of nearby states utilizing mutual aid agreements; in-state response would likely be very limited.

Sources:	
Illinois State Geological Survey	Illinois State Geological Survey. Earthquake Maps
National Climatic Data Center	http://www.ncdc.noaa.gov/stormevents/
Rock Island County, Bi-State Regional Commission	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
State of Illinois, IEMA	<i>Illinois Natural Hazard Mitigation Plan, 2013</i>
U.S. Geological Survey	Seismic Hazard Maps and Data

Expansive Soils

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

Expansive Soils are soil and soft rock that tend to swell or shrink excessively due to changes in moisture content. Expansive soils contain fine minerals such as clays that are capable of absorbing water. When they absorb water, they increase in volume. The more water they absorb the more their volume increases. These soils may expand or contract 10% or more. These changes in volume can exert excessive force on a structure or remove the support needed by the structure.

The shrink or swell potential of soils containing clay may be a factor in water main breaks that occur in Rock Island County, especially when accompanied by cycles of freezing and thawing. No data has been collected on specific occurrences of damage or hazard to buildings attributed to expansive soils for the county.

Probability. Probability and frequency analyses have not been prepared because of the nature of occurrence of this hazard. This is consistent with other geologic hazards that occur slowly over time. According to information from the Illinois State Geological Survey, the expansive soils are not that hazardous, but wind up being the most damaging hazard to structures in the United States.

Magnitude and Severity. Bowing or collapse of building walls, upheaval of concrete slabs, or building subsidence may occur after repetitive shrink-swell stress. “The amount of soil expansion is inversely proportional to the weight that a structure places on the soil. Thus, heavy structures generally are less impacted by expansive soils than are lighter structures such as pavements, building slabs, and canal liners.” 2009 American Geological Institute - Living with Unstable Ground by Thomas L. Holzer

Soils types in Illinois are generally less than 50% clay with slight to moderate swelling potential. The 2004 Rock Island County Soil Survey categorizes soils based on their linear extensibility. Linear extensibility refers to the change in length of an unconfined clod of soil as moisture is decreased from a moist to dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change. For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used. See Map 3.1 for expansive soil locations in Rock Island County.

The shrink-swell potential is low if it is less than 3%, moderate at 3 to 6%, high at 6 to 9%, and very high if greater than 9%. The 2004 Rock Island County Soil Survey shows about 181,089 acres or 62.7% of the soils in the county have a linear extensibility that is greater than 3% for dwellings with basements. These soils are in the moderate to high category, and the survey indicates that the structures in these soils should have accommodations.

Soils in upper Rock Island County north of the Rock River tend to have more sand and even less clay content, so expansive soils are much less of a hazard. Those planning for future development should take into consideration expansive soils in combination with areas of steep slope, floodplains, and hydric soils, and consider the suitability and limitations of soils, especially for dwellings with basements.

There is little, if any direct human impact or impact to the health and safety of persons in the affected area. Effects commonly involve swelling clays beneath areas covered by buildings and slabs of concrete and asphalt, such as those used in construction of highways, walkways, and airport runways. However, these soils in combination with other factors may pose limitations on development, especially for dwellings with basements. These factors include depth to water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

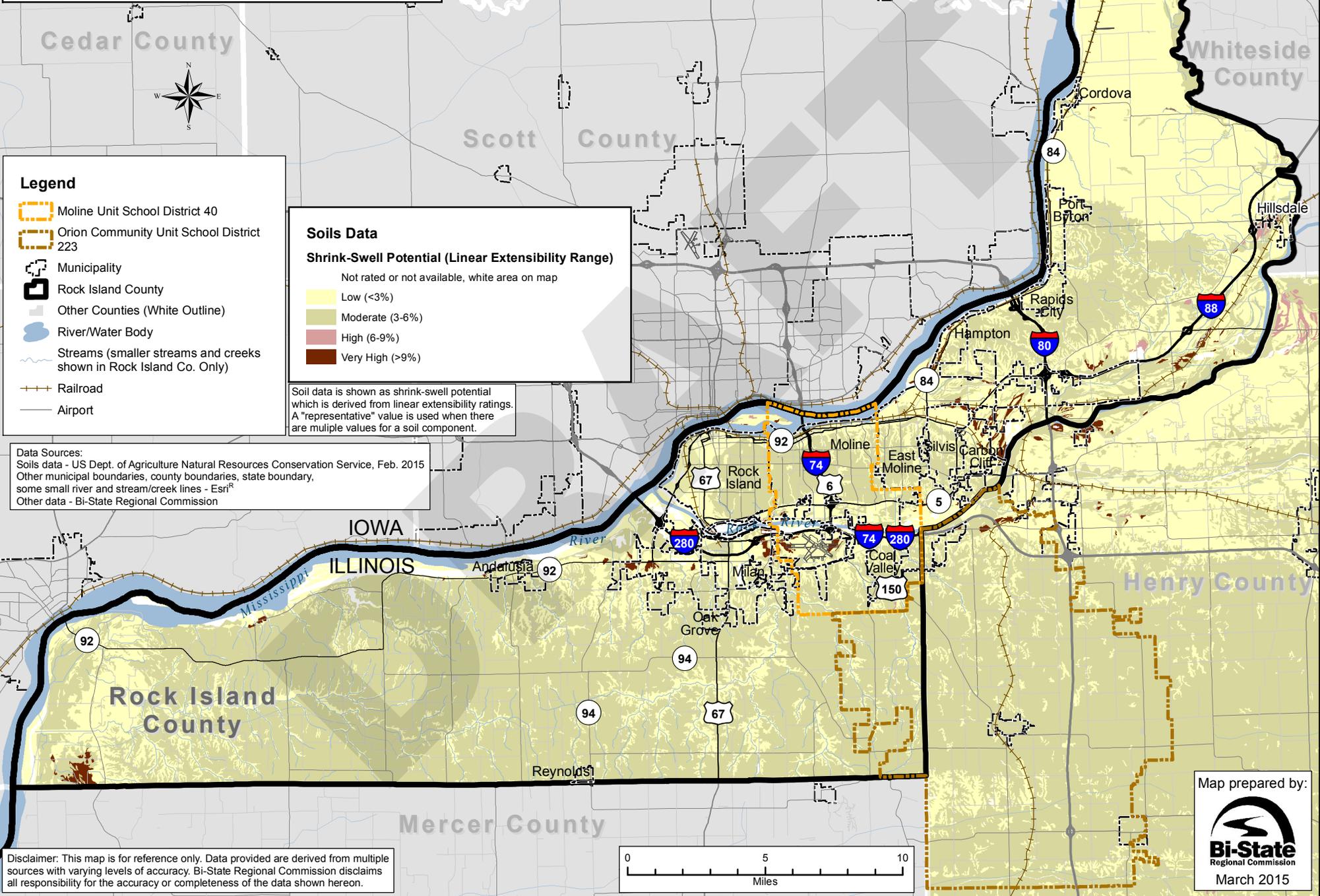
The most extensive damage from expansive soils occurs to highways and streets. Houses and one-story commercial buildings are more apt to be damaged by the expansion of swelling than are multi-story buildings, which usually are heavy enough to counter swelling pressures. The most obvious manifestations of damage to buildings are to basements. Use of a facility, road, or driveway may be affected while repairs are being made.

Warning time. Most issues related to expansive soils happen over a long time.

Duration. The response tied to damage that occurs due to expansive soils depends largely on the extent of the damage and when the damage is first noticed. Damage can be mitigated on new construction with proper building technique for the soil type and moisture level. Damage can be mitigated on existing buildings by incorporating some of the same types of techniques used in new construction. This may take longer and cost more than new construction.

Sources:	
U.S. Department of Agriculture Natural Resource Conservation Service, 2004 Soil Survey of Rock Island County	2009 American Geological Institute – Living with Unstable Ground by Thomas L. Holzer
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
National Homebuilders Association	

Map 3-1 Rock Island County Hazard Mitigation Plan Expansive Soil



Legend

- Moline Unit School District 40
- Orion Community Unit School District 223
- Municipality
- Rock Island County
- Other Counties (White Outline)
- River/Water Body
- Streams (smaller streams and creeks shown in Rock Island Co. Only)
- Railroad
- Airport

Soils Data

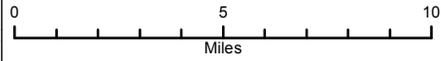
Shrink-Swell Potential (Linear Extensibility Range)

- Not rated or not available, white area on map
- Low (<3%)
- Moderate (3-6%)
- High (6-9%)
- Very High (>9%)

Soil data is shown as shrink-swell potential which is derived from linear extensibility ratings. A "representative" value is used when there are multiple values for a soil component.

Data Sources:
Soils data - US Dept. of Agriculture Natural Resources Conservation Service, Feb. 2015
Other municipal boundaries, county boundaries, state boundary, some small river and stream/creek lines - Esri[®]
Other data - Bi-State Regional Commission

Disclaimer: This map is for reference only. Data provided are derived from multiple sources with varying levels of accuracy. Bi-State Regional Commission disclaims all responsibility for the accuracy or completeness of the data shown hereon.



Map prepared by:



March 2015

Extreme Heat

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

Extreme Heat occurs when there are temperatures (including heat index) in excess of 100 degrees Fahrenheit (F) or 3 successive days of 90+ degrees Fahrenheit. A heat advisory is issued when temperatures reach 105 degrees, and a warning is issued at 115 degrees.

The heat index is a number in degrees Fahrenheit that tells how hot it really feels when relative humidity is added to the actual air temperature. Exposure to full sunshine can increase the heat index by at least 15 degrees. Extreme heat can impose stress on humans and animals. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure and/or physical activity due to the body's inability to dissipate the heat. Urban areas are particularly at risk because of air stagnation and large quantities of heat-absorbing materials such as streets and buildings. Extreme heat can also result in distortion and failure of structures and surfaces such as roadways and railroad tracks.

Historical Occurrence. The record high temperature for Rock Island County recorded for the summer season at Moline is 111° F on July 14, 1936. During the last two weeks of July 1999, the Midwest experienced a lengthy series of days with temperatures higher than 90° F. Before it was over, some 127 deaths were attributed to heat in Illinois. Another extreme heat event occurred during mid-July 1995 that also resulted in a severe loss of life, predominately in the larger urban areas of Illinois. Rock Island County has experienced extended periods during the summer where temperatures can exceed 90° F combined with high humidity. According to the National Climatic Data Center, the most recent extreme heat event was July 4-7, 2012. During this period, temperatures ranged from the upper 90s to lower 100s. The Heat Index values were 105-115° F during the afternoon and evening. The hottest day was July 7 with reported highs between 100-105° F. Genesis hospitals in the Quad Cities treated 14 people for heat-related illnesses on July 4.

Probability. Based on historical information, Illinois will likely experience around 26 days a year with temperatures above 90° F. Rock Island County will experience an average of 20 days per year above 90° F.

Magnitude and Severity. According to the *Illinois Natural Hazard Mitigation Plan, 2013*, Rock Island County has an elevated rating. Certain populations, including the elderly, small children, chronic invalids, and others with medical problems, are particularly susceptible to heat reactions. While property damage is relatively low compared to other natural hazards, the loss resulting from human life is high. The New York Times article "Most Deadly of the Natural Disasters: The Heat Wave" states that heat waves kill more people in the United States than all other natural disasters combined. The article references a University of Delaware study indicating that 1,500 American city dwellers die each year because of heat compared with 200 from tornadoes, earthquakes, and floods combined. Extreme heat has been overlooked because there is not visible damage like in a tornado, and its impact is greatly understated in terms of human toll because not all heat-related deaths are recorded.

Warning Time. Periods of extreme heat are predictable within a few degrees within 3 days or so. Variations in the local conditions can affect the actual temperature within a matter of hours or even minutes. The National Weather Service will initiate alert procedures when the heat index is expected to exceed 105° F for at least two consecutive days.

Duration. There is a very good chance that there will also be a period of 3 consecutive days or more with temperatures in the 90s. It is also common for the temperature to hit 100° F or more once every three years during the summer months.

Sources:	
National Climatic Data Center	http://www.ncdc.noaa.gov/stormevents/
Rock Island County, Bi-State Regional Commission	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
State of Illinois, IEMA	<i>Illinois Natural Hazard Mitigation Plan, 2013</i>

Flash Flooding

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

A flash flood is an event occurring with little to no warning where water levels rise at an extremely fast rate. Flash flooding results from intense rainfall over a brief period, sometimes combined with rapid snow melt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is an extremely dangerous form of flooding that can reach full peak in only a few minutes and allows little time or no time for protective measures to be taken by those in its path. Flash flood waters move at very fast speeds and can roll boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animal, than slower-developing river and stream flooding.

Floods are the most common and widespread of all natural disasters except fire. Magnitude of flash flooding varies by watershed based on the effects of amounts of rain over time. The following available information from the National Climatic Data Center gives an indication of the magnitude of such events:

The National Climatic Data Center identifies 27 events in Rock Island County between 01/1/1997 and 10/31/2014 as flash flooding due to periods of intense rainfall. Most of the flash flooding events were from major rain events throughout the county with localized areas affected. The most frequent locations with reported flash floods were Milan, Moline, and Rock Island. Additional reports were rural Rock Island County, Andalusia, Carbon Cliff, and Coal Valley where effects range from minor street flooding to roads being impassable. Notable events in the county include:

- **October 17-18, 1998:** Rain developed during the early morning hours and fell across much of eastern Iowa and Northwest Illinois dumping two to four inches of rain by late afternoon. An additional half to two inches of rainfall during the evening sent several creeks and rivers near or slightly above their banks. Heavy rain in parts of Rock Island County knocked out power and filled back yards and farm fields with water. At southwest Rock Island's Lake View Estates, at least 100 people were stranded after rapidly rising water submerged the access roads. High water forced the closing of U.S. Highway 150 near Coal Valley and shut down several access roads at the Quad City Airport, hampering airport operations.
- **April 3, 1999:** Two to three inches of rain fell in one hour causing localized flooding to streets and houses at 9th Street and 17th Avenue in Rock Island. A fatality occurred when a 39-year-old male drove from dry ground into the flooded intersection at 5th Avenue and 40th Street in Rock Island. The victim's car began floating and became lodged underneath a railroad viaduct, at which time he left his vehicle and was swept away. The water depth underneath the railroad viaduct was estimated at six to seven feet.

- **March 12, 2006:** Thunderstorms across the Quad Cities metro area produced rainfall rates exceeding 1 inch per 30 minutes. Spotters, amateur radio, and the media reported numerous roads flooded out or cars floating in Rock Island at 11th Street and 14th Avenue.
- **June 12-13, 2008:** A strong cold front moved through eastern Iowa, northeast Missouri, and northern Illinois bringing one to five inches of rain causing flash flooding. In Andalusia, ten inches of water covered all the streets in town. In Moline, flash flood waters about two feet deep stranded some concert goers in the parking lot of iWireless Center. The 500 block of 1st Street and the 500 to 1100 blocks of 4th Street were closed due to sink holes. In downtown Rock Island, most of the streets were flooded about one foot deep. Near Illinois City, County Road 59 was washed out downhill from Load Thunder Forest Preserve. In Milan, flash flooding caused closure of numerous roads including Route 67 and 4th Street West between 1st and 10th Avenue.
- **June 30, 2014:** A strong cold front pushed into a very warm, unstable air mass as a significant upper level storm system tracked into the northern Great Lakes. A major severe weather and flash flood event unfolded across the area. This event resulted in the indirect death of one person in Moline who died of electrocution while wading through water in his basement. Life-threatening flash flooding due to 4 to 6 inches of rainfall was reported. The fire department reported Argyle Creek was flooding into about 20 houses in Carbon Cliff, and the bridge over 1st Avenue sustained structural damage from the flooding and was closed to traffic. Bridge replacement was estimated at \$350,000. A pump failure at a levee on Sugar Creek in East Moline resulted in damage to 40-50 properties.

Probability. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. Portions of the land within Rock Island County are very developed with significant amounts of impervious surfaces. As more development occurs in the watersheds, the amount of runoff produced also increases. Unless measures are taken to reduce the amount of runoff produced (or slow its movement), flash floods will continue to occur and possibly increase. In certain areas, aging storm sewer systems were not designed to carry the capacity currently needed to handle the increased storm runoff. This combined with rainfall trends (that are moving upwards) and rainfall extremes (that are patterning higher) all demonstrate the high likelihood, yet unpredictable nature of flash flooding in Rock Island County.

The *Illinois Natural Hazard Mitigation Plan, 2013* showed Rock Island County's flood hazard at an elevated risk. In Rock Island County, areas of the Rock River floodplain are subject to sudden rises in flooding from ice jams. The relatively shallow depth of the river and constructions in the river flow due to narrow areas and obstructions such as bridges or dams can back up water behind an ice jam with little to no advanced warning. The Rock River forms the eastern boundary of Rock Island County for a distance of about 20 miles before flowing westward across the county to join the Mississippi River at the city of Rock Island.

Magnitude and Severity. Flash floods occur in all 50 states in the U.S. Particularly at risk are those in low-lying areas; close to dry creek beds or drainage ditches; or near water or downstream from a dam, levee, or storage basin. People and property with insufficient storm sewers and other drainage infrastructure can also be put at risk because the drains cannot rid the

area of the runoff quickly enough. Nearly half of all flash flood fatalities are auto-related. Motorists often try to traverse water-covered roads and bridges and are swept away by the current. Six inches of swiftly-moving water can float a full-sized automobile. Recreational vehicles and mobile homes located in low-lying areas can also be swept away by water.

Areas in a floodplain, downstream from a dam or levee, or in low-lying areas can certainly be affected by flash flooding. People and property located in areas with narrow stream channels, saturated soil, or on land with large amounts of impermeable surfaces are likely to be affected in the event of significant rainfall. Unlike areas affected by river/stream flood, flash floods can affect areas a good distance from the stream itself. Flash flood prone areas are not particularly those areas adjacent to rivers and streams. Streets can become swift-moving rivers, and basements can become deathtraps because flash floods can fill them with water in a matter of minutes.

Rescuers are at significant risk when attempting to work in swift-moving floodwaters associated with flash flooding. Continuity of operations may be affected depending on the area, transportation limitations, and delayed or postponed government services. Personal property can be extensively damaged and destroyed by swift-moving water. Facilities and infrastructure can be scoured around, degrading its structural integrity. Flash floods can quickly inundate areas thought to be out of the Special Flood Hazard Area (SFHA).

Warning Time. Flash floods may be unpredictable, but there are factors that can point to the likelihood of the occurrence of a flash flood in the area. Flash floods occur within a few minutes or few hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. Knowledge of the watershed characteristics, modeling, monitoring, and warning systems increase the predictability of flash floods. Depending on the location in the watershed, warning times can be increased. The National Weather Service (NWS) forecasts the height of flood crests, the data, and the time the flow is expected to occur at a particular location. Gauges on the Rock River at Moline and Joslin are recorded through the National Weather Service Advanced Hydrologic Prediction Service.

Duration. The response to the effects of flash flooding in Illinois is short in duration due to the nature of the hazard.

Sources:	
National Climatic Data Center	Quad City Times
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
FEMA Region 5 Report Disaster Costs 1999-2013	

Grassland, Field, or Woodland Fire

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

This hazard is a fire occurring in grasslands, wooded areas, or farm fields that is uncontrolled and threatens life and property. These fires can occur when conditions are favorable, including periods of severe drought or low humidity combined with high winds when vegetation is dry and burns easily.

Rock Island and Moline both have year-round burn bans for vegetative materials. Local burn bans are common in other parts of the county at times of severe vegetation dryness. In 2010, Black Hawk State Historic Site along with Augustana College's Collinson Ecological Preserve and West Lake Park in Scott County, IA received a joint multi-year Federal Forestry Hazard Mitigation grant. The grant was used to mitigate the large number of downed trees caused by the July 2008 derecho that went through the area. An additional grant from the Illinois Nature Preserves Commission allowed the work to continue at Black Hawk State Historic Site. Prescribed burns as well as additional staff and volunteer hours are being used to clear understory brush and reduce the duff layer from the Site's Nature Preserve. The Historic Site is an area of wildland-urban interface in the county. Prescribed fire is also being used at the Loud Thunder Forest Preserve near Andalusia and the Collinson Ecological Preserve in Milan, as a method of fuel reduction.

The National Climatic Data Center contains no record of reported large wildfires or forest fires for Rock Island County from 1950 to present time. In Illinois, from 2007 to 2013, there were 7,034 acres burned by wildfires. There were 62,862 acres burned by prescribed fires in Illinois from 2008 to 2013. There are no records of prescribed burns prior to 2008. Local fire departments or fire protection districts, particularly in more rural portions of the planning area, may have more history with occurrences of fires in grasslands, agricultural fields, or wooded areas.

Probability. Primarily because of the potential for lightning to trigger a grassland or woodland fire, there is a near 100% chance that a grassland or other form of wildfire could occur each year in the planning area. Human activities are the primary cause of these outdoor fires. People burn when it is too windy and dry and do not have precautions in place to mitigate a small fire should it start spreading. The probability of this occurring in a given year in this county is 100%. The National Weather Service issues a daily Fire Weather Planning Forecast. This forecast gives the expected weather conditions and fire danger probability for a region for that day.

Magnitude and Severity. The *Illinois Natural Hazard Mitigation Plan, 2013* did not rate counties for fire hazard. Buildings are becoming more vulnerable to wildfires as development occurs in the wildland-urban interface areas of the planning area. The value of exposed property is increasing at a faster rate than population. Rock Island County is vulnerable to forest and woodland fires because the county had 14,498 farm acres in woodlands as of 2012. It has an additional 3,901 acres in forest and nature preserves, large publicly-owned natural areas and privately-owned ecological preserves. This acreage does not include city parks and the wooded

ravines in the urban areas. In 2012, the county also had 13,143 acres of pastureland and 119,622 acres of cropland. Grassland or cropland fires are more likely to occur in the planning area than woodland fires. Grass fires are often more easily contained and extinguished before there is damage to people or developed property. However, in rural areas grass fires have spread into farm fields causing considerable damage to crops. In the fall, when crops are dry, large portions of crop fields may easily combust due to lightning strikes or when harvesting equipment overheats or throws off sparks. If this happens, it can be quite costly to the farmer in terms of lost production and or equipment. Field fires near the outer edges of communities could become severe quickly.

As a scale of magnitude, Keetch and Byram (1968) designed a drought index specifically for fire potential assessment. It is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. It is a continuous index relating to the flammability of organic material in the ground. The Keetch-Byram Drought Index (KBDI) attempts to measure the amount of precipitation necessary to return the soil to full field capacity. It is a closed system ranging from 0 to 800 units and represents a moisture regime from 0 to 8 inches of water through the soil layer. At 8 inches of water, the KBDI assumes saturation. Zero is the point of no moisture deficiency, and 800 is the maximum drought that is possible. At any point along the scale, the index number indicates the amount of net rainfall that is required to reduce the index to zero, or saturation. The inputs for KBDI are weather station latitude, mean annual precipitation, maximum dry bulb temperature, and the last 24 hours of rainfall. Reduction in drought occurs only when rainfall exceeds 0.20 inch (called net rainfall). The computational steps involve reducing the drought index by the net rain amount and increasing the drought index by a drought factor. The KBDI scale and description of moisture conditions is as follows:

- KBDI = 0 – 200:** Soil moisture and large class fuel moistures are high and do not contribute to fire intensity. This is typical of the spring dormant season following winter precipitation.
- KBDI = 200 – 400:** Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity.
- KBDI = 400 – 600:** Typical of late summer, early fall. Lower litter and duff layers contribute to fire intensity and burn actively.
- KBDI = 600 – 800:** Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

The Haines Index (HI) (also known as Lower Atmosphere Severity Index) is another way to measure the atmosphere's contribution to the growth potential of a wildfire. This National Weather Service index uses a numerical value that indicates the potential for wildfires to experience extreme fire behavior. The index is derived from the stability (temperature difference between different levels of the atmosphere) and moisture content (dew point depression) of the lower atmosphere.

Haines Index	Potential For Large Fire Growth
2 or 3	Very Low
4	Low
5	Moderate
6	High

In 2009, the National Weather Service in the Quad Cities started using the Grassland Fire Danger Index (GFDI). Weather Service personnel use the GFDI advise the public when dangerous burning conditions exist. This index contains five fire ratings: low, medium, high, very high, and extreme. The National Weather Service will only issue an advisory notice to the public when the index is in the very high or extreme category.

Most grass fires are usually contained to highway right-of-way and rail right-of-way ditches or other geographically small areas and are less than a few acres in size. However, high winds can change a small fire into a multi-acre fire within a matter of minutes. The extent is dependent upon conditions such as land use/land cover, moisture, and wind. Field fires can be more extensive due to the availability of burnable materials and the difficulty involved in getting fire suppression equipment to the fire. Most grass or field fires destroy only the grasses, crops, or other low land cover. Residents and school children with preexisting health conditions related to the heart and lungs may need to be removed from areas of heavy smoke. Buildings in the fire path may need to be evacuated of persons and livestock. Injuries and/or deaths most often occur during efforts to fight the fire such as burns, sprains and muscle strains, smoke inhalation, and heat exhaustion. Death due to natural causes such as heart attack or asthma attack may occur.

Property damage is usually limited to grass, small trees, crops, fence posts, etc. Damage could occur to buildings, if the fire is out of control. Large fires can result in road closures and traffic detours due to the large volume of smoke limiting visibility. Fires can be triggered by naturally occurring weather events, such as drought or lightning strikes. Large forest fires may result in erosion issues, but grass, plants, and trees generally start growing again as conditions permit.

There is minimal financial or economic risk in rural areas with potential for crop loss. There is moderate risk in the urban-wild land fringe areas where fires could affect structures.

Warning time. The National Weather Service's daily Fire Weather Planning Forecasts; Haines Index forecasts; and Grassland Fire Rating forecasts, watches, and warnings alert the public several days in advance of potential for extreme wildfire behavior. Local fire departments also issue burn bans and warnings on days when there is high potential for erratic fire behavior. The warning time residents have after a fire starts depends on the fuel type for that fire. Flash fuels such as tall grasses, dry field crops, leaves, and draped pine needles are readily ignited and are consumed rapidly when dry. Slash, which is debris left after logging, pruning, thinning, or brush cutting (including logs, chips, bark, branches, stumps, and broken understory trees or brush), can also burn very quickly if fuel is dry and conditions are windy. Heavy fuels, such as large diameter snags, logs, and large limb wood, when ignited are consumed more slowly than flash fuels.

Duration. Most fires can be extinguished quickly if the fire is accessible to firefighting equipment.

Sources:	
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
United States Fire Service Wild Fire Assessment Service (WFAS)	National Interagency Fire Center
USDA National Agricultural Statistical Service Census of Agriculture	River Action Wild Places for Rock Island County
National Weather Service	

Hazardous Materials Incident

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

A hazardous materials incident is an accidental release of chemical substances, mixtures, or potential explosions that present danger to the public health and safety during the production or handling of materials during transportation or at a facility. Hazards of this nature may cause death or injury to persons, damage to property, and/or damage to the environment when released into soil, water, or air. Chemicals are manufactured and used in ever increasing types and quantities. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents usually occur within a localized area, and the use of planning and zoning can minimize the area of impact.

Most hazardous materials incidents are localized and are quickly contained or stabilized by highly trained fire departments and hazardous materials teams. Depending on the characteristics of the hazardous material or the volume of product involved, the affected area can be as small as a room in a building or as large as five square miles or more. General wind patterns and climate data help in predicting spread of airborne materials. Many times, additional regions outside of the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as a river, lake, or aquifer.

Rock Island County is bordered by the Mississippi River. The Mississippi River is a navigable waterway, and boats and barges regularly use the river as transport. The Coast Guard is the responder to spills on waterways. On November 25, 2013 the tugboat Stephen L. Colby sunk on the Mississippi River near Le Claire, Iowa, across the river from Rapids City and Hampton, Illinois. There were no reports of injury to the crew, but the tugboat released approximately 89,000 gallons of diesel fuel into the river. There was a quick response to the incident, and much of the diesel fuel was captured. Clean-up took over two weeks, but there were no reported fish kills or contamination to drinking water.

Railroads also have the potential to have hazardous materials incidents from derailments or accidental release from container cars. Rail lines run along both the Mississippi and Rock Rivers and through the urban areas of the county. The Rock Island County Emergency Management Director has been notified by the railroad company that Bakken oil is transported through the county. Bakken oil is more flammable than other types of crude oil and causes explosions. Transport of Bakken oil by rail has grown rapidly over recent years.

Hazardous materials are also transported through the county in pipelines. Spills may occur due to a break in a line or during construction or activities requiring digging. In Illinois, state law requires that anyone planning a project that requires digging must contact the Joint Utility Locating Information for Excavators (JULIE). JULIE is a not-for-profit corporation whose mission is to prevent damages to underground utilities, environment, and property while reducing service interruptions and costly repairs.

Extremely Hazardous Substances are shown by general location in Map 3-2. The majority of facilities are located within the Cities of Moline and Rock Island; however, sites are scattered throughout both urban and rural areas. Fixed hazardous material facilities within Rock Island County tend to cluster along the railroads as well as major highways and interstates. Rock Island County also has multiple pipelines running throughout the county and are shown on Map 3-2. The vast majority of pipeline incidents that occur are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations. With development occurring at an unprecedented rate and the ground becoming more and more congested with utilities, the probability of an underground pipeline incident is significant. Petroleum and natural gas pipeline accidents occur with some regularity, but they usually have a limited impact and are quickly and adequately handled by pipeline company emergency crews and local and state responders. Pipeline operators are required to coordinate all safety preparedness and response activities with the communities. Continuing to plan, train, and exercise emergency procedures help to limit the occurrence and severity of incidents.

Probability. According to hazardous materials spill reports provided by Rock Island County Emergency Management Agency, there have been 68 spills since 2009, averaging slightly over 11 incidents per year. The City of Rock Island has experienced the largest number of incidents, totaling 24 cover the last five years, followed by Moline with 15 total. According to Rock Island County EMA, approximately 90% of the hazardous materials incidents involved diesel spillage of leaking underground storage tanks. The probability of a hazardous material incident occurring within Rock Island County is 100%, but the probability varies by individual communities. Carbon Cliff, Coal Valley, Oak Grove, Port Byron, Rapids City, and Reynolds did not have incidents within the past five years, making the probability of an incident low. Andalusia, Cordova, Hampton, Hillsdale, and Silvis had less than five incidents within five years, making their probability on an incident average. Unincorporated Rock Island County, East Moline, Milan, Moline, and Rock Island experienced five or more incidents in the past five years making the probability of an incident high.

Magnitude and Severity. Most of the hazardous materials incidents are localized and are quickly contained or stabilized by highly trained fire departments and hazardous materials teams. Depending on the characteristics of the hazardous materials or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as a river, lake, or aquifer.

The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals may cause painful and damaging burns to skin if they come in direct contact with the body.

