KIPDA

Kentuckiana Regional Planning and Development Agency

THE KIPDA REGIONAL HAZARD MITIGATION PLAN: 2016

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EXECUTIVE SUMMARY

Which legislation regulates us to produce plans?

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act enacted under the Disaster Mitigation Act of 2000 (DMA 2000) provided revitalized approaches to mitigation planning. This section established a new requirement for Local Mitigation Plans, and following a disaster, authorized up to 7% of Hazard Mitigation Grant Program (HMGP) funds available to a State to be used for development of State, Tribal, and Local Mitigation Plans.

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.
(44 CFR 201.2).

Mitigation is crucial to the citizens and residents that reside in and KIPDA Region, covering Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble Counties. Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

The DMA 2000 emphasizes greater interaction between State and Local mitigation planning activities that highlights the need for improved linkages of hazard assessment and capability analyses. The revised guidance emphasizes the need for State, Tribal, and Local entities to closely coordinate mitigation planning and implementation efforts. The most successful of these plans have three common elements:

- **Comprehensive risk assessments** that form a solid foundation for decision-making; and
- **Input from a wide range of stakeholders** who would play a role during implementation of mitigation actions at the Federal, State, and Local levels.
- **Comprehensive mitigation strategy** that is organized, easily referenced, and can be used as a working document for communities to track progress toward becoming more resilient.

What is the purpose of the KIPDA Regional Hazard Mitigation Plan?

"The purpose of the KIPDA Hazard Mitigation Plan is to provide guidance for building and maintain a more resilient community."

The purpose of the KIPDA Regional Hazard Mitigation Plan is to provide guidance for building and maintaining a more resilient community. Due to the documented risk and exposure to many kinds of natural and man-made hazard events, in particular flooding, severe storms, and severe winter storms, among nine others, the KIPDA Regional Mitigation Plan Committee understands the need for improved information for decision-making when managing disasters. The plan is the result of a systematic evaluation of the nature and extent of the vulnerability posed by the effects of natural and man-made hazards present (risk assessment) and includes a five-year action plan to minimize future vulnerability (mitigation strategy), accompanied by a schedule that outlines a method for monitoring and evaluating plan progress (plan maintenance). The geography examined for the plan includes KIPDA's regional counties listed to the right.

KIPDA Counties Examined:

- Bullitt
- Henry
- Oldham
- Shelby
- Spencer
- Trimble

Which hazards does the Plan address?

The plan includes natural hazards where there is a historical record or the potential of damage caused to people and property. The hazard categories included in the plan are consistent with the 2013 Commonwealth of Kentucky Enhanced Hazard Mitigation Plan minus the hazardous materials and mine subsidence, which were not regarded as pertinent to the KIPDA Region. It should be noted that Extreme Temperature has been added as hazard profile Category.

• **Dam Failure**	• **Karst/Sinkhole**
• **Drought**	• **Landslide**
• **Earthquake**	• **Severe Storm**
• **Extreme Temperature**	• **Severe Winter Storm**
• **Flood**	• **Tornado**
• **Hailstorm**	• **Forest Fire**

Who produced the plan?

The plan development effort is a result of a partnership between the counties creating the KIPDA Regional Hazard Mitigation Committee (RHMC), which is the formal body for review and acceptance of the plan using grant funding provided by the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP). The plan was prepared by KIPDA and other local stakeholders such as County Judge Executives, Emergency Management Directors, Local First Responder Agencies, and Citizens in the KIPDA counties including Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble.

With the input and participation of these groups, the Plan has incorporated current mitigation efforts, future mitigation actions, and examined the strategies and action items found in other current and up-to-date local, regional, and state plan documents. Throughout the planning process, the KIPDA Regional Mitigation Plan Committee has harnessed the collective mitigation knowledge of Federal, State, and Regional Officials, as well as representatives from both the public and private sectors. Without the help and coordinated assistance of all the above mentioned groups, this plan would not reflect the partnerships necessary to run a successful mitigation program.

EXECUTIVE SUMMARY

What are the sections of the Plan?

The Plan contains the following seven sections, plus appendices, including acronyms and references:

1. Plan Overview
2. Prerequisites
3. Planning Process
4. Risk Assessment
5. Mitigation Strategy
6. Plan Maintenance Procedures
7. Plan Update and Approval

1. **Plan Overview**

This section provides a descriptive narrative of the plan layout, the KIPDA area profile, Board of Directors, population and Census statistics, and plan development participants. This section helps the reader gain an understanding of the magnitude of the area for the regional plan and gives a more descript knowledge base in dealing with the hazard profiles.

2. **Prerequisites**

This section details the needed framework in order for the plan to be legally and officially accepted by the region by using multi-jurisdictional planning. The headers includes adoption by local governing bodies, multi-jurisdiction plan adoption and participation, overall strategy approaching the multi-jurisdictional process, public postings of meeting dates, with current and previous meeting dates.

3. **Planning Process**

This section provides a descriptive narrative of how the plan was produced, who was involved, and what other policies and programs were used to inform the plan. To facilitate the planning process, key stakeholders were identified and organized into a planning committee, the KIPDA Regional Hazard Mitigation Committee. Then several publicly-accessible meetings were held to garner ownership of and input on the Plan. This included 4 regional meetings and 12 County-wide sub-committee mitigation meetings, which were open to the public. Individual meetings with county Emergency Management Directors and other key personnel were also held to ensure the plan's update on key components. Solicitation of mitigation ideas from the local community was a primary focus of the planning process, as it was believed the local community understands the needs of the area better than anyone else. Different first responder and emergency management agencies, including citizens, local government offices, and private businesses were asked directly for input into the planning update. As stakeholders, their participation became paramount for a successful update.

4. **Risk Assessment**

This section includes developing a hazard profile as well as the identification, compilation, and integration of the existing hazard databases throughout the KIPDA area into one managed database contained in Geographical Information Systems (GIS). Once the hazards were identified, vulnerability was assessed on a location by location basis with extra weight on critical facilities. Demonstrated by maps, this provided the necessary information for the planning committee to examine past occurrences of hazards and assess probabilities, all in order to determine appropriate mitigation strategies to pursue in the future. Data from various agencies including Center for Hazardous Research (CHR), the 2013 Kentucky Hazard Mitigation Plan, The Census Bureau, The Kentucky Division of Forestry, the Kentucky State Data Center, the Department of Agriculture, USGS, the Kentucky Geological Survey, NAOO, SHELDUS, HAZUS, and other GIS mapping information, were included.

5. **Mitigation Strategy**

This section includes the determination of hazard mitigation goals, objectives, and actions as identified during public stakeholder and planning committee meetings. The mitigation strategy was based on the review of the risk assessment process and feedback provided during public meetings. The Plan developers then worked to assess the KIPDA region's current capabilities in order to create a viable mitigation strategy. As an update to this plan, mitigation techniques were solicited from various first responder agencies in each individual counties including; Police and Sherriff, Emergency Management, Fire and Rescue, Planning and Zoning, Citizens, and other community agencies.

6. **Plan Maintenance Procedures**

This section outlines the plan maintenance steps: plan implementation, monitoring, evaluating, and updating, with a particular focus on collaboration with Emergency Management Directors and County Judge Executives from the regional counties to allow for better incorporation of existing planning mechanisms.

7. **Plan Updates and Approval**

This section provides a description and documentation of the plan submittal process. This process begins with the KIPDA Regional Mitigation Plan Committee submitting the plan to KYEM for review and comment, then making any requested revisions. KYEM then submits the plan to FEMA Region IV for review and approval, pending local (university) adoption. Once certified approvable by FEMA, the KIPDA Regional Mitigation Plan Committee submits the plan to the members of the Planning Committee for formal adoption, and then resubmits to State and FEMA for final review and approval. A signed copy of the formal Adoption is to be included in the final review. This endorsement demonstrates the KIPDA region's commitment to fulfilling the mitigation strategy.

1 PLAN OVERVIEW

PURPOSE OF THE HAZARD MITIGATION PLAN

The KIPDA Regional Hazard Mitigation Plan Update Objective:

To produce a mitigation plan for the KIPDA Region that outlines a program of mitigation activities to mitigate vulnerability to natural and man-made hazards.

Mitigation Planning Requirements
Text boxes in this color and shape are used throughout the plan to summarize the regulations in 44 CFR Part 201. Exact CFR references applicable to each section help the reader understand the rule and/or planning requirements.

Setting forth and committing to the above objective at the first Steering Committee meeting, was the first commitment by the KIPDA Regional Hazard Mitigation Committee (Consisting of representatives from the following counties: Bullitt, Henry, Oldham, Shelby, Spencer and Trimble) to the mitigation plan update process. As a result of intensive participation in the plan development process, the KIPDA Regional Hazard Mitigation Committee was able to outline a thorough list of committed mitigation action items to pursue. This policy document demonstrates the KIPDA regions commitment to reducing the risks from natural and man-made hazards, and should serve as a guide for all levels of local and university decision makers.

In accordance with the "Local Mitigation Plan Review Guide" the KIPDA Region Hazard Mitigation Plan Update includes the following basic requirements:

- A well-documented and open planning process that includes opportunity for public comment during draft plan development and prior to approval;
- The opportunity for involvement of committed communities, including Bullitt County, Henry County, Oldham County, Shelby County, Spencer County, Trimble County, and the Kentuckiana Regional Planning & Development Agency (KIPDA);
- The review and incorporation of existing plans, studies, reports and technical information;
- A risk assessment that provides the factual basis for activities proposed in the mitigation strategy;
- A mitigation strategy that provides the KIPDA Regional blueprint for reducing potential losses identified in the risk assessment.

In summary, the KIPDA Region Hazard Mitigation Plan seeks to provide the overall guidance to weave together the planning efforts neighboring local agencies, of university agencies, and private and non-profit organizations for the enhanced continuation of a viable and comprehensive local mitigation program.

Counties Participating:
Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble.

KIPDA AREA PROFILE

The Kentuckiana Regional Planning and Development Agency (KIPDA) became incorporated as a nonprofit corporation in 1973 and became one of fifteen such Area Development Districts (ADDs) in Kentucky. Although the ADDs are public bodies under Kentucky law, the Area Development Districts are neither State nor are they a branch of local government.

Instead, the Area Development Districts represent a partnership of local units of government. KIPDA consists of Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer and Trimble Counties in Kentucky and Clark and Floyd Counties in Indiana as well as the cities located within these counties. For the purposes of the KIPDA Regional Hazard Mitigation Plan, only the Kentucky counties of Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble will be considered.

KIPDA provides regional planning, review and technical services in the areas of public administration, social services and transportation as well as community ridesharing programs. KIPDA also coordinates services for persons 60 years of age and over. KIPDA is designated by the Kentucky State Clearinghouse as the regional review agency for virtually all applications for federal and/or state funds made by organizations or governments within the state of Kentucky.

A 24-member Board of Directors, listed below, oversees the activities of the agency. The governing board consists of chief elected executives from the nine counties it serves as well as representatives of nine member municipalities, an at-large minority representative and appointees from the six rural counties.

KENTUCKIANA REGIONAL PLANNING AND DEVELOPMENT AGENCY

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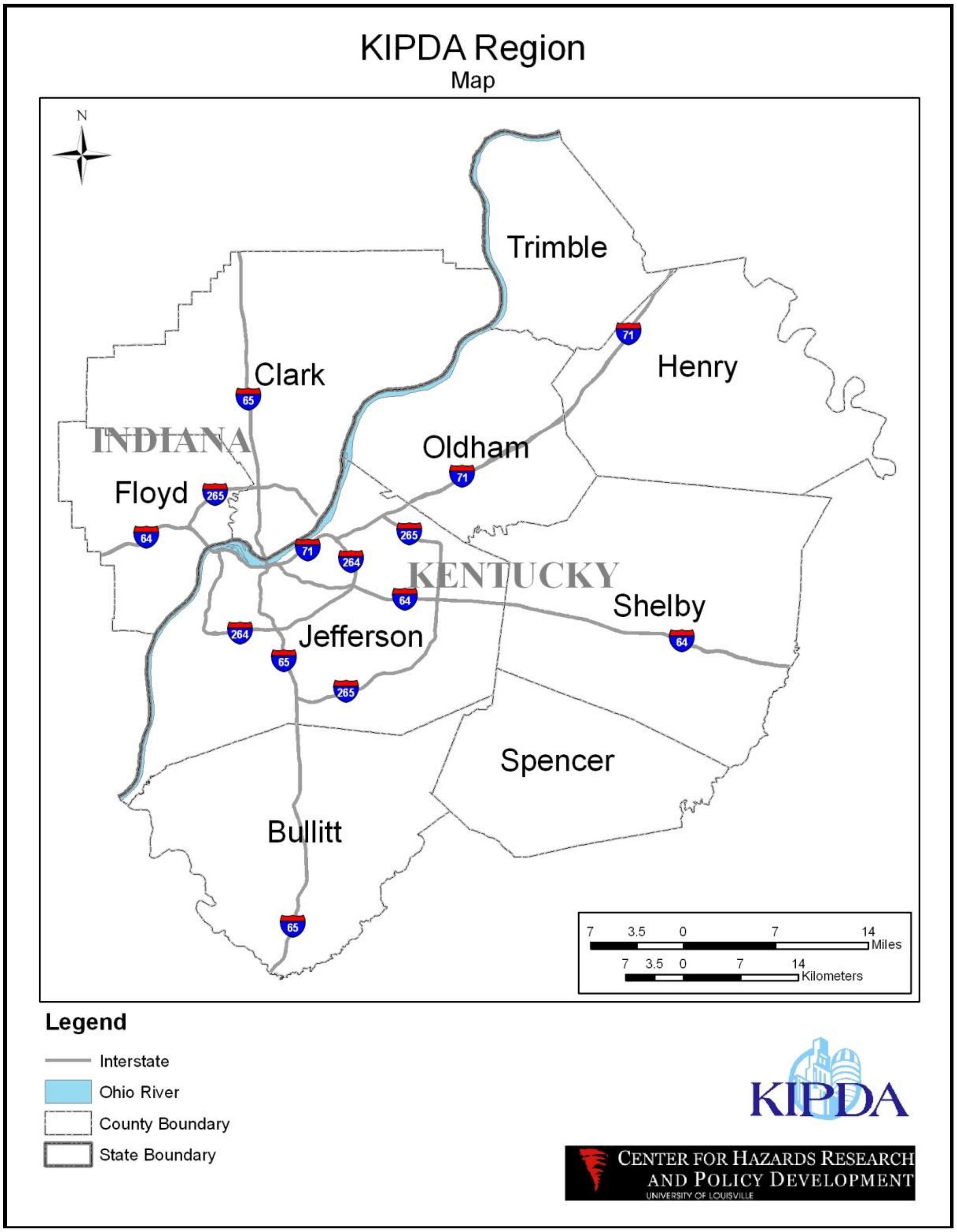
PLAN OVERVIEW

The KIPDA Region is composed of Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer, and Trimble counties in Kentucky and Clark and Floyd counties in Indiana. As of the 2014 census estimate, 1,178,813 people live in the region that encompasses 2,612 square miles of land. There are 3 major interstates, I-64, I-65, and I-71 that pass through the region. The map below is of the KIPDA area.

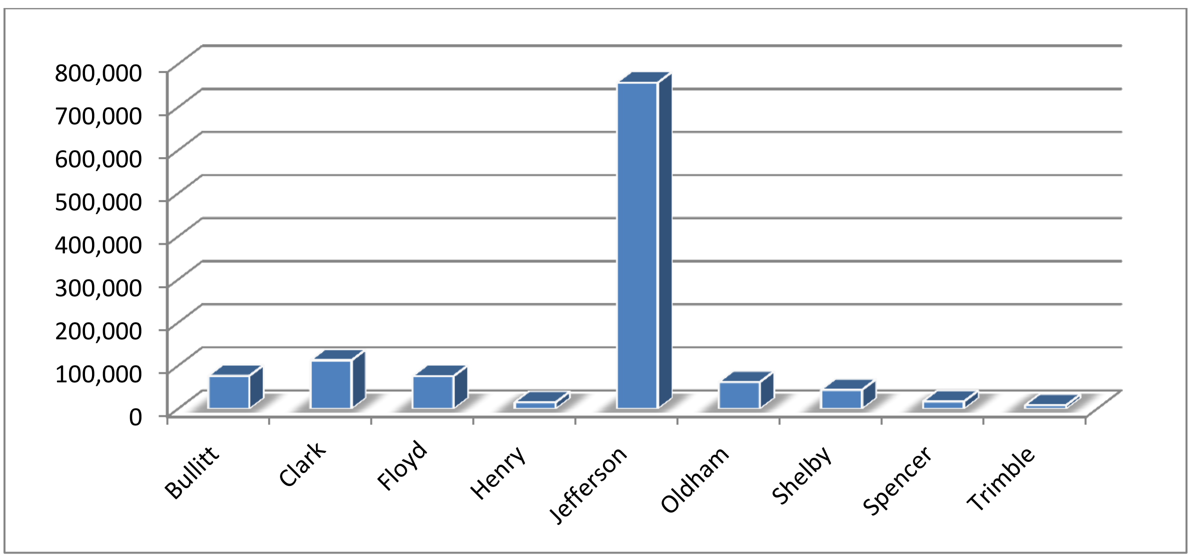


PLAN OVERVIEW

There are nine counties in the KIPDA region, 7 in Kentucky and 2 in Indiana. The table below shows their governmental structure and the 2014 Population Estimate by the US Census Bureau.

