

3.3.2.9 Drought

I. Background

The National Oceanic and Atmospheric Administration (NOAA) defines drought as a deficiency in precipitation over an extended period. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades.

The United States is vulnerable to the social, economic, and environmental impacts of drought. Historical weather records of United States indicate that there have been three or four major droughts over the last 100 years. Two of these disasters, the 1930's Dust Bowl drought and the 1950's drought, each lasted 5 to 7 years and covered large areas of the U.S.

According to the National Climatic Data Center (NCDC), during the 31 years prior to 2011, the United States has experienced 114 weather/climate disasters where overall damages/costs reached or exceeded \$1 billion. The standardized losses for the entire 114 events exceeded \$800 billion. During that period, there were 16 drought events that totaled \$195 billion in losses; an average of slightly over \$12 billion per each drought event.

Drought is a normal, recurring global occurrence in most parts of the world. Drought is among the earliest documented climatic events, and tied to several biblical stories. Migrations of Hunter-gatherer populations in 9,500 BC Chile have been linked to drought, as has the exodus of early humans out of Africa and into the rest of the world about 135,000 years ago.

Measuring Drought

The Palmer Drought Index, sometimes called the Palmer Drought Severity Index (PDSI), is used to measure drought and is based on recent precipitation and temperature. Developed by meteorologist Wayne Palmer, the index is based on a supply-and-demand model of soil moisture to measure the departure of the moisture supply. The index is most effective in determining long-term drought and not as good dealing with conditions over a time period of weeks. The index uses 0 as normal with drought shown in terms of negative numbers. It also works to describe wet spells, using corresponding positive numbers. The PDSI is calculated based on precipitation and temperature data, as well as the local Available Water Content (AWC) of the soil.

NOAA utilizes the index to publish weekly, Palmer maps for the United States. Global Palmer data sets have been developed based on instrumental records beginning in the 19th century. The chart below illustrates the Palmer Drought Index.

Table 3.3.2.9.1 - Palmer Classifications	
4.0 or more	Extremely wet
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	Incipient dry spell
-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
<i>Source: National Drought Mitigation Center</i>	

An alternative method is the Drought Severity Classification used by the U.S. Drought Monitor service. (<http://droughtmonitor.unl.edu/Home.aspx>). It uses a scale of D0-D4 that has a direct relationship to the Palmer method illustrated above.

Table 3.3.2.9.2

Drought Severity Classification			
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)
D0	Abnormally Dry	Going into drought: <ul style="list-style-type: none"> ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> ▪ some lingering water deficits ▪ pastures or crops not fully recovered 	-1.0 to -1.9
D1	Moderate Drought	<ul style="list-style-type: none"> ▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested 	-2.0 to -2.9
D2	Severe Drought	<ul style="list-style-type: none"> ▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed 	-3.0 to -3.9
D3	Extreme Drought	<ul style="list-style-type: none"> ▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions 	-4.0 to -4.9
D4	Exceptional Drought	<ul style="list-style-type: none"> ▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies 	-5.0 or less

Source: <http://droughtmonitor.unl.edu/AboutUs/ClassificationScheme.aspx>

Types of Droughts

Droughts are typically defined in three main ways:

1. Meteorological droughts occur when there is a prolonged period of time with less than average precipitation. A meteorological drought usually precedes the other kinds of droughts.
2. Agricultural droughts affect crop production or the ecology of the range. An agricultural drought can occur independently with any change in precipitation levels when soil conditions and erosion, triggered by poorly managed agricultural endeavors, cause a shortfall in the amount of water available to the crops.
3. Hydrological droughts happen when water reserves available in sources such as aquifers, lakes, and reservoirs fall below the statistical average. A hydrological drought tends to show up more slowly because it involves stored water that is used, but not replenished. As with an agricultural drought, this type of drought can be triggered by more than just a loss of rainfall.

Hazards/Consequences of Drought

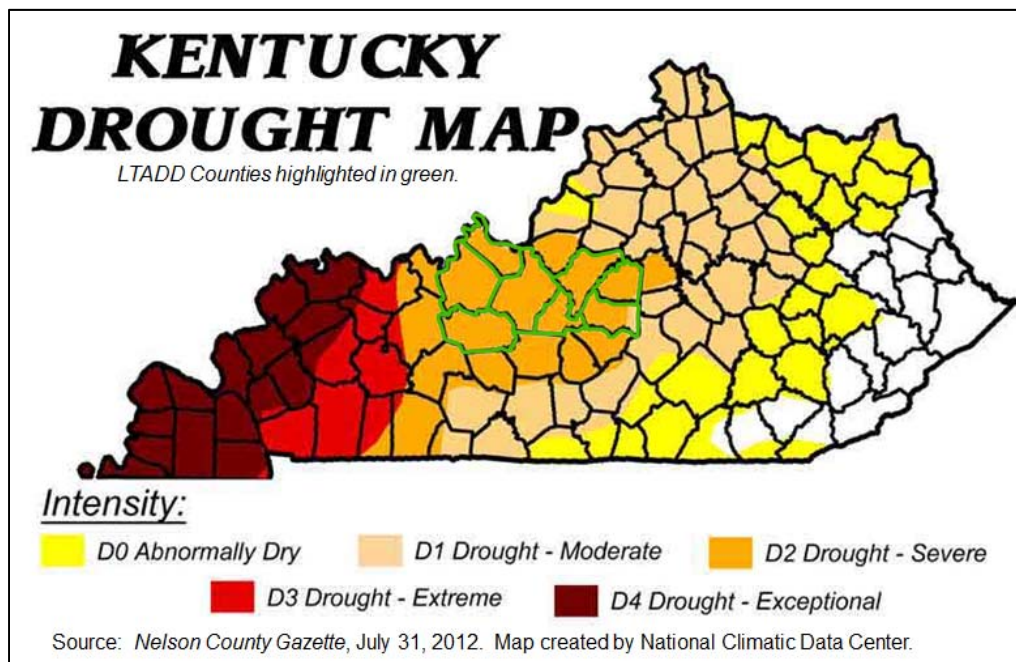
Periods of drought can cause significant environmental, agricultural, health, economic and social consequences. Subsistence farmers and populations dependent on water sources for food are more vulnerable to famine and diminished economic means. Drought can cause a reduction in overall water quality when reduced water flows increase contamination of remaining water sources. Other consequences of drought include:

- Reduced crop growth or yield productions and carrying capacity for livestock
- Dust bowls and landscape erosion
- Dust storms when drought reduces the water content of the soil
- Damage to terrestrial and aquatic life habitats
- Hunger and famine due to reduced food crops
- Malnutrition, dehydration and related diseases
- Mass migration of humans and wildlife resulting in displaced people and animals
- Reduced electricity as a result of low water flow through hydroelectric dams
- Water shortages for residential and industrial users
- Snake migration that results in increased snakebites
- Social unrest
- Wildfires are more common during periods of drought and often result in loss of life and widespread property damage
- Exposure and oxidation of acid sulfate soils due to falling surface and groundwater levels
- Navigable waters can become unsafe for navigation as a result of drought
- Degradation of the environment in the form of erosion and ecological damage may occur as the result of drought

II. Profile

According to NOAA, there have been 17 recorded drought events in Kentucky since 1996. Three of these droughts caused serious damage to agricultural crops. In 1996, drought affected 20 Western Kentucky Counties and crop damage was estimated at \$154 million. In 2002, 22 counties were affected by drought with damages estimated at \$70 million. The drought of 2012 was a Level 2 drought in 24 Kentucky Counties and a Level 1 drought in an additional 66 Counties. The entire State was at least abnormally dry. Total crop production for State was at 47% of the usual annual yield and crop damage was severe. There was widespread shortage of animal feed as well. There were no deaths attributed to these drought events, however, they did affect agriculture, tourism, wildlife, residential and commercial water use, recreation, wildlife habitat, increased wildfires, electric power generation and water quality.

The map below illustrates the widespread effect and severity of the 2012 drought in Kentucky.





North Rolling Fork at Bradfordsville, Summer 2008.
Source: LTADD Archive.

The chart below outlines significant drought events in Kentucky since May of 1930. The Lincoln Trail Region lies within the Central region of the Commonwealth. The 2012 drought affected the entire State with PDSI ratings ranging from -0.5 to -3.99.

Table 3.3.2.9.2 - Significant Kentucky Drought Events			
Time Period	Location/Region	PDSI Rating	Crop Losses
May 1930 – December 1931	Bluegrass, Central, East, West	-4.73	NA
Fall 1939 – Spring 1942	Central, Bluegrass, East	-3.97	NA
Summer 1952 – Winter 1955	West, Bluegrass, Central	NA	NA
Summer 1996	West	NA	\$154 million
Summer 2002	West	NA	\$70 million
Summer 2007	Statewide	-2.75	Unknown
Fall 2008	Statewide	-2.75	Unknown
Spring/Summer 2012	Statewide	-0.5 to -3.99	Unknown
Source: NOAA, KY Energy and Environment Cabinet			

III. Analysis

To analyze drought as a hazard threat to the Lincoln Trail Region, research was done to determine what constitutes a drought and the far-reaching effects that it has. Historical events were researched and documented as well. Resources for information gathered include NOAA, the National Weather Service, the National Climatic Data Center, the National Drought Mitigation Center and the Commonwealth of Kentucky Energy and Environment Cabinet.

One drought event was recorded for any part of the Lincoln Trail Region between May, 1930 and June, 2015 per the sources cited above.

While drought events are not easily captured and reported, the table above is evidence of their occurrence. The back-to-back droughts of 2007 and 2008 were a hardship on local farmers and the 2012 drought adversely impacted the entire State.

Heat in concert with lack of precipitation often exacerbates drought conditions. The Kentucky Mesonet data below tracks maximum temperatures for the region over the last five years.

Table 3.3.2.9.3

Maximum Temperature Table for Lincoln Trail Region from 2010 to 2015							
<i>Source: Kentucky Mesonet</i>							
Mesonet Station	2010	2011	2012	2013	2014	2015 Jan. – March 3	Average Station 5 Year Average 2010 – 2014
Breckinridge Co. (MQDY)	100.1	98.6	103.1	94.2	93.5	61.9	97.9
Grayson Co. (BLRK)	96.3	98.3	102.5	92.1	92.9	63.5	96.42
Hardin Co. (CCLA)	99.6	98.1	103.0	93.3	92.3	61.1	97.26
LaRue Co. (HDGV)	NA	82.1 Sept. – Dec.	103.1	90.0	90.6	62.3	NA
Marion Co. (LRT0)	NA	100.8 May – Dec.	102.7	90.5	92.6	62.8	NA
Meade Co. (BRND)	NA	100.4 March – Dec.	103.6	93.1	90.7	61.9	NA
Average	98.67	99.24	103.0	92.2	92.1	62.25 Jan. – March 3	97.04 Annual 8-County Regional 5 Year Average 2010 – 2014

Kentucky Mesonet data for local precipitation over the last five years is included below. The region will closely monitor and track Mesonet data to help track drought conditions specific to the eight-county area.

Table 3.3.2.9.4

Precipitation Data for Lincoln Trail Region from 2010 to 2015							
<i>Source: Kentucky Mesonet</i>							
Mesonet Station	2010	2011	2012	2013	2014	2015 Jan. – March 3	Total
Breckinridge Co. (MQDY)	29.63"	72.20"	39.77"	47.44"	45.28"	5.11"	239.43"
Grayson Co. (BLRK)	44.34"	71.22"	39.69"	55.93"	40.85"	5.82"	257.86"
Hardin Co. (CCLA)	38.70"	71.21"	50.07"	46.20"	42.21"	4.95"	253.34
LaRue Co. (HDGV)	NA	16.72" Sept – Dec.	44.77"	51.02"	43.38"	6.22"	NA
Marion Co. (LRT0)	NA	27.53" May – Dec.	48.22"	54.38"	42.51"	5.44"	NA
Meade Co. (BRND)	NA	48.80" March – Dec.	47.56"	49.55"	48.07"	4.11"	NA
Average	37.557"	71.543"	45.013"	50.753"	43.717"	5.275"	49.7166" annual 8-county regional 5 year average

Table 3.3.2.9.6 Summary of Drought Index Data

	Percentage of Area in each drought category, Jan 1, 2000 to July 12, 2016.					
		Abnormally Dry	Moderate Drought	Severe Drought	Extreme Drought	Exceptional Drought
	NONE	D0	D1	D2	D3	D4
Breckinridge	78.0	22.0	9.6	3.3	0.7	0.0
Grayson	77.1	22.9	11.1	3.3	0.5	0.0
Hardin	78.6	21.4	10.3	2.5	0.5	0.0
Larue	77.6	22.4	9.9	3.4	0.6	0.0
Marion	76.3	23.7	10.5	4.0	0.7	0.0
Meade	79.4	20.6	9.2	2.9	0.8	0.0
Nelson	77.7	22.3	10.5	3.0	0.6	0.0
Washington	77.0	23.0	11.3	3.8	0.7	0.0
Lincoln Trail Region	77.7	22.3	10.3	3.3	0.6	0.0

Source: U.S. Drought Monitor
(<http://droughtmonitor.unl.edu/MapsAndData/DataTables.aspx>)

Note: This data is based on the “Traditional Statistics” and may include multiple data in each category. It is possible to have a higher percent area for a higher category. Thus it may exceed 100% for any given area. This data is over a very short time span so it has limited use at this time to predict drought probability or correlate with any loss data. However, in the future further monitoring and data collection may yield more robust analysis.

3.3.2.10 Earthquakes

I. Background

According to the United State Geological Survey (USGS), an earthquake is “what happens when two blocks of the earth suddenly slip past one another. The surface where they slip is called the fault or fault plane. The location below the earth’s surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.” This phenomenon results in a shaking, trembling, or concussion of the earth, often accompanied by a rumbling noise. The seismicity, seismism, or seismic activity of an area refers to the frequency, type and size of earthquakes experienced over a period of time.

At times, an earthquake will be preceded by a foreshock. A foreshock is smaller than an actual earthquake and will occur in the same place as the larger earthquake that follows. A foreshock cannot be identified as such until the larger earthquake has happened. The larger earthquake is called the mainshock and may be followed by aftershocks. Aftershocks are smaller earthquakes that follow a mainshock and can continue for weeks or months after the mainshock.

USGS explains “the earth has four major layers: the inner core, outer core, mantle and crust. The crust and the top of the mantle make up a thin skin on the surface of our planet. However, this skin is not all in one piece, it is made up of many pieces like a puzzle covering the surface of the earth. These pieces are slowly moving around, sliding past one another and bumping into one another. These pieces are called tectonic plates, and the edges of the plates are called the plate boundaries. The plate boundaries are made up of many faults, and most of the earthquakes around the world occur in these faults. Since the edges of the plates are rough, they get stuck while the rest of the plate keeps moving. When the plate has moved far enough, the edges unstuck on one of the faults and there is an earthquake.”

When the edges of the fault are stuck together, the rest of the block keeps moving, and the energy that would normally allow the blocks to slide past one another is being stored up. The force of the moving blocks eventually overcomes the friction of the jagged edges of the faults and causes them to break apart. All of the stored up energy is released and radiates outward from the fault in all directions as seismic waves. The seismic waves shake the ground as they move through it and as the waves reach the earth’s surface, they shake the ground and anything on it.

Measuring Earthquakes

There are three scales for measuring the intensity of an earthquake. The *Mercalli scale* was invented in 1902 by Guiseppe Mercalli and uses observations of the people who experience the earthquake to estimate its intensity. This scale was subjective and dependent on the opinions of witnesses.

In 1934, Charles Richter developed the *Richter scale*. The Richter scale measured the magnitude of an earthquake using a formula based on amplitude of the largest wave recorded on a specific type of seismometer and the distance between the earthquake and the seismometer. Richter's scale was specific to earthquakes in California, but other scales, based on wave amplitudes and total earthquake duration, were developed for use in other situations and were consistent with Richter's scale.

The following chart compares equivalents for the Mercalli scale to the Richter scale and identifies some of the hazards associated with earthquakes.

Table 3.3.2.10.1 - Modified Mercalli Intensity Scale		
Mercalli Intensity	Equivalent Richter Magnitude	Witness Observations
I	1.0 to 2.0	Felt by very few people; barely noticeable.
II	2.0 to 3.0	Felt by a few people, especially on upper floors.
III	3.0 to 4.0	Noticeable indoors, especially on upper floors, but may not be recognized as an earthquake.
IV	4.0	Felt by many indoors. May feel like heavy truck passing by.
V	4.0 to 5.0	Felt by almost everyone, some people awakened. Small objects moved, trees and poles may shake.
VI	5.0 to 6.0	Felt by everyone. Difficult to stand. Some heavy furniture moved, some plaster falls. Chimneys may be slightly damaged.
VII	6.0	Slight to moderate damage in well built ordinary structures. Considerable damage to poorly built structures. Some walls may fall.
VIII	6.0 to 7.0	Little damage in specially built structures. Considerable damage to ordinary buildings, severe damage to poorly built structures. Some walls collapse.
IX	7.0	Considerable damage to specially built structures, buildings shifted off foundations. Ground cracked noticeably. Wholesale destruction. Landslides.
X	7.0 to 8.0	Most masonry and frame structures and their foundations destroyed. Ground badly cracked. Landslides. Wholesale destruction.
XI	8.0	Total damage. Few, if any structures standing. Bridges destroyed. Wide cracks in ground. Waves seen on ground.
XII	8.0 or greater	Total damage. Waves seen on ground. Objects thrown up into the air.
<i>Source: Michigan Technological University</i>		

As the chart below illustrates, earthquakes are also categorized ranging from minor to great, depending on magnitude.

Table 3.3.2.10.2 - Earthquake Magnitude Classes	
Class	Magnitude
Great	8 or more
Major	7.0 – 7.9
Strong	6.0 – 6.9
Moderate	5.0 – 5.9
Light	4.0 – 4.9
Minor	3.0 – 3.9
<i>Source: Michigan Technological University</i>	

Table 3.3.2.10.3 - Earthquake Magnitude Scale		
Magnitude	Earthquakes Effects	Estimated Number Each Year
2.5 or less	Usually not felt, but can be recorded by seismograph.	900,000
2.5 to 5.4	Often felt, but only causes minor damage.	30,000
5.5 to 6.0	Slight damage to buildings and other structures.	500
6.1 to 6.9	May cause a lot of damage in very populated areas.	100
7.0 to 7.9	Major earthquake. Serious Damage.	20
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.	One every 50 to 10 years
<i>Source: Michigan Technological University</i>		

The newest scale for measuring the magnitude of an earthquake is the **Moment Magnitude Scale**. The moment magnitude scale is based on the total moment release of the earthquake. Moment is a product of the distance a fault moved and force required to move it. The moment magnitude scale estimates are about the same as Richter magnitudes for small and large earthquakes, but only the moment magnitude scale is capable of measuring M8 (read ‘magnitude 8’) and greater events accurately.

Causes/Prevention of Earthquakes

Earthquakes occur naturally due to the makeup of the earth and the constant movement that takes place between its tectonic plates. These quakes cannot be predicted ahead of time. However, scientists have mapped the major fault lines in the world and know where the greatest likelihood of an earthquake will occur.

While we cannot prevent natural earthquakes from occurring, we can significantly mitigate their effects by identifying hazards, avoid building structures in hazardous areas, building safer structures, and educating the public on earthquake safety. Earthquakes caused by human activity have been documented in the United States and various locations around the world. Earthquakes resulting from human activity include impoundment of reservoirs,

surface and underground mining, withdrawal of fluids and gas from the subsurface, and the injection of fluids into underground formations. Most man-made earthquakes are small and present little hazard, larger and potentially damaging man-made earthquakes have occurred in the past.

Hazards, resulting from man-made earthquakes, can be mitigated by minimizing or eliminating the human activity that causes them.

Effects of Earthquakes

The effects of earthquakes include, but are not limited to, the following:

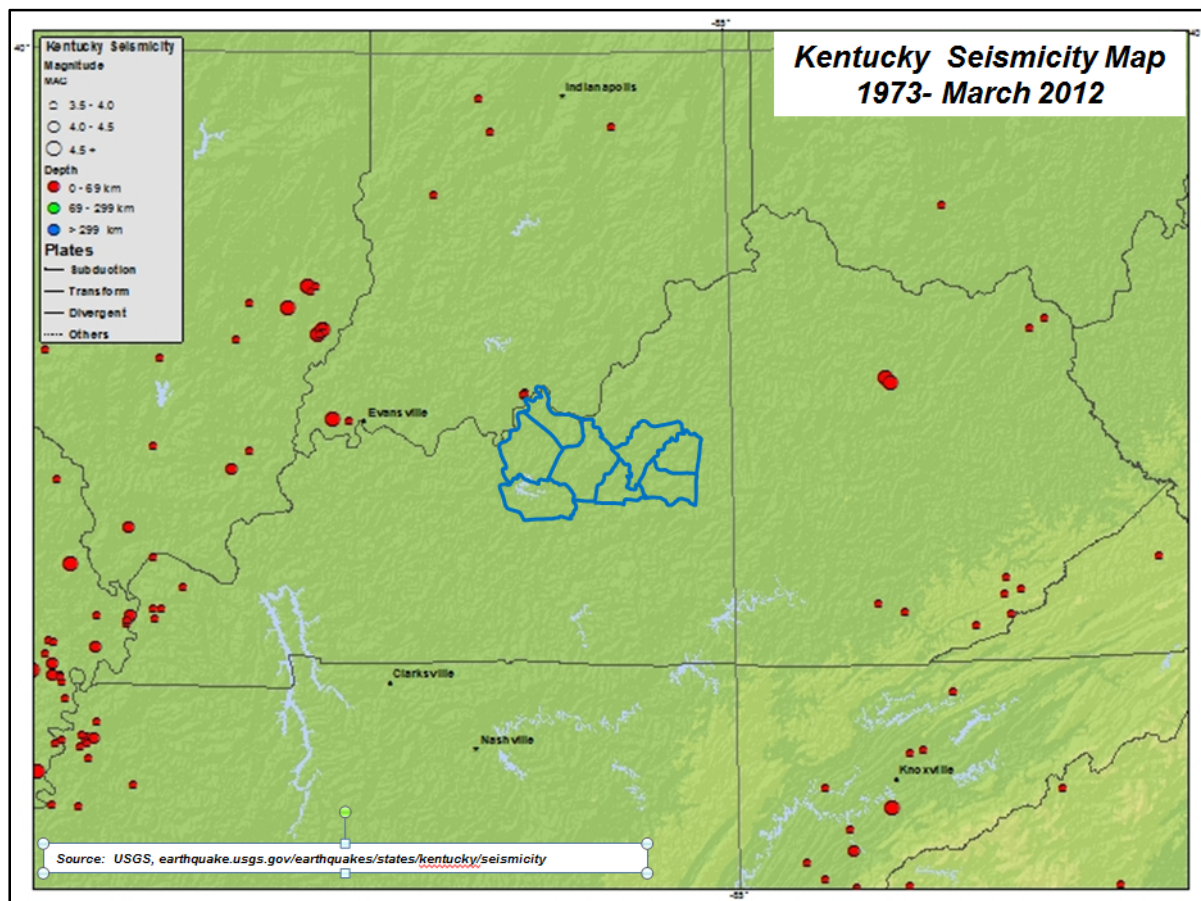
- Shaking and ground rupture are the main effects of an earthquakes. This will result in damage to buildings and other rigid structures. The severity of the local effect will depend on the complex combination of the earthquake magnitude, the distance of the site from the epicenter, and the local geological and geomorphological conditions, which may amplify or reduce wave propagation. The degree of ground shaking is measured by ground acceleration. Ground rupture is a major risk for large engineering structures such as dams, bridges, and nuclear power stations.
- Fires can result from earthquakes when shaking or ground rupture damages electrical power or gas lines. When water mains rupture as the result of an earthquake, it becomes very difficult to stop the spread of fire once it is started.
- Landslide and avalanches can be the effect of an earthquake when the quake results in slope instability.
- Soil liquefaction occurs when shaking, water-saturated granular material (such as sand) temporarily loses its strength and changes from a solid form into a liquid. This can cause structures to sink into the ground and collapse upon themselves.
- Tsunamis are long-wavelength, long-period sea waves produced by the sudden or abrupt movement of large volumes of water. This can occur when an earthquake takes place under a sea or other large body of water. Large waves produced by an earthquake can overrun nearby coastal areas in a matter of minutes. Tsunamis can also travel thousands of kilometers across open-ocean and wreak destruction on far shores hours after the earthquake that generated them.
- Floods may be a secondary effect of earthquakes, if dams are damaged or destroyed. Earthquakes may also cause landslips to dam rivers, which collapse and cause floods.
- Human impacts as a result of an earthquake include injury and loss of life, road and bridge damage, general property damage, and collapse or destabilization of buildings. The aftermath of an earthquake may bring disease, lack of basic necessities and higher insurance premiums.

II. Profile

Kentucky Earthquake History

Most earthquake activity in Kentucky has occurred in the western portion of the State near the New Madrid seismic zone. As early as 1779, 1791 and 1792 earthquake activity was recorded in the northern and eastern portions of Kentucky. Between 1811 and 1812, about 2,000 to 3,000 tremors were felt in Kentucky as a result of an initial shock on December 16, 1811.

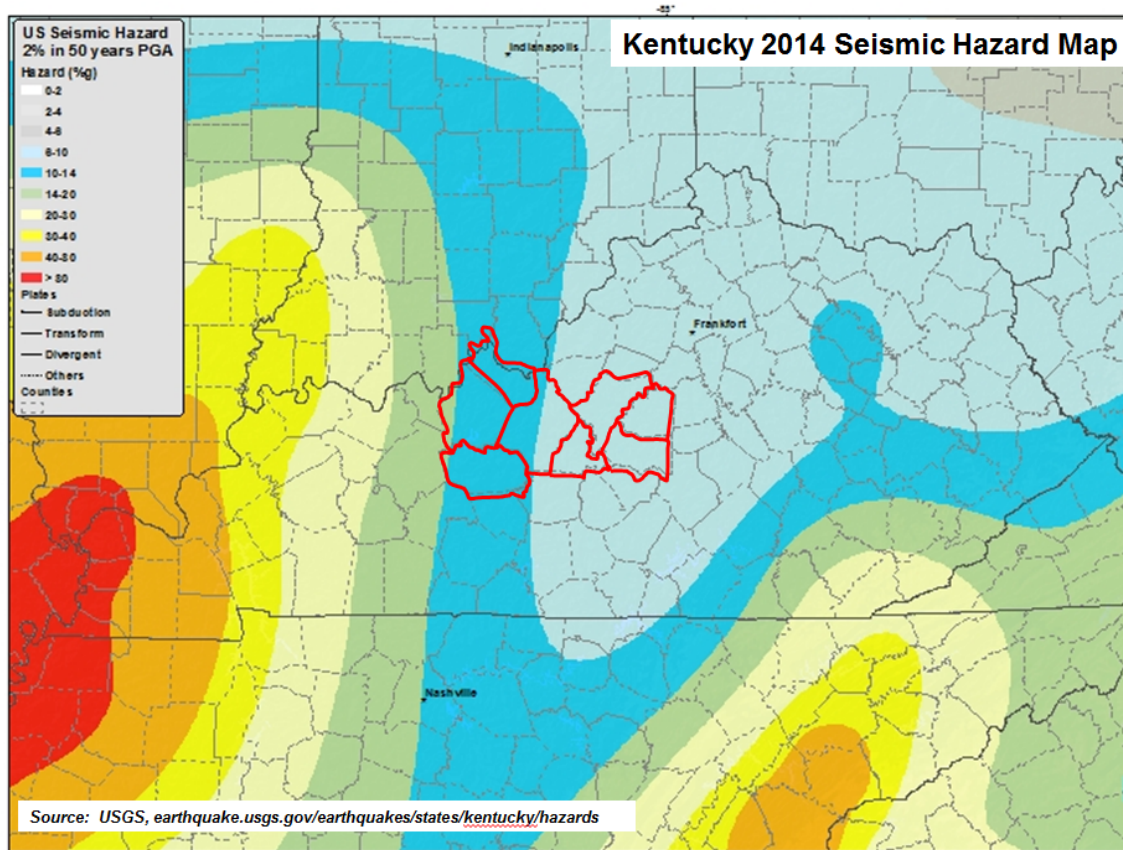
Over the next 100 years, a number of moderate earthquakes occurred in the State. A shock at Columbus, Kentucky on March 12, 1878 caused a section of bluff on the Mississippi River



to cave in. On October 26, 1915, an earthquake at Mayfield was reported to have shaken pictures from walls. A sharp earthquake, with an epicenter near the mouth of the Ohio River, occurred on December 7, 1915 and shook western Kentucky and adjoining regions. It was an intensity V to VI and was felt over an area of 60,000 square miles.

Other earthquake events were recorded in 1841, 1916, 1915 and 1924. About 75,000 square miles of land in Kentucky, Illinois, Indiana, and Tennessee were affected by an earthquake, on September 2, 1925. The epicenter of the quake was near Henderson and

landslides were noted in the damage reports. At Louisville, about 100 miles away, a chimney fell and a house reportedly sank.



Slight damage was reported near Middlesboro Kentucky as the result of an intensity V earthquake on January 1, 1954. The earthquake that occurred on November 9, 1968 was measured as an intensity VII and did considerable masonry damage at the City Building in Henderson, Kentucky which was about 50 miles east, southeast of the epicenter.

III. Analysis

The data below is from the United States Geological Survey and depicts the chance of a major earthquake (5.0 to 9.2) in each of the Lincoln Trail Region's eight counties within a 50km area, within the next 50 years.

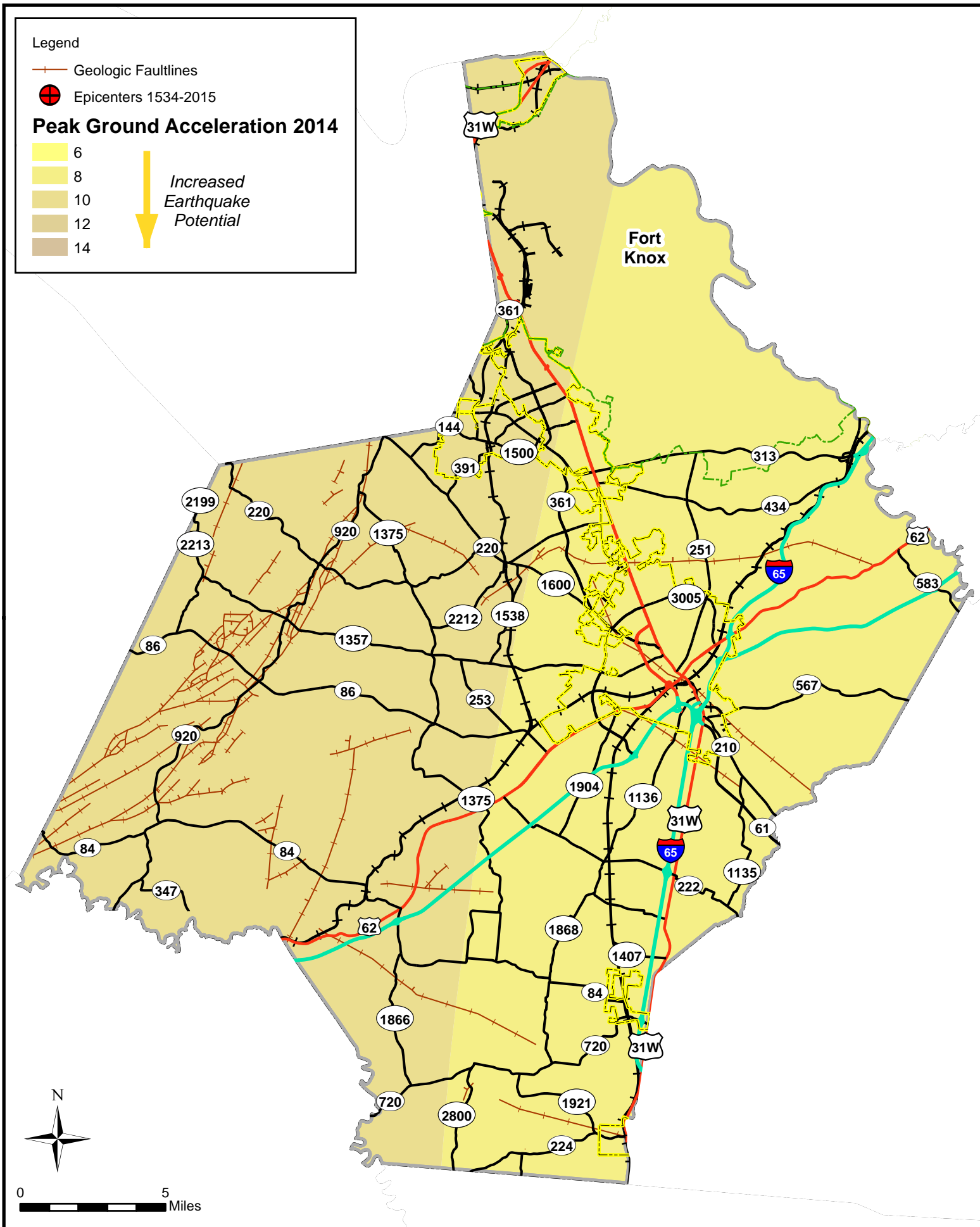
Table 3.3.2.10.4 - Earthquake Chance for the Lincoln Trail Region Counties	
County	Chance of Major Earthquake within Next 50 years
Breckinridge	1.09%
Grayson	0.73%
Hardin	0.50%
LaRue	0.30%
Marion	0.30%

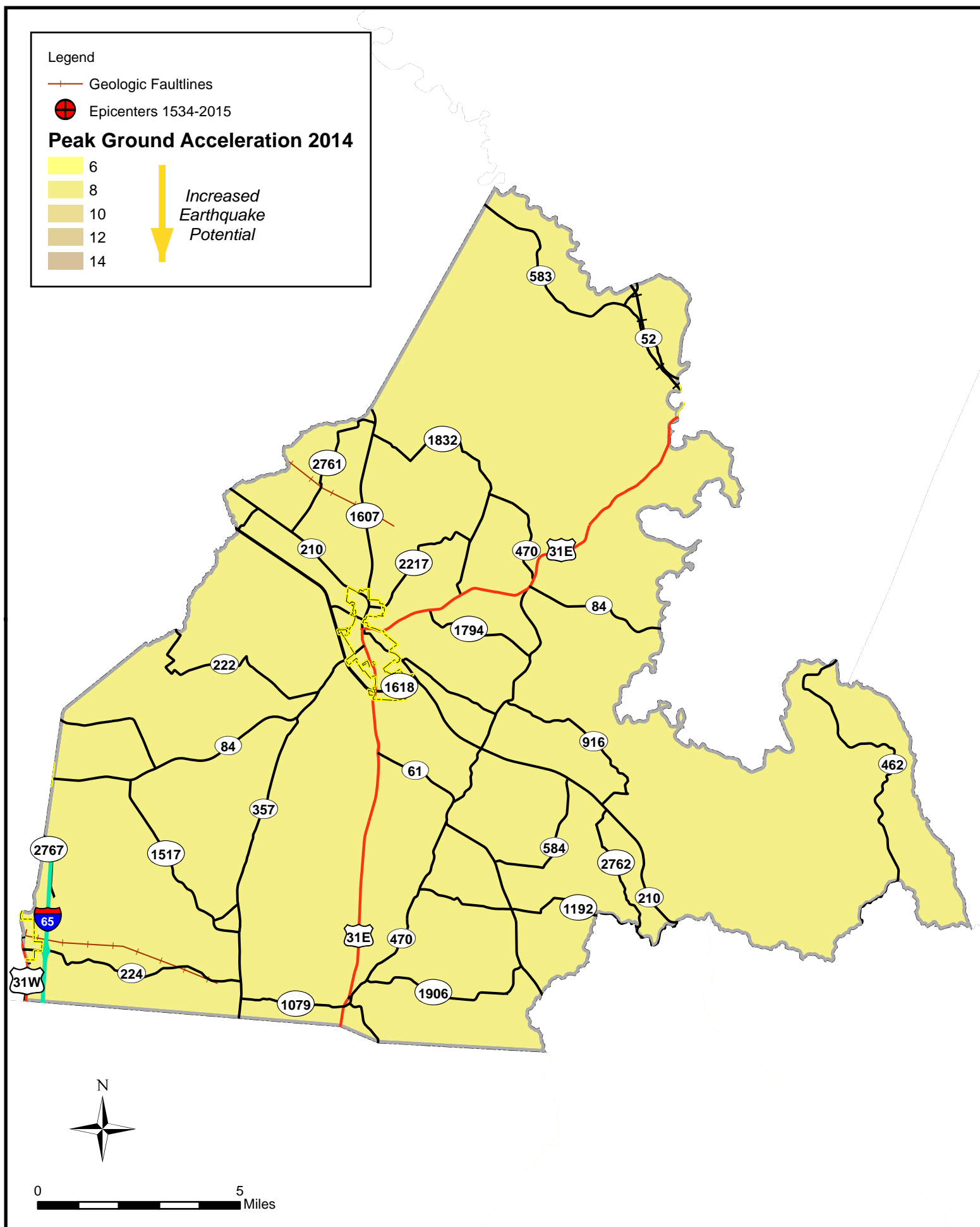
Meade	0.83%
Nelson	0.39%
Washington	0.41%
<i>Source: USGS Database</i>	

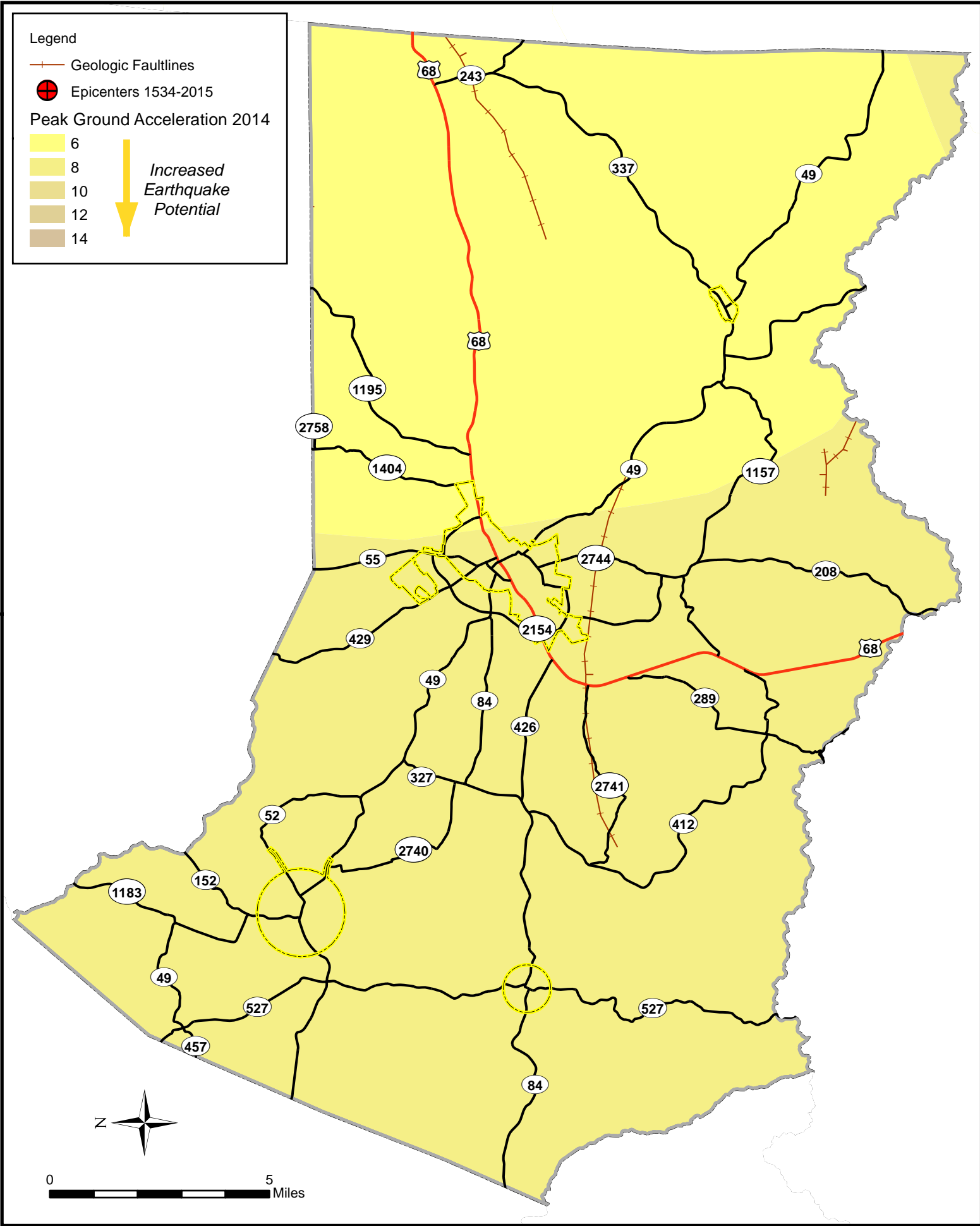
There is little likelihood that any part of the Lincoln Trail Region will experience a disaster as a result of an earthquake. However, the region must plan preparedness measures, and mitigate hazards by educating the public on earthquakes, using wise land use guidelines and by avoiding activities that increase the chance of creating a man-made earthquake.