A hazardous materials accident can occur almost anywhere, so any area is considered vulnerable to an accident. Pets, livestock, and vegetation in close proximity to facilities producing, storing, or transporting hazardous substances are at higher risk. Populations near transportation corridors or downstream, downwind, and downhill of a released substance are also vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injections, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated

food and water. Fixed facilities are required to have an off-site consequence plan that addresses the population of the surrounding area. Responding personnel are required to be trained to HAZMAT Operation Level to respond to the scene. Those personnel that come into direct contact with substances released are required to have HAZMAT Technician level training.

Warning Time. When managed properly under current regulations, hazardous materials pose little risk. However, when handled improperly or in the event of an accident, hazardous materials can pose a significant risk to the population. Hazardous materials incidents usually occur very rapidly with little or no warning. Even if reported immediately, people in the area of release have very little time to be warned and evacuated. During some events, sheltering in place is the best alternative to evacuation because the material has already affected the area and there is no time to evacuate safely. Public address systems, television, radio, and the NOAA Weather Alert Radios are used to disseminate emergency messages about hazardous materials incidents.

Duration. Response to a hazardous materials release is generally limited to the immediate effects of a release of dangerous materials and their threat to life and property. However, due to the laws surrounding hazardous materials and the duty to the public to inform and protect citizens from the effects of hazardous materials in their vicinity, response is expanded for environmental emergencies.

Sources:	
Quad Cities News WQAD-TV	Nelson, Shellie. Nov. 27, 2012. "Illinois Offers Potassium Iodide Pills to Residents Near Nuclear Plants."
Rock Island County	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
Rock Island County LEPC	Quarterly Meeting April 2015
JULIE	http://www.illinois1call.com/index.html
NBC News	http://www.nbcnews.com/news/other/towboat-carrying-89-000-gallons-fuel-sinks-mississippi-river-f2D11657522
State of Illinois, IEMA	<i>Illinois Natural Hazard Mitigation Plan, 2013</i>

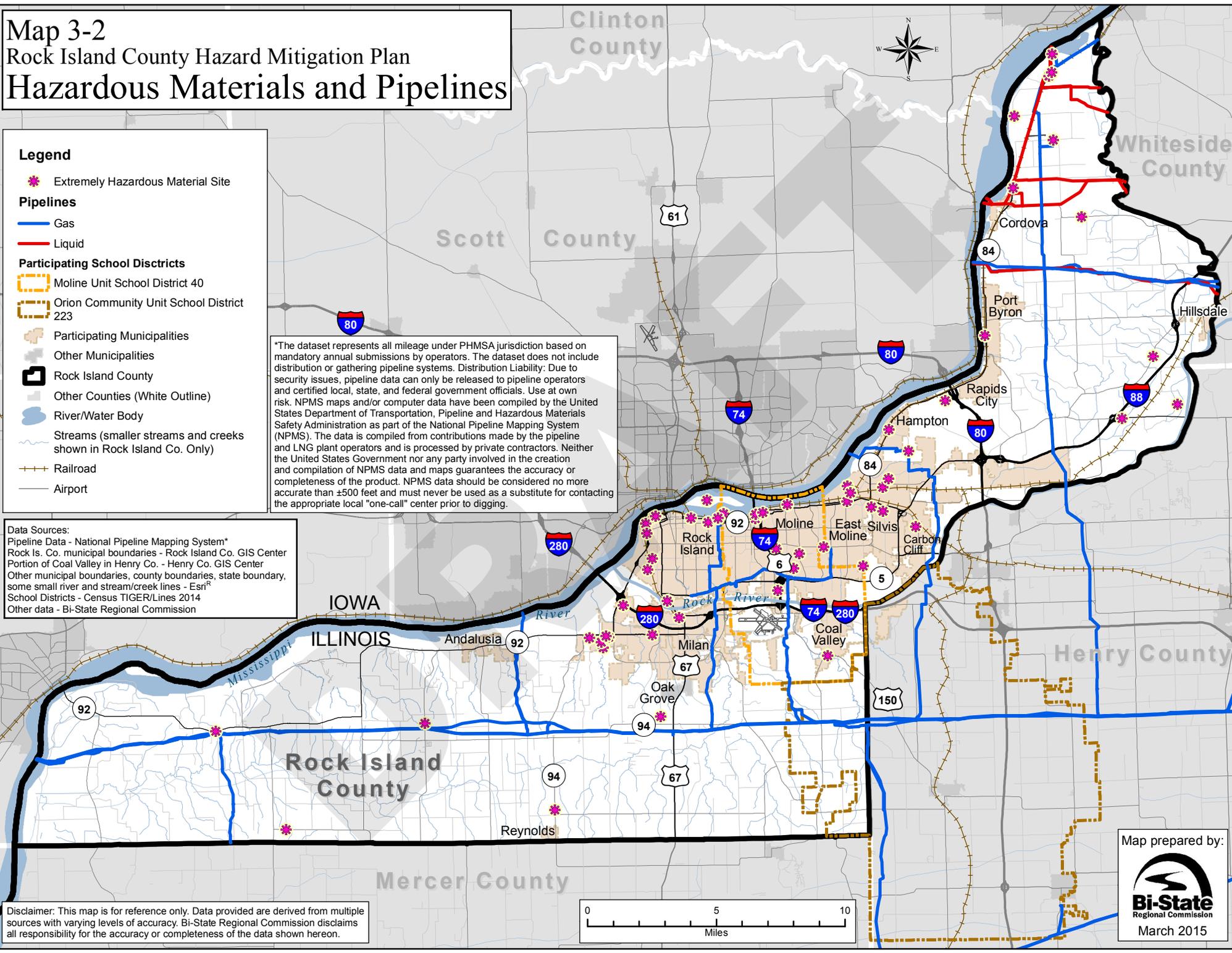
Map 3-2 Rock Island County Hazard Mitigation Plan Hazardous Materials and Pipelines

Legend

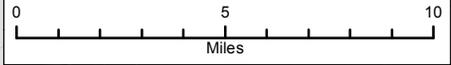
- Extremely Hazardous Material Site
- Pipelines**
 - Gas
 - Liquid
- Participating School Districts**
 - Moline Unit School District 40
 - Orion Community Unit School District 223
- Participating Municipalities
- Other Municipalities
- Rock Island County
- Other Counties (White Outline)
- River/Water Body
- Streams (smaller streams and creeks shown in Rock Island Co. Only)
- Railroad
- Airport

*The dataset represents all mileage under PHMSA jurisdiction based on mandatory annual submissions by operators. The dataset does not include distribution or gathering pipeline systems. Distribution Liability: Due to security issues, pipeline data can only be released to pipeline operators and certified local, state, and federal government officials. Use at own risk. NPMS maps and/or computer data have been compiled by the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration as part of the National Pipeline Mapping System (NPMS). The data is compiled from contributions made by the pipeline and LNG plant operators and is processed by private contractors. Neither the United States Government nor any party involved in the creation and compilation of NPMS data and maps guarantees the accuracy or completeness of the product. NPMS data should be considered no more accurate than ±500 feet and must never be used as a substitute for contacting the appropriate local "one-call" center prior to digging.

Data Sources:
 Pipeline Data - National Pipeline Mapping System*
 Rock Is. Co. municipal boundaries - Rock Island Co. GIS Center
 Portion of Coal Valley in Henry Co. - Henry Co. GIS Center
 Other municipal boundaries, county boundaries, state boundary, some small river and stream/creek lines - Esri[®]
 School Districts - Census TIGER/Lines 2014
 Other data - Bi-State Regional Commission



Disclaimer: This map is for reference only. Data provided are derived from multiple sources with varying levels of accuracy. Bi-State Regional Commission disclaims all responsibility for the accuracy or completeness of the data shown hereon.



Map prepared by:

 Bi-State
 Regional Commission
 March 2015

Influenza Pandemic

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

An influenza pandemic is a global outbreak of disease that occurs when a new influenza A virus appears or “emerges” in the human population, causes serious illness, and then spreads easily from person to person worldwide. Pandemics are different from seasonal outbreaks or “epidemics” of influenza. Seasonal outbreaks are caused by subtypes of influenza viruses that are already in existence among people, whereas pandemic outbreaks are caused by new subtypes or by subtypes that have never circulated among people or that have not circulated among people for a long time. Past influenza pandemics have led to high levels of illness, death, social disruption, and economic loss. Examples of influenza viruses with pandemic potential include avian flus H5N1 and H7N9. These are non-human viruses for which humans have little to no immunity. Human infections with these viruses have occurred rarely, but is not spread easily from person to person. If either virus changes in a way to allow for efficient spread of infection, an influenza pandemic may occur.

During the first wave of the pandemic, outbreaks may occur simultaneously in many locations throughout the nation, preventing a targeted concentration of national emergency resources in one or two places – and requiring each locality to depend in large measure on its own resources to respond. An effective local response will depend on pre-established partnerships and collaborative planning by public health officials, hospital administrators, and community leaders who have considered a range of best-case and worst-case scenarios.

If a disease is highly infectious, it will likely spread across the nation by the time it is discovered. This causes a severe disadvantage during the response and recovery. Influenza happens every year in nearly every country in the world. It spreads through a population for a few months and then will disappear or will move onto another country.

Probability. Many scientists believe it is only a matter of time until the next influenza pandemic occurs. Since 1918, influenza pandemics have occurred four times.

- **1918-1919:** The Spanish flu affected 20-40% of the population worldwide, and an estimated 50 million died. Nearly 675,000 people died in the United States.
- **1957-1958:** In February 1957, another flu pandemic was identified in the Far East. The virus was found in the United States in August and then spread among school children when classes began in the fall. Infection rates peaked in October and declined in December. A second wave of infection hit in January 1958. While not as devastating as the Spanish flu, approximately 68,000 people in the United States died with the highest rates among the elderly.
- **1968-1969:** This flu virus was first reported in Hong Kong in early 1968 and detected in the United States in September 1968, although it was not widespread until December. Deaths peaked in December 1968 and January 1969, with those over 65 being the most

likely to die. The number of deaths between September 1968 and March 1969 totaled 38,800.

- **2009-2010:** H1N1 was first diagnosed in the United States in April 2009. By June, 18,000 cases were reported in the United States. A total of 74 countries were affected. 80 million people were vaccinated against H1N1, which minimized the impact of the illness. The CDC estimates that between 43 and 89 million people had H1N1 with an estimated 8,870 to 18,300 H1N1-related deaths.

The occurrence and severity of the next influenza pandemic cannot be predicted, but modeling studies suggest that its effect in the United States could be severe. In the absence of any control measures (vaccination or drugs), it is estimated that in the United States, a medium-level pandemic could cause in between 15% and 35% of the U.S. population to be affected by pandemic influenza.

Public health agencies work to protect citizens from infectious diseases and preserve the health and safety of people through disease surveillance, investigation of suspect outbreaks, education, and consultation to county, local, and public/private health agencies. Historically pandemics occur every 30 years.

Magnitude and Severity. The occurrence and severity of the next influenza pandemic cannot be predicted, but modeling studies suggest that its effect in the United States could be severe. When the next pandemic occurs, in the absence of any control measures (vaccination or drugs), it is estimated that in the United States, a medium-level pandemic could cause between 15% and 35% of the U.S. population to be affected by pandemic influenza.

Potential Pandemic Influenza Cases, Deaths and Hospitalizations in Rock Island County from a Pandemic Flu (assuming a 15% - 35% attack rate)*				
County Population	Projected Cases	Projected Outpatient Visits	Projected Hospitalized	Projected Dead
149,374	22,406-52,280	8,402-23,526	134-444	44-104

*Estimates are based on CDC national projections

Source: Rock Island County Health Department Pandemic Flu Plan

Because of our highly mobile society, these diseases can move rapidly across the nation within days, weeks, or months. Many of the diseases on the national notification list result in serious illness or death. Some are treatable; others only the symptoms are treatable.

The numbers of health-care workers and first responders available to work can be expected to be reduced. They will be at high risk of illness through exposure, and some may have to miss work to care for ill family members. Resources in many locations could be limited because of how widespread pandemic influenza would be.

Warning Time. The private practitioner is the first line of defense and will undoubtedly be the first to witness the symptoms of human disease incidents. The Illinois Department of Public Health (DPH) and the U.S. Centers for Disease Control and Prevention (CDC) monitor reports submitted by doctors, hospitals, and labs to identify patterns. The DPH and the CDC are proactive in providing information to the health care community on medical concerns.

Conditions related to scope and magnitude can escalate quickly, and area resources can be drained of personnel, medications, and vaccinations quickly.

Duration. A pandemic will last much longer than most other public health emergency events and may include “waves” of influenza activity separated by months. Response to highly infectious diseases occurs continuously, although the direct effects of a pandemic influenza can occur for months at a time as evident with the H1N1 influenza in 2009.

Sources:	
Center for Disease Control: Resources for Pandemic Flu	Rock Island County Health Department Pandemic Flu Plan
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	Flu.gov Pandemic Flu History

Land Subsidence

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

There are two causes of potential land subsidence in Rock Island County: manmade land subsidence, which is a downward sinking, collapse, or a shifting of the land surface resulting from underground mining or land excavation; and natural land subsidence.

Illinois generally has two forms of mine subsidence: pit and sag. During the late 1800s to early 1900s, coal was extracted from many locations within the planning area. Land areas over these old mines were generally sparsely populated, and if settlement or collapse occurred, homes or other structures were seldom damaged. As towns or cities expand over these old mined-out areas, subsidence damage to structures may become increasingly common.

Although the central and southern parts of Illinois present the highest risk of land subsidence, the Illinois State Geological Survey (ISGS) has recorded about 250 underground mine locations in Rock Island County in its *Directory of Coal Mines in Illinois*, published December 2013 (see Map 3-3). Those records document mine operations as early as 1863 and as late as 1940. Rock Island County has about 4.7% of its land area or an estimated 13,500 acres undermined by coal mines. Because mining activity was not regulated or documented until the late 1800s, little or no size or location information is available for older mines. The Illinois State Geological Survey (ISGS) also has record of one underground clay mine in Rock Island County.

Rock Island County also has two large open pit limestone quarries currently in operation. They are Collinson Quarry in Milan, IL and Allied Stone Quarry on Vandruff's Island, which is an island in the Rock River between Rock Island and Milan, IL. The Collinson Quarry is located adjacent to the town of Milan, and there is a large trailer park located within 500 feet of the quarry pit. A residential neighborhood, including a neighborhood park, is directly adjacent to the Collinson quarry property boundaries. Smaller limestone quarries operated in Moline on Sylvan Island and in the Port Byron and Cordova areas.

Natural land subsidence is a downward sinking, collapse, or a shifting of the land surface due to natural geology and topography of the area. The geology of an area containing karst features may contribute to land subsidence. Karst is a terrain with unique landforms and hydrology created from the dissolution of soluble rocks such as limestone and dolomite. This terrain is characterized by springs, caves, sinkholes, and a unique hydrogeology that results in aquifers that are highly productive, but extremely vulnerable to contamination. In the United States, about 40% of the groundwater used for drinking comes from karst aquifers.

Rock Island County contains areas of gently dipping to flat-lying beds of carbonate rock (limestone) beneath an overburden of noncarbonate material (shale, sandstone, loess) 10 feet to 200 feet thick. These areas have fissures, tubes, and caves generally less than 1,000 feet long and 50 feet in vertical extent. Fissures are commonly conduits for subterranean streams. In addition, they can cause serious engineering problems to things such as reservoirs and road cuts, bridge abutments, piers, and dam foundations and abutments.

Rock Island County also contains many areas of natural subsidence due to the local geology. Pennsylvanian shale underlies the surficial soils in many areas of the county. These shales do not allow water to penetrate and are very slippery when wet. Shales outcrop in the bottoms of many deep ravines in the county and at the bases of the steep bluffs bordering the Rock and Mississippi Rivers. These bluff areas are moving, and slumping can occur after heavy rains. A Surficial Geology of Rock Island County, Illinois created by Dr. Richard C. Anderson in 1980 shows the areas of high vulnerability to land subsidence or landslides. These areas are known as the Lacon Formation and are shown in black on the map. Areas in the Lacon Formation within the City of Rock Island were verified by LIDAR and direct field observation by Augustana student Kevin Gosiewski, for his senior thesis in 2015. He noted that these areas show hummocks and slumps and evidence of recent movement. Trees with root balls intact have slid down into ravines or have bent trunks indicative of soil movement.

Probability. The potential for manmade subsidence in an area depends on many factors, but a key factor is the proximity of the area to underground mines. In ISGS Circular 575, GIS mapping software was used to define and apply two zones around each known coal mine location in Illinois. Zone 1 includes the land over or adjacent to mines that, based on the mapped extent and general depth of the mine, could be affected by subsidence. Zone 2 surrounds Zone 1 and indicates additional land that could be affected because exact mine information has not been obtained. These two zones are associated only with known underground mines. Areas outside these two zones also could be undermined. Old, undocumented mine openings have been discovered in many parts of the state, even in areas not known to contain minable deposits. Although the potential for subsidence exists in these places, most undocumented mines were prospect pits or short-term operations that undermined only a few acres. Designation of an area in these zones cannot be directly translated in to a subsidence risk. Probability of for mine subsidence is generally higher in Zone 1 than the adjacent Zone 2. Many other factors come into play in determining the actual risk for any one location. The table below shows mine affected acres by land use category for Rock Island County. Density refers to the development density of the land. Housing units (house, apartment, mobile home, etc.) were determined by using year 2000 U.S. Census Block information for housing units. Commercial structures were not included in the table below.

**Acres and Percentage of Land in Zone 1 and 2 by Land Use Category
Year 2009 for Rock Island County**

	Low-medium density		High-density		Urban open space		Rural area		Total area		Estimated Housing units	
	(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)	(%)	(units)	(%)
Zone 1	329	2.9	218	1.6	437	5.3	4,042	1.7	5,025	1.9	2,028	3.2
Zone 2	528	4.7	497	3.6	554	6.7	6,925	2.9	8,504	3.2	2,950	4.6
Total 1+2	857	7.6	715	5.2	991	12.0	10,967	4.7	13,529	5.0	4,978	7.8

Source: Illinois State Geological Survey Circular 575

The Illinois Geological Survey reports the probability for natural land subsidence caused by karst features is rare for Rock Island County. The probability for subsidence is very high or is occurring in the areas of steep bluffs and ravines that contain a shale layer.

Magnitude and Severity. In 2009, an estimated 4,978 housing units were vulnerable to mine subsidence in Rock Island County. This number will increase as the density of buildings increases within the urban area and on the urban fringe in the areas that were previously mined.

Mine subsidence areas in Illinois are usually 2-40 feet across and 6-8 foot deep. However, a general subsidence can spread over several acres. Depth of collapse is based on the depth of the mine shaft that collapses. The collapse can spread sideways as it moves upward to the land surface. Lateral propagation of the subsidence is highly unpredictable. Mine subsidence incidents in Rock Island County have generally been related to coal mining. Several small occurrences have happened in the Carbon Cliff area. One required the rebuilding of a neighborhood road. There has been one Mine Subsidence Insurance claim filed in Rock Island County between 1999 and 2012.

Land subsidence movements are not selective – all structures (buildings, sidewalks, driveways, fences, streets, curbs, etc.) in the immediate area will be affected with a subsidence event. The type and extent of damage to structures directly relates to their physical orientation and location in the subsidence area. Ground movements can also damage water and sewer lines, as well as other utilities. In most cases, damage ranges from minor to moderate in severity. Repair or renovations are usually sufficient to restore structural integrity. However, in severe cases, ground settlement and the resulting damages associated with land subsidence may require complete demolition and rebuilding.

Geological karst features are reported to occur in Rock Island County. The sinkhole incident noted by ISGS is a karst feature that has affected the ground surface west of 11th Street in the City of Rock Island where the coal-bearing Pennsylvanian strata was removed by the Mississippi River and the bedrock below the area is the Devonian limestone.

The health and safety of persons in affected areas is limited. Injuries and death are unlikely. The safety of response personnel depends on the type and size of the collapse and what is impacted by the collapse. If the collapse causes a petroleum pipeline break and a fire results, there may be health and safety risks. There may be risks if people need to be rescued from the collapse area. Property damage would be limited to a very small number of structures. Infrastructure damages would possibly be more significant. Utilities such as pipelines, cables, power poles, etc. could be vulnerable to downward movements of the soil. This may be of greater concern as new areas of the planning area are developed. Interruption of services would be limited to only those services where infrastructure was affected. For example, there may be power outages or water or sewer disruptions if a subsidence event would destroy underground utilities. Cross-country pipelines can also be affected by mine subsidence, if mine location information was not available when the pipelines were constructed. Breakage of pipelines carrying natural gas or other petroleum products could cause extensive environmental damage. Breakage of pipelines carrying sewage also carries environmental concerns. Breakage of pipelines carrying water could cause localized flooding, road collapse, and interruption of water service or cause detours on transportation routes. Land subsidence by manmade causes have damaged homes and commercial structures, disrupted gas/electricity, water service, communications, and could even disrupt transportation

routes. From 1999 – 2012, the State of Illinois has had 1,021 confirmed mine subsidence claims filed for a total of \$109,036,849. In 1979, the Mine Subsidence Insurance Act was passed to provide subsidence insurance for homeowners in mining areas. The risk of damage was high enough that the law mandated that private insurance carriers include coverage as a part of their homeowner policies. Homeowners in counties where 1% or more of the land has been undermined will automatically have subsidence insurance added to their policies when issued. Rock Island County has the mandatory insurance requirement. Those individuals refusing coverage will be asked to sign a waiver. (ISGS, 06) Later Amendments to this Act have increased coverage for insured structures from \$50,000 (1979) to \$350,000 (1990). Mine subsidence insurance in Illinois covers damage caused by underground mining of any solid mineral resource. (ISGS, 13)

Warning time. Subsidence events resulting from mining or natural features are very isolated and localized. They are very hard to predict in advance due to undermined and destabilized rock and soil conditions or movements below ground. Warning signs such as cracks and soil settlement may appear in advance and may need to be closely watched with inspections and overall monitoring of conditions. Events may occur over extended periods, although they have occurred very rapidly with little advance warning.

Duration. Land movement can be quick and can last days or even years.

Sources:	
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
Illinois State Geological Survey Circular 575 - <i>The Proximity of Underground Mines to Urban and Developed Lands in Illinois, 2009</i> by Christopher P. Korose, Andrew G. Louchios, and Scott D. Elrick	Illinois Mine Subsidence Insurance Fund
United States Geological Survey – Office of Groundwater	USGS publication <i>Engineering Aspects of Karst</i> by William E. Davis
Illinois Geological Survey publication: ISGS Guidebook 18 – <i>Early Pennsylvanian Paleotopography and Depositional Environments, Rock Island County, IL, 1985</i> by Richard L. Leary, Illinois State Museum, Springfield, IL	Illinois Geological Survey publication: Circular 510, <i>Geology for Planning Rock Island County, Illinois, 1980</i> , by Richard C Anderson, Augustana College, Rock Island, IL

Map 3-3 Rock Island County Hazard Mitigation Plan Land (Mine) Subsidence

Legend

Coal Mine Data (Illinois)

- Coal Mine Points*
- Coal Mined Areas*
- ⬡ Quarry

Participating School Districts

- Moline Unit School District 40
- Orion Community Unit School District 223

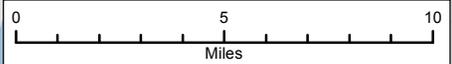
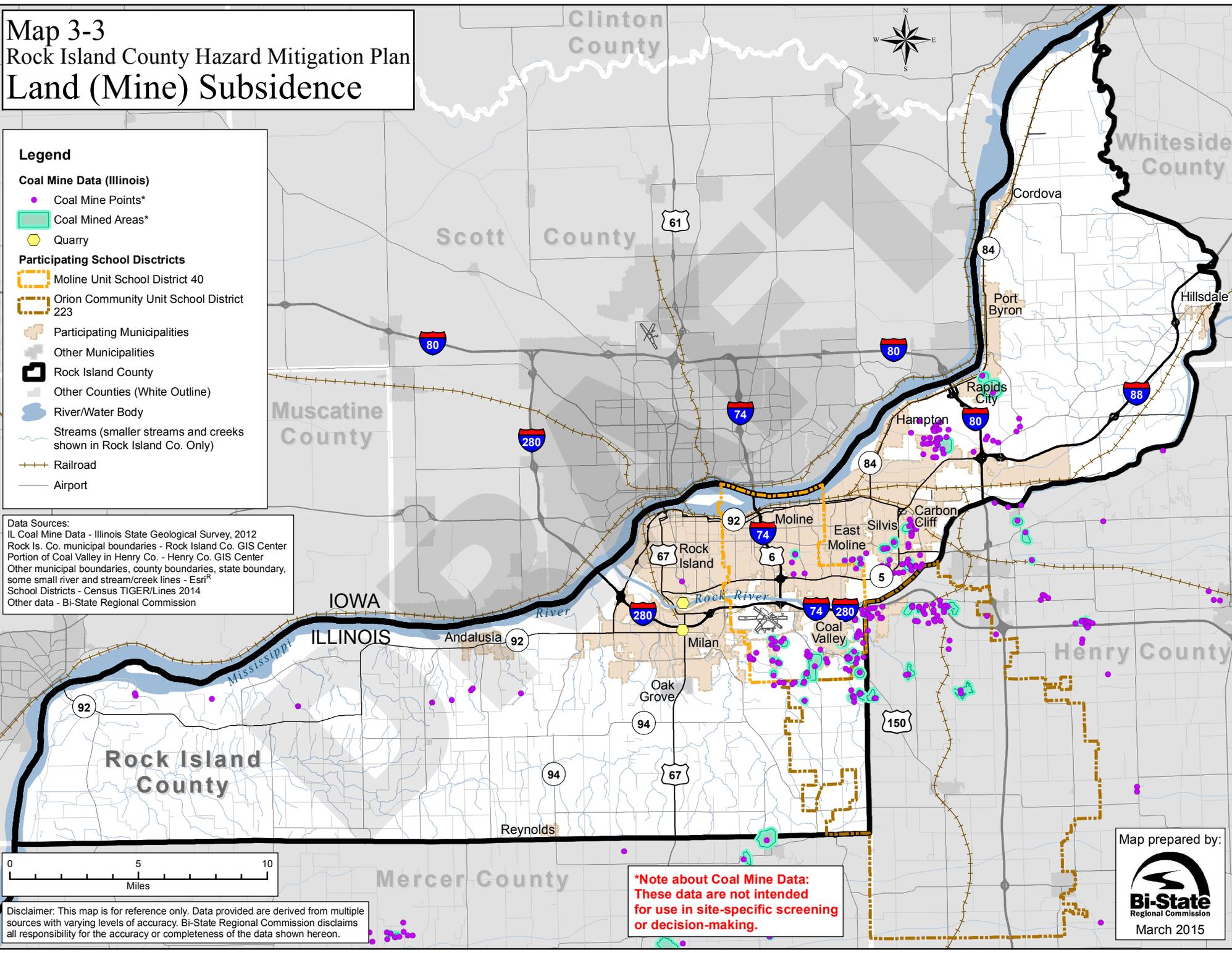
Participating Municipalities

- Participating Municipalities
- Other Municipalities
- Rock Island County
- Other Counties (White Outline)

Rock Island County

- River/Water Body
- ~ Streams (smaller streams and creeks shown in Rock Island Co. Only)
- - - Railroad
- Airport

Data Sources:
 IL Coal Mine Data - Illinois State Geological Survey, 2012
 Rock Is. Co. municipal boundaries - Rock Island Co. GIS Center
 Portion of Coal Valley in Henry Co. - Henry Co. GIS Center
 Other municipal boundaries, county boundaries, state boundary, some small river and stream/creek lines - Esri[®]
 School Districts - Census TIGER/Lines 2014
 Other data - Bi-State Regional Commission



Disclaimer: This map is for reference only. Data provided are derived from multiple sources with varying levels of accuracy. Bi-State Regional Commission disclaims all responsibility for the accuracy or completeness of the data shown hereon.

***Note about Coal Mine Data:
 These data are not intended
 for use in site-specific screening
 or decision-making.**

Map prepared by:

 Bi-State
 Regional Commission
 March 2015

Landslide

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

A landslide is a downward and outward movement of slope-forming materials reacting under the force of gravity. Landslides occur when masses of rock, earth, or debris move down a slope. Landslides can have great variation in size and speed of flow. Landslides have been occurring over the same terrain since prehistoric times. In Illinois, they are primarily activated by excessive rainfall and by human modification of the land. This information is reiterated by the Illinois State Geological Survey, which typically sees most landslides as the result of human interaction where toes of slopes are cut away for roads, borrow, or just more flat space. Other removals are associated with small creeks, streams, and rivers removing stream bank material and floods saturating bases of slopes.

The geographic extent of historic events has been limited to less than a city block in size and has “run out” over the stretch of less than 100 yards. The maximum extent is limited to steep bluff areas within the planning area. Steep bluff areas with as much as 18 to 60% slope were identified in the Illinois Route 5 Corridor Study done in 1986. Areas of steep slope in combination with shale layer along the bluffs of the Rock River can be of concern for future development.

Probability. The bluff edges and side slopes in the planning area, where underlain with Pennsylvanian shale, are susceptible to slumping and landslides. The northern third of Rock Island County does not have a shale layer, and landslide probability is very low. The soils in this area tend to contain more sand than loess or clay.

There have been several small-scale landslide events in Illinois. However, there have been none of such significance that it has resulted in injury or death. According to the Illinois State Geological Survey Circular 510, the geologic materials in Rock Island County provide adequate foundation for most types of construction. Some soils are made up of Peyton Colluvium, which is a poorly sorted mixture of silt, clay, sand, and pebbles that has accumulated, largely by creep and slopewash, at the base of steep, unstable slopes. It also includes alluvial fans. The Peyton Colluvium is often found in association with the Lacon Formation, which are deposits from large-scale mass-movements on steep slopes. The Lacon Formation is the product of soil and rock creep, slump, and landslides, all common on steep slopes underlain by weak materials such as shale, glacial till, and loess. When dry, these materials are firm and stable, but when water saturated, they lose their strength and then creep, slump, or slide downhill. Such conditions are common on the steep valley sides in Rock Island County, particularly in those areas where shale is present. The Lacon Formation is recognizable throughout the county. However, it has not been mapped separately, because some areas are too small to map and other areas do not have definable boundaries. In addition, the materials that make up the extensive unstable slopes, loess, glacial till, and shale can usually be distinguished and mapped individually even though they may have moved downslope. The Peyton Colluvium is mapped only where it is extensive and easily recognized on aerial photographs, such as along the bluffs of the Mississippi River downstream from the mouth of the Rock River. It is usually less than 10 feet (3 m) thick.

Areas where shale underlies the loess along the north bluff of the Rock River have produced occurrences of slumping or minor landslides in Rock Island County. The most notable was in the Wildwood subdivision between the Cities of Rock Island and Moline in the early 1990s. Several expensive residential structures were damaged or destroyed because of landslides or slumping. Damage to municipal sewer lines also occurred in this area. There have been several occurrences of slides along the steep Rock River Bluffs in the Black Hawk State Historic Site. This has caused trail structures to be removed and rebuilt. Remedial actions have been to stabilize the soils and trails along the bluff.