County Governments in the KIPDA Area		
County	**Type of Government**	**2014 Population Estimate**
Bullitt	Judge/Executive and 4 Magistrates	77,955
Clark, IN	3 Commissioners and 7 Council Members	114,262
Floyd, IN	3 Commissioners and 7 Council Members	76,179
Henry	Judge/Executive and 6 Magistrates	15,572
Jefferson	Mayor and 26 Council Members	760,026
Oldham	Judge/Executive and 8 Magistrates	63,490
Shelby	Judge/Executive and 7 Magistrates	44,875
Spencer	Judge/Executive and 5 Magistrates	17,668
Trimble	Judge/Executive and 4 Magistrates	8,786

As evidenced in the chart below, the majority of the population in the KIPDA area resides in Jefferson County. At an estimated 2014 population of 760,026, Jefferson County has a much greater population than the other 8 counties combined; 418,718, with a total of 1,178,813 for the KIPDA region.



Further demographic data, obtained from the census bureau, for the KIPDA Area counties is contained in the following charts:

	Bullitt County	Clark County	Floyd County	Henry County	Jefferson County	Oldham County	Shelby County	Spencer County	Trimble County	Regional Total
Land Area – Square Miles	299	583	148	289	385	189	384	186	149	**2,612**
County Seat	Shepherds-ville	Jeffersonville	New Albany	New Castle	Louisville	LaGrange	Shelbyville	Taylorsville	Bedford	--
Population										
Population, 2014 estimate	77,955	114,262	76,179	15,572	760,026	63,490	44,875	17,668	8,786	**1178813**
Land area in square miles, 2010	297.02	372.86	147.94	286.28	380.42	187.22	379.64	186.68	151.65	**2389.71**
Persons per square mile, 2010	250.2	295.6	504.1	53.9	1,948.10	322.2	110.8	91.4	58.1	**3634.4**
Race										
White alone, percent, 2014 (a)	96.7%	88.9%	91.1%	94.6%	73.4%	91.8%	88.6%	96.2%	96.2%	96.7%
Black or African American alone, percent, 2014 (a)	1.1%	7.4%	5.5%	2.9%	21.5%	4.4%	7.7%	1.8%	1.5%	1.1%
American Indian and Alaska Native alone, percent, 2014 (a)	0.3%	0.4%	0.3%	0.4%	0.2%	0.5%	0.5%	0.4%	0.6%	0.3%
Asian alone, percent, 2014 (a)	0.6%	1.0%	1.1%	0.3%	2.5%	1.6%	1.0%	0.4%	0.5%	0.6%
Native Hawaiian and Other Pacific Islander alone, percent, 2014 (a)	Z	0.1%	Z	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	Z
Two or More Races, percent, 2014	1.2%	2.2%	2.0%	1.8%	2.2%	1.5%	2.0%	1.2%	1.1%	1.2%
Hispanic or Latino, percent, 2014 (b)	1.7%	5.2%	2.9%	3.2%	4.8%	3.8%	8.7%	1.8%	3.5%	1.7%
White alone, not Hispanic or Latino, percent, 2014	95.2%	84.3%	88.7%	91.7%	69.3%	88.7%	81.0%	94.6%	94.0%	95.2%

	Bullitt County	Clark County	Floyd County	Henry County	Jefferson County	Oldham County	Shelby County	Spencer County	Trimble County	Regional Total
Education										
High school graduate or higher, percent of persons age 25+, 2009-2013	85.00%	86.20%	88.00%	79.50%	88.10%	91.70%	85.00%	88.20%	84.50%	**86%**
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	12.70%	18.90%	22.60%	12.80%	30.40%	40.10%	23.80%	16.60%	16.10%	**22%**
Housing										
Housing units, 2014	30,461	48,986	32,300	6,669	341,449	21,203	16,989	6,928	3,924	**508909**
Homeownership rate, 2009-2013	82.20%	71.60%	71.80%	72.00%	62.70%	84.80%	70.80%	84.80%	77.10%	**75%**
Housing units in multi-unit structures, percent, 2009-2013	8.30%	17.90%	17.30%	6.80%	29.50%	7.10%	13.30%	5.50%	4.60%	**12%**
Median value of owner-occupied housing units, 2009-2013	$145,500	$127,400	$150,400	$123,300	$149,100	$245,700	$165,000	$170,300	$107,300	**1384000**
Households, 2009-2013	27,874	42,502	29,087	6,008	305,832	19,532	15,469	6,230	3,512	**456046**
Persons per household, 2009-2013	2.69	2.58	2.54	2.55	2.39	2.89	2.66	2.76	2.5	**2.6**

	Bullitt County	Clark County	Floyd County	Henry County	Jefferson County	Oldham County	Shelby County	Spencer County	Trimble County	Regional Total
Income										
Per capita money income in past 12 months (2013 dollars), 2009-2013	$24,308	$24,312	$27,185	$21,923	$27,925	$33,591	$27,039	$26,666	$22,070	**235019**
Median household income, 2009-2013	$54,836	$50,496	$53,961	$46,016	$46,959	$83,391	$57,298	$65,209	$49,718	**507884**
Persons below poverty level, percent, 2009-2013	10.20%	12.20%	13.30%	17.10%	16.70%	6.80%	12.40%	7.70%	17.20%	**13%**

*Statistics based off 2014 Census Projections. All data is current with the United States Census Bureau at time of publication.

PLAN OVERVIEW

There are 114 incorporated cities/towns in the KIPDA Region that along with their governmental structure and 2014 population estimates are listed in the table below.

COUNTY	CITY	CLASS	TYPE OF GOVERNMENT	2010 POPULATION	2014 POPULATION
Bullitt	Fox Chase	Home Rule	Mayor/6 Council Members	447	472
Bullitt	Hebron Estates	Home Rule	Mayor/4 Commissioners	1,084	1,134
Bullitt	Hillview	Home Rule	Mayor/6 Council Members	7,613	8002
Bullitt	Hunters Hollow	Home Rule	Mayor/4 Commissioners	359	377
Bullitt	Lebanon Junction	Home Rule	Mayor/6 Council Members	1,816	1,898
Bullitt	Mt. Washington	Home Rule	Mayor/6 Council Members	11,743	12,246
Bullitt	Pioneer Village	Home Rule	Mayor/6 Council Members	2,713	2,810
Bullitt	Shepherdsville	Home Rule	Mayor/6 Council Members	11,336	11,856
Clark, IN	Borden	Town	Mayor/4 Council Members	813	825
Clark, IN	Charlestown	3	Mayor/5 Council Members	2,497	2,526
Clark, IN	Clarksville	Town	7 Town Council Members	911	923
Clark, IN	Jeffersonville	3	Mayor/7 Council Members	834	841
Clark, IN	Sellersburg	Town	7 Town Council Members	106	107
Clark, IN	Utica	Town	5 Town Council Members	2,352	2,408
Floyd, IN	Georgetown	Town	5 Town Council Members	1,475	1,502
Floyd, IN	Greenville	Town	5 Town Council Members	495	506
Floyd, IN	New Albany	2	Mayor/9 Council Members	447	472
Henry	Campbellsburg	Home Rule	Mayor/6 Council Members	1,084	1,134
Henry	Eminence	Home Rule	Mayor/6 Council Members	7,613	8002
Henry	New Castle	Home Rule	Mayor/4 Commissioners	359	377
Henry	Pleasureville	Home Rule	Mayor/4 Commissioners	1,816	1,898
Henry	Smithfield	Home Rule	Mayor/6 Council Members	11,743	12,246
Jefferson	Anchorage	Home Rule	Mayor/6 Council Members	2,713	2,810
Jefferson	Audubon Park	Home Rule	Mayor/6 Council Members	11,336	11,856
Jefferson	Bancroft	Home Rule	Mayor/4 Commissioners	813	825

COUNTY	CITY	CLASS	TYPE OF GOVERNMENT	2010 POPULATION	2014 POPULATION
Jefferson	Barbourmeade	Home Rule	Mayor/4 Council Members	1,220	1,251
Jefferson	Beechwood Village	Home Rule	Mayor/6 Council Members	1,326	1,359
Jefferson	Bellemeade	Home Rule	Mayor/4 Council Members	866	889
Jefferson	Bellewood	Home Rule	Mayor/4 Council Members	322	330
Jefferson	Blue Ridge Manor	Home Rule	Mayor/4 Commissioners	768	789
Jefferson	Briarwood	Home Rule	Mayor/4 Council Members	436	445
Jefferson	Broeck Pointe	Home Rule	Mayor/4 Commissioners	272	279
Jefferson	Brownsboro Farm	Home Rule	Mayor/4 Commissioners	649	662
Jefferson	Brownsboro Village	Home Rule	Mayor/4 Commissioners	320	327
Jefferson	Cambridge	Home Rule	Mayor/3 Council Members	175	177
Jefferson	Coldstream	Home Rule	Mayor/6 Council Members	1,102	1,130
Jefferson	Creekside	Home Rule	Mayor/5 Commissioners	305	314
Jefferson	Crossgate	Home Rule	Mayor/4 Council Members	225	228
Jefferson	Douglass Hills	Home Rule	Mayor/6 Council Members	5,495	5,640
Jefferson	Druid Hills	Home Rule	Mayor/4 Commissioners	308	317
Jefferson	Fincastle	Home Rule	Mayor/2 Commissioners	818	844
Jefferson	Forest Hills	Home Rule	Mayor/4 Commissioners	445	455
Jefferson	Glenview	Home Rule	Mayor/4 Council Members	532	543
Jefferson	Glenview Hills	Home Rule	Mayor/4 Commissioners	320	328
Jefferson	Glenview Manor	Home Rule	Mayor/3 Commissioners	191	194
Jefferson	Goose Creek	Home Rule	Mayor/4 Council Members	294	303
Jefferson	Graymoor-Devondale	Home Rule	Mayor/6 Council Members	2,874	2,937
Jefferson	Green Spring	Home Rule	Mayor/4 Council Members	716	736
Jefferson	Heritage Creek	Home Rule	Mayor/6 Council Members	1,078	1,111
Jefferson	Hickory Hill	Home Rule	Mayor/4 Commissioners	114	116
Jefferson	Hills and Dales	Home Rule	Mayor/4 Commissioners	142	144
Jefferson	Hollow Creek	Home Rule	Mayor/4 Council Members	784	806
Jefferson	Hollyvilla	Home Rule	Mayor/2 Council Members	538	549
Jefferson	Houston Acres	Home Rule	Mayor/4 Council Members	491	501

COUNTY	CITY	CLASS	TYPE OF GOVERNMENT	2010 POPULATION	2014 POPULATION
Jefferson	Hurstbourne	Home Rule	Mayor/4 Council Members	4,223	4,336
Jefferson	Hurstbourne Acres	Home Rule	Mayor/4 Council Members	1,814	1,863
Jefferson	Indian Hills	Home Rule	Mayor/9 Council Members	2,873	2,946
Jefferson	Jeffersontown	Home Rule	Mayor/8 Council Members	26,643	26,949
Jefferson	Kingsley	Home Rule	Mayor/4 Council Members	382	391
Jefferson	Langdon Place	Home Rule	Mayor/4 Council Members	937	964
Jefferson	Lincolnshire	Home Rule	Mayor/4 Commissioners	148	150
Jefferson	Louisville Metro	First Class	Mayor/Council Members	598,183	612,780
Jefferson	Lyndon	Home Rule	Mayor/6 Council Members	11,023	11,311
Jefferson	Lynnview	Home Rule	Mayor/6 Council Members	915	937
Jefferson	Manor Creek	Home Rule	Mayor/4 Council Members	226	229
Jefferson	Maryhill Estates	Home Rule	Mayor/4 Council Members	179	181
Jefferson	Meadow Vale	Home Rule	Mayor/4 Council Members	136	138
Jefferson	Meadowbrook Farm	Home Rule	Mayor/3 Commissioners	737	754
Jefferson	Meadowview Estates	Home Rule	Mayor/4 Council Members	364	371
Jefferson	Middletown	Home Rule	Mayor/4 Commissioners	7,233	7,422
Jefferson	Minor Lane Heights	Home Rule	Mayor/6 Council Members	167	169
Jefferson	Mockingbird Valley	Home Rule	Mayor/4 Council Members	432	441
Jefferson	Moorland	Home Rule	Mayor/3 Council Members	583	601
Jefferson	Murray Hill	Home Rule	Mayor/4 Council Members	442	452
Jefferson	Norbourne Estates	Home Rule	Mayor/3 Council Members	1,021	1,045
Jefferson	Northfield	Home Rule	Mayor/6 Council Members	371	379
Jefferson	Norwood	Home Rule	Mayor/4 Council Members	354	363
Jefferson	Old Brownsboro Place	Home Rule	Mayor/4 Council Members	651	663
Jefferson	Parkway Village	Home Rule	Mayor/4 Commissioners	833	855
Jefferson	Plantation	Home Rule	Mayor/5 Council Members	363	370
Jefferson	Poplar Hills	Home Rule	Mayor/4 Council Members	4,708	4,860
Jefferson	Prospect	Home Rule	Mayor/6 Council Members	406	415
Jefferson	Richlawn	Home Rule	Mayor/3 Council Members	4,223	4,336

COUNTY	CITY	CLASS	TYPE OF GOVERNMENT	2010 POPULATION	2014 POPULATION
Jefferson	Riverwood	Home Rule	Mayor/4 Council Members	447	457
Jefferson	Rolling Fields	Home Rule	Mayor/4 Commissioners	647	660
Jefferson	Rolling Hills	Home Rule	Mayor/3 Commissioners	961	985
Jefferson	Saint Matthews	Home Rule	Mayor/8 Council Members	17,495	17,911
Jefferson	Saint Regis Park	Home Rule	Mayor/7 Council Members	1,458	1,495
Jefferson	Seneca Gardens	Home Rule	Mayor/4 Council Members	697	710
Jefferson	Shively	Home Rule	Mayor/6 Council Members	15,288	15,643
Jefferson	South Park View	Home Rule	Mayor/3 Council Members	7	7
Jefferson	Spring Mill	Home Rule	Mayor/4 Commissioners	287	296
Jefferson	Spring Valley	Home Rule	Mayor/4 Commissioners	655	668
Jefferson	Strathmoor Manor	Home Rule	Mayor/3 Council Members	338	344
Jefferson	Strathmoor Village	Home Rule	Mayor/4 Council Members	649	661
Jefferson	Sycamore	Home Rule	Mayor/4 Council Members	160	162
Jefferson	Ten Broeck	Home Rule	Mayor/4 Commissioners	103	104
Jefferson	Thornhill	Home Rule	Mayor/4 Council Members	180	182
Jefferson	Watterson Park	Home Rule	Mayor/6 Council Members	978	997
Jefferson	Wellington	Home Rule	Mayor/4 Council Members	566	577
Jefferson	West Buechel	Home Rule	Mayor/6 Council Members	1,232	1,264
Jefferson	Westwood	Home Rule	Mayor/4 Commissioners	635	648
Jefferson	Wildwood	Home Rule	Mayor/2 Commissioners	261	269
Jefferson	Windy Hills	Home Rule	Mayor/6 Council Members	2,389	2,427
Jefferson	Woodland Hills	Home Rule	Mayor/3 Council Members	745	710
Jefferson	Woodlawn Park	Home Rule	Mayor/6 Council Members	944	968
Jefferson	Worthington Hills	Home Rule	Mayor/3 Commissioners	1,449	1,487
Oldham	Crestwood,	Home Rule	Mayor/4 Commissioners	4,537	4,788
Oldham	Goshen	Home Rule	Mayor/4 Commissioners	910	962
Oldham	LaGrange	Home Rule	Mayor/8 Council Members	8,093	8,516
Oldham	Orchard Grass Hills	Home Rule	Mayor/6 Council Members	1,596	1,689
Oldham	Park Lake				Annexed in 2006

PLAN OVERVIEW

COUNTY	CITY	CLASS	TYPE OF GOVERNMENT	2010 POPULATION	2014 POPULATION
Oldham	Pewee Valley	Home Rule	Mayor/6 Council Members	1,452	1,522
Oldham	River Bluff	Home Rule	Mayor/4 Council Members	403	427
Shelby	Shelbyville	Home Rule	Mayor/6 Council Members	14,124	14,985
Shelby	Simpsonville	Home Rule	Mayor/4 Commissioners	2,500	2,655
Spencer	Taylorsville	Home Rule	Mayor/4 Commissioners	766	790
Trimble	Bedford	Home Rule	Mayor/4 Commissioners	610	609
Trimble	Milton	Home Rule	Mayor/4 Council Members	574	574

*Statistics based off 2014 Census Projections. All data is current with the United States Census Bureau at time of publication.