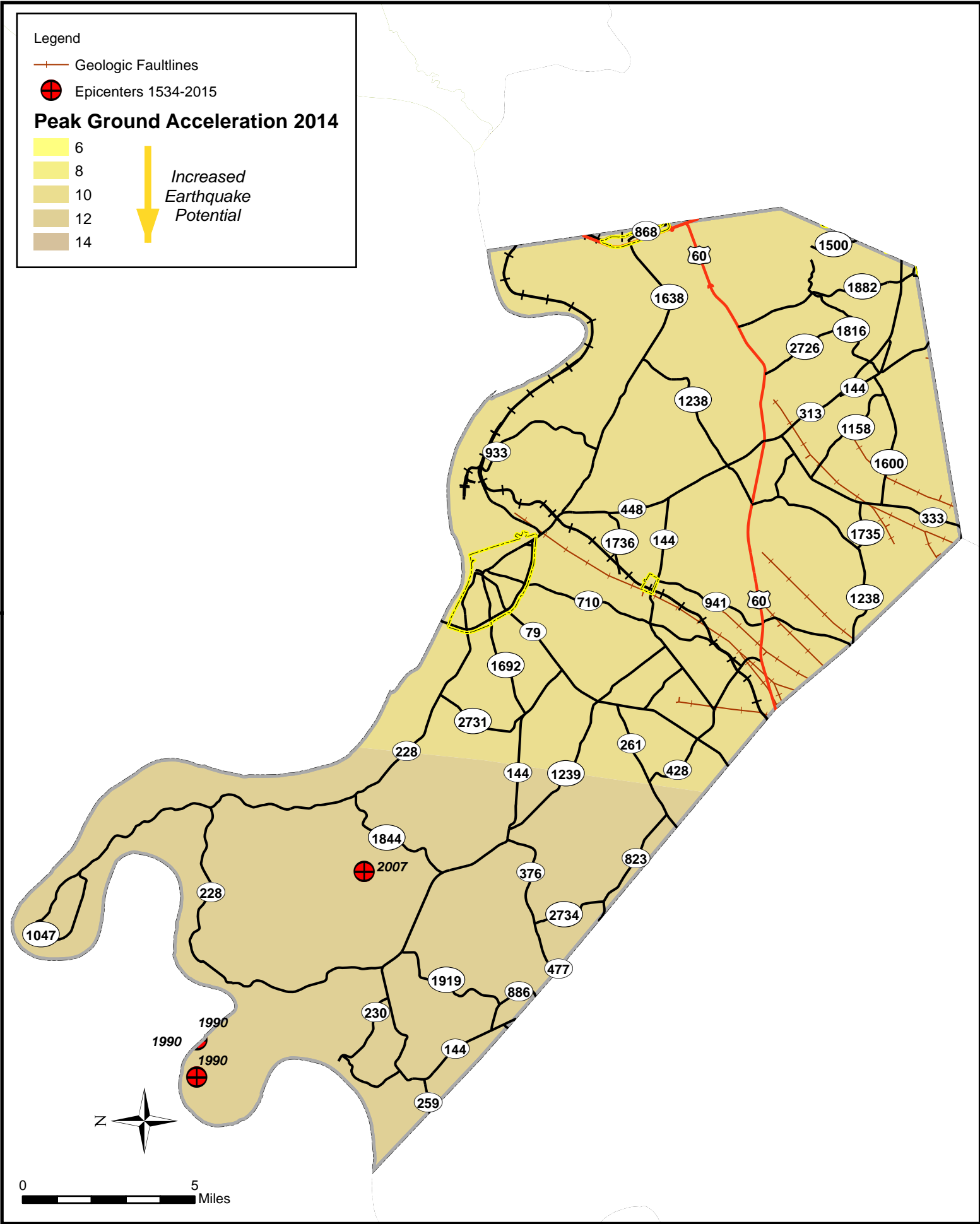
There have been no recorded earthquakes with its epicenter in the region since the 2010 update was published per USGS. Source: earthquake.usgs.gov/earthquakes/search.

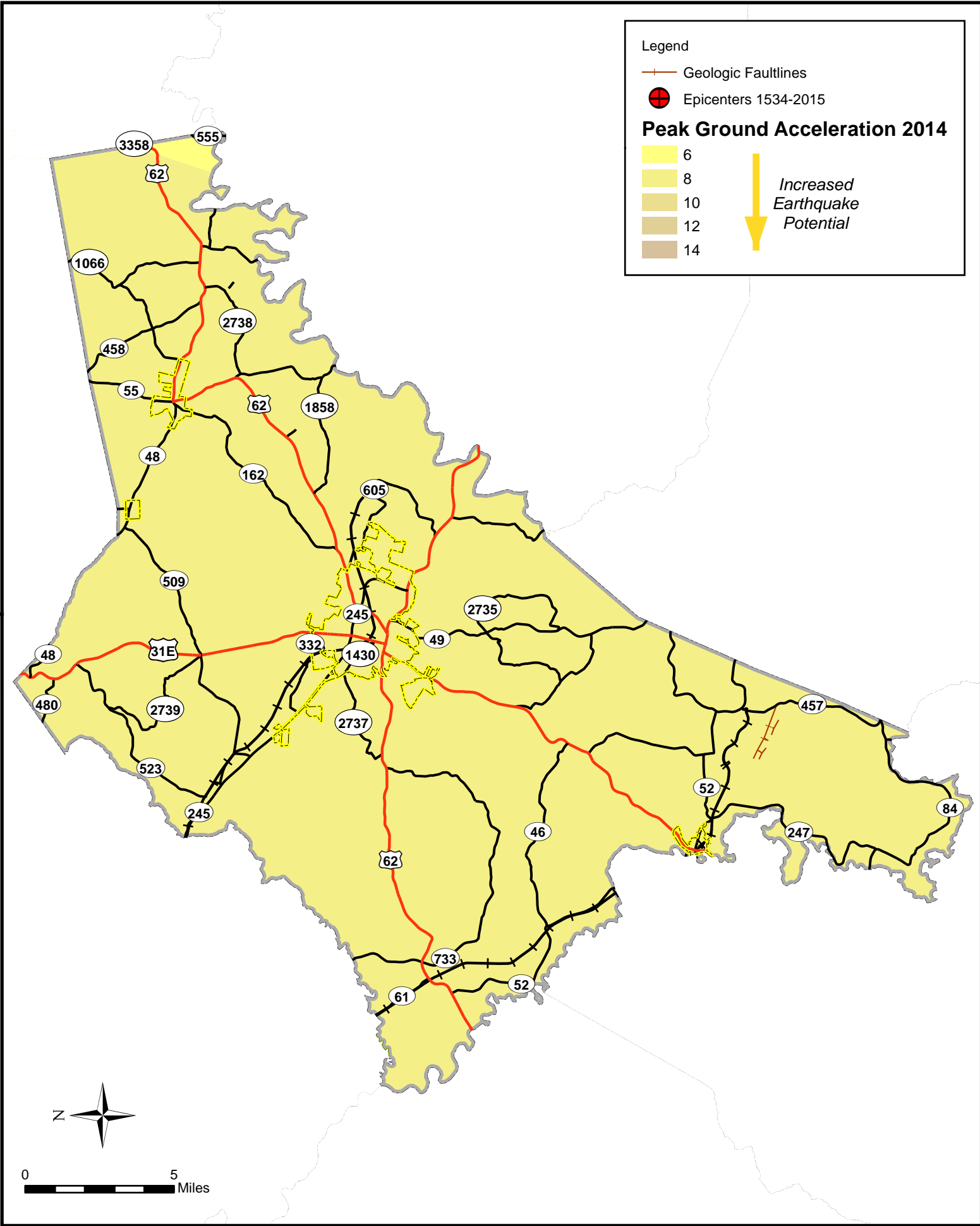
The following maps illustrate the few documented historic earthquakes that have had their epicenter in the Lincoln Trail Region. It also shows the potential for future events by portraying the Peak Ground Acceleration (PGA) values in shades of yellow and alluvial soils that have a higher potential for liquefaction. The PGA in the region decreases from west to east. The faults that exist in the Region are very old and inactive but are portrayed on the map by the black, ticked lines for reference.

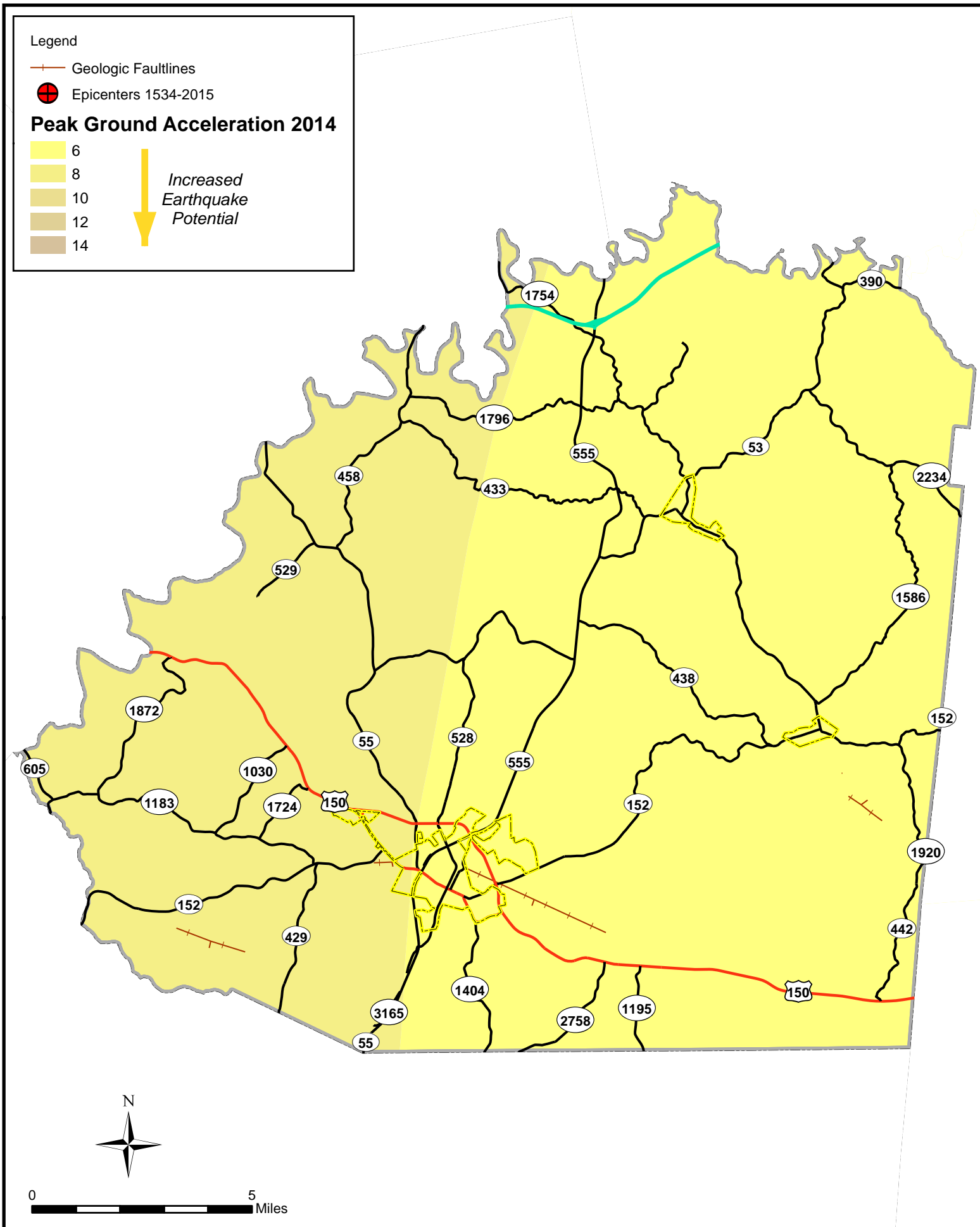












3.3.2.11 Hurricane

I. Background

Merriam-Webster defines a hurricane as “an extremely large, powerful and destructive storm with very strong winds that occurs especially in the western part of the Atlantic Ocean.” Typically, a hurricane is considered a tropical storm with winds of 74 miles per hour or greater. The storm or cyclone is accompanied by rain, thunder, and lightning.

Hurricanes are unique. Unlike any other storms on earth, hurricanes can be viewed from space as powerful, tightly coiled weather systems. Also called cyclones; the general term for all circulating weather systems, the storms move counterclockwise in the Northern Hemisphere over tropical waters. There are three classes of tropical cyclones:

1. **Tropical Depression** - A tropical depression is an organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph or less.
2. **Tropical Storm** - A tropical storm is an organized system of strong thunderstorms with a defined circulation and maximum sustained wind of 39 to 73 mph.
3. **Hurricane** - A hurricane is an intense tropical storm with a well-defined circulation and maximum sustained winds of 74 mph or greater. In the western Pacific, hurricanes are called typhoons,” and similar storms in the Indian Ocean are called cyclones.

The National Atmospheric and Oceanic Agency (NOAA) further defines the attributes of a hurricane. “Hurricanes are products of the tropical oceans and atmosphere. Powered by heat from the sea, they are steered by the easterly trade winds and the temperate westerlies, as well as by their own ferocious energy. Around their core, winds grow with great velocity, generating violent seas. Moving ashore, they sweep the ocean inward while spawning tornadoes and producing torrential rains and floods. Each year on average, ten tropical storms (of which six become hurricanes) develop over the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Many of these remain over the ocean. However, about five hurricanes strike the United States coastline every 3 years. Of these five, two will be major hurricanes (category 3 or greater on the Saffir-Simpson Hurricane Scale).”

Saffir-Simpson Hurricane Scale and Associated Damages

The intensity of a hurricane is measured by 5 categories. The following scale provides examples of the impacts and damages associated with each category in the United States.

Table 3.3.2.11.1 - Saffir-Simpson Hurricane Wind Scale		
Category	Wind Speed (mph)	Damage
1	74 - 95	Very dangerous winds will produce some damage
2	96 - 110	Extremely dangerous winds will cause extensive damage
3	111 - 129	Devastating damage will occur
4	130 - 156	Catastrophic damage will occur
5	> 156	Catastrophic damage will occur
<i>Source: NOAA - National Hurricane Center</i>		

II. Analysis

Hurricanes in Kentucky

Although catastrophic damage can result from hurricanes, the geographic location of the Lincoln Trail Region and Kentucky precludes the State from experiencing this level of damage.

However, in September of 2008, Hurricane Ike caused widespread damage across eleven states including Arkansas, Illinois, Indiana, Kentucky, Michigan, Missouri, New York, Ohio, Pennsylvania, Tennessee, and West Virginia. Although the storm made landfall in Texas and Louisiana, the effects were even felt in parts of Ontario due to the incredible strength and size of Ike.

In Kentucky, the Louisville area declared a state of emergency due to major damage, and the Louisville International Airport was temporarily closed. A utility spokesperson indicated that the area suffered its worst power outage in 30 years as a result of Ike. Near Covington, the Cincinnati – Northern Kentucky International Airport was also temporarily closed and the control tower evacuated. An apartment building in Covington also lost its entire roof. The Kentucky Governor declared a statewide state of emergency and many schools were closed or delayed in the first 3 days following the storm. Statewide, over 600,000 customers lost electricity as a result of the winds, and a boy was struck and killed by a blown tree limb in Simpsonville.

3.3.2.12 Tsunami

I. Background

The Nation Oceanic and Atmospheric Administration defines a tsunami as “a series of ocean waves generated by sudden displacements in the sea floor, landslides, or volcanic activity. In the deep ocean, the tsunami wave may come gently ashore or may increase in height to become a fast moving wall of turbulent water several meters high.”

While a tsunami cannot be mitigated, the impact of a tsunami can be mitigated through public education, community preparedness, timely warnings, and effective response efforts.

Tsunami waves do not resemble normal sea waves. Instead of appearing as a normal breaking wave, a tsunami may initially resemble a rapidly rising tide. Tsunamis usually consist of a series of waves with periods ranging from minutes to hours, arriving in a “wave train.” The height of waves can be tens of meters in large events. The impact of tsunamis is limited to coastal areas, but their destructive force can be disastrous and may affect entire ocean basins.

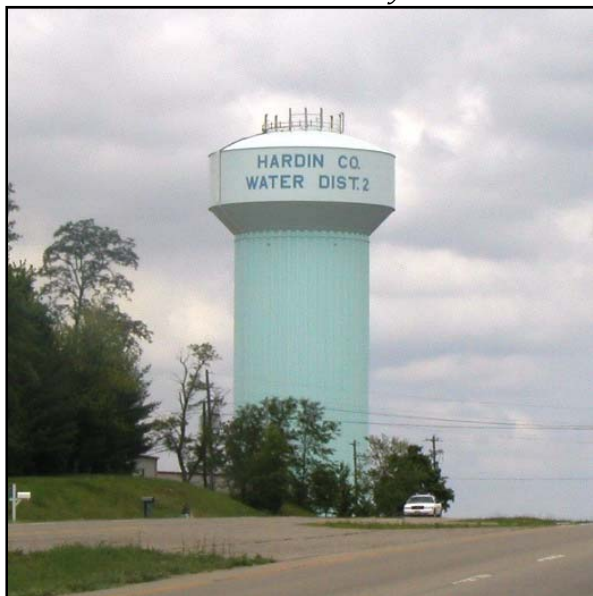
II. Analysis

Due to the geographic location of Kentucky and the eight-county Lincoln Trail Region, tsunamis do not pose a threat to Kentucky jurisdictions.

3.3.3 Assessing Vulnerability: Identifying Assets

Summary: The geographic location of the Lincoln Trail Region, lends itself to some risk from most natural hazards. Therefore no community facility or location should be considered “safe” from any type of natural hazard event that could occur in the region. The following section summarizes the physical assets in the Lincoln Trail Region. This portion of the plan identifies information such as critical facilities, transportation infrastructure, and population patterns. In part, the definition of an “asset” is its value. When possible, an effort was made to determine a dollar value for each asset. Because parcel data originates from numerous, diverse sources, this information is difficult to quantify and summarize. The cumulative product of this research, is a “snapshot” of the vulnerabilities to the natural hazard events, that exist in the Lincoln Trail Region. In conjunction with the economic value of regional assets, risk has been evaluated as part of the section 3.3.4; “Estimating Potential Losses.”

Note: for the purpose of compilation of data the City of Upton while lying in both Hardin and LaRue Counties is considered to be in Hardin County.



Various Critical Facilities in Lincoln Trail Region. Source: LTADD Archive.

Table 3.3.3.1 - Population Characteristics

Name	Population	Total Households	Median Household Income	Total Families	Median Family Income	Per Capita Income	Individuals Below Poverty Level	Percent Below Poverty Level
BRECKINRIDGE	20,040	7,213	\$38,907	5,178	\$46,870	\$18,101	3,928	19.6
Cloverport	1,285	509	\$24,637	327	\$32,039	\$15,014	438	34.1
Hardinsburg	2,477	929	\$30,673	548	\$38,056	\$16,534	473	19.1
Irvington	1,220	482	\$27,361	312	\$31,667	\$22,421	338	27.7
GRAYSON	25,997	9,897	\$32,339	6,803	\$41,216	\$19,115	6,057	23.3
Caneyville	564	509	\$25,417	140	\$39,375	\$18,084	129	22.9
Clarkson	1,105	929	\$24,464	267	\$35,938	\$12,651	349	31.6
Leitchfield	6,750	482	\$26,325	1,685	\$29,832	\$15,386	2,059	30.5
HARDIN	108,191	39,401	\$48,687	28,277	\$58,565	\$24,147	17,094	15.8
Elizabethtown	28,940	11,394	\$42,904	7200	\$56,650	\$24,834	5,354	18.5
Radcliff	22,552	8,856	\$45,550	5993	\$52,968	\$22,777	4,533	20.1
Sonora	552	197	\$42,386	141	\$56,250	\$28,711	52	9.5
Upton	1,131	314	\$32,593	231	\$34,076	\$12,348	543	48
Vine Grove	5,043	2,036	\$54,125	1430	\$62,391	\$26,193	545	10.8
West Point	914	380	\$28,547	248	\$34,583	\$16,120	265	29
LARUE	14,064	5,221	\$39,753	3,866	\$50,559	\$19,611	2,377	16.9
Hodgenville	3,223	1,283	\$29,464	857	\$33,306	\$16,836	774	24
MARION	20,045	7,368	\$38,719	4,755	\$47,360	\$28,865	3,408	17
Bradfordsville	424	171	\$27,083	112	\$33,810	\$12,610	63	14.9
Lebanon	5,587	2,464	\$21,983	1288	\$32,197	\$18,595	1,631	29.2
Loretto	668	280	\$29,231	173	\$41,458	\$15,868	197	29.5
Raywick	282	122	\$43,636	98	\$44,318	\$20,876	45	16
MEADE	29,210	10,342	\$46,756	7,872	\$50,574	\$20,898	4,936	16.9
Brandenburg	2,759	1,007	\$36,020	671	\$43,935	\$18,114	775	28.1
Ekron	129	36	\$31,667	28	\$30,833	\$14,005	46	35.7
Muldraugh	1,100	448	\$28,676	228	\$29,412	\$13,914	399	36.3
NELSON	44,540	16,571	\$43,833	12,171	\$54,708	\$23,545	8,106	18.2
Bardstown	12,568	4,949	\$30,354	3219	\$34,803	\$21,665	3,821	30.4
Bloomfield	1,124	439	\$37,344	317	\$43,036	\$20,888	155	13.8
Fairfield	128	48	\$52,500	36	\$53,750	\$24,514	4	3.1
New Haven	849	377	\$27,604	250	\$38,438	\$19,424	213	25.1
WASHINGTON	11,875	4,480	\$40,845	3,322	\$48,578	\$19,837	1,686	14.2
Mackville	249	105	\$55,288	80	\$62,500	\$23,005	44	17.7
Springfield	2,553	1,061	\$34,542	647	\$41,642	\$18,896	585	22.9
Willisburg	329	106	\$41,875	77	\$48,482	\$16,235	64	19.6
LTADD	273,962	100,493		171,091			47,593	17.4
Source US Census, American Community Survey - 2013, 5 Year.								

Residential: Housing is an integral component of the social and physical environment of any community. The provision of adequate housing should be regarded as an element of the overall planning process. Although a challenging goal, the provision of sound and affordable housing for all citizens of the region can be aided by comprehensive planning programs as well as, sensible hazard mitigation strategies. The table below details selected housing characteristics across the region. As illustrated, the median value of homes ranged from the mid \$50,000s to the upper \$90,000s, in 2013. The exception is in the Cities of Cloverport and Ekron, where the median home value was below \$51,000, in 2013. The counties within the Lincoln Trail region have continued to realize an increase in the median

housing value since 1990. The increase over the last eight-year period was not as significant as in the period between 1990 and 2000. However, compared to the state housing increase, all eight counties surpass the state's 37% increase.

Table 3.3.3.2 - Housing Characteristics

Name	Population	Total Housing Units	Occupied Housing Units	% Mobile Homes	Vacant Housing Units	Owner Occupied	Renter Occupied	Median Housing Value ¹			
								1990	2000	2008	2013
BRECKINRIDGE	20,040	10,592	7,213	28	3,379	5,769	1,444	\$37,700	\$64,600	\$93,000	\$82,700
Cloverport	1,285	566	509	19	57	339	170	\$24,400	\$39,000	\$56,000	\$44,100
Hardinsburg	2,477	1,058	929	8	129	554	375	\$45,800	\$72,700	\$104,800	\$82,500
Irvington	1,220	596	482	7	114	318	164	\$37,500	\$58,100	\$84,100	\$71,800
GRAYSON	25,997	13,506	9,897	23	3,609	7,158	2,739	\$35,700	\$65,600	\$95,800	\$87,700
Caneyville	564	336	258	14	78	157	101	\$29,800	\$56,900	\$76,800	\$65,900
Clarkson	1,105	498	444	26	54	212	232	\$26,000	\$50,600	\$72,100	\$71,700
Leitchfield	6,750	2,956	2,674	6	282	1,289	1,385	\$40,100	\$66,900	\$95,200	\$83,000
HARDIN	108,191	44,211	39,401	11	4,810	24,780	14,621	\$58,300	\$88,300	\$143,500	\$140,600
Elizabethtown	28,940	12,757	11,394	3	1,363	6,020	5,374	\$59,500	\$98,300	\$162,800	\$155,400
Radcliff	22,552	10,222	8,856	13	1,366	4,063	4,793	\$65,000	\$83,500	\$134,400	\$121,400
Sonora	552	207	197	2	10	171	26	\$30,600	\$62,500	\$101,500	\$106,500
Upton	1,131	398	314	13	84	226	88	\$32,100	\$56,900	\$97,100	\$70,500
Vine Grove	5,043	2,230	2,036	6	194	1,569	467	\$52,200	\$81,100	\$136,000	\$121,200
West Point	914	441	380	14	61	202	178	\$25,600	\$54,500	\$79,900	\$81,100
LARUE	14,064	6,198	5,221	14	977	3,984	1,237	\$39,500	\$72,100	\$111,000	\$101,000
Hodgenville	3,223	1,457	1,283	3	174	567	716	\$39,300	\$65,900	\$93,000	\$79,900
MARION	20,045	8,164	7,368	13	796	5,664	1,704	\$39,500	\$70,300	\$105,000	\$100,200
Bradfordsville	424	193	171	46	22	103	68	\$16,100	\$27,500	\$37,500	\$54,200
Lebanon	5,587	2,720	2,464	6	256	1,427	1,037	\$39,600	\$64,100	\$93,900	\$95,400
Loretto	668	315	280	14	35	230	50	\$33,600	\$65,400	\$97,700	\$93,900
Raywick	282	124	122	13	2	113	9	\$24,200	\$68,500	\$109,000	\$111,800
MEADE	29,210	11,891	10,342	18	1,549	7,426	2,916	\$49,700	\$85,500	\$114,000	\$120,500
Brandenburg	2,759	1,165	1,007	5	158	511	496	\$47,900	\$75,400	\$108,000	\$106,800
Ekron	129	39	36	28	3	31	5	\$28,300	\$50,300	\$52,000	\$50,600
Muldraugh	1,100	513	448	18	65	130	318	\$37,000	\$54,900	\$58,000	\$70,000
NELSON	44,540	18,189	16,571	9	1,618	12,491	4,080	\$45,800	\$87,100	\$129,700	\$124,500
Bardstown	12,568	5,651	4,949	3	702	2,695	2,254	\$46,900	\$76,000	\$107,600	\$102,500
Bloomfield	1,124	509	439	10	70	328	111	\$37,700	\$72,900	\$108,000	\$95,500
Fairfield	128	52	48	8	4	41	7	\$40,400	\$49,121	\$52,000	\$82,500
New Haven	849	467	377	2	90	231	146	\$36,800	\$68,600	\$105,300	\$94,300
WASHINGTON	11,875	5,034	4,480	16	554	3,713	767	\$40,700	\$72,000	\$112,000	\$107,300
Mackville	249	109	105	0	4	85	20	\$32,200	\$56,700	\$85,800	\$88,300
Springfield	2,553	1,247	1,061	1	186	692	369	\$40,900	\$74,900	\$114,200	\$86,300
Willisburg	329	123	106	8	17	72	34	\$38,800	\$66,300	\$73,000	\$96,700
LTADD	273,962	117,785	100,493	15	17,292	70,985	29,508				\$121,802
Source US Census, American Community Survey - 2013, 5 Year.											
1 - This includes values of owner occupied housing only. It does not include Mobile Homes or homes on lots over 10 acres.											
The data for 1990 and 2000 are Decennial Census, 2008 and 2013 are US Census Estimates.											

Commercial: Currently, there is no inventory of commercial structures in the Lincoln Trail Region or for any of its eight counties or twenty-seven cities.

Industrial: The 2015 Kentucky Directory of Manufacturers, from the Economic Development Cabinet, reports that there are 172 industries in the Lincoln Trail Region. An estimated 18,960 people are employed by these industries. Due to rapid industrial growth, the dynamic nature of employment and the absence of individual dollar values, no further analysis for potential loss can be completed at this time. However, the number of companies and employees can't be disregarded when considering the economic impact of any hazard event.

Table 3.3.3.3 - Lincoln Trail Region Industries		
Jurisdiction	Number of Industries	Number of Employees
Breckinridge County	6	260
Garfield	1	5
Hardinsburg	5	255
Grayson County	31	3,270
Clarkson	2	142
Leitchfield	28	3,092
Millwood	1	36
Hardin County	46	5,871
Cecilia	3	147
Elizabethtown	38	5,466
Radcliff	4	155
Sonora	1	103
LaRue County	8	426
Hodgenville	7	424
Magnolia	1	2
Marion County	26	3,812
Lebanon	24	3,681
Loretto	2	131
Meade County	3	88
Brandenburg	3	88
Nelson County	42	4,318
Bardstown	32	4,104
Boston	2	79
Cox's Creek	5	86
New Haven	2	40
New Hope	1	10
Washington County	10	915
Springfield	10	915
Lincoln Trail Region	172	18,960
<i>Source: Report: 2015 Kentucky Directory of Manufacturers</i>		

Agricultural: Agricultural lands are particularly susceptible to damage from drought, flooding, hail, and storms. The frequency and magnitude of events during a growing season is a major determinant of the impact of any natural hazard on crops. The natural hazards listed above, as well as lightning, could also affect livestock. The total estimated value of livestock, crops and agricultural related lands at risk in the region, is detailed in the following table.

Table 3.3.3.4 - Agricultural Assets

Location	Number of Farms	Farmland	Cropland	Cropland in Floodplain ¹	Harvested Cropland	Estimated Market Value Cropland and Structures Per Acre	Estimated Market Value Crop & Livestock Production
		Acres				Dollars	
BRECKINRIDGE	1,304	259,774	116,614	1,614	94,705	\$2,399	\$79,537,000
GRAYSON	1,407	200,895	87,091	2,260	65,408	\$2,270	\$45,663,000
HARDIN	1,357	202,970	114,429	4,145	100,480	\$3,505	\$57,949,000
LARUE	720	111,975	66,947	3,600	60,759	\$3,422	\$41,877,000
MARION	1,016	166,417	70,227	6,101	61,911	\$2,693	\$56,491,000
MEADE	754	119,495	63,718	2,121	57,249	\$3,244	\$36,571,000
NELSON	1,326	187,755	97,168	9,325	87,325	\$3,363	\$64,439,000
WASHINGTON	1,011	140,948	55,949	2,368	48,388	\$2,560	\$33,770,000
LTADD	8,895	1,390,229	672,143	31,534	576,225	\$23,456	\$416,297,000

Source: USDA 2012 Ag Census

1 - Comparison using USGS National Gap Analysis Program Landcover data, version 2, May 2011 and FEMA DFIRM Flood Elevation data 2007-2012.

This comparison reflects more the current landuse for agriculture versus the potential landuse as with previous plans.

In addition unlike past plan data it focuses on land used for crops and excludes pasture lands.



Agriculture is an important economic factor in Lincoln Trail Region. Source: LTADD Archive.

Transportation: Each County has a fully equipped road department to maintain county roads and bridges. The Kentucky Transportation Cabinet is responsible for the remaining state roads.

Table 3.3.3.5 - Transportation Assets

Location	Road Miles ¹	Bridges ²	Airports ³	Rail Miles ⁴
BRECKINRIDGE	873	90	1	30
Cloverport	11			
Hardinsburg	19		1	
Irvington	11			
GRAYSON	934	117	2	34
Caneyville	4			
Clarkson	6			
Leitchfield	48			
HARDIN	1,152	221	2	70
Elizabethtown	169		1	
Radcliff	102			
Sonora	5			
Upton	7			
Vine Grove	34			
West Point	9			
LARUE	450	57		3
Hodgenville	14			
MARION	475	142		0
Bradfordsville	2			
Lebanon	32			
Loretto	2			
Raywick	1			
MEADE	554	22		24
Brandenburg	13			
Ekron	2			
Muldraugh	7			
NELSON	699	145	1	30
Bardstown	78			
Bloomfield	7			
Fairfield	1			
New Haven	4			
WASHINGTON	449	102	1	0
Mackville	1			
Springfield	16			
Willisburg	1			
LTADD	5,586	896	7	191

1. County Mileage includes Federal, state and County roads, KYTC July 2015.

2. Bridges are on Federal and State roads only, Bureau of Transportation Statistics, 2015

3. Paved Runways with some services, Bureau of Transportation Statistics, 2015

4. Main Lines only, Bureau of Transportation Statistics, 2015



Transportation Facilities in Lincoln Trail Region. Source: LTADD Archive.

Utilities: The Lincoln Trail Region is served by numerous utilities, provided by various sources. The following tables detail the wastewater and water treatment systems currently operating in the Lincoln Trail Region. Due to future growth projections, there are several projects currently being considered by the regional water management council that pertain to line expansions and/or system upgrades.

Table 3.3.3.6 - Wastewater Utility Assets

County	Owner	Treatment Plant	Max Hydraulic Capacity (MGD)	Ave Daily Flow (MG)	Population Served
Breckinridge	Cloverport	Cloverport Stp	0.20	0.10	1,071
	Hardinsburg	Hardinsburg Stp	0.73	0.56	2,169
	Irvington	Irvington Wwtp	0.15	0.05	1,181
Grayson	Caneyville	Caneyville Wwtp	0.12	0.05	609
	Clarkson	Clarkson Wwtp	0.04	0.03	899
	Leitchfield	Leitchfield Wwtp	2.00	1.22	5,666
Hardin	Airview Estates Subdivision	Airview Estates Wwtp	Design - 0.055	na	na
	Elizabethtown	Valley Creek Wwtp	29.00	6.09	28,475
	Hardin County Water Dist #1	Radcliff	4.00	1.98	23,296
	Hardin County Water Dist #1	Ft Knox	6.00	3.30	<i>included in above</i>
	Vine Grove	Vine Grove Wwtp	0.71	0.35	4,226
	West Point	West Point Wwtp	0.10	0.78	839
Larue	Hodgenville	Hodgenville Wwtp	0.78	0.56	3,558
Marion	Bradfordsville	Bradfordsville Wwtp	0.04	0.01	305
	Lebanon	Lebanon Wwtp	3.00	1.20	6,011
	Loretto	<i>Collection System Only</i>	with Lebanon	with Lebanon	803
Meade	Brandenburg	Brandenburg Wwtp	0.91	0.25	2,782
	Doe Valley Association, Inc.	Doe Valley Wwtp	Design - 0.15	na	1,878
	Muldraugh	<i>Collection System Only</i>	with Ft Knox	with Ft Knox	936
Nelson	Bardstown	Bardstown	3.00	2.50	17,207
	Bardstown	Jerry L. Riley	4.00	0.75	0
	Bloomfield	<i>Collection System Only</i>	with Bardstown	with Bardstown	978
	New Haven	New Haven Wwtp	0.16	0.10	935
Washington	Springfield Water & Sewer Commission	Springfield Stp	0.88	0.47	2,705
<i>Source: Kentucky Infrastructure Authority, Water Resources Information System, Sept. 2015</i>					

Table 3.3.3.7 - Water Utility Assets

County	Owner	Water Treatment Plant Name	Design Capacity (MGD)	Total Population	Useage (Million Gallons)
Breckinridge	Hardinsburg Water	Hardinsburg Water	2.00	14,015	455.62
Grayson	Leitchfield Utilities Commission	Leitchfield	2.88	20,656	588.50
Grayson	Grayson County Water District	Grayson County	2.30	15,787	371.12
Hardin	Hardin County Water District #1	Pirtle Springs	2.70	124,996	964.44
Hardin	Hardin County Water District #1 Fort Knox System	Muldraugh Plant	7.00	38,241	677.09
		Fort Knox/Central	3.50		
Hardin	Hardin County Water District #2	City Springs	3.00	75,922	1,579.22
		Freeman Lake	3.00		
		White Mills	8.10		
Hardin	West Point Water Dept	West Point	0.35	898	21.95
LaRue	Hodgenville Water Works	Hodgenville	0.50	11,161	192.76
Marion	Lebanon Water Works County Inc	Lebanon	5.20	20,820	786.28
Meade	Brandenburg Water Works	Barney Johnson	1.00	19,254	246.76
Nelson	Bardstown Municipal Water Dept	Sympson Lake	6.00	51,304	1,348.02
Washington	Springfield Water Works	Springfield	3.00	10,413	394.29
<i>Source: Kentucky Infrastructure Authority, Water Resources Information System, Sept. 2015</i>					



Critical Facilities are exposed to many hazards in the Lincoln Trail Region. *Source: LTADD Archive.*

Critical Facilities: These facilities may be public or private: they are critical components of effective loss mitigation and recovery efforts during and after any hazard event. When planning for and implementing hazard mitigation strategies, communities should give top priority to their critical facilities. For the purposes of this document the Lincoln Trail Region has identified their critical facilities to be those listed. The list identifies the location of each facility, not a specific government authority. The number of critical facilities remained constant with the only changes, as noted below, in the categories of government buildings, water storage tanks and wells.

Table 3.3.3.8 Critical Facilities

Jurisdiction	Communications – Pubic Radio Transmitters (1)	Fire Stations(2)	Police Stations(2)	Government Buildings(2)	Hospitals(2)	Waste Water Treatment Plants(3)	Water Treatment Plants(3)	Pumping Stations(3)	Storage Tanks(3)	Wells(3)	Schools(4)
Breckinridge	0	6	0	1	0	0	1	6	7	3	4
Cloverport	0	1	1	1	0	1	0	0	2	0	3
Hardinsburg	2	1	2	5	1	1	0	0	2	0	2
Irvington	0	1	1	1	0	1	0	0	1	0	1
Grayson	0	4	0	0	0	0	2	8	10	0	1
Caneyville	0	1	1	1	0	1	0	0	0	0	1
Clarkson	0	1	1	1	0	1	0	0	1	0	1
Leitchfield	2	2	2	5	1	1	0	2	4	0	5
Hardin	1	8	0	0	1	2	3	8	11	0	10
Elizabethtown	3	5	2	7	1	0	2	2	10	0	12
Radcliff	2	2	1	3	0	1	0	3	2	0	9
Sonora	0	1	0	1	0	0	0	0	0	0	1
Upton	0	1	0	1	0	0	0	0	0	0	1
Vine Grove	2	1	1	1	0	1	0	1	3	0	5
West Point	0	1	1	1	0	1	1	0	1	2	1
Larue	1	2	0	0	0	0	0	6	8	0	2
Hodgenville	0	2	2	4	0	1	1	1	3	0	4
Marion	0	1	0	0	0	0	1	3	8	0	1
Bradfordsville	0	1	0	2	0	1	0	0	1	0	0
Lebanon	2	2	2	8	1	1	0	1	1	0	7
Loretto	0	1	0	1	0	0	0	0	1	0	1
Raywick	0	1	0	1	0	0	0	0	0	0	0
Meade	0	5	0	0	0	1	1	7	7	0	3
Brandenburg	2	1	2	5	0	0	1	0	1	3	5
Ekron	0	1	0	1	0	0	0	0	0	0	1
Muldraugh	0	1	1	1	0	0	0	0	0	0	0
Nelson	0	3	0	0	0	1	1	9	17	0	3
Bardstown	1	2	2	8	1	1	0	3	4	0	12
Bloomfield	0	1	1	1	0	0	0	1	1	0	2
Fairfield	0	0	0	1	0	0	0	0	0	0	0
New Haven	0	1	1	1	0	1	0	0	0	0	2
Washington	0	0	0	0	0	0	0	4	5	0	1
Mackville	0	1	0	0	0	0	0	0	0	0	1
Springfield	0	2	2	5	0	1	1	1	4	0	4
Willisburg	0	1	0	1	0	0	0	0	0	0	2
Total in Region	18	65	26	69	6	19	15	66	115	8	108

Source: 1 - FCC

2 - LTADD Structure Inventory

3 - Kentucky Infrastructure Authority, Water Resources Information System, Sept. 2015

4 - KY Dept. of Education, Sept 2015

Special Critical Facilities: Dams represent a unique critical facility situation where the loss of the facility itself due to any disaster can lead to an additional disaster in the form of flooding.