Magnitude and Severity. Those occupying structures overlooking or on the side of river valleys and steep ravines are most vulnerable. At this time, these areas constitute a very small portion of homes and commercially occupied structures in the county. Road cut areas are the most vulnerable.

There is very little risk to health and safety of persons in affected areas. Injuries and death are very unlikely except in the case of undetected slope failure or if warning signs in structures that are located on steep slopes are ignored. Property damage would be limited to a very small percentage of structures. Infrastructure damages would be more significant. Utilities such as pipelines, cables, power poles, etc. are often vulnerable to downward movements of the soil. Slides may cause minor power outages or water disruptions if the slide affects these utilities. Landslides are usually a naturally occurring event. In Illinois, these would be on a very localized scale. Slides may alter stream flow and direction until the stream seeks a new channel. Landslides have damaged homes and disrupted electricity, water service, communications, and transportation routes. Economic effects would be secondarily associated with landslides.

Warning time. Warning time depends on the individual landslide. If it is a slow slide, there may be warning time. If it is a sudden slide, then there may be no warning.

Speed of Onset. Landslides and flooding are often related because precipitation, runoff, and ground saturation combine to destabilize soil and rock. For this reason, potential landslides can be detected if high potential landslide areas are monitored. Landslides can last from minutes to days. Response to the slide depends on slide location and what the landslide affects.

Sources:	
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
Illinois State Geological Survey Circular 510 - 1980 Geology for Planning in Rock Island County, Illinois by R. C. Anderson	2009 American Geological Institute - Living with Unstable Ground by Thomas L. Holzer

Levee Failure (Non Performance)

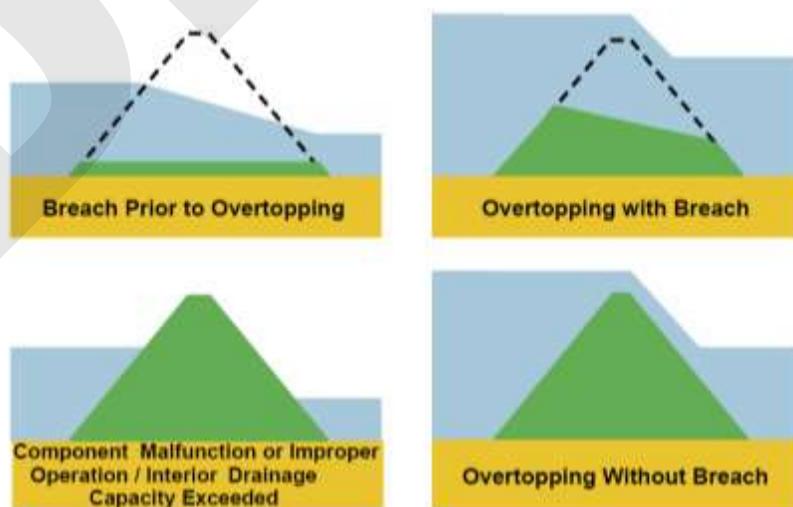
Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

The Federal Emergency Management Agency (FEMA) defines a levee as “a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water in order to reduce the risk from temporary flooding.” Levees reduce the risk of flooding, but do not eliminate the risk. Levees and floodwalls are constructed from the earth, compacted soil, or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. A levee system comprises one or more levee segments and other features that collectively provide flood risk reduction to a defined area. The levee system is inclusive of all features that are integral to the performance of excluding flood waters from the leveed area. These levee features may consist of embankment sections, floodwall sections, closure structures, pumping stations, and interior drainage works. Highway and railroad embankments or other non-levee features that are integral to the performance of excluding flood water from the leveed area will be considered to be part of a levee system for evaluation purposes. Embankments that function as levees also exist in water conveyance systems, navigation channels, recreation areas, and habitat restoration projects.

Levees typically function in keeping the leveed area free from inundation. Hence, in common language, a levee does not perform (“that fails”) when people and property get wet. In technical terms levees can “non perform” through four principal modes:

- Breach Prior to Overtopping
- Overtopping with Breach
- Component Malfunction or Improper Operation/Interior Drainage Capacity Exceeded
- Overtopping Without Breach

**Figure 3-4
Levee Breach Diagram**



Levees are designed with an expected water height. Sometimes, this water height corresponds to a flood frequency such as a 10-year, 50-year, or 100-year return period. As longer records are kept, the flood frequencies are changed such that although the height of the levee remains constant, a levee that provided 100-year flood frequency may not always provide assurance that it will provide a leveed area free from inundation.

FEMA provides flood insurance to the nation. Rates for flood insurance are set by an examination of potential flooding using the best available information. Levees can be accredited by FEMA that allows for lower insurance rates if the levee is shown to have sufficient capability to resist nonperformance. Levees that have a minimum performance at the 100-year flood flow frequency can be accredited by FEMA and results in lower flood insurance rates.

Rock Island County has 13 levees, according to the *Illinois Statewide Mitigation Plan - Rock Island County Flood Hazard Assessment* conducted by the Natural Hazard Research and Mitigation Group (NHRMC) at Southern Illinois University, Carbondale. Eleven of those levee districts participate in the PL-84-99 program that provides reimbursement for specific damages to levees that result from high-water events. The levee sponsor is required to provide a standard level of maintenance and proper operation acceptable to the United State Army Corps of Engineers (USACE), which in turn reduces the probability of levee nonperformance. Below is a chart from the assessment with information on the levees in Rock Island County.

An acceptable rating indicates no unacceptable rating on any of the rated items, and a significant majority of acceptable over minimally acceptable ratings. Minimally acceptable indicates no unacceptable rating on any of the rated items, and less than a significant majority of acceptable over minimally acceptable ratings. Unacceptable ratings indicate one or more unacceptable ratings on any of the rated items. Levees with unacceptable ratings are often moved from active to inactive status within the PL84-99 Program until the necessary repairs to the levee system are made. The PL 84-99 rating is a relative judgment of how closely the levee is operated and maintained to USACE standards.

Name	River	Area (Acres)	Design Protection Level	Program		Inspection	
				PL 84-99	FEMA accredited	Date	Rating
Meredosia Drainage and Levee District	Mississippi River	10,044	100-year	Yes	No	2/23/2015	Minimally Acceptable
Zuma-Canoe Special Service Area	Rock River	5,007	~50-year	Yes	No	4/21/2011	Inactive
East Moline, IL LFPP	Mississippi River	1,193	200-year	Yes	Yes	2/9/2015	Minimally Acceptable
Rock Island Arsenal (Fed Gov)	Mississippi River	822	NA	No	No	N/A	N/A
Rock Island, IL LFPP	Mississippi River	863	200-year	Yes	Yes	112/9/2014	Minimally Acceptable
Milan, IL and Big Island Conservatory District	Rock River	1,147	200-year	Yes	Yes	2/14/2015	Acceptable
Milan, IL West	Rock River		200-year	Yes	Yes	2/15/2015	Minimally Acceptable
Milan, IL –East	Rock River	811	200-year	Yes	Yes	2/15/2015	Minimally Acceptable
Village of Andalusia Levee RDB Hill Creek	Mississippi River	63	50-year	Yes	No	Not Available	Minimally Acceptable
Village of Andalusia Levee LDB Hill Creek	Mississippi River	113	50-year	Yes	No	Not Available	Minimally Acceptable
Drury Drainage District	Mississippi River	5110	50-year	Yes	No	3/20/2014	Minimally Acceptable
Andalusia Refuge Levee	Mississippi River	130	2-year	No	No	N/A	N/A
Bay Island Drainage and Levee District	Mississippi River	24,989	50-year	Yes	No	3/20/2014	Minimally Acceptable
Milan/ RDB South Slough/ Mill Creek	South Slough and Mill Creek	85		Yes	No	2/15/2015	Minimally Acceptable

Probability. Records of levee nonperformance within Rock Island County are few. The Meredosia Levee along the Rock River was overtopped in 1946 due to ice jams on the Rock River. In 1973, the Meredosia Levee nonperformance was caused by underseepage and backward erosion piping. Backward erosion piping is a process in which erosion initiates at the exit point of seepage, and progressive backward erosion results in formation of a continuous water passage or pipe. The mainstem Mississippi River levee was sandbagged to prevent an overtopping breach. Ponding of water in the inundated area fostered the federal project to increase in height to that which is present along the Mississippi. The levee for controlling flood waters from the Rock River is still at the pre-1973 level as it was not reconstructed as planned.

The probability of nonperformance of a levee or floodwall is difficult to predict, and USACE has undertaken a probabilistic analysis of levee non performances for the levees in Rock Island County. Proper design, construction, and operation and maintenance can limit the probability of a levee component not performing.

In 2013, a record high water event was predicted on the Mississippi to crest 5 feet above the historic maximum level. Fortunately, several days of unexpected cold decreased the upstream flows and allowed waters to remain below record heights, and no levee overtopping occurred. Throughout the 1970s to 2000s, the watersheds that feed the Rock and Mississippi Rivers have witnessed significant changes in climate patterns than those experienced in the first 2/3s of the 20th century. That earlier period contained the flow records that were the basis of design of the levee height. This has, in most basins, increased the flood frequencies from that used in the original designs thereby increasing the probability of overtopping. Development in the watershed can raise flood levels and make a levee designed and constructed under previous characteristics inadequate for current runoff conditions.

Magnitude and Severity. People, property, and utilities in the floodplain are most at risk. The magnitude and severity of flooding impact depends on several factors. These factors include:

- Mode of levee nonperformance
- Potential depth of inundation
- Nature of building construction in the leveed area i.e. wood vs. masonry
- Social and economic valuation of building contents
- Warning times of the event occurring
- Evacuation plans and plan execution
- Community willingness to leave threatened properties

Levees and floodwalls, when considered “protective,” give a false sense of security. People feel that levees will protect them and their property against any future flooding. If actual risk is not communicated to the residents by the jurisdiction, there may be effects to the reputation of the community of the levee fails.

Floodwaters breaching a levee are usually contained in the historic floodplain. Levee nonperformance in one area may prevent flooding in another area. A levee breach or overtopping occurring along one segment may drop the level of water along other segments of

the stream. For initial overtopping, the overriding concern where the overtopping location will occur and the availability of water will determine the inundation of the interior.

In an urban setting, the severity and duration may cause health-related concerns to the public, while the main impact of a levee nonperformance in agricultural areas is economic. It should be pointed out that the inundated areas of the Meredosia primarily agricultural levee was declared a public health hazard that required breaching to control the mosquito population. In a breach, water bursting through a narrow levee breach is moving much faster than the floodwaters in the main channel. The breaking out of this front of water and its fast flow can cause more destruction to structures behind the levee than floodwaters in the main channel would have caused.

Residents behind levees often have a false sense of security. If the actual risk is not communicated to the residents by the jurisdiction, there may be effects to the reputation of the community if the levee fails. Effects would be similar to those experienced during a river or flash flood. Areas directly behind a levee (land-side) can experience pooling of water.

With updated floodplain mapping, FEMA requires certification of levees in order for property protected by the levee to be eligible for flood insurance at a discounted rate. Without certification, those properties would only be eligible for flood insurance at the actuarial rate for the elevation of the structure compared to the 100-year or 1 percent flood level.

The Census data indicates that approximately 9,300 people live in leveed areas in Rock Island County. Since the likelihood of a levee nonperformance is during a flood, the amount of warning time available should allow the health and safety of persons in the affected area to be minimal. Injuries and death are possible but unlikely.

Continuity of operation would be minimal and would be determined by which levee failed. Nonperformance of the Rock Island Levee could have a significant impact on the continuity of county and city government. Property damage would be limited to inundation areas behind the levee system. Levees protecting more urban areas such as downtown Rock Island, East Moline, southwest Rock Island, and a large portion of Milan would cause significantly more damage than in the rural areas. See the River Flooding profile for information related to aggregate flood losses by Census Block in the Levee Fails Scenario of HAZUZ-HM.

Economic and financial effects vary based on which levee fails. Crop flooding, severe scouring, and erosion around bridges could take place and could have agricultural and economic effects in rural areas. If an urban area levee did not perform, the economic and financial losses would be very high. Using the available databases, USACE has estimated nonperformance consequences, in aggregate for the Rock Island County Levees, of approximately \$1.3 billion dollars, although this does not include the loss of wages, inconvenience by loss of critical infrastructure, and inventory of businesses.

Warning Time. The amount of warning time depends on the type of levee nonperformance and the ability to effectively transmit the warning. Local flood warning systems can help in determining the maximum water surface and the timing of a flood situation. Hours or days of warning may be available for high water that may overtop levees, but this does not provide complete security from a rupture in the levee itself. A sudden nonperformance of a portion of the levee may send floodwaters gushing from this break within seconds. Normally, occupants of

the floodplain can be warned about potential levee breaches or breaks when high water encroaches upon the levee. Plans for effective transmittal of warnings need to be evaluated, exercised, and refined.

Duration. The effects of a levee nonperformance and its association with river flooding are extensive and require substantial response efforts. The Meredosia leveed area remained inundated for approximately 10 weeks in 1965. Large volumes of water can enter formerly dry areas, forming temporary lakes. Such lakes do not go away immediately, because the lake is blocked from returning to the main channel by higher grounds that were not destroyed. Consequently, the water level drops along the main river days before it drops behind breached levees. Often, pumps behind the levees are needed to remove floodwaters that breach the levees. This alleviates some of the effects associated with levee non performances. Levee nonperformance continues to cause damage long after it occurs. In urban settings, flooding may have a deleterious effect on economic prosperity lasting 25 years or more. The Institute of Business and Home Safety estimates that only 10% of small business survive a flooding event.

Sources:	
“The International Levee Handbook” CIRIA Publication C731, CIRIA, www.ciria.org (2014)	Moss, R.E.S. and Eller, J.M. (2007) “Estimating the Probability of Failure and Associated Risk of the California Bay Delta Levee System.” GeoDenver, Feb.
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	Illinois Statewide Mitigation Plan – Rock Island County Flood Hazard Assessment
Illinois State Water Survey, McConkey, Sally (2013)	FEMA Factsheet: What is a Levee, November 11, 2012
U.S. Army Corps of Engineers (USACE) National Levee Database: http://nld.usace.army.mil/egis/f?p=471:1:	

Radiological Incident

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

Definition. This hazard is an incident resulting in a release of radiological or nuclear material at a fixed facility to include power plants, hospitals, laboratories, and the like.

Description. Although the term “nuclear accident” has no strict technical definition, it generally refers to events involving the release of significant levels of radiation. Most commercial nuclear facilities in the United States were developed in the mid-1960s and are designed to withstand aircraft attack. Therefore, they should withstand most natural hazards even though they may not have been specifically designed for those forces. Medical facilities may also have radiological materials.

Historical Occurrence. Emergency classifications are divided into four categories. Each calls for a certain level of response from plant and government personnel. From least to most severe, the classifications are: Unusual Event, Alert, Site Area Emergency, and General Emergency. Since 1993, the Quad Cities Nuclear Power Plant operated by Exelon near Cordova has had 12 Unusual Events, 3 Alerts, and no Site Area Emergencies or General Emergencies.

Probability. The Quad Cities Nuclear Power Plant is located approximately 3 miles north of the Village of Cordova on the Illinois bank of the Mississippi River. All operators of facilities that use radioactive materials and transporters of radioactive waste are circumspect in the packaging, handling, and shipment of the radioactive waste, and, since they are closely regulated by a variety of federal, state, and local organizations, the likelihood of an incident is remote. Hospital facilities in Rock Island County that have radiological materials have recently upgraded facilities to avoid future incidents. Due to very strict nuclear regulatory restrictions, standards, and inspections, as well as very detailed and established emergency response plans, the hazard planning steering committee has evaluated that the probability of a fixed radiological incident occurring in Rock Island County is less than 1% in the next 100 years.

Magnitude/Severity. In 30 years of nuclear power production in the U.S., no deaths or serious injuries from radiation have been recorded among the general public. Except in a nuclear detonation, exposure to large amounts of radiation is less likely to cause large-scale damage, death, and injury than many of the conventional hazards we face. Wide-scale radiological hazards would come from naturally-occurring radiation such as radon. According to the United States Geological Survey, all of Illinois has a high potential to geologic radon. All nuclear facilities in the United States identify a 10-mile radius as an Emergency Planning Zone and a 50-mile radius as an Ingestion Pathway Zone.

Map 3-4
Quad Cities Station Emergency Planning Zone



Source: Quad Cities News WQAD-TV. Nelson, Shellie. Nov. 27, 2012. "Illinois Offers Potassium Iodide Pills to Residents Near Nuclear Plants."

Warning Time. Ionizing radiation cannot be seen, smelled, heard, or detected with human senses. Detection instruments are needed to indicate the existence of dangerous radiation. Distance from the incident would dictate the amount of time needed to avoid exposure from damaging radiation. Protective actions directed by state, county, and city officials would depend upon weather conditions and developments at the power plant. In an actual emergency, the public can turn to their local Emergency Alert System Station or NOAA Weather Radio.

Sources:	
Exelon Corporation	Michael Muth, Emergency Preparedness
Quad Cities News WQAD-TV	Nelson, Shellie. Nov. 27, 2012. "Illinois Offers Potassium Iodide Pills to Residents Near Nuclear Plants."
Rock Island County and Bi-State Regional Commission	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
State of Illinois, IEMA	<i>Illinois Natural Hazard Mitigation Plan, 2013</i>

River Flooding

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

River flooding is a rising or overflowing of a tributary or body of water that covers adjacent land not usually covered by water when the volume of water in a stream exceeds the capacity of the channel. Floods are the most common and widespread of all natural disasters, except fire. Most communities in the United States can experience some kind of flooding after spring rains, heavy thunderstorms, winter snow thaws, waterway obstructions, or levee or dam failures. Often, it is a combination of these elements that causes damaging floods.

Floodwaters can be extremely dangerous. The force of six inches of swiftly moving water can knock people off their feet, and two feet of water can float a car. Floods can be slow or fast rising but generally develop over a period of days. Flooding is a natural and expected phenomenon that occurs annually, usually restricted to specific streams, rivers, or watershed areas.

Flood categories in feet at the National Weather Service gauge point within Rock Island County are as follows:

Flood Stages	Mississippi River at LeClaire	Mississippi River at Rock Island	Rock River at Joslin	Rock River at Moline
Major Flood Stage (ft)	13.5	18	16.5	14
Moderate Flood Stage (ft)	12	16	14	13
Flood Stage (ft)	11	15	12	12
Action Stage (ft)	10	13	11	11

The National Climatic Data Center reports 69 flood events for Rock Island County between 1/01/1997 and 7/02/2014. Twenty-five of these events are listed as flash flood and are addressed in the Flash Flooding Hazard Profile. The remaining 44 events document flooding on the major rivers in Rock Island County: The Mississippi River and its tributary the Rock River. The highest crest on record for the Mississippi River occurred in 1965 for the LeClaire river gauge and 1993 for the Rock Island river gauge.

The Mississippi River Flood of 1965 (DR-194) was caused by higher precipitation levels within the upper Midwest and a colder than usual March that inhibited a gradual melt of snow pack up stream. The City of Rock Island experienced severe flooding in the downtown area. As a result of the 1965 flood, the City of Rock Island decided to protect its downtown with a levee, which was finished in 1973.

The Great Flood of 1993 (DR-997) did the most damage along the Mississippi River in Illinois in recorded history. Heavy snowfall in the winter and continuous heavy rain falling on most of the upper Midwest in the spring and summer caused major flooding in nine states. Flood waters

begin rising in March 1993 and receded in September. The Great Flood had severe effects on agricultural land, and barge traffic ceased for over eight weeks, causing severe economic loss to barge operators.

On April 18, 2001 (DR-1368), flooding began as a result of heavy rains and snow melt in the upper Midwest and continued through the end of the month. On May 9, 2001, the President declared 10 counties a major disaster where near-record flooding occurred on the Mississippi River from the Wisconsin border down to the confluence of the Mississippi and Missouri rivers (FEMA 1368-DR). Rock Island County local governments reported approximately \$1.95 million in damages and preventative measures under the FEMA Public Assistance program and received approximately \$1.5 million from FEMA.

Often known as the Great Flood of 2008 (DR-1771), major to record flooding occurred during the month of June 2008. Persistent heavy rain from late May to early June resulted in both the Mississippi River and the Rock River rising above flood stage in most locations. Within Rock Island County, local governments reported approximately \$2.42 million in damages and preventative measures under the FEMA Public Assistance program and received approximately \$1.87 million in FEMA funding.

The 2011 Mississippi River Flood made the top ten historic crests at both Mississippi River gauges within Rock Island County; however Rock Island County was not part of a disaster declaration as a result of this flood. Snowmelt from above normal snowfall in Minnesota caused major flooding along the Mississippi River and remained above major flood levels for one week.

In the spring of 2013, heavy rains of three to seven inches combined with snowmelt caused major flooding on both the Mississippi River and the Rock River. The flood event is the flood of record for the Rock River at Moline. The Rock River remained above major flood level for the last two weeks of April.

Historic Crests at the Four River Gauges in Rock Island County

	Mississippi River at LeClaire		Mississippi River at Rock Island		Rock River at Joslin		Rock River at Moline	
	Crest	Date	Crest	Date	Crest	Date	Crest	Date
1	17.75	4/28/1965	22.63	7/9/1993	19.24	6/7/2002	16.53	4/21/2013
2	16.93	4/24/2001	22.48	4/28/1965	19.11	4/21/2013	16.38	3/6/2008
3	16.56	7/8/1993	22.33	4/25/2001	18.88	2/23/1997	16.15	4/26/1973
4	14.97	4/22/2011	22	3/10/1868	18.73	5/31/1996	15.79	6/7/2002
5	14.84	6/16/2008	21.49	6/16/2008	18.55	6/16/2000	15.7	5/20/1974
6	14.61	4/19/1997	20.94	7/4/2014	18.35	3/26/1993	15.31	2/24/1997
7	14.6	4/26/1969	20.71	4/22/2011	18.02	2/27/2001	15.25	5/31/1996
8	14.45	7/4/2014	19.66	4/20/1997	18.01	2/22/1994	15.2	2/24/1971
9	14.03	5/8/1975	19.4	6/27/1892	17.81	3/22/1979	15.1	3/24/1979
10	14.01	4/28/1952	19.3	4/26/1969	17.74	4/23/1973	15.01	6/17/2000

All the incorporated communities within Rock Island County [except Oak Grove that does not have a Special Flood Hazard Area (SFHA)] participate in the National Flood Insurance Program (NFIP) and have adopted floodplain management ordinances based on the State Model Ordinance, which goes beyond minimum requirement of the NFIP. The Moline-Coal Valley Community School District and the Orion Community School District are not eligible to participate in the NFIP.

In addition to floodplain management practiced as required in their ordinances, Rock Island County and the City of Moline participate in the Community Rating System. Rock Island County is currently a Class 7 and Moline is a Class 8. The Community Rating System (CRS) is a volunteer program for NFIP-participating communities. The goal is to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. The CRS provides incentives in the form of premium discounts for communities that go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding.

Probability. Rock Island County has been included in eleven federally-declared flood disasters. Given that the list of events for Rock Island County includes more than one event in some years, it might be estimated that at least minor flooding could occur nearly every year somewhere in the county. The *Illinois Hazard Mitigation Plan, 2013* categorized Rock Island County's flood hazard at Elevated. Locally, a flood hazard varies greatly from Oak Grove with no probability because it has no SFHA to much higher for areas with larger amounts of SFHAs. Below is a list of the percentage of floodplain within each community.

Jurisdiction	Percent of Jurisdiction within SFHA
Andalusia	33.29%
Carbon Cliff	30.64%
Coal Valley	11.22%
Cordova	16.45%
East Moline	9.00%
Hampton	17.47%
Hillsdale	79.45%
Milan	24.84%
Moline	18.16%
Oak Grove	0.00%
Port Byron	4.88%
Rapids City	8.48%
Reynolds	11.28%
Rock Island, City of	19.58%
Rock Island, County of	21.34%
Silvis	0.13%

The Illinois State Water Survey was contracted by the Illinois Department of Natural Resources to study and remap the Rock River floodplain to reduce inconsistencies discovered when the

Flood Insurance Rate Maps were converted into a digital format. The study and mapping process is being funded by FEMA. Maps are currently in draft format and under technical review.

Magnitude/Severity. Flooding effects include potential loss of life. River flooding does not have as high of risk as flash flooding because of the slower onset of the river flood. Personal property can be extensively damaged and destroyed by swift moving water. Facilities and infrastructure can be scoured around, degrading its structural integrity. Damage and disruption of communications, transportation, electric service, and community services are likely in severe cases. Water treatment and wastewater treatment facilities are often located in or near the floodplain and are at high risk of flooding and will eventually be taken offline.

The vulnerability from river flooding is quite delineated. Work in flood hazard mapping has allowed many communities to restrict development in hazardous areas. The Federal Emergency Management Agency has delineated the special flood hazard areas in Rock Island County. Flood Insurance Rate Maps (FIRMs) show properties potentially affected by the floods that have at least a 1% chance of occurring in any given year. Generally, these areas are in the floodplain or adjacent areas. Map 3-5 on page 68 shows general locations of the repetitive loss properties (discussed below) as associated with the Special Flood Hazard Areas with a 1% chance of flooding annually in the preliminary digital FIRM for Rock Island County.

The National Flood Insurance Program (NFIP) Repetitive Loss Properties (RLP) report identifies properties vulnerable to multiple flood losses. Repetitive loss properties are any NFIP-insured buildings for which two or more claims of more than \$1,000 each were paid by the NFIP within any 10-year period. This report provided by FEMA Region V shows 170 repetitive loss properties with 588 total claims totaling \$7,374,336 within Rock Island County as of August 28, 2014. Map 3-5 shows approximate locations of the repetitive loss properties in Rock Island County as well as the FIRM 1% chance of flooding occurring in any given year. More detailed FIRMS for the planning area can be found in Appendix 3-3.

Below is more detailed information on Repetitive Loss Properties by jurisdiction. For privacy reasons, the data for jurisdictions with less than three RLPs has been suppressed, but was provided to the jurisdiction.

Jurisdiction	Number of Properties	Number of Losses	Total Payments
Andalusia	7	15	\$ 114,073.38
Carbon Cliff	7	25	\$ 442,123.61
Coal Valley	0	0	0
Cordova	***	***	***
East Moline	5	14	\$ 166,927.43
Hampton	4	11	\$ 75,930.09
Hillsdale	***	***	***
Milan	5	12	\$ 94,490.86
Moline	17	51	\$ 1,409,603.19
Oak Grove	N/A	N/A	N/A
Port Byron	3	9	\$ 94,194.99
Rapids City	0	0	0
Reynolds	0	0	0
Rock Island, City of	***	***	***
Rock Island County of	117	433	\$ 4,858,399.86
Silvis	0	0	0
Total (includes all data)	170	588	\$ 7,374,336.78

The *Illinois Hazard Mitigation Plan, 2013* included information on a state-wide HAZUS analysis conducted by the Natural Hazard Research Group at Southern Illinois University, Carbondale to develop a risk assessment focused on defining the potential flood exposure throughout each county in Illinois. HAZUS is a Geographic Information System-based risk assessment tool designed by FEMA in collaboration with the National Institute of Building Sciences. The HAZUS flood model assesses the impact of flooding based on FEMA and USACE damage relationships that was then applied to infrastructure inventories to estimate losses for a selected flood scenario. Level 1 HAZUS flood loss modeling was utilized to create a flood-hazard assessment to estimate potential flood losses within the 100-year floodplain. Two scenarios were run in the HAZUS flood model. One where levees hold and one where levees fail.

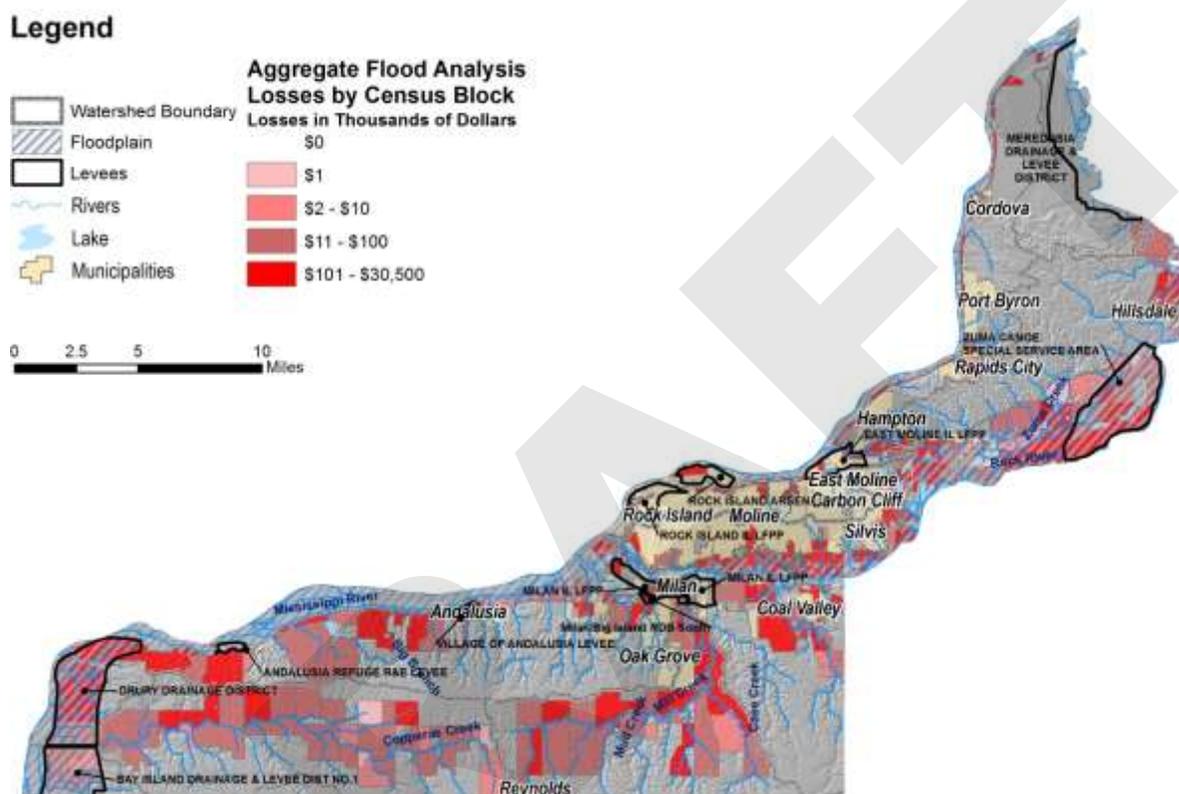
Expected Flood Exposure and Losses in 100-year Floodplain for Levee Holds Scenario

General Occupancy	Estimated Building Exposure x \$1000	Building Losses x \$1000	Total Building Related Losses x \$1000
Residential	\$1,362,404	\$66,480	\$105,020
Commercial	\$763,751	\$36,890	\$132,900
Industrial	\$260,353	\$16,630	\$63,520
Other	\$119,185	\$3,310	\$20,830
Total	\$2,505,693	\$123,300	\$322,270

For the Levee Holds Scenario, approximately 2,800 households may be displaced due to the flood. This includes households evacuated from within or very near the inundated area. From the displaced households, approximately 5,700 people may seek temporary shelter.