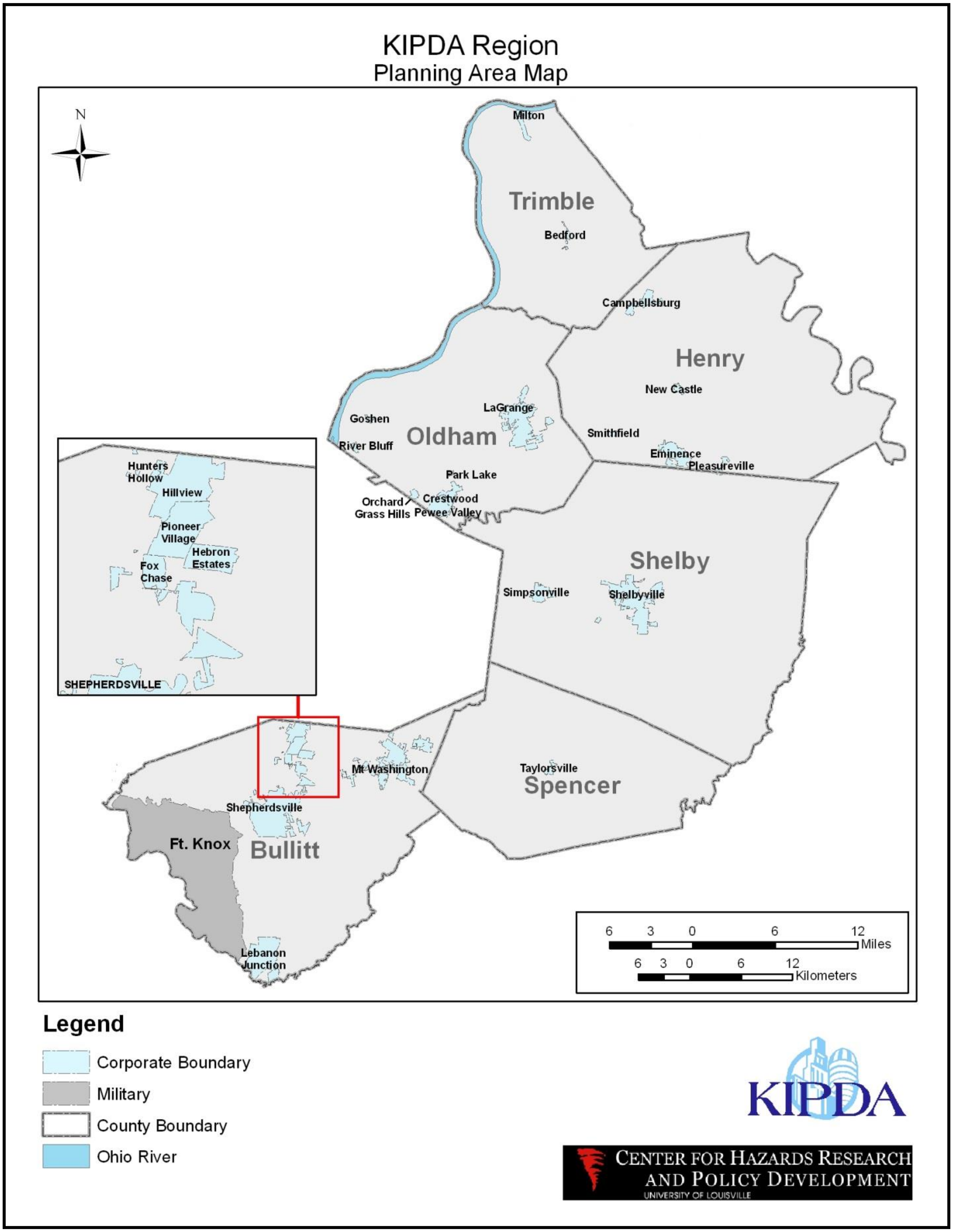
PLAN DEVELOPMENT PARTICIPANTS

Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble counties and their respected cities compose the planning area for the KIPDA Regional Hazard Mitigation Plan. The Louisville-Jefferson County Metro Government completes their own hazard mitigation plan and the two Indiana counties in the KIPDA Region are not included. The following table lists the area covered by the KIPDA Hazard Mitigation Plan and the 2014 Population Estimates from the US Census Bureau.

County	CITY	2010 Population Estimates	2014 Population Estimates
Bullitt		**74,319**	**77,955**
	Fox Chase	447	472
	Hebron Estates	1,084	1,134
	Hillview	7,613	8002
	Hunters Hollow	359	377
	Lebanon Junction	1,816	1,898
	Mt. Washington	11,743	12,246
	Pioneer Village	2,713	2,810
	Shepherdsville	11,336	11,856
Henry		**15,416**	**15,572**
	Campbellsburg	1,084	1,134
	Eminence	7,613	8002
	New Castle	359	377
	Pleasureville	1,816	1,898
	Smithfield	11,743	12,246
Oldham		60,316	63,490
	Crestwood,	4,537	4,788
	Goshen	910	962
	LaGrange	8,093	8,516
	Orchard Grass Hills	1,596	1,689
	Pewee Valley	1,452	1,522
	River Bluff	403	427
Shelby		**42,074**	**44,875**
	Shelbyville	14,124	14,985
	Simpsonville	2,500	2,655
Spencer		**17,061**	**17,668**
	Taylorsville	766	790
Trimble		**8,809**	**8,786**
	Bedford	610	609
	Milton	574	574

PLAN OVERVIEW

The planning area for the KIPDA Regional Hazard Mitigation Plan is mapped below.



2 PREREQUISITES

ADOPTION BY THE LOCAL GOVERNING BODY

Following the recommendation of the KIPDA Regional Hazard Mitigation Committee, the KIPDA Area Development District's Board of Directors adopted the KIPDA Regional Hazard Mitigation Plan as the official mitigation plan for Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble counties along with their cities on October 20, 2005. The 2011 Plan was also adopted for each county from the months of June 2011 through September 2011.
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Once FEMA formally accepts the 2016 KIPDA Regional Hazard Mitigation Plan, the resolutions and dates will be included in this section.

MULTI-JURISDICTIONAL PLAN ADOPTION

The following chart summarizes the jurisdictions that have formally adopted the KIPDA Regional Hazard Mitigation Plan as their jurisdiction's official Hazard Mitigation plan in 2011. *(See Appendix F)*

RESOLUTION OF ADOPTION		
JURISDICTION	**ADOPTED**	**DATE OF ADOPTION**
BULLITT COUNTY	Yes	August 2, 2011
Fox Chase, City of	Yes	August 9, 2011
Hebron Estates, City of	Yes	August 2, 2011
Hillview, City of	Yes	August 15, 2011
Hunters Hollow, City of	Yes	August 16, 2011
Lebanon Junction, City of	Yes	August 1, 2011
Mt. Washington, City of	Yes	January 9, 2012
Pioneer Village, City of	Yes	August 23, 2011
Shepherdsville, City of	Yes	January 9, 2012
HENRY COUNTY	Yes	June 21, 2011
Campbellsburg, City of	Yes	June 13, 2011
Eminence, City of	Yes	August 8, 2011
New Castle	Yes	July 7, 2011
Pleasureville, City of	Yes	August 1, 2011
Smithfield, City of	Yes	July 14, 2011
OLDHAM COUNTY	Yes	August 2, 2011
Crestwood, City of	Yes	July 13, 2011
Goshen, City of	Yes	August 15, 2011
Lagrange, City of	Yes	July 05, 2011
Orchard Grass Hills, City of	Yes	August 9, 2011
Pewee Valley, City of	Yes	July 6, 2011
River Bluff, City of	Yes	August 23, 2011
SHELBY COUNTY	Yes	August 16, 2011
Shelbyville, City of	Yes	August 11, 2011
Simpsonville, City of	Yes	August 17, 2011
SPENCER COUNTY	Yes	June 20, 2011
Taylorsville, City of	Yes	June 05, 2011
TRIMBLE COUNTY	Yes	June 20, 2011
Bedford, City of	Yes	June 20, 2011
Milton, City of	Yes	June 16, 2011

MULTI-JURISDICTIONAL PLANNING PARTICIPATION

Every jurisdiction that has been included in the KIPDA Regional Hazard Mitigation Plan was involved in the planning process and composition of the Regional Hazard Mitigation Plan.

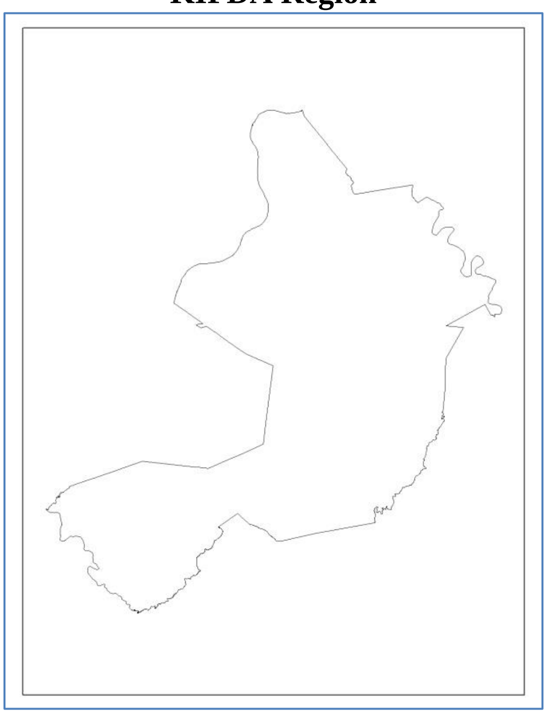
For the updated plan, the County Emergency Management Staff and County Judge Executives acted as representatives for the County and its cities that are included in the KIPDA Regional Hazard Mitigation Plan. In addition to input from other county/city staff including the PVA, mayors, planning and zoning, Red Cross, private citizens, school boards and private corporations all included input into the 2016 update. *(See Appendix B)*

44 CFR 201 (a)

All counties including Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble were involved in the multi-jurisdictional planning.

The following chart on the next page documents the participation of each jurisdiction in the initial planning process.

KIPDA Region



PREREQUISITES

Jurisdiction	Attendance in Local Committee Meetings	Attendance in Regional Meetings	Direct Planning Process Participation	Direct Risk Assessment Participation	Direct Plan Maintenance & Procedures Participation	Presentation of Findings & Review	Adoption of the Plan
Bullitt County	X	X	X	X	X	X	X
Fox Chase, City of	X		X	X			X
Hillview, City of	X		X	X			X
Hebron Estates, City of	X		X	X			X
Hunters Hollow, City of	X		X	X			X
Lebanon Junction, City of	X		X	X			X
Mt. Washington, City of	X		X	X			X
Pioneer Village, City of	X		X	X			X
Shepherdsville, City of	X		X	X			X
Henry County	X	X	X	X	X	X	X
Campbellsburg, City of	X		X	X			X
Eminence, City of	X		X	X			X
New Castle, City of	X		X	X			X
Pleasureville, City of	X		X	X			X
Smithfield, City of	X		X	X			X
Oldham County	X	X	X	X	X	X	X
Crestwood, , City of	X		X	X			X
Goshen, City of	X		X	X			X
LaGrange, City of	X		X	X			X
Orchard Grass Hills, City of	X		X	X			X
Pewee Valley, City of	X		X	X			X
River Bluff, City of	X		X	X			X
Shelby County	X	X	X	X	X	X	X
Shelbyville, City of	X		X	X			X
Simpsonville, City of	X		X	X			X
Spencer County	X	X	X	X	X	X	X
Taylorsville, City of	X		X	X			X
Trimble County	X	X	X	X	X	X	X
Bedford, City of	X		X	X			X
Milton, City of	X		X	X			X
KIPDA	X	X	X	X	X	X	X

OVERALL SUMMARY OF MULTI-JURISDICTIONAL PLANNING PROCESS

The KIPDA Hazard Mitigation Committee had oversight of each phase of the planning process, guided the sub-committees in each county, and reviewed the risk assessment findings and mitigation strategy input of subcommittees and plan development staff.

The KIPDA Hazard Mitigation Committee was responsible for establishing plan maintenance procedures and approved of plan content. The local mitigation committees (Subcommittees of the Regional Committee) participated in each phase of the planning process of the original KIPDA Regional Hazard Mitigation Plan. They assisted in establishing the public involvement and processes and procedures. During the development of the Hazard Profiles and their associated risk assessment, they provided the Regional Mitigation Committee and the KIPDA staff with historical and technical information to assist in hazard identification, profiling of events, and the vulnerability assessment. The subcommittees reviewed all information as researched by the KIPDA staff for their communities prior to submission to the Regional Mitigation Committee and inclusion in the plan. The Local Mitigation committees designated a chairperson in each county assisted by Eric Dennison, Public Administration Specialist, with the Kentuckiana Regional Planning and Development Agency. Each of the local mitigation committee meetings was held in each county.

All meetings were open to the public and their input during these committees impacted the plan and is documented throughout the plan sections. Each meeting was posted on the website and local papers including *(See Appendix A)*:

Newspapers and Website from Each County						
Bullitt	Henry	Oldham	Shelby	Spencer	Trimble	KIPDA
The Pioneer News	Henry County Local	The Oldham Era	The Sentinel-News	The Spencer Magnet	The Trimble Banner	http://www.kipda.org

Meeting Documentation notes, minutes, maps, attendance records, and information reviewed has been documented for all meetings and has been filed at the KIPDA office.

For the update of the KIPDA Regional Hazard Mitigation Plan, the content of the initial plan was improved upon. County Emergency Managers were tasked with gathering specific information and data which was returned to KIPDA staff. They were responsible for conducting the Local Subcommittees if they determined they were needed and all attended the Regional Committee meetings with additional county employees such as the PVA. *(See Appendix D)*

PREREQUISITES

The KIPDA Regional Hazard Mitigation Committee met on the following dates and locations:

March 20, 2015	-	KIPDA
July 23, 2015	-	KIPDA
October 22, 2015	-	KIPDA
January 7, 2016	-	KIPDA

Previous dates for the 2006 and 2011 KIPDA Regional Hazard Mitigation Committee include:

January 7, 2004	-	KIPDA
March 12, 2004	-	KIPDA
June 18, 2004	-	KIPDA
September 14, 2004	-	KIPDA
June 25, 2010	-	KIPDA
August 17, 2010	-	KIPDA
September 28, 2010	-	KIPDA
November 4, 2010	-	KIPDA

Local mitigation committees for each county occurred:

May 18, 2015	-	Trimble County
June 6, 2015	-	Spencer County
July 3, 2015	-	Oldham County
October 30, 2015	-	Bullitt County
September 15, 2015	-	Shelby County
September 16, 2015	-	Henry County

Previous local mitigation committee meetings met:

February 12, 2004	-	Henry County
February 13, 2004	-	Shelby County
February 16, 2004	-	Spencer County
March 16, 2004	-	Oldham County
March 19, 2004	-	Trimble County
April 28, 2004	-	Bullitt County
June 16, 2010	-	Trimble County

3 THE PLANNING PROCESS

Mitigation planning is the systematic process of organizing technical, financial, and human resources, learning about the hazards that can affect a community, setting clear goals to reduce a community's vulnerability to identified hazards, and implementing an effective mitigation strategy. Laying the foundation of an effective mitigation planning process is one of many steps to building a more resilient community.

Capturing in a narrative what is accomplished during the planning process is very important for three reasons:

- By documenting steps as they are completed with reference to the planning timeline, the Planning Team can quickly determine what needs to be done.
- The narrative becomes a record of how and why the plan was prepared.
- Documenting the planning process is a requirement under the rule.

The following section demonstrates the accomplishment of the KIPDA Regional Hazard Mitigation Plan Update process by describing the Planning Team (KIPDA Regional Hazard Mitigation Committee), County-wide meetings, individual EMA director meetings, public participation, and the incorporation of existing planning mechanisms.

Documentation of the Planning Process

A comprehensive description of the planning process informs citizens and other readers about the manner in which the plan was developed. Retention of leadership, staffing, and in-house knowledge may fluctuate over time. Therefore, the description of the planning process serves as a permanent record that explains how decisions were reached through stakeholder input. For this process, many different stakeholders were used to represent the diversity of knowledge within the KIPDA region.

> §201.6(b): The plan shall include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how local agencies participated.

Planning Team

The KIPDA Regional Hazard Mitigation Plan was prepared by the KIPDA Regional Hazard Mitigation Committee with aid from the University of Louisville Center for Hazards Research and Policy Development (CHR).