Within the Lincoln Trail, eight-county region, there are 112 dams. Of the 112 dams in the region, 16 are owned by local municipalities, 67 are privately owned, 4 are federal, 3 belong to the Dept. of Transportation, 19 are owned by conservation districts, 2 by the Department of Parks and 1 by Fish and Wildlife.

The following chart lists all of the 112 dams in the Lincoln Trail Region by county, and shows each dam's current hazard class. The information below, was provided by the Department for Environmental Protection of the Kentucky Energy and Environment Cabinet. The various dams listed are portrayed on the maps in section 3.3.2.1 Flooding.

Table 3.3.3.9.-. Lincoln Trail Region Dams

Breckinridge County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Hardinsburg Dam	Breckinridge	Low	Municipality	Hardinsburg
Hardinsburg FFA Camp Lake Dam	Breckinridge	Moderate	Dept. of Transportation	Hardinsburg
Dry fork Lake Dam	Breckinridge	Low	Private	Glen Dean
N. Fork Rough River FRS #2	Breckinridge	Low	Conservation District	Custer
N. Fork Rough River FRS #1	Breckinridge	Low	Conservation District	Kingswood
Honey Locust Dam	Breckinridge	Low	Private	Cloverport
John Smith Dam	Breckinridge	Low	Private	Mattingly
GE Bennette Dam	Breckinridge	Low	Private	Mattingly
Norfleet Dam	Breckinridge	Low	Private	Glen Dean
Blancehtte Dam	Breckinridge	High	Private	Hardinsburg
Breckinridge	Breckinridge	Moderate	Private	Hardinsburg
Walter Stennett Lake Dam	Breckinridge	Low	Private	Kingswood
Lee Thomas Lake Dam	Breckinridge	Moderate	Private	Cloverport
Mattingly Dam	Breckinridge	Low	Private	Garfield
Pape Dam	Breckinridge	Low	Private	Fordsville

Grayson County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO

Caney Creek FRS #1	Grayson	Moderate	Conservation District	Caneyville
Short Creek FRS #7	Grayson	Low	Conservation District	Falls of Rough
Leitchfield Reservoir Dam	Grayson	Moderate	Municipality	Leitchfield
Pine Knob Dam	Grayson	Low	Private	Spring Lick
Caney Creek FRS #13	Grayson	Moderate	Conservation District	Caneyville
Big Reedy Creek FRS #8	Grayson	Low	Conservation District	Ready
Caney Creek FRS #6	Grayson	High	Conservation District	Caneyville
Caney Creek FRS #9	Grayson	Moderate	Conservation District	Spring Lick
Caney Creek MPS #2	Grayson	Moderate	Conservation District	Caneyville
Short Creek FRS #8A	Grayson	Low	Conservation District	Spring Lick
Caney Creek FRS #5	Grayson	Moderate	Conservation District	Caneyville
Caney Creek FRS #12	Grayson	Moderate	Conservation District	Spring Lick
Wolford Lake Dam	Grayson	Low	Private	Millerstown
Caney Creek FRS #10	Grayson	Low	Conservation District	Spring Lick
Caney Creek FRS #3	Grayson	Low	Conservation District	Caneyville
Caney Creek FRS #7	Grayson	Moderate	Conservation District	Spring Lick
Ray Carter Farm Lake Dam	Grayson	Low	Private	Ready
Hickory Hollow Lake Dam	Grayson	Low	Private	Welch's Creek

Hardin County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Valley Creek MPS #4	Hardin	High	Conservation District	Elizabethtown
Valley Creek FRS #8	Hardin	High	Conservation District	Elizabethtown
Hardin Co. Sportsman	Hardin	Moderate	Private	Elizabethtown

Lake Dam				
Sanders Spring Branch FRS #5	Hardin	Low	Federal	Vine Grove
Valley Creek FRS #12	Hardin	High	Conservation District	Elizabethtown
Valley Creek FRS #3	Hardin	High	Conservation District	Elizabethtown
Sanders Spring Reservoir	Hardin	Low	Municipality	Vine Grove
CL Ratcliff Dam	Hardin	Low	Private	Constantine
Paradise Dam	Hardin	Low	Private	Lebanon Junction
Tom Murphy Dam	Hardin	Low	Private	Colesburg
Douglas Dam (Upper) #1	Hardin	Low	Federal	Colesburg
Douglas Dam (Lower) #2	Hardin	Moderate	Federal	Vine Grove
Russell Knight Lake Dam	Hardin	Low	Private	Flaherty

LaRue County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Hodgenville RES (NF Nolin River)	LaRue	Low	Municipality	Hodgenville
LaRue Co. Sportsman's Lake Dam	LaRue	Low	Private	Hodgenville
Dixie Stock Farm Dam	LaRue	Low	Private	Tonieville
N. Fork Nolin River MPS 3	LaRue	High	Municipality	Hodgenville
Doug Sprowls Lake Dam	LaRue	Low	Private	Magnolia
Walter Smith Lake Dam	LaRue	Moderate	Private	New Haven
N. Fork Nolin River MPS # 15	LaRue	High	Municipality	Hodgenville

Marion County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Marion Co. Sportsman's Dam	Marion	Moderate	Dept. of Fish and Wildlife	Lebanon East

Lebanon Impound #1	Marion	Low	Municipality	Lebanon West
Lebanon Impound #2	Marion	Moderate	Municipality	Spurlington
Langford Dam	Marion	High	Private	Bradfordsville
Montgomery Dam	Marion	Moderate	Private	Lebanon West
George Dam	Marion	Low	Private	Lebanon West
Nerinx Dam	Marion	Low	Private	Loretto
Coon Hollow Hereford Dam	Marion	Low	Private	Loretto
Star Hill Distillery Dam	Marion	Low	Private	Saint Catherine
John Angel Lake Dam	Marion	Moderate	Private	Lebanon East
Lebanon Water Works	Marion	High	Municipality	Lebanon East

Meade County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Doe Valley Lake Dam	Meade	Moderate	Private	Rock Haven
Grayhamton Lake Dam	Meade	Low	Federal	Rock Haven
Hayes Dam	Meade	Low	Private	New Amsterdam

Nelson County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Maywood Dam	Nelson	Low	Private	Bardstown
Lake Sympton Dam	Nelson	Moderate	Dept. of Transportation	Cravens
Spooky Hollow (Lower) Dam	Nelson	Moderate	Private	Cravens
Hurricane Lake Dam	Nelson	Moderate	Private	Lebanon Junction
JW Dant Distillery Dam	Nelson	Low	Private	New Haven
Lake Johnson Dam	Nelson	Low	Private	Nelsonville
Eagle Lake Dam	Nelson	Low	Private	Lebanon Junction
TW Samuels Distillery Dam #3	Nelson	Low	Private	Samuels

Melody Lake Dam	Nelson	Low	Private	Loretto
Ballard Lake Dam	Nelson	Low	Private	Loretto
Timber Trails Lake Dam	Nelson	Moderate	Private	Lebanon Junction
Heaven Hill Distillery Dam	Nelson	Low	Private	Bardstown
Holt Dam	Nelson	Low	Private	Bardstown
Barton Dam	Nelson	Moderate	Private	Bardstown
Bardstown Dam (Upper)	Nelson	Moderate	Municipality	Bardstown
Bardstown Dam (Lower)	Nelson	High	Municipality	Bardstown
TW Samuels Distillery Dam #1	Nelson	Moderate	Private	Samuels
TW Samuels Distillery Dam #2	Nelson	Moderate	Private	Samuels
Bloomfield Dam (Upper)	Nelson	Moderate	Municipality	Bloomfield
Bloomfield Dam (Lower)	Nelson	Moderate	Municipality	Bloomfield
Edwin Hagen Lake Dam	Nelson	Low	Private	Bardstown
Daffodil Hills Farm Dam	Nelson	Low	Private	Bardstown
Gobins Lake Dam	Nelson	Low	Private	Fairfield
Spooky Hollow Upper Lake Dam	Nelson	Moderate	Private	Cravens
Bloomfield City Park Dam	Nelson	High	Municipality	Bloomfield
Jim Beam #3	Nelson	Low	Private	Lebanon Junction
Monterra Dam	Nelson	Low	Private	Lebanon Junction
Stone Creek Farm Dam	Nelson	Low	Private	Bardstown

Washington County Dams				
Name of Dam	County	Hazard Class	Owner Type	TOPO
Springfield Reservoir (Old)	Washington	High	Municipality	Springfield

Springfield Reservoir (New)	Washington	Low	Municipality	Saint Catherine
Willisburg Lake Dam	Washington	High	Dept. of Transportation	Brush Grove
Sam Nally Dam	Washington	Low	Private	Saint Catherine
Hays Farm Dam	Washington	Low	Private	Brush Grove
John Barber Dam	Washington	Low	Private	Maud
Hugh L. Grundy Farm Dam	Washington	Low	Private	Maud
St. Rose Lake (Upper)	Washington	Low	Private	Saint Catherine
St. Rose Lake (Lower)	Washington	Low	Private	Saint Catherine
Morrison Onan Farm Dam	Washington	Low	Private	Springfield
Goode Pay Lake	Washington	Low	Private	Mackville
Willis Walker Farm Dam	Washington	Low	Private	Brush Grove
Lincoln Homestead State Park Dam	Washington	Low	Department of Parks	Brush Grove
Sam Smith Dam	Washington	High	Private	Springfield
AW Tate Dam	Washington	Low	Private	Springfield
Truman Lawson Dam	Washington	Low	Private	Springfield
Lincoln Homestead Dam #2	Washington	Low	Department of Parks	Brush Grove

Source: Kentucky Division of Water

3.3.4 Assessing Vulnerability: Potential Losses

I. Estimating Potential Losses:

The following section provides a compilation of potential economic and human losses that could occur as a result of a natural hazard in the Lincoln Trail Region. To determine this potential loss, the vulnerability (or risk) of a natural hazard must be determined and combined with the value of the assets, both human and economic. The resulting values are to be considered estimates, only due to an overall lack of comprehensive and complete data (event data and asset value data) and the limited sophistication of the methodology. While considered restricted in their use, the values do allow for the identification of various scenarios and should be helpful in the relative evaluation and prioritization of any proposed mitigation strategies.

Vulnerability Methodology: A review of the profiled hazards and the assets inventory, leads to a need to determine which physical areas are the most vulnerable to risk, in order to best devise solutions and allocate resources to mitigate potential hazard events. This results in a two phase approach. The first phase is the determination of the total potential economic and human cost of a particular event. In the second phase, these potential losses are allocated to the geographic areas that are identified with the highest risk for any particular natural hazard event.

A. Social Vulnerability: The published literature regarding natural hazard risk assessment notes that there is a definite social factor associated with each level of vulnerability of any particular area.¹ To incorporate this factor into the study the following methodology was used.

To establish a geographic area for the data used in this analysis, the basic US Census Bureau *Block* was used since it ensures the finest possible granularity. The statistical information used was readily available at this level for the entire LTADD region. The block boundaries used were from the 2010 Census.

Table 3.3.4.1 - Social Vulnerability Source Units

Social Vulnerability Category	Basic Unit	Source
Female Population	Block	2010 Census
Under 18 Population	Block	2010 Census
Over 65 Population	Block	2010 Census
Minority Population	Block	2010 Census
Total Population	Block	2010 Census
Family Poverty Population	Block Group	2013 5 Year ACS
Housing Units	Block	2010 Census
Housing Type, Mobile Homes	Block	2010 Census

¹ See Cutter & Odeh.

In addition, the 2013 American Community Survey 5-Year cycle for family units below poverty level by Block Group was used, and included an economic standing risk in the calculations. This value was assigned to each Block that makes up the Block Group since the data is not available at a lower level. The values for each block were analyzed, according to its county as a whole, to generate a *Social Vulnerability (SV)* score². For example, the minority population score for an individual block is determined as follows:

$$SV(\text{minority pop}) = \left(\frac{\text{minority pop in block}}{\text{minority pop in county}} \right) / \left(\frac{\text{minority pop in block}^{[max\ value]}}{\text{minority pop in county}} \right)$$

This calculation resulted in a SV score for each value in each block. The sum of these scores yields the *Total Social Vulnerability (TSV)* score for the block as a whole.

Below is a table that reflects the range and mean of the block scores for each county and for the region as a whole.

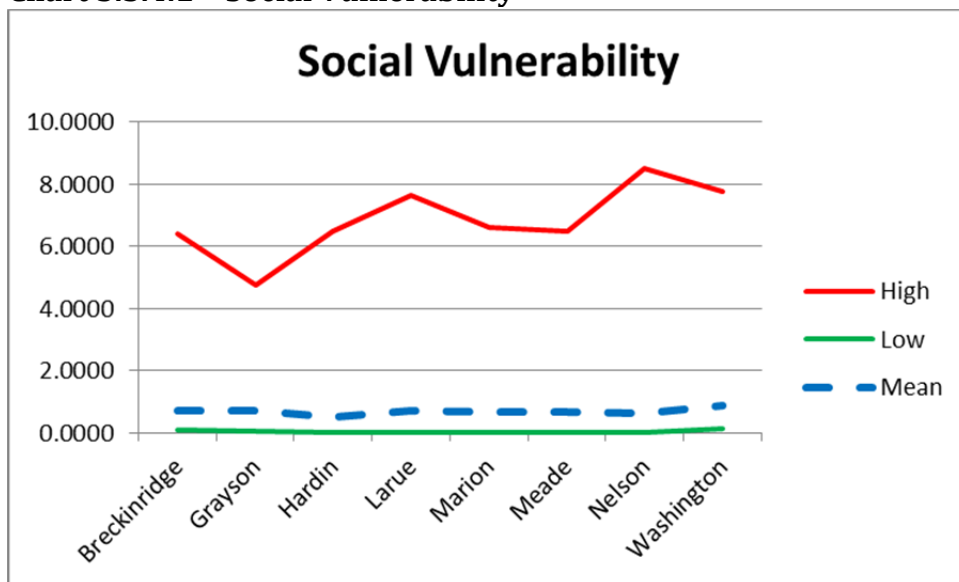
Table 3.3.4.2 - Social Vulnerability Scores

Social Vulnerability Scores	High	Low	Mean
Breckinridge	6.4188	0.1116	0.6908
Grayson	4.7429	0.0416	0.7122
Hardin	6.4849	0.0000	0.5165
Larue	7.6549	0.0000	0.6933
Marion	6.6224	0.0000	0.6697
Meade	6.4976	0.0000	0.6699
Nelson	8.5105	0.0000	0.6178
Washington	7.7614	0.1121	0.8838
Lincoln Trail	8.5105	0.0000	0.6372

Note: Zero values are generally the result of no population in a block. This is typical for areas of open water but may occur in other areas of unused land.

² Each block's score was determined on a county basis and not as regional value to better reflect the highest risk areas in the individual county. The following maps of the vulnerability are scaled based on region-wide values.

Chart 3.3.4.1 - Social Vulnerability



B. Geographic Vulnerability

Several of the natural hazard events determined to be a significant threat (section 3.3, table 3.3.1.1) to the Lincoln Trail Region, are not typically bound by geography. The risk potential is therefore assumed to be the same throughout the Region for all natural hazards except for ones that generally have a specific geographic component such as karst (sinkholes), landslides / subsidence, earthquakes and especially flooding. Flooding (except for some flash flooding and Dam failure related flooding) is considered to be confined to the predetermined flood zones as defined by the FEMA DFIRM mapping data.

Because of its significant threat to the region, flooding is used for mapping and analysis. This version also includes a value score for data that is available for karst terrain, earthquakes and landslides.

To determine the *Geographic Vulnerability (GV)* score, the US Census block polygons from the 2010 Census were used in conjunction with the social vulnerability calculations. The historic frequencies for each county from the “Hazard Frequency Table” 3.3.2.1 were assigned to the individual blocks for non-geographic specific events. For events that are geographically based blocks, values were assigned based on the referenced geographic type as a percentage of each block area, for karst and landslide (slopes greater than 5%.) For earthquakes it was based on the Peak Ground Acceleration zone the centroid of the block was located in. For flooding it was allocated based on the presence of a 100 or 500-year flood zones in each block.

Table 3.3.4.3 - Geographic Vulnerability Source Units

Geographic Vulnerability Category	Basic Unit	Range	Source
Hail	Block	county wide	NEIC, NCDC & SHELDUS Cumulative as reported in tables in previous sections.
Lightning	Block	county wide	
Snow / Ice	Block	county wide	
Tornado	Block	county wide	
Thunderstorm	Block	county wide	
Flooding	Block	100 & 500 Year Flood Plains	FEMA DFIRM 2007 - 2011
Karst	Block	Mapped Karst based on 1:24K USGS Topographic Maps	KY Geological Survey, 2003
Landslide / Subsidence	Block	Areas of Slope Greater than 5% based on 30ft Digital Elevation Models	US Geological Survey, 2000
Earthquake	Block	Peak Ground Acceleration - 2% probability of exceedance in 50 years.	US Geological Survey, 2014

Table 3.3.4.4 - Geographic Specific Event Factors

	County Wide				
	Hail	Lightning	Snow_Ice	Tornado	Thunderstorm
Breckinridge	1.4951	0.4587	0.7339	0.2936	3.7798
Grayson	1.6634	0.5688	0.7706	0.2703	3.469
Hardin	1.8447	0.6239	0.8257	0.4404	5.1282
Larue	1.0085	0.6055	0.6972	0.176	3.5413
Marion	1.0841	0.6422	0.5872	0.2018	3.3028
Meade	1.1429	0.5138	0.7339	0.2202	3.7477
Nelson	1.3271	0.7523	0.7523	0.2385	4.1835
Washington	0.9533	0.6606	0.7706	0.2018	3.0826

Table 3.3.4.4 - Geographic Specific Event Factors (cont.)

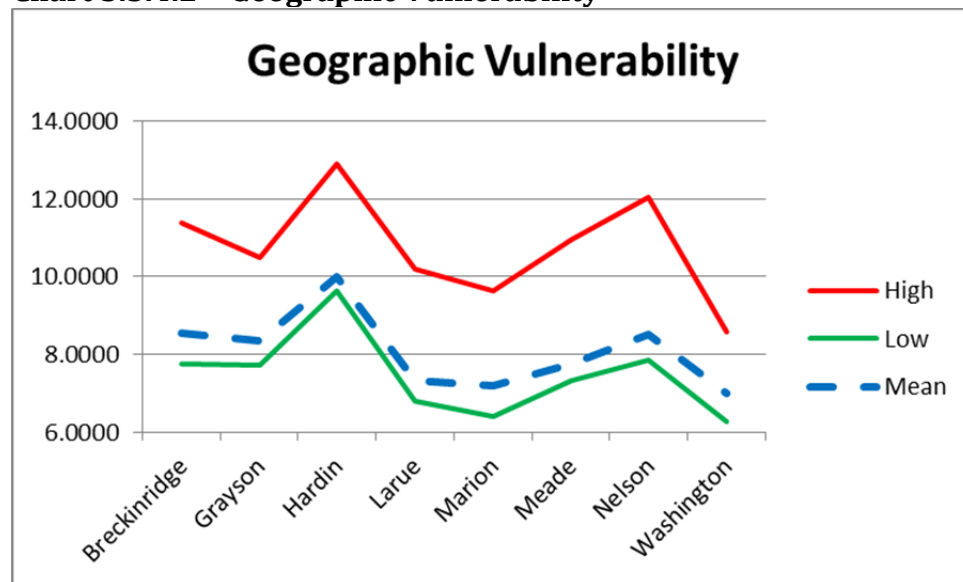
	Geographic Specific			
	Flooding	Karst	Landslide/Subsidence	Earthquake
Breckinridge	1 for 100 year, 0.2 for 500 year	County-wide score value calced against Karst acres per block as a %	County-wide score value calced against Slope acres per block as a %	PGA Value from USGS:
Grayson				
Hardin				
Larue				6% *g = 0.589
Marion				8% *g = 0.785
Meade				10% *g = 0.981
Nelson				12% *g = 1.177
Washington				14% *g = 1.373

The total GV score (*TGV*) is determined by the sum of the GV score for each of the hazard event types used.

Table 3.3.4.5 - Geographic Vulnerability Scores

Geographic Vulnerability Scores	High	Low	Mean
Breckinridge	11.3707	7.7421	8.5487
Grayson	10.4976	7.7231	8.3619
Hardin	12.9113	9.6479	10.0125
Larue	10.2072	6.8135	7.3392
Marion	9.6250	6.4071	7.1887
Meade	10.9476	7.3395	7.7633
Nelson	12.0387	7.8427	8.5284
Washington	8.5911	6.2579	6.9921
Lincoln Trail	12.9113	6.2579	8.6130

Chart 3.3.4.2 - Geographic Vulnerability



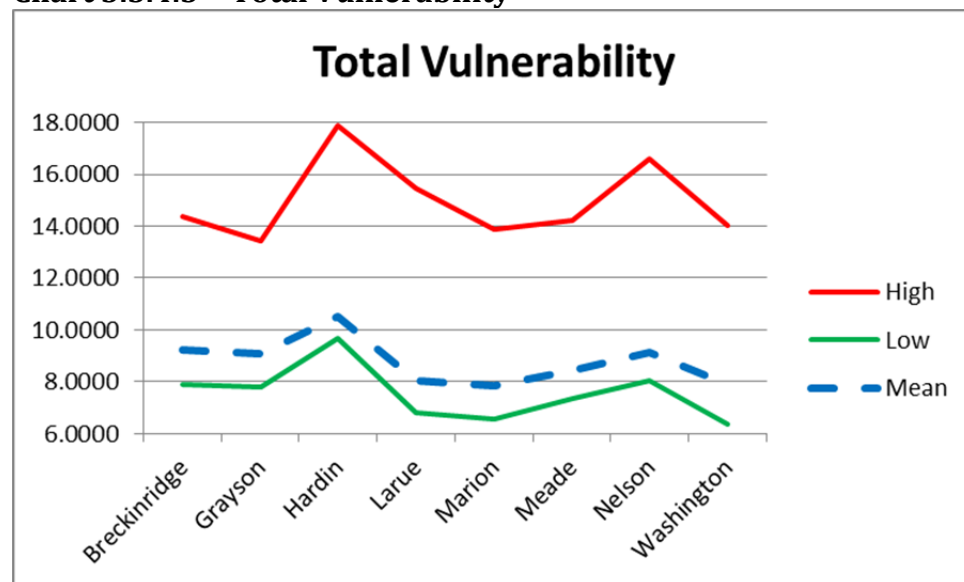
C. Total Vulnerability Score

The factor of the SV and GV yields the *Total Vulnerability (TV)* score for each Census block.

Table 3.3.4.6 - Total vulnerability Scores

Total Vulnerability Scores	High	Low	Mean
Breckinridge	14.3569	7.9044	9.2394
Grayson	13.4313	7.8062	9.0741
Hardin	17.8846	9.6479	10.5290
Larue	15.4703	6.8135	8.0326
Marion	13.8898	6.5767	7.8585
Meade	14.2297	7.3395	8.4332
Nelson	16.5869	8.0387	9.1462
Washington	14.0193	6.3700	7.8759
Lincoln Trail	17.8846	6.370007	9.2502

Chart 3.3.4.3 - Total Vulnerability



This score allows a determination of the relative vulnerability of each block to a hazard event. The scores were classified using a natural breaks method of four categories. The classification ranges are as follows:

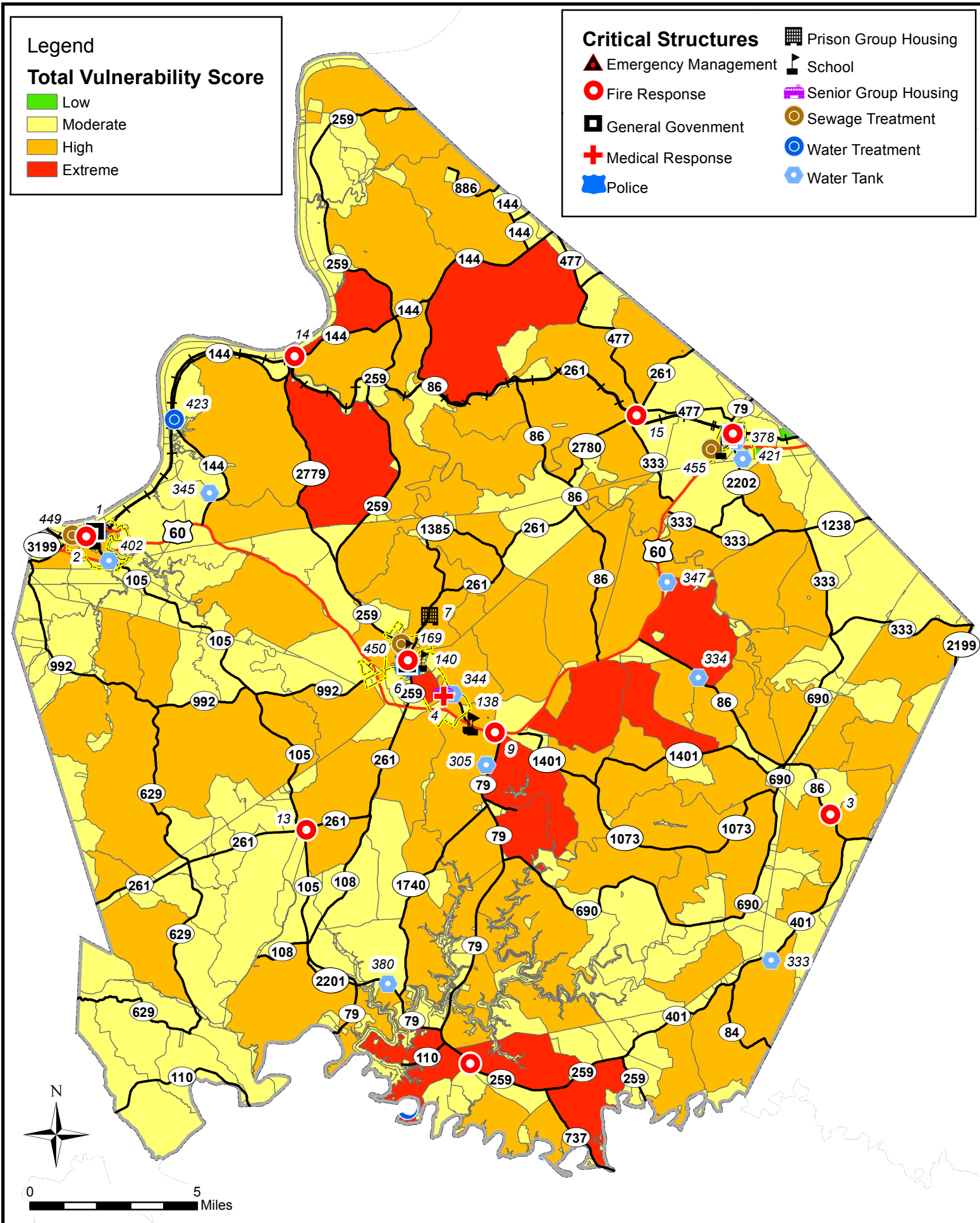
Low	6.3700 – 7.9306
Moderate	7.9307 – 9.1590
High	9.1591 – 10.4813
Extreme	10.4814– 17.8846 (maximum value)

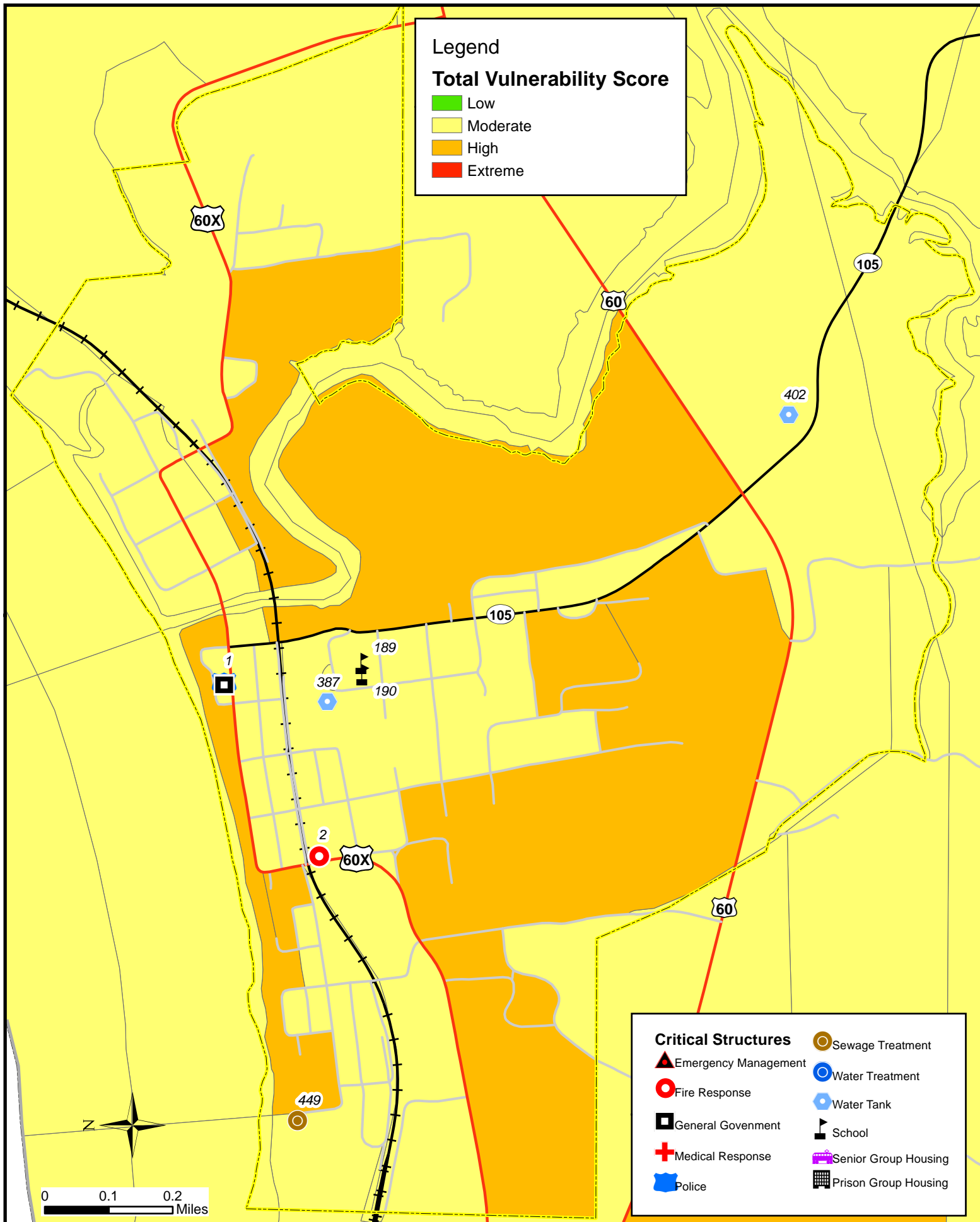
The results of this analysis aids in providing focus areas for the evaluation of current mitigation strategies and implementation of future strategies. The following table and individual entity maps illustrate the block vulnerability for each county and plot, and the critical structures that currently fall within the extreme or high zones.

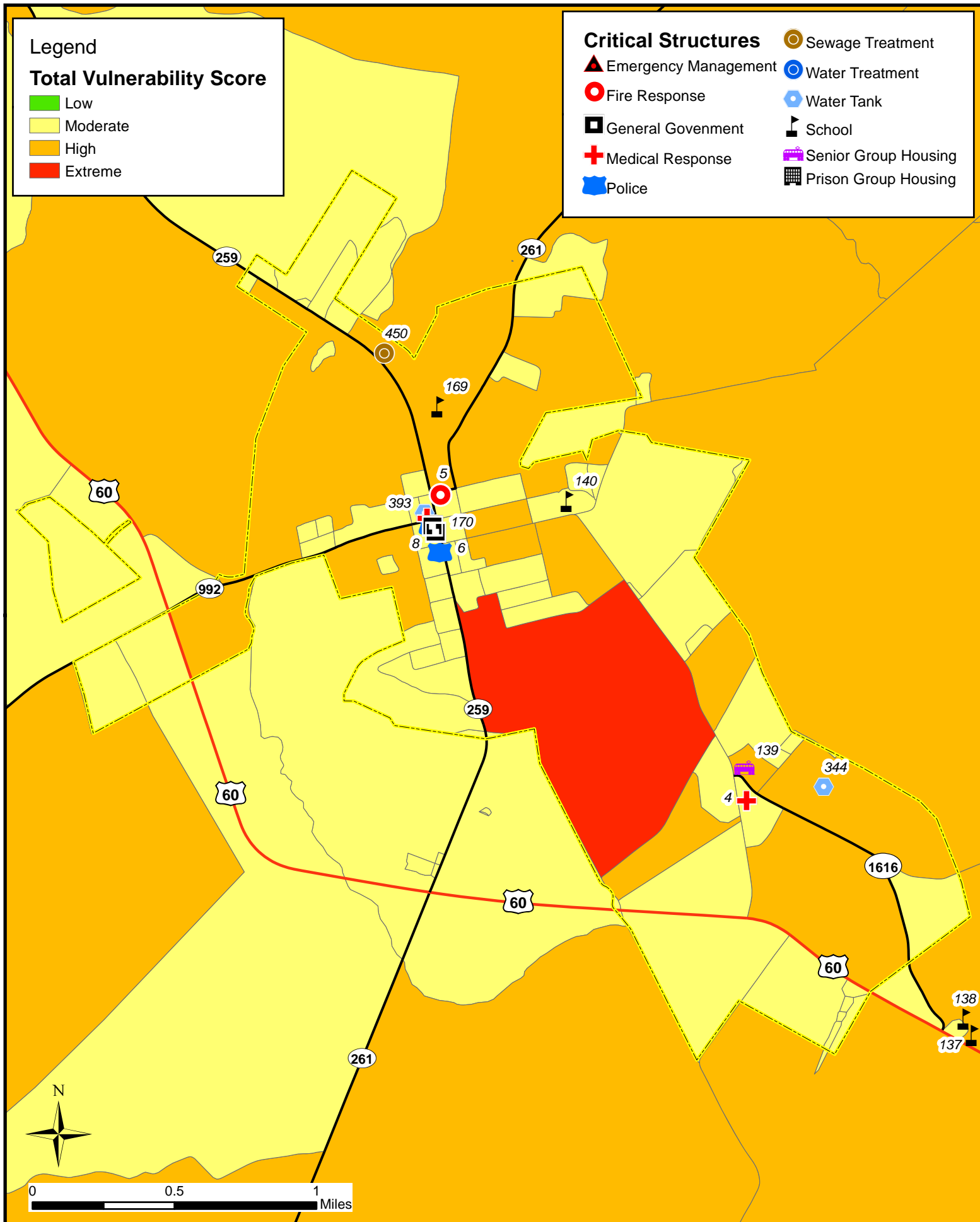
Table 3.3.4.7 - Critical Facilities located in combined Socially and Geographically Vulnerable Area by County.