Approximately 26,800 tons of debris may be generated from this flood scenario. Debris includes building materials such as drywall, insulation, wood, brick, and foundations. If the tonnage is converted into truck loads (25 tons/truck), it would take an estimated 1,100 truckloads to remove debris.

Figure 3-5
Aggregate flood losses by census block
for Rock Island County for the Levee Holds Scenario



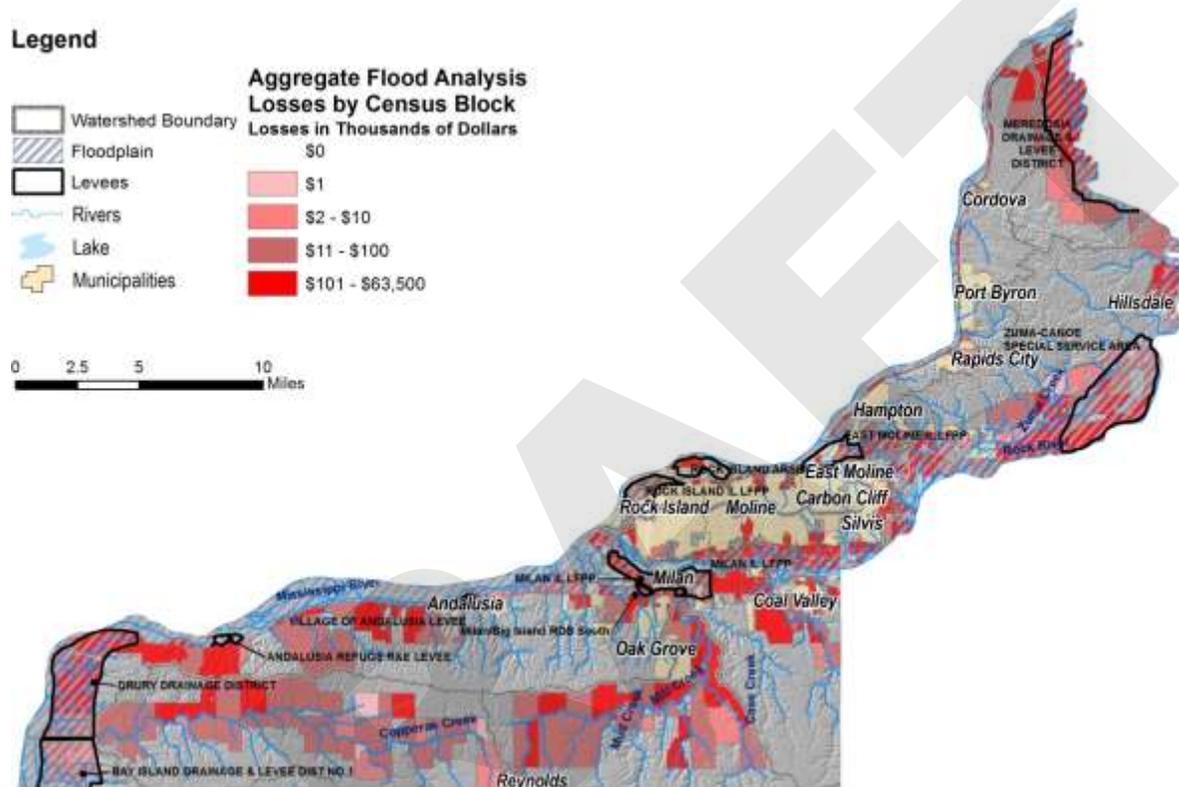
Expected Flood Exposure and Losses in 100-year Floodplain for Levee Fails Scenario

General Occupancy	Estimated Building Exposure x \$1000	Building Losses x \$1000	Total Building Related Losses x \$1000
Residential	\$1,760,781	\$115,380	\$185,620
Commercial	\$1,265,604	\$137,960	\$476,610
Industrial	\$378,456	\$38,880	\$147,480
Other	\$22,931	\$16,560	\$111,090
Total	\$3,607,772	\$308,770	\$920,790

For the Levee Fails Scenario, approximately 5,700 households may be displaced due to the flood. This includes households evacuated from within or very near the inundated area. From

the displaced households, approximately 13,600 people may seek temporary shelter. Approximately 52,600 tons of debris may be generated from this flood scenario. If the tonnage is converted into truck loads (25 tons/truck), it would take an estimated 2,100 truckloads to remove debris.

Figure 3-6
Aggregate Flood Losses by Census Block
for Rock Island County for the Levee Fails Scenario

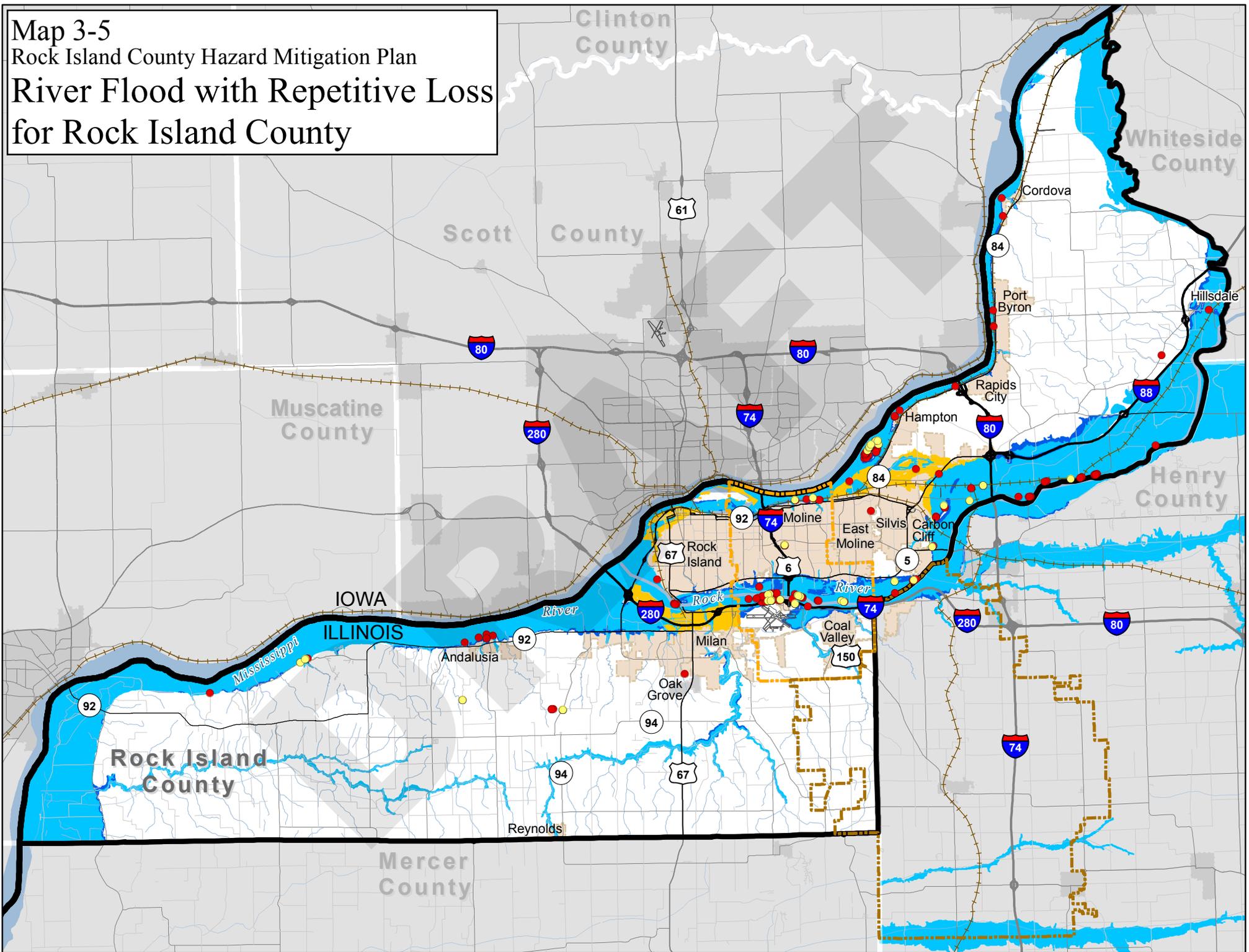


Warning Time. Gauges along streams and rain gauges throughout the state provide for an early flood warning system. River flooding usually develops over the course of several hours or even days, depending on the basin characteristics and the position of the particular reach of the stream. The National Weather Service provides flood forecasts for Illinois. Flood warnings are issued over emergency radio and TV messages as well as the NOAA Weather Radio. People in the paths of river floods may have time to take appropriate actions to limit harm to themselves and their property.

Duration. River floods can last as long as a few days to as long as several months depending on the severity of flooding. The response to the effects of river flooding in Illinois are extensive and require many days to adequately respond to the needs of the county, city, school district, and citizens.

Sources:	
National Flood Insurance Program Digital Flood Insurance Rate Maps, 2010	Illinois State Water ISWS Survey Hydrology and Hydrologic Reports of Lower Rock River
<i>Illinois Natural Hazard Mitigation Plan, 2013</i>	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
Community Rating System	FEMA Flood Insurance Study, 1986
FEMA Region V NFIP Repetitive Loss Property Report	Rock Island County Flood Hazard Assessment Report (HAZUS-MH)
National Climatic Data Center	Quad City Times

Map 3-5
Rock Island County Hazard Mitigation Plan
River Flood with Repetitive Loss
for Rock Island County



Severe Storms Combined

Hail, Lightning, Thunderstorm, Tornadoes, and Wind

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

This combined hazard category of severe storms includes hail, lightning, thunderstorms, tornadoes, and wind. Severe storms typically occur in conjunction with each other. Thunderstorms are accompanied by lightning and can produce strong winds, hail, and tornadoes.

Hailstorms are thunderstorms that produce hail. A hailstone is a ball or irregularly shaped lump of ice that forms within a large cumulonimbus thunderstorm cloud. Hail is produced by many strong thunderstorms. Strong rising currents of air within a storm carry water droplets at a height where freezing occurs. Ice particles grow in size until they are too heavy to be supported by the updraft. Hail can be smaller than a pea or as large as a softball and can be very destructive to plants, crops and buildings. Pets and livestock are particularly vulnerable to hail.

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt.” This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000 degrees Fahrenheit in a split second. This rapid heating, expansion, and cooling of air near the lightning bolt creates thunder. Almost all lightning will occur within 10 miles of its parent thunderstorm, but it can strike from much farther away. Lightning detection equipment has confirmed bolts striking almost 50 miles away from the parent thunderstorm.

Thunderstorms are created from a combination of moisture, rapidly raising warm air, and a lifting mechanism such as clashing warm and cold air masses. Thunderstorms can occur singly, in clusters, or in lines. Most thunderstorms produce only thunder, lightning, and rain, but severe storms can produce tornadoes, straight-line winds and microbursts above 58 mph, lightning, hailstorms, and flooding. The National Weather Service considers a thunderstorm severe if it produces hail at least one-inch in diameter, wind 58 mph or higher, or tornadoes. Straight-line winds can often exceed 60 mph, are common occurrences, and are often mistaken for tornadoes.

A tornado is a violent whirling wind characteristically accompanied by a funnel-shaped cloud extending down from a cumulonimbus cloud that progresses in a narrow, erratic path. Rotating wind speeds can exceed 300 mph and travel across the ground at average speeds of 25 to 30 mph. A tornado can be a few yards to about a mile wide where it touches the ground; however, an average tornado is a few hundred yards wide. It can move over land for distances ranging from short hops to many miles, causing great damage wherever it descends. Multiple tornado funnels can develop from the same supercell cumulonimbus thunderstorm. The funnel is made visible by the dust sucked up and by condensation of water droplets in the center of the funnel. Most tornadoes occur in spring and summer months, but they can and have occurred in the fall and winter months. Late afternoon to evening hour tornadoes are most common, but they can occur at any time of the day.

Windstorms can be described as extreme winds associated with severe winter storms, severe thunderstorms, downbursts, and very strong pressure gradients. It is difficult to separate the various wind components that cause damage from other wind-related natural events that often occur with or generate windstorms. Historically, windstorms are associated with severe thunderstorms and blizzards. High impact Derechos are associated with bands of rapidly moving thunderstorms known as bow echoes, squall lines, or quasi-liner thunderstorm systems. They are a widespread long-lived storm that races across a large area such as a state or region.

Between 1951-2012, the National Climatic Data Center reports a total of 345 severe storm events have occurred in Rock Island County. The severe weather events include tornadoes and thunderstorms with hail, lightening, and wind speeds ranging between 50 and 80 mph. Severe storms may develop or be an outgrowth of a typical thunderstorm weather system. These events resulted in \$12,698,700.00 in total losses. Many times, it is difficult to separate these types of weather events and distinguish them as individual hazard events, as one system can spawn multiple events. There have been six major disaster declarations in Rock Island County involving severe storms.

Severe Storms Major Disaster Declarations:

- 1965 – DR#194
- 1974 – DR# FDAA 438-DR
- 1985 – DR# FEMA 735-DR
- 1990 – DR# FEMA 871-DR
- 2008 – DR# FEMA 1771-DR
- 2013 – DR# FEMA 4116-DR

Selected historical events in Rock Island County:

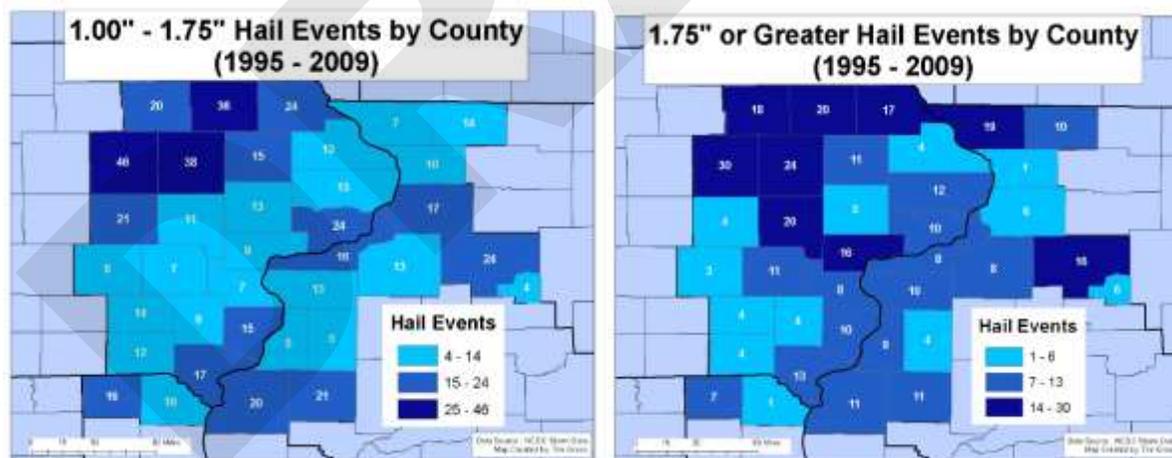
- **March 15, 2016:** Severe late winter thunderstorms produced an EF2 tornado in the Hampton/Rapids City area. Tornado winds speeds were estimated at 130 mph. The storm path was 4.8 miles long and 200 yards wide. Forty homes were damaged and four were completely destroyed. Other damage occurred in the John Deere Road and 7th Street Moline area to the hospital building façade, cart stations at Target and HyVee were lifted and dropped onto cars, and some building damage occurred to businesses. Augustana College, Rock Island had building damage to student housing when a large tree fell, and 30 students had to be relocated. Power was out to the entire campus for over 12 hours. Arsenal Island in Rock Island had damage to 50 trees on the island and damage to a building roof and some vehicles. Peak winds were reported at 69 mph and the Quad City International Airport, Moline. Quarter to half dollar size hail fell in many locations in the county. **Injuries:10**
- **June 22, 2015:** Severe thunderstorms produced significant straight line winds and tornadoes. An EF2 tornado was reported near Edgington in Rock Island County causing heavy damage to roofs and several garages were destroyed. Large trees were uprooted. There were no reported injuries.

- **June 24, 2013:** Severe thunderstorm with winds measured at 68 mph at the Quad City Airport, Moline, IL. Damage and uprooting occurred to numerous trees in Moline, .75 inch hail was reported and numerous power outages occurred.
- **May 31, 2013:** Severe thunderstorms produced an EF1 tornado near Andalusia, IL with 95 mph winds. Tornado travelled north to Buffalo, Iowa. Total path length 2.5 miles. Path width was 100yards. Trees were damaged and one mobile home was damaged.
- **April 14, 2012:** Thunderstorms developed during the late afternoon through much of the evening hours. Large hail and damaging winds were reported across eastern Iowa and western Illinois. Three aircraft were damaged at the Quad City International Airport near Moline. A house was partially unroofed near the airport, and a highway sign was also blown over. The automated wind sensor recorded 78 mph winds at the airport. A dome of a former church was blown off at 700 22nd street near the Quad City International Airport, falling onto a house and causing some damage.
- **May 29, 2011:** Thunderstorms developed in the region with heavy rain, and some storms produced large hail and damaging winds. Wind gusts estimated to be 60 mph blew a large tree down across 18th Avenue in Rock Island around 10:40 a.m. CDT May 29. A 60 mph wind gust was measured by the ASOS at the Quad City International Airport in Moline at 10:40 a.m. CDT May 29. Wind gusts estimated to be 60 mph blew down several large tree branches in Rock Island, IL at 10:45 a.m. CDT May 29. **Property Damage:** \$20,000
- **May 29, 2011:** Thunderstorms developed in the region with heavy rain, and some storms produced large hail and damaging winds. Wind gusts estimated to be 60 mph blew a large tree down across 18th Avenue in Rock Island around 10:40 a.m. CDT May 29. A 60 mph wind gust was measured by the ASOS at the Quad City International Airport in Moline at 10:40 a.m. CDT May 29. Wind gusts estimated to be 60 mph blew down several large tree branches in Rock Island, IL at 10:45 a.m. CDT May 29. **Property Damage:** \$20,000
- **June 23, 2010:** In Milan, four adults were shocked by a nearby lightning strike at the KOA campground at 4:54 p.m. CDT. The Boy Scout leaders were attempting to hold down an awning when the lightning struck. One person complained about difficulty hearing and was transported to a hospital.
- **June 18, 2010:** A frontal system over the area brought two rounds of showers and thunderstorms to the mid-Mississippi Valley. There were scattered reports of hail, heavy rain, and damaging winds across much of the area. Rainfall totals through mid-evening were widely varied, ranging from a couple tenths of an inch to well over 2 inches in some locations. A few lightning strikes also caused some damage with 80 mph winds reported. Several vehicles at a campground, Illiniwek Park, suffered damage from falling tree limbs. In Port Byron, a roof was torn from a building and tossed onto nearby power poles, causing one of the poles to fall and smash the attached transformers into a passing van, setting the van on fire. The occupants of the van escaped without major injury. In Hampton, lightning struck a house, setting fire to the attic. Sixty mph winds were reported in Moline at 7:38 p.m. with wind gusts of 60 to 70 mph northeast of East Moline at 7:49 p.m. **Injuries:**6 **Property Damage:** \$42,000

- **June 18-19, 2009:** An upper level disturbance moved through the region during the morning and early afternoon hours of June 18 and produced showers and thunderstorms across the area with some reports of damaging winds and large hail. Heavy rains also common resulted in some flash flooding. Quarter to golf ball-sized hail fell for about five minutes in Coal Valley, IL around 12:20 p.m. June 18. Three-quarter-inch hail was reported in Moline. Quarter-sized hail fell at the intersection of John Deere Road and 41st Street in Rock Island at 12:31 p.m. One and a half-inch diameter hail fell at the Wal-Mart in Moline around 12:32 p.m. A wind gust estimated to be 65 mph blew a semi-trailer outside of its traffic lane about 2 miles north of Coal Valley, IL around 12:31 p.m. June 18. A cold front pushed through Iowa and Illinois during the afternoon and evening of June 19 bringing severe thunderstorms and flooding to much of the area. Winds in excess of 70 mph were reported as well as torrential downpours that produced from three quarters of an inch to over 3 inches of rain in only an hour or two. Heavy rain resulted in flash flooding of some streets in Milan and Moline during the early evening. Quad City International Airport in Moline recorded 72 mph winds. Wind gusts estimated to be 65 mph blew down some 5 to 6 inch diameter tree branches in Cordova around 5:52 p.m. Wind gusts estimated to be 65 mph blew down several tree branches in Moline around 6:00 p.m. **Property Damage:** \$75,000
- **July 21, 2008:** A severe line of thunderstorms moved into the area and produced widespread and destructive straight line winds of 60-94 mph, This storm was classified as a Derecho. The highest measured wind gust was 94 mph at the National Weather Service Office in Moline, IL. The damage corridor started 5 miles west of the Quad City International Airport in Moline, IL. It followed Interstate 280 to the Quad City Airport and then along John Deere Road in Moline then eastward generally 10 miles through Colona and the Green River corridor in Henry County. These extreme winds produced wind damage in an area 20-40 miles wide, comprised largely of downed trees and power lines. Power was knocked out to over 130,000 utility customers in the Quad Cities Area. Many homes, businesses, and private and public water wells lost power for several days to a week. The John Deere Road Corridor in Moline had several large utility poles bent over with one snapped in half. Milan also had many utility poles snapped in half. Numerous elevated business signs were blown out or severely damaged. There was severe damage to a bank's automatic teller machine and drive-up overhang structure. Windows were blown out of a few businesses. Empty utility trailers were blown across a road and on to their sides. Widespread tree damage occurred across the County with damage impacting houses, vehicles, businesses and power lines. Many local roads were blocked by debris and downed powerlines for several days.
- **May 13, 2008:** A cold front moving into a warm and unstable air mass triggered severe thunderstorms across portions of the region. Several reports of nickel to quarter-sized hail were received from trained spotters in extreme eastern Iowa and northwest Illinois. A trained spotter estimated hail the size of pennies near Illinois City.
- **June 6, 2006:** Lightning from storms struck two houses in Moline with considerable damage from resulting fires.
- **March 13, 2006:** An F1 tornado south of Illinois City travelled 13 miles and caused damage to several buildings.

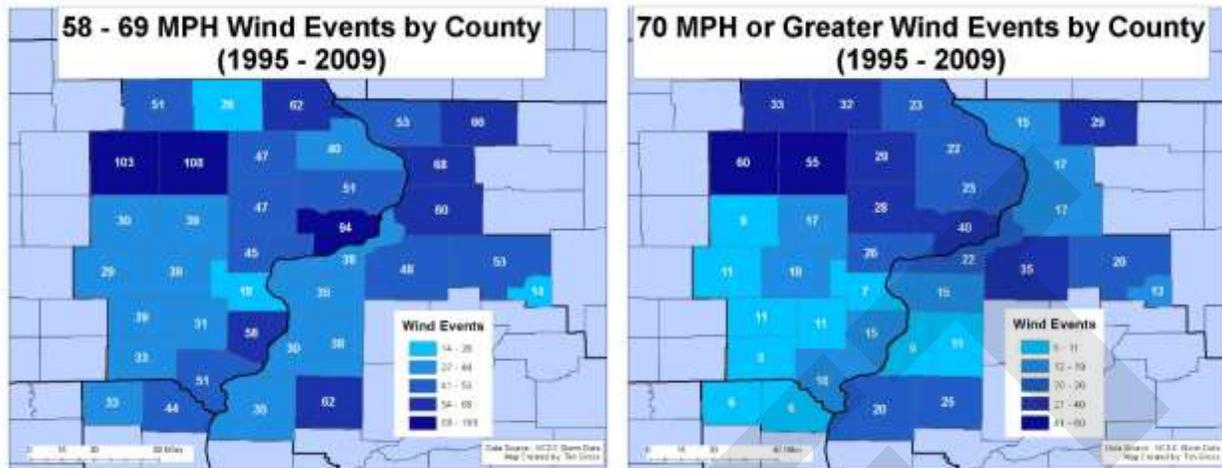
- **March 12, 2006:** A thunderstorm event included record wind gust of 93 knots or 107 mph near the Quad City International Airport in Moline. A Hampton Inn under construction on the northeast side of the airport was demolished, and a nearby interstate highway sign was blown over. Many trees were downed in the area. Trinity Medical Center on 7th Street in Moline lost all electrical power for several hours.
- **June 10, 1999:** A man and woman fishing along the Rock River just east of the U.S 67 bridge in Milan were struck and killed by lightning.
- **June 29, 1998:** A Derecho crossed Rock Island County with winds exceeding 65 mph.
- **June 18, 1998:** 3.00 inch hail was recorded near Milan
- **May 18, 1997:** 3.00 inch hail was recorded near Milan
- **April 6, 1997:** Strong gradient winds without a thunderstorm caused widespread and significant damage to trees and power lines. Gusts of 52 knots were recorded at the Quad City International Airport in Moline.
- **May 10, 1996:** Thunderstorm winds between 80 and 90 mph struck the Quad Cities Nuclear Power Plant operated by Exelon near Cordova. No damage was done to the plant or its operations; however, several small outbuildings sustained heavy damage, and a number of “tear away” tiles were blown off the main building of the facility.
- **March 13, 1990:** An F3 tornado was reported near Cordova with one injury and \$2.5 million in property damage

Figure 3-7
Hail Events by County



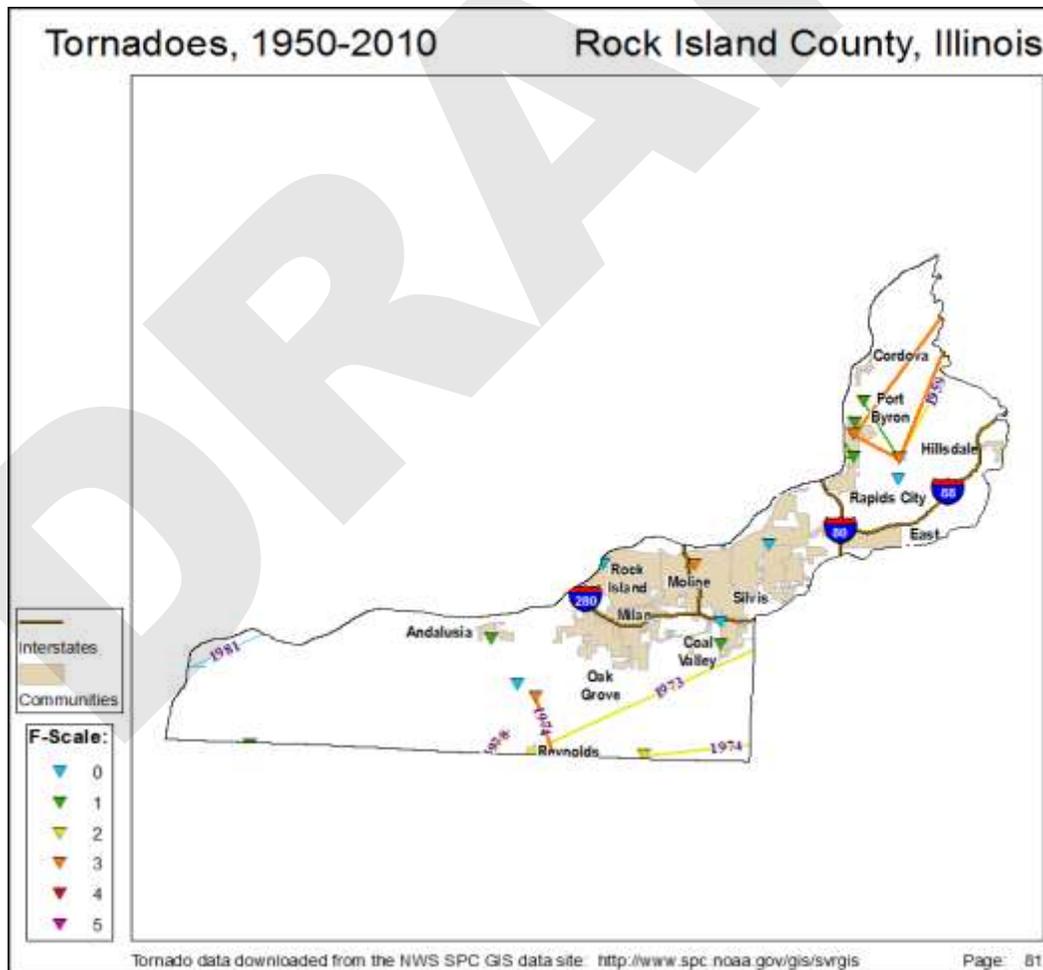
Source: NWS Quad Cities IA/IL Office (<http://www.crh.noaa.gov/dvn/?n=riskassessment>)

Figure 3-8
Wind Events by County



Source: NWS Quad Cities IA/IL Office (<http://www.crh.noaa.gov/dvn/?n=riskassessment>)

Figure 3-9
Historic Tornado Touchdowns by Severity in Rock Island County



Source: State Climatologist Office for Illinois (<http://www.sws.uiuc.edu/atmos/statecli/>)

Probability. According to the *Illinois Hazard Mitigation Plan, 2013* based on 61 years of historical records, the annual probability of a severe storm event (hail, lightning, thunderstorm, and wind) is 525.8% or approximately 5 events per year, and the annual probability of a tornado event is 30.6% or approximately 0.3 events per year.

Storm Events in Rock Island County 1951-2012	Severe Storms - combined hail, lightning, thunderstorm, wind	Tornadoes
Number of Events	326	19
Total Recorded Losses	\$1,931,200.00	\$10,767,500.00
Average \$ in property damage per event	\$5,923.93	\$566,710.53
Annual probability of Event	525.8%	30.6%
Estimated Annual Loss	\$31,178.39	\$173,669.35

Source: 2013 Illinois Natural Hazard Mitigation Plan
(http://www.iema.illinois.gov/planning/Documents/Plan_IllMitigationPlan.pdf)

Magnitude and Severity. Those most at risk from severe storms are those in dwellings without secure foundations or basements, such as manufactured homes and campgrounds as well as people in automobiles. Vulnerable populations that include the elderly, very young, and the physically and mentally disabled are at most risk because of the lack of mobility to escape the path of destruction. People who may not understand the watches and warnings due to language barriers are also at risk.

Large hail, strong straight-line winds, heavy rains, flash flooding, lightning, and tornadoes are associated with severe storms and may cause significant damage to a wider area. Lightning presents the greatest immediate danger to people and livestock during a thunderstorm, and is the second most frequent weather-related killer in the U.S. with nearly 100 deaths and 500 injuries each year. (Floods and flash floods are the number one cause of weather-related deaths in the U.S.). Livestock and people who are outdoors, especially under a tree or other natural lightning rods, in or on water, or on or near hilltops are at risk from lightning. Hail can be very dangerous to people, pets, and livestock if shelter is not available.