The Planning Team oversaw the plan development strategy, coordination of the development process for the strategy, and the methodology used throughout the plan. The following is a description of the Planning Team, comprised of KIPDA employees, elected county Judge Executives and county Emergency Managers:

Name	Representing	Title
Honorable Melanie Roberts	Bullitt	Bullitt County Judge/Executive
Mike Phillips	Bullitt	Bullitt County Emergency Management
Honorable John Logan Brent	Henry	Henry County Judge/Executive
Jody Rucker	Henry	Henry County Disaster & Emergency Services
Honorable David Voegele	Oldham	Oldham County Judge/Executive
Kevin Nuss	Oldham	Oldham County Emergency Management
Honorable Rob Rothenburger	Shelby	Shelby County Judge/Executive
Paul Whitman	Shelby	Shelby County Emergency Management
Honorable John Riley	Spencer	Spencer County Judge/Executive
Jeff Coulter	Spencer	Spencer County Hazard Management
Honorable Jerry Powell	Trimble	Trimble County Judge/Executive
Ronnie McCane	Trimble	Trimble County Hazard Management
Rick Bobo	KYEM	Region IV
Jarrett Haley	KIPDA	Director of Public Administration
Eric Dennison	KIPDA	Public Administration Specialist
Adam Forseth	KIPDA	GIS Department Manager
Michael Clair	KIPDA	GIS Specialist

The planning process in theory is linear, but in practice became a series of iterations as the Planning Team worked to execute a system that accommodated multiple regional and county wide meetings. The process began in March of 2015 and was organized in the following manner:

THE PLANNING PROCESS

	Element	Mar-2015-	Jun-2015-	Sep-2015-	Dec-2015-	Jan-2016-
1	**Complete Planning Process**					
1a	Regional Committee Meeting #1 Purpose: Kick-off and data collection	3/20				
1b	Regional Committee Meeting #2 Purpose: Risk assessment results		7/23			
1c	Regional Committee Meeting #3 Purpose: Mitigation Funding and Project Examples			10/22		
1d	Regional Committee Meeting #4 Purpose: Draft plan review, plan maintenance					01/06
2a	County Meetings/EMA Director Stakeholder/Public *Purpose: Data collection, mitigation strategy- Bullitt County*		05/15	10/23	12/09	
1e	County Meetings/EMA Director Stakeholder/Public *Purpose: Data collection, mitigation strategy- Henry County*		05/15	09/29		03/22
1e	County Meetings/EMA Director Stakeholder/Public *Purpose: Data collection, mitigation strategy- Oldham County*		05/12	07/02		01/07
1e	County Meetings/EMA Director Stakeholder/Public *Purpose: Data collection, mitigation strategy- Shelby County*		05/05	09/16		02/24
1e	County Meetings/EMA Director Stakeholder/Public *Purpose: Data collection, mitigation strategy- Spencer County*		05/26	06/05	12/08	
1e	County Meetings/EMA Director Stakeholder/Public *Purpose: Data collection, mitigation strategy- Trimble County*		05/07	05/18	11/12	
2	**Update Risk Assessment**					
2a	Review and Update Identify and Profile Section *Purpose: Show historical hazard events*	03/01-07/01				
2b	Review and Update Vulnerability Assessment *Purpose: Demonstrate areas of vulnerability*	03/01-10/01				
3	**Update Mitigation Strategy**					
3a	Review and Update Goals and Actions *Purpose: Demonstrate mitigation successes*		06/01-12/01			
4	**Update Plan Maintenance Process**			09/01-12/01		
5	**Submit Draft Plan for Stakeholder Review**				01	
6	**Submit for Approval to State**				01	
7	**Submit for Approval to FEMA**					04

Public and Local Agency Involvement

In order to enable the development of mitigation measures that are supported by a broader cross section of public and private stakeholders, and reflects the needs of the community, opportunity for open public involvement was integrated into the planning process. Opportunities were created and achieved by the creation and participation of the local mitigation subcommittees in each county. Public officials in each county and city participated in the mitigation subcommittee meetings and the Regional Mitigation Planning Committee meetings. All local subcommittee meetings and Regional Mitigation Committees were open to the general public and provided for comments from the citizenry of each jurisdiction.

While the planning team was responsible for leading and facilitating the plan update process, input from steering committee members and other stakeholder groups ensured that the plan is truly representative of the university as a whole. To encourage public participation, the KIPDA Regional Hazard Mitigation Planning Committee posted meeting information through publicly accessible web and social media mechanisms, sent invitations and reminders via email and made follow-up telephone calls to key stakeholders groups. Also, notice of county sub-committee meetings were posted in the local newspapers of each county *(See Appendix B).*

Various representatives of key stakeholder groups served on the Regional Planning Committee for the plan update. The committee includes a cross-section of Emergency Management Directors from each county, elected public officials such as County Judge Executives, and other local, regional, and state agencies; all that represent the community-at-large.

After the planning team identified local stakeholder groups to be represented on the committee, an email was sent to each, requesting assistance and participation in the plan update process.

The request asked that each stakeholder group assign at least one liaison to work on the KIPDA Regional Hazard Committee. With a schedule of four steering committee meetings throughout the plan update process; all liaisons were invited to attend. The purpose of each Regional committee and sub-committee meeting varied, but the main objective was to set a stage ripe for productive discussion among members that revolved around strengthening the culture of mitigation in the KIPDA region.

The stakeholders and their agencies were key contributors to the development of the plan, not only having attended publicly advertised KIPDA Regional Committee meetings, but also in their role as active providers of data and information, which were captured through correspondence outside of committee meetings, by email, phone, and six individual stakeholder meetings and 12 county wide subcommittee meetings held throughout the plan update process *(See Appendix B).*

To ensure plenty of stakeholder involvement, the planning team conducted 4 publicly advertised Regional Planning Committee meetings, in addition to 6 individual stakeholder meetings and 12 countywide subcommittee meetings; all allowing for an interactive and inclusive planning process to take place among representatives of the KIPDA region and other concerned organizations. The above table lists the dates of Planning Committee Meetings, EMA Director Meetings and Countywide Meetings.

KIPDA HAZARD MITIGATION COMMITTEE REGIONAL MEETINGS

KIPDA Regional Planning Committee Meeting I: March 20, 2015

In general, the main purpose of the first KIPDA Regional Planning Committee meeting was to introduce members to the plan update process, to start a discussion on hazardous areas and events that have occurred over the last five years, and to work on determining data needs and availability. The meeting participants engaged in dialogue revolving around key hazards that occur at the KIPDA region. Members also shared sources of applicable data (Geographic Information Systems (GIS) files, official reports, plans, surveys, etc.) to which their respective agencies maintain and made arrangements to share with the KIPDA Regional Hazard Mitigation Committee for the purpose of informing the risk assessment section of the plan. The Committee also voted on methodology and time lines for the planning process.

Sequence of Events

Mr. Nick Grinstead, Planning Grants Manager at the University of Kentucky's Hazard Mitigation Grant Program, presented the changes for the third Hazard Mitigation Plan and what FEMA will be looking for from KIPDA. Mr. Grinstead said the plan should include breadth of participation, project lists, and validation of risk assessment. Mr. Grinstead implied FEMA is looking for new projects and wants every community to have a list of projects that they can fund and that can be funded through other grants as well. Part of KIPDA's role will be to identify capacities to funds projects. KIPDA will also be responsible for conducting a risk assessment and validating the risk assessment with examples, or narratives, of major disasters. This will provide assistance in funding mitigation goals.

Mr. Dennison presented the planning process and spoke about changes to the third iteration of the plan. Mr. Dennison spoke on adding the Flood Mitigation Assistance (FMA) grant as a requirement portion to the updated plan. This also included a presentation on the Community Rating System (CRS) and how this could aid in flood mitigation.

Mr. Dennison discussed preliminary Hazard profiles for the region, and creating a time table to have individual stake holder meetings with each county's Emergency Management Director to go over a review of past mitigation actions. Mr. Dennison also stressed the need for community involvement by suggesting countywide meetings that included all agencies that dealt with hazard mitigation to have a stake in the 2016 KIPDA Regional Hazard Mitigation Plan.

The KIPDA Regional Hazard Mitigation Committee voted on the methodology to be used for the Risk Assessment, which used the Hazard and Exposure Scores used in the KY Commonwealth Enhanced Hazard Mitigation Plan and CHR's previous plans. This was accepted as appropriate to ensure parallel documents that tied into the Kentucky Commonwealth Plan.

The KIPDA Regional Hazard Mitigation Committee elected officers for the board, and selected Shelby County Judge Executive Rob Rothenburger as chairman and Bullitt County EMA Director Kevin Nuss as the vice chairman of the committee. Both were chosen to represent the constituents of the KIPDA region as in an elected official and EMA director, both who are key representative stakeholders in the 2016 KIPDA Regional Hazard Mitigation Plan. *(See Appendix B and E)*

Regional Hazard Committee Meeting II: July 23, 2015

In general, the purpose of the second meeting was to present the KIPDA Regional Planning Committee members with the preliminary results of the risk assessment, as a basis to have an informed discussion about mitigation measures that are needed, in-progress, or completed for the purpose of reducing the university's vulnerability to hazard events, as identified in the risk assessment. Ultimately, this meeting served as the stage for updating the mitigation strategy, and preempted the need for several individual stakeholder meetings to occur over the next month that ensured a thorough updating of the five-year action plan.

<u>Sequence of Events</u>

Mr. Dennison started the meeting discussing the Risk Assessment and data.

The presentation went over findings of the Risk Assessment, which included the following 11 Hazards:

1. Earthquake
2. Wildfire/Forest Fire
3. Drought
4. Dam Failure
5. Tornado
6. Severe Storm
7. Severe Winter Storm
8. Flood
9. Karst/Sinkhole
10. Hailstorm
11. Landslide

It was decided that based on findings of evidence and the effects of hazard mitigation, the hazard profile of Extreme Temperature should be added to the risk assessment in order to properly plan mitigation actions for the events. While this report does not include the effects of Climate Change, the community is seeing more temperature related instances with extreme heat and cold. This conclusion was based on the KY 2013 Enhanced Plan, which included the Extreme Heat Hazard Profile.

The mapping of the risk assessment was completed by Michael Clair and Adam Forseth, of KIPDA's GIS department. The presentation went on to show the vulnerabilities to each county according to the Risk Assessment Data. All eleven of the presented vulnerabilities showed the risk to the area and the risk to critical facilities.

The meeting went over the planning process in more depth and voted on dates of next meetings and included more county wide meetings. The presentation of the risk assessment helps justify the mitigation section. For example, in the KIPDA region, tornados pose one of the greatest risks to the area (See Section 4, Risk Assessment: Hazard Profile Tornado). Since this hazard profile stands out as one of the highest damaging events, it only makes sense to include mitigation actions that prevent and help protect the county and its populace. *(See Appendix B and E)*

Regional Hazard Committee Meeting III: October 22, 2015

In general, the purpose of the third regional meeting was to present the KIPDA Regional Planning Committee members with the preliminary findings of the county wide held meetings, where mitigation actions were solicited from community members including first responder agencies such as police, fire, search and rescue, emergency management. *(See Appendix B and E)*

Sequence of Events

The meeting began with an approval of prior meeting minutes for the KIPDA Regional Hazard Mitigation Committee.

Emily Bartee, from KYEM, then gave a presentation on CHAMPS, the Community Hazard Assessment Mitigation Planning System, where she discussed how the program can be best used to help local emergency managers in putting planning ideas into the centralized database. The main goal of utilizing CHAMPS is to give local emergency managers tools to develop mitigation projects. This not only will expand the local planning mechanisms, it also becomes justification for mitigation projects for future events.

Mr. Dennison then gave a power point presentation on the mitigation actions that have come from the county wide meetings. While starting with a review of the plan, the risk assessment, the mitigation presentation included findings that incorporated new techniques and mitigation actions, while keeping and maintaining past successful mitigation actions from the previous plans. Risk Map and the inclusion of social media as hazard mitigation tools for communities was one of the biggest highlights of the presentation and were included as possible mitigation actions in the 2016 plan.

The plan also discussed the remaining match and discussed options for implementing planning procedures to increase stakeholder participation. It was decided that the KIPDA Regional Hazard Mitigation Committee would invoke more county-wide based meetings to discuss the findings of the updated 2016 KIPDA Hazard Mitigation Plan, and share with each community what mitigation techniques that came forth due to stakeholder participation, including more LEPC meetings and possibly school board meetings.

The KIPDA Regional Hazard Mitigation Committee also voted on the next meeting date and future planning process opportunities.

Regional Hazard Committee Meeting IV: January 7, 2016

This meeting is to discuss the draft process and to vote on acceptance of the meeting. A general presentation of match dollars, meetings, and future process will be discussed. *(See Appendix B and E)*

Sequence of Events

The meeting began with an approval of prior meeting minutes for the KIPDA Regional Hazard Mitigation Committee.

Eric Dennison began the meeting with updating the Committee on the Draft Status, which was available on line since the start of December, 2015. The focus on the meeting was to adopt the draft and see what elements were missing from the current plan.

A plan outline was given, with a review of each section, including a refresher on statistics from the area, and mitigation techniques from the County-wide meetings.

Besides a refresher on the various sections, the planning process and plan maintenance were discussed for future maintenance. It was decided that yearly meetings would occur, as well with local emergency planning committees (LEPC) as vehicles for planning maintenance.

The mitigation section was examined and the Committee voted to successfully adopt the plan.

Future meetings were addressed and will be decided upon once a formal review from FEMA is complete, including a meeting that will seek to formally adopt the 2016 plan.

INDIVIDUAL STAKEHOLDER MEETINGS

While steering committee meetings provided the opportunity for discussion and input across multiple agencies/sectors at one time, individual stakeholder meetings allowed the planning team to gather detailed and vital information from specified stakeholders to ensure the most thorough plan update. The planning team held as many meetings as were needed, most often for the purpose of identifying critical facilities, collecting/identifying sources of data to inform the risk assessment, and to perform a detailed evaluation an update of the 2011 mitigation strategy. One of the biggest components of the planning process included individual meetings with Emergency Management Directors from each county within the KIPDA Region. These meetings focused on the 2011 KIPDA Hazard Mitigation Plan and updating past mitigation actions. *(See Appendix D)* Many hours were spent organizing, planning, and revisiting the previous plan in order for the update, including phone calls, internet communication, and individual meetings. Mr. Dennison communicated with each individual Emergency Management Director and set up meetings to discuss the future of the plan.

It should be noted that each meeting was contained the same agenda, where the 2011 plan was discussed, past mitigation actions were assessed, reassessment of jurisdictional capabilities and agencies, and new actions and needs. On a whole, these meetings were kept uniform in discussion, as a main mechanism of updating the plan and discussing future meetings. This was paramount to the plan, as a way to show what tools and mitigation actions were completed in the 2011 plan, plan maintenance, and where the community stood in terms of services going forward.

Bullitt County- May 15, 2015

Bullitt County Emergency Management Director Michael Phillips met with KIPDA Public Administration Specialist Eric Dennison on May 15, 2015.

Prior to the meeting, the Director was given copies of past occurrences, mitigation actions, and the risk assessment. He was then asked to assess the successes of the 2011 plan against the planned mitigation actions. Each objective and goal was analyzed and then updated to see what the current needs where. Appendix D contains the outcomes of those meetings.

Many hours were spent collecting data, reassessing the 2011 plan, and determining what direction to take the plan. It was decided, in part, to continue with some of the previous mitigation actions, and to update those actions accordingly as needed. The need arose to incorporate a centralized database for future mitigation actions, and was decided to become an integral part of the next planning cycle. CHAMPS, the Community Hazard Assessment and Mitigation Planning System is offered as a free resource to Kentucky communities to enhance disaster management efforts based on the concept of understanding risk, then mitigating to reduce loss of life and property.

The individual meeting dictated the course of the regional meetings and the county wide meetings by setting a discourse on the path with direct interpretation of the mitigation plan with those emergency managers directly involved with mitigating damages within the region.

Henry County- May 05, 2015

Henry County Emergency Management Director Jody Rucker met with KIPDA Public Administration Specialist Eric Dennison on May 5, 2015.

Prior to the meeting, the Director was given copies of past occurrences, mitigation actions, and the risk assessment. He was then asked to assess the successes of the 2011 plan against the planned mitigation actions. Each objective and goal was analyzed and then updated to see what the current needs where. Appendix D contains the outcomes of those meetings.

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The individual meeting dictated the course of the regional meetings and the county wide meetings by setting a discourse on the path with direct interpretation of the mitigation plan with those emergency managers directly involved with mitigating damages within the region.

Oldham County- May 12, 2015

Oldham County Emergency Management Director Kevin Nuss met with KIPDA Public Administration Specialist Eric Dennison on May 12, 2015.

Prior to the meeting, the Director was given copies of past occurrences, mitigation actions, and the risk assessment. He was then asked to assess the successes of the 2011 plan against the planned mitigation actions. Each objective and goal was analyzed and then updated to see what the current needs where. Appendix D contains the outcomes of those meetings.

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The individual meeting dictated the course of the regional meetings and the county wide meetings by setting a discourse on the path with direct interpretation of the mitigation plan with those emergency managers directly involved with mitigating damages within the region.

Shelby County- May 05, 2015

Shelby County Emergency Management Director Paul Whitman met with KIPDA Public Administration Specialist Eric Dennison on May 5, 2015.

Prior to the meeting, the Director was given copies of past occurrences, mitigation actions, and the risk assessment. He was then asked to assess the successes of the 2011 plan against the planned mitigation actions. Each objective and goal was analyzed and then updated to see what the current needs where. Appendix D contains the outcomes of those meetings.

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The individual meeting dictated the course of the regional meetings and the county wide meetings by setting a discourse on the path with direct interpretation of the mitigation plan with those emergency managers directly involved with mitigating damages within the region.