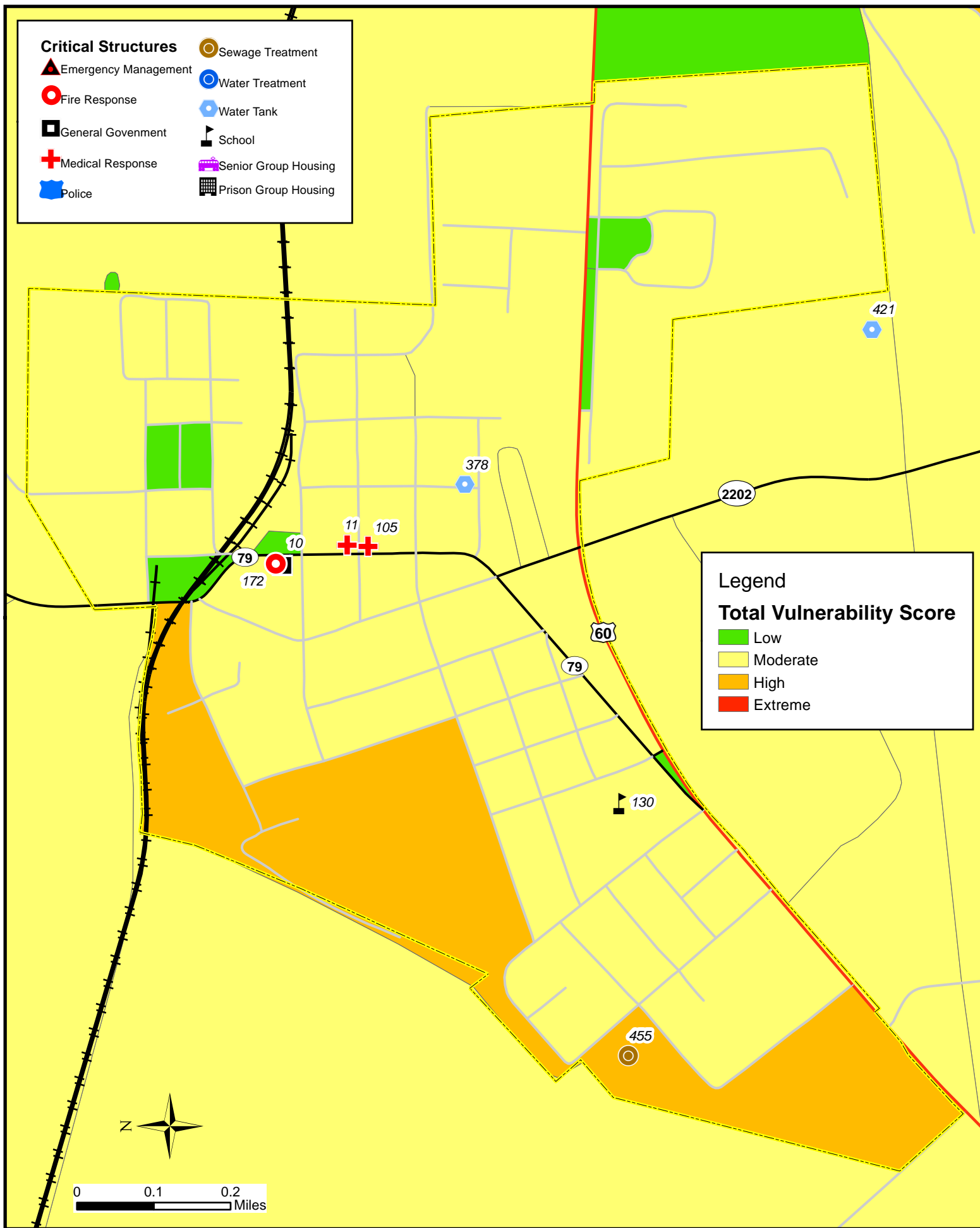
Breckinridge County

MAP NUMBER	FACILITY NAME	COUNTY	FUNCTION
1	CLOVERPORT POLICE	BRECKINRIDGE	POLICE
2	CLOVERPORT VFD	BRECKINRIDGE	FIRE RESPONSE
3	CUSTER FIRE DEPT	BRECKINRIDGE	FIRE RESPONSE
4	BRECKINRIDGE MEMORIAL HOSPITAL	BRECKINRIDGE	MEDICAL RESPONSE
5	HARDINSBURG VFD	BRECKINRIDGE	FIRE RESPONSE
6	HARDINSBURG POLICE	BRECKINRIDGE	POLICE
7	BRECKINRIDGE COUNTY JAIL	BRECKINRIDGE	PRISON GROUP HOUSING
8	BRECKINRIDGE COUNTY SHERIFF	BRECKINRIDGE	POLICE
9	HARNED VFD	BRECKINRIDGE	FIRE RESPONSE
10	IRVINGTON POLICE	BRECKINRIDGE	POLICE
11	IRVINGTON AREA EMERGENCY MEDICAL HQ	BRECKINRIDGE	MEDICAL RESPONSE
12	MCDANIELS EMS FIRE & RESCUE SERVICE	BRECKINRIDGE	MEDICAL RESPONSE
13	MCQUADY VFD	BRECKINRIDGE	FIRE RESPONSE
14	STEPHENSPORT VFD	BRECKINRIDGE	FIRE RESPONSE
15	WEBSTER VFD	BRECKINRIDGE	FIRE RESPONSE
105	IRVINGTON AREA AMBULANCE SERVICE	BRECKINRIDGE	MEDICAL RESPONSE
106	MCDANIELS FIRE-RESCUE, INC.	BRECKINRIDGE	FIRE RESPONSE
113	CLOVERPORT CITY HALL	BRECKINRIDGE	GENERAL GOVERNMENT
130	IRVINGTON ELEMENTARY SCHOOL	BRECKINRIDGE	SCHOOL
131	IRVINGTON CITY HALL	BRECKINRIDGE	GENERAL GOVERNMENT
136	BRECKINRIDGE COUNTY HIGH SCHOOL	BRECKINRIDGE	SCHOOL
137	BRECKINRIDGE COUNTY AREA TECHNOLOGY CENTER	BRECKINRIDGE	SCHOOL
138	BRECKINRIDGE COUNTY MIDDLE SCHOOL	BRECKINRIDGE	SCHOOL
139	MEDCO CENTER	BRECKINRIDGE	SENIOR GROUP HOUSING
140	HARDINSBURG ELEMENTARY SCHOOL	BRECKINRIDGE	SCHOOL
169	ST. ROMUALD ELEMENTARY SCHOOL	BRECKINRIDGE	SCHOOL
170	HARDINSBURG CITY HALL	BRECKINRIDGE	GENERAL GOVERNMENT
171	BRECKINRIDGE COUNTY COURTHOUSE	BRECKINRIDGE	GENERAL GOVERNMENT
172	IRVINGTON VFD	BRECKINRIDGE	FIRE RESPONSE
189	FREDERICK FRAIZE HIGH SCHOOL	BRECKINRIDGE	SCHOOL
190	WILLIAM H. NATCHER ELEMENTARY SCHOOL	BRECKINRIDGE	SCHOOL
281	BRECKINRIDGE COUNTY HEALTH DEPARTMENT	BRECKINRIDGE	MEDICAL RESPONSE
287	MCDANIELS VFD	BRECKINRIDGE	FIRE RESPONSE
305	BEN WRIGHT	BRECKINRIDGE	WT
333	HUDSON	BRECKINRIDGE	WT
334	STINNETTSVILLE TANK	BRECKINRIDGE	WT
344	FAIRGROUNDS RD.	BRECKINRIDGE	WT
345	PERSIMMON FLATS TANK	BRECKINRIDGE	WT
347	IRVINGTON	BRECKINRIDGE	WT
378	IRVINGTON WATER TANK	BRECKINRIDGE	WT
380	AXTEL	BRECKINRIDGE	WT
387	ELEVATED TANK	BRECKINRIDGE	WT
393	DOWNTOWN	BRECKINRIDGE	WT
402	STANDPIPE TANK	BRECKINRIDGE	WT
421	SAM DOWELL RD	BRECKINRIDGE	WT
423	HARDINSBURG REVERSE OSMOSIS WATER TREATMENT FACIL*	BRECKINRIDGE	WTP
449	CLOVERPORT STP	BRECKINRIDGE	STP
450	HARDINSBURG STP	BRECKINRIDGE	STP
455	IRVINGTON WWTP	BRECKINRIDGE	STP



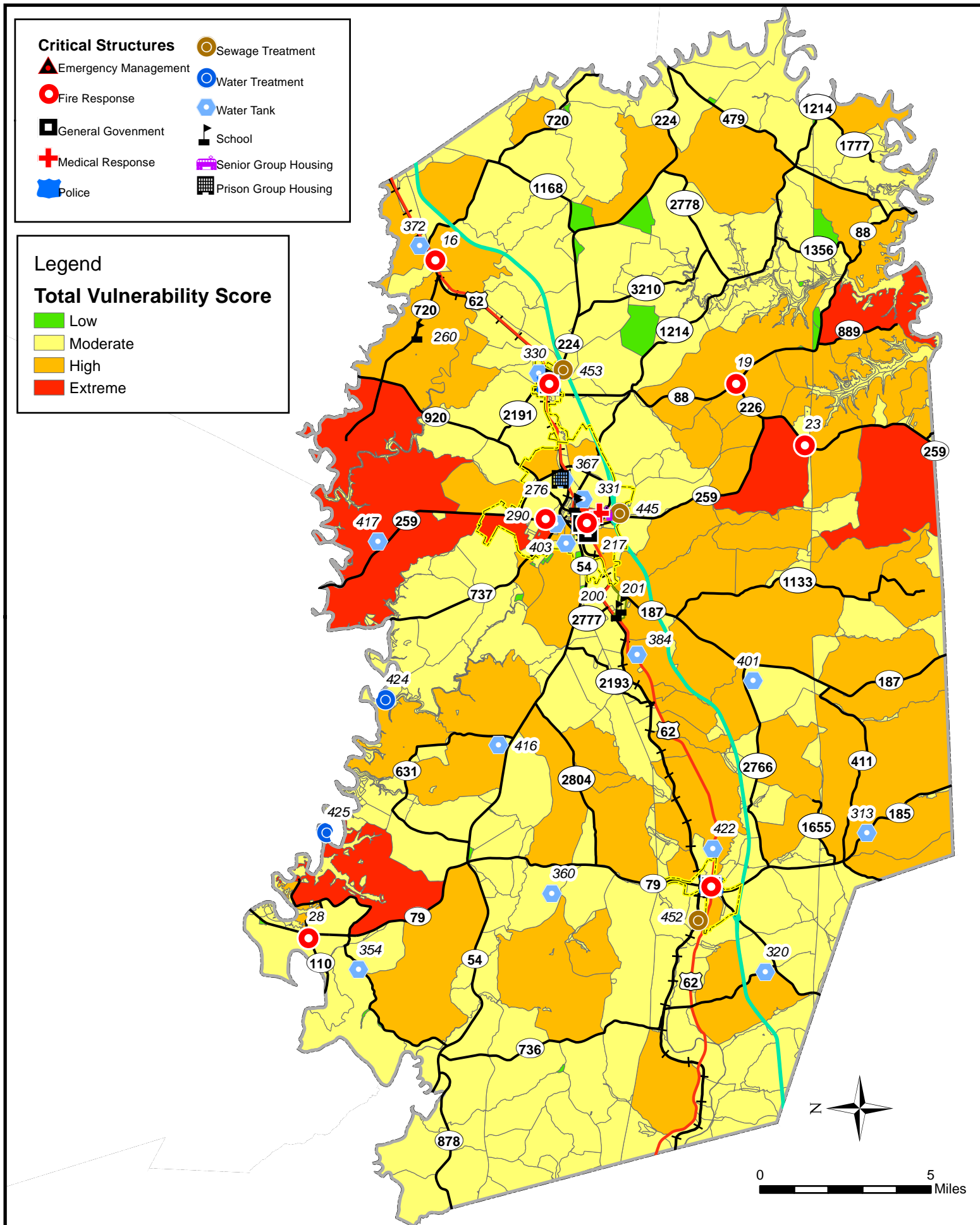


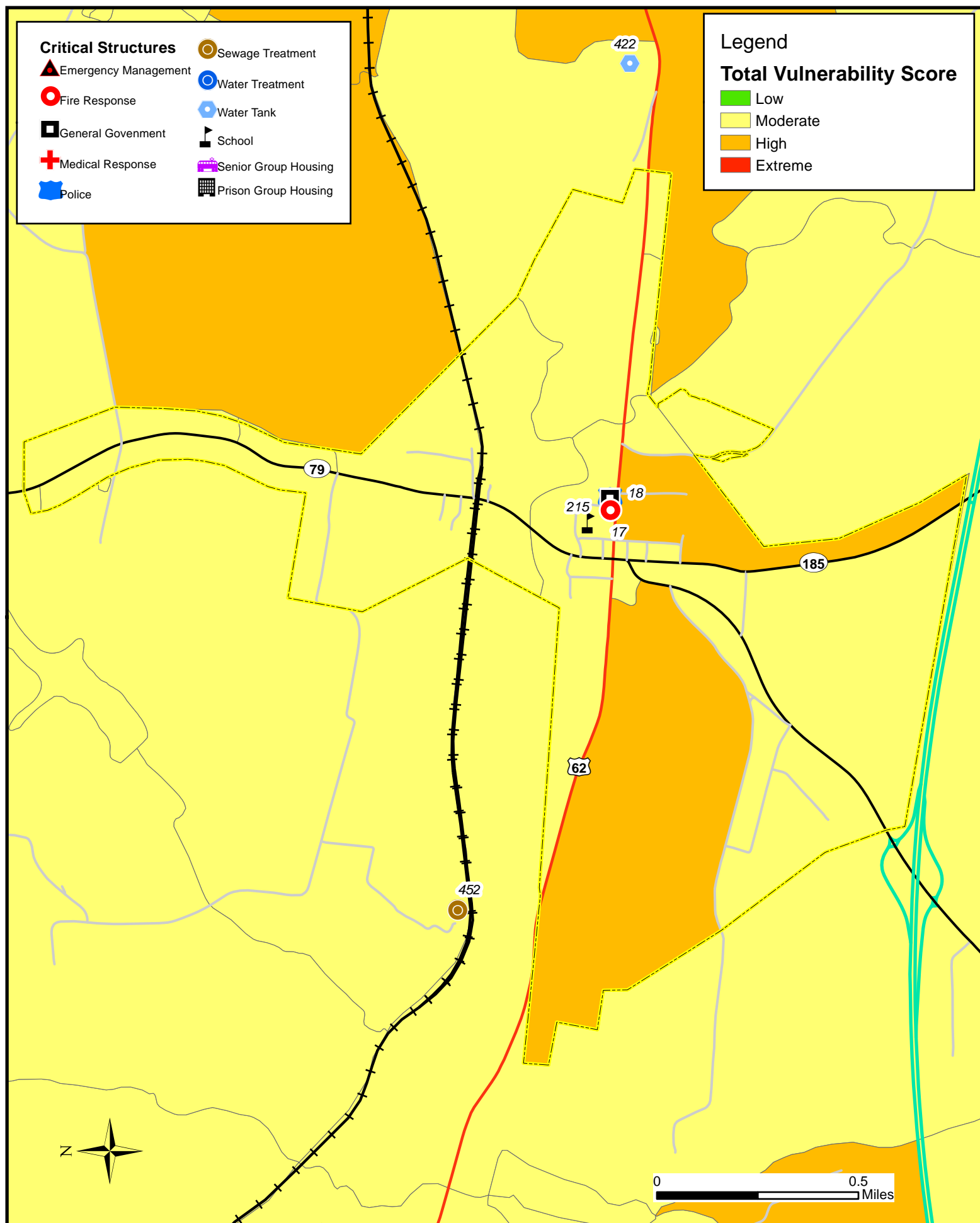


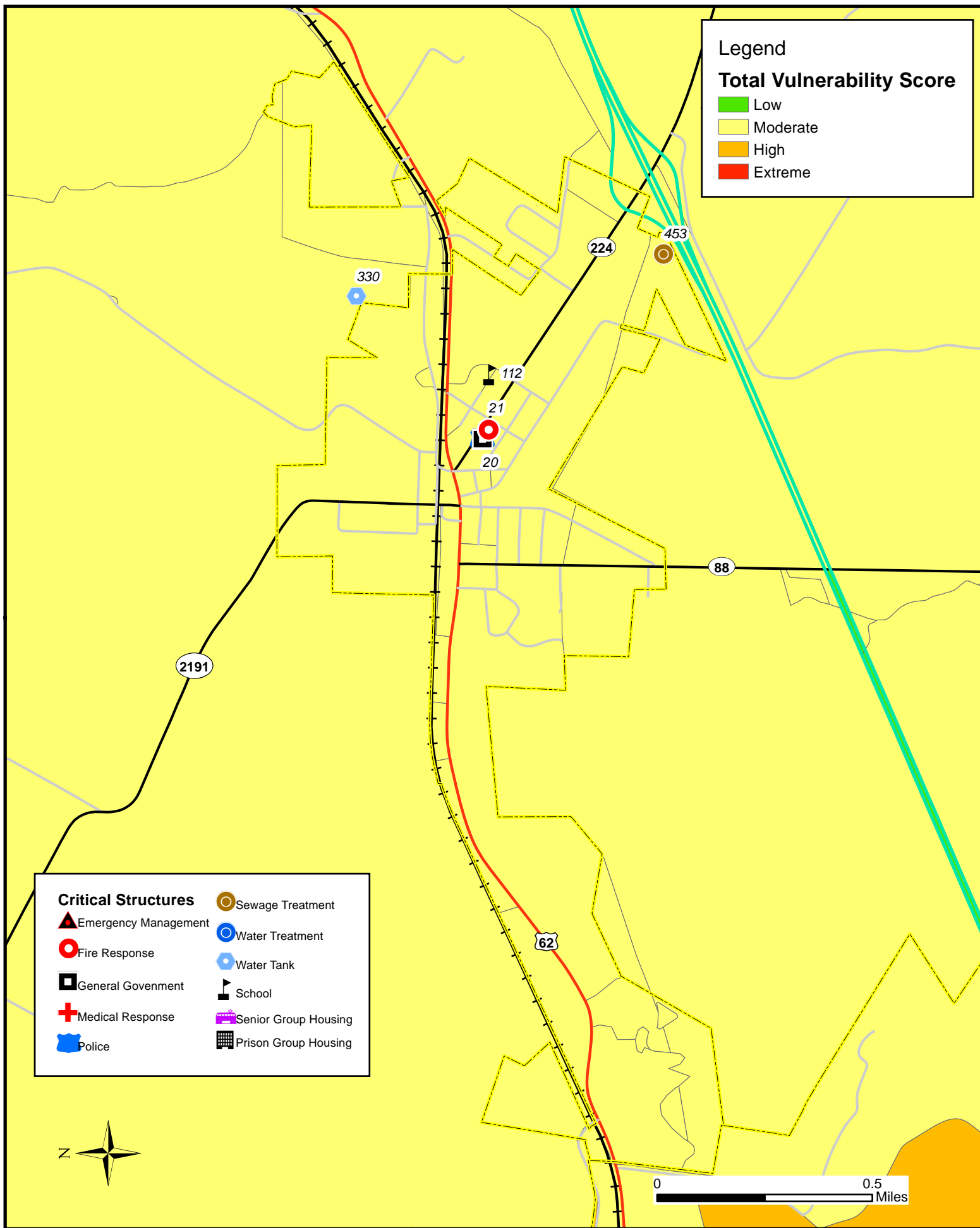


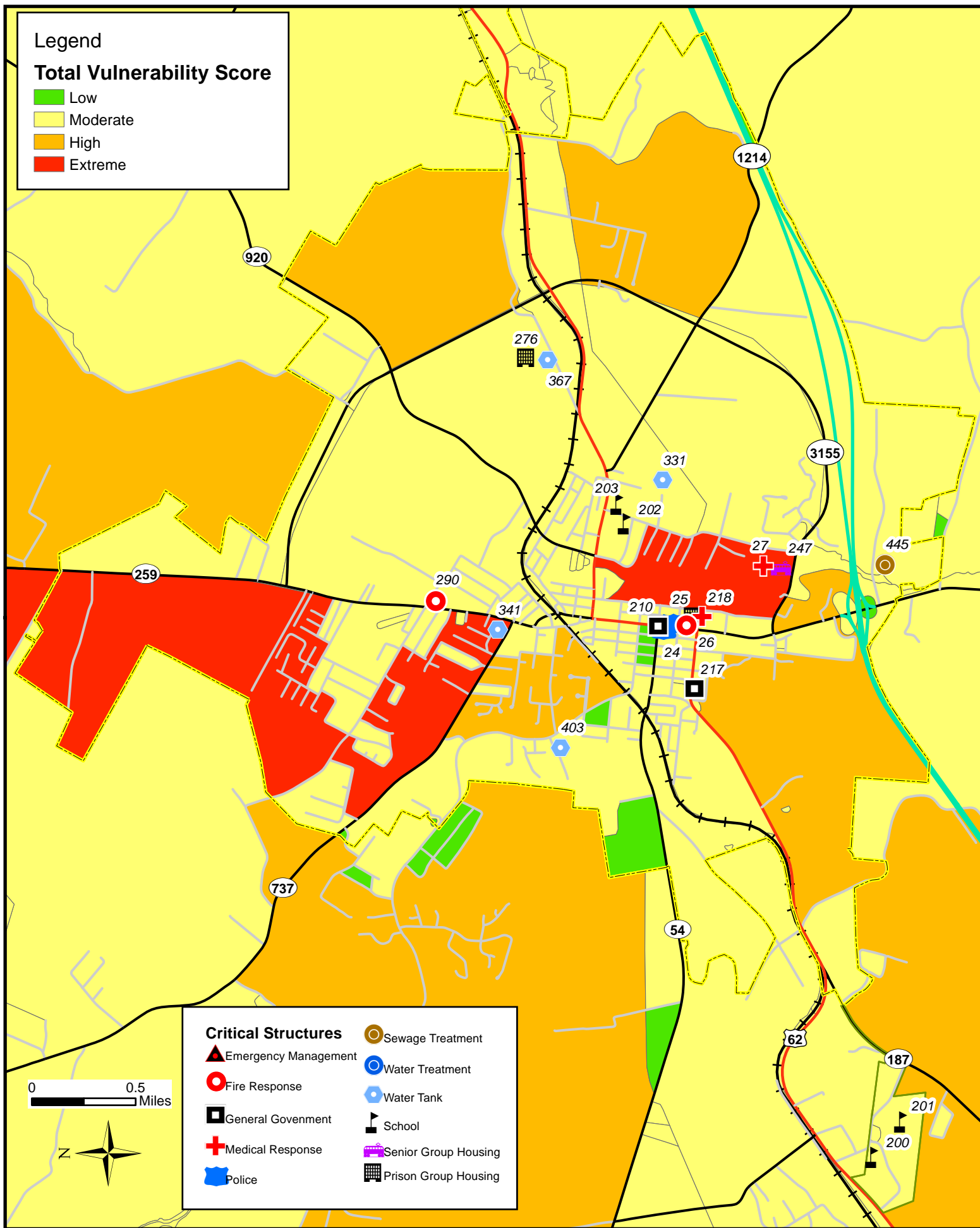
Grayson County

16	EAST GRAYSON COUNTY FIRE DEPT	GRAYSON	FIRE RESPONSE
17	CANEYVILLE VFD	GRAYSON	FIRE RESPONSE
18	CANEYVILLE POLICE	GRAYSON	POLICE
19	WAX FIRE DEPT	GRAYSON	FIRE RESPONSE
20	CLARKSON POLICE	GRAYSON	POLICE
21	CLARKSON VFD	GRAYSON	FIRE RESPONSE
22	LEITCHFIELD PD	GRAYSON	POLICE
23	ANETA FIRE DEPT	GRAYSON	FIRE RESPONSE
24	GRAYSON COUNTY SHERIFF	GRAYSON	POLICE
25	GRAYSON COUNTY JAIL	GRAYSON	PRISON GROUP HOUSING
26	LEITCHFIELD VFD	GRAYSON	FIRE RESPONSE
27	TWIN LAKES REGIONAL MEDICAL CENTER	GRAYSON	MEDICAL RESPONSE
28	FALLS OF ROUGH VFD	GRAYSON	FIRE RESPONSE
112	CLARKSON ELEMENTRY SCHOOL	GRAYSON	SCHOOL
200	ORAN P LAWLER ELEMENTARY SCHOOL	GRAYSON	SCHOOL
201	GRAYSON COUNTY HIGH SCHOOL	GRAYSON	SCHOOL
202	H W WILKEY ELEMENTARY SCHOOL	GRAYSON	SCHOOL
203	GRAYSON COUNTY MIDDLE SCHOOL	GRAYSON	SCHOOL
210	GRAYSON COUNTY COURTHOUSE	GRAYSON	GENERAL GOVENMENT
214	CANEYVILLE CITY HALL	GRAYSON	GENERAL GOVENMENT
215	CANEYVILLE ELEMENTARY SCHOOL	GRAYSON	SCHOOL
216	CLARKSON CITY HALL	GRAYSON	GENERAL GOVENMENT
217	LEITCHFIELD CITY HALL	GRAYSON	GENERAL GOVENMENT
218	GRAYSON COUNTY HEALTH DEPARTMENT	GRAYSON	MEDICAL RESPONSE
247	GRAYSON MANOR NURSING HOME	GRAYSON	SENIOR GROUP HOUSING
260	ST. PAUL ELEMENTARY SCHOOL	GRAYSON	SCHOOL
276	GRAYSON COUNTY CORRECTIONAL FACILITY	GRAYSON	PRISON GROUP HOUSING
290	LEITCHFIELD VFD	GRAYSON	FIRE RESPONSE
313	185 TANK	GRAYSON	WT
320	WINDY RIDGE	GRAYSON	WT
330	CLARKSON	GRAYSON	WT
331	SCHOOL ST.	GRAYSON	WT
341	ORCHARD ST.	GRAYSON	WT
354	LONE HILL	GRAYSON	WT
360	POST TOUSEY	GRAYSON	WT
367	DETENTION CENTER	GRAYSON	WT
372	BIG CLIFTY	GRAYSON	WT
384	BLACK ROCK	GRAYSON	WT
401	SHREWSBURY	GRAYSON	WT
403	SUNBEAM RD.	GRAYSON	WT
416	DUFF RD	GRAYSON	WT
417	CONKLIN TANK	GRAYSON	WT
422	HWY 62 EAST	GRAYSON	WT
424	LEITCHFIELD	GRAYSON	WTP
425	GRAYSON COUNTY	GRAYSON	WTP
445	LEITCHFIELD WWTP	GRAYSON	STP
452	CANEYVILLE WWTP	GRAYSON	STP
453	CLARKSON WWTP	GRAYSON	STP







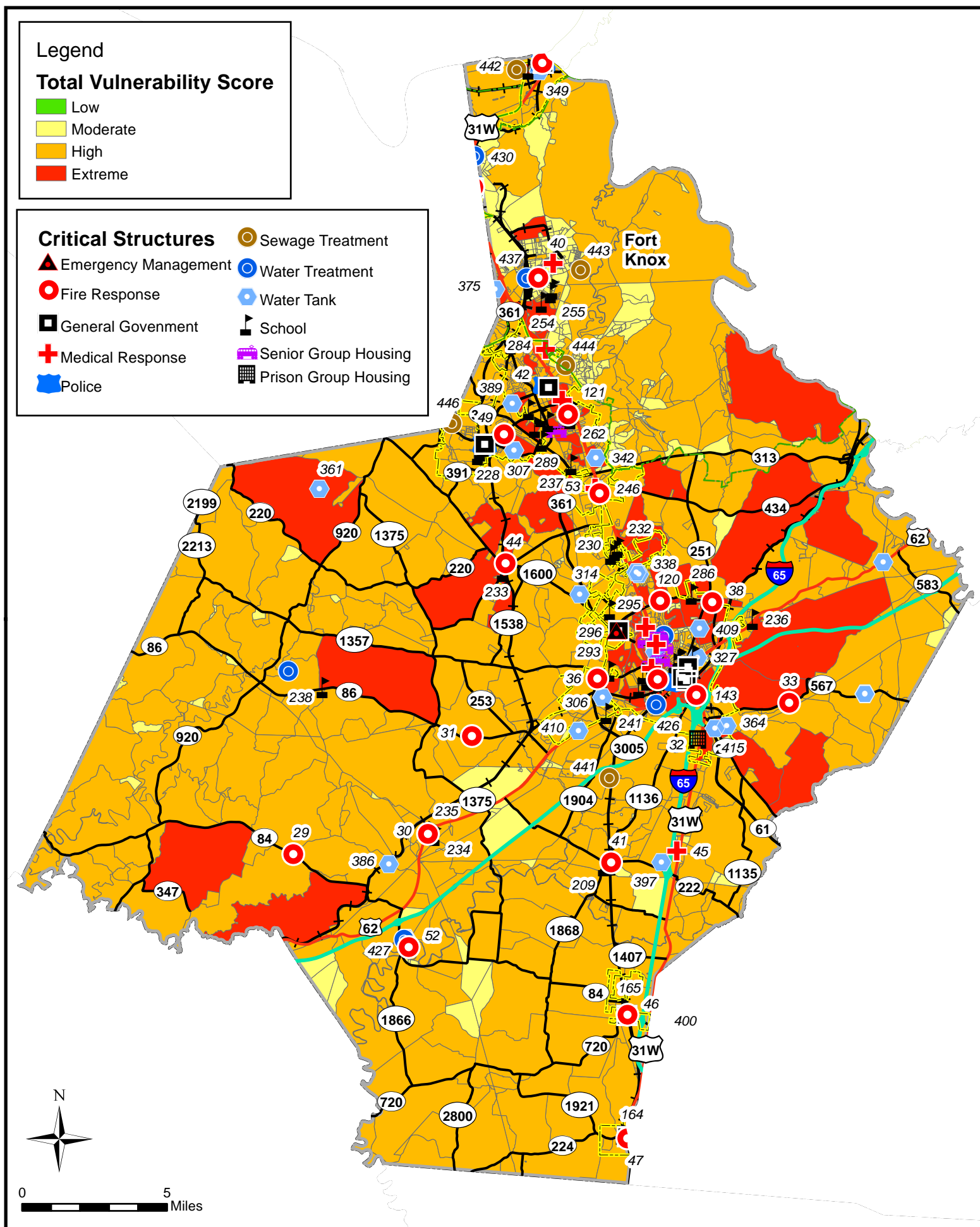


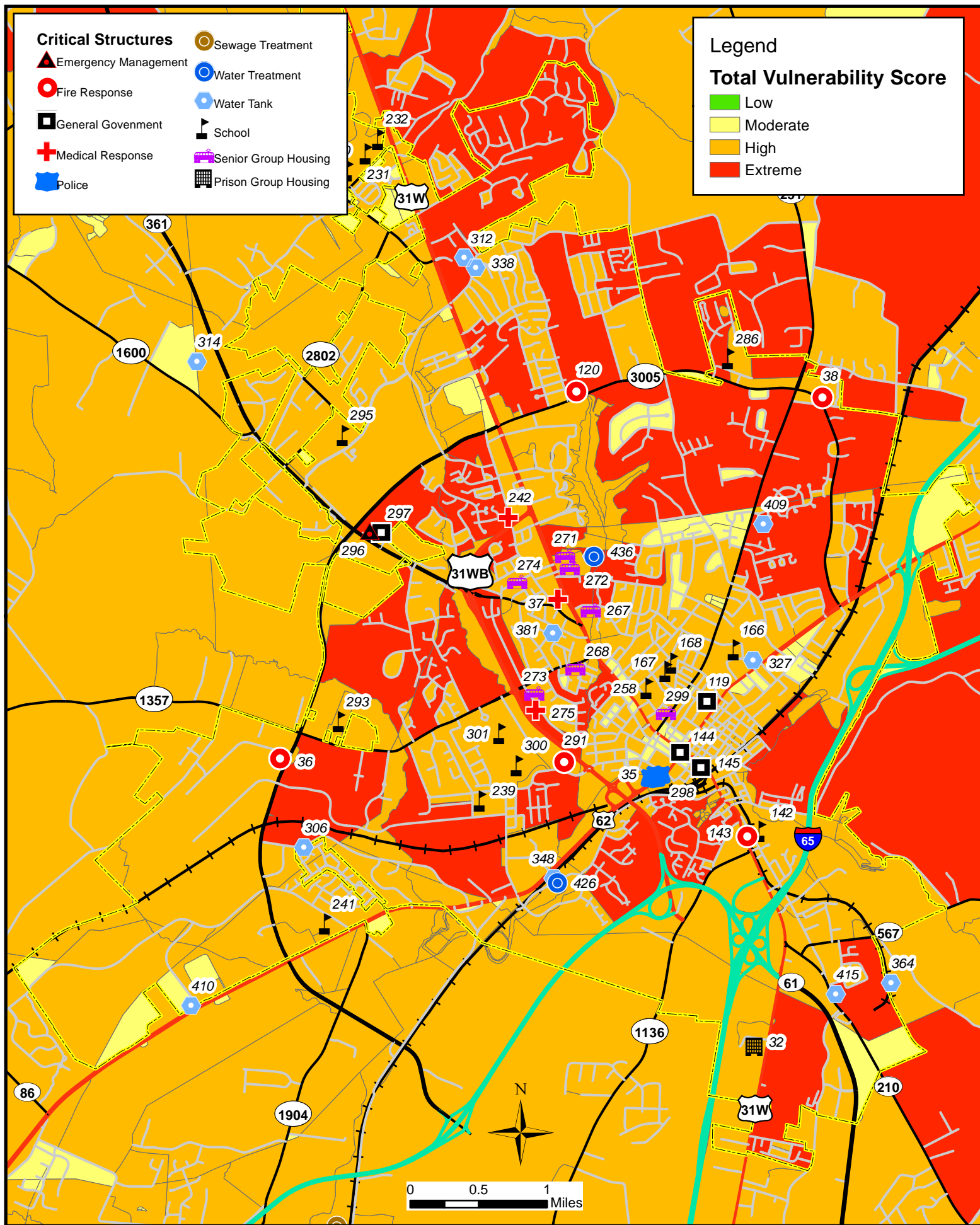
Hardin County

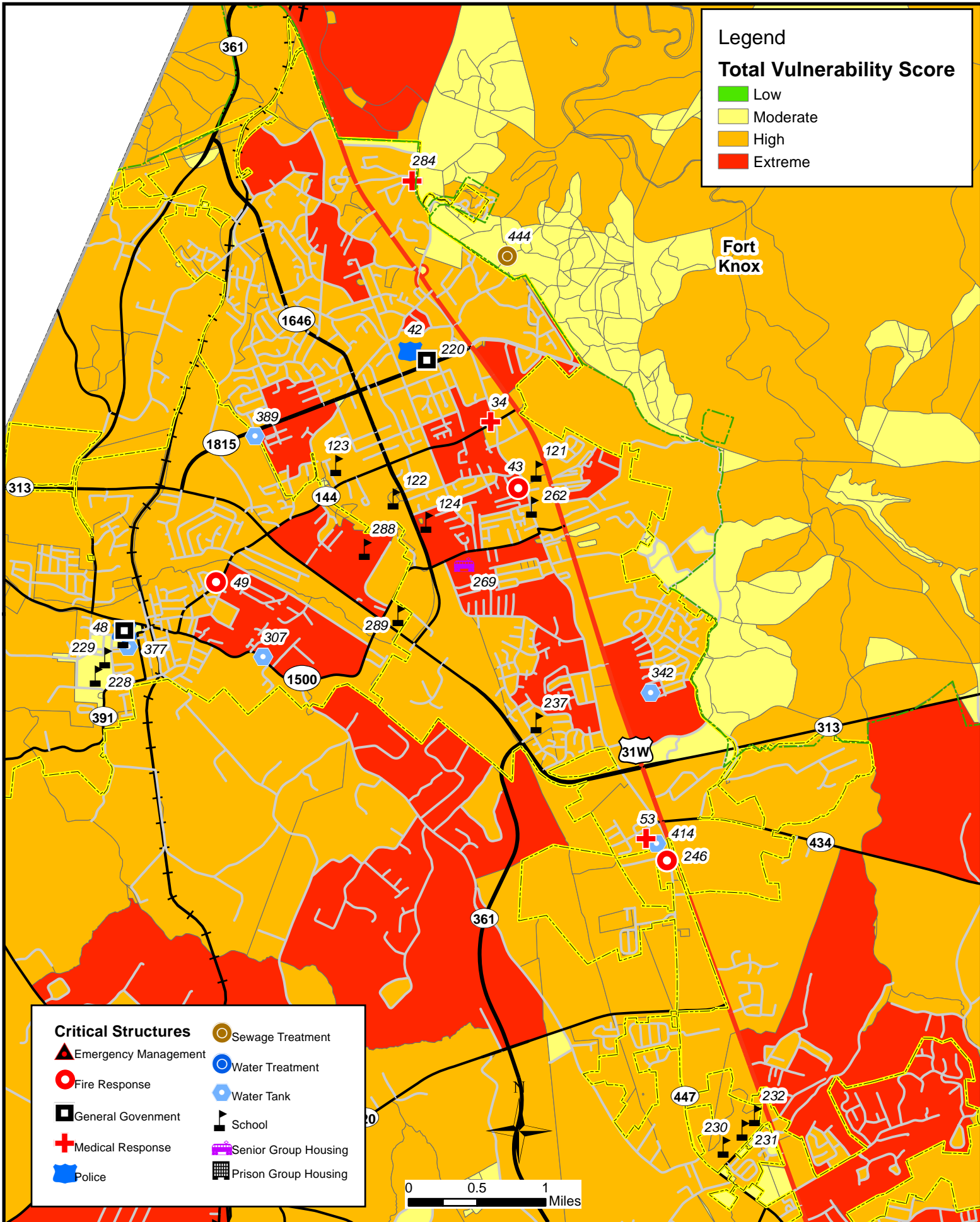
29	WEST 84 FIRE DEPT	HARDIN	FIRE RESPONSE
30	STEPHENSBURG VFD	HARDIN	FIRE RESPONSE
31	KENTUCKY 86 FIRE DEPT	HARDIN	FIRE RESPONSE
32	HARDIN COUNTY JAIL	HARDIN	PRISON GROUP HOUSING
33	VALLEY CREEK FIRE DEPT	HARDIN	FIRE RESPONSE
34	HARDIN COUNTY AMBULANCE SERVICE, NORTH HARDIN	HARDIN	MEDICAL RESPONSE
35	ELIZABETHTOWN POLICE	HARDIN	POLICE
36	ELIZABETHTOWN FIRE STATION #1	HARDIN	FIRE RESPONSE
37	HARDIN MEMORIAL HOSPITAL	HARDIN	MEDICAL RESPONSE
38	CENTRAL HARDIN COUNTY FIRE DEPT	HARDIN	FIRE RESPONSE
39	FORT KNOX FIRE DEPT	HARDIN	FIRE RESPONSE
40	IRELAND ARMY HOSPITAL	HARDIN	MEDICAL RESPONSE
41	GLENDALE FIRE DEPT	HARDIN	FIRE RESPONSE
42	RADCLIFF POLICE	HARDIN	POLICE
43	RADCLIFF FD #1	HARDIN	FIRE RESPONSE
44	RINEYVILLE FIRE DEPT	HARDIN	FIRE RESPONSE
45	HARDIN COUNTY AMBULANCE SERVICE, SOUTH HARDIN	HARDIN	MEDICAL RESPONSE
46	SONORA FIRE DEPT	HARDIN	FIRE RESPONSE
47	UPTON FIRE DEPT	HARDIN	FIRE RESPONSE
48	VINE GROVE POLICE	HARDIN	POLICE
49	VINE GROVE FIRE DEPT	HARDIN	FIRE RESPONSE
50	WEST POINT FIRE DEPT	HARDIN	FIRE RESPONSE
51	WEST POINT POLICE	HARDIN	POLICE
52	WHITE MILLS FIRE DEPT	HARDIN	FIRE RESPONSE
53	LINCOLN TRAIL HOSPITAL	HARDIN	MEDICAL RESPONSE
119	NATIONAL GUARD ARMORY	HARDIN	GENERAL GOVERNMENT
120	ELIZABETHTOWN FIRE STATION #3	HARDIN	FIRE RESPONSE
121	RADCLIFF MIDDLE SCHOOL	HARDIN	SCHOOL
122	NORTH HARDIN HIGH SCHOOL	HARDIN	SCHOOL
123	MEADOW VIEW ELEMENTARY SCHOOL	HARDIN	SCHOOL
124	PARKWAY ELEMENTARY SCHOOL	HARDIN	SCHOOL
141	VINE GROVE CITY HALL	HARDIN	GENERAL GOVERNMENT
142	VALLEY VIEW EDUCATION CENTER	HARDIN	SCHOOL
143	ELIZABETHTOWN FIRE STATION #2	HARDIN	FIRE RESPONSE
144	ELIZABETHTOWN CITY HALL	HARDIN	GENERAL GOVERNMENT
145	HARDIN COUNTY JUSTICE CENTER	HARDIN	GENERAL GOVERNMENT
163	UPTON CITY HALL	HARDIN	GENERAL GOVERNMENT
164	UPTON ELEMENTARY SCHOOL	HARDIN	SCHOOL
165	SONORA ELEMENTARY SCHOOL	HARDIN	SCHOOL
166	ELIZABETHTOWN HIGH SCHOOL	HARDIN	SCHOOL
167	MORNINGSIDE ELEMENTARY SCHOOL	HARDIN	SCHOOL
168	T. K. STONE MIDDLE SCHOOL	HARDIN	SCHOOL
209	EAST HARDIN MIDDLE SCHOOL	HARDIN	SCHOOL
213	WEST POINT CITY HALL	HARDIN	GENERAL GOVERNMENT
219	SONORA CITY HALL	HARDIN	GENERAL GOVERNMENT
220	RADCLIFF CITY HALL	HARDIN	GENERAL GOVERNMENT
228	JAMES T. ALTON MIDDLE SCHOOL	HARDIN	SCHOOL
229	VINE GROVE ELEMENTARY SCHOOL	HARDIN	SCHOOL
230	JOHN HARDIN HIGH SCHOOL	HARDIN	SCHOOL
231	BLUEGRASS MIDDLE SCHOOL	HARDIN	SCHOOL
232	NEW HIGHLAND ELEMENTARY SCHOOL	HARDIN	SCHOOL
233	RINEYVILLE ELEMENTARY SCHOOL	HARDIN	SCHOOL
234	LAKEWOOD ELEMENTARY SCHOOL	HARDIN	SCHOOL
235	WEST HARDIN MIDDLE SCHOOL	HARDIN	SCHOOL
236	LINCOLN TRAIL ELEMENTARY SCHOOL	HARDIN	SCHOOL
237	WOODLAND ELEMENTARY SCHOOL	HARDIN	SCHOOL
238	HOWEVALLEY ELEMENTARY SCHOOL	HARDIN	SCHOOL
239	HARDIN ALTERNATIVE SCHOOL	HARDIN	SCHOOL
240	BROWN STREET CENTER	HARDIN	SCHOOL
241	CENTRAL HARDIN HIGH SCHOOL	HARDIN	SCHOOL
242	LINCOLN TRAIL DISTRICT HEALTH DEPARTMENT	HARDIN	MEDICAL RESPONSE
246	RADCLIFF FD #2	HARDIN	FIRE RESPONSE
252	SCOTT MIDDLE SCHOOL	HARDIN	SCHOOL
254	MACDONALD INTERMEDIATE SCHOOL	HARDIN	SCHOOL
255	FORT KNOX HIGH SCHOOL	HARDIN	SCHOOL
258	ELIZABETHTOWN CHRISTIAN ACADEMY	HARDIN	SCHOOL
262	ST. CHRISTOPHER ELEMENTARY SCHOOL	HARDIN	SCHOOL
267	HELMWOOD HEALTHCARE CENTER	HARDIN	SENIOR GROUP HOUSING
268	KENNSINGTON MANOR	HARDIN	SENIOR GROUP HOUSING
269	NORTH HARDIN HEALTH & REHAB CENTER	HARDIN	SENIOR GROUP HOUSING

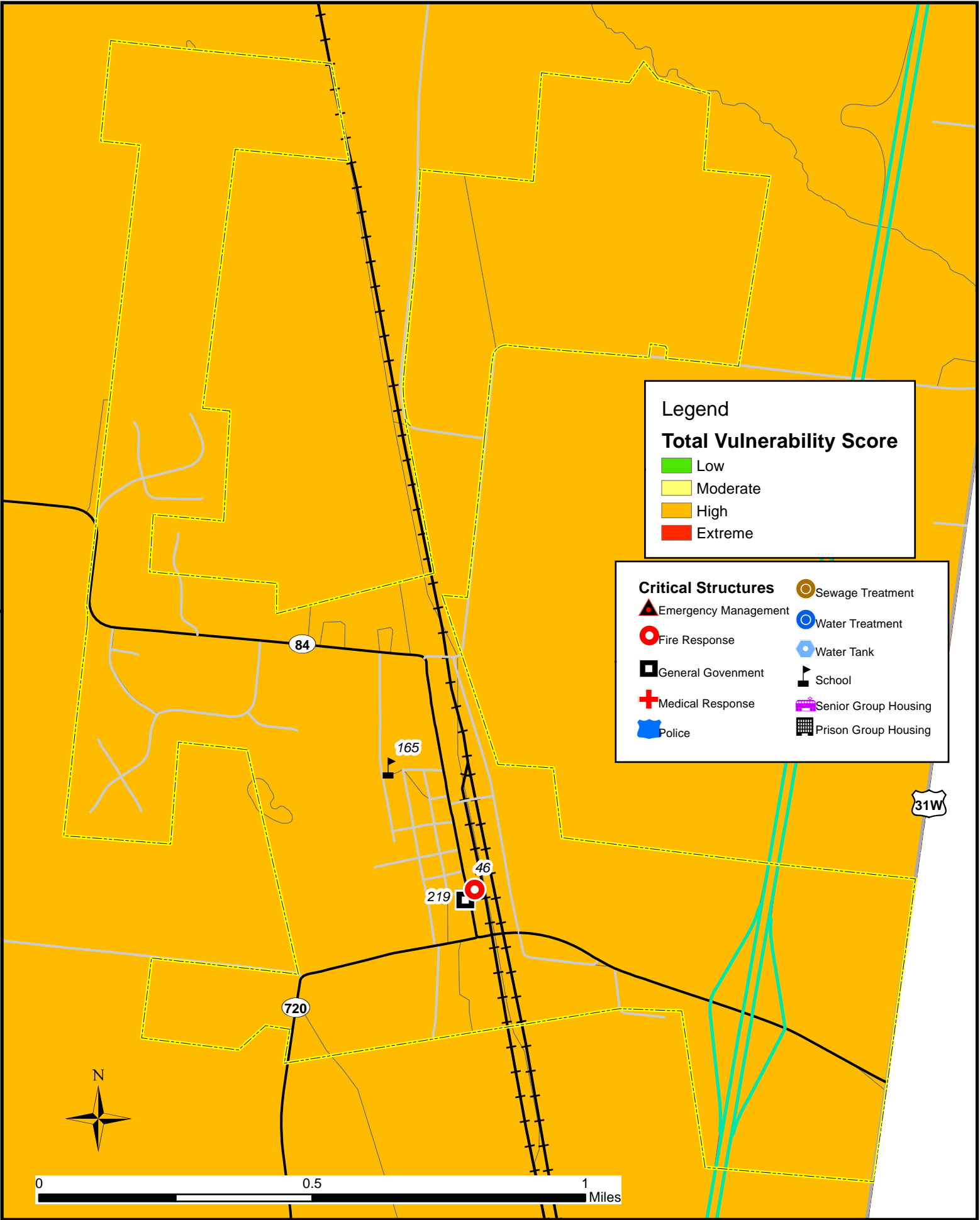
Hardin County (cont.)