High winds can damage trees, homes (especially manufactured homes), and businesses as well as knock vehicles off of the road. Straight-line winds are responsible for most thunderstorm damage. Unlike tornadoes, windstorms may have a destructive path that is tens of miles wide and several hundred miles long. Generally, the destructive path of a tornado is only a couple of hundred feet in width, but stronger tornadoes can leave a path of destruction up to a mile wide. As with the other severe storms, those most vulnerable during a tornado will be the ones unable to escape the path of destruction

Tornado intensity is measured by the Fujita Scale, which estimates wind speeds based on the damaged caused by the tornado. The Fujita scale was revised in 2007 to the Enhanced Fujita (EF) Tornado Scale, which includes additional enhanced descriptions of damage to multiple types of structures and vegetation with photographs and enhanced training materials. Figures 4 and 5 show the Enhanced Fujita scale and destruction categories.

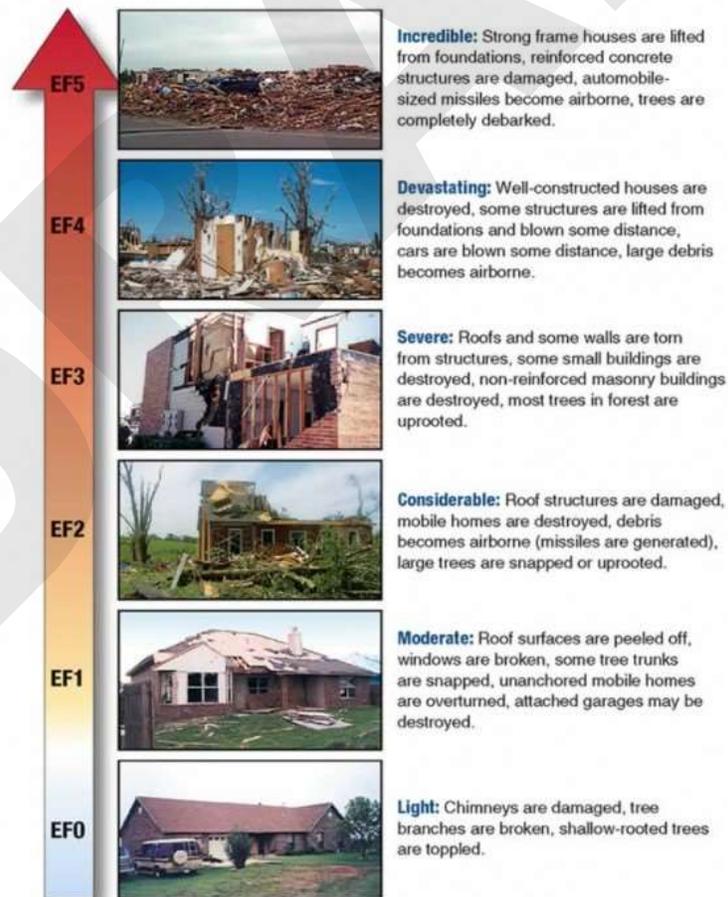
Figure 3-10
Fujita/ Enhanced Fujita Scale

Fujita Scale		EF Scale	
Fujita Scale	3-Second Gust Speed (mph)	EF Scale	3-Second Gust Speed (mph)
F0	45-78	EF0	65-85
F1	79-117	EF1	86-109
F2	118-161	EF2	110-137
F3	162-209	EF3	138-167
F4	210-261	EF4	168-199
F5	262-317	EF5	200-234

The Fujita Scale categorizes tornado severity based on observed damage. The six-step scale ranges from F0 (light damage) to F5 (incredible damage). Since February 2007, the National Weather Service has used the Enhanced Fujita Scale (EF Scale). This new scale ranges from EF0 to EF5. See <http://www.spc.noaa.gov/efscale> for further information on the EF Scale.

<http://www.safeguardshelters.com/fujitascale.php>

Figure 3-11
Tornado Destruction based on Enhanced Fujita



<http://www.safeguardshelters.com/fujitascale.php>

Effects from severe storms can range from broken tree branches, shingle damage to roofs, and some broken windows all the way to complete destruction of well-constructed structures, infrastructure, trees, and entire towns. Crop damage is often associated with windstorms and hail; stripping the plant of leaves, laying down crops, breaking stalks, and twisting plants, reducing yield and making it difficult to harvest. Hail can also do considerable damage to vehicles and buildings. Exposure to hail larger than a nickel can be very dangerous and life threatening. Severe storms can affect many critical services, especially electrical power. Disruption of critical services can also affect operations. Economic effects can result from direct damages to facilities or business disruption from the lack of critical services such as electrical power.

Warning Time. Advances in weather prediction and surveillance have increased the accuracy of storm location and direction. Weather forecasting and severe weather warnings issued by the National Weather Service usually provide residents and visitors with adequate time to prepare. Isolated problems arise when warnings are ignored. The advancement in weather forecasting has allowed watches to be delivered to those in the path of these storms up to hours in advance. Watches are issued when conditions are favorable for thunderstorms to develop 12 to 24 hours in advance. Advisories are issued when existing or imminent threats cover part or all of the forecast area and pose a threat to life and property. The best lead time for a specific severe storm and tornado is about 30 minutes. Tornadoes are harder to predict and have been known to change paths very rapidly, thus limiting the time to take shelter. Tornadoes may not be visible on the ground due to blowing dust or heavy rain and hail. Warnings in the 20 to 30 minute range are usually available prior to the occurrence of the storm. Some severe storms can be seen approaching, while others hit without much warning. The National Weather Service issues severe storm watches and warnings as well as statements about severe weather and localized storms. These messages are broadcast over NOAA Weather Alert Radios as well as TV and radio stations. In addition to the National Weather Service and NOAA alerts, the Quad Cities Metro Area has a linked outdoor warning siren system.

Duration. Severe storms can be quite expansive with areas of localized severe conditions. Most severe thunderstorm cells are 5 to 25 miles wide with a larger area of heavy rain and strong winds around the main cell. Most non-severe thunderstorms have a lifespan of 20 to 30 minutes, yet severe thunderstorms can last longer than 30 minutes. Generally, the destructive path of a tornado is only a couple of hundred feet in width, but stronger tornadoes can leave a path of destruction up to a mile wide. Normally, a tornado will stay on the ground for no more than 20 minutes; however, one tornado can touch ground several times in different areas.

Sources:	
National Weather Service Weather Forecast Office – Quad Cities, IA/IL (http://www.crh.noaa.gov/dvn/)	NOAA National Climatic Data Center (http://www.ncdc.noaa.gov/stormevents/)
<i>Illinois Natural Hazard Mitigation Plan, 2013</i> (http://www.iema.illinois.gov/planning/Documents/Plan_IllMitigationPlan.pdf)	State Climatologist Office for Illinois (http://www.sws.uiuc.edu/atmos/statecli/)
NOAA Storm Prediction Center – <i>About Derechos</i> (http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm)	Quad Cities – Rock Island County Emergency Actualization Plan (5/20/2014)

Severe Winter Storm

Hazard Score Calculation					
Historical/ Probability	Vulnerability	Severity of Impact	Current Population	Projected Population	Hazard Score

Severe winter weather conditions that affect day-to-day activities. These can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and/or extreme cold. Winter storms are common during the months of October through April.

Description. The various types of extreme winter weather cause considerable damage. Heavy snows cause immobilized transportation systems, downed trees and power lines, collapse of buildings, and loss of livestock and wildlife. Blizzard conditions are winter storms that last at least three hours with sustained wind speeds of 35 mph or more, reduced visibility of 1/4 mile or less, and white out conditions. Heavy snows of more than 6 inches in a 12-hour period or freezing rain greater than 1/4 inch accumulation may cause hazardous conditions in the community and slow or stop the flow of vital supplies, as well as disrupting emergency and medical services. Loose snow begins to drift when the wind speed reaches a critical speed of 9 to 10 mph under freezing conditions. The potential for some drifting is substantially higher in open country than in urban areas where buildings, trees, and other features obstruct the wind. Ice storms result in fallen trees, broken tree limbs, downed power lines and utility poles, fallen communications towers, and impassable transportation routes. Severe ice storms have caused total electric power losses over large areas of Illinois and rendered assistance unavailable to those in need due to impassable roads. Frigid temperatures and wind chills are dangerous to people, particularly the elderly and the very young. Dangers include frostbite or hypothermia. Water pipes, livestock, fish and wildlife, and pets are also at risk from extreme cold and severe winter weather.

Historical Occurrence. The National Climatic Data Center reports 43 storm events for Rock Island County between January 1, 1994 and December 1, 2014. Notable events include:

- **December 6, 1994:** Freezing rain, sleet, and snow storm occurred in northwest Illinois in the vicinity of the Quad Cities. The ice storm caused thousands of tree limbs to break, taking power lines with them. The damage to lines, poles, and equipment was extensive. Nearly 300,000 residents lost power. Repairs to damaged electrical equipment cost an estimated \$1 million. Hardest hit were Moline, East Moline, Rock Island, and the rural Illinois communities of Orion, Reynolds, and Sherrard. The weight of heavy snow brought down tree limbs, and more than 300 Iowa-Illinois Gas and Electric employees worked around the clock during a four-day period to restore power. Thirty tree clean-up crews were required to clear tree limbs and fallen trees.
- **April 10, 1997:** Twelve to eighteen inches of heavy snow fell in several waves. The weight of snow was enough to collapse roofs of barns and sheds and damaged trees. Perhaps the greatest impact of the late season snow is that most cities had to re-tool trucks for snow removal after having just modified them for summer duty. Snow also slowed sand bagging efforts on the Mississippi River.

- **January 1, 1999:** Holiday travelers were stranded at the Quad City International Airport in Moline when airport crews were unable to keep up with 8-12 inches of blowing and drifting snow.
- **January 31-February 2, 2011:** A wide spread severe winter storm passed over the majority of Illinois resulting in large accumulations of heavy snow. Moline, Illinois observed 16.7 inches of snow from the evening of February 1 to the morning of February 2, setting a new 24-hour snowfall record, topping a January 3, 1971 event by 0.3 inches. The Moline three-day totals of 18.4 inches also tied the record for a single storm that was set in January 1979.
- **January 22-24, 2014:** Thirty-five mph wind gusts exacerbated sub-zero temperatures and caused wind chill values to fall below -30 degrees. The winter of 2013-2014 was about 9 to 10 degrees below normal and was the snowiest and 6th coldest winter for Moline.
- The only recent event that resulted in death from the cold occurred in January 2004. On January 25, an elderly man in Milan attempted to climb over his fence and became hung up, and on January 29, an elderly man in Hampton fell near his house and died from hypothermia.

Probability. Winter storms regularly move easterly and use both the southward plunge of cold arctic air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow and sometimes blizzard conditions in Iowa and Illinois, as well as other parts of the Midwest. The cold temperatures, strong winds, and heavy precipitation are the ingredients of winter storms. Most counties can usually expect 2 or 3 winter storms a season with an extreme storm every 3 to 5 years on average. A snowfall greater than 6" from one single storm occurs in approximately 49% of Illinois winters, while a large winter storm event of 10 inches or more will occur about once every 3 years.

Magnitude/Severity. Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents. About 70% of winter-related deaths occur in automobiles, and about 25% are people caught out in a storm. Those at risk are primarily either engaged in an outdoor activity (shoveling snow, digging out vehicles, or assisting stranded motorists), or are elderly or very young. Citizens' use of kerosene heaters and other alternative forms of heating create other hazards such as structural fires and carbon monoxide poisoning. The *Illinois Hazard Mitigation Plan, 2013* estimates that the annual loss from Severe Winter Storm events is \$79,665.60 for Rock Island County and \$4.7 million for the state. However, in March 2011, a federal disaster declaration estimated damages of \$529,447.45 for Rock Island County resulting from severe winter storm activity. The *Illinois Hazard Mitigation Plan, 2013* gave Rock Island County a high rating for Severe Winter Storms.

Warning Time. The National Weather Service has developed effective weather advisories that are promptly and widely distributed. Radio, TV, and weather alert radios provide the most immediate means to do this. Accurate information is made available to public officials and the general public up to days in advance. Weather prediction capabilities have made significant improvements in recent years. There are several notifications made by the National Weather Service, including winter storm watches, winter storm warnings, blizzard warnings, winter weather advisories, and frost/freeze advisories.

Duration. Winter storms may affect a large area, although local variations in storm intensity and quantity of snow or ice may occur. The duration of the storm will be determined by the local response to snow removal and any associated losses and dangers of electrical outages. The Illinois Department of Transportation, Rock Island County road departments, and local public works agencies are responsible for the removal of snow and treatment of snow and ice with sand and salt on the hundreds of miles of streets and highways in Rock Island County.

Sources:	
National Climatic Data Center	Storm Events Database. http://www.ncdc.noaa.gov/stormevents/
National Weather Service	Climate Reports: February 2014 & Winter 2013-2014.
Rock Island County, Bi-State Regional Commission	<i>Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009</i>
State of Illinois, IEMA	<i>Illinois Natural Hazard Mitigation Plan, 2013</i>
FEMA Region 5	http://www.fema.gov/zh-hans/disaster/1960 . Illinois Severe Winter Storm and Snowstorm, DR-1960.

Assessing Vulnerability: Overview

This section analyzes the Rock Island County planning area's vulnerability to hazards in terms of community assets and population. This first part is a general profile of Rock Island County that describes the county-wide planning area characteristics and its historic development.

Community Profile: Rock Island County, Illinois

Local History

Rock Island County was the home of the Sauk and Meskwaki (Fox) tribes of Native Americans for about one hundred years before the county became incorporated. These native peoples lived, farmed, and hunted all along the Rock River Valley. Black Hawk was a distinguished leader of the Sauk tribe, and his legacy remains in numerous landmarks that bear his name. White settlements eventually pushed the Native Americans out of the area after the Black Hawk War, but not without much bloodshed.

On February 9, 1831, the Illinois General Assembly established Rock Island County and defined its boundaries. In 1833, early pioneers approved formation of a county government with the first county election held on July 5 of that year. In 1856, petitions were submitted to the county board requesting the formation of townships during the next election in November. In this election, Col. George Davenport, John W. Spencer, and George W. Harlan were the first County Commissioners elected along with Benjamin Axe being chosen first Sheriff and Levi Wells first County Coroner. This township form of government is still in existence after nearly 150 years.

The railroads played a significant role in the development of the area, and the rail yards and "humping stations" that exist today in Silvis and Carbon Cliff are a remnant of that once thriving industry. Local coal was a stimulus to the development of the rail lines. Newspaper accounts at the turn of the nineteenth century report numerous mine openings for both coal and clay, mine fires, water supply and sulfur contamination problems, the building of huge mining scales, and the founding of many coal and rail companies. All this is evidence of the important role of coal and rail in the early development of the county-wide planning area.

The United States Census of Population taken in 1840 was the first census to list a population figure for Rock Island County; at that time, a total of 2,610 people lived in the county. By 1860, the population had jumped to 21,005 persons, and since then it has experienced both inclines and declines in population. In 1960, Rock Island County's population was 150,991, an increase of 148,381 people since the first census was taken 120 years before. The period from 1890 to 1920 was one of rather rapid and sustaining population growth, and during those 30 years 50,380 people were added to the county's population. This sustained growth, however, dropped abruptly during the 1920s when the population increase was only 5,894 people. During the Depression of the 1930s, the population of Rock Island County grew at a rate greater than the larger regions of which it is a part – the State of Illinois, the North Central Region, and the United States as a whole. Past population growth in Rock Island County has been characterized by sustained, but rarely "booming" expansion. More recent population trends are identified later in this section.

Dates of certificate of incorporation as issued by the Secretary of State of Illinois

Earlier dates of community settlement or founding as reported by the local jurisdiction are shown in parentheses.

Village of Andalusia – 1894 (1845)

Village of Carbon Cliff – 1907

Village of Coal Valley – 1876 (1856)

Village of Cordova – 1894

City of East Moline – 1903

Village of Hampton – 1894 (1838)

Village of Hillsdale – 1951 (1895)

Village of Milan – 1893 (1870)

City of Moline – 1872 (1848)

Village of Oak Grove – 1956

Village of Port Byron – 1877 (1836)

Village of Rapids City – 1875

Village of Reynolds – 1897

City of Rock Island – 1879 (1841)

City of Silvis – 1907 (1906)

Source: Illinois Counties & Incorporated Municipalities, Illinois Secretary of State, May 2006

Geography

Rock Island County is comprised of 452 square miles with a total land area of 426.75 square miles. The physical setting is dominated by the major rivers and streams that flow across the county and along its borders. The Mississippi River extends for more than 60 miles along its western border and is no more than 14 miles distant from any point in the county. The Rock River forms the eastern boundary for a distance of almost 20 miles before flowing westward across the county to join the Mississippi at the city of Rock Island.

The topography is characterized by relatively flat upland areas, ranging from 700 to 800 feet above sea level, and river floodplains, which range from 580 feet above sea level at the northeast end of the county to 540 feet in the southwest. The Mississippi and Rock Rivers follow roughly parallel courses in the northern half of the county and are separated by a narrow upland tract, which itself is segmented by broad valleys connecting the Mississippi and Rock River floodplains. The extensive floodplains of Rock Island County are not restricted to areas immediately adjoining the major rivers.

Government Structure

Rock Island County is governed by a 25-member board elected by district to four-year terms. Elections are on a staggered basis. The county has both taxing and bonding authority. County government provides court and law enforcement services, the Department of Public Works (road and bridge building and maintenance), the Department of Public Health, a liquor commission, veterans assistance, community mental health facilities and services, county nursing homes, a forest preserve district, and a zoning office that handles all inspections, platting and building permits. County board districts are distinct from townships. Townships within Rock Island County have elected supervisors and trustees and take care of assessments for property taxes. The county offers limited sewer services only to the unincorporated developed area of Coyne Center.

Other participating jurisdictions include incorporated municipalities that range from small villages to cities with sizeable staff. All the villages have a similar governmental structure with the President of the Board of Trustees as the Chief Executive Officer of the village. The president is generally elected for a four-year term, except for the Village of Port Byron, which has a two-year term for Village Board President. All villages elect board members for four-year staggered terms. More information on government structure can be found under the individual jurisdiction profiles.

Climate and Weather

The climate in Rock Island County is subhumid midcontinental with an average annual temperature of 51 degrees Fahrenheit. The average July temperature is 75.4 degrees Fahrenheit, and the January average temperature is 22.6 degrees Fahrenheit. The typical precipitation in Rock Island County is 37.96 inches with an average of 31.6 inches of snowfall, and an average wind speed of 7.4 mph.

Source: National Weather Service Forecast Office. (1981-2010 Normals)

Monthly Normals for Moline Quad City International Airport

Month	Average Temperature	Probability of Precipitation
January	22.6	1.5%
February	27.0	1.6%
March	39.1	2.9%
April	51.4	3.6%
May	61.8	4.3%
June	71.5	4.5%
July	75.4	4.3%
August	73.5	4.5%
September	65.4	3.1%
October	53.2	3.0%
November	40.0	2.6%
December	26.6	2.2%

Source: National Oceanic & Atmospheric Administration. National Environmental Satellite, Data, and Information Service. Moline Quad City International Airport Station. 1981-2010 Station Normals of Temperature, Precipitation and Heating and Cooling Degree Days.

Seasonal Normals for Moline Quad City International Airport

	Winter	Spring	Summer	Fall	Annual
Average Temperature	25.4	50.8	73.5	52.9	50.7
Probability of Precipitation	5.3%	10.8%	13.30%	8.6%	38.0%

Source: National Oceanic & Atmospheric Administration. National Environmental Satellite, Data, and Information Service. Moline Quad City International Airport Station. 1981-2010 Station Normals of Temperature, Precipitation and Heating and Cooling Degree Days.

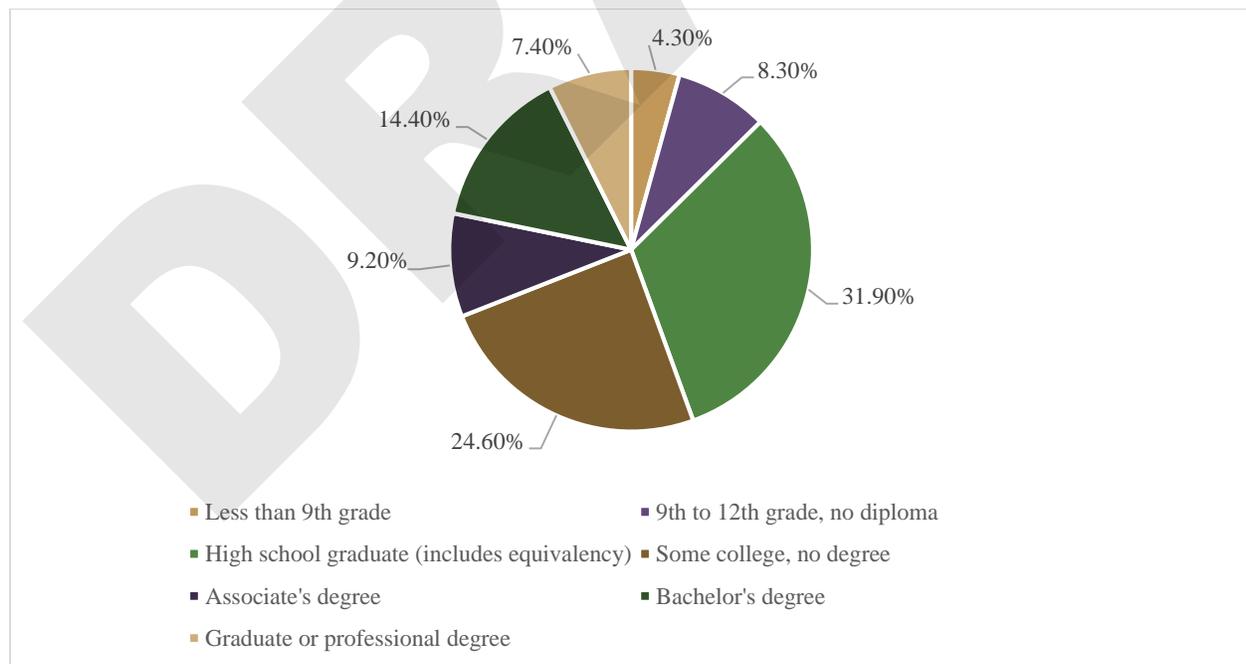
Communications (Quad Cities Area)

Newspapers	Radio Stations	Local TV Stations
The Quad City Times (Davenport, IA)	27 FM Stations	CH 23: Western Univ. - QC
The Dispatch / The Rock Island Argus (Moline, IL)	6 AM Stations	CH 34: Iowa Public TV
Star Courier (Kewanee, IL)		CH 36: KWQC Davenport
The North Scott Press (Eldridge, IA)		CH 38: WQAD Moline
Aledo Times-Record (Aledo, IL)		CH 49: KLJB Davenport
The River Cities Reader (Davenport, IA)		CH 61: KQCT-LP Davenport

Education (Rock Island County)

When looking at the county population over the age of 25, 55.6% has at least some college experience, while 14.4% has bachelor’s degrees, and 7.4% has graduate degrees.

**Figure 3-12
Educational Attainment**



Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

Schools and Colleges

Rock Island County contains all or portions of the following school districts:

- Hampton School District #29
- United Township HS District #30
- Silvis School District #34
- Carbon Cliff-Barstow School District #36
- East Moline School District #37
- Moline Unit School District #40
- Rock Island School District #41
- Riverdale Community Unit School District #100
- Sherrard Community Unit School District #200
- Rockridge Community School District #300
- Black Hawk Area Special Education District

There are three private or parochial schools in Rock Island County. Buildings that serve Augustana College, Black Hawk College, and Western Illinois University are also located within the county.

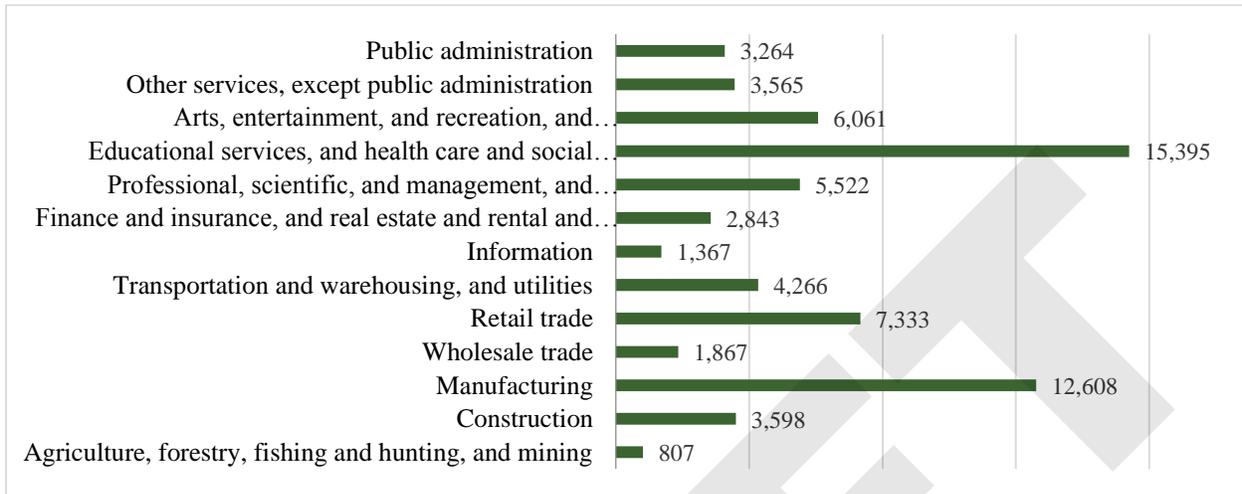
Economic Characteristics

Employment Status

Population 16 years and over	117,865
In labor force	74,749
Civilian labor force	74,649
Employed	68,496
Unemployed	6,153
Armed Forces	100
Not in labor force	43,116

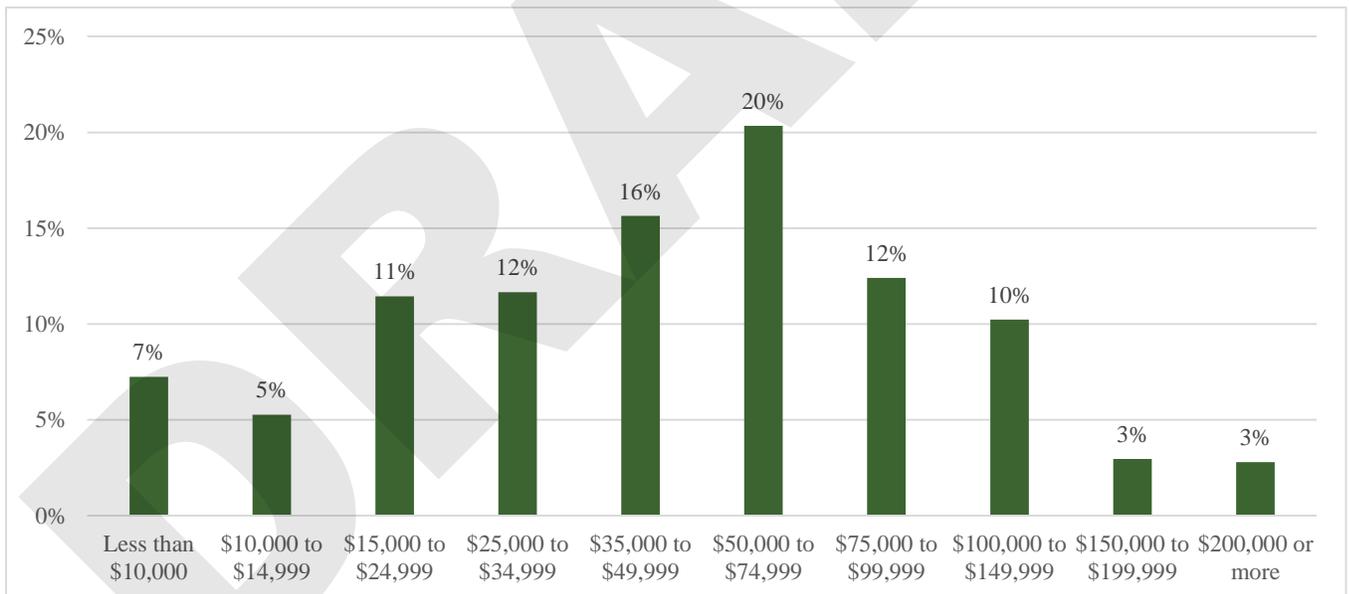
Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

**Figure 3-13
Employment By Industry**



Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

**Figure 3-14
Household Income**



Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

Top Area Employers as of February 2015 (Rock Island County, IL and Scott County, IA)

	Employer	Employed
1	Rock Island Arsenal	6,271
2	Deere & Company	5,800
3	Genesis Health Systems (all locations)	5,000
4	HyVee (all locations)	3,978
5	Unity Point - Trinity (all locations)	2,697
6	Tyson Fresh Meats	2,500
7	Davenport CSD	2,200
8	Alcoa Inc	2,000
9	Walmart (all locations)	1,853
10	Oscar Mayer Foods Corp	1,600
11	City of Davenport	1,295
12	APAC Customer Service Inc	1,200
13	Moline CSD	1,111
14	Group O Companies	1,100
15	Isle Casino Hotel Bettendorf	1,000
16	XPAC	1,000
17	Genesis Medical Center - Silvis	970
18	Mid American (all locations)	943
19	John Deere Davenport Works	840
20	Blackhawk College	825
21	Rock Island County	802
22	Excelon	700
23	Rock Island CSD	684
24	Rhythm City Casino	650
25	City of Rock Island	636
26	St Ambrose University	620
27	Rock Island County	602
28	Sears Manufacturing	600
29	Bettendorf Community School District	560
30	Palmer Chiropractic College	500
31	Scott County	450
32	UPS	450
33	Pleasant Valley Community School District	423
34	City of Moline	405
35	City of Bettendorf	300

Source: InfoGroup, Individual Employers.