Spencer County- May 26, 2015

Spencer County Emergency Management Director Jeff Coulter met with KIPDA Public Administration Specialist Eric Dennison on May 26, 2015

Prior to the meeting, the Director was given copies of past occurrences, mitigation actions, and the risk assessment. He was then asked to assess the successes of the 2011 plan against the planned mitigation actions. Each objective and goal was analyzed and then updated to see what the current needs where. Appendix D contains the outcomes of those meetings.

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The individual meeting dictated the course of the regional meetings and the county wide meetings by setting a discourse on the path with direct interpretation of the mitigation plan with those emergency managers directly involved with mitigating damages within the region.

Trimble County- May 07, 2015

Trimble County Emergency Management Director Ronnie McCane met with KIPDA Public Administration Specialist Eric Dennison on May 7, 2015.

Prior to the meeting, the Director was given copies of past occurrences, mitigation actions, and the risk assessment. He was then asked to assess the successes of the 2011 plan against the planned mitigation actions. Each objective and goal was analyzed and then updated to see what the current needs where. Appendix D contains the outcomes of those meetings.

Many hours were spent collecting data, reassessing the 2011 plan, and determining what direction to take the plan. It was decided, in part, to continue with some of the previous mitigation actions, and to update those actions accordingly as needed. The need arose to incorporate a centralized database for future mitigation actions, and was decided to become an integral part of the next planning cycle. CHAMPS, the Community Hazard Assessment and Mitigation Planning System is offered as a free resource to Kentucky communities to enhance disaster management efforts based on the concept of understanding risk, then mitigating to reduce loss of life and property.

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Bullitt County LEPC 12/09/2015

COUNTY-WIDE MEETINGS

Multiple county wide meetings allowed the planning team to gather detailed and vital information from specified stakeholders to ensure the most accurate plan. The focus of each county meeting followed a specific agenda.

The KIPDA Regional Hazard Mitigation committee felt it was paramount to include the input of the local communities involved by inviting and presenting to a diverse group of stakeholders from the public sector, elected officials, the private sector, and local citizens.

At each of these stakeholder meetings, the KIPDA Regional Hazard Mitigation Committee felt the best way to seek input on the plan was to present risk assessment data and solicit input from the community regarding the hazards that had the largest effect on the county. Each person was asked to comment on mitigation actions that would impact the community.

It was felt that each specific agency, organization, or citizen could voice their concerns and comment on mitigation issues they dealt with most, and their input would be the most beneficial to the plan since they are the ones who deal with the repercussions of those actions on a daily basis.

It should be noted that each meeting was contained the same agenda, where in the 2011 plan was discussed, past mitigation actions were assessed, reassessment of jurisdictional capabilities and agencies, and a discussion of new actions and needs. On a whole, these meetings were kept uniform in discussion, as a main mechanism of updating the plan and discussing future meetings. This was paramount to the plan, as a way to show tools and mitigation actions, plan maintenance, and where the community stood in terms of services going forward. The biggest change of the planning process was to solicit mitigation ideas from county meetings to give a greater spectrum and place a greater importance on stakeholder participation.

The KIPDA Regional Hazard Mitigation Committee then proceeded to conduct further Countywide meetings to update each stakeholder on the findings from the first round of countywide meetings. The presentations giving were to continue public involvement from stakeholders and to show how they help in updating the KIPDA Regional Hazard Mitigation Plan of 2016.

The following pages give summaries of each meeting, as each was crucial to the planning process:

Bullitt County- October 30, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

Sequence of Events

The KIPDA Regional Hazard Mitigation Committee felt the best vehicle for reaching the greatest number of stakeholders to participate in the planning process would be at each county's Local Emergency Planning Committee (LEPC). Using this event helped reach all involved in the communities safety.

Mr. Dennison began the presentation with a brief summary of the Risk Assessment portion of the 2011 and 2016 KIPDA Regional Hazard Mitigation Plan Updates, followed by a conversation of mitigation techniques. The meeting discussed the twelve (12) hazard profiles of the region (see Risk Assessment), the cost associated with each event, and how each event affected the county by critical facility and population.

For plan purposes, mitigation techniques were broken down to six different archetype sections:

1. Prevention
2. Property Protection
3. Natural Resource Protection
4. Structural Projects
5. Emergency Services
6. Public Information and Awareness

After a discussion of these archetypes, each stakeholder participant was asked to name a specific mitigation action for each archetype for the county. This opened up a group discussion, where the meeting participants talked about specific issues and mitigation actions that could aid the county.

While many ideas arose *(See Appendix C)* dealing with mitigation, the most discussed mitigation technique came from the use of social media. In the past 5 years, over 68% of Americans have smart cell phone access, and 71% of online adult users access Facebook (Stats according to Facebook). From a Public Information and Awareness archetype, this means of distribution hits a large number of the population and can serve as a warning and mitigation for more recipients than radio or television.

The meeting adjourned with a thoughtful discussion of future mitigation techniques and an agreement for greater community participation. The stakeholder process of soliciting mitigation techniques has become an invaluable too in writing and updating the 2016 KIPDA Regional Hazard Mitigation Plan.

Henry County- September, 22, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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Oldham County- July 02, 2015

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Shelby County- September 16, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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Spencer County- June 06, 2015 & June 10, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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Trimble County- May 08, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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FOLLOW UP MEETINGS- POST MITIGATION AND RISK ASSESMENT FINDINGS

Mr. Dennison gave a presentation to each of the county's LEPC meetings. In this meeting, The KIPDA Regional Hazard Mitigation Committee shared the findings and results of the Risk Assessment and the findings of the mitigation actions that were solicited from each LEPC meetings. The purpose was to keep stakeholders from each county engaged in the planning process of the KIPDA Region Hazard Mitigation Plan Update and to encourage future participation for future events.

Appendix B contains a detailed list of all agencies, organizations, and citizens that attended each meeting.

Bullitt County- December 9, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

Sequence of Events:

Mr. Dennison greeted each participant with thanks for their commitment and a brief review of how stakeholder participation was vital to the entire process, especially the planning process.
A more detailed review of the Risk Assessment was presented, showcasing population trends, disaster mitigation reviews, and damage assessments of each profile, with emphasis on the individual county.

The mitigation action discussion began with a review of each project type and additions from the initial county wide meetings. This overview showcased mitigation actions that had been solicited by the community. In this presentation, the stakeholders were reminded that their direct participation was indeed implemented into the plan, and that each stakeholder was crucial to the planning process.

It should be noted that each county meeting, in every single one, one of the largest mitigation actions to come forth was the incorporation of new technologies and social media to aid in mitigation practices.

After discussing detailed mitigation actions, a discussion of community match was considered, followed by a question and answer session.

Henry County- March 22, 2016

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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After discussing detailed mitigation actions, a discussion of community match was considered, followed by a question and answer session.

Oldham County- January 7, 2016

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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After discussing detailed mitigation actions, a discussion of community match was considered, followed by a question and answer session.

Shelby County- February 24, 2016

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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Spencer County- December 8, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

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After discussing detailed mitigation actions, a discussion of community match was considered, followed by a question and answer session.

Trimble County- November 12, 2015

The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings were combined with each county Local Emergency Planning Committees, which included members from various first responder agencies, public officials, private businesses, and citizens. Representation included Emergency Managers, County Fiscal Court, County Judge Executives, Police, Sheriff, Fire, Search and Rescue, Planning and Zoning, Red Cross, National Weather Service, Kentucky State Police, private businesses and private citizens.

Sequence of Events:

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OTHER MEETINGS

Center for Hazardous Research –February through July 2015

The KIPDA Regional Hazard Mitigation Committee (RHMC) spoke extensively with the Center for Hazardous Research (CHR) throughout the formative stages of the planning process. Relying on CHR's vast expertise, they helped develop a strategy to most effectively plan and solicit involved stakeholder participation.

While some meetings included just phone conversations, planning and layout strategies to update the plan were heavily discussed, including looking at other plans and conforming the 2016 KIPDA Regional Hazard Mitigation Plan to the 2013 Kentucky Enhanced Hazard Mitigation Plan.

CHR shared all available data and techniques with the KIPDA Regional Hazard Mitigation Committee in regards to updating the best plan possible. From their expertise, the Update was able to take shape and utilize a common layout and theme.

Regional Planning Council –October 13, 2015
Kentucky Association of Mitigation Managers –January 14, 2016
KIPDA Board Meeting –January 28, 2016
Bluegrass Mitigation Managers Meeting –January 19, 2016

The four meetings helped enable local individuals and governments of the Kentucky portion of the KIPDA region to identify, evaluate, and recommend regional planning needs. The KIPDA Regional Hazard Committee met with stakeholders from throughout the county. These meetings included an overview of the 2016 update beginning with the explanation of hazard mitigation, the planning process, how planners approach the update process, then an overview of the Risk Assessment and the Mitigation Measures, including soliciting participation.

OPPORTUNITY FOR PUBLIC COMMENT

Opportunity for Public Comment was provided in two ways. First, Regional Mitigation Committee meetings and county wide meetings were open to the public and were advertised Public meetings to kick off the planning process, as well as continue to encourage public involvement in the planning process, and a variety of means to reach the public through the KIPDA monthly meeting notice. *(See Appendix A)*

Website Notification and Local Papers:

Newspapers and Website from Each County and KIPDA						
Bullitt	Henry	Oldham	Shelby	Spencer	Trimble	KIPDA
The Pioneer News	Henry County Local	The Oldham Era	The Sentinel-News	The Spencer Magnet	The Trimble Banner	http://www.kipda.org

Documentation is included in each section how public input and information impacted the plan. Secondly, subcommittee meetings were held at a location suitable for the public in each respective county to invite citizens from those jurisdictions to participate in the mitigation planning process. In some instances, subcommittee meetings were merged with other pre-existing local emergency planning meetings.

A public meeting will be held prior to plan approval following comments received from the State Hazard Mitigation Officer and the public from the draft review. Public meetings will be advertised via local newspapers.

The draft was available for public download on the KIPDA website. KIPDA staff and the Regional Hazard Mitigation Committee were to review any comments received to determine their impact on the plan content.

OPPORTUNITY FOR PUBLIC/PRIVATE PARTICIPATION

KIPDA staff was responsible for informing each jurisdiction in the region of the new requirements and impacts the Robert T. Stafford Disaster Relief and Emergency Assistance Act have on their respective jurisdiction. KIPDA staff reviewed each jurisdiction and neighboring government agency as well as non-profit organizations that may be affected by the mitigation plan. These entities were invited to attend the Regional Mitigation Planning committee meetings as well as participate in subcommittee meetings in their respective counties. During this process no participation from these entities was achieved. However, both the Regional committee as well as the county subcommittees invited staff as needed from other local departments and agencies to provide input and information through the planning process. This process proved more effective than letters to other agencies. Also, during the selection of the local county subcommittee members, the mayors and county judges considered a wide array of local people to serve on these committees. These people included magistrates, disaster relief organizations, floodplain managers, emergency management personnel, city council members, building inspectors and educational institutions, fire and police departments, local businesses, private and non-profit organizations, and private citizens.

In addition to local resources, appropriate State and Federal representatives were notified and invited to attend scheduled RHMC meetings through emails and telephone calls. During the planning process, those participating on the regional mitigation committee were the Kentucky Emergency Management Area 5 Manager Rick Bobo, Josh Human, University of Louisville's Center for Hazard's Research (CHR) Project Manager, and Doug Eades, KYEM. These three individuals offered expertise in information on past disasters and sources of flood mitigation funding that allowed the mitigation planning committees to choose actions and strategies that work and are effective in reducing potential losses. For the update of the plan, Josh Human and staff at the CHR were a valuable source for information and provided guidance into the risk assessment and format of the plan.

KIPDA staff was responsible to educate, train, and inform the committee members and participants about the mitigation planning goals and notify members of meetings and schedules as needed.

REVIEW AND INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS, AND TECHNICIAL INFORMATION

KIPDA staff reviewed relevant mitigation material, including current mitigation studies and reports as well as the Comprehensive Economic Development Strategies plan (CEDS) completed for the KIPDA region. KIPDA staff researched and reviewed relevant studies, reports, technical information along with GIS information obtained through local communities, State and Federal agencies, as well as information that was collected from other studies that KIPDA has conducted. The information reviewed included information obtained from universities and National Data sources related to natural hazards. As appropriate, these materials were incorporated into the plan and are documented throughout the plan.

After discussions with Josh Human with the Center for Hazards Research, the Regional Hazard Mitigation Committee decided to use the State plan as a template for the update in an effort to create uniformity between the Regional and State Plan. One of the complaints the Committee had with the initial plan was its flow, the change of format directly addressed this deficiency. Additionally, methodology for risk assessments of the identified hazards for the updated plan follows that established in the State Plan to further the uniformity between the plans.

All research and data collected by KIPDA staff was presented to the Regional Hazard Mitigation Committee for their approval for final inclusion in the KIPDA Regional Hazard Mitigation Plan.

The planning team reviewed several local, regional, and state data, and planning mechanisms to identify programs and policies that currently promote or could potentially further mitigation initiatives for the KIPDA Region. Emergency Managers from each county and external agencies were requested to review common mitigation strategies, and inconsistencies and conflicts in policies, plans, programs, and (if applicable) regulations.
The following is a list of data, reports, plans, and manuals containing information that was incorporated into plan:

The planning team reviewed several local, regional, and state data, and planning mechanisms to identify programs and policies that currently promote or could potentially further mitigation initiatives for the KIPDA Region. Emergency Managers from each county and external agencies were requested to review common mitigation strategies, and inconsistencies and conflicts in policies, plans, programs, and (if applicable) regulations.

The following is a list of data, reports, plans, and manuals containing information that was incorporated into plan:

Local Mitigation Plan Existing Plans and Reports

§201.6(b): The plan must address how existing plans, studies, reports, and technical information were reviewed, and if appropriate, incorporated into the plan.

PLANS AND MANUALS

- Kentuckiana Planning and Development
  Agency (KIPDA) Hazard Mitigation Plan 2011
- Severe Weather communication policies and procedures from each County
- Louisville Downtown Development Plan
- Louisville Metro Hazard Mitigation Plan 2013
- Kentucky Enhanced Hazard Mitigation Plan 2013
- University of Kentucky Hazard Mitigation Plan 2015
- Kentucky State University Hazard Mitigation Plan 2014
- Kentucky Community and Technical College System Hazard Mitigation Plan 2013
- FEMA- State and Local Mitigation How-To-Guide- Developing the Mitigation Plan
- FEMA- Local Multi-Hazard Mitigation Planning Guidance
- FEMA- Connecting Floodplain Management to Hazard Mitigation Plans
- § 201.6 Local Mitigation Plans
- FEMA- Mitigation Planning Workshop for Preparing and Reviewing Local Plans
- FEMA Publication 386-2, *Understanding Your Risk, section 1, Identify Hazards*
- FEMA- Hazard Mitigation Assistance Guidance- 2015
- FEMA- Multi-Jurisdictional Mitigation Planning: State and Local Mitigation Planning 386-5

DOCUMENTATION OF THE PLANNING PROCESS

The mitigation planning process included Public involvement and the tasks of developing the risk assessment, mitigation strategies, plan maintenance, and the process of plan adoption.

Each jurisdiction was involved in the planning process and composition of the plan. Public Participation is defined for this plan as an opportunity provided for each jurisdiction and its citizens to participate in the planning process. The opportunity for Public participation was offered and achieved through attendance in local mitigation committee meetings, regional mitigation committee meetings, involvement in the planning, risk assessment, plan maintenance sections of the plan as well as through reviewing presentations of findings of the plan and adoption of the plan. Every jurisdiction in the KIPDA region participated in the local mitigation committee in each county.

The Regional Mitigation Planning Committee had oversight of each phase of the planning process, guided the subcommittees in each county, and reviewed the risk assessment findings and mitigation strategy input of the KIPDA Staff and subcommittees. The Regional Mitigation Committee was responsible for establishing plan maintenance procedures and approval of plan content.

The local mitigation committees participated in each phase of the planning process during the development of the original KIPDA Hazard Mitigation Plan. These committees assisted in establishing the public involvement processes and procedures for plan development. During the development of the Hazard Profiles and risk assessment they provided the Regional Mitigation Committee and the KIPDA staff with historical and technical information to assist in hazard identification, profiling of events, and the vulnerability assessment. The subcommittees reviewed all information as researched by the KIPDA staff for their communities prior to submission to the Regional Mitigation Committee and inclusion in the plan. The Local Mitigation committees were chaired by the local Disaster and Emergency Services manager in each county assisted by Jarrett Haley, Comprehensive Planner with the KIPDA. Each of the local mitigation committee meetings was held in its respective county.

The public input from these committees impacted the plan and is documented throughout the plan sections. Meeting Documentation notes, minutes, maps, attendance records, and information reviewed has been documented for all meetings and has been filed at the KIPDA office.