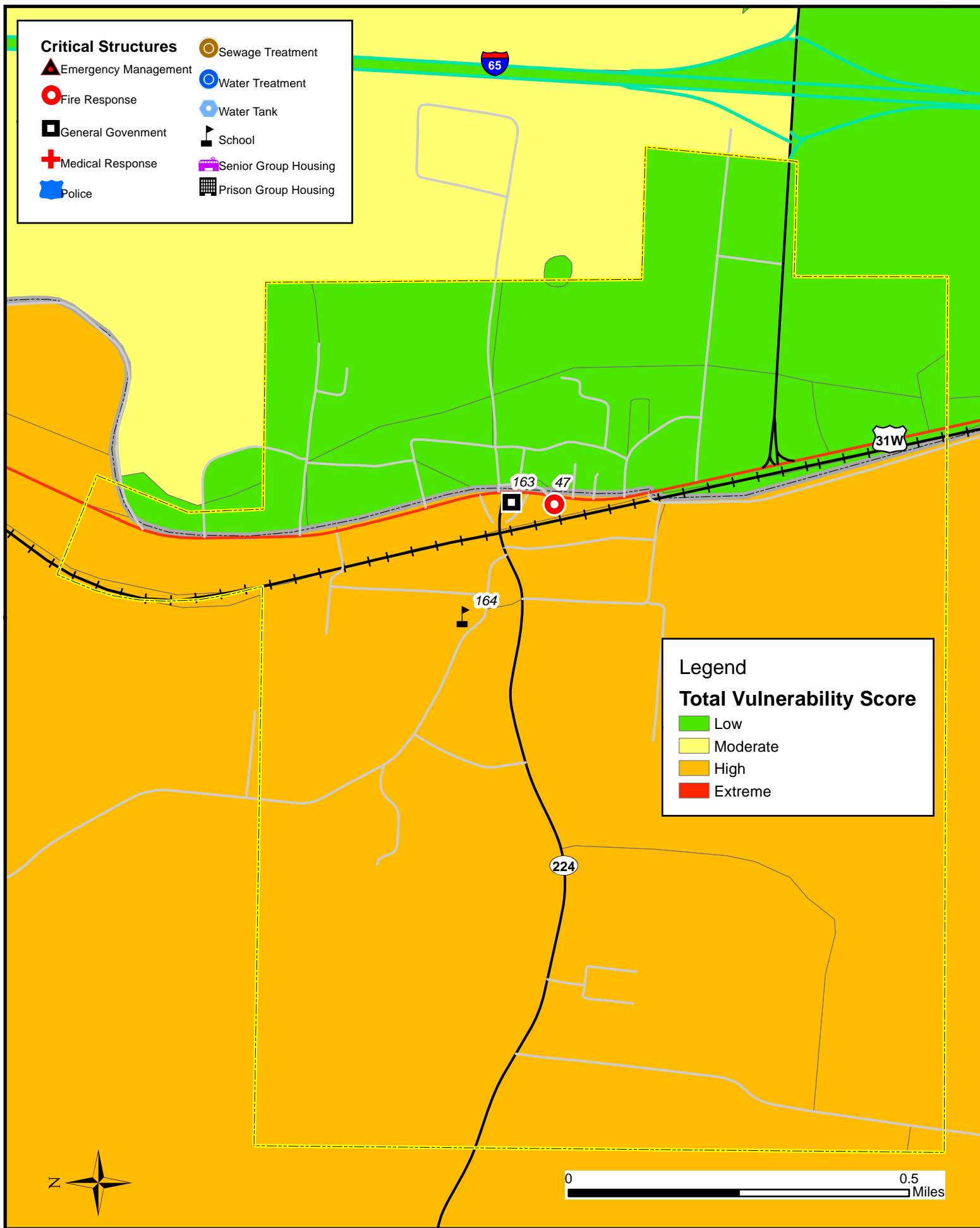
271	HEALTHSOUTH REHAB CENTER	HARDIN	SENIOR GROUP HOUSING
272	ATRIA ASSISTED LIVING	HARDIN	SENIOR GROUP HOUSING
273	MORNINGSIDE GARDENS ASSISTED LIVING	HARDIN	SENIOR GROUP HOUSING
274	TAYLOR MADE ASSISTED LIVING	HARDIN	SENIOR GROUP HOUSING
275	HARDIN CO. HEALTH CENTER	HARDIN	MEDICAL RESPONSE
277	WEST POINT ELEMENTARY SCHOOL	HARDIN	SCHOOL
284	HARDIN COUNTY HEALTH DEPARTMENT	HARDIN	MEDICAL RESPONSE
286	HEARTLAND ELEMENTARY	HARDIN	SCHOOL
288	WOODLAND ES	HARDIN	SCHOOL
289	NORTH HARDIN CHRISTIAN	HARDIN	SCHOOL
291	CENTRAL KENTUCK FIRE TRAINING CENTER	HARDIN	FIRE RESPONSE
293	G C BURKHEAD ELEMENTARY SCHOOL	HARDIN	SCHOOL
295	ST JAMES ELEMENTARY SCHOOL	HARDIN	SCHOOL
296	HARDIN COUNTY EMERGENCY MANAGEMENT	HARDIN	EMERGENCY MANAGEMENT
297	HARDIN COUNTY GOVERNMENT CENTER	HARDIN	GENERAL GOVERNMENT
298	ELIZABETHTOWN POLICE DEPT	HARDIN	POLICE
299	COMMUNICARE	HARDIN	SENIOR GROUP HOUSING
300	ELIZABETHTOWN COMMUNITY & TECHNICAL COLLEGE	HARDIN	SCHOOL
301	HARDIN COUNTY EARLY COLLEGE & CAREER CENTER	HARDIN	SCHOOL
306	PETERSON DRIVE TOWER	HARDIN	WT
307	ELEVATED TANK	HARDIN	WT
312	PEAR ORCHARD TANK	HARDIN	WT
314	RINEYVILLE TANK	HARDIN	WT
319	PIRTLE SPRINGS CLEAR WELL	HARDIN	WT
326	LONESTAR TANK	HARDIN	WT
327	MULBERRY	HARDIN	WT
336	FREEMAN LAKE WTP	HARDIN	WT
338	OAKLAWN	HARDIN	WT
342	WHISPERING HILLS	HARDIN	WT
348	CITY SPRINGS WATER PLANT CLEARWELL	HARDIN	WT
349	WEST POINT WATER STORAGE TANK	HARDIN	WT
353	VALLEY CREEK TANK	HARDIN	WT
358	VALLEY CREEK TANK	HARDIN	WT
361	BRIZENDINE	HARDIN	WT
364	SOUTH END TANK	HARDIN	WT
369	CLEARWELL #1	HARDIN	WT
375	PRITCHARD	HARDIN	WT
377	STANDPIPE TANK	HARDIN	WT
381	HELMWOOD	HARDIN	WT
386	EASTVIEW TANK	HARDIN	WT
389	LINCOLN TRAIL	HARDIN	WT
397	GLENDALE TANK	HARDIN	WT
400	SONORA TANK	HARDIN	WT
409	PEAR ORCHARD	HARDIN	WT
410	CECILIA TANK	HARDIN	WT
413	CLEARWELL #2	HARDIN	WT
414	LONGVIEW	HARDIN	WT
415	DOW CORNING TANK	HARDIN	WT
426	CITY SPRINGS	HARDIN	WTP
427	WHITE MILLS	HARDIN	WTP
428	PIRTLE SPRINGS	HARDIN	WTP
429	WEST POINT	HARDIN	WTP
430	MULDRAUGH PLANT	HARDIN	WTP
436	FREEMAN LAKE	HARDIN	WTP
437	FORT KNOX/CENTRAL WTP	HARDIN	WTP
441	VALLEY CREEK WWTP	HARDIN	STP
442	WEST POINT WWTP	HARDIN	STP
443	FT KNOX WWTP	HARDIN	STP
444	RADCLIFF WWTF	HARDIN	STP
446	VINE GROVE WWTP	HARDIN	STP

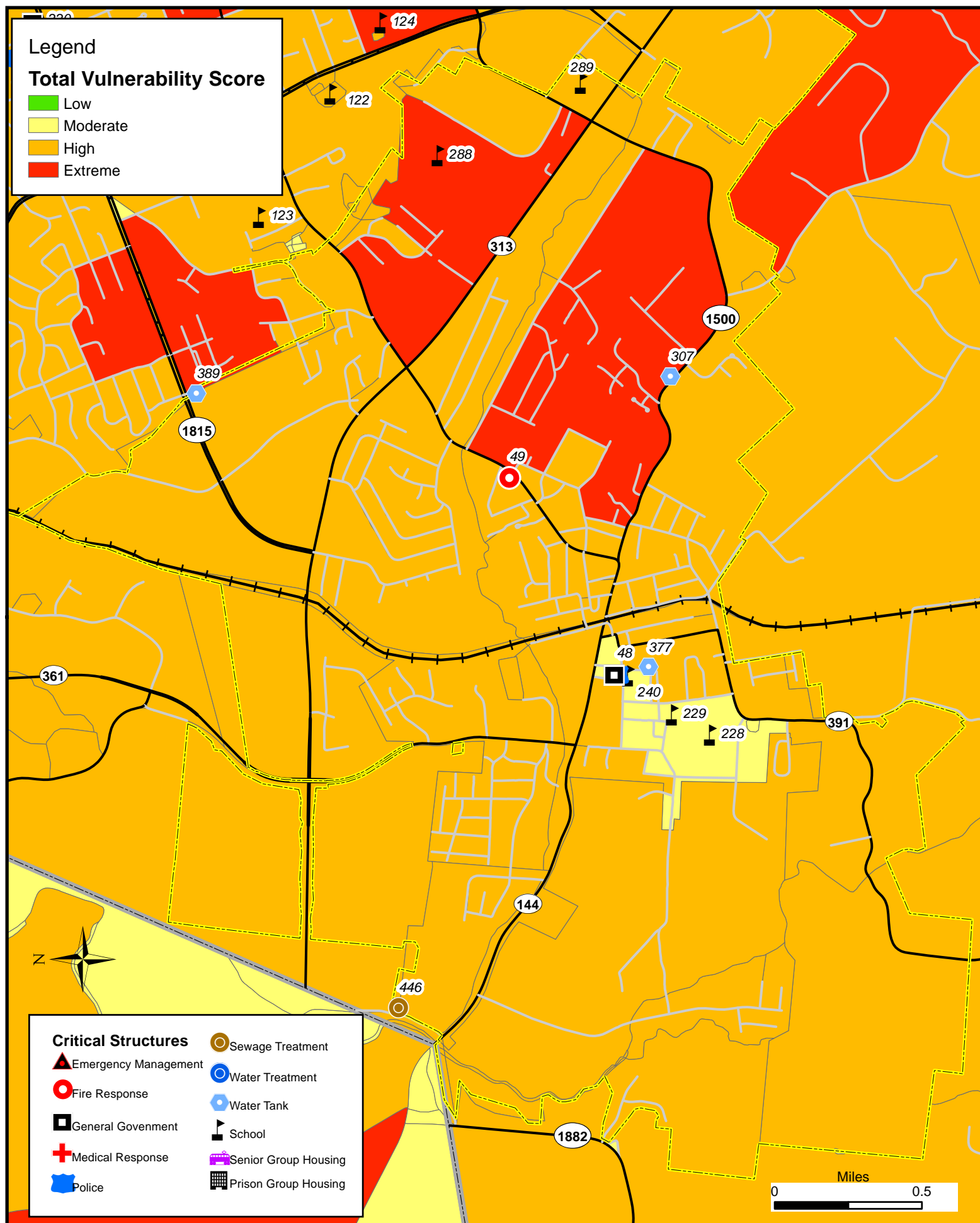


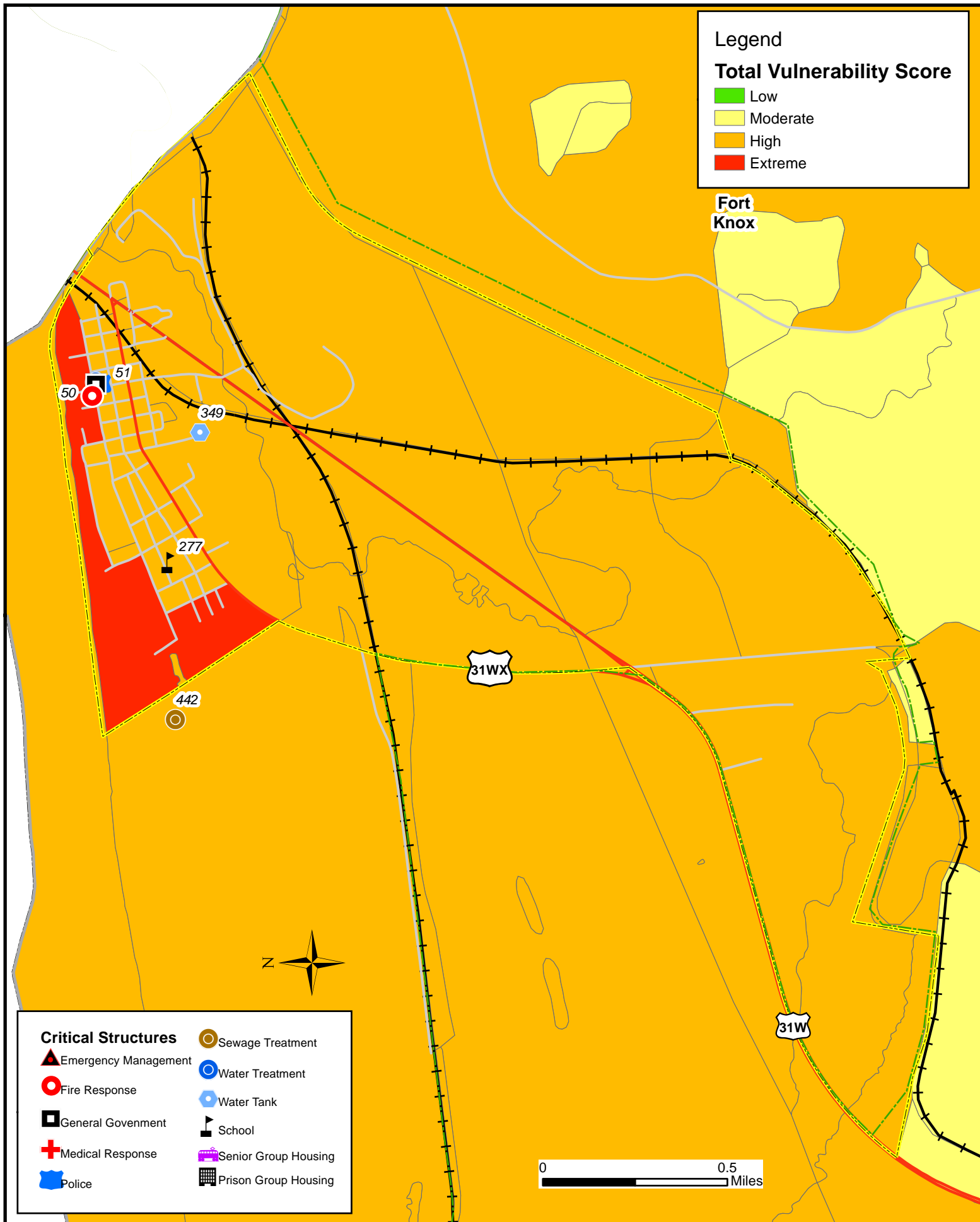






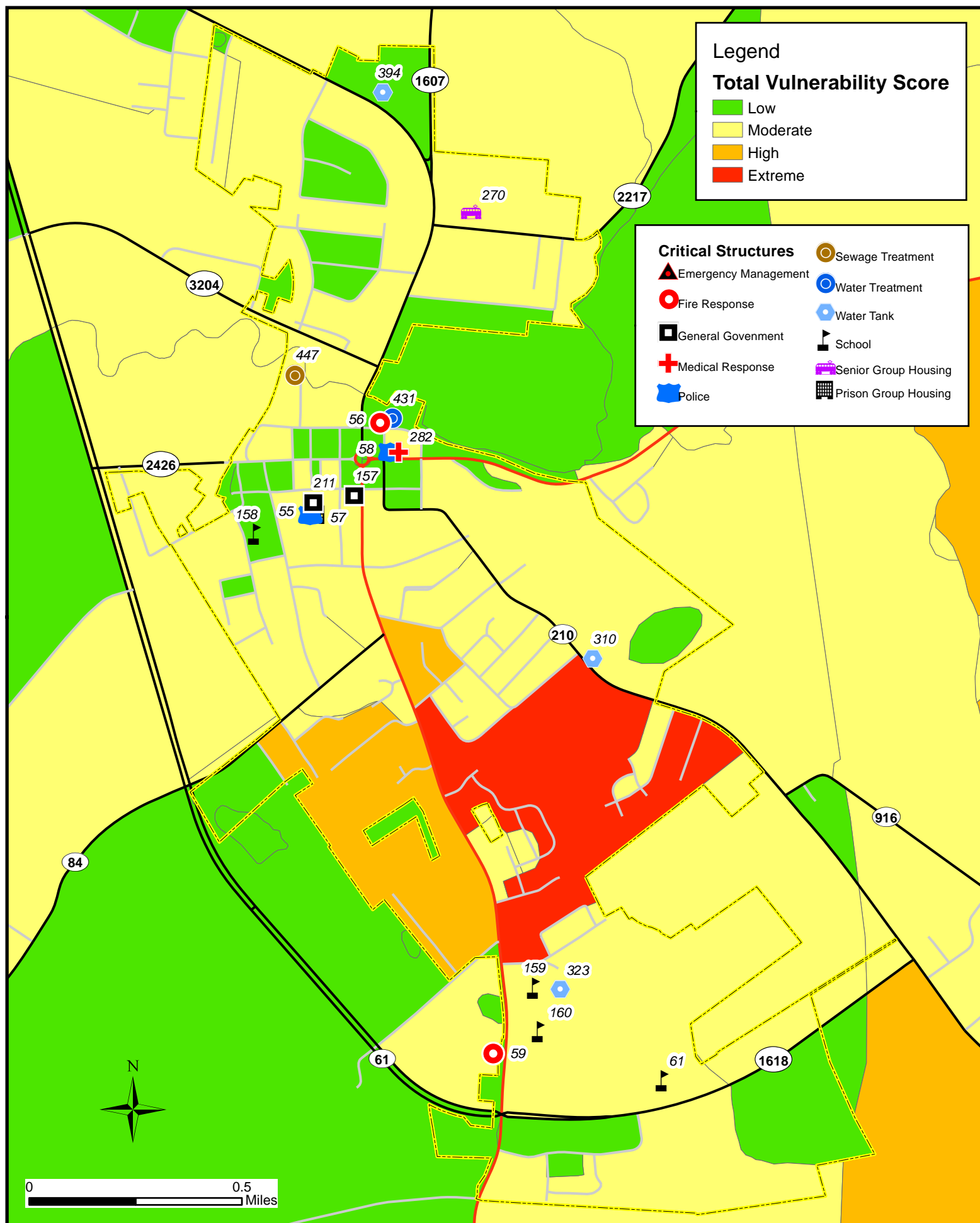






LaRue County

54	BUFFALO FIRE DEPT	LARUE	FIRE RESPONSE
55	LARUE COUNTY SHERIFF	LARUE	POLICE
56	HODGENVILLE FIRE DEPT	LARUE	FIRE RESPONSE
57	LARUE COUNTY JAIL	LARUE	PRISON GROUP HOUSING
58	HODGENVILLE POLICE	LARUE	POLICE
59	LARUE COUNTY FIRE DEPT	LARUE	FIRE RESPONSE
60	MAGNOLIA FIRE DEPT	LARUE	FIRE RESPONSE
61	LARUE COUNTY EMS	LARUE	SCHOOL
157	HODGENVILLE CITY HALL	LARUE	GENERAL GOVENMENT
158	HODGENVILLE ELEMENTARY SCHOOL	LARUE	SCHOOL
159	LARUE COUNTY MIDDLE SCHOOL	LARUE	SCHOOL
160	LARUE COUNTY HIGH SCHOOL	LARUE	SCHOOL
161	MAGNOLIA ELEMENTARY SCHOOL	LARUE	SCHOOL
162	BUFFALO ELEMENTARY SCHOOL	LARUE	SCHOOL
211	LARUE COUNTY COURTHOUSE	LARUE	GENERAL GOVENMENT
270	SUNRISE MANOR	LARUE	SENIOR GROUP HOUSING
282	LARUE COUNTY HEALTH DEPARTMENT	LARUE	MEDICAL RESPONSE
310	FAIRGROUNDS TANK	LARUE	WT
318	NAT RODGERS	LARUE	WT
323	HIGH SCHOOL TANK	LARUE	WT
332	BUFFALO WATER TOWER	LARUE	WT
362	INDUSTRIAL TANK	LARUE	WT
379	WONDERLAND WATER TOWER	LARUE	WT
383	ATTILLA TANK	LARUE	WT
390	WHITE CITY WATER TOWER	LARUE	WT
394	NORTH TANK	LARUE	WT
404	TENNISON RD TANK	LARUE	WT
405	EAST LEAFDALE	LARUE	WT
418	ROANOKE WATER TOWER	LARUE	WT
431	HODGENVILLE	LARUE	WTP
447	HODGENVILLE WWTP	LARUE	STP



Marion County

62	BRADFORDSVILLE FIRE DEPT	MARION	FIRE RESPONSE
63	GRAVEL SWITCH FIRE DEPT	MARION	FIRE RESPONSE
64	MARION COUNTY SHERIFF	MARION	POLICE
65	MARION COUNTY JAIL	MARION	PRISON GROUP HOUSING
66	NORTON SPRING VIEW HOSPITAL	MARION	MEDICAL RESPONSE
67	LEBANON FIRE DEPT	MARION	FIRE RESPONSE
68	MARION COUNTY FIRE & RESCUE	MARION	FIRE RESPONSE
69	LIFE FIRST EMERGENCY SERVICE	MARION	MEDICAL RESPONSE
70	NORTON RESTHOME	MARION	SENIOR GROUP HOUSING
71	LORETTO FIRE DEPT	MARION	FIRE RESPONSE
72	RAYWICK FIRE DEPT	MARION	FIRE RESPONSE
132	LORETTO CITY HALL	MARION	GENERAL GOVENMENT
133	ST. FRANCIS OF ASSISI ELEMMENTARY SCHOOL	MARION	SCHOOL
176	LEBANON CITY POLICE STATION	MARION	POLICE
177	MARION COUNTY COURT HOUSE	MARION	GENERAL GOVENMENT
178	MARION COUNTY DISASTER & EMERGENCY SERVICES	MARION	EMERGENCY MANAGEMENT
179	MARION COUNTY HEALTH DEPARTMENT	MARION	MEDICAL RESPONSE
180	LEBANON ELEMENTARY SCHOOL	MARION	SCHOOL
181	ST AUGUSTINE ELEMENTARY SCHOOL	MARION	SCHOOL
182	LEBANON CITY HALL	MARION	GENERAL GOVENMENT
183	LEBANON MIDDLE SCHOOL	MARION	SCHOOL
184	MARION COUNTY AREA TECH CENTER	MARION	SCHOOL
185	MARION COUNTY HIGH SCHOOL	MARION	SCHOOL
186	GLASSCOCK ELEMENTARY SCHOOL	MARION	SCHOOL
187	MARION COUNTY BOARD OF EDUCATION	MARION	SCHOOL
191	BRADFORDSVILLE CITY HALL	MARION	GENERAL GOVENMENT
192	CEDARS OF LEBANON NURSING HOME	MARION	SENIOR GROUP HOUSING
278	JUSTICE CENTER	MARION	GENERAL GOVENMENT
280	WEST MARION ES	MARION	SCHOOL
304	RAYWICK CITY HALL	MARION	GENERAL GOVENMENT
316	HWY 49 (NARROWS)	MARION	WT
325	LORETTO	MARION	WT
335	ST. CHARLES	MARION	WT
340	HOLY CROSS	MARION	WT
356	SPRINGFIELD RD	MARION	WT
359	ST. ROSE TANK	MARION	WT
370	OLD CALVARY RD #2	MARION	WT
373	BRADFORDSVILLE	MARION	WT
388	HWY 84 (GAP KNOB)	MARION	WT
408	RILEY	MARION	WT
412	OLD CALVARY RD #1	MARION	WT
432	LEBANON	MARION	WTP
448	LEBANON WWTP	MARION	STP
454	BRADFORDSVILLE WWTP	MARION	STP

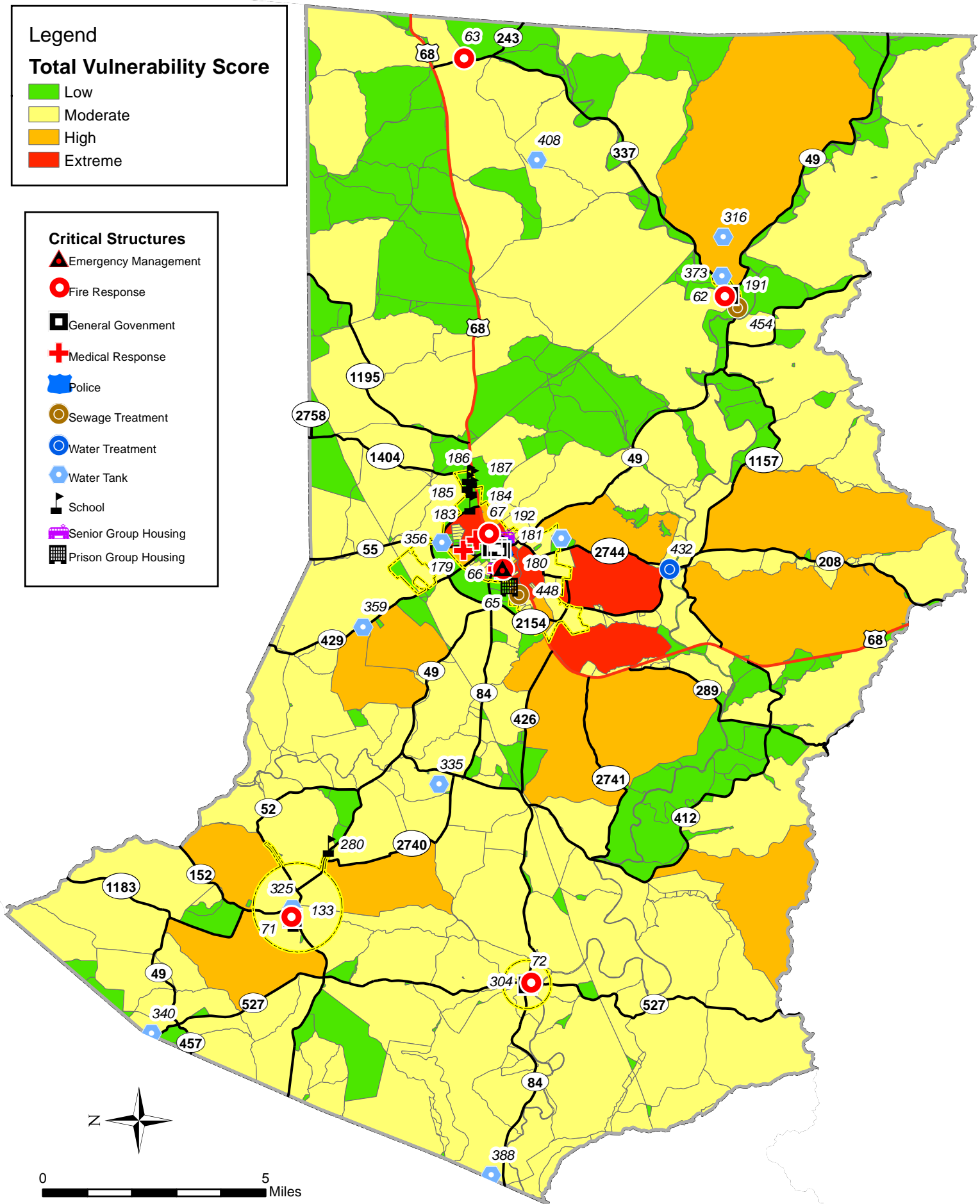
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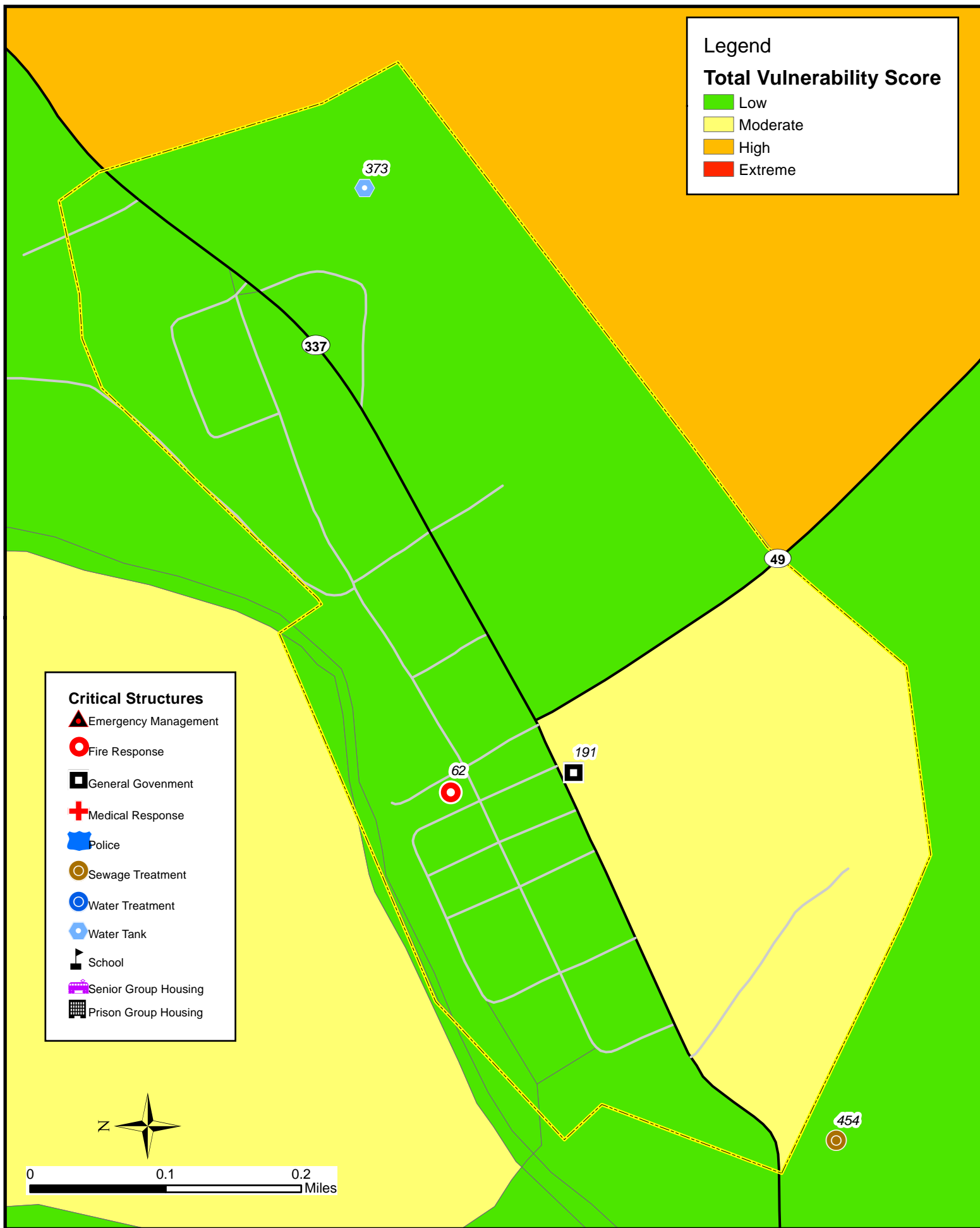
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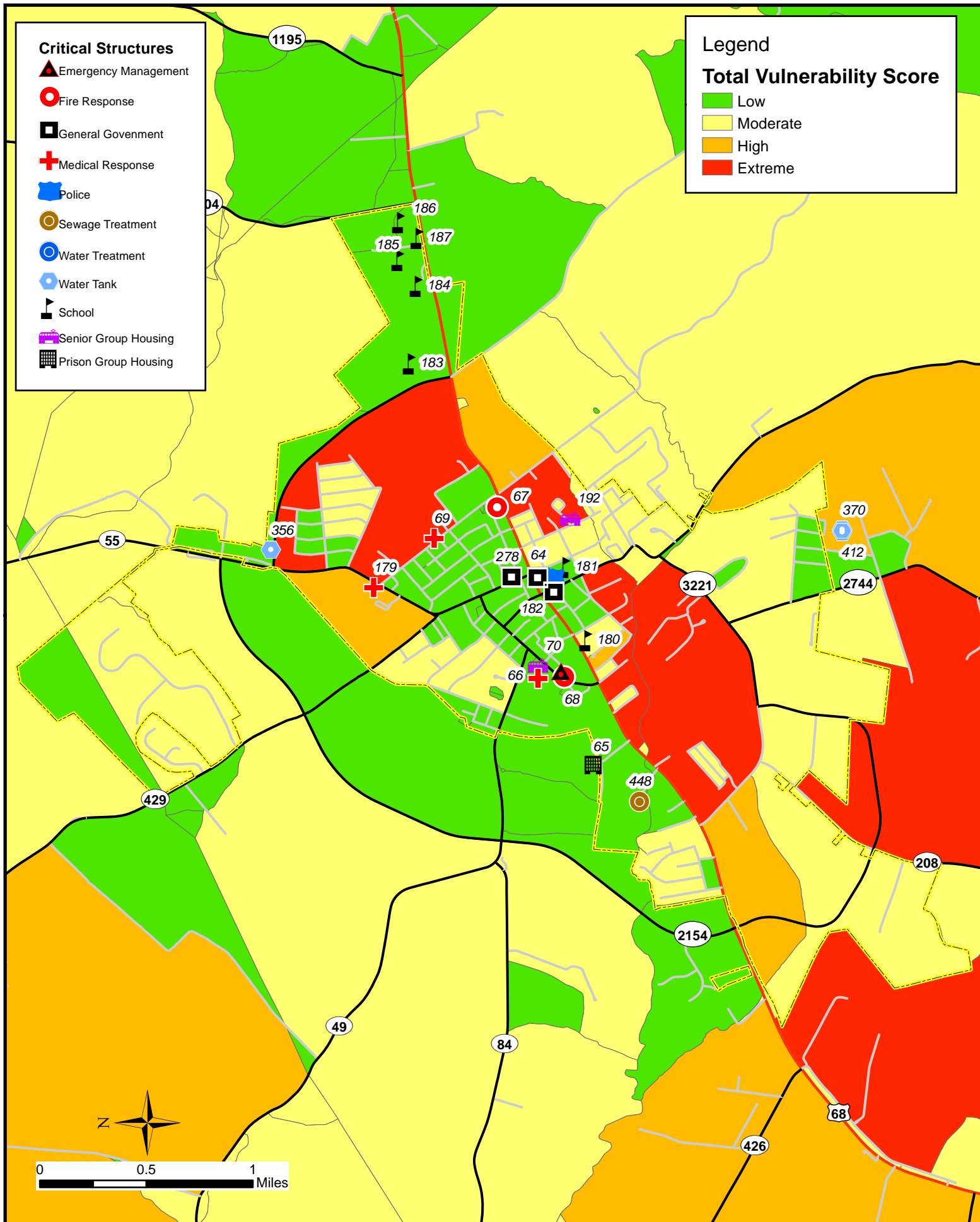
- Low
- Moderate
- High
- Extreme