Housing**Units in Structure**

Unit Type	Number of Structures	Percent of Total Structures
1-unit, detached	46,805	71%
1-unit, attached	2,782	4%
2 units	2,401	4%
3 or 4 units	2,360	4%
5 to 9 units	3,153	5%
10 to 19 units	2,412	4%
20 or more units	4,158	6%
Mobile home	1,649	3%
Boat, RV, van, etc.	0	0%
Total Housing Units: 65,720		

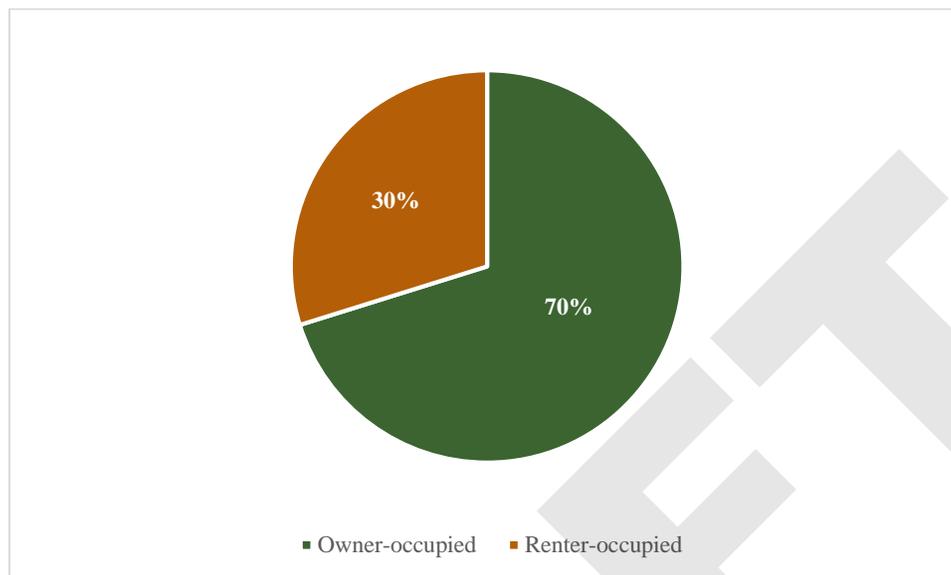
Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

Year Structure Built

Built 2010 or later	272	0%
Built 2000 to 2009	3,934	6%
Built 1990 to 1999	4,128	6%
Built 1980 to 1989	3,996	6%
Built 1970 to 1979	8,512	13%
Built 1960 to 1969	10,654	16%
Built 1950 to 1959	10,087	15%
Built 1940 to 1949	6,653	10%
Built 1939 or earlier	17,484	27%

Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

**Figure 3-15
Home Ownership**



Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates

Infrastructure

Rock Island County is traversed by four Interstate Highways: I-80, I-280, I-88, and I-74. In addition, there are U.S. Routes 6, 150, and 67. Six automobile bridges span the Mississippi River within Rock Island County's limits: the I-80 Bridge, the Iowa-Illinois (I-74) Bridge, the Government Bridge, the Centennial Bridge, the I-280 Bridge, and the Muscatine Bridge. The Quad City International Airport, located in Moline, Illinois, offers commercial air service for the Quad Cities Metropolitan Statistical Area and beyond. Railway companies operating within the county include the Burlington Northern Santa Fe, Canadian Pacific, and Iowa Interstate. Waterways within the county include the commercially navigable Mississippi River, the Rock River, and Copperas Creek (both the Rock River and Copperas Creek are tributaries of the Mississippi River). Lock and Dam 14, 15, and 16 on the Mississippi River are located within the county borders. Source water for municipalities in the county comes from either the Mississippi River or individual wells. Water treatment facilities are operated by individual municipalities and are located in the communities of Coal Valley, East Moline, Milan, Moline, Port Byron, Rock Island, and Silvis. Wastewater is also treated by individual municipalities with treatment facilities located in East Moline, Milan, Moline (North and South facilities), and Rock Island (Mill Street and Southwest facilities).

Medical and Healthcare

Rock Island County is served by three hospital campuses: Genesis Medical Center, Illini Campus in Silvis; UnityPoint Trinity in Moline; and UnityPoint Trinity in Rock Island.

*Population and Selected Social Characteristics (Rock Island County)*Household Types

• Family households (families)	37,698	62%
– With own children under 18 years	15,567	26%
– Married-couple family	27,630	46%
– Male householder, no wife present, family	2,583	4%
– Female householder, no husband present, family	7,485	12%
• Nonfamily households	22,758	38%
– Householder living alone	20,059	33%
▪ 65 years and over	8,074	13%

Average Household Size 2.37

Total Households 60,456

Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

Age Categories

5 to 14 years	12.30%
15 to 17 years	3.70%
18 to 24 years	9.20%
15 to 44 years	37.20%
16 years and over	79.90%
18 years and over	77.60%
60 years and over	23.00%
62 years and over	20.40%
65 years and over	16.50%
75 years and over	7.90%

Median age 40

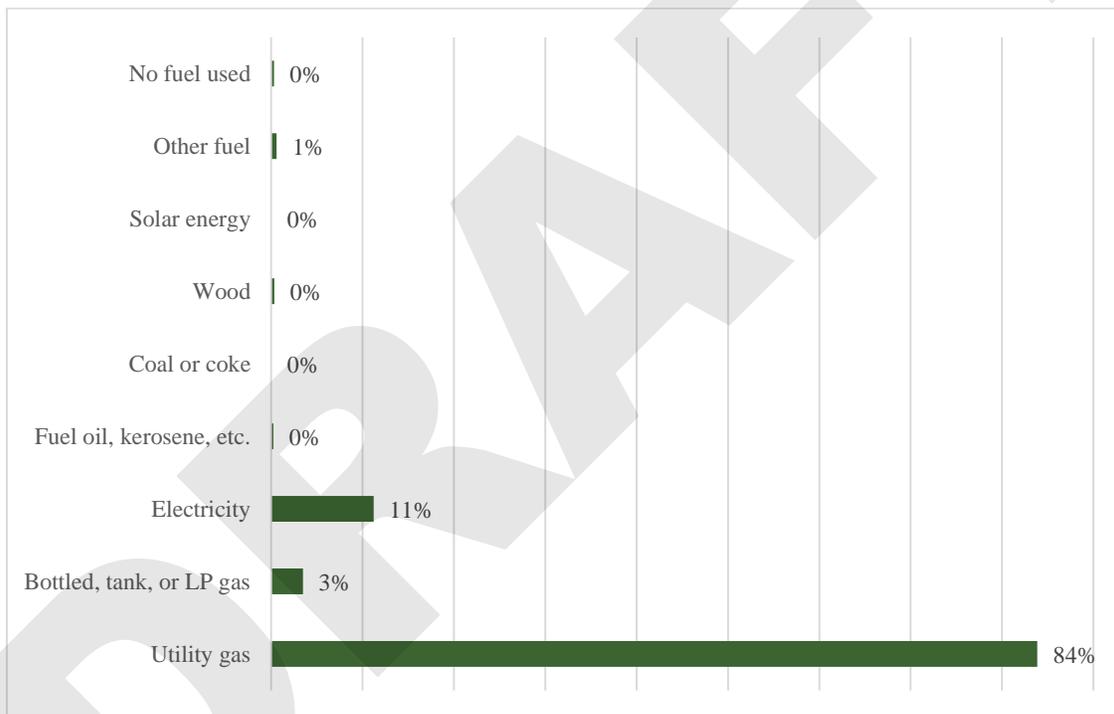
Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates

Ethnicity

White	124,173	84%
Black or African American	15,815	11%
American Indian and Alaska Native	1,421	1%
Asian	3,432	2%
Native Hawaiian and Other Pacific Islander	181	0%
Some other race	6,889	5%

Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates

**Figure 3-16
Heating Sources**



Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

Municipal Population Trends

Jurisdiction	2014 Population	2019 Population	% Change 2014-2019
Rock Island County	147,499	147,587	0.1%
Andalusia	1,312	1,416	7.9%
Carbon Cliff	2,128	2,125	-0.1%
Coal Valley	3,742	3,744	0.1%
Cordova	673	677	0.6%
East Moline	21,125	21,016	-0.5%
Hampton	1,892	1,914	1.2%
Hillsdale	496	476	-4.0%
Milan	5,039	5,002	-0.7%
Moline	43,802	44,074	0.6%
Moline School District	48,693	49,024	0.7%
Oak Grove	391	388	-0.8%
Orion School District	5,995	5,976	-0.3%
Port Byron	1,791	1,899	6.0%
Rapids City	920	890	-3.3%
Reynolds	539	540	0.2%
Rock Island	38,876	38,787	-0.2%
Silvis	7,313	7,190	-1.7%
Unincorporated Rock Island County	17,460	17,449	-0.1%

Source: ESRI, Community Analyst

Assessing Vulnerability: Identifying Structures

Determining Community Assets

An outline and definition of assets was taken from the state and local hazard mitigation planning how-to guide Understanding Your Risks: Identifying Hazards and Estimating Losses, FEMA document 386-2 published August 2001. The following types of facilities were considered. General information about the presence of these types of facilities in the county-wide planning area is mentioned here in italics as available. However, a description of the facilities selected by participating jurisdictions is included within the individual multi-jurisdiction risk assessments beginning on page 99.

A. Critical Buildings and Facilities

- **Essential Facilities:** Essential to the health and welfare of the whole population and are especially important following hazard events. The potential consequences of losing them are so great, that that should be carefully inventoried. Be sure to consider not only their structural integrity and content value, but also the effects on the interruption of their functions because *the vulnerability is based on the service they provide rather than simply their physical aspects*.
 - Hospitals: Genesis and Trinity Healthcare systems
 - Other medical facilities
 - Police stations
 - Fire stations

- Emergency operations centers
- Evacuation shelters
- Schools and colleges: *Black Hawk College, Augustana College, and Western Illinois University*
- **Transportation Systems**
 - Airways: airports, heliports: Quad City International Airport
 - Highways: bridges, tunnels, roadbeds, overpasses, transfer centers
 - *Interstate Highways: I-80, I-280, I-88, and I-74*
 - *I-74 Bridge Reconstruction and Realignment scheduled to be completed in 2018*
 - *U.S Routes 6, 150, and 67*
 - *Six automobile bridges span the Mississippi River within Rock Island County's limits: the I-80 Bridge, the Iowa-Illinois (I-74) Bridge, the Government Bridge, the Centennial Bridge, the I-280 Bridge, and the Muscatine Bridge*
 - *Rock River bridges*
 - Railways: trackage, tunnels, bridges, rail yards, depots
 - *Burlington Northern Santa Fe and Iowa Interstate railroads (Iowa Chicago & Eastern operates on Burlington Northern tracks within the county)*
 - Waterways: canals, locks, seaports, ferries, harbors, drydocks, piers
 - *Mississippi River(commercially navigable)*
 - *Rock River and other tributaries of the Mississippi River*
 - *Lock and Dam 14, 15, and 16 on the Mississippi River are located within the county borders*
- **Lifeline Utility Systems**
 - Potable water
 - *Water treatment operated by individual jurisdictions*
 - Wastewater
 - *Wastewater treatment provided by individual jurisdictions*
 - Oil
 - Natural Gas: MidAmerican Energy

- Electric Power: MidAmerican Energy
- Communications Systems
- **High Potential Loss Facilities**
 - Nuclear Power Plants: Quad Cities Nuclear Power Plant
 - Dams *as documented in the Dam and Levee Failure Hazard Profile*
 - Military Installations: *Rock Island Arsenal*
- **Hazardous Material Facilities:** Includes facilities housing industrial/hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins

B. Vulnerable Populations: Can include small children, persons with disabilities, elderly persons or non-English speaking residents that may require special response assistance or special medical care after a disaster.

Rock Island County

Vulnerable populations countywide:

Under 5 years of Age:	8,910 or 6.1% of total
Persons with Disability (all age groups):	18,729 or 13.0%
65 years and older:	24,394 or 16.5%

Language spoken at home other than English:

There are 17,555 residents, or 12.8% of the population, who speak a language other than English.

Source: U.S. Census Bureau, 2013 American Community Survey 5-Year Estimates.

C. Economic Elements: Could affect the local or regional economy if significantly disrupted

- Major employers *Listed previously*
- Financial centers

D. Special considerations: Such as areas of high-density residential or commercial development that, if damaged, could result in high death tolls and injury rates

- Shopping districts and malls
 - *Southpark shopping mall*
 - *Avenue of the Cities commercial development*
 - *Individual municipality downtown business and commercial districts*

- High density residential developments
- High rise residential or commercial buildings
- High-attendance event venues, such as sports fields, entertainment facilities, etc
 - *I-wireless Center*
- College dorms: *Augustana College*

E. Historic, cultural, and natural resource areas: Including areas that may be identified and protected under state or federal laws

- *Deere-Wiman Center, Moline*
- *Butterworth Center, Moline*

F. Other important facilities: Help ensure a full recovery of your community following a hazard event

- Government functions
- Major employers or banks
- Certain commercial establishments, such as grocery homes, hardware stores, and gas stations

Rock Island County

- City Halls, Village Halls, Police, and Fire Stations
- Public Works Buildings
- Rock Island County Building
- U.S. Postal Offices and Facilities
- Federal Buildings/Courts

Critical Facilities

Participating jurisdictions were asked to inventory community assets that could be damaged by a hazard event using the samples listed above as a guide. They individually determined which ones they considered critical facilities. These assets and critical facilities are described in general terms for each participating jurisdiction in the Multi-Jurisdiction Risk Assessment section beginning on page 99. While specific site addresses are not included in this document for security reasons, the selected critical facilities have been mapped for the planning area as a whole and in relation to the 100-year floodplain areas. The list may be further refined in future plan updates.

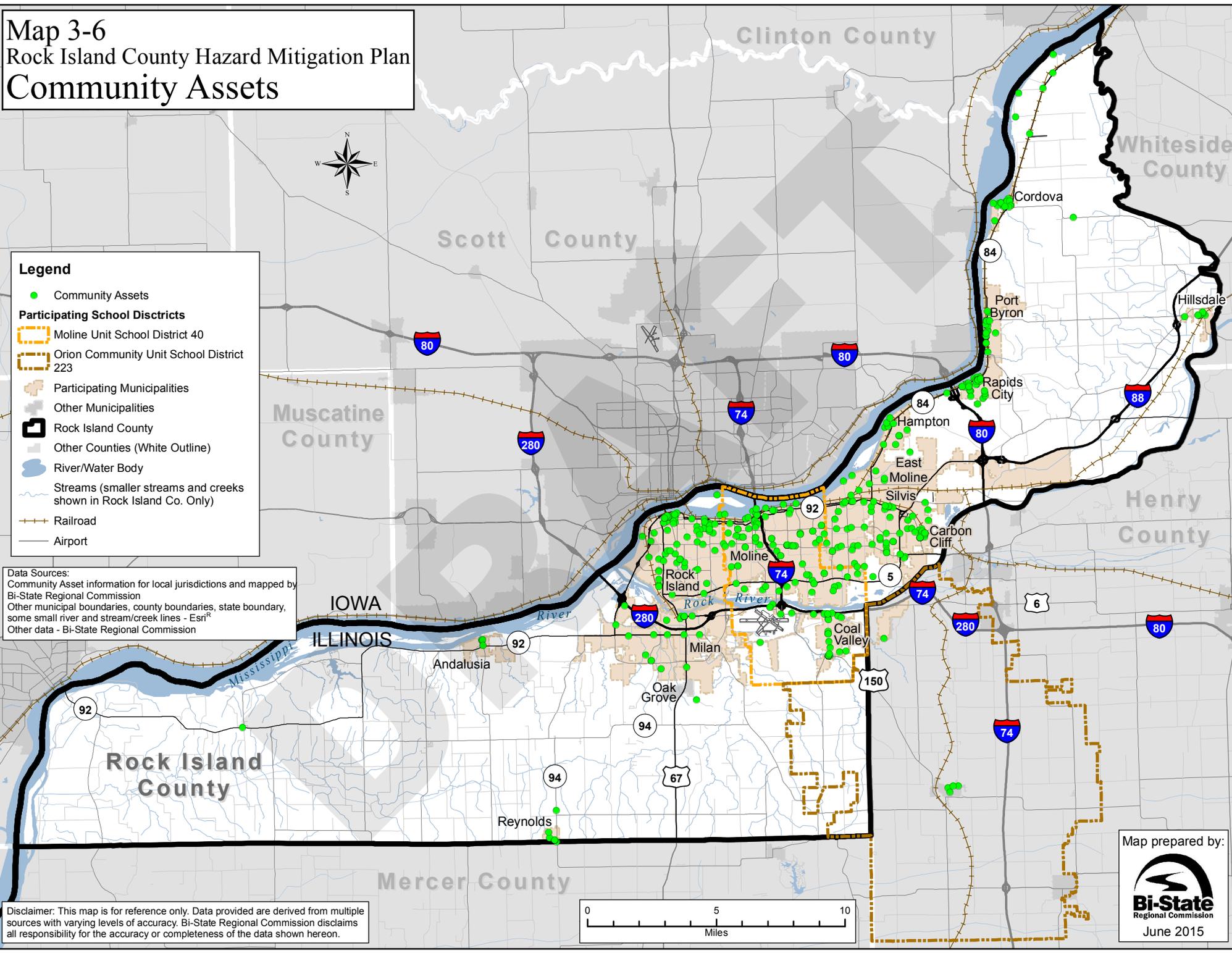
Map 3-6 Rock Island County Hazard Mitigation Plan Community Assets



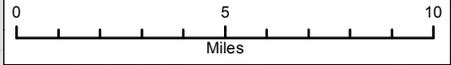
Legend

- Community Assets
- Participating School Districts**
- Moline Unit School District 40
- Orion Community Unit School District 223
- Participating Municipalities
- Other Municipalities
- Rock Island County
- Other Counties (White Outline)
- River/Water Body
- Streams (smaller streams and creeks shown in Rock Island Co. Only)
- Railroad
- Airport

Data Sources:
 Community Asset information for local jurisdictions and mapped by Bi-State Regional Commission
 Other municipal boundaries, county boundaries, state boundary, some small river and stream/creek lines - Esri®
 Other data - Bi-State Regional Commission



Disclaimer: This map is for reference only. Data provided are derived from multiple sources with varying levels of accuracy. Bi-State Regional Commission disclaims all responsibility for the accuracy or completeness of the data shown hereon.



Map prepared by:

 June 2015

Assessing Vulnerability: Analyzing Development Trends

Future land uses in the Rock Island County planning area are shown in Map 3-7 on page 98. The map provides the ability to view generalized future land use plans for the area in a comprehensive manner. In developing this map, the comprehensive/land use plans for the jurisdictions were used. Note that some smaller jurisdictions do not have land use plans, and zoning information was used in those cases. Municipal plans took precedence over county plans since their extraterritorial jurisdiction extends 1.5 miles in Illinois. The land use categories used on the map provide transition between different jurisdictions while allowing for a variety of land uses. Although the land use categories on the map were selected to reduce discrepancies, the task of fitting each jurisdiction's specific land uses to these categories was difficult. It is important to emphasize that these are generalized land use classifications, and questions regarding specific parcels of land should be directed to the appropriate jurisdiction. Every jurisdiction has different factors for classifying land use.

Existing land use is concentrated on the peninsula between the Mississippi and Rock River. The largest cities in the planning area, Moline, Rock Island, and East Moline, make up the Illinois portion of the Quad Cities Metropolitan Area. Earliest settlement is generally along the Mississippi River, but railroads stimulated settlement further out with the commercial development of natural resources in timber, clay, and coal. Map 3-7 on page 98 shows commercial development (shown in red) and industrial development (shown in lavender), which are generally concentrated along major transportation corridors.

Development Trends

With limited space remaining on the peninsula, development pressures for residential growth are radiating out of the core urban area. While the current development pattern is still fairly concentrated within the boundaries of Interstates 80 and 280, the desired future growth pattern is shown by areas mapped as low-density residential in the light yellow color. Some of this future development is shown south of the Rock River and in a corridor of U.S. Route 67. The recent opening of the west Rock River Bridge, known formally as Veterans Memorial Bridge at Carr's Crossing, has increased growth in this direction, especially for the Village of Milan area. Other planned future development connects the Mississippi River towns of the upper part of the county. The attraction of the rivers for residential development also extends downriver below the confluence of the Rock River with the Mississippi and toward the Village of Andalusia. The geographic distribution of flood plain, substantial slope, and former coal mine sites identified in the risk assessment means that future development needs to be carefully planned and regulated to avoid hazard risks. More specific information related to development since the 2009 plan and five years out can be found in each jurisdiction's individual profile.

Map 3-7 Rock Island County Hazard Mitigation Plan Future Land Use

Legend

Future Land Use*

- Commercial
- Conservation/Recreation
- Residential
- Industrial
- Institutional

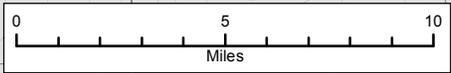
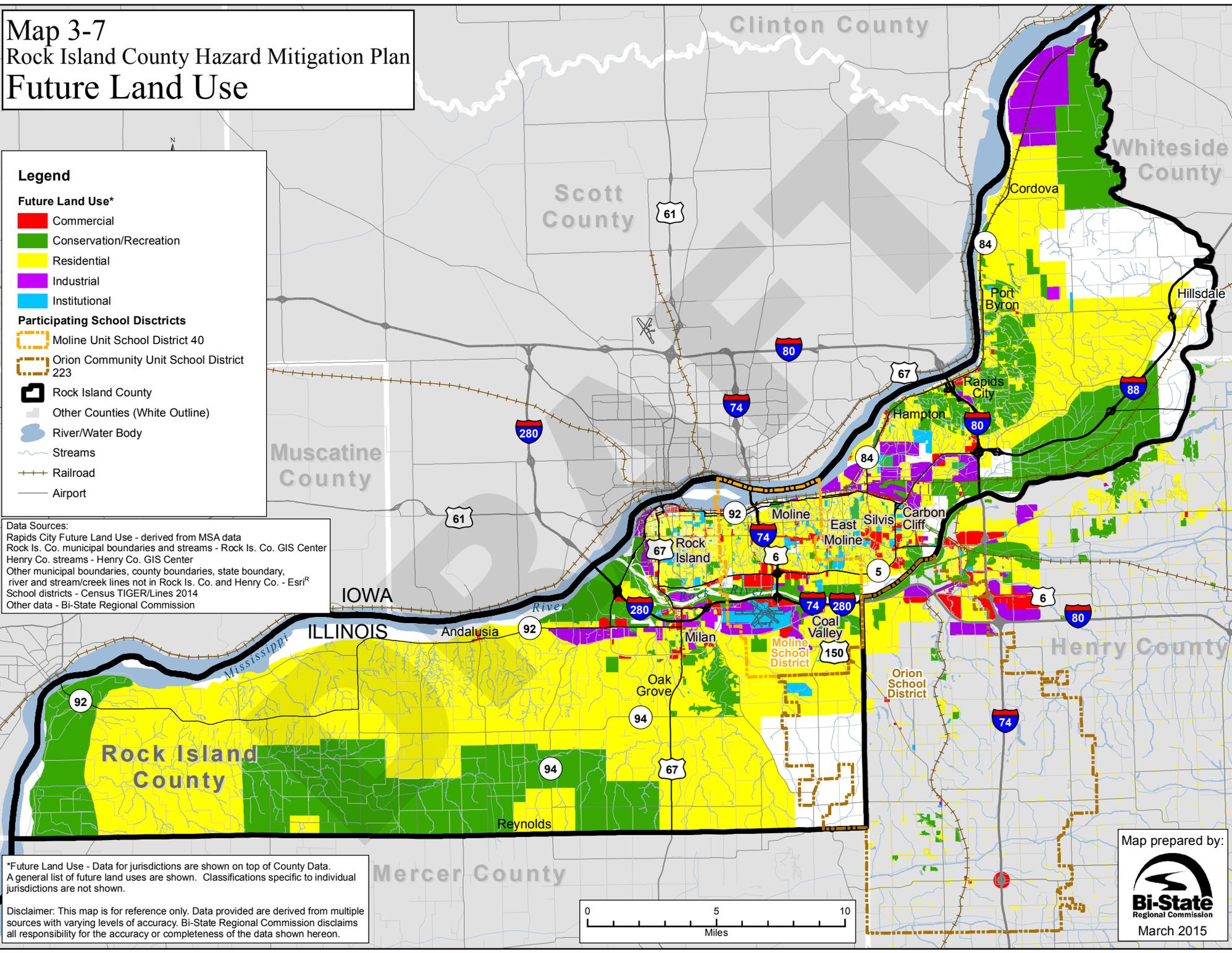
Participating School Districts

- Moline Unit School District 40
- Orion Community Unit School District 223
- Rock Island County
- Other Counties (White Outline)
- River/Water Body
- Streams
- Railroad
- Airport

Data Sources:
 Rapids City Future Land Use - derived from MSA data
 Rock Is. Co. municipal boundaries and streams - Rock Is. Co. GIS Center
 Henry Co. streams - Henry Co. GIS Center
 Other municipal boundaries, county boundaries, state boundary, river and stream/creek lines not in Rock Is. Co. and Henry Co. - Esri®
 School districts - Census TIGER/Lines 2014
 Other data - Bi-State Regional Commission

*Future Land Use - Data for jurisdictions are shown on top of County Data. A general list of future land uses are shown. Classifications specific to individual jurisdictions are not shown.

Disclaimer: This map is for reference only. Data provided are derived from multiple sources with varying levels of accuracy. Bi-State Regional Commission disclaims all responsibility for the accuracy or completeness of the data shown hereon.



Multi-Jurisdictional Risk Assessment

As described in the previous section on Profiling Hazards on page 9, each of the participating jurisdictions evaluated the hazards identified for the planning area. Each jurisdiction was asked to score the hazards profiled based on the methodology in Attachment 3-1. Each jurisdiction was asked to score the hazards based on their own local perspective and to note any additional information for the profile specific to its jurisdiction. The following individual jurisdiction risk assessments provide comparable data regarding population and land area. A geographic summary notes specific features that distinguish the jurisdiction from the planning area as a whole. The hazard priority list provides the top ranking hazards based on the hazard profile scoring and adjusted as needed based on local experience. This is compared to hazard priorities for each jurisdiction in the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009*. This section also explains any differences in hazard ranking compared to the planning area. The Critical Facilities section on page 95 summarizes structures identified as important to the jurisdiction that may be vulnerable to hazard effects. The specific lists of critical facilities were mapped in relation to the floodplain for the county-wide planning area as presented on Map 3-6 on page 96. New to this plan are discussions on the governmental structure and financial capabilities of each jurisdiction. This was identified to assist in determining whether mitigation actions were feasible.

Andalusia

Population:

2000: 1,166 **2014:** 1,312 **2019:** 1,416 (Projected)

Current County Rank in Population: 11

Land Area: 1.18 SQ MI

County Rank in Land Area: 12

Land Use & Geography:

Andalusia is located in the lower southwest portion of Rock Island County on the Mississippi River below the confluence of the Rock River. Because of the Mississippi River islands in that location, Andalusia is not on the main Mississippi River channel but on the backwater area called Andalusia Slough. Most of the older developed area is north of Illinois Route 92. Most of this area is part of the Mississippi River flood plain, but protected by levees. South of Route 92 begins some of the river bluff area with more slopes and ravines and timbered areas. There is a new residential addition that has been developed in an area with some slope issues. However, existing planning mechanisms provide subdivision and site review along with regulatory erosion controls.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Department of Public Works
 - Sewer Department

- **Boards and Commissions:**

- Planning and Zoning Board
- Water and Sewer
- Streets and Alleys
- Finance and Audit
- Buildings and Grounds
- Zoning Board of Appeals
- Parks and Recreation
- Tax Increment Finance
- Police

The Village of Andalusia participates in the National Flood Insurance Program and has a floodplain management ordinance enforced by Rock Island County's Building and Zoning Department. Andalusia also has zoning and building ordinances that are enforced by contract with Rock Island County. Andalusia is a volunteer community with ambulance service and fire department staffed by volunteers, and police services provided by the Rock Island County Sheriff's Department.

Financial Capabilities:

Andalusia is a taxing body and can also issue bonds, but the village does not have a capital improvement plan. As of September 2013, Andalusia has two Tax Increment Financing Districts, with one at 1st Street and 6th Avenue, and the other on Andalusia Road.

Critical Facilities:

Andalusia listed six structures. These are primarily local government facilities, including the Village Hall, water, maintenance, police, and fire. Also included is the U.S. Post Office. Because of the geography of the area, all of these facilities are in the floodplain behind the levee. The well heads for the Village's water supply are within the floodplain. In the event of a flood, the water source could be super chlorinated for a time. Doing this for a long period of extended flood conditions could burn out pump equipment. The long-term solution would be to move the well heads to a better location. This will entail realigning the water distribution system in relation to the water tower.

Development Trends:

According to their Future Land Use Map, found in the *2045 Quad Cities Long Range Transportation Plan*, Andalusia's commercial developments are centered downtown along 1st street and Highway 92, with single-family residential zoned in the south and west of the city, and multi-family residential zoned in the northeast. The land that is zoned for single-family residential in the northwest corner of the village is adjacent to the Mississippi River, which is a slight cause for concern, although there is a levee that abuts the waterfront. By 2020, there will be a predicted 753 total housing units, a population of 1945 people, of which 152 will be employed in the city, with 41 working in an industrial field, 29 working in retail, and 82 working in other employment. The predictions for 2040 are similar, albeit with a total population of 1971, and a total of 763 housing units.

Hazard Priorities:**2015**

1. Severe Storms Combined
2. Severe Winter Storms
2. Flash Flooding
2. River Flooding
2. Levee Failure

2009

1. Severe Storms (combined)
2. River Flood
3. Tornado
4. Dam or Levee Failure
5. Extreme Heat/ Drought

Andalusia's hazard priorities are mostly similar to the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009*. Small shifts in priorities may be due to a different scoring methodology and the inclusion of tornadoes in the Severe Storms Combined. The frequency of severe storms and the related problems triggered by this hazard, such as power outages, make this a priority hazard for many of the jurisdictions in the planning area. Additionally, substantial river frontage makes river flood and levee failure a major concern. The levee was constructed by the U.S. Army Corps of Engineers and has been maintained by the village. In October 2014, the Village Board of Trustees began a process of getting Levee Accreditation from FEMA by contracting help from Klingner and Associates Engineers.

Carbon Cliff***Population:*****2000:** 1,689**2014:** 2,128**2019:** 2,125 (Projected)**Current County Rank in Population:** 8**Land Area:** 2.05 SQ MI**County Rank in Land Area:** 9***Land Use & Geography:***

The Village of Carbon Cliff is on the east end of the peninsula of land between the Mississippi and Rock Rivers that characterizes the central portion of Rock Island County. The northwest corner of Carbon Cliff is about two to three miles from the Mississippi River, but there is a small portion of Rock River frontage to the south and east of the village. Illinois Route 84 separates the bluff line from the flood plain. Unlike the Mississippi River towns in the upper portion of the county, the bluff line is to the west of Route 84, and the land to the east is part of the Rock River floodplain. With historic development based on mining and the railroad, Iowa Interstate Railroad tracks cross the village from northwest to southeast. The oldest development is between the bluff line and the railroad tracks, and the 100-year flood plain line meanders through this portion of town. The elevation toward the east of the railroad tracks declines even more. The village is surrounded by wetlands on the north and east sides. Heavy rains can cause flash flooding from the bluff area and add to the drainage problems on the lower side of town. Also on this lower side, historic coal mine sites have been mapped that contribute to the village's name. In an Illinois Route 5 Corridor Study done by Bi-State Regional Commission in 1986, one mine was described as having extensive shafts that run in several directions of a couple of blocks.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Maintenance Department
 - Water and Sewer
 - Fire (Carbon Cliff Barstow Fire Protection District)
- **Boards and Commissions:**
 - Building Board of Appeals
 - Ethics Commission
 - Planning Commission
 - Public Works Quarterly Billing Appeals Committee
 - Zoning Board of Appeals

The Village of Carbon Cliff participates in the National Flood Insurance Program, and has a floodplain management ordinance and a zoning code that are enforced by the Director of Community & Administrative Services. The village has a building code that is enforced by contract by the City of East Moline's Building Inspector. The police services are provided by the Rock Island County Sheriff's Department.