All Components of the Risk Assessment were developed using the best available data in the KIPDA Region. During the process of hazard identification, KIPDA staff used GIS resources to identify hazards that affect the KIPDA Region. KIPDA staff identified hazards and the mitigation committees reviewed and discussed the information. In the identification process hazards were evaluated through public participation in the county subcommittee meetings. Some information regarding hazards and their affects were created in addition to data collected by the KIPDA staff. KIPDA staff used FEMA Publication 386-2, *Understanding Your Risk, section 1, Identify Hazards* as a guide for identifying hazards in the region. Committee members reviewed local records of the Emergency Management office, local newspapers, and historical knowledge of sub-committee participants, local officials and community members, as well as information from the GIS department of KIPDA.

The Mitigation Strategy was created from the public input of the Mitigation Committees based on the findings of the hazard profiles and vulnerability assessment of this plan. Mitigation committees used the FEMA how to guide on Mitigation Strategies as a guide to developing the Mitigation goals, objectives and actions.

The KIPDA Regional Mitigation Committee developed a method to ensure that regular review and update of the Hazard Mitigation Plan occurs. The KIPDA Regional Committee developed a plan maintenance schedule to insure continued public involvement in the planning process and implementation activities.

KIPDA staff was also directly involved in the planning process. Eric Dennison of the KIPDA staff managed the planning project, assisted local emergency managers, and chaired the committee meetings. Mr. Dennison assisted with development of the committee organization and guided the implementation of the planning process as well as oversaw and assisted with data collection and analysis required for the development of the risk assessment and coordination of development of the mitigation strategy.

Mr. Dennison provided input on the establishment of plan maintenance and assisted as required in the plan adoption process. Adam Forseth and Michael Clair provided GIS support required to develop the plan. This support included research and oversight of research by the GIS coordinator, leading to the identification of hazards, the profiling of hazard events, assessing vulnerabilities and identifying assets. Using Arc Map 10.2.2 GIS software Mr. Forseth and staff used available GIS resources including Census data, available Property Valuation Administration (PVA) data, and shapefiles provided by the Center for Hazards Research to create maps.

The KIPDA Regional Hazard Mitigation Committee ran a HAZUS-MH model for earthquake in the KIPDA region. Using the methodology developed by the Center for Hazards Research (explained in detail in section 4.1) KIPDA staff was able to formulate loss data and vulnerability maps.

INCORPORATION OF FLOOD MITIGATION ASSISTANCE (FMA)

One of the new requirements of the 2016 KIPDA Regional Hazard Mitigation Plan includes the incorporation of Flood Mitigation Assistance. While the focus of the updated 2016 plan is a regional plan that incorporates the hazard profiles for the KIPDA Region, Flooding remains one of the most prominent disaster profiles in the KIPDA region.

The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to States, Territories, federally-recognized tribes and local communities for projects that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP. FMA funding is available for flood hazard mitigation projects, plan development and management costs. Funding is appropriated by Congress annually.

The KIPDA Regional Hazard Mitigation Committee felt it necessary to point out areas of the plan that were directly related to flooding and mitigation activates associated with flooding. While the Risk Assessment portion of the 2016 plan directly deals with Flooding and its effects, it should be noted a symbol indicates the importance of Flooding.

Throughout the plan, the below symbol is used to indicate to the reader that certain sections pertain to FMA:

This symbol guides the plan towards better flooding mitigation techniques, but also shows the individual relationship of flooding to mitigation planning as a whole to the entire structure of the plan. This concept was prevalent in all mitigation meetings including KIPDA Regional Hazard Mitigation Committee meetings, Countywide Local Emergency Planning Committees, Regional Planning Council meetings, and individual EMA Director Meetings.

The 2016 KIPDA Regional Hazard Mitigation Plan includes an extended Hazard Profile on Flooding in the Risk Assessment Section to give further detail.

4 RISK ASSESSMENT OVERVIEW

The 2016 KIPDA Regional Hazard Mitigation Plan assesses the KIPDA Region's risks over the last three (5) years. This section will be used to understand each identified hazard and as the blueprint for KIPDA's mitigation strategy.

The 2016 update of the KIPDA Regional Hazard Mitigation Plan has a designed Risk Assessment section to be consistent with the updated 2013 Commonwealth of Kentucky Enhanced Hazard Mitigation Plan. The Identify and Profile Sections have been revised with a complete overview of the definitions and a complete update to the data provided in the profile section. The section also connects the applicable CFR requirements to each section.

The Assessing Vulnerability by Jurisdiction section received an updated vulnerability model that is consistent with Kentucky Enhanced Plan and the Center for Hazardous Research Model. This model also played a role in improving the Assessing Vulnerability of State Facilities, Estimating Potential Losses by Jurisdiction, and the Estimating Potential Losses of State Facilities sections.

A congruent format, which is in line with the KY State Enhanced Hazard Mitigation Plan, was used for the changes and for the update of the Risk Assessment section. County Emergency Managers agreed with staff at the Kentucky Emergency Management (KYEM) that this section needed a better flow and formatting for better use of planning and mitigation. This re-format created a "Hazard Risk Assessment Overview" for each hazard sequentially. These changes integrated each of the required steps of the crosswalk to each of the identified hazards. This format will allow the reader to see each step of the Risk Assessment associated with each hazard to improve flow and comprehension and easier access to the information with it all contained in one location.

The overview for each identified hazard risk will contain these following components

- Hazard Identification:
    - Description
    - Types
    - Facts
    - Impacts
- Hazard Profile:
    - Profile Risk Table
    - Geographic Locations Affected
    - Previous Occurrences
- Jurisdictional Vulnerability Assessment
- State Facility Vulnerability
- Jurisdictional Potential Loss Estimate
- State Facility Potential Loss Estimate

Overview

- 44 CFR §201.4(c)(2)(i)
- 44 CFR §201.4(c)(2)(ii)
- 44 CFR §201.4(c)(2)(iii)

The KIPDA region is vulnerable to a wide array of natural hazards that pose a threat to life and property. Twelve hazards were identified through an extensive process that utilized input from the KIPDA Regional Hazard Planning Committee members (comprised of representatives and elected officials from County agencies, City governments, local emergency management offices, fire departments, the State Emergency Management - Area 6 Office, and the University of Louisville), public input, and researching past federal disaster declarations in the region.

The identified hazards are as follows:

	Hazard
1	Dam Failure
2	Drought
3	Earthquake*
4	Extreme Temperature
5	Flood
6	Hailstorm
7	Karst/Sinkhole
8	Landslide
9	Severe Storm
10	Severe Winter Storm
11	Tornado
12	Wildfire/Forest Fire

The following hazards showed negligible impact, were not part of federal disaster declarations or are of lower risk to the state, and were not addressed in the plan:

- Hurricane
- Tsunami
- Volcano

*The Earthquake hazard profile used HAZUS data for the profile, and due to results, followed the format of the HAZUS Report.

As mentioned above, past federal disaster declarations were an important tool in identifying hazards that affect the KIPDA Region. The following graph provides a breakdown of the number by county followed by a table identifying all past federal disaster declarations.

County	Number of Declared Disasters
Bullitt	14
Henry	12
Oldham	8
Shelby	11
Spencer	16
Trimble	13

Disaster Declaration Number	Declaration Date	Incident Type	Counties Receiving Individual or Public Assistance
4239-DR	August 12, 2015	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Henry, Spencer, Trimble
4218-DR	May 12, 2015	Flooding	Bullitt, Spencer
4217-DR	May 1, 2015	Flooding	Bullitt, Spencer
4057-DR	March 6, 2012	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Trimble
1976-DR	May 4, 2011	Severe Storms, Tornadoes, and Flooding	Henry, Oldham, Spencer, Trimble
1925-DR	July 23, 2010	Severe Storms, Flooding, and Mudslides	Shelby
1912-DR	May 11, 2010	Severe Storms, Flooding, Mudslides, and Tornadoes	Henry, Trimble
1855-DR	August 14, 2009	Severe Storms, Straigh-line Winds, and	Trimble
1818-DR	February 5, 2009	Severe Winter Storm and Flooding	Henry, Trimble (Bullitt, Oldham Shelby, Spencer debris rmoval and emergency protective measures including direct Federal assistance under the Public Assistance
3302-EM	January 28, 2009	Severe Winter Storm and Flooding	Henry, Shelby, Spencer
1802-DR	October 9, 2008	Severe Wind Storm Associated with Tropical Depression Ike	Bullitt, Shelby, Trimble
1757-DR	May 19, 2008	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	Spencer
1746-DR	February 21, 2008	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Shelby, Spencer
3231-EM	September 10, 2005	Hurricane Katrina Evacuation	Bullit, Henry, Oldham Shelby, Spencer,
1578-DR	February 8, 2005	Severe Winter Storms and Record Snow	Shelby
1537-DR	August 6, 2004	Severe Storms and Flooding	Shelby, Spencer
1523-DR	June 10, 2004	Severe Storms, Tornadoes, Flooding, and Mudslides	Bullitt, Henry, Oldham, Shelby, Spencer, Trimble
1471-DR	June 3, 2003	Severe Storms, Flooding, mud and Rock Slides, and Tornadoes	Bullitt
1454-DR	March 14, 2003	Severe Winter Ice and Snow Storms, Heavy Rain, Flooding, Tornadoes, and Mud and	Shelby, Spencer
1320-DR	February 28, 2000	Severe Storms and Flooding	Oldham
1310-DR	January 10, 2000	Tornadoes, Severe Storms, Torrential Rains, and Flash Flooding	Spencer
1163-DR	March 4, 1997	Severe Storms and Flooding	Bullitt, Henry, Oldham, Shelby, Spencer,
1117-DR	June 1, 1996	Severe Storms and Tornadoes	Bullitt, Spencer
1089-DR	January 13, 1996	Blizzard	Bullitt, Henry, Oldham, Shelby, Spencer,
893-DR	January 29, 1991	Severe Storms and Flooding	Trimble
821-DR	February 24, 1989	Severe Storms and Flooding	Bullitt, Henry, Trimble
568-DR	December 12, 1978	Severe Storms and Flooding	Bullitt, Henry, Oldham, Trimble
420-DR	April 4, 1974	Tornadoes	Bullitt, Henry, Oldham, Spencer
332-DR	May 15, 1972	Severe Storms and Flooding	Bullitt
288-DR	June 5, 1970	Severe Storms and Flooding	Bullitt

HAZARD PROFILE

The profiling hazards section identifies the geographic locations affected by each hazard and identifies the historical occurrences, which in turn creates a probability (table on following page) of future events for each hazard. A comprehensive evaluation of the profile section was completed by KIPDA staff to adjust to the new data which has been acquired for the plan update. The process included updating occurrence data, reviewing hazard specific data information, talking with stakeholders, and reviewing the local hazard mitigation plans. KIPDA followed a standardized “Risk Profile Table” for each of the hazards, developed by the Center for Hazards Research at the University of Louisville, which capture the following data elements:

1. Period of Occurrence
2. Officially Recorded Occurrence Data*
3. Annual Chance Probability Ratio
4. Warning Time
5. General Potential Impacts
6. Recorded Loss
7. Annualized Loss
8. Extent

The hazards profiled for the KIPDA Regional Hazard Mitigation Plan are:

1. Dam Failure
2. Drought
3. Earthquake
4. Extreme Temperature
5. Flood
6. Hailstorm
7. Karst
8. Landslide
9. Severe Storm
10. Severe Winter Storm
11. Tornado
12. Wildfire/ Forest Fire

**It should be noted that while some hazard events occur, they may not be officially recorded.*

Risk Matrix for the KIPDA Region							
Hazard Type	**Time Period**	**Range – Years of Data Collection**	**Officially Recorded Occurrences**	**Total Losses**	**Annual Rate of Occurrence**	**Average Losses**	**Average Annual Loss**
Earthquake	1960-2015	55	0	$0	0	$0	$0
Karst/Sinkhole	Unknown	Unknown	1,653	$0	Unknown	Unknown	Unknown
Dam Failure	1973-2015	32	1	$0	0.03	$0	$0
Wildfire/Forest Fire	1997-2015	18	184	$0	10.2	$0	$0
Drought	1960-2015	55	0	$0	0	$0	$0
Landslide	1975-2015	40	29	$4,555	0.73	$651	$114
Extreme Temperature	1960-2015	55	6	$59,422	0.11	$59,422	$1,080
Hail Storm	1960-2015	55	243	$6,727,190	4.42	$165,346	$122,313
Severe Storm	1960-2015	55	975	$18,865,760	17.73	$115,727	$343,014
Severe Winter Storm	1960-2015	55	249	$19,562,704	4.53	$471,776	$355,686
Flood	1960-2015	55	217	$118,150,478	3.95	$3,300,462	$2,148,191
Tornado	1960-2015	55	74	$189,688,121	1.35	$15,548,312	$3,448,875
TOTALS			**3,631**	**353,058,229**		**19,661,695**	**6,419,272**

The Risk Matrix table provides a view of the risk each hazard poses to the KIPDA Region. Combining the average occurrence and loss statistics formulates an average annual loss for each hazard, and therefore provides a model for loss estimation by hazard. Clearly, the flood hazard and tornado have the most potential to do damage to the KIPDA Region with severe winter storm, hail, and severe storm posing a high risk as well.

It is important to note, that hazards without an average annual loss should still be considered a threat to the KIPDA Region. This is mainly caused by lack of current data (occurrences or losses) for some of the hazards. Importantly, hazards can have a very low probability but a potentially high magnitude of losses (Earthquake). Please note the Risk Matrix data will be used for multiple purposes throughout the risk assessment section.

PROFILING HAZARDS

To disseminate the profile information, KIPDA Hazard Mitigation Committee used a common format for each hazard that was congruent with the 2013 KY State Enhanced Plan. The “Profile Risk Table” summarizes key data elements that allow the end user to view the hazard. Below is an example of the “Profile Risk Table” along with an explanation of each data element

Hazard: Profile Risk Table	
Period of occurrence:	When does this hazard occur?
Number of officially recorded events: (Year)	Number of hazard events in KIPDA Region based on county occurrences for each hazard.
Annual Rate of Occurrence:	Expected annual number of state-wide occurrences per year based on county-level occurrence data.
Warning time:	Average warning time for this type of hazard.
Potential impacts:	The potential impacts this hazard could produce.
Recorded losses:	Amount of damages captured within Kentucky for each hazard. (This data is very diverse).
Annualized Loss:	The expected annual loss state-wide per year from each hazard.
Extent:	Worst case scenario based on historic data.

ASSESSING VULNERABILITY BY JURISDICTION

The KIPDA Regional Hazard Mitigation Committee believed using the methodology contained in the KY State Enhanced Plan for assessing vulnerability, potential losses by jurisdiction, and potential losses of state facilities would be beneficial in creating continuity between the local and State plans. Descriptions of the methodology as defined by the Center for Hazards Research (CHR) team at the University of Louisville follows:

The Assessing Vulnerability section uses best available data from national, state, and local data sources and was created using best available data and modeling techniques. The model used for the KIPDA Regional Hazard Mitigation Plan is based on the Center for Hazards Research and Policy Development's (CHR) recognized Hazard Vulnerability Score methodology. This model has been used for multiple state, local, and university mitigation plans.

This model is very flexible and can be adjusted to fit the data and needs of particular institutions. The model provides an understanding of relative risk and vulnerabilities from hazards across the region. Uncertainties are inherent in any vulnerability/risk assessment, arising in part from incomplete scientific knowledge concerning natural and man-made hazards and their effects on the built environment. Uncertainties can also result from approximations and simplifications that are necessary for a comprehensive analysis (such as incomplete inventories, demographics, loss data or economic parameters).

Assessing Vulnerability Requirement §201.6(c)(2)(ii):

The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

The KIPDA Region Risk Assessment incorporates multiple models in use and integrates them into a specific model for the Plan. FEMA requires state and local partners to assess the jurisdiction's overall vulnerability to population, property, infrastructure and critical facilities. The planning team, using the best available data and methods, assessed the vulnerability of the assets within the KIPDA region.

One of the most important steps in creating a vulnerability assessment model within GIS is to define the geographic unit of measurement. Developing the vulnerability assessment within GIS provides the planning community the following benefits:

1. Better dollar allocation
2. Better policy decisions
3. Better visuals
4. Better tool for locals

GRID LEVEL RISK ASSESSMENT MODEL

A very important step in creating a Vulnerability Assessment Model is to define the planning area. Through the creation of the last three (3) State Hazard Mitigation Plans, CHR has continued to develop a risk assessment that has become more granular. The KIPDA Regional Hazard Committee voted to use this same model in its Risk assessment portion to give continuity between this local plan and the 2013 KY State Enhanced Plan. CHR used its knowledge of creating local plan vulnerability assessments and created a statewide census block level assessment. This data was migrated for the county level for the KIPDA Regional Hazard Mitigation Plan Update for 2016.

This model produced a more equal playing field but still tended to get skewed in areas that were more rural, based on the fact that the census blocks within these areas were typically larger in size. The lack of equal area distribution caused the census block model to still have some particular issues when comparing individual census blocks due to the unequal size of each census block.