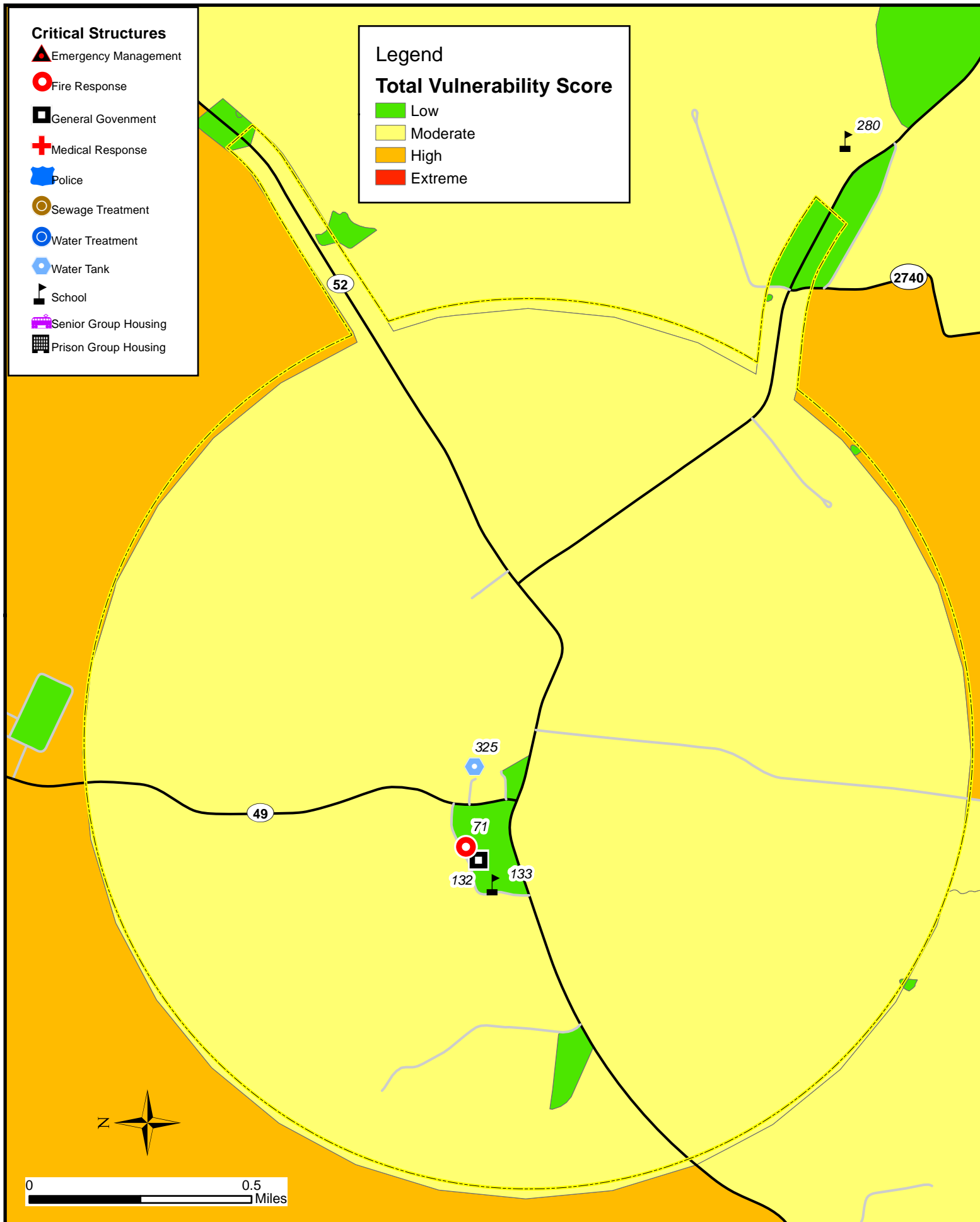
Critical Structures

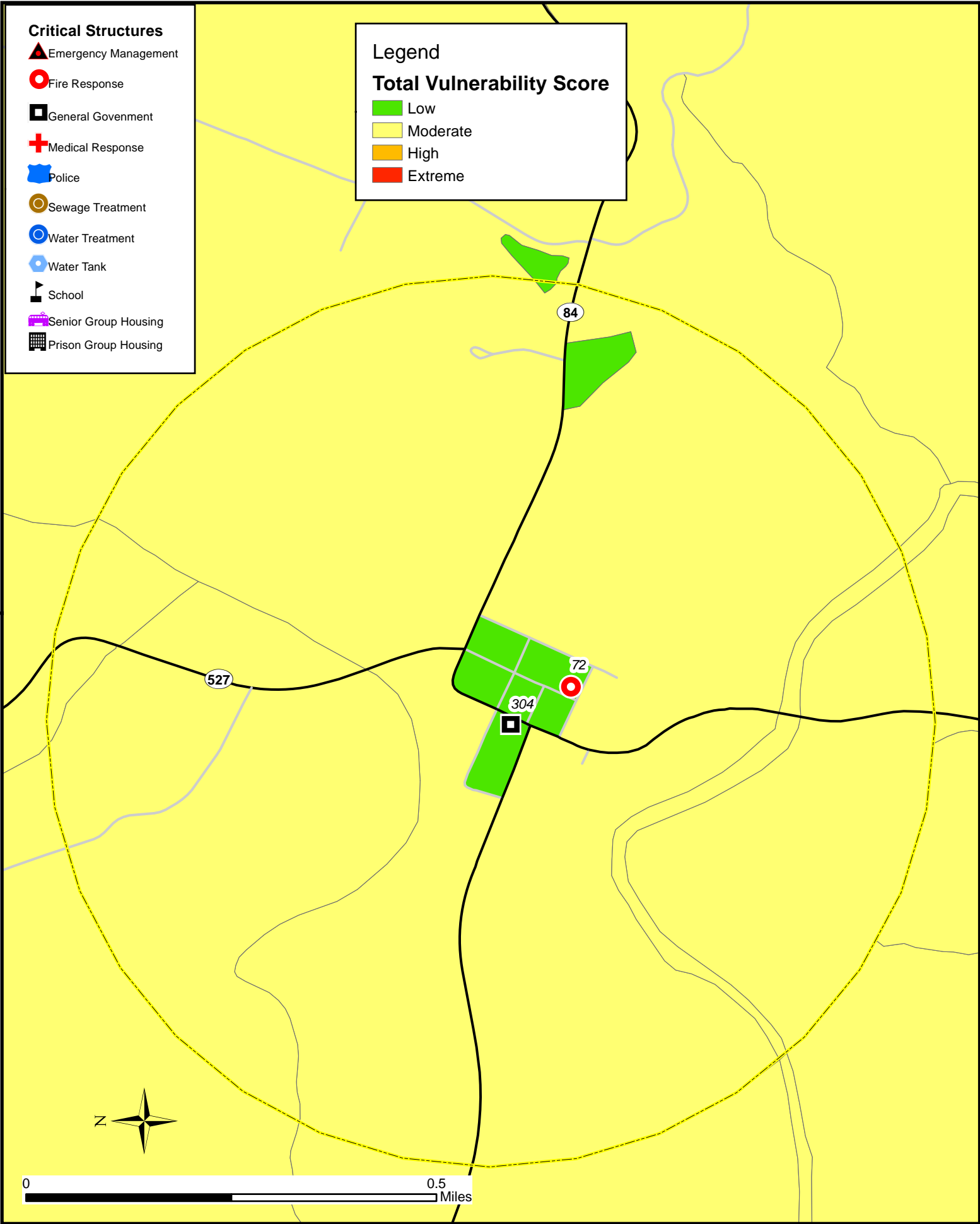
- ▲ Emergency Management
- Fire Response
- General Government
- + Medical Response
- Police
- Sewage Treatment
- Water Treatment
- ⬢ Water Tank
- ⚑ School
- Senior Group Housing
- Prison Group Housing











Meade County

73	BATTLETOWN FIRE DEPT	MEADE	FIRE RESPONSE
74	WOLF CREEK FIRE DEPT	MEADE	FIRE RESPONSE
75	MEADE COUNTY SHERIFF	MEADE	POLICE
76	MEADE COUNTY JAIL	MEADE	PRISON GROUP HOUSING
77	BRANDENBURG POLICE	MEADE	POLICE
78	MEADE COUNTY FIRE DEPT	MEADE	FIRE RESPONSE
79	EKRON FIRE DEPT	MEADE	FIRE RESPONSE
80	MULDRAUGH FIRE DEPT	MEADE	FIRE RESPONSE
81	MULDRAUGH POLICE	MEADE	POLICE
82	PAYNEVILLE FIRE DEPT	MEADE	FIRE RESPONSE
83	RHODELIA FIRE DEPT	MEADE	FIRE RESPONSE
84	FLAHERTY FIRE DEPT	MEADE	FIRE RESPONSE
85	MEADE COUNTY EMS	MEADE	MEDICAL RESPONSE
107	BRANDENBURG CENTRAL ELEMENTARY SCHOOL	MEADE	SCHOOL
108	BRANDENBURG CITY HALL	MEADE	GENERAL GOVERNMENT
109	MEADE COUNTY VOCATIONAL SCHOOL	MEADE	SCHOOL
110	JAMES R. ALLEN ELEMENTARY SCHOOL	MEADE	SCHOOL
111	MEADE COUNTY HIGH SCHOOL	MEADE	SCHOOL
114	STUART PEPPER MIDDLE SCHOOL	MEADE	SCHOOL
115	MEADE COUNTY COURTHOUSE	MEADE	GENERAL GOVERNMENT
116	BRANDENBURG ELEMENTARY SCHOOL	MEADE	SCHOOL
198	MEADE COUNTY HEALTH DEPARTMENT	MEADE	MEDICAL RESPONSE
221	MULDRAUGH STORM SHELTER	MEADE	GENERAL GOVERNMENT
222	NATIONAL GUARD ARMORY	MEADE	GENERAL GOVERNMENT
223	EKRON ELEMENTARY SCHOOL	MEADE	SCHOOL
224	PAYNEVILLE ELEMENTARY SCHOOL	MEADE	SCHOOL
225	FLAHERTY ELEMENTARY SCHOOL	MEADE	SCHOOL
226	MULDRAUGH CITY HALL	MEADE	GENERAL GOVERNMENT
227	BATTLETOWN ELEMENTARY SCHOOL	MEADE	SCHOOL
250	VAN VOORHIS ELEMENTARY	MEADE	SCHOOL
257	ST. JOHN THE APOSTLE ELEMENTARY SCHOOL	MEADE	SCHOOL
292	FLAHERY PRIMARY SCHOOL	MEADE	SCHOOL
308	HIGH PRESSURE TANK	MEADE	WT
311	WATER TANK #1	MEADE	WT
322	FLAHERTY TANK	MEADE	WT
350	GARRETT	MEADE	WT
366	STANDPIPE TANK	MEADE	WT
395	PAYNEVILLE	MEADE	WT
411	WATER TANK #2	MEADE	WT
433	BARNEY JOHNSON	MEADE	WTP
440	BRANDENBURG WWTP	MEADE	STP
457	ALL ABOUT HOME ASSISTED LIVING	MEADE	SENIOR GROUP HOUSING
458	BEEHIVE ASSISTED LIVING	MEADE	SENIOR GROUP HOUSING

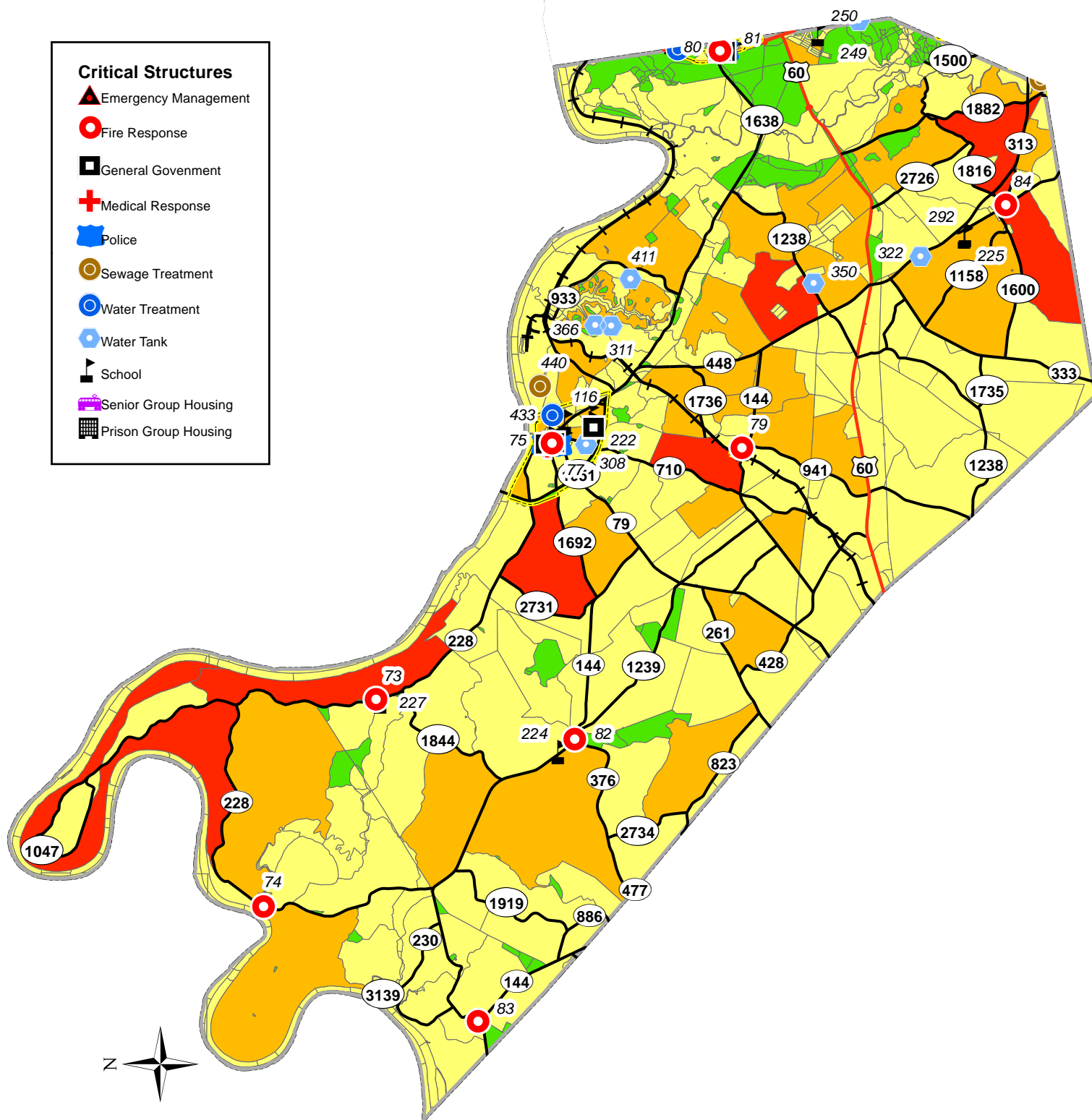
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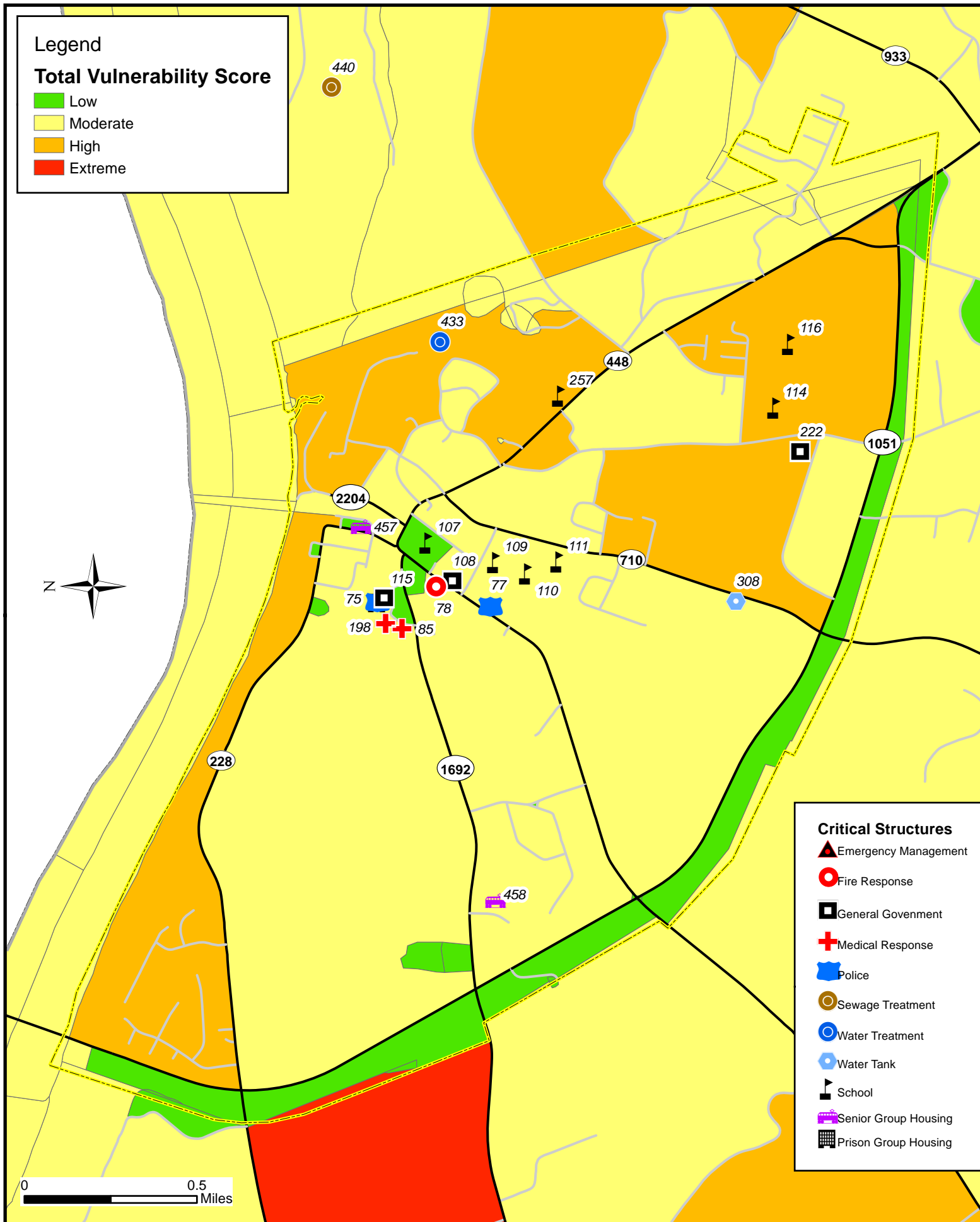
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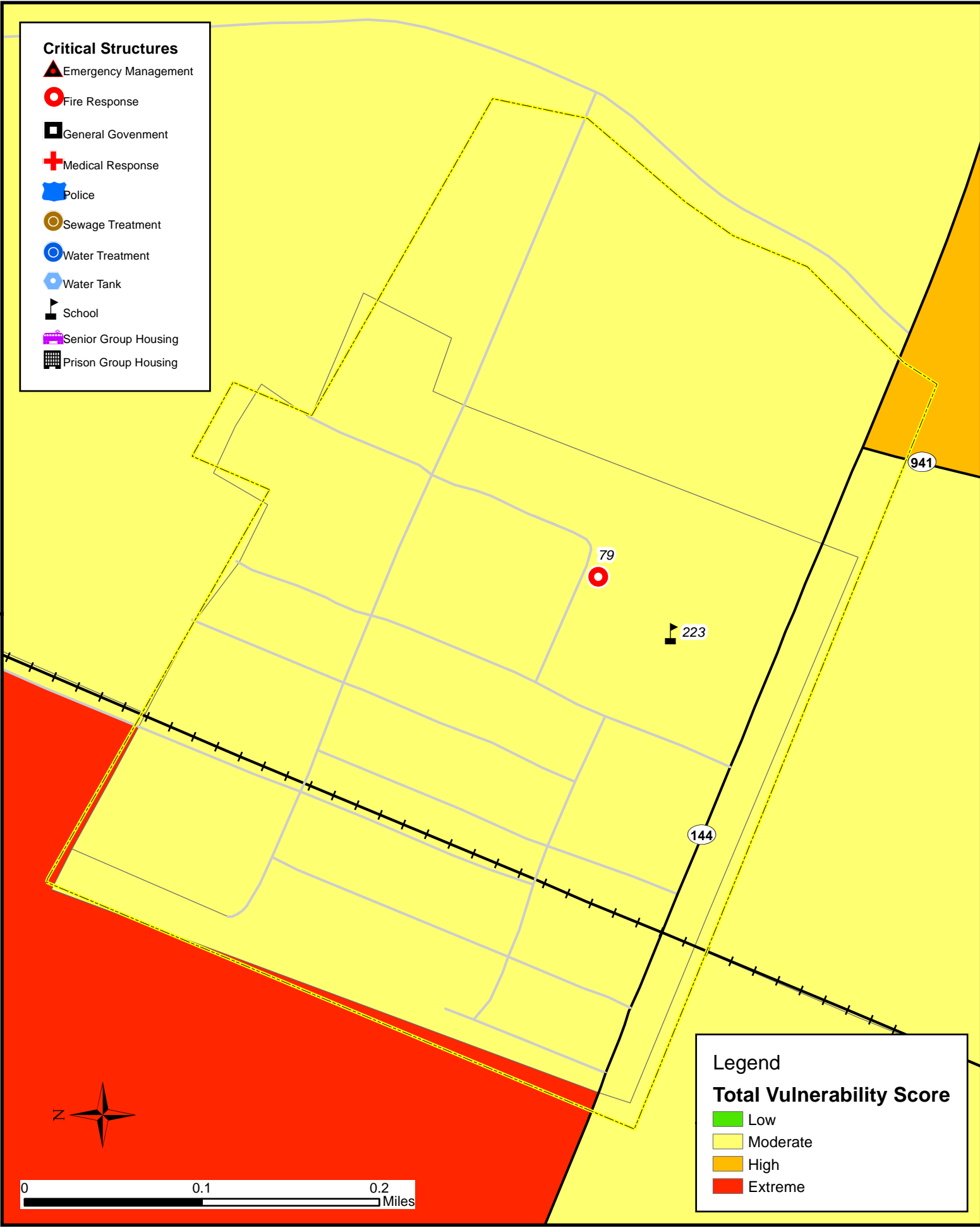
- Low
- Moderate
- High
- Extreme

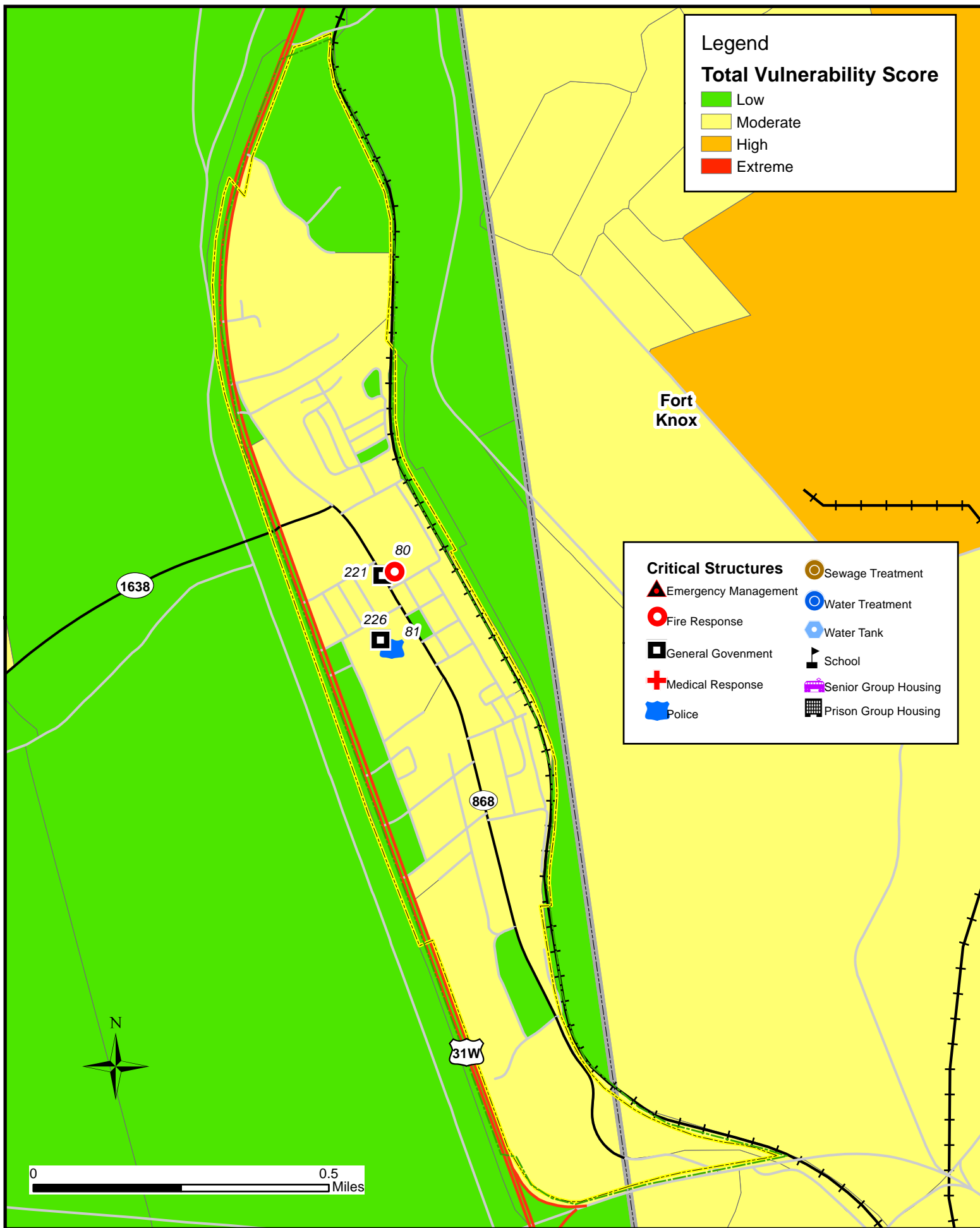
Critical Structures

- Emergency Management
- Fire Response
- General Govenment
- Medical Response
- Police
- Sewage Treatment
- Water Treatment
- Water Tank
- School
- Senior Group Housing
- Prison Group Housing







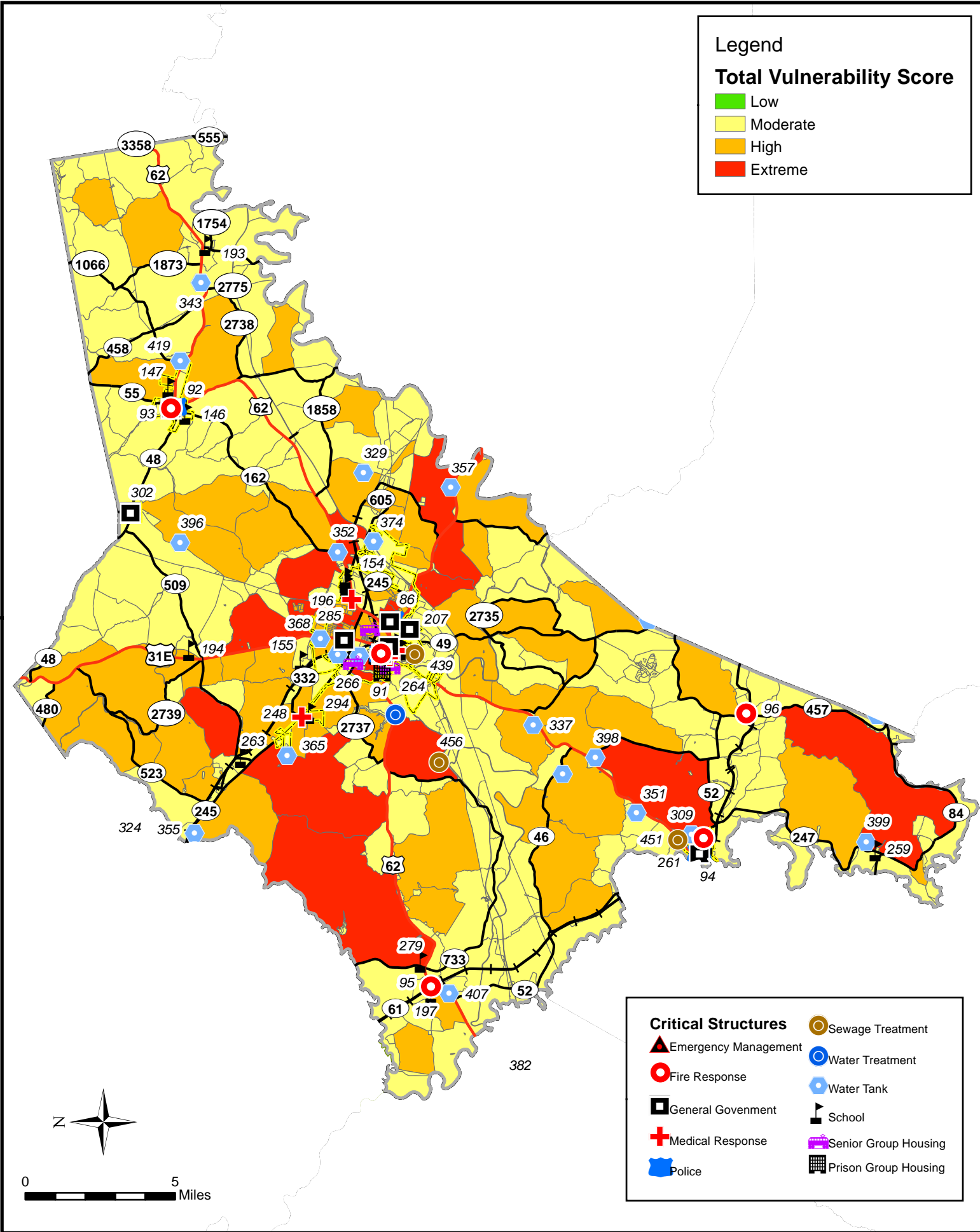


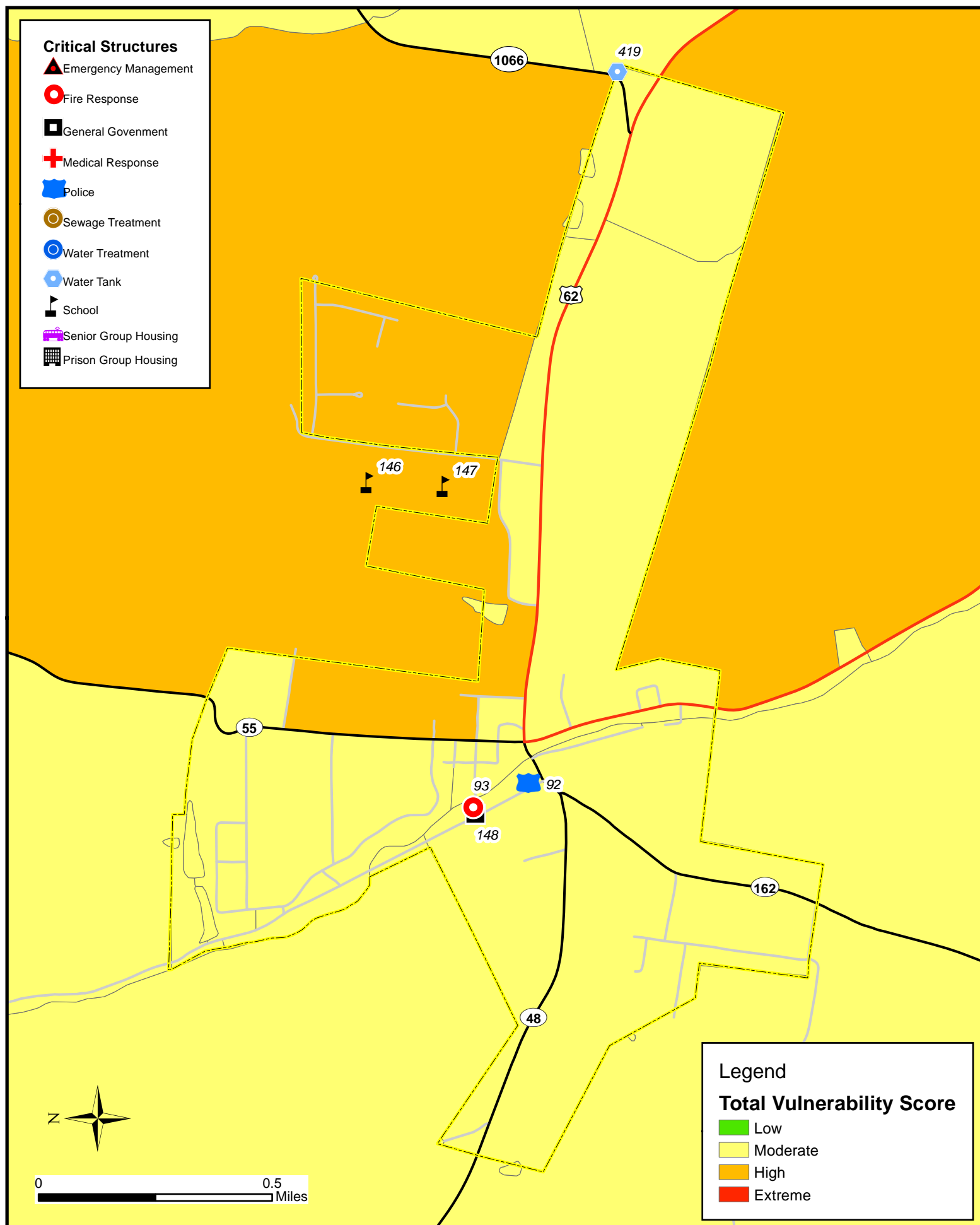
Nelson County

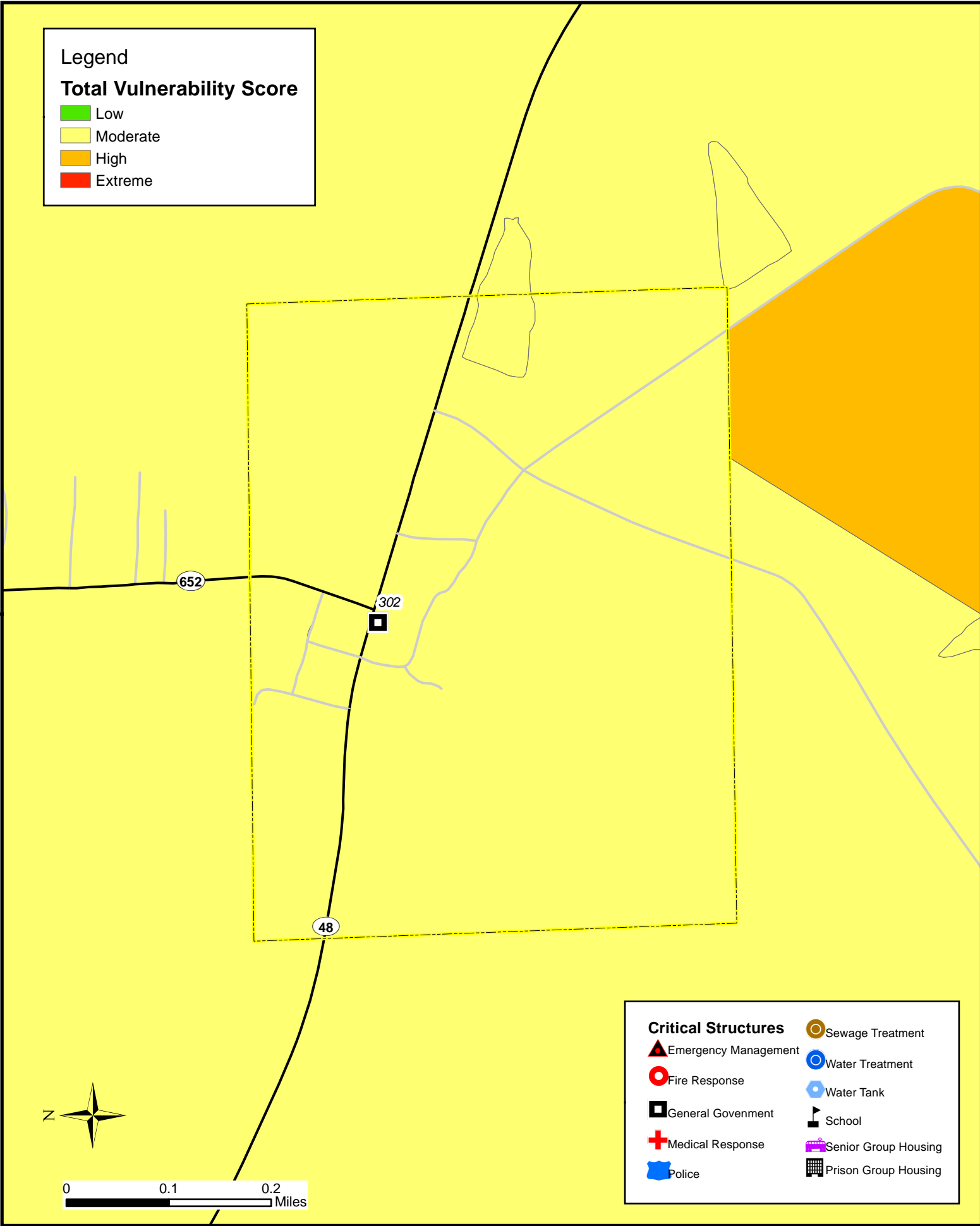
86	NELSON COUNTY SHERIFF	NELSON	POLICE
87	FLAGET MEMORIAL HOSPITAL	NELSON	MEDICAL RESPONSE
88	BARDSTOWN POLICE	NELSON	POLICE
89	BARDSTOWN VFD	NELSON	FIRE RESPONSE
90	BARDSTOWN-NELSON COUNTY FIRE DEPT	NELSON	FIRE RESPONSE
91	NELSON COUNTY JAIL	NELSON	PRISON GROUP HOUSING
92	BLOOMFIELD POLICE	NELSON	POLICE
93	NORTHEAST NELSON VFD	NELSON	FIRE RESPONSE
94	NEW HAVEN POLICE	NELSON	POLICE
95	BOSTON VFD	NELSON	FIRE RESPONSE
96	NEW HOPE FIRE DEPT	NELSON	FIRE RESPONSE
97	ROLLING FORK FIRE DEPT	NELSON	FIRE RESPONSE
134	NEW HAVEN CITY HALL	NELSON	GENERAL GOVENMENT
135	NEW HAVEN MS	NELSON	SCHOOL
146	E. L. BROWN JR. ELEMENTARY SCHOOL	NELSON	SCHOOL
147	BLOOMFIELD MIDDLE SCHOOL	NELSON	SCHOOL
148	BLOOMFIELD CITY HALL	NELSON	GENERAL GOVENMENT
149	BETHLEHEM HIGH SCHOOL	NELSON	SCHOOL
150	FOSTER HEIGHTS ES	NELSON	SCHOOL
151	ST. MONICKS ELEMENTARY SCHOOL	NELSON	SCHOOL
152	BARDSTOWN HIGH SCHOOL	NELSON	SCHOOL
153	NELSON COUNTY VOCATIONAL SCHOOL	NELSON	SCHOOL
154	NELSON COUNTY HIGH SCHOOL	NELSON	SCHOOL
155	SPALDING COLLEGE EXTENSION CENTER	NELSON	SCHOOL
156	NATIONAL GUARD ARMORY	NELSON	GENERAL GOVENMENT
174	BARDSTOWN CITY HALL	NELSON	GENERAL GOVENMENT
175	NEW HAVEN FIRE DEPARTMENT	NELSON	FIRE RESPONSE
193	CHAPLIN ES	NELSON	SCHOOL
194	COX'S CREEK ES	NELSON	SCHOOL
195	NEW HAVEN ES	NELSON	SCHOOL
196	OLD KENTUCKY HOME MS	NELSON	SCHOOL
197	BOSTON ES	NELSON	SCHOOL
199	NELSON COUNTY GOVENMENT	NELSON	GENERAL GOVENMENT
204	SAINT JOSEPH ELEMENTARY SCHOOL	NELSON	SCHOOL
205	BARDSTOWN ELEMENTARY SCHOOL	NELSON	SCHOOL
206	BARDSTOWN MIDDLE SCHOOL	NELSON	SCHOOL
207	NELSON COUNTY NATIONAL GUARD	NELSON	GENERAL GOVENMENT
208	NELSON COUNTY JUSTICE CENTER	NELSON	GENERAL GOVENMENT
248	FLAGET MEMORIAL HOSPITAL	NELSON	MEDICAL RESPONSE
259	ST. ANN ELEMENTARY SCHOOL	NELSON	SCHOOL
261	ST. CATHERINE TRI-PARISH SCHOOL	NELSON	SCHOOL
263	ST. GREGORY ELEMENTARY SCHOOL	NELSON	SCHOOL
264	COLONIAL HOUSE NURSING HOME	NELSON	SENIOR GROUP HOUSING
265	FEDERAL HILL MANOR NURSING HOME	NELSON	SENIOR GROUP HOUSING
266	WINDSOR GARDENS ASSISTED LIVING	NELSON	SENIOR GROUP HOUSING
279	BOSTON ES	NELSON	SCHOOL
283	NELSON COUNTY HEALTH DEPARTMENT	NELSON	MEDICAL RESPONSE
285	NELSON COUNTY EMS	NELSON	MEDICAL RESPONSE
294	THOMAS NELSON HIGH SCHOOL	NELSON	SCHOOL
302	FAIRFIELD CITY HALL	NELSON	GENERAL GOVENMENT
309	INDIAN HILLS	NELSON	WT
317	CLEARWELL TANK	NELSON	WT
324	KY 1604	NELSON	WT
328	245 TANK	NELSON	WT
329	WIRE LN	NELSON	WT
337	BALLTOWN TANK	NELSON	WT
339	CLEARWELL TANK	NELSON	WT
343	CHAPLIN	NELSON	WT
351	VITTITOW	NELSON	WT
352	EAST BARDSTOWN TANK	NELSON	WT
355	WELLER LOOP	NELSON	WT
357	BOTLAND TANK	NELSON	WT
365	LUTHERAN CHURCH RD	NELSON	WT
368	FAIRGROUNDS TANK	NELSON	WT
371	INDUSTRIAL PARK	NELSON	WT
374	WOODLAWN SPRINGS/INDUSTRIAL	NELSON	WT
382	HARDIN COUNTY TANK	NELSON	WT
385	CLEARWELL TANK	NELSON	WT
396	MURRAY'S RUN	NELSON	WT
398	CULVERTOWN	NELSON	WT

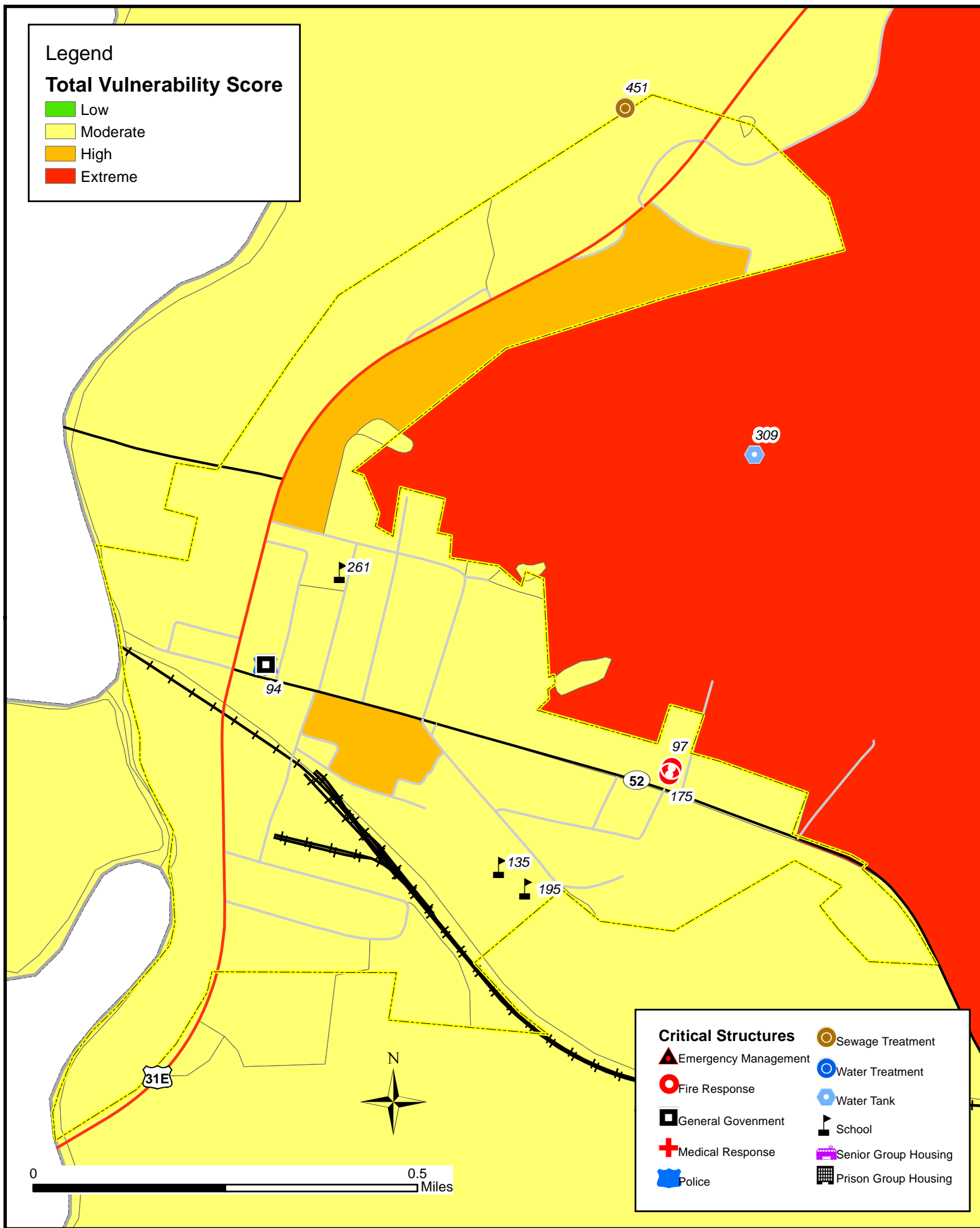
Nelson County (cont.)