Financial Capabilities:

Carbon Cliff is a taxing body, and can also issue bonds. Carbon Cliff does not have a capital improvement plan. As of September 2013, Carbon Cliff has two Tax Increment Financing Districts.

Critical Facilities:

Carbon Cliff listed 20 structures in its inventory of community assets. Sixteen of these are noted as critical and include village services and infrastructure, such as Village Hall, fire, police, and water and sewer infrastructure. Two school buildings are included as critical facilities, as are the railroad tracks that pass through town. Critical facilities located east of Route 84 may be in or near the 100-year flood plain. Two housing areas were noted for vulnerable populations. Two commercial convenience outlets were listed as other important facilities, providing local services and economic continuity following major hazard events.

Development Trends:

Carbon Cliff has some future industrial and future commercial zoning planned for the eastern and northern edges of the city, although neither of them extend enough to be adjacent to the Rock River. As far as future development, by 2025, there will be a predicted increase of 10 more total housing units, 1,188 more students, 50 more industrial employees, and 35 other total employees. By 2045, development will include 40 more new housing units, 1,214 more students, and 100 additional industrial employees.

Hazard Priorities:**2015**

1. Severe Winter Storms
2. Severe Storms Combined
2. Flash Flooding
3. River Flooding
3. Drought

2009

1. Severe Storms/River Flood
2. Flash Flood
3. Severe Winter Storms
4. Land Subsidence/Extreme Heat
5. Tornado

The hazards of Severe Winter Storms is at the top of the list due to the amount of damage incurred during winter snowstorms. Severe Storms Combined is also high on the list due to the high occurrence of events and severity of damage. Flash Flooding and River Flooding scored high as well due to the village's proximity to the Rock River. Due to flash flooding associated with heavy rain, the bridge at First Street and Argillo Creek has been heavily damaged and is no longer open. With the floodplain and wetlands as described in the geography section above, severe storms produce heavy rains that contribute to flash flooding. With run off from the bluff area, storm water drainage is a major issue for the village. Incidents of Drought can happen annually, which is why it is also included in the top-ranked hazards.

Coal Valley***Population:*****2000:** 3,871**2014:** 3,742**2019:** 3,744 (Projected)**Current County Rank in Population:** 7**Land Area:** 2.76 SQ MI**County Rank in Land Area:** 7***Land Use and Geography:***

The Village of Coal Valley has developed land within a bluff line south of the Rock River. Coal Creek and Shaffer Creek and bluff slopes provide conditions for occurrence of flash flooding. U.S. Routes 6 and 150 run through the village with Interstate 280/74 running on the north side of the village limits along the Rock River. Former coal mine sites are located throughout the village. A recent draft flood way and floodplain map from the Illinois State Water Survey concerns the village, as the draft map puts a large section of the U.S. Route 6 village commercial area within the flood way of the Rock River.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Administration
 - Finance

- Police
- Water & Sewer
- Roads & Parks
- **Boards and Commissions:**
 - Planning and Zoning Committee

The Village of Coal Valley participates in the National Flood Insurance Program and has a floodplain management ordinance and a zoning code, which are enforced by the Public Works Director. The village has a building code that is enforced by the building inspector.

Financial Capabilities:

The village has 9 to 12 months of capital reserve and is able to directly finance some major water and sewer capital improvement projects through its water and sewer account. There is one active TIF district on route 6 in Coal Valley. As of August 2015, Coal Valley is developing a 10-year capital improvement plan with the village administrator and the trustees.

Critical Facilities:

Coal Valley has 31 structures on its list of community assets. Fifteen of these include local government infrastructure critical to continued operations such as Village Hall, township office, maintenance garage, water wells with towers and ground storage tanks, and sanitary sewer lift stations. The fire station is located in the village and is part of the Coal Valley Fire Protection District, which has 25 volunteers on its roster. The U.S. Post Office is a federal facility included in the list of critical facilities. Ten structures listed include private businesses providing essential services, such as a medical clinic, banks, restaurants, gas stations, and the power company. Six other structures listed note locations of potentially vulnerable populations, such as schools, child day care, and mobile homes.

Development Trends:

Within the next 5 years, there could be three new residential subdivisions constructed within the village and redevelopments within the village's TIF District. Coal Valley's future land use map is comprised of mostly low density residential zoning, with some commercially zoned land in the west and in the downtown area in the north of the village by Highway 6. There is also some land zoned for heavy industrial in the northeast corner of the village, along the Mississippi River near Kone and FCA Manufacturing. Future developments by 2025 include an estimated 219 more housing units, 315 more school students, 20 more industrial employees, and 25 other employment workers. By 2045, there is estimated to be an increase to 205 more housing units, 315 more school students, and 25 more workers.

Hazard Priorities:**2015**

1. Severe Storms Combined
2. Severe Winter Storms
3. Flash Flooding
3. River Flooding
3. Drought
3. Extreme Heat
3. Landslides
3. Land Subsidence

2009

1. Tornado
2. Flash Flood
3. Severe Storms (Combined)
3. Severe Winter Storms
4. Hazardous Material Incident

Coal Valley's top hazards are similar to the planning area. Severe Storms Combined is the top hazard for Coal Valley. Severe Winter Storms is also a hazard priority due to the high occurrence of winter storms. The following hazards were all tied: Flash Flooding, River Flooding, Drought, Extreme Heat, Landslides, and Land Subsidence. Given the proximity of the bluffs, slopes, and creeks in Coal Valley, flooding is a serious concern for the area.

Additionally, extreme heat and drought occurs on an almost annual basis for the community. While there is no record of any structural damage from ground subsidence due to the old mine sites, the number of sites in the area and the topography of the area cause landslides and land subsidence to be a higher threat to Coal Valley. A recent excavation along U.S. Route 150 discovered an old mine site that was filled in. Coal mine sites on the west end of the village could pose concern for future development for both Coal Valley and the City of Moline.

Cordova***Population:***

2000: 671 **2014:** 673 **2019:** 677 (Projected)

Current County Rank in Population: 13

Land Area: 0.60 SQ MI

County Rank in Land Area: 15

Land Use & Geography:

The Village of Cordova is one of the smaller participating jurisdictions in terms of land area and population. The village is located on the Mississippi River, which forms its corporate boundary on the west. The 100-year flood plain elevation follows the river shoreline, but most of the streets are above this elevation. A tributary drainage area of the 100-year flood elevation crosses the village through a central part where the Mississippi River takes a slight bend. North of this drainage area, the elevation rises so that the 100-year flood plain of the Mississippi River is much narrower than in the southern portion of the village. Although most of the developed area of the village appears to be above the 100-year flood elevation, periods of high river flooding may hamper access to parts of the village. As with the other river towns in upper Rock Island County, the Burlington Northern and Santa Fe Railroad tracks and Illinois Route 84 run parallel to the Mississippi River through portions of Cordova's jurisdiction.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Fire
 - Parks and Recreation
 - Recycling
 - Water & Sewer
- **Boards and Commissions:**
 - Planning and Zoning Committee
 - Zoning Board of Appeals

Cordova disbanded its police department in 2011, citing controversy and lawsuits, and its fire protection currently falls under the Cordova Fire Protection District, which is a predominately volunteer department. The village participates in the National Flood Insurance Program and has both a floodplain management ordinance and building code. The village has a building inspector who enforces the floodplain management ordinance and building code.

Financial Capabilities:

Cordova is a taxing body, can also issue bonds, and as of September 2013, Cordova has three Tax Increment Financing Districts. As of spring 2015, Cordova is working with MSA to develop a capital improvement plan that will outline their financial capabilities and their planned infrastructure.

Critical Facilities:

Cordova listed 30 facilities in its inventory of community assets. Twenty of these are local government structures and infrastructure, including the Village Hall, water and wastewater treatment services, bridges, and emergency services and communication. Several river-related facilities were noted, such as boat docks and barge terminals. Private businesses include several chemical facilities as major employers, both in and near corporate limits. Other businesses listed provide convenience outlets for food and gasoline. For vulnerable populations, places where large numbers of people may congregate, large employers with potentially hazardous materials, and housing for seniors and the disabled were noted.

Development Trends:

In 2009, Cordova held multiple community workshops to explore the subject of active recreation and downtown development by the waterfront, including the development of a boat launch, fishing pier, gazebo, potential new municipal building, and parking at a downtown central site. An additional development site near the west shoreline was identified for the potential development of passive/active recreation including enhanced natural environment with trails, fishing, eagle watching/birding, basketball courts, and a skate park and potential parking on village-owned parcels along Third Street. A boat landing currently exists off Main Avenue and off 2nd Avenue South.

Hazard Priorities:**2015**

1. Radiological Incident
2. Hazardous Materials
3. Extreme Heat
3. Severe Storms Combined
3. Severe Winter Storms

2009

1. Radiological Incident
2. Hazardous Materials Incident
3. Extreme Heat/Severe Storms(Combined)/Severe Winter Storms

Cordova's hazard priorities of 2015 are exactly the same as the priorities from 2009. With the Quad Cities Nuclear Power Plant just a few miles north of the corporate limits, Cordova ranks Radiological Incident as the highest hazard priority. Although the 10-mile evacuation planning radius for the plant may touch other Rock Island County jurisdictions, Cordova is the nearest neighbor. With the railroad and state highway running through town, regular freight transportation is perceived as a hazard. In addition, several businesses in and near Cordova are listed as Critical Facilities because of the sensitive materials handled. As a result, Cordova ranks Hazardous Materials Incident higher than the planning area when scored on the basis of vulnerability and severity of effects. The remaining priority hazards for Cordova include the same extreme weather hazards that were noted for the planning area: Severe Storms Combined, Severe Winter Storms, and Extreme Heat, which all occur annually in the area.

East Moline***Population:***

2000: 21,320 **2014:** 21,125 **2019:** 21,016 (Projected)

Current County Rank in Population: 3

Land Area: 14.76 SQ MI

County Rank in Land Area: 4

Land Use & Geography:

The City of East Moline is located in the central part of Rock Island County on the east end of the peninsula between the Mississippi River and the Rock River. East Moline only has frontage on the Mississippi River. The corporate limits meet the City of Moline to the west and south and the City of Silvis to the east. Although East Moline does not have frontage on the Rock River, the flood plain of the Rock River reaches into the northeast portions of the city north of Silvis and the Village of Carbon Cliff as well as land south of Illinois 95/5/Interstate 88. Sugar Creek as a tributary of the Mississippi also has its floodplain in this northeast area. A system of levees along the Mississippi River and Sugar Creek protect areas that would otherwise be in the 100-year floodplain. This levee has been certified.

Illinois Route 92 travels east and west through the city and roughly marks the separation between the Mississippi River floodplain to the north and the bluff line that forms an east-west spine in this central peninsula. Much of the southern portion of East Moline is characterized by upland slopes and ravines. Illinois Route 84 turns north between East Moline and Silvis into the upper portion of the county. The Burlington Northern and Santa Fe Railroad tracks run parallel to the

Mississippi River through the northern and older developed portion of East Moline until the tracks turn north paralleling Route 84 in the upper county. Route 92 joins Illinois Route 5 on a diagonal across the northeastern portion of East Moline.

Government Structure:

- Mayor-Council structure, non-home rule
- Seven elected city council representatives elected by wards
- Mayor serves a 4-year term, City Council serves 4-year, staggered terms
- **Departments:**
 - City Administrator
 - Engineering
 - Finance
 - Fire
 - Health
 - Human Resources
 - Inspections
 - Maintenance Services
 - Police
 - Wastewater Treatment
 - Water Filtration
- **Boards and Commissions:**
 - Board and Zoning Appeals
 - Citizens' Advisory Committee
 - Economic Development Commission
 - Historical Preservation Commission
 - Human Relations Commission
 - Library Board
 - Park Board
 - Plan Commission

The City of East Moline participates in the National Flood Insurance Program, and has a floodplain management ordinance that is enforced by the City Engineer. The city has a building code that is enforced by the Building Inspector.

Financial Capabilities:

The city has a five-year comprehensive Capital Improvement Plan. Major categories in the CIP are streets, stormwater, utility, water plant, water distribution, sewer plant, sewer collection, public safety, and parks. Hazard mitigation projects, especially those related to stormwater management or the levee system, could be incorporated into the CIP. The city can also issue bonds to finance large projects.

Critical Facilities:

East Moline included 31 facilities on its list of community assets, up from 24 in the last plan. New assets include the lift stations, Hope Creek Nursing Home, and River Wood Rehab Facility, which is senior housing. Of these, 21 were designated as critical facilities. Critical facilities include those for administration and operation of essential community services and infrastructure, such as City Hall, police and fire stations, lift stations, water and wastewater treatment, and engineering and maintenance. The city also included the Mississippi River levee system as a critical facility. Finally, five senior housing facilities, a nursing home, and a rehabilitation facility were listed among the critical facilities for their concentration of a

vulnerable population. In addition to these critical facilities, other community assets include schools, community centers, and the East Moline Correctional Center. These were designated as locations of vulnerable populations. The John Deere Harvester Works plant was listed as an economic asset and also for the large number of employees who might be considered a vulnerable population in a hazard event.

Development Trends:

The comprehensive plan for the city was completed in 1999, with the demographics section and Future Land Use Map updated in 2006. Changes within the existing corporate limits identify a mixed-use area, known as The Quarter, between 7th Street and Deere Harvester and 13th Street and the Mississippi River. Infill of light industrial uses in available space north of 13th Avenue and residential uses south of the central business are proposed. Growth through annexation is proposed to occur to the east along Illinois Routes 5 and 92 and Interstate 88 to Interstate 80 and north to the Mississippi River. Light industrial development is expected to occur to the south of IL5/IL92 and I-88. Residential development is expected to occur to the north of this area. Commercial development is proposed in the northwest quadrant of the I-88 and I-80 interchange. As part of the *2045 Quad Cities Long Range Transportation Plan*, East Moline provided the following changes by 2025: an increase of 617 new total housing units, 4,985 more enrolled students, 315 more industrial employees, 175 more retail employees, and 75 total other employees.

Hazard Priorities:

2015

1. Severe Storms Combined
1. Severe Winter Storm
1. Hazardous Materials
4. Levee Failure
4. Flash Flooding
4. Extreme Heat
7. River Flooding

2009

1. Severe Storms (Combined)
1. Severe Winter Storms
3. Tornado
4. River Flood
5. Extreme Heat

East Moline's top hazard priorities are similar to the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009*. Tornado was incorporated into the Severe Storms Combined, so it no longer appears in the list separately. New into the top priority is Hazardous Materials. The main reason this hazard is now in the top priority is because of the new scoring methodology used. Hazardous Materials affect a larger percentage of the city compared to river and flash floods and occur more frequently than levee failures. The severity has such a large range that it tied as the top hazard. Levee Failure is also new to the top priorities as the city recognizes the large area the levee protects and the damage that would occur should their certified levee fail. Flash Flooding is new to the list largely due to its frequency and damage it has caused in particular in the Watertown neighborhood. The neighborhood experiences flooding when the pumps on the levee fail and water collects behind the levee. Extreme Heat and River Flooding remain in East Moline's top priority. Extreme Heat can be expected to occur at least annually in the planning area. In addition to a regular probability of occurrence, Extreme Heat may trigger other hazards, such as power outages, making this a priority hazard for both the

planning area and East Moline. River Flooding is lower in the hazard rankings because East Moline's certified levee protects a large portion of the floodplain. As new development moves to the northeast, it is vulnerable to the Rock River flood plain where there is no levee protection. Any future development would fall under the floodplain management ordinance.

Hampton

Population:

2000: 1,329 **2014:** 1,892 **2019:** 1,914 (Projected)

Current County Rank in Population: 9

Land Area: 1.65 SQ MI

County Rank in Land Area: 10

Land Use & Geography:

The Village of Hampton is located in the upper portion of Rock Island County on the Mississippi River upstream from the City of East Moline. Illinois Route 84 and Burlington Northern and Santa Fe railroad tracks pass through Hampton roughly parallel to the Mississippi River shoreline, marking a dividing line between steeper bluff areas and flatter land to the river. The oldest developed part of Hampton is on the Mississippi River side west and below the highway/railroad line. First Avenue runs along the Mississippi River at the western corporate limits. The central portion of the village east of First Avenue to the highway is above the 100-year flood elevation, although some parts are at the 500-year flood elevation. However, south to where First Avenue becomes River Road and north where First Avenue becomes Water Street, the elevation declines back to Zone A 100-year flood levels. Even without a levee, Hampton weathers many spring Mississippi River flood seasons without serious flooding. However, severe, high Mississippi River floods are a threat at the northern and southern ends of the village below the highway and restrict access. More recent development is generally found at the level of the highway and above the hills and ravines of the bluff line.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Fire
 - Parks and Recreation
 - Police
 - Public Works (Water and Sewer)
- **Boards and Commissions:**
 - Zoning Board

Hampton participates in the National Flood Insurance Program and has a floodplain management ordinance and building code enforced by the building inspector.

Financial Capabilities:

Hampton has three financial districts, and most of the financing is used for the purchase of vehicles. There is an informal capital improvement plan. The approximate amount of the operating budget of the Village of Hampton is \$2,742,951.00.

Critical Facilities:

Hampton listed 13 facilities including the village hall, police and fire departments, and Maintenance Services Building. Eight of the facilities listed refer to water or wastewater infrastructure. The Hampton Heritage Center is also a village facility and is an important cultural asset. Most of these facilities are not within the 100-year flood elevation.

Development Trends:

Hampton is located on the Mississippi River, and their future land use map has park land zoned by the waterfront, which should help mitigate flooding along future developments. There is a small amount of low density residential land along the Mississippi river on the west side of the village. By 2025, future development is predicted to create 21 additional housing units and 225 more students enrolled in grades K through 12. By 2045, there is expected to be an additional 20 housing units and 225 additional enrolled students.

Hazard Priorities:

2015

1. Severe Storms Combined
2. Severe Winter Storms
3. Extreme Heat
3. River Flooding
3. Radiological Incident

2009

1. River Flood
2. Severe Storms (Combined)
3. Tornado
4. Extreme Heat
5. Hazardous Materials Incident

Hampton's vulnerability to Severe Storms Combined, Severe Winter Storms, and Extreme Heat is similar to that of the rest of the county, and reflects the threat and incident of annual occurrence at the top of the hazard priority list. Because of its position on the Mississippi River, River Flooding is also a high priority hazard. Also, its close proximity to the nuclear power plant prompted the community also included radiological incident in its top hazard priorities.

Hillsdale

Population:

2000: 578

2014: 496

2019: 476 (Projected)

Current County Rank in Population: 15

Land Area: 0.75 SQ MI

County Rank in Land Area: 14

Land Use & Geography:

The Village of Hillsdale is one of the smaller jurisdictions in both population and land area participating in this plan update. Hillsdale is in a geographically flat part of Rock Island County, which can contribute to widespread flooding from the Rock River. All but a few structures within the corporate limits are in a flood plain area. The most severe incident of flooding in recent record occurred February 20, 1997. Heavy rains in combination with frozen soil and ice jams caused the Rock River to reach a record crest of 18.77 feet at Joslin. Despite massive sand-bagging efforts, the combination of high water and ice broke through levees near Erie and Hillsdale. Hillsdale was 95% covered in knee-deep water with some areas over ten feet deep. Eighty percent of Hillsdale's residents were evacuated. There are no other geographic features that distinguish Hillsdale from the other jurisdictions in the county in regard to naturally occurring hazards. However, in regard to the human-cause hazards identified in this planning process, several trains a day pass through downtown, and the Quad Cities Nuclear Power Plant at Cordova is within 12-15 miles.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Fire
 - Police
 - Maintenance
- **Boards and Commissions:**
 - Finance Committee
 - Park Committee
 - Police Committee
 - Sanitary/Sewer Committee
 - Streets Committee

Hillsdale participates in the National Flood Insurance Program and has a floodplain management ordinance and building code that is enforced by contract with Rock Island County.

Financial Capabilities:

Hillsdale is a taxing body and can also issue bonds, but it does not have a capital improvement plan.

Critical Facilities:

Hillsdale listed seven structures in its inventory of community assets. Three of these are government facilities, including the Village Hall/Police Station, the Fire Protection District facility, and the U.S. Post Office. The other four structures listed are local businesses included for essential services and economic continuity. These include the grain elevator, bank, and two convenience stores with gasoline. It was noted that with a small community, everyone turns out to help with flood incidents, including sandbagging threatened properties or moving books from the library.

Development Trends:

Hillsdale is a small town whose population is projected to decrease by 2019, according to ESRI Community Analyst. There are no large scale developments scheduled for Hillsdale.

Hazard Priorities:**2015**

1. River Flooding
1. Levee Failure
2. Flash Flooding
2. Grassland, Field, or Woodland Fire
2. Severe Winter Storm

2009

1. River Flood
2. Severe Winter Storms
2. Hazardous Materials Incident
3. Radiological Incident
4. Severe Storms (Combined)

Hillsdale ranks River Flooding and Levee Failure highest among priority hazards. This is understandable in light of the geography and flooding incident described above. The village intends to repair and reconstruct a flood protection levee to the 100-year flood level. This will eliminate the flood flow from one end of town, and may explain why levee failure is also ranked at the top. Hillsdale also ranks the hazards of Severe Winter Storms; Flash Flooding; and Grassland, Field, or Woodland Fires as the second priorities. Because of particular features described above for Hillsdale, flash flooding and grass fires both threaten Hillsdale, as do the annual events associated with Severe Winter Storm.

Milan***Population:*****2000:** 5,395**2014:** 5,039**2019:** 5,002 (Projected)**Current County Rank in Population:** 6**Land Area:** 5.87 SQ MI**County Rank in Land Area:** 5***Land Use & Geography:***

The Village of Milan is located south of the Rock River. It is bordered by the southwest portion of the City of Rock Island on the west and by the Quad City International Airport on the east. The land area consists of a north facing bluff and Mill Creek with its highly dissected valley sides, lesser creeks, terraces, and rolling upland plains. The land north of Knoxville Road is mostly protected by a certified levee on the Rock River. There is floodplain adjacent to Mill Creek that is susceptible to floods, especially flash flooding from ice jams and heavy rain. See Appendix 3.3 for more details of the Special Flood Hazard Areas. The transition from the Rock River Valley to the upland area is marked by a distinct topographic change from flat low land to slopes. The higher land south of the current village limits is characterized by rolling terrain. Mill Creek is responsible for much of the topography in this part of Rock Island County.

Government Structure:

- President-Village Board of Trustees

- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **City Departments:**
 - Public Works
 - Police
 - Building
 - Parks and Recreation
- **Boards and Commissions:**

<ul style="list-style-type: none"> – Advisory Board for Building Inspectors – Board of Local Improvements – Building Board of Appeals – Local Liquor Control Commission – Metropolitan Airport Authority of Rock Island Co. 	<ul style="list-style-type: none"> – Park Advisory Board – Planning Commission – Police Commission – Police Pension Board – Zoning Board of Appeal
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Milan participates in the National Flood Insurance Program and has a floodplain management ordinance enforced by the City Administrator. The village also has a building code that is enforced by the Building Inspector.

Financial Capabilities:

Milan is a taxing body, can issue bonds, and has 3 TIF districts as of September 2013. As of summer 2015, the city developed a plan to raise the rates for water and sewer in order to increase funds for capital improvement plans and pay for any bond indebtedness incurred.

Critical Facilities:

Milan listed 10 facilities in its inventory of community assets. Four of these are related to essential village services, including police, fire, water, and wastewater treatment. Other critical infrastructure includes bridges and river-related levees and dam. Two business locations were noted for the services provided and the economic contribution to the community. This includes a telecommunications transmission center and a major grocery complex. Although protected by the levee system, a number of these sites would otherwise be located in the 100-year floodplain.

Development Trends:

The future land use map of Milan has a diversity of land uses, partly stemming from its mix of industrial, commercial, and office properties, and due to its close proximity to the Quad City International Airport. There is some land use adjacent to the Rock River, with developments zoned for a mix of industrial and commercial uses, although there is a levee adjacent to the river. By 2025, future development is predicted to create 226 more housing units, 421 additional enrolled students, 345 more industrially employed workers, 295 more retail employees, and 23 more total other employees. By 2045, development is expected to create 103 more housing

units, 500 more enrolled students, 280 more industrial employees, 445 more retail employees, and 55 other employees.

Hazard Priorities:

2015

1. Severe Storms Combined
2. Flash Flooding
2. Hazardous Material
2. Levee Failure
3. Severe Winter Storms

2009

1. Severe Storms (Combined)
2. Severe Winter Storms
3. Extreme Heat
4. Tornado
5. River Flood

Similar to the planning area, Severe Storms Combined can occur at least annually, and was ranked as the top priority hazard. Additionally, Flash Flooding and Levee Failure are priority hazards from the Rock River and Mill Creek as described in the geography section above. Continued certification of the levees is an ongoing priority. Hazardous materials that travel through the area are also a concern, as is Severe Winter Storms, which can occur annually in the region.

Moline

Population:

2000: 43,299 **2014:** 43,802 **2019:** 44,074 (Projected)

Current County Rank in Population: 1

Land Area: 16.43 SQ MI

County Rank in Land Area: 3

Land Use & Geography:

The City of Moline is the largest municipality in population. It is located on the peninsula between the Mississippi and Rock Rivers in the center portion of Rock Island County. Moline is bordered by the city of Rock Island to the west and by the City of East Moline to the east. The Mississippi River runs from east to west through this area known as the Quad Cities, so the Mississippi River is Moline's northern border. Rock Island Arsenal is located on an island of the Mississippi River between Moline and the City of Rock Island. Bluffs facing the Mississippi River to the north and the Rock River to the south form a spine running east to west across the peninsula. As a result, the center portion of Moline is in an upland area that drains off both north and south in steep slopes and ravines.

On the south, Moline touches and crosses the Rock River in several locations. Historic coal mine sites are recorded generally east of I-74 and south of the Avenue of the Cities. Transportation features include Interstate 74 north and south through the center of the city with major interchanges at Illinois Route 5 and I-280. Tracks for the Iowa Interstate Railroad roughly parallel the Mississippi River across the north of the city through the oldest downtown and industrial developed areas.

Government Structure:

- Mayor-Council structure, home rule
- Eight elected city council representatives elected to seven wards; one at-large representative
- Mayor serves a 4-year term, City Council serves 4-year, staggered terms
- **Departments:**
 - City Administration
 - City Clerk
 - Economic Development
 - Finance
 - Fire
 - Human Resources
 - Information Technology
 - Law
 - Library
 - Parks & Recreation
 - Planning & Development
 - Police
 - Public Works
- **Boards and Commissions:**
 - Citizen’s Advisory Council on Urban Policy
 - Consolidated Public Safety Communication Budget Board
 - Fire & Police Commissioners
 - Fire Pension Board
 - Foreign Fire Tax Board
 - Historic Preservation Advisory Commission
 - Human Rights Commission
 - Keep Moline Beautiful Commission
 - Library Board of Trustees
 - Moline Centre Main Street Commission
 - Moline Housing Authority Board
 - Park Board
 - Plan Commission
 - Police Pension Board
 - Project Management Team
 - Traffic Engineering Committee
 - Youth Commission

The City of Moline participates in the National Flood Insurance Program and has a floodplain management ordinance, which is enforced by the city’s Floodplain Manager. The city has a building code enforced by the Building Inspector. The city also has a stormwater management ordinance enforced by the city’s Environmental Manager.

Financial Capabilities:

The city has a comprehensive Capital Improvement Plan. Hazard mitigation projects, especially those related to stormwater management could be incorporated into the CIP. The city is a taxing body and receives revenue from property and sales taxes and fee-based revenue. The city has and is capable of receiving and managing grants, and can issue bonds for large projects.

Critical Facilities:

The City of Moline listed 92 facilities in its inventory of community assets. Of these, 49 are designated as critical and include major infrastructure, such as water and sewer system facilities,

schools, major medical centers, and bridges. Other transportation-related facilities listed as critical include the Quad City International Airport, railroads, and the transit system center. Business facilities included as critical relate to electrical energy transmission and fuel products storage. Other local government facilities include City Hall, police and fire departments, library, municipal garage, and pump stations. Areas noted for vulnerable populations include schools and colleges, child day care, elderly housing and assisted living, low income or minority housing concentrations, and medical facilities. Facilities where large numbers of people may congregate are listed, including arenas and shopping centers. Historic or cultural facilities include the Deere-Wiman House and the Butterworth Center.

Development Trends:

The city's most recent comprehensive plan was adopted November 13, 2001. A description of future land use is taken from that plan. The South Rock Planning District is generally bounded by the Rock River on the north and the City of Coal Valley on the east. The vast majority of this area is not in the city limits and will need to be annexed. The Quad City International Airport is located in the district and is the single largest land use. The airport has many effects on adjacent land use such as noise, structure height, approach zones, traffic, and utilities. This southern development area is the future economic driver of Moline. The city plans to move forward with annexation so that it can help guide new development rather than end up trying to correct development problems that could have been prevented. Some development has occurred, but the city has the opportunity to create the vision of a new planned community that incorporates community planning and sustainable development principles. In 2014, Moline updated their comprehensive plan for Moline Centre, Florecente, and Edgewater neighborhoods. The most significant change will occur during and after the construction of the new Interstate 74 Bridge. The current right of way for the bridge will be vacated and redeveloped.

Moline provided the following growth estimates for the *2045 Quad Cities Long Range Transportation Plan*: by 2025, there will be an estimated increase of 1,705 housing units, 8,783 additional student enrolled in grades K-12, 8,850 additional students enrolled in post-secondary school, 190 additional industrial workers, 1,130 additional retail employees, and 2,005 additional "other" employees. By 2045, there will be another 1,020 housing units, 9,071 more students enrolled in grades K-12, 9,071 additional students enrolled in post-secondary school, 310 more retail workers, and 1,355 more "other" employees.