In order to create an even playing field in terms of equal area distribution, CHR and the KIPDA Regional Hazard Mitigation Committee decided to go with a 1 Kilometer (KM) Military Grid Reference System (MGRS) for their planning areas of capture for the entire State and for each county. This helped incorporate the Commonwealth of Kentucky Enhanced Hazard Mitigation Plan and the KIPDA Regional Hazard Mitigation Plan Update for 2016. The MGRS was chosen based on the equal area distribution of each grid cell and the fact that the military based grid system can also be used during response and recovery efforts. This model promotes usage at the State level as well as the local county level. The Grid-Level Risk Assessment Model specifically provides the following improvements:

1. Equal area calculations based on each unit being equal sized
2. Allows better comparisons between planning areas in different parts of the counties
3. Potential for better policy decisions and dollar allocation
4. Improved visual interpretations
5. Enhanced tools for local planning usage
6. Military grid provides enhanced usage during response and recovery

The Grid-Level Risk Assessment methodology provides enhanced data for use in this local plan and provides policy and decision makers a refined view of where risk is located and what areas need mitigation. CHR and the KIPDA Regional Hazard Mitigation Committee’s goal is to provide local leaders with a useful assessment model.

METHODOLGY

There are multiple models that attempt to determine risk and hazard vulnerability. The KIPDA Regional Hazard Mitigation Committee relied heavily on CHR's knowledge of the "Risk Assessment" research field to develop the Vulnerability Assessment Model that was used for the 2016 KIPDA Regional Hazard Mitigation Plan Update.

In order to follow and comprehend the Hazard Vulnerability Assessment Model the following definitions are very important to comprehend:

Important definitions associated with this vulnerability assessment model:

- **Hazard Identification**: Anything which either threatens the residents of a community or the things that they value
- **Exposure**: A community's assets: people, property, essential facilities, and infrastructure potentially exposed to a hazard
- **Vulnerability**: Part of an "exposure" that is at "risk" to each "hazard"

CHR's staff and the KIPDA Regional Hazard Mitigation Committee researched and conducted test runs to utilize the updated methodology. The revised model relies heavily on GIS spatial analyses and provides the user with several layers of integrated information which can be used individually to display different planning scenarios. This approach enabled the creation of a Hazard Vulnerability Score for each hazard.

MODEL

The model was designed to achieve a "Hazard Vulnerability Score" which is the foundation for assessing the vulnerability of each hazard. This Hazard Vulnerability Score is also built on multiple layers of data to provide the end users with various ways of using and interpreting the data. To achieve the Hazard Vulnerability Score the Exposure Score and Hazard Score are first scored from 0-1 based on the highest number being 1. In order to weight each of the scores they are multiplied by.5 so each score (Exposure/Hazard) accounts for 50% of the Hazard Vulnerability Score. In order to visualize the data on the Hazard Vulnerability Maps each Hazard Vulnerability Score is categorized into categories as follows:

1. Low
2. Moderate
3. High
4. Severe

These classifications are based on the Natural Breaks (Jenks) classification, which breaks data into like classes. These categories are displayed within the legends of the map. By categorizing facilities on the map into these categories it provides the end user the ability to visually label which areas are more vulnerable and thus more at risk. The Hazard Vulnerability Score provides a visual display of the potential extent each hazard poses for the KIPDA Region.

Hazard Vulnerability Score = Exposure Score + Hazard Score

When measuring vulnerability, CHR and the KIPDA Regional Hazard Mitigation Committee first measured what would be exposed to each hazard. Exposure Score was built on multiple layers of data and provides the foundation for assessing vulnerability. For this model the exposure score was comprised of these three (3) variables:

1. Population Score
2. Property Score
3. Critical Infrastructure Score

EXPOSURE SCORE

Exposure Score = Population Score + Property Score + Critical Infrastructure Score

Definition of Variables

1. **Population Score** – To develop an improved population density model for use within the MGRS 1 KM grid system, CHR and the KIPDA Regional Hazard Mitigation Committee used a method called Dasymetric Mapping (http://pubs.usgs.gov/fs/2008/3010/fs2008-3010.pdf). This method of mapping population data uses an aggregation area model using a combination of population data and land cover data. For this model, 2010 census block data was used to capture population and 2006 USGS National Land Cover Database (NLCD2006) was used for land cover data. Basically, this type of mapping assigns population density based on different types of land cover (high density, low density, non-urban inhabited, uninhabited). Each one of the specific land cover areas is assigned a population number based on the census blocks population. This method attempts to distribute a census blocks population number to where there is actual land cover, instead over the entire area. This data was then aggregated to each 1 KM MGRS grid for consumption. Each grid within Population Score is scored from 0-1. This score is multiplied by .33 so it accounts for 33% of the composite Exposure Score.

2. **Property Score** – Comprised of 2010 census block group total household value (# of housing units x average household value) aggregated to the 1 KM MGRS grid. This data was then scored 0-1 and multiplied by .50 so it accounted for 50% of the Property Score. Next, a total number of businesses acquired from ESRI’s business analyst were then counted within each 1 KM MGRS grid. This data was then scored 0-1 and multiplied by .50 so it accounted for 50% of the Property Score. These two (2) scores were then added together to create the composite Property Score. This score is multiplied by .33 so it accounts for 33% of the composite Exposure Score.

3. **Critical Infrastructure Score** – Comprised of multiple Critical Facilities (points and lines) across Kentucky. This data was retrieved from KYEM, Division of State Risk and Insurance, ESRI, Kentucky Infrastructure Authority, Kentucky office of Geographic Information (OGI), Kentucky Transportation Cabinet, HAZUS, SHELDUS, and Public Service Commission. This included data ranging from several different classes of GIS points and lines. The point data included the following:

> *Fire stations, police stations, prisons, primary schools, hospitals, emergency operation facilities, nursing homes, public health facilities, emergency medical service facilities, sewer treatment facilities, sewer package treatment and lift station facilities, water pumps, water treatment plants, sewage treatment plants, water tanks, electric power plants, pressure and storage gas facilities, refinery and storage oil facilities, airport facilities, Highway bridges, rail facilities EPA FRS Facilities and State owned facilities.*

The total numbers of critical facilities (points) were then counted within each 1 KM MGRS grid. This data was then scored 0-1 and multiplied .80 so it accounted for 80% of the Critical Infrastructure Score. The line data included the following:

> *Sewer lines, water lines, power transmission lines, pipelines, Kentucky Transportation Cabinet all roads mapped and railroads.*

The total length of each line was captured within each 1 KM MGRS grid and combined. This data was then scored 0-1 and multiplied by .20 so it accounted for the other 20% of the Critical Infrastructure Score. These two (2) scores were then added together to create the composite Critical Infrastructure Score. This score is multiplied by .33 so it accounts for 33% of the composite Exposure Score.

The Exposure Score places the asset variables into the Hazard Vulnerability Score. This data is critical for Emergency Managers to use in order to comprehend where high concentrations of need could be during or before a disaster. Each exposure variable was calculated and scored 0-1 and then multiplied by .33 to create a weighted score of 33% for each category. Once all three (3) were added together to create the composite exposure score they were broken into four (4) categories, using Natural Breaks classification The four (4) categories provide different levels of severity displayed on each map:

1. Low
2. Moderate
3. High
4. Severe

HAZARD SCORE

The Hazard Score assigns a hazard variable to the Hazard Vulnerability Score. The Hazard Score varies with each hazard due to the fact some hazards have area boundaries for analysis, like flooding, while numbers of occurrences are best for those hazards occurring anytime or anyplace, like severe storms. Due to the variation on how each Hazard Score was calculated a description for each hazard will be provided within each "Hazard Risk Assessment Overview."

After the Exposure Score and the Hazard Score were determined, the equation was set into motion to produce a Hazard Vulnerability Score for each identified hazard. The Hazard Vulnerability Scores contain some bias toward the more populated areas in the state. This is due to a correlation between more populated areas and their tendency to have higher numbers of critical facilities, properties, transportation facilities, etc. This resulted in higher populated areas having greater exposure in general. However, with the data provided, other equations can be developed with or without one or more variables, or a different weighting system. The goal of this model was to assess the most vulnerable areas throughout the region. Given the most populated areas have the most at risk, this model achieved that goal.

Requirement §201.4(c)(2)(iii):

The KIPDA Region shall include an overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in the risk assessment. KIPDA shall estimate the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.

ESTIMIATING POTENTIAL LOSSES OF JURISDICTIONS AND STATE FACILITIES

A key piece to any risk management system is to understand a community's potential losses. CHR and the KIPDA Regional Hazard Mitigation Committee decided to capture loss using two (2) different methodologies. The methodologies differ in that one is a county-level assessment, which was used to capture jurisdictional potential loss, where the other is geo-spatially specific, which was used to capture both vulnerability and loss estimates on State facilities. The two (2) models that were used for the 2016 KIPDA Hazard Mitigation Plan Update ***are the Average Annualized Loss Model and the Hazard Boundary Overlay Loss Estimation Model***.

As has been mentioned before, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties can also result from approximations and simplifications that are necessary for a comprehensive analysis (such as incomplete or duplicate inventories, socio-economic data, loss data, or occurrence data).

JURISDICTIONAL: AVERAGE ANNUALIZED LOSS MODEL

This model uses annual rate of occurrence data and average losses data to calculate an Average Annual Loss for several of the identified hazards (See Risk Matrix Table). Annual rate of occurrence is based on past occurrences and average losses are based on past losses.

Knowing both the "annual rate of occurrence" and the "average losses" produces the ability to predict an Average Annual Loss for any given year by multiplying the two values together. This model provides a suitable understanding of general loss for each county within the KIPDA Region. The model relies on capturing historical event data and therefore it is fundamental that future hazard occurrence data is captured (Occurrence and Loss Data).

CHR and the KIPDA Regional Hazard Planning Committee were able to acquire sufficient data to develop an Average Annual Loss estimate for the following ten (10) Hazards:

1. Flood
2. Earthquake
3. Landslide
4. Wildfire/Forest Fire
5. Drought
6. Extreme Temperature
7. Hail Storm
8. Severe Storm
9. Severe Winter Storm
10. Tornado

Currently Karst/Sinkhole and Dam Failure do not have suitable loss data to capture an Average Annual Loss number. However, loss estimates were developed for these hazards through analyzing the property values within each "Severe Hazard Score" grids. This methodology assumed a complete loss of all property within each Karst and Dam Failure Severe Hazard Score grid.

For the other ten (10) hazards, CHR and the KIPDA Regional Hazard Planning Committee developed an Average Annual Loss number for every county within the KIPDA Region. This was developed in order for each county to have a general understanding of the potential effects for each hazard posed in terms of average dollar loss per year. As mentioned above, this data model was developed using the best available data for each hazard.

SHELDUS and NOAA data was used for Flood, Earthquake, Wildfire/Forest Fire, Drought, Hail Storm, Severe Storm, Severe Winter Storm, and Tornado's. While SHELDUS and NOAA data are the best available data source for many events, it does at times provide a simplified view of events within a state, taking the total losses from the event and dividing the losses evenly among the affected counties. This is done due to shortcomings in the source data that SHELDUS and NOAA utilizes and while each affected county does not necessarily have equal losses as you may see in the table, a more refined breakdown of losses for all events is currently not available due to the data capture limitations of SHELDUS and NOAA. FEMA's HAZUS hazard software was used in the Earthquake portion of the Risk Assessment.

For the assessed hazards not listed above, alternative data sources were used due to the availability of Kentucky specific data and/or the lack of SHELDUS data, the breakdown of those sources and hazards follows. Data from HAZUS, FEMA's Hazard Software was used to calculate damage to the area for Earthquake data, along with SHELDUS. Again, this data is the best available data for this specific hazard at this moment. Kentucky Geological Survey (KGS) data was used for Landslide data capture. For Extreme Temperature CHR and the KIPDA Regional Hazard Planning Committee used SHELDUS, NOAA, and NCDC data in order to capture extreme cold events, which were only present in the NCDC data records.

In order to capture potential losses for each hazard, CHR and the KIPDA Regional Hazard Planning Committee scoured the best available data sources.

STATE FACILITIES: HAZARD BOUNDARY OVERLAY LOSS ESTIMATION MODEL

The vulnerability assessment and potential loss estimate for state-owned facilities were determined using the same methodology. The Division of State Risk and Insurance which insures state-owned facilities provided CHR and the KIPDA Regional Hazard Mitigation Committee an updated list of state-owned facilities and the total insurance coverage on each structure. The database contained 6,881 state-owned, addressed facilities. This was then filtered out to the county level to cover the KIPDA region.

To work with the addressed state-owned facilities, each had to be geo-coded in a GIS system. Geo-coding is a GIS process where an address is assigned a geographic location according to addressed road coverage. This method gives the address from the database an x, y coordinate position in the world. The CHR team and the KIPDA Regional Hazard Planning Committee performed this geo-coding process using ArcGIS Street map and ArcGIS 10.2.2. This data was geo-coded and then double checked for accuracy for the 2016 plan, using the KY State data.

Using the "Severe Hazard Score" hazard boundary layer from the Hazard Score grid, vulnerability assessments and loss estimates were performed on the state facilities. The Severe Hazard Score 1 KM MGRS grids were used as the hazard boundary that was used to overlay on the geo-referenced state facility GIS file. The state facilities that were located within the severe hazard zones were then identified and assumed to be vulnerable and estimated to be damaged during an event.

CRITICAL FACILITIES

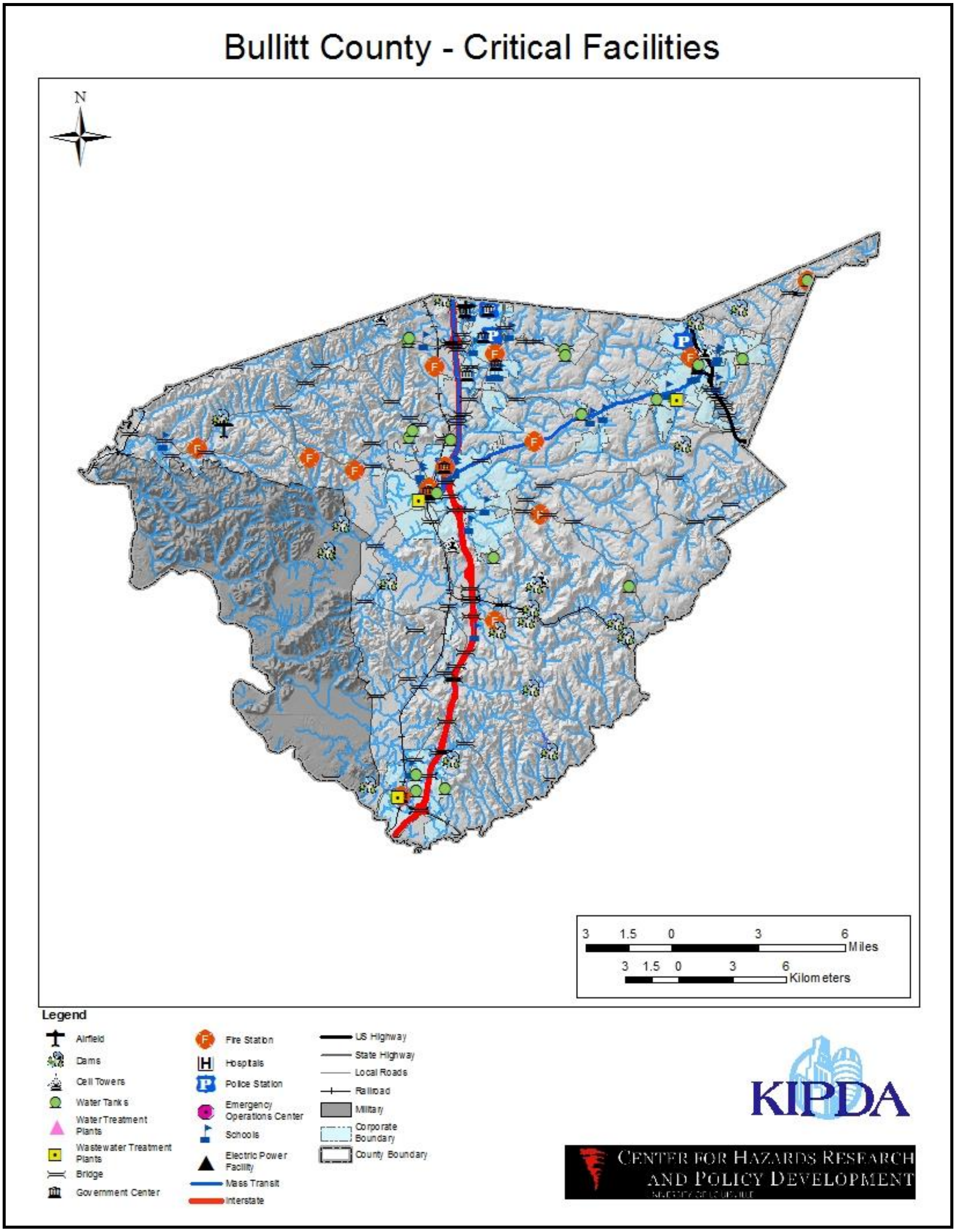
As part of the Risk Assessment, critical facilities in the region were identified. These are presented in this section in the form of relief maps for each county as a whole and then for each jurisdiction included in the KIPDA Regional Hazard Mitigation Plan. The 2016 plan maps show updated information and facilities since the 2011 plan. All data was verified through the 2013 Kentucky State Hazard Mitigation Plan, Center for Hazardous Research, SHELDUS, HAZUS, and Emergency Management Directors of each county.