399	HOWARDSTOWN TANK	NELSON	WT
407	BOSTON TANK	NELSON	WT
419	BLOOMFIELD	NELSON	WT
434	SYMPSON LAKE	NELSON	WTP
439	BARDSTOWN WWTP	NELSON	STP
451	NEW HAVEN WWTP	NELSON	STP
456	JERRY L RILEY WWTP	NELSON	STP



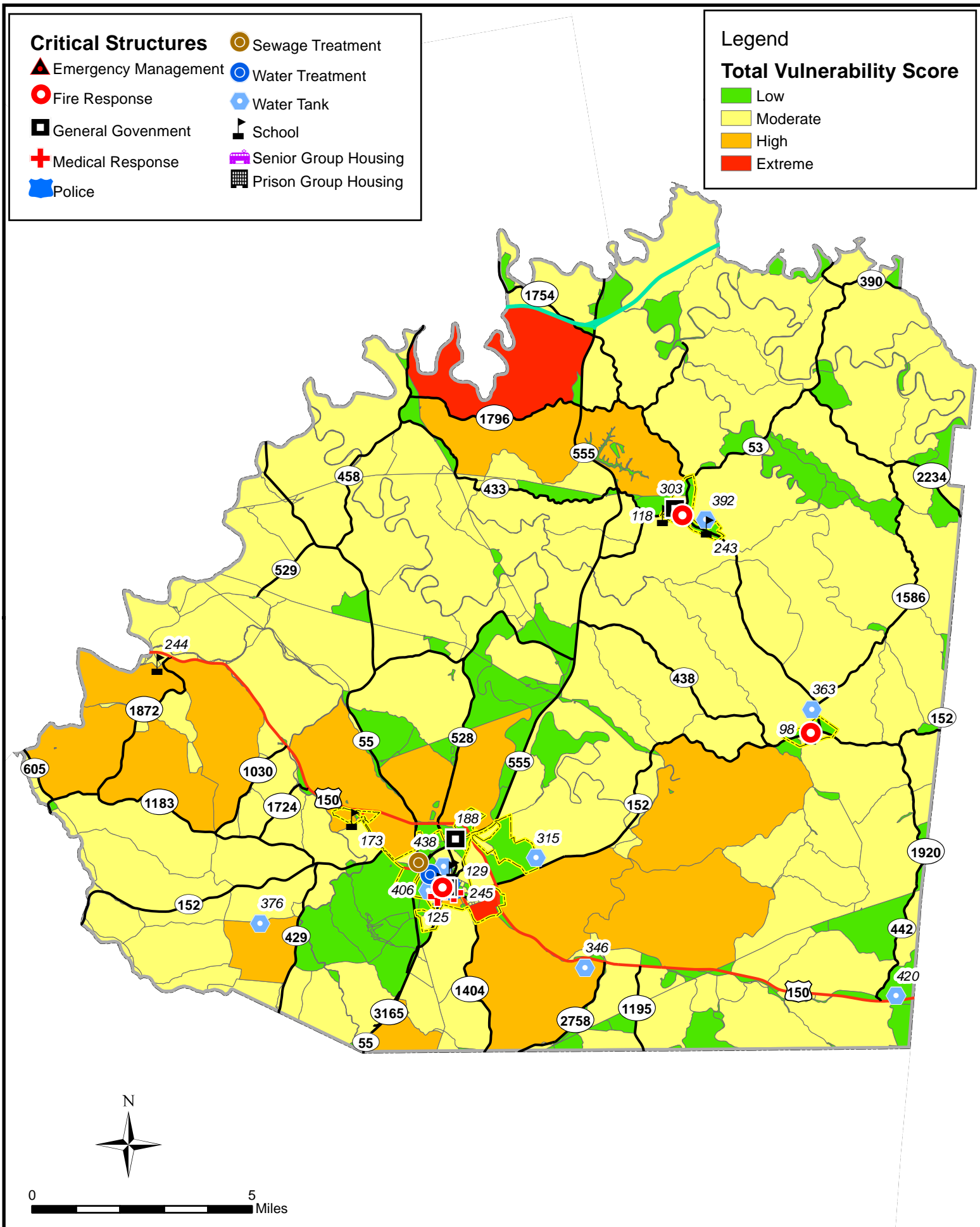


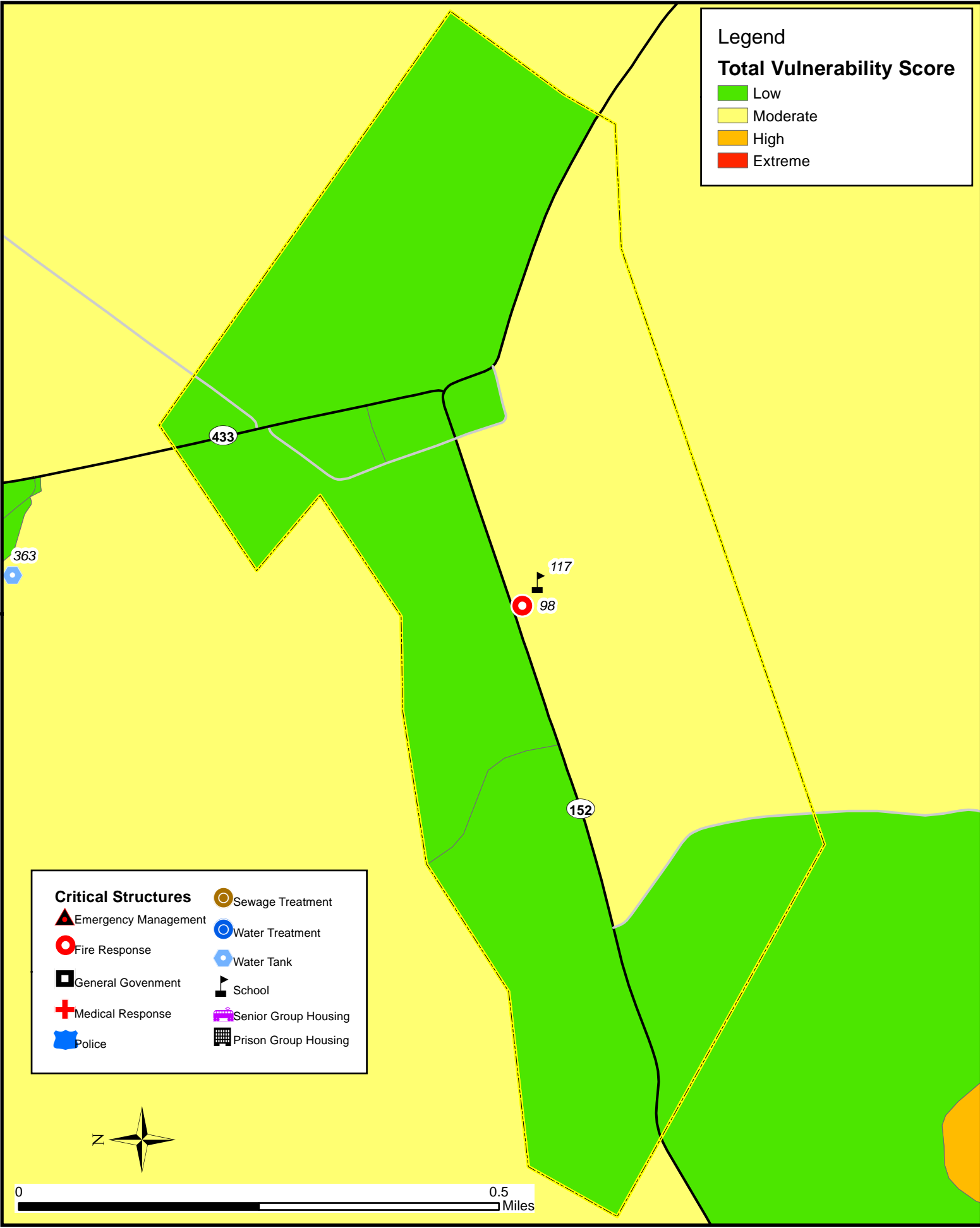


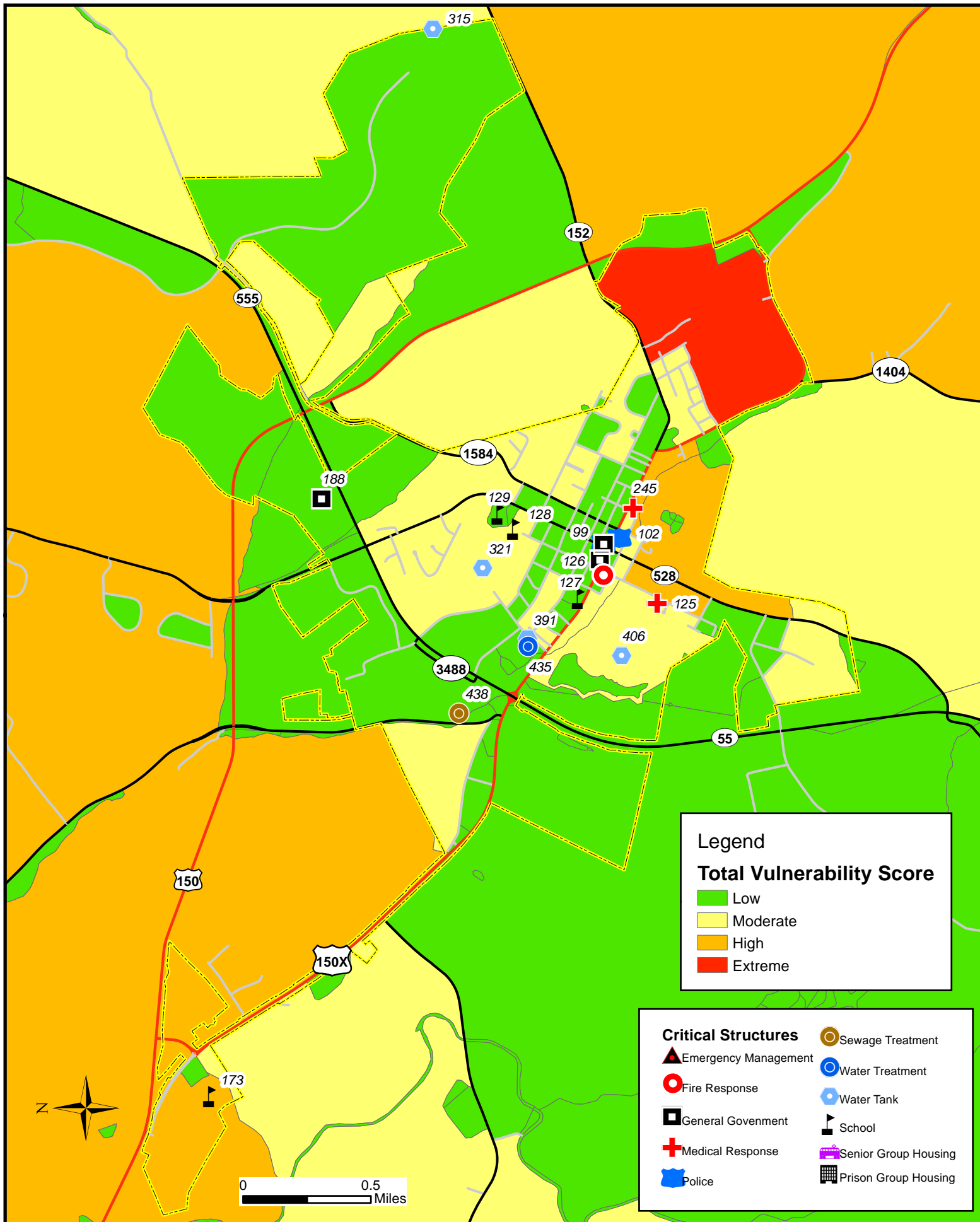


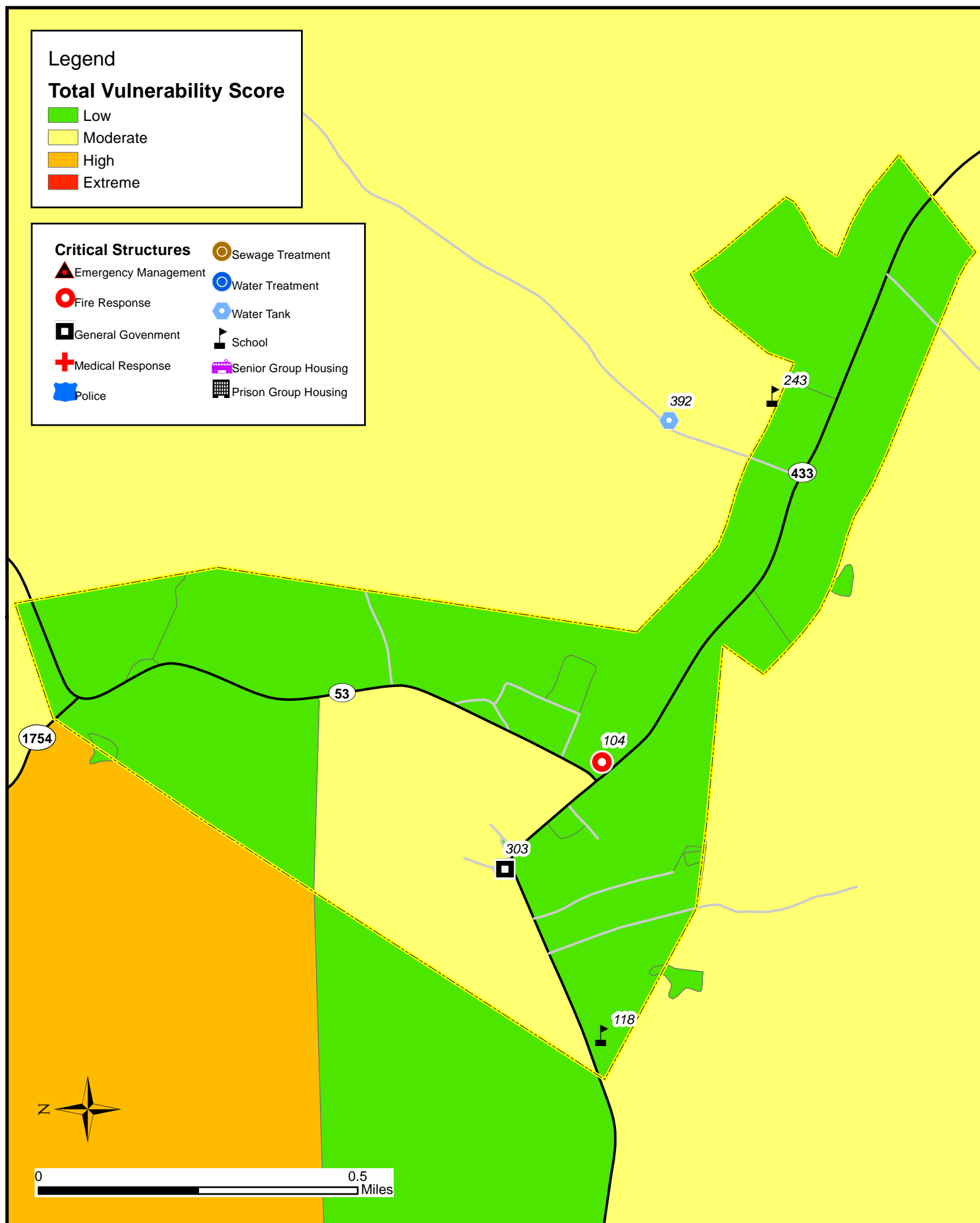
Washington County

98	MACKVILLE FIRE DEPT	WASHINGTON	FIRE RESPONSE
99	WASHINGTON COUNTY SHERIFF	WASHINGTON	POLICE
100	SPRINGFIELD FIRE DEPT	WASHINGTON	FIRE RESPONSE
101	WASHINGTON COUNTY FIRE DEPT	WASHINGTON	FIRE RESPONSE
102	SPRINGFIELD POLICE	WASHINGTON	POLICE
103	WASHINGTON COUNTY JAIL	WASHINGTON	PRISON GROUP HOUSING
104	WILLISBURG FIRE DEPT	WASHINGTON	FIRE RESPONSE
117	MACKVILLE ELEMENTARY SCHOOL	WASHINGTON	SCHOOL
118	CENTRAL KENTUCKY YOUTH ACADEMY	WASHINGTON	SCHOOL
125	WASHINGTON COUNTY EMS	WASHINGTON	MEDICAL RESPONSE
126	SPRINGFIELD CITY HALL	WASHINGTON	GENERAL GOVENMENT
127	ST. DOMINIC SCHOOL	WASHINGTON	SCHOOL
128	SPRINGFIELD ELEMENTARY SCHOOL	WASHINGTON	SCHOOL
129	WASHINGTON COUNTY HIGH SCHOOL	WASHINGTON	SCHOOL
173	ST. CATHERINE COLLEGE	WASHINGTON	SCHOOL
188	NATIONAL GUARD ARMORY	WASHINGTON	GENERAL GOVENMENT
212	WASHINGTON COUNTY COURTHOUSE	WASHINGTON	GENERAL GOVENMENT
243	NORTH WASHINGTON ELEMENTARY SCHOOL	WASHINGTON	SCHOOL
244	FREDERICKTOWN ELEMENTARY SCHOOL	WASHINGTON	SCHOOL
245	WASHINGTON COUNTY HEALTH OFFICE	WASHINGTON	MEDICAL RESPONSE
303	WILLSIBURG CITY HALL	WASHINGTON	GENERAL GOVENMENT
315	INDUSTRIAL PARK	WASHINGTON	WT
321	HIGH SCHOOL	WASHINGTON	WT
346	SIMMSTOWN	WASHINGTON	WT
363	MACKVILLE	WASHINGTON	WT
376	OLD ELIZABETH TOWN RD	WASHINGTON	WT
391	WTP TANK	WASHINGTON	WT
392	WILLISBURG	WASHINGTON	WT
406	ARMORY HILL	WASHINGTON	WT
420	WESLEY CHAPEL	WASHINGTON	WT
435	SPRINGFIELD	WASHINGTON	WTP
438	SPRINGFIELD WATER AND SEWER COMMISSION	WASHINGTON	STP









II. Loss Estimation: Potential and Actual Losses

Losses can be reviewed and evaluated in terms of actual past losses and potential future losses. They can include not only human life, physical structures, crops, etc. but also many other economic factors such as lost rents, wages and production. The overall lack of data pertaining to structures/assets and their values does not allow us to generate a comprehensive loss analysis. In order to evaluate and run scenarios on a “typical” disaster for a specific area and review the data on a micro level, this information would have to be converted into block or zip code level data.

Therefore the loss estimation will be based on past event losses and compiled at a higher level than might be desired. The economic and human costs are given for each of the six primary focus hazards and broken out by county with a regional summary. The averages for any particular event or year are assumed to be the estimated loss. The factor of population and economic growth over time, would cause the loss estimates to continue to rise without implementation of any mitigation measures. A review of the data available is contained in the following tables.

Potential losses takes into account the known values of structures in relation to their vulnerability to type and extent of a specific event.

The data in the tables below is gathered from numerous sources and defined as follows:

The structure sources for each county vary. LTADD maintains a critical structure GIS layer of various facilities including, EOC's, Police & Fire Stations, Government Buildings, Hospitals, Water and Wastewater Utility infrastructure, Schools, Airports, and many other miscellaneous buildings. In addition, LTADD has access to point structure data from many of the individual county's 911 systems. This includes Breckinridge, Hardin (partial), LaRue, Marion, Meade and Washington. The data was collected between 2008 and 2015, depending on the county. The LTADD staff also used GPS to map structures located in floodplains for Grayson, Hardin, Meade and Nelson Counties in 2010. All this data was compared against the landslide and flood plain polygon datasets in a GIS program to generate an approximate count of residences within each of the county's landslide and flood plain hazard areas. This data is used for estimate purposes only and should not be considered definitive or complete counts.

For consistency, Residential and Mobile Home facilities counts are based on US Census, American Community Survey 2013 5-year estimates for Total Housing Units. Data represents the total Housing Unit count minus the percentage figure of Mobile Homes to reach the values for each.

Replacement value for homes is from the US Census “Median value of owner-occupied housing units, 2009-2013” ACS data.

Replacement value for other features was not updated due to the lack of available information.

Table 3.3.4.8 - Current inventory of existing structures and their potential loss estimate by County/City

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Breckinridge County	Residential	7,610	\$82,700	\$629,347,000	302	\$24,975,400	230	\$19,021,000
Cloverport	Mobile Homes	2,982	\$23,464	\$69,969,648	9	\$211,176	52	\$1,220,128
Hardinsburg	Emergency Operations Center	1	\$100,000	\$100,000	0	\$0	0	\$0
Irvington	Radio Station or Transmitter	2	\$98,000	\$196,000	0	\$0	0	\$0
	Fire Station	9	\$500,000	\$4,500,000	1	\$500,000	0	\$0
	Police Station	4	\$1,372,000	\$5,488,000	1	\$1,372,000	0	\$0
	Government Building ¹	8	\$0	\$6,900,000	1	\$0	0	\$0
	Hospital	1	\$3,430,000	\$3,430,000	0	\$0	0	\$0
	Sewage Treatment Plant	3	\$62,268,000	\$186,804,000	0	\$0	0	\$0
	Water Treatment Plant	1	\$32,634,000	\$32,634,000	0	\$0	0	\$0
	Pumping Stations	6	\$75,000	\$450,000	0	\$33,750,000,000	0	\$0
	Wells	3	\$150,000	\$450,000	0	\$0	0	\$0
	Storage Tanks	12	\$750,000	\$9,000,000	0	\$0	0	\$0
	Schools	10	\$3,825,000	\$38,250,000	0	\$0	0	\$0
	Air Ports	1	\$10,651,000	\$10,651,000	0	\$0	0	\$0
	Natural Gas Facilities	1	\$1,068,200	\$1,068,200	0	\$0	0	\$0
	Power Plants/Oil Refineries	0	\$0	\$0	0	\$0	0	\$0
County Total		10,654	\$117,027,364	\$999,237,848	314	\$33,777,058,576	282	\$20,241,128

¹ Due to disparity in building sizes unit cost not available

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Grayson County	Residential ¹	10,380	\$87,700	\$910,326,000	65	\$5,700,500	1	0
Caneyville Clarkson Leitchfield	Mobile Homes	3,126	\$14,747	\$46,099,122	NA	0	NA	0
	Emergency Operations Center	1	\$100,000	\$100,000	0	0	0	0
	Radio Station or Transmitter	2	\$98,000	\$196,000	0	0	0	0
	Fire Station	8	\$500,000	\$4,000,000	0	0	0	0
	Police Station	4	\$1,372,000	\$5,488,000	0	0	0	0
	Government Building ²	7	\$0	\$6,900,000	0	0	0	0
	Hospital	1	\$6,860,000	\$6,860,000	0	0	0	0
	Sewage Treatment Plant	3	\$62,268,000	\$186,804,000	0	0	0	0
	Water Treatment Plant	2	\$32,634,000	\$65,268,000	0	0	0	0
	Pumping Stations	10	\$75,000	\$750,000	1	\$75,000	0	0
	Wells	0	\$150,000	\$0	0	0	0	0
	Storage Tanks	15	\$750,000	\$11,250,000	0	0	0	0
	Schools	8	\$7,883,000	\$63,064,000	0	0	0	0
	Air Ports	2	\$10,651,000	\$21,302,000	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	0	\$0	\$0	0	0	0	0
County Totals		13,569	\$123,443,447	\$1,328,407,122	66	\$5,775,500		

¹ Limited data. Only Floodplain structures are mapped.

² Due to disparity in building sizes unit cost not available

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Hardin County	Residential ¹	39,262	\$140,600	\$5,520,237,200	863	\$121,337,800	22	\$3,093,200
Elizabethtown Radcliff Sonora Upton Vine Grove West Point	Mobile Homes ²	4,949	\$17,519	\$86,701,531	101	\$1,769,419	NA	0
	Emergency Operations Center	3	\$100,000	\$300,000	0	0	0	0
	Radio Station or Transmitter	8	\$98,000	\$784,000	0	0	0	0
	Fire Station	19	\$500,000	\$9,500,000	1	\$500,000	0	0
	Police Station	5	\$1,372,000	\$6,860,000	2	\$2,744,000	0	0
	Government Building*	14	\$0	\$15,100,000	2	\$0	0	0
	Hospital	2	\$10,290,000	\$20,580,000	0	0	0	0
	Sewage Treatment Plant	6	\$62,268,000	\$373,608,000	2	\$124,536,000	0	0
	Water Treatment Plant	4	\$32,634,000	\$130,536,000	2	\$65,268,000	0	0
	Pumping Stations	14	\$75,000	\$1,050,000	0	\$0	0	0
	Wells	2	\$150,000	\$300,000	2	\$300,000	0	0
	Storage Tanks	26	\$750,000	\$19,500,000	1	\$750,000	0	0
	Schools	39	\$6,441,000	\$251,199,000	0	\$0	0	0
	Air Ports	2	\$10,651,000	\$21,302,000	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	1	\$98,000	\$98,000	0	0	0	0
County Total		44,356	\$125,585,119	\$6,457,655,731	976	\$317,205,219	22	\$3,093,200

¹ Residential Structure mapping data for Cities of Elizabethtown & Radcliff not available.

² Mobile Home in Flood Plain and Landslide Areas is not updated.

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
LaRue County	Residential	5,317	\$101,000	\$537,017,000	78	\$7,878,000	7	\$707,000
Hodgenville	Mobile Homes ¹	881	\$21,414	\$18,865,734	NA	0	NA	0
	Emergency Operations Center	1	\$100,000	\$100,000	0	0	0	0
	Radio Station or Transmitter	1	\$98,000	\$98,000	0	0	0	0
	Fire Station	4	\$500,000	\$2,000,000	1	\$500,000	0	0
	Police Station	2	\$1,372,000	\$2,744,000	0	0	0	0
	Government Building ²	4	\$0	\$3,500,000	0	0	0	0
	Hospital	0	\$0	\$0	0	0	0	0
	Sewage Treatment Plant	1	\$62,268,000	\$62,268,000	1	\$62,268,000	0	0
	Water Treatment Plant	1	\$32,634,000	\$32,634,000	1	\$32,634,000	0	0
	Pumping Stations	7	\$75,000	\$525,000	0	\$0	0	0
	Wells	0	\$0	\$0	0	0	0	0
	Storage Tanks	11	\$750,000	\$8,250,000	0	0	0	0
	Schools	6	\$4,806,000	\$28,836,000	0	0	0	0
	Air Ports	0	\$0	\$0	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	1	\$107,800,000	\$107,800,000	0	0	0	0
County Totals		6,236	\$210,525,414	\$804,637,734	81	\$103,280,000	7	\$707,000

¹ Mobile Home in Flood Plain and Landslide Areas is not updated.

² Due to disparity in building sizes unit cost not available

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Marion County	Residential	7,141	\$100,200	\$715,528,200	185	0	19	0
Bradfordsville Lebanon Loretto Raywick	Mobile Homes	1,023	\$13,827	\$14,145,021	NA	0	1	0
	Emergency Operations Center	1	\$100,000	\$100,000	0	0	0	0
	Radio Station or Transmitter	2	\$98,000	\$196,000	0	0	0	0
	Fire Station	6	\$500,000	\$3,000,000	0	0	0	0
	Police Station	2	\$1,372,000	\$2,744,000	0	0	0	0
	Government Building ²	12	\$0	\$12,100,000	0	0	0	0
	Hospital	1	\$6,860,000	\$6,860,000	0	0	0	0
	Sewage Treatment Plant	2	\$62,268,000	\$124,536,000	1	\$62,268,000	0	0
	Water Treatment Plant	1	\$32,634,000	\$32,634,000	1	\$32,634,000	0	0
	Pumping Stations	4	\$75,000	\$300,000	0	\$0	0	0
	Wells	0	\$0	\$0	0	0	0	0
	Storage Tanks	11	\$750,000	\$8,250,000	0	0	0	0
	Schools	9	\$5,706,000	\$51,354,000	0	0	0	0
	Air Ports	0	\$0	\$0	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	0	\$0	\$0	0	0	0	0
County Total		8,215	\$110,477,027	\$971,747,221	187	\$94,902,000	0	0

1 Mobile Home in Flood Plain is not updated.

2 Due to disparity in building sizes unit cost not available

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Meade County	Residential	9,714	\$120,500	\$1,170,537,000	141	\$16,990,500	39	0
Brandenburg Ekron Muldraugh	Mobile Homes	2,177	\$11,776	\$25,636,352	3	0	1	0
	Emergency Operations Center	1	\$100,000	\$100,000	0	0	0	0
	Radio Station or Transmitter	2	\$98,000	\$196,000	0	0	0	0
	Fire Station	8	\$500,000	\$4,000,000	1	0	0	0
	Police Station	3	\$1,372,000	\$4,116,000	0	0	0	0
	Government Building ¹	7	\$0	\$6,900,000	0	0	0	0
	Hospital	0	\$0	\$0	0	0	0	0
	Sewage Treatment Plant	3	\$62,268,000	\$186,804,000	0	0	0	0
	Water Treatment Plant	1	\$32,634,000	\$32,634,000	0	\$0	0	0
	Pumping Stations	7	\$75,000	\$525,000	0	\$0	0	\$0
	Wells	3	\$150,000	\$450,000	3	\$450,000	0	0
	Storage Tanks	8	\$750,000	\$6,000,000	0	0	0	\$0
	Schools	9	\$7,409,000	\$66,681,000	0	0	0	0
	Air Ports	0	\$0	\$0	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	1	\$107,800,000	\$107,800,000	0	0	0	0
County Total		11,944	\$213,288,276	\$1,612,379,352	148	\$17,440,500	40	\$0

¹ Due to disparity in building sizes unit cost not available

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Nelson County	Residential ¹	16,627	\$124,500	\$2,070,061,500	92	\$11,454,000	0	0
Bardstown	Mobile Homes	1,562	\$17,519	\$27,364,678	NA	0	NA	0
Bloomfield	Emergency Operations Center	1	\$100,000	\$100,000	0	0	0	0
Fairfield	Radio Station or Transmitter	1	\$98,000	\$98,000	0	0	0	0
New Haven	Fire Station	7	\$500,000	\$3,500,000	1	0	0	0
	Police Station	4	\$1,372,000	\$5,488,000	2	0	0	0
	Government Building ²	11	\$0	\$15,300,000	1	\$0	0	0
	Hospital	1	\$6,860,000	\$6,860,000	0	0	0	0
	Sewage Treatment Plant	4	\$62,268,000	\$249,072,000	1	\$62,268,000	0	0
	Water Treatment Plant	1	\$32,634,000	\$32,634,000	0	0	0	0
	Pumping Stations	13	\$75,000	\$975,000	1	\$75,000	0	\$0
	Wells	0	\$150,000	\$0	0	0	0	0
	Storage Tanks	22	\$750,000	\$16,500,000	0	0	2	\$1,500,000
	Schools	19	\$5,674,000	\$107,806,000	0	0	0	0
	Air Ports	1	\$10,651,000	\$10,651,000	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	0	\$0	\$0	0	0	0	0
County Total		18,274	\$121,274,019	\$2,546,410,178	98	\$73,797,000	2	\$1,500,000

¹ Limited data. Only Floodplain structures are mapped.

² Due to disparity in building sizes unit cost not available

Jurisdiction	Type of Facility	# of Existing Structures	Estimated Replacement Value Per Unit	Total Potential Loss	# of Existing Structures in Floodplain	Potential Loss in Floodplain	# of Existing Structures in Landslide Prone Area	Potential Loss in Landslide Prone Area
Washington County	Residential	4,243	\$107,300	\$455,273,900	87	\$9,335,100	10	\$1,073,000
Mackville Springfield Willisburg	Mobile Homes	791	\$13,827	\$10,937,157	19	\$262,713	3	\$41,481
	Emergency Operations Center	1	\$100,000	\$100,000	0	0	0	0
	Radio Station or Transmitter	0	\$98,000	\$0	0	0	0	0
	Fire Station	4	\$500,000	\$2,000,000	0	0	0	0
	Police Station	2	\$1,372,000	\$2,744,000	0	0	0	0
	Government Building ¹	6	\$0	\$8,500,000	0	0	0	0
	Hospital	0	\$0	\$0	0	0	0	0
	Sewage Treatment Plant	1	\$62,268,000	\$62,268,000	0	0	0	0
	Water Treatment Plant	1	\$32,634,000	\$32,634,000	0	0	0	0
	Pumping Stations	5	\$75,000	\$375,000	1	\$75,000	0	0
	Wells	0	\$0	\$0	0	0	0	0
	Storage Tanks	9	\$750,000	\$6,750,000	0	0	0	0
	Schools	7	\$4,392,000	\$30,744,000	0	0	0	0
	Air Ports	1	\$10,651,000	\$10,651,000	0	0	0	0
	Natural Gas Facilities	0	\$0	\$0	0	0	0	0
	Power Plants/Oil Refineries	0	\$0	\$0	0	0	0	0
County Total		5,071	\$112,961,127	\$622,977,057	107	\$9,672,813	13	\$1,114,481

¹ Due to disparity in building sizes unit cost not available

Table 3.3.4.9 - Actual Losses Based on Past Events

THUNDERSTORMS WINDS	Total Cost	Number Events	Number Years	Total Loss of Life	Total Injuries	Average Cost Per Year	Average Cost Per Event	Average Loss of Life Per Year	Average Loss of Life Per Event	Average Injuries Per Year	Average Injuries Per Event
BRECKINRIDGE	\$1,211,803	206	54.5	0.25	2.21	\$22,235	\$5,883	0.00	0.00	0.04	0.01
GRAYSON	\$1,215,287	196	56.5	0.25	6.62	\$21,510	\$6,200	0.00	0.00	0.12	0.03
HARDIN	\$64,735,949	300	58.5	4.45	133.17	\$1,106,597	\$215,786	0.08	0.01	2.28	0.44
LARUE	\$1,509,787	193	54.5	1.32	11.6	\$27,703	\$7,823	0.02	0.01	0.21	0.06
MARION	\$1,247,735	180	54.5	0.24	1.63	\$22,894	\$6,932	0.00	0.00	0.03	0.01
MEADE	\$1,679,733	208	55.5	3.45	46.26	\$30,265	\$8,076	0.06	0.02	0.83	0.22
NELSON	\$1,404,130	228	54.5	0.3	12.58	\$25,764	\$6,158	0.01	0.00	0.23	0.06
WASHINGTON	\$1,453,572	168	54.5	0.22	3.58	\$26,671	\$8,652	0.00	0.00	0.07	0.02
LTADD	\$74,457,996	1679	58.5	10.48	217.65	\$1,272,786	\$44,347	0.18	0.01	3.72	0.13
FLOODS	Total Cost	Number Events	Number Years	Total Loss of Life	Total Injuries	Average Cost Per Year	Average Cost Per Event	Average Loss of Life Per Year	Average Loss of Life Per Event	Average Injuries Per Year	Average Injuries Per Event
BRECKINRIDGE	\$7,801,684	53	48.5	2.09	0.11	\$160,859	\$147,202	0.04	0.04	0.00	0.00
GRAYSON	\$8,185,065	46	48.5	0.04	0.11	\$168,764	\$177,936	0.00	0.00	0.00	0.00
HARDIN	\$47,893,889	69	48.5	2.17	0.11	\$987,503	\$694,114	0.04	0.03	0.00	0.00
LARUE	\$8,067,971	37	48.5	0.17	0.11	\$166,350	\$218,053	0.00	0.00	0.00	0.00
MARION	\$9,740,835	44	48.5	0.31	2.54	\$200,842	\$221,383	0.01	0.01	0.05	0.06
MEADE	\$7,284,005	42	48.5	1.14	0.11	\$150,186	\$173,429	0.02	0.03	0.00	0.00
NELSON	\$35,033,005	93	48.5	3.17	2.11	\$722,330	\$376,699	0.07	0.03	0.04	0.02
WASHINGTON	\$8,984,658	39	48.5	0.17	0.11	\$185,251	\$230,376	0.00	0.00	0.00	0.00
LTADD	\$132,991,112	423	48.5	9.26	5.31	\$2,742,085	\$314,400	0.19	0.02	0.11	0.01
HAIL	Total Cost	Number Events	Number Years	Total Loss of Life	Total Injuries	Average Cost Per Year	Average Cost Per Event	Average Loss of Life Per Year	Average Loss of Life Per Event	Average Injuries Per Year	Average Injuries Per Event
BRECKINRIDGE	\$4,925,750	77	51.5	0.01	0.52	\$95,646	\$63,971	0.00	0.00	0.01	0.01
GRAYSON	\$2,438,935	84	50.5	0.01	0.5	\$48,296	\$29,035	0.00	0.00	0.01	0.01
HARDIN	\$26,768,252	95	51.5	0.01	0.52	\$519,772	\$281,771	0.00	0.00	0.01	0.01
LARUE	\$1,969,355	59	58.5	0.06	0.56	\$33,664	\$33,379	0.00	0.00	0.01	0.01
MARION	\$35,497,179	58	53.5	0.06	2.56	\$663,499	\$612,020	0.00	0.00	0.05	0.04
MEADE	\$25,032,572	68	59.5	0.01	2.52	\$420,715	\$368,126	0.00	0.00	0.04	0.04
NELSON	\$22,857,556	71	53.5	0.06	1.56	\$427,244	\$321,937	0.00	0.00	0.03	0.02
WASHINGTON	\$10,875,034	51	53.5	0.06	3.56	\$203,272	\$213,236	0.00	0.00	0.07	0.07
LTADD	\$130,364,632	563	59.5	0.28	12.3	\$2,191,002	\$231,554	0.00	0.00	0.21	0.02

Table 3.3.4.9 - Actual Losses Based on Past Events (cont.)