Hazard Priorities:

2015

1. Severe Storms Combined
2. Severe Winter Storms
2. Flash Flooding
2. River Flooding
2. Extreme Heat
6. Hazardous Materials

2009

1. Severe Winter Storms
2. Hazardous Materials Incident
3. Flash Flood
3. Severe Storms (Combined)
5. Extreme Heat

Moline's hazard priorities are similar to the *Rock Island County Multi-Jurisdictional Local Hazard Mitigation Plan, 2009*. Small shifts in priorities may be due to a different scoring methodology and the inclusion of tornadoes in the Severe Storms Combined. Flash flooding is caused by both north and south facing bluffs, and heavy rains and run-off in steep or ravine areas

have a more immediate and severe impact on structures and foundations. Therefore, urban flash flooding has a higher priority for Moline. New to the top hazard priority list is River Flooding. This is due in part to increased frequency of flooding but also due to the scouring of a pedestrian bridge connecting Moline to an island in the Mississippi River. The bridge was deemed unsafe in 2013, and the city closed the island to public use. The island is viewed as a large natural asset to the city, and the bridge is estimated to cost over \$1 million to replace. Areas of the 100-year floodplain are generally north of the railroad tracks to the Mississippi River. Ben Butterworth Parkway along the edge of the Mississippi provides a buffer, and most structures are outside the floodplain. Mississippi River flooding may impact road access and some sewer and water lines, but there is minimal property damage. Access issues for new development east of I-74 for RiverTech and the Western Illinois University campus will be mitigated with an all-weather access road. On the Rock River side, much of Moline's river frontage and the 100-year flood plain is taken up by Green Valley Park. With freight transfer by railroad and major highways through developed areas, the frequency and probability of hazardous materials spills is a major concern for the fire department.

Moline-Coal Valley Community School District #40

Overview:

The Moline-Coal Valley School district provides public education for grades kindergarten through 12. The district also has a preschool and an alternative high school. Below are enrollment numbers for the district's schools.

School Enrollment as of April 15, 2015

School	Location	Enrollment	Staff	Total
Bicentennial Elementary	Coal Valley	317	41	358
Butterworth Elementary	Moline	251	36	287
Ericsson Elementary*	Moline	106	25	131
Franklin Elementary	Moline	286	37	323
Garfield Elementary*	Moline	377	44	421
Hamilton Elementary	Moline	600	N/A	Over 600
Jane Addams Elementary	Moline	270	35	305
Lincoln-Irving Elementary	Moline	443	44	487
Logan Elementary	Moline	385	48	433
Roosevelt Elementary	Moline	305	57	362
Washington Elementary	Moline	305	39	344
Willard Elementary	Moline	270	35	305
Jefferson Early Learning Center	Moline	274	25	299
John Deere Middle School	Moline	761	70	831
Wilson Middle School	Moline	889	72	961
Moline High School	Moline	2056	202	2258
Coolidge Campus	Moline	97	29	126

Ericsson and Garfield Elementary Schools closed at the end of the 2014-2015 school year. District lines were redrawn with a major expansion of Hamilton Elementary School. Elementary schools serve kindergarten through fifth grade. Middle schools serve grades 6-8, and high school is 9-12.

The district reports to a school board with seven members elected by residents within the school district. The board is responsible for setting policies, budgets, and administrative decisions in public meetings. The Superintendent is responsible for advising the school board and overall administration of the entire school district. Other administrative positions include:

- Assistant Superintendent for Assessment and Accountability
- Assistant Superintendent for Pupil, Personnel and Special Education
- Assistant Superintendent for Curriculum and Instruction
- Assistant Superintendent of Human Resources
- Chief Financial Officer, Comptroller and Treasurer
- Director of ELL Programs
- Director of Facilities and Grounds
- Assistant Director of Special Services
- Educational Technology Manger

In addition, each school has additional administration. Elementary schools have a Principal. middle schools have a Principal, an Assistant Principal, and a School Counselor. The High school has a Principal, two Assistant Principals, two Deans of Students, and an Athletic Director.

Land Use & Geography:

The district spans 27.88 square miles, serving an estimated 43,768 residents in Moline, parts of Coal Valley, and the Rock Island Arsenal. See Map 2-1 on [page](#) for district location. None of the schools are located within the floodplain or are protected by levee systems.

Financial Capabilities:

The school district is a taxing body. Its main revenue is generated from a tax levy to properties located within the school district, while the district also receives state and federal funding. The district can issue bonds for large projects as well as apply for and manage both state and federal grants. The district utilizes a three-year operational plan to address improvements to student achievement, capacity building, and sustainability throughout the school district.

Critical Facilities:

The school district's critical facilities are all of the schools and their administrative building. (See Map 3-6 on page 96)

Development Trends:

The school district recently completed a major expansion of Hamilton Elementary School and closed two elementary schools. There are no other expansions identified in the 2014-2017 Operational Plan.

Hazard Priorities:

1. Severe Storms Combined
1. Severe Winter Storms
1. Hazardous Materials Incident
4. Extreme Heat
5. Influenza Pandemic

This is the Moline-Coal Valley Community School District's first time participating in the multi-jurisdictional hazard mitigation plan. The school district's hazard priorities are similar to the planning area. Hazardous Materials Incident scored higher for the school district to the number of extremely hazardous substance sites within Moline. Both Severe Winter Storms and Extreme Heat have caused school closures. Unlike the majority of the other participating jurisdictions, the school district left Influenza Pandemic in its top hazard priorities. An influenza pandemic would cause staffing issues at schools or could cause closure to deep clean the school(s).

Orion Community Unit School District #223***Overview:***

The Orion School district provides public education for students in pre-kindergarten through twelfth grade. Below is enrollment numbers for the district's schools. There is one high school, one middle school, one elementary school, and one district office.

School Enrollment for Academic Year 2014-2015

School	Location	Enrollment	Max Capacity
Orion High School	Orion	305	600
Orion Middle School	Orion	282	550
C.R. Hannah Elementary School	Orion	447	600

The district is governed by a school board with seven members elected by residents within the school district. The board is responsible for setting policies, budgets, and administrative decisions in public meetings. The superintendent is responsible for advising the school board and overall administration of the entire school district. Among other duties, the board is responsible for providing a quality education for all students that focuses on academic excellence and achievement, seeking parental and community input, and to strive to offer opportunities to students that will provide them with the tools needed to become well-rounded, effective, life-long learners, and productive members of society. As of the 2014 2015 school year, there are 68 total teachers, a principal in each school, and a superintendent.

Land Use & Geography:

The district serves the communities of Orion, Andover, Lynn Center, Osco, Sunny Hill, Warner, and portions of Coal Valley, Colona, and Green Rock in Henry County and a small portion of Rock Island County. As of the 2014-2015 school year, there were 1,034 students currently enrolled, but the district as it stands currently has a capacity to serve 1,750 students. While the majority of the school district is located in Henry County, the school district elected to participate in the Rock Island County plan because hazards affect students and staff that live in Rock Island County and travel through Rock Island County to get to school.

Financial Capabilities:

The school district is a taxing body. Its main revenue comes from the revenue generated from properties levees to properties located within the school district, while the district also receives state and federal funding. The district can issue bonds for large projects as well as apply for and manage both state and federal grants. According to the Illinois State Board of Education's District Report Card for school year 2013-2014, the district receives about 67% of its funding from local sources, 29% of its funding from state sources, and 4% of its funding from federal sources.

Critical Facilities:

The school district's critical facilities are all of the schools and their administrative building. See the corresponding Map 3-6 on page 96 for reference.

Development Trends:

The school district does not have any major expansion or development planned, although it would like to take the actions of installing a safe room and generators in event of hazards.

Hazard Priorities:

1. Severe Storms Combined
2. Severe Winter Storms
3. Extreme Heat
3. Flash Flooding

This is the Orion Community School District's first time participating the in the multi-jurisdictional hazard mitigation plan. The school district's hazard priorities are similar to the planning area. Both Severe Winter Storms and Extreme Heat have the potential to cause school closures. Extreme Heat and Flash Flooding have the potential to do serious harm to students and individuals.

Port Byron***Population:*****2000:** 1,479**2014:** 1,791**2019:** 1,899 (Projected)**Current County Rank in Population:** 10**Land Area:** 2.48

County Rank in Land Area: 8***Land Use & Geography:***

The Village of Port Byron is in the upper portion of Rock Island County just north of Rapids City. Since the village is located upstream of the westward bend of the Mississippi, the river forms the western corporate limits. There is a bluff just above the river's edge, so that most of the oldest parts of the village are outside the 100-year flood plain. However, there are some pockets where the flood plain crosses Main Street along the river, which may affect access to parts of the village during major floods. As with other river towns in the upper part of the county, Illinois Route 84 travels the line between the higher river bluffs and the flatter land going toward the river. However, instead of paralleling the highway at the upland bluff line, the Burlington Northern and Santa Fe railroad tracks travel right on the edge of the river bluff between Main Street and the Mississippi. The railroad bed forms somewhat of a levee protecting the bluff at the river's edge from erosion. While the original settlement is at the river's edge, newer residential development is in the upland bluff area above and east of Route 84.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Police
 - Public Works
- **Boards and Commissions:**
 - Cemetery Board
 - Planning and Zoning Board
 - Economic Development Committee

Port Bryon participates in the National Flood Insurance Program and has a floodplain management ordinance and building code that are enforced by the building inspector.

Financial Capabilities:

Port Byron has TIF funding West of Highway 84; part of the subdivisions are included, and the village is currently working on a capital improvement plan and updating infrastructure.

Critical Facilities:

Port Byron listed 27 structures in its inventory of community assets, of which 21 are noted as critical. Of the critical facilities, several are located at the Village Municipal Building in addition to administrative functions, including police, fire department, emergency operations, and a warming center. Other essential services are also noted, such as water and wastewater treatment. Transmission facilities for electrical power, natural gas, and radio communication are listed, as are transportation facilities such as Illinois Route 84 and those related to the Burlington Northern and Santa Fe railroad tracks. Several commercial facilities are noted that may handle sensitive materials. A church and day care are listed as locations of vulnerable populations. In

addition, the village lists several commercial establishments that would be important for recovery and economic continuity in the event of a disaster.

Development Trends:

Port Byron is a waterfront village located in the north eastern part of the county along the Mississippi River, and their proposed land use map contains a lot of land zoned for conservation and open space. There are some residential and mixed development zones near the waterfront, and then a mix of residential and open space land zoned as the village extends east. By 2025, there will be an estimated 32 additional housing units, 10 additional retail employees, and 10 other non-retail and non-industrial employees. By 2045, there will be an estimated 55 additional housing units, 20 additional industrial employees, 10 additional retail employees, and 15 "other" employees.

Hazard Priorities:

2015

1. Radiological Incident
1. Severe Winter Storm
2. Severe Storms Combined
2. Grassland, Field, or Woodland Fire
2. River Flooding

2009

1. Severe Storms (Combined)
2. Extreme Heat
2. River Flood
3. Flash Flood
3. Tornado
4. Hazardous Materials Incident

The highest ranking hazard, Radiological Incident, is due to the proximity to the nuclear power plant. Severe Winter Storm and Severe Storms Combined ranked high because the annual occurrence of strong winter snow storms. Additionally, with Mississippi River frontage, the threat of flooding is higher for Port Byron. Because of the slopes and ravines, flash flooding can be an issue in heavy rains, although no issues of land subsidence or landslide are reported for the area. Grass fires are also a concern, given a higher occurrence of fires in the community.

Rapids City

Population:

2000: 1,109

2014: 920

2019: 890 (Projected)

Current County Rank in Population: 12

Land Area: 1.62 SQ MI

County Rank in Land Area: 11

Land Use & Geography:

Rapids City is in the upper portion of Rock Island County on the Mississippi River. The Mississippi River forms the northwest corporate boundary of the village due to the bend in the river. Rapids City is upstream and just east of where I-80 crosses the Mississippi River. The Village of Port Byron is upstream to the north and meets the Rapids City corporate limits. Similar to other river towns in the upper part of the county, Illinois Route 84 and the Burlington

Northern and Santa Fe railroad track run in a parallel line to the Mississippi River and mark the change in geography between the bluff line and the flatter land surface at the riverfront. First Avenue in the older historic area of development follows the Mississippi shore line and is within the 100-year flood elevation. However, the elevation rises approaching the line of the highway and railroad track, so that portions of the older development are not in the 100-year flood zone. Newer development is south of the highway where the bluffs rise into hills and ravines.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Fire
 - Public Works
 - Parks
- **Boards and Commissions:**
 - Planning and Zoning Commission

Rapids City participates in the National Flood Insurance Program and has a floodplain management ordinance and building code enforced by the building/electrical inspector.

Financial Capabilities:

Rapids City has a comprehensive/action plan that outlines funding tools, including tax abatement, TIF funding (if created), and state and federal grant programs, and has a vision of completing a capital improvement plan with the planning commission and village board in the coming years.

Critical Facilities:

The Village of Rapids City listed 12 facilities as community assets. Half of those are associated with village operations and are considered critical, including the Village Hall, Public Works building, and water and wastewater infrastructure. Other facilities are important to economic continuity within the village, including the public boat dock and restroom, a bank, and convenience stores. With the exception of the boat dock, all the facilities listed appear to be located above the 100-year floodplain.

Development Trends:

Port Byron is a waterfront village located in the north-eastern part of the county along the Mississippi River, and their proposed land use map contains a lot of land zoned for conservation and open space. There are some residential and mixed development zones near the waterfront, and then a mix of residential and open space land zoned as the village extends east. By 2025, there will be an estimated 32 additional housing units, 10 additional retail employees, and 10 other non-retail and non-industrial employees. By 2045, there will be an estimated 55 additional housing units, 20 additional industrial employees, 10 additional retail employees, and 15 "other" employees.

Hazard Priorities:**2015**

1. Severe Storms Combined
2. Severe Winter Storm
2. River Flooding
3. Flash Flooding
3. Hazardous Materials Incident

2009

1. Severe Storms (Combined)
2. Tornado
3. Severe Winter Storms
4. Extreme Heat
5. River Flood

Severe Storms Combined is the top rated hazard due to occurrence of this hazards within the area. Relatedly, Severe Winter Storm hazards occur at least annually in the area, and these weather extremes have a high priority for most of the participating jurisdictions. River Flooding and Flash Flooding are priorities for Rapids City with much of its historic development near the Mississippi riverfront. However, the bulk of the land area of Rapids City is at or above the bluff line, so the maximum geographic extent of River Flooding as a hazard is comparatively minor. Hazardous Materials Incident is a concern for Rapids City as well, partly due to the nearby railroad traffic that travels adjacent to 2nd Avenue, occasionally with hazardous materials for 3M Manufacturing.

Reynolds***Population:***

2000: 543 **2014:** 539 **2019:** 540 (Projected)

County Rank in Population: 14

Land Area: 0.37 SQ MI

County Rank in Land Area: 17

Land Use & Geography:

The Village of Reynolds is the smallest of the participating jurisdictions both in terms of population and land area. Reynolds has no major river frontage; however, the head of Mill Creek is a source of occasional minor flooding. There are no other unique geographic features noted, since the land area of the incorporated village is relatively small and flat. The village is surrounded by undeveloped agricultural uses, and no specific soil limitations are noted for future development.

Government Structure:

- President-Village Board of Trustees
- 6 Trustees elected at-large
- President and Trustees serve 4-year, staggered terms
- **Departments:**
 - Water and Sewer
- **Boards and Commissions:**
 - Planning and Zoning Commission

Reynolds participates in the National Flood Insurance Program and has a floodplain management ordinance and building code enforcement responsibilities that fall under the Village Board. Reynolds has a volunteer fire department that oversees the fire protection district.

Financial Capabilities:

Reynolds has no capital improvement plan that is currently available publically, nor any TIF districts available for financing. The village is a taxing body and can issue bonds for large projects.

Critical Facilities:

Reynolds listed nine structures in its list of community assets. None appear to be in a flood hazard area. Six of these are related to village operations. The Village Hall is listed as an important facility with the fire department, water, and wastewater infrastructure listed as critical. The grade school is also listed as a critical facility and location of a vulnerable population. Two businesses are also listed. One operates for farm service and has agricultural chemicals and fuel on site. A bank location is also listed. Local businesses are important for recovery and continued economic activity in the event of a disaster.

Development Trends:

Reynolds is a small community with very little predicted population growth or large scale development predicted in the coming years.

Hazard Priorities:

2015

1. Severe Storms Combined
1. Severe Winter Storm
2. Grassland, Field, or Woodland Fire

2009

1. Severe Storms (Combined)
2. Tornado
3. Severe Winter Storms
4. Wildfire
5. Extreme Heat

As with the rest of the planning area, Severe Storms Combined and Severe Winter Storm hazards are weather events that are likely to occur annually with both direct and secondary effects. These weather-related hazards may have power outages as a secondary impact. The most distinct difference between Reynolds and the planning area is that Grassland, Field, or Woodland Fire has replaced Extreme Heat in its list of priority hazards. Wildfires have occurred from agricultural burning in the open areas surrounding the village. It is reported that the local rural fire protection district may be called out 5-6 times in a dry fall season for agricultural fires that have gotten out of control.

Rock Island

Population:

2000: 39,675

2014: 38,876

2019: 38,787 (Projected)

Current County Rank in Population: 2

Land Area: 16.85 SQ MI

County Rank in Land Area: 2

Land Use & Geography:

The City of Rock Island is the second largest jurisdiction in Rock Island County in population; however, the city is the largest municipality in land area after the unincorporated county. The older developed areas of the city occupy the toe of the peninsula between the Mississippi and Rock Rivers. In addition, the city has annexed a sizable area southwest of the Rock River. The geology of the peninsula includes bluff lines from both rivers. Bluff areas also are present in the southwest area starting at about 85th Avenue West along the old Rock River flood plain basin. In addition to features that pose natural hazards, Rock Island has both highway and freight rail infrastructure that increases the potential for hazardous materials incidents from truck traffic and rail shipment of ethanol.

Government Structure:

- Mayor-Council structure, home rule
- Seven elected city council representatives elected by wards
- Mayor serves a 4-year term, City Council serves 4-year, staggered terms
- **City Departments:**
 - Administration
 - City Clerk/Treasurer
 - Community & Economic Development
 - Human Resources
 - Fire
 - Legal
 - Library
 - Parks & Recreation
 - Police
 - Public Works
- **Boards and Commissions**
 - Advanced Tech & Sustainability Consortium
 - Arts Advisory Committee
 - Beautification Commission
 - Board of Zoning Appeals
 - Building Code Board of Appeals
 - Citizens' Advisory Committee
 - Commercial/Industrial Revolving Loan Fund
 - Electrical Code Board of Appeals
 - Fire Pension Board of Trustees
 - Fire and Police Commissioners Board
 - Health Code Board of Appeals
 - Human Rights Commission
 - Labor Day Parade Advisory Board
 - Library Board of Directors
 - Liquor Control Commission
 - Martin Luther King, Jr. Community Center Board
 - Mechanical Bode Board of Appeals
 - Neighborhood Partners
 - Parks & Recreation Board
 - Planning Commission
 - Plumbing Code Board of Appeals
 - Police Pension Board of Trustees
 - Preservation Commission

- Property Maintenance Board of Appeals
- Sunset Marina Boaters Advisory Committee
- Water Pollution Control Commission
- Water Resource Committee

The City of Rock Island participates in the National Flood Insurance Program and has a floodplain management ordinance that is enforced by the city's Floodplain Manager. The city has a building code that is enforced by the Building Inspector, as well as a stormwater management ordinance enforced by the city's Public Works Department.

Financial Capabilities:

The city has a comprehensive 5-year Capital Improvement Plan. Hazard mitigation projects, especially those related to stormwater management could be incorporated into the CIP. The city is a taxing body and receives revenue from property and sales taxes and fee-based revenue. The city has and is capable of receiving and managing grants and can issue bonds for large projects.

Critical Facilities:

The City of Rock Island's critical facilities list remains mostly unchanged from the 2009 plan. The City of Rock Island listed 78 facilities in its list of community assets. Ten of these are for city operation and infrastructure, including City Hall, fire and police departments, water, and wastewater treatment facilities. The most significant change in the critical facilities list is the relocation of the Police Department building. A new building is currently under construction with completion scheduled for December 2015. Five structures listed are related to Rock Island County administration and operations. Federal facilities include a Federal Building and U.S. Post Office. Fourteen of the facilities listed may include vulnerable populations, including child day care and senior, disabled, and low-income housing. In addition, 16 school or training facilities are listed with an additional 16 directly related to the Augustana College campus. Large gathering areas, such as stadiums, arenas, or theaters are listed. The city has included communications facilities, such as radio, television, or telecommunications. Several businesses are included that handle sensitive materials, such as fuel or other hazardous materials.

Development Trends:

The city's comprehensive planning focuses on neighborhoods. There are two parallel strategies being pursued by the City of Rock Island for development and redevelopment. They are: 1) to promote infill development in the older areas of the city north of the Rock River and 2) to promote new development south of the Rock River. The infill in older developed areas is represented by the *New Old Chicago Plan* (July 2006) and the *Columbia Park Plan* (December 2004). The *Southwest Area Plan* (December 2000) promotes residential, commercial, and industrial development that is sensitive to the natural features of the area such as slopes, ravines, trees, drainage areas, and creeks. All development is contemplated to reflect the City Council's goals of sustainability and energy conservation. The city sees the *New Old Chicago Plan* implementation occurring over the next 10 years, with Columbia Park being a 20-year time frame. The Southwest Area is expected to be the city's long-range growth area over the next 20 to 50 years.

Rock Island provided the following estimates for the *2045 Quad Cities Long-Range Transportation Plan*: by 2025, there is a predicted increase of 515 additional housing units, 1188 additional school enrolled students, 310 additional industrial employees, 445 additional retail employees, and 165 additional "other" employees. By 2045, development in Rock Island will incur an additional 75 housing units, 1214 school enrolled children, 105 additional industrial employees, 175 additional retail employees, and 120 "other" employees.

Hazard Priorities:

2015

1. Hazardous Materials Incident
2. Severe Storms Combined
2. Levee Failure
4. Severe Winter Storm
4. Extreme Heat

2009

1. Severe Storms (Combined)
2. Severe Winter Storms
3. Hazardous Materials Incident
4. River Flood
5. Tornado

The City of Rock Island ranked Hazardous Materials Incident higher than the planning area. With considerable movement of materials by highway and freight rail in a largely developed area, there is greater historical occurrence, vulnerability, and probability of a hazardous materials incident than in less populated portions of the planning area. Severe Storms Combined and Severe Winter Storm remain in the top priority hazards. Two new hazards have entered the city's top hazard priorities, replacing River Flooding and Tornado, which was added to Severe Storms Combined. Levee Failure, since receiving its own hazard profile, jumped up in the city's priorities. This is because a great majority of the city's floodplain is protected by certified levees. The result of a levee failure would be immense. Because levees protect most of the floodplain in the city, River Flooding is not a large hazard.

Rock Island County (Unincorporated)

Population:

2000: 19,466 **2014:** 17,460 **2019:** 17,449 (Projected)

Current County Rank in Population: 4

Land Area: 354.64 SQ MI

County Rank in Land Area: 1

Land Use & Geography:

Rock Island County is the lead jurisdiction in this multi-jurisdictional plan. The unincorporated land area is the largest of all the jurisdictions in the planning area. While having the fourth largest population of all the jurisdictions, with such a large land area, it is the least densely developed. Undeveloped and agricultural land makes up a large part of the unincorporated area. Rock Island County also has the most river frontage of all the jurisdictions, with the Rock and Mississippi Rivers making up a good portion of its borders. Also because of its large land area, Rock Island County has a sample of more of the different geographic features of the county

within its jurisdiction. Larger areas of floodplain, slope, and soils with limitations for development all pose potential hazards for future development.

Government Structure:

- County Board – County Administrator
- 25 Board Members elected by District
- 4-year, staggered terms with Chair elected by the Board
- **Additional Elected Officials (Also 4-Year Terms)**
 - Auditor
 - County Clerk
 - Circuit Clerk
 - Coroner
 - Recorder
 - Regional Superintendent of Schools
 - Sheriff
 - State’s Attorney
 - Treasurer
- **County Departments**
 - Administration
 - Assessments
 - Court Administration
 - Court Services
 - Emergency Management
 - GIS
 - Forest Preserve
 - Highway
 - Hope Creek Care Center
 - Human Resources
 - Information Systems
 - Public Defender
 - Public Health
 - Veterans Assistance
 - Zoning & Building
- **Boards and Commissions**
 - Administration
 - Board of Review
 - Executive
 - Finance
 - Governmental Affairs
 - Health and Human Services
 - Human Resources
 - Public Works

Financial Capabilities:

The county is a taxing body and receives revenue from property tax and fees for services, and is capable of receiving and managing federal, state, and local grants. The county can issue bonds to finance large projects. The county does not have a Capital Improvement Plan but is currently developing a 5-year CIP that is anticipated to be approved in May 2016.

Critical Facilities:

A number of community assets for Rock Island County are located within incorporated jurisdictions. Critical facilities, such as the Rock Island County Courthouse and the Rock Island County Office Building, are already listed for the City of Rock Island where they are located. Since some assets for Rock Island County were listed with the municipalities, this reduced the number of remaining assets to list. As a result, Rock Island County has identified six critical facilities, generally located in unincorporated areas. These facilities include the county

Emergency Management Agency office, the Highway Department building, and several rural fire protection district stations located in the unincorporated area.

Development Trends:

Rock Island County has jurisdiction over land uses in the unincorporated area. These land uses are largely agricultural and open spaces with the exception of limited residential development and pockets of industrial development in unincorporated areas, such as north of Cordova. While the future land use map shows large areas of low-density residential development, in reality, immediate growth pressure will likely stay close to the largest cities.

Hazard Priorities:

2015

1. River Flooding
1. Flash Flooding
1. Levee Failure
4. Severe Storms Combined
4. Severe Winter Storm
4. Hazardous Materials Incident
6. Extreme Heat
6. Influenza Pandemic

2009

1. Severe Winter Storms
2. Severe Storms (Combined)
3. Flash Flood
3. River Flood
5. Tornado
6. Extreme Heat

Unincorporated Rock Island County has three hazards tied for highest priority: River Flooding, Flash Flooding, and Levee Failure. This is not surprising as unincorporated Rock Island County has the largest amount of floodplain in the planning area, as well as the largest number of repetitive loss properties both along the Rock River and on Campbell's Island in the Mississippi River. With the occurrence of ice jams on the Rock River causing flooding with little advance warning, it is easy to see why Flash Flooding is equal to River Flooding in Rock Island County priority. The levee systems within unincorporated Rock Island County are not certified. The unincorporated county has a high occurrence of Severe Storms Combined and Severe Winter Storm hazards. Some of the extremely hazardous sites within the planning area are located in unincorporated Rock Island County, while rail lines and pipelines are also located throughout the unincorporated county leading to Hazardous Materials Incident entering the top hazard priorities. Extreme Heat is listed as a priority because of frequency of occurrence and disproportionate impact on agriculture, especially livestock. Finally, Influenza Pandemic makes the top priorities due further distances to medical facilities to seek needed attention.

Silvis

Population:

2000: 7,323

2014: 7,479

2019: 7,190 (Projected)

Current County Rank in Population: 5

Land Area: 4.16 SQ MI

County Rank in Land Area: 6

Land Use & Geography:

The City of Silvis ranks as the fifth largest jurisdiction in the planning area by population and sixth by land area. The city is bordered by the City of East Moline on the north and west and by the Village of Carbon Cliff on the east. Located on the peninsula between the Rock and Mississippi Rivers, there are areas of river bluff and steep slopes. The corporate boundaries of the city touch the Rock River. There is a floodplain and wetland area north of the rail yard to the northern boundary of the city. A certified levee in this area that also runs west into East Moline protects that area from flooding. There is a small area of floodplain along the Rock River where a golf course is located. See Appendix 3-3 for maps of the flood hazard areas. The historic rail yard and trackage in this northern area was used as a place to reassemble train cars. There is still considerable freight traffic but less than at its historic peak.

Historic records of coal mine activity show some sites located between Silvis and East Moline. No mine subsidence issues have been reported for Silvis; however, coal mine locations may be in currently unincorporated or undeveloped areas and maybe an issue for future development.

Government Structure:

- Mayor-Council structure, non-home rule
- Eight elected city council representatives elected by wards
- Mayor serves a 4-year term, City Council serves 4-year, staggered terms
- **Departments:**
 - City Administrator
 - City Clerk
 - Fire
 - Inspections
 - Parks
 - Police
 - Treasurer
 - Police
- **Boards and Commissions:**
 - Civil Service
 - Economic Development Commission
 - Library Board
 - Liquor Commission
 - Planning & Zoning Board
 - Police Pension Board
 - Water Board
 - Zoning Board of Appeals

The City of Silvis participates in the National Flood Insurance Program and has a floodplain management ordinance enforced by the Building Inspector. The city has a building code that is enforced by the City Inspector.

Financial Capabilities:

The City of Silvis is a taxing body and receives revenue from property tax and sales tax. The city is capable of receiving and managing grants.

Critical Facilities:

The City of Silvis's critical facilities include City Hall, the fire department, street department, public safety building, water department, water plant, and two water towers. The fire department had not been included in the previous plan. Also considered for this plan were the city's vulnerable populations at Deer Villa Apartments, Warren Towers, Illini Towers, and Heartland.

Development Trends:

Silvis adopted its comprehensive plan in 1998. In that plan, few changes were proposed for the exiting corporate limits. Infill and conversion of residential uses were proposed to concentrate commercial development along 1st Street between 6th and Crosstown Avenues and along 1st Avenue and Illinois Route 92. The newly annexed area to the south to of the city was expected to change from open space to commercial land south of Colona Road and east of 10th Street. During public input, expanded commercial and residential development was suggested east of Illinois Route 5 and north of Colona Road. In the longer term, existing subdivisions near the Friendship Farms area may be annexed to the city and remain in residential use. Recognizing the wetland and flood prone areas of the Rock River, these areas were proposed to remain in open space use whenever possible.

Silvis gave the following estimates for the *2045 Quad Cities Long-Range Transportation Plan*: by 2025, there is a predicted increase of 515 housing units, 1188 school enrolled students, 310 industrial employees, 445 retail employees, and 165 other employees. By 2045, there is a predicted increase of 75 additional housing units, 1214 school enrolled students, 105 industrial employees, 175 retail employees, and 120 "other" employees.

Hazard Priorities:**2015**

1. Severe Storms Combined
1. Severe Winter Storm
3. Flash Flooding
4. Extreme Heat
5. Hazardous Materials Incident

2009

1. Severe Storms (Combined)
2. Severe Winter Storms
3. Flash Flood
4. Tornado
5. Hazardous Materials Incident

The City of Silvis has the same two top ranked hazards as they did in the previous plan. Flash Flooding remained their third highest priority, and Tornado was included in the Severe Storms Combined profile. While Influenza Pandemic scored higher than Flash Flooding, the city elected to removed it from its top priorities as the hazard is primarily addressed by the Rock Island County Health Department in partnership with the State Health Department and the Centers for Disease Control and Prevention. As noted in the geographic narrative above, Silvis does not have a large amount of floodplain; therefore, River Flooding was lower on their hazard priorities than Flash Flooding. With the bluff and steep slopes, urban flooding may occur with heavy rainfall as Flash Flooding. Hazardous Materials Incident was moved to the fifth priority due to the considerable freight rail activity in Silvis. In addition, there are Illinois Highways 5, 92, and 84 that add highway and truck traffic to the potential for Hazardous Materials Incident within the corporate boundaries of Silvis.