LIGHTNING	Total Cost	Number Events	Number Years	Total Loss of Life	Total Injuries	Average Cost Per Year	Average Cost Per Event	Average Loss of Life Per Year	Average Loss of Life Per Event	Average Injuries Per Year	Average Injuries Per Event
BRECKINRIDGE	\$289,285	25	54.5	0.04	0.36	\$5,308	\$11,571	0.00	0.00	0.01	0.01
GRAYSON	\$423,574	31	54.5	0.04	2.36	\$7,772	\$13,664	0.00	0.00	0.04	0.08
HARDIN	\$869,962	34	54.5	1.11	2.36	\$15,963	\$25,587	0.02	0.03	0.04	0.07
LARUE	\$61,022	33	54.5	0	0	\$1,120	\$1,849	0.00	0.00	0.00	0.00
MARION	\$154,253	35	54.5	0.14	0.39	\$2,830	\$4,407	0.00	0.00	0.01	0.01
MEADE	\$129,715	28	54.5	0	0	\$2,380	\$4,633	0.00	0.00	0.00	0.00
NELSON	\$907,717	41	54.5	2.12	2.34	\$16,655	\$22,139	0.04	0.05	0.04	0.06
WASHINGTON	\$223,179	36	54.5	0.12	0.34	\$4,095	\$6,199	0.00	0.00	0.01	0.01
LTADD	\$3,058,707	263	54.5	3.57	8.15	\$56,123	\$11,630	0.07	0.01	0.15	0.03
SNOW & ICE	Total Cost	Number Events	Number Years	Total Loss of Life	Total Injuries	Average Cost Per Year	Average Cost Per Event	Average Loss of Life Per Year	Average Loss of Life Per Event	Average Injuries Per Year	Average Injuries Per Event
BRECKINRIDGE	\$1,411,082	40	54.5	0.31	1.83	\$25,891	\$35,277	0.01	0.01	0.03	0.05
GRAYSON	\$1,981,398	42	54.5	0.29	3.41	\$36,356	\$47,176	0.01	0.01	0.06	0.08
HARDIN	\$2,792,155	45	54.5	0.29	3.47	\$51,232	\$62,048	0.01	0.01	0.06	0.08
LARUE	\$1,050,662	38	54.5	0.29	3.36	\$19,278	\$27,649	0.01	0.01	0.06	0.09
MARION	\$2,681,555	32	54.5	0.29	3.36	\$49,203	\$83,799	0.01	0.01	0.06	0.11
MEADE	\$1,420,840	40	54.5	0.29	1.81	\$26,070	\$35,521	0.01	0.01	0.03	0.05
NELSON	\$2,307,155	41	54.5	1.29	3.47	\$42,333	\$56,272	0.02	0.03	0.06	0.08
WASHINGTON	\$2,697,743	42	54.5	0.37	3.48	\$49,500	\$64,232	0.01	0.01	0.06	0.08
LTADD	\$16,342,589	320	54.5	3.42	24.19	\$299,864	\$51,071	0.06	0.01	0.44	0.08
TORNADOS	Total Cost	Number Events	Number Years	Total Loss of Life	Total Injuries	Average Cost Per Year	Average Cost Per Event	Average Loss of Life Per Year	Average Loss of Life Per Event	Average Injuries Per Year	Average Injuries Per Event
BRECKINRIDGE	\$5,185,260	16	54.5	1.09	20.00	\$95,142	\$324,079	0.02	0.07	0.37	1.25
GRAYSON	\$56,483,213	15	55.5	3.00	23.09	\$1,017,716	\$3,765,548	0.05	0.20	0.42	1.54
HARDIN	\$16,118,723	24	54.5	2.00	73.09	\$295,756	\$671,613	0.04	0.08	1.34	3.05
LARUE	\$5,110,111	11	62.5	0.00	19.12	\$81,762	\$464,556	0.00	0.00	0.31	1.74
MARION	\$735,833	11	54.5	0.00	4.15	\$13,502	\$66,894	0.00	0.00	0.08	0.38
MEADE	\$6,142,325	12	54.5	31.00	267.09	\$112,703	\$511,860	0.57	2.58	4.90	22.26
NELSON	\$2,033,978	13	54.5	1.00	28.15	\$37,321	\$156,460	0.02	0.08	0.52	2.17
WASHINGTON	\$1,840,007	11	54.5	0.00	5.15	\$33,762	\$167,273	0.00	0.00	0.09	0.47
LTADD	\$93,649,450	113	56	38.09	439.84	\$1,683,586	\$828,756	0.68	0.34	7.91	3.89

NOTE: The historic frequency of a hazard event over a given period of time determines the historic recurrence interval. For example: If there have been 10 Thunderstorm events in the County in the past 5 years, statistically you could expect that there will be 2 events a year.

Realize that from a statistical standpoint, there are several variables to consider. 1) Accurate hazard history data and collection are crucial to an accurate recurrence interval and frequency. 2) Data collection and accuracy has been much better in the past 10-20 years (NCDC weather records). 3) It is important to include all significant recorded hazard events which will include periodic updates to this table.

By updating and reviewing this table over time, it may be possible to see if certain types of hazard events are increasing in the past 10-20 years.

These values should be considered low. More events that have occurred than are documented by the sources used in this table.

All data is compiled at the county level due to extremely limited city specific data, therefore all data and analysis represents incorporated and unincorporated areas inclusively.

Compilation of SHELATUS, NCDC & NCEI. 1967- June 30 2015.

Chart 3.3.4.4 - Lincoln Trail Region - Average Cost Per Year by Event

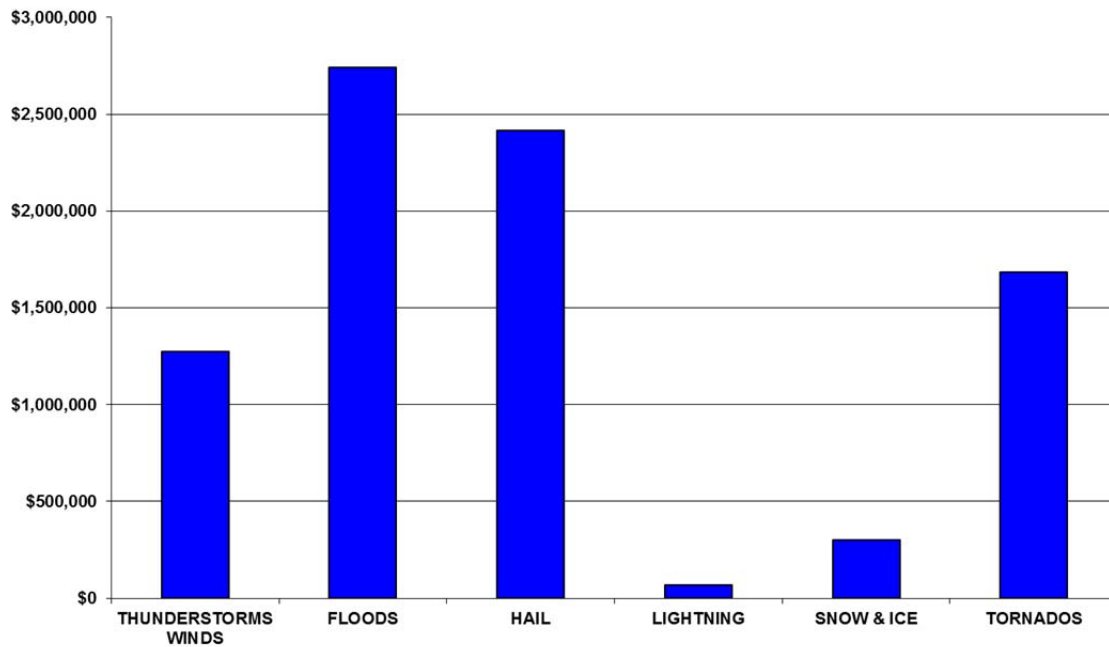


Chart 3.3.4.5 - Lincoln Trail Region - Average Cost Per Event

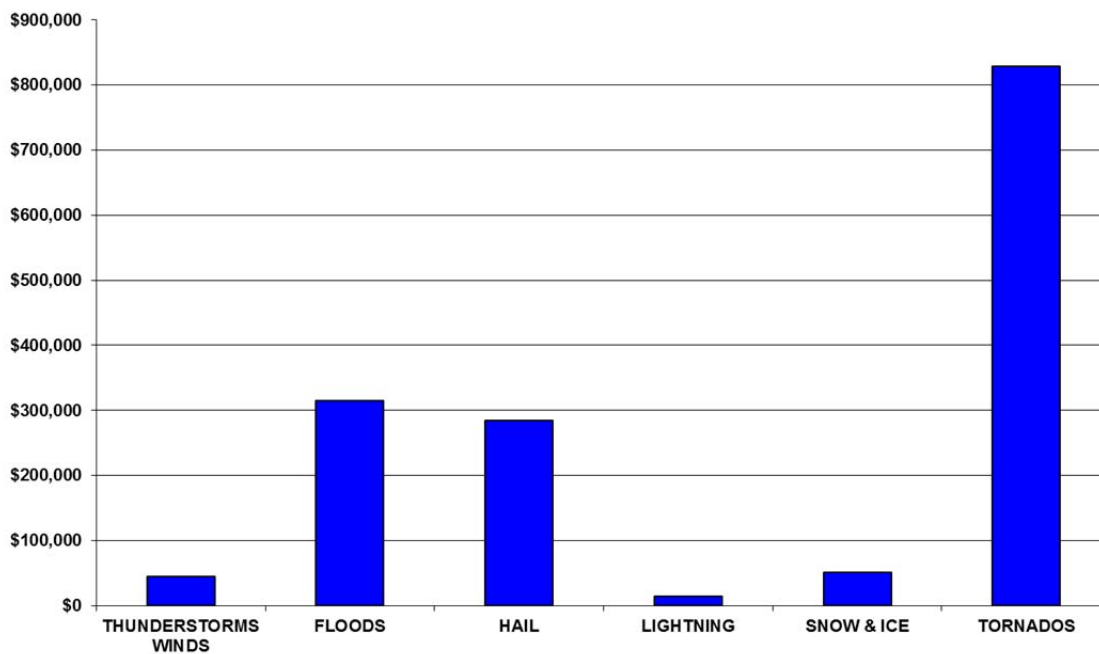


Chart 3.3.4.6 - Lincoln Trail Region - Average Loss of Life Per Year

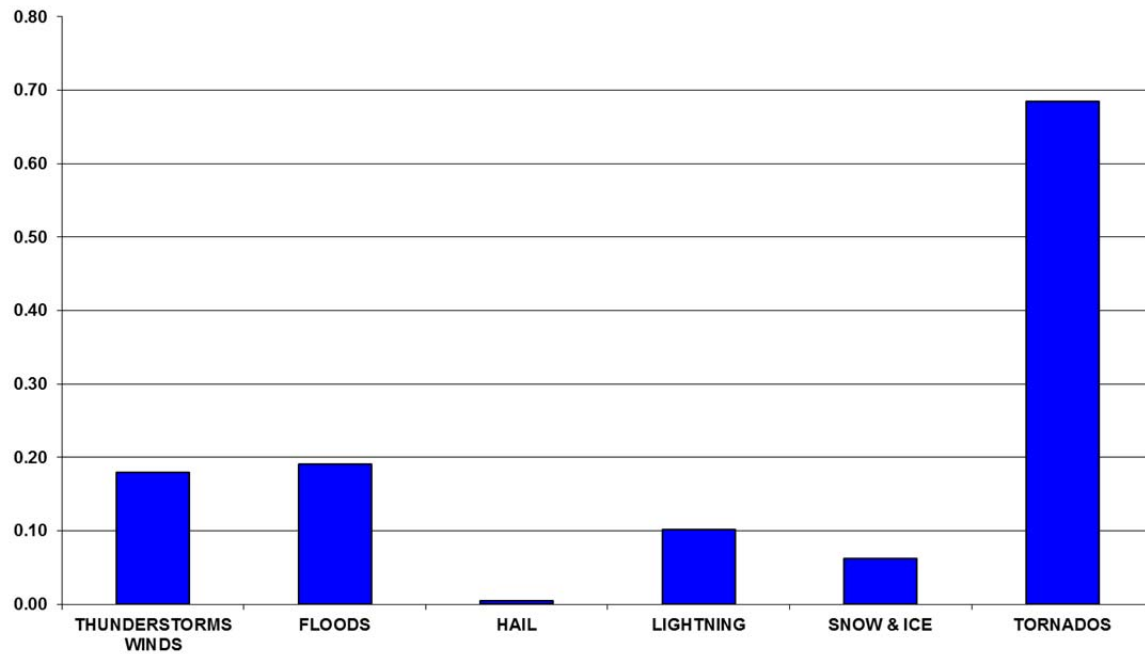


Chart 3.3.4.7 - Lincoln Trail Region - Average Injuries Per Year

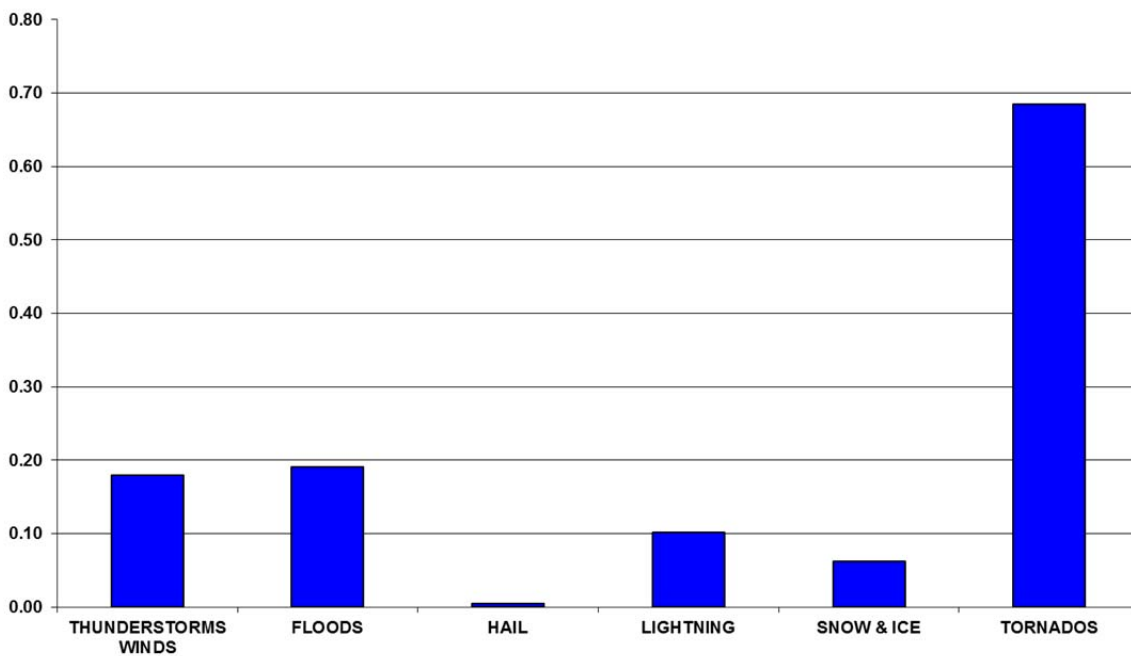


Chart 3.3.4.8 - Lincoln Trail Region – Total Events of Documented Period

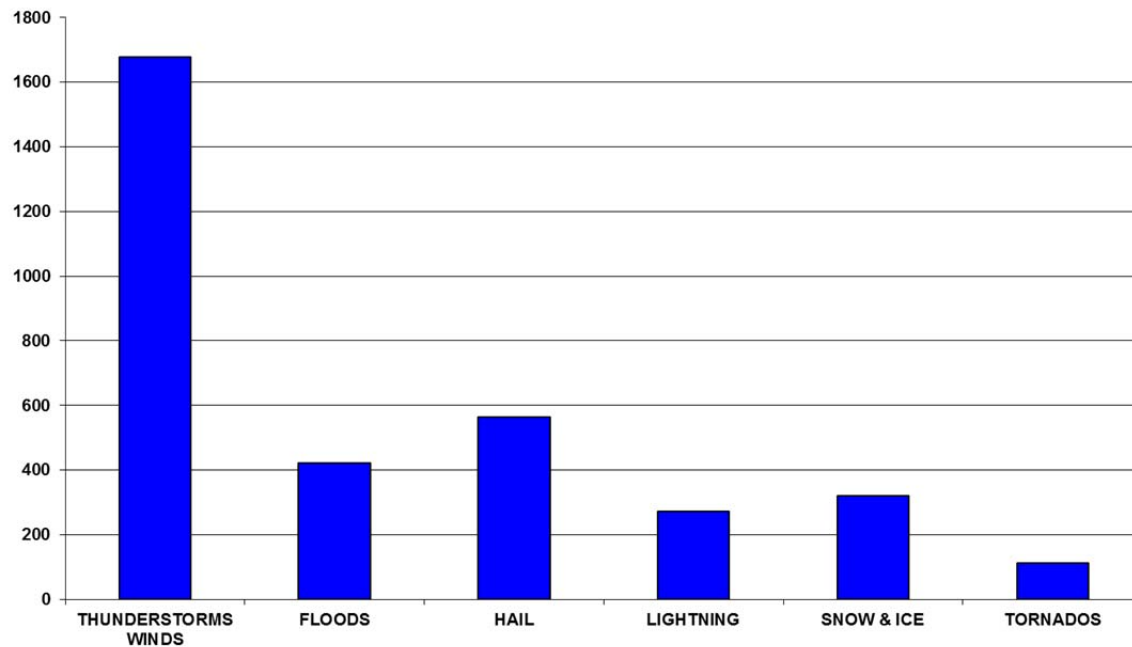
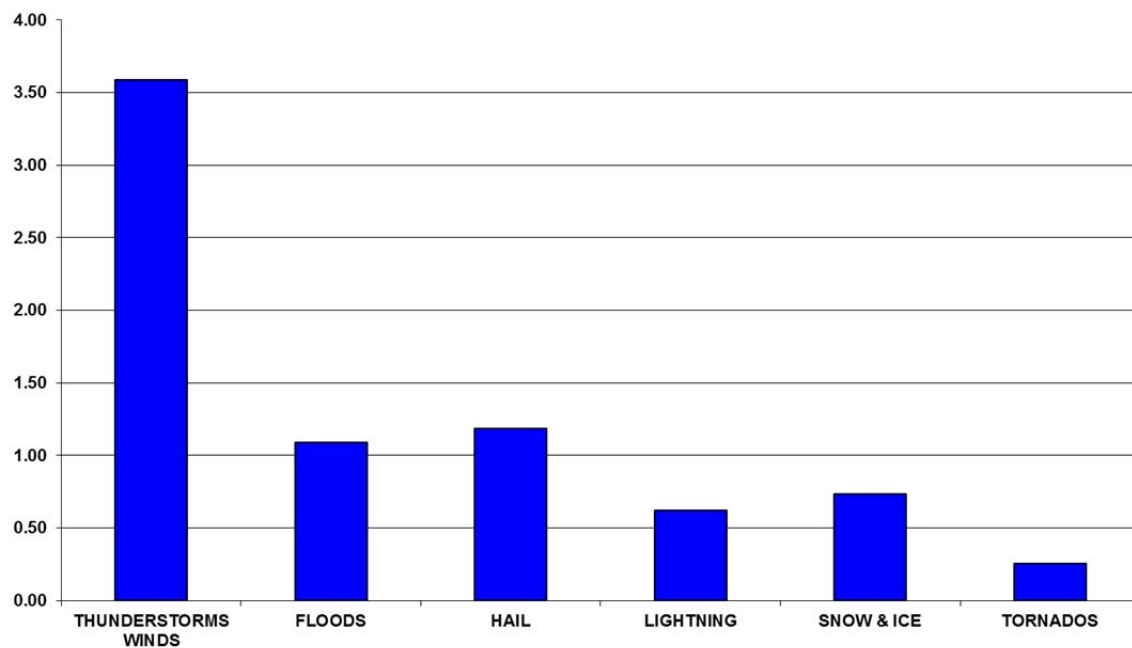


Chart 3.3.4.9 - Lincoln Trail Region – Average Events Per Year



3.3.5 Assessing Vulnerability: Analyzing Develop Trends

Population Growth

The Kentucky State Data Center at the University of Louisville, projects population growth based on the most recent 2010 census data. Table 3.3.5.1 illustrates the population growth for each of the eight counties in the Lincoln Trail Region as well as the entire region. Population figures for 2010 are actual census figures.

Every county within the region is expected to grow over the next fifteen years. Nelson County is expected to see the largest percentage increase of 29.63%, while the entire region sees a population increase of 21.11%.

Tracking population growth offers the region the opportunity to assess how efficiently its first response and preparedness capabilities will effectively serve the population.

Table 3.3.5.1 Population Growth Projections for the Lincoln Trail Region						
Jurisdiction	2010 (census)	2015	2020	2025	2030	Projected Gain
Breckinridge Co.	20,059	20,819	21,489	22,065	22,485	12.09%
Grayson Co.	25,746	26,476	27,048	27,465	27,703	07.60%
Hardin Co.	105,543	111,225	116,612	121,541	125,896	19.28%
LaRue Co.	14,193	14,596	14,961	15,265	15,512	09.29%
Marion Co.	19,820	20,637	21,424	22,152	22,757	14.82%
Meade Co.	28,602	29,819	30,901	31,801	32,481	13.56%
Nelson Co.	43,437	46,791	50,119	53,337	56,309	29.63%
Washington Co.	11,717	12,118	12,486	12,813	13,086	11.68%
LTADD Region	261,117	282,481	295,040	306,439	316,231	21.11%
<i>Source: Kentucky State Data Center, University of Louisville, 2011</i>						

Housing

In addition to an increase in population, each county in the Lincoln Trail Region has realized an increase in housing units and number of households. With these increases, each county must assess its level of resiliency and preparedness to meet the needs and responsibility of additional residents and property. Table 3.3.5.2 summarizes the population, number of households and number of housing units in each county in 2000. Table 3.3.5.3 immediately below it, shows the number of households and housing units in each county in 2010, and the increase over the 2000 census data.

Table 3.3.5.2 - Households and Housing Units in Lincoln Trail Region - 2000			
County	Population	Housing Units	Households
Breckinridge	18,648	9,890	7,324
Grayson	24,053	12,802	9,596
Hardin	94,174	37,673	34,497
LaRue	13,373	5,860	5,275
Marion	18,212	7,277	6,613
Meade	26,349	10,293	9,470
Nelson	37,477	14,934	13,953
Washington	10,916	4,542	4,121
<i>Source: U.S. Census Bureau – 2000 Census</i>			

Table 3.3.5.3 - Households and Households in the Lincoln Trail Region - 2010				
County	Housing Units	% change from 2000 to 2010	Households	% change from 2000 to 2010
Breckinridge	10,592	+7.10%	7,213	-1.52%
Grayson	13,506	+5.50%	9,897	+3.13%
Hardin	44,211	+17.35%	39,401	+14.22%
LaRue	6,198	+5.77%	5,221	-1.02%
Marion	8,164	+12.19%	7,368	+11.42%
Meade	11,891	+15.53%	10,342	+9.21%
Nelson	18,189	+21.80%	16,571	+18.76%
Washington	5,034	+10.90%	4,480	+8.71%
<i>Source: U.S. Census Bureau – 2010 Census</i>				

Housing Growth

Table 3.3.5.4 shows data from the U.S. Census Bureau database concerning new, privately-owned, residential building permits reported by each of the eight counties in the Lincoln Trail Region. Most counties have seen a significant decline in residential construction, due in part, to the decline in the economy and the reduction of troops and programs at Fort Knox.

Table 3.3.5.4 - Residential Building Permits						
Jurisdiction	2004	2006	2008	2010	2012	2014
Residence Type						
Breckinridge Co.						
Single Family	18	12	10	4	5	2
Two Family	1	0	0	1	0	0
Three/Four Family	0	0	0	0	0	0
Five/More Family	2	0	0	0	0	0
Total	21	12	10	5	5	2

Grayson Co.						
Single Family	0	0	0	4	3	1
Two Family	0	0	0	7	2	0
Three/Four Family	1	0	1	1	1	1
Five/More Family	0	0	0	0	0	0
Total	1	0	1	12	6	2
Hardin Co.						
Single Family	904	804	378	674	248	188
Two Family	14	30	24	12	0	5
Three/Four Family	5	26	18	3	16	0
Five/More Family	13	12	13	25	9	19
Total	936	872	433	714	273	212
LaRue Co.						
Single Family	83	55	25	33	35	29
Two Family	5	1	0	0	3	7
Three/Four Family	0	0	0	0	0	0
Five/More Family	0	0	0	0	0	0
Total	88	56	25	33	38	36
Marion Co.						
Single Family	14	5	7	6	8	9
Two Family	0	1	1	0	1	0
Three/Four Family	0	0	0	1	1	1
Five/More Family	1	0	0	0	0	0
Total	15	6	8	7	10	10
Meade Co.						
Single Family	133	142	100	135	75	75
Two Family	6	2	5	2	3	3
Three/Four Family	1	3	4	4	1	1
Five/More Family	0	0	4	4	0	0
Total	140	147	113	145	79	79
Nelson Co.						
Single Family	406	325	180	146	112	168
Two Family	5	0	0	0	0	3
Three/Four Family	4	3	0	0	0	5
Five/More Family	1	0	3	0	0	0
Total	416	328	183	146	112	176
Washington Co.						
Single Family	5	6	3	2	1	1
Two Family	0	1	0	0	4	5
Three/Four Family	0	0	0	0	0	0
Five/More Family	0	0	0	0	2	2
Total	5	7	3	2	7	8
<i>Source: U.S. Bureau of the Census</i>						

Land Use

There has been no significant change in land use within the Lincoln Trail Region over the last five years. The growth areas of Hardin and Nelson Counties have continued to realize some population growth, and several counties have completed work on highway bypass projects. However, the region still remains largely rural in nature and has a strong agricultural presence. According to the U.S. Department of Agriculture's Natural Agriculture Statistics Services (NASS), there were 1,390,229 acres of farmland in the Region in 2012. Of that acreage, approximately 48.94% was used for cropland, 5.20% for other purposes, 24.06% as pastureland, and 21.46% was woodland.

The economic impact of agricultural activities in the region is significant. In 2012, NASS estimated the value of agricultural products sold was \$416,297,000.00. Of that amount, about \$216,189,000.00 was in crop sales and \$200,108,000.00 in the sale of livestock.

Changes and development in the region are guided and controlled by the comprehensive plans of each jurisdiction, and development in hazard prone areas is restricted.

Table 3.3.5.5 summarizes agricultural land use and data for each of the eight counties in the region. The data illustrates that between 1997 and 2012, on a regional level, there was an approximate 13.44% decrease in the number of farms; a decrease of 7.70% in the number of acres of land used for farmland; and an overall increase of about 62.67% in the estimated market value of farm products sold

Table 3.3.5.5 - Lincoln Trail Region Agricultural Statistics: 1997 to 2012				
Jurisdiction	Year	Number of Farms	Number of Acres in Farmland	Estimated Market Value of Farm Products Sold
Breckinridge County	1997	1501	281,261	\$32,712,000
	2002	1443	276,456	\$28,714,000
	2007	1509	274,473	\$56,081,000
	2012	1304	259,774	\$79,537,000
	% Change from 1997 to 2012	-13.12%	-7.64%	+143.14%
Grayson County	1997	1568	221,081	\$34,860,000
	2002	1650	233,136	\$31,642,000
	2007	1530	216,492	\$41,192,000
	2012	1357	202,970	\$45,663,000
	% Change from 1997 to 2012	-13.46%	-8.19%	+30.99%

Hardin County	1997	1854	236,346	\$40,418,000
	2002	1732	239,740	\$35,898,000
	2007	1588	222,267	\$46,907,000
	2012	1357	202,970	\$57,949,000
% Change from 1997 to 2012		-26.81%	-14.21%	+43.37%
LaRue County	1997	896	122,658	\$25,272,000
	2002	888	134,410	\$21,057,000
	2007	811	125,432	\$26,579,000
	2012	720	111,975	\$41,877,000
% Change from 1997 to 2012		-19.64%	-8.71%	+65.71%
Marion County	1997	1072	172,011	\$34,336,000
	2002	1054	171,252	\$28,754,000
	2007	1055	160,684	\$39,653,000
	2012	1016	166,417	\$56,491,000
% Change from 1997 to 2012		-5.22%	-3.25	+64.52%
Meade County	1997	964	129,046	\$19,480,000
	2002	955	134,771	\$16,171,000
	2007	887	121,448	\$28,712,000
	2012	754	119,495	\$36,571,000
% Change from 1997 to 2012		-21.18%	-7.40%	+87.74%
Nelson County	1997	1401	185,507	\$39,525,000
	2002	1407	189,104	\$33,242,000
	2007	1406	196,225	\$54,803,000
	2012	1326	187,755	\$64,439,000
% Change from 1997 to 2012		-5.35	1.21%	+63.03%
Washington County	1997	1142	162,741	\$32,833,000
	2002	1119	149,739	\$27,060,000
	2007	1119	162,993	\$33,000,000
	2012	1011	140,948	\$33,770,000
% Change from 1997 to 2012		-2.71%	-13.39%	+2.85%
<i>Source: U.S. Department of Agriculture, National Agriculture Statistics Service</i>				

Economic and Social Growth

According to the *Lincoln Trail Occupational Outlook to 2020*, published by the Education and Workforce Development Cabinet, the Department of Workforce Investment and the Kentucky Office of Employment and Training, employment in

the Lincoln Trail Region is projected to grow from a 2010 level of 96,368 to 110,015 by 2020. This is a projected gain of 14.2%.

Total annual job openings are expected to be about 3,683, with an annual growth in job openings of approximately 1,445. About 2,238 of the annual job openings are expected to result from separations from the labor force due to retirements or job transfers. Thirty-nine percent of job openings will result from growth, with the remaining 61% resulting from separations from the labor force.

The greatest number of annual job openings is expected to be in Office and Administrative Support Occupations, followed by Sales and Related Occupations and Healthcare Practitioners and Technical Occupations. Two occupations with the greatest number of job openings are Registered Nurses and Combined Food Prep. & Serving Workers, Including Fast Food.

The highest growth rate occupations for the decade are most likely to be:
 Healthcare Practitioners and Technical Occupations (61.1%)
 Healthcare Support Occupations (58.9%)
 Community and Social Service Occupations (34.3%)

Table 3.3.5.6 - Lincoln Trail Region Industrial Sites by County	
Breckinridge County	Meade County
Breckinridge County Commerce Park	Bill Corum Commerce Park 163-001 Buttermilk Fall Industrial Site 163-002
Grayson County	Nelson County
Judge K.H. Goff Industrial Park 085-001 Leitchfield Industrial Site 085-008	Wilson Industrial Park 179-003 Bardstown Industrial Site 179-007 Bardstown Industrial Site 179-004 Bardstown TEBCO 179-009
Hardin County	Washington County
Hughes Center of Commerce & Industry T.J. Patterson Industrial Park 093-003 Millpond Business Center 093-004 Glendale Site 093-005	Springfield Industrial Site 229-005 Springfield-Washington County Commerce Center 229-004
Marion County	
Crossroads Industrial Park 155-004 KY 208 Industrial Park 155-005	
<i>Source: Kentucky Cabinet for Economic Development 2015</i>	

Table 3.3.5.7 – Employment by Type and County (U.S. Census Bureau)

Types of Employment	Breckinridge			Grayson			Hardin			LaRue		
Year	2003	2008	2013	2003	2008	2013	2003	2008	2013	2003	2008	2013
Agriculture, Forestry, Fishing, Hunting	24	11	15	0	0	0	0	49	37	0	44	32
Mining	22	25	23	0	0	0	0	43	61	0	0	NA
Construction	185	277	220	434	386	349	1,557	1,754	1,133	152	234	159
Manufacturing	220	345	304	2,596	2,116	1,669	6,258	5,572	5,662	745	717	496
Trade, Transportation, Utilities	676	663	724	1,563	1,493	1,398	7,275	8,679	8,087	329	340	285
Information	27	33	22	37	45	38	749	1,004	943	0	0	0
Financial Activities	170	174	165	224	257	291	1,669	2,104	1,955	145	148	151
Services	821	386	460	1,719	1,596	1,087	10,594	16,174	17,227	641	776	744
Public Administration	227	222	184	331	347	376	3,962	3,385	5,140	116	102	114
Other	0	0	4	0	8	1	19	46	10	0	0	0
Total	2,372	2,136	2,121	6,904	6,248	5,209	32,083	38,810	40,255	2,734	2,361	1,981
Types of Employment	Marion			Meade			Nelson			Washington		
Year	2003	2008	2013	2003	2008	2013	2003	2008	2013	2003	2008	2013
Agriculture, Forestry, Fishing, Hunting	26	32	0	8	9	17	0	0	0	0	0	0
Mining	0	0	0	76	98	103	0	0	0	0	0	0
Construction	229	221	163	270	448	354	1,222	1,240	1,043	256	310	165
Manufacturing	2,473	3,322	3,130	319	317	327	3,900	3,998	3,814	893	1,029	949
Trade, Transportation, Utilities	753	821	915	892	851	651	2,285	2,705	2,670	552	363	451
Information	31	28	26	0	105	102	116	111	110	13	0	0
Financial Activities	155	162	162	195	262	217	387	458	409	103	92	0
Services	1,774	1,458	1,480	847	257	766	3,336	3,609	4,148	615	157	226
Public Administration	231	9	6	223	228	282	418	422	426	176	158	153
Other	2	2	NA	0	9	NA	3	8	4	0	0	NA
Total	5,763	6,055	5,882	2,830	2,584	2,819	11,667	12,551	12,624	2,608	2,109	1,944

3.3.6 Multi-Jurisdictional Risk Assessment

Overall Summary

As previously stated, most of the natural hazards documented to significantly affect the Lincoln Trail Region, do not adhere to geographic boundaries. The exceptions are floods, landslides and karst. That data enabled the LTHMC to determine that the entire region is at risk for those hazards identified in table 3.3.1.1. On a more definitive level, the tables below summarize the degree or level of risk each hazard poses to the individual counties and the region, as it pertains to the annual frequency chance and economic loss. With limited data at the city level for each hazard, any data that was gathered was merged to create a comprehensive county risk level. For county specific frequency percentages please refer to table 3.3.2.1, or for dollar losses, table 3.3.4.9

Risk Level	Frequency Chance Per year
High Risk Hazard	61%+
Moderate Risk Hazard	31%-60%
Low Risk Hazard	11%-30%
Negligible Risk Hazard	0%-10%

Table 3.3.6.1 - Risk Level based on Historical Frequency Chance Per Year

	THUNDERSTORMS / WINDS	FLOODS	HAIL	LIGHTNING	SNOW & ICE	TORNADOS
BRECKINRIDGE	HIGH	HIGH	HIGH	MODERATE	HIGH	LOW
GRAYSON	HIGH	HIGH	HIGH	MODERATE	HIGH	LOW
HARDIN	HIGH	HIGH	HIGH	HIGH	HIGH	MODERATE
LARUE	HIGH	HIGH	HIGH	HIGH	HIGH	LOW
MARION	HIGH	HIGH	HIGH	HIGH	MODERATE	LOW
MEADE	HIGH	HIGH	HIGH	MODERATE	HIGH	LOW
NELSON	HIGH	HIGH	HIGH	HIGH	HIGH	LOW
WASHINGTON	HIGH	HIGH	HIGH	HIGH	HIGH	LOW
LTADD	HIGH	HIGH	HIGH	MODERATE	HIGH	LOW

Economic Loss: In reviewing the economic loss table below, an annual loss of \$100,000 for an entire county may not seem to justify being categorized as “High Risk”. For a large metropolitan area, it probably shouldn’t be. However, six of the eight Lincoln Trail Region counties have less than 30,000 residents and three of the six have populations less than 20,000. The limited tax base and low-to-moderate-income (LMI) index* in most of these areas further exacerbates their circumstances and it is difficult for them to handle even the “Low Risk” hazards. Only five of the 35 Lincoln Trail jurisdictions have a LMI below 40% while ten have a LMI over 50%. In an area where 40%+ of the families have an income below 80% of the median, local units of government experience immense social and economic responsibilities that are compounded by the damages caused by annual weather events.

*Low to Moderate Income Index: Low or moderate income census tracts are considered to be those in which the median family income is below 80% of the median family income for the Metropolitan Statistical Area (MSA) or Primary Metropolitan Area (PMSA) in which they are located.

Risk Level	Economic Loss Per Year
High Risk Hazard	\$100,000+
Moderate Risk Hazard	\$50,000-\$99,999
Low Risk Hazard	\$25,000-\$49,999
Negligible Risk Hazard	0-\$24,999

Table 3.3.6.2 - Risk Level based on Annual Historical Economic Loss

	THUNDERSTORMS / WINDS	FLOODS	HAIL	LIGHTNING	SNOW & ICE	TORNADOS
BRECKINRIDGE	NEGLIGIBLE	HIGH	MODERATE	NEGLIGIBLE	LOW	MODERATE
GRAYSON	NEGLIGIBLE	HIGH	LOW	NEGLIGIBLE	LOW	HIGH
HARDIN	HIGH	HIGH	HIGH	NEGLIGIBLE	MODERATE	HIGH
LARUE	LOW	HIGH	LOW	NEGLIGIBLE	LOW	NEGLIGIBLE
MARION	NEGLIGIBLE	HIGH	HIGH	NEGLIGIBLE	LOW	LOW
MEADE	LOW	HIGH	HIGH	NEGLIGIBLE	LOW	HIGH
NELSON	LOW	HIGH	HIGH	NEGLIGIBLE	LOW	LOW
WASHINGTON	LOW	HIGH	HIGH	NEGLIGIBLE	LOW	LOW
LTADD	HIGH	HIGH	HIGH	MODERATE	HIGH	HIGH