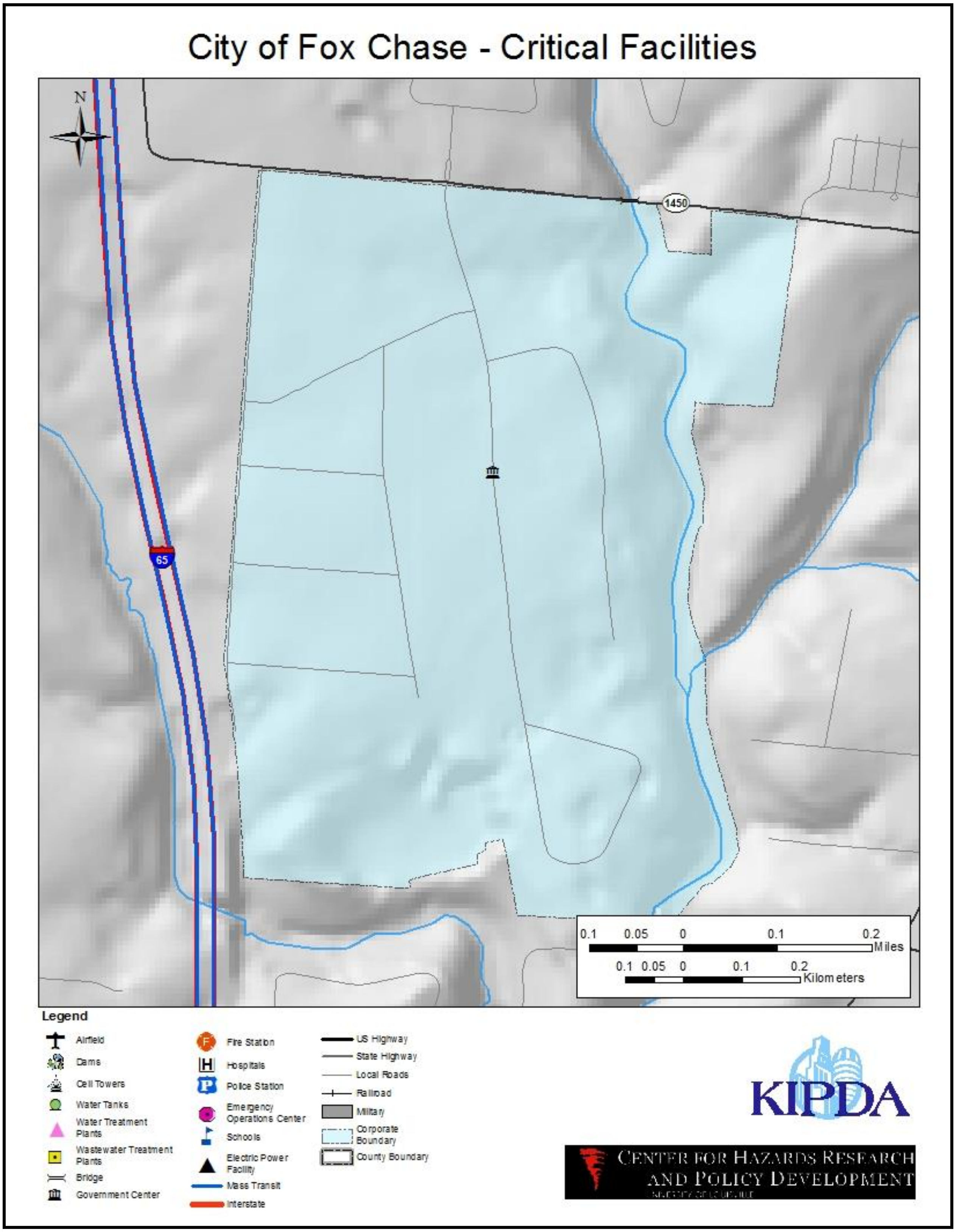
The following Counties and Cities are addressed in the Critical Facilities:

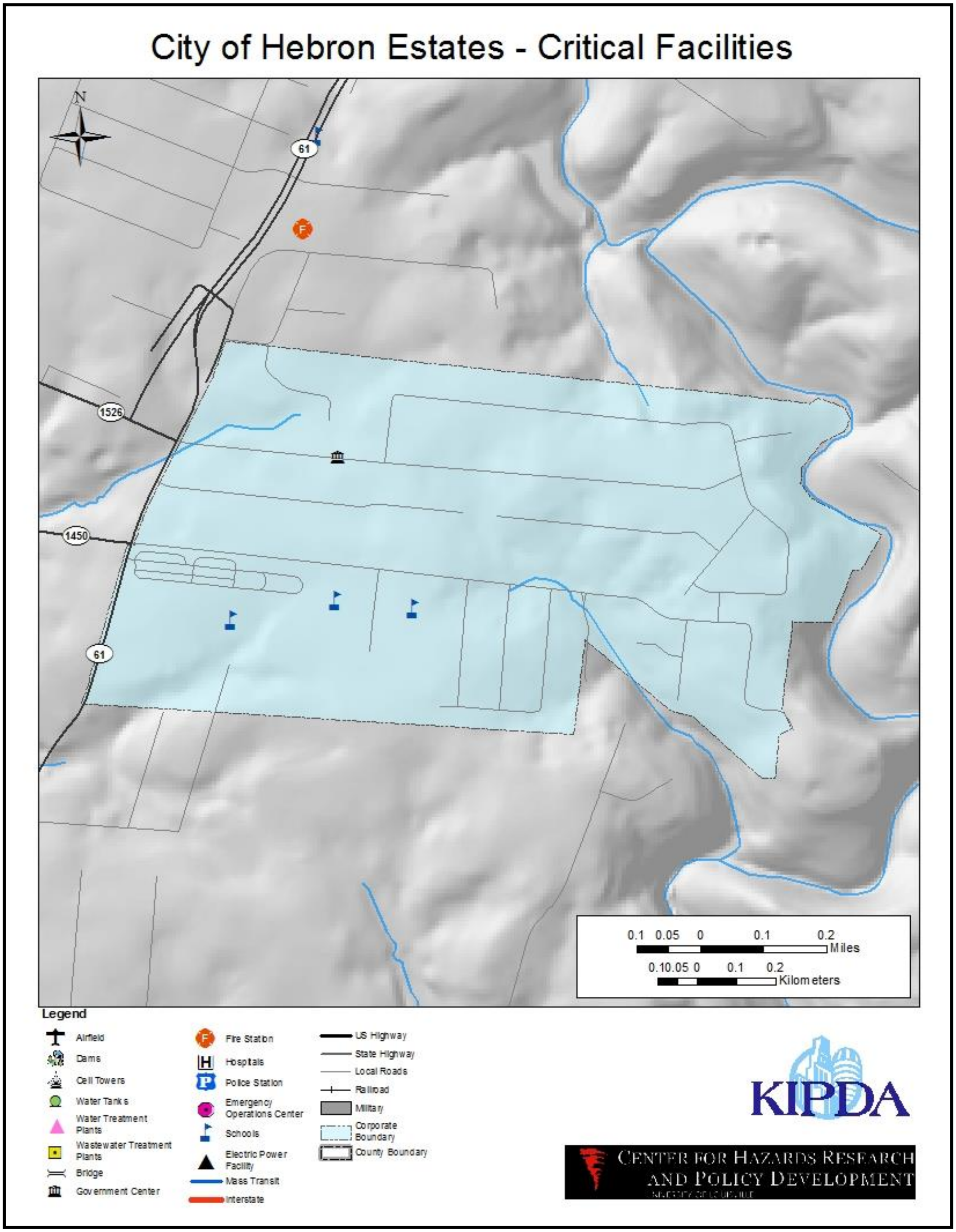
- Bullitt County
  - City of Fox Chase
  - Hebron Estates
  - City of Hillview
  - City of Hunters Hollow
  - Lebanon Junction
  - Mount Washington
  - Pioneer Village
  - Shepherdsville
- Henry County
  - Campbellsburg
  - Eminence
  - New Castle
  - Pleasureville
  - Smithfield
- Oldham County
  - Crestwood
  - Goshen
  - La Grange
  - Orchard Grass
  - Peewee Valley
  - River Bluff
- Shelby County
  - Shelbyville
  - Simpsonville
- Spencer County
  - Taylorsville
- Trimble County
  - Bedford
  - Milton

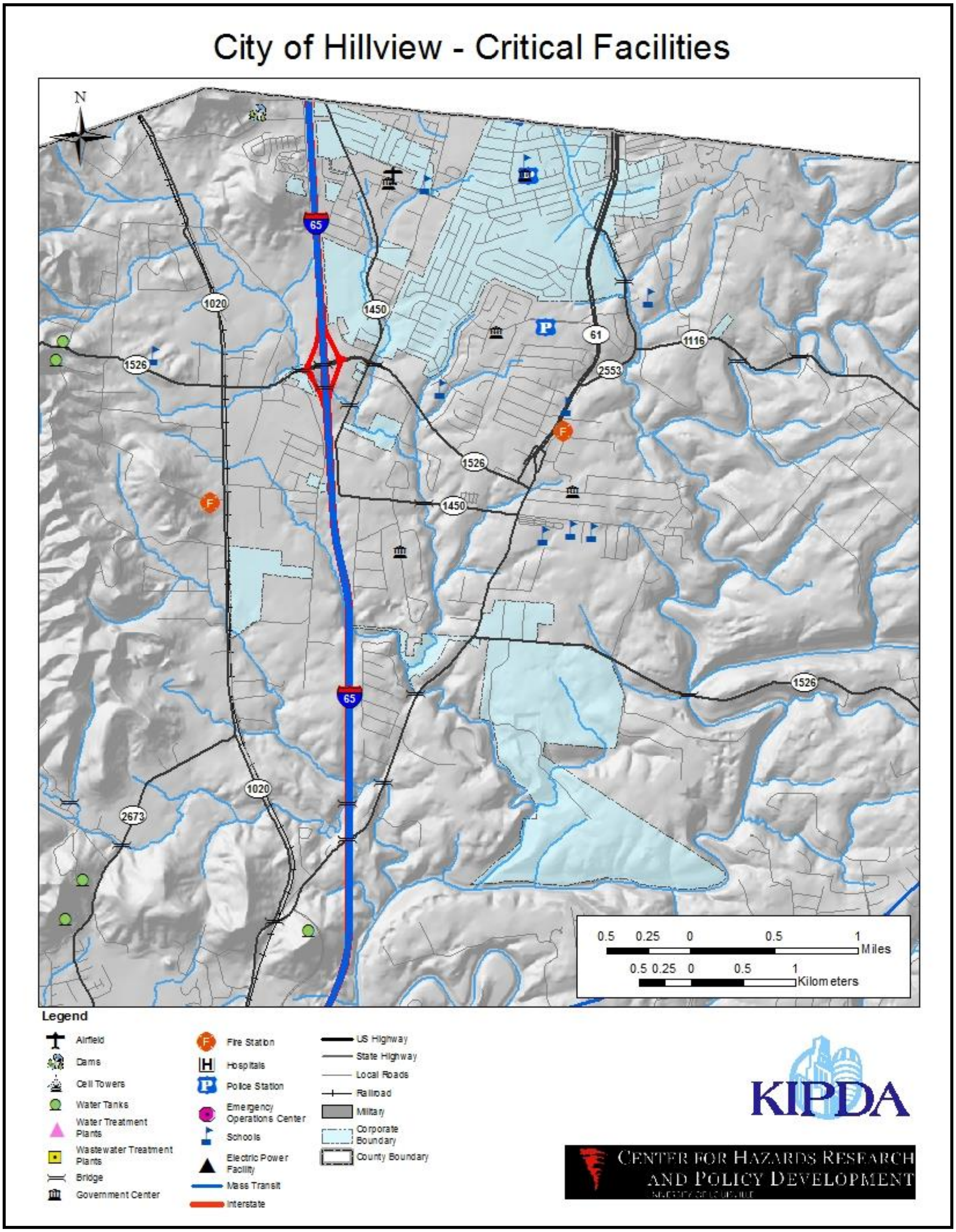
Critical facilities identified are listed below in addition to the legend of each map.

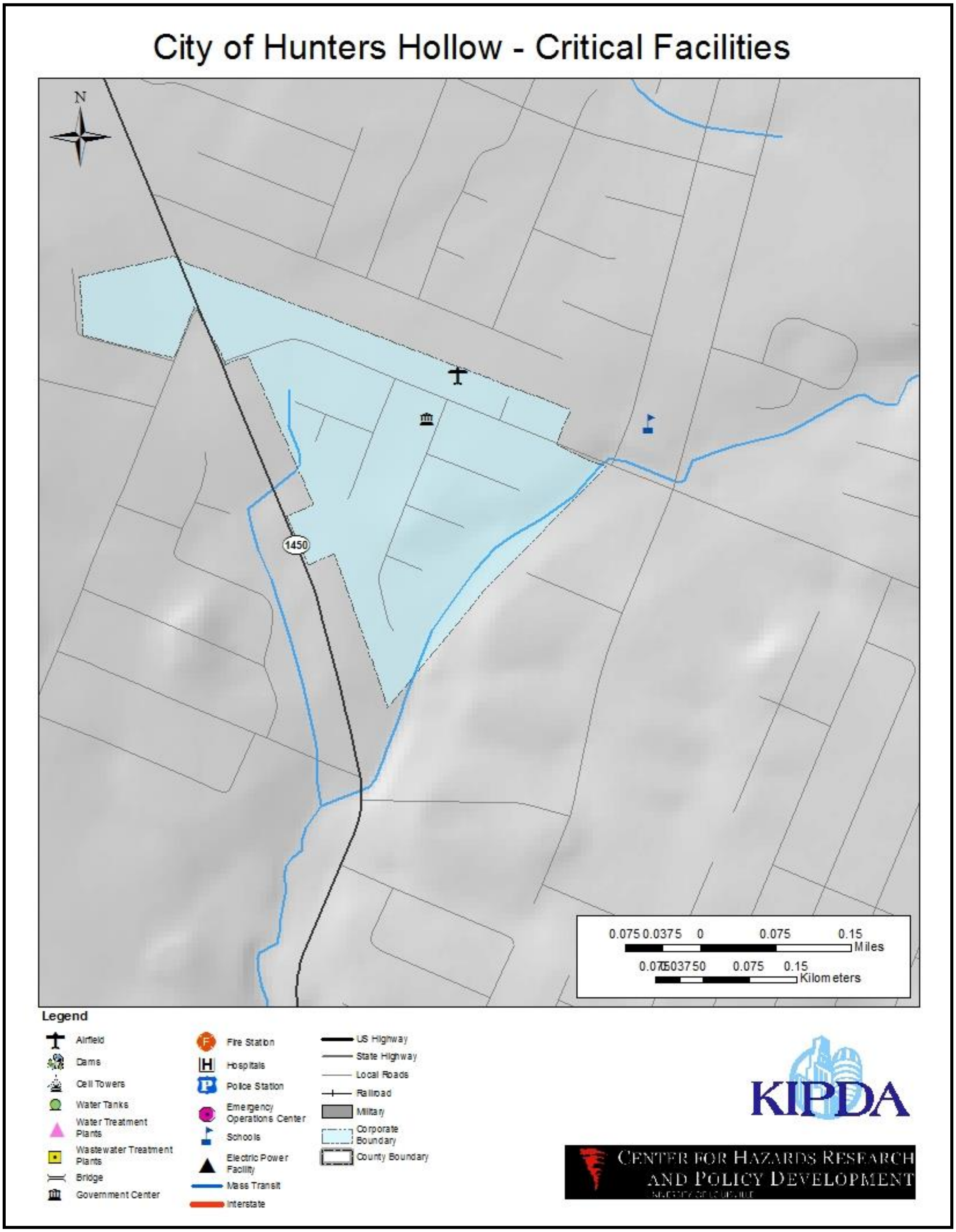
Airfield	Police Stations
Dams	Emergency Operations Centers
Cell Towers	Schools
Water Tanks	Electric Power Facilities
Water Treatment Plants	Mass Transit
Wastewater Treatment Plants	Interstates
Bridges	US Highways
Government Centers	State Highways
Fire Stations	Local Roads
Hospitals	Railroads


Bullitt County - Critical Facilities
N
3 1.5 0 3 6
Miles
3 1.5 0 3 6
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Fox Chase - Critical Facilities
N
1450
65
0.1 0.05 0 0.1 0.2
Miles
0.1 0.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Hebron Estates - Critical Facilities
N
61
1526
1450
61
0.1 0.05 0 0.1 0.2
Miles
0.10.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Hillview - Critical Facilities
N
65
1020
1450
61
1116
1526
2553
1450
1526
65
1020
2673
0.5 0.25 0 0.5 1
Miles
0.5 0.25 0 0.5 1
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Hunters Hollow - Critical Facilities
N
1450
0.075 0.0375 0 0.075 0.15
Miles
0.075 0.0375 0 0.075 0.15
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
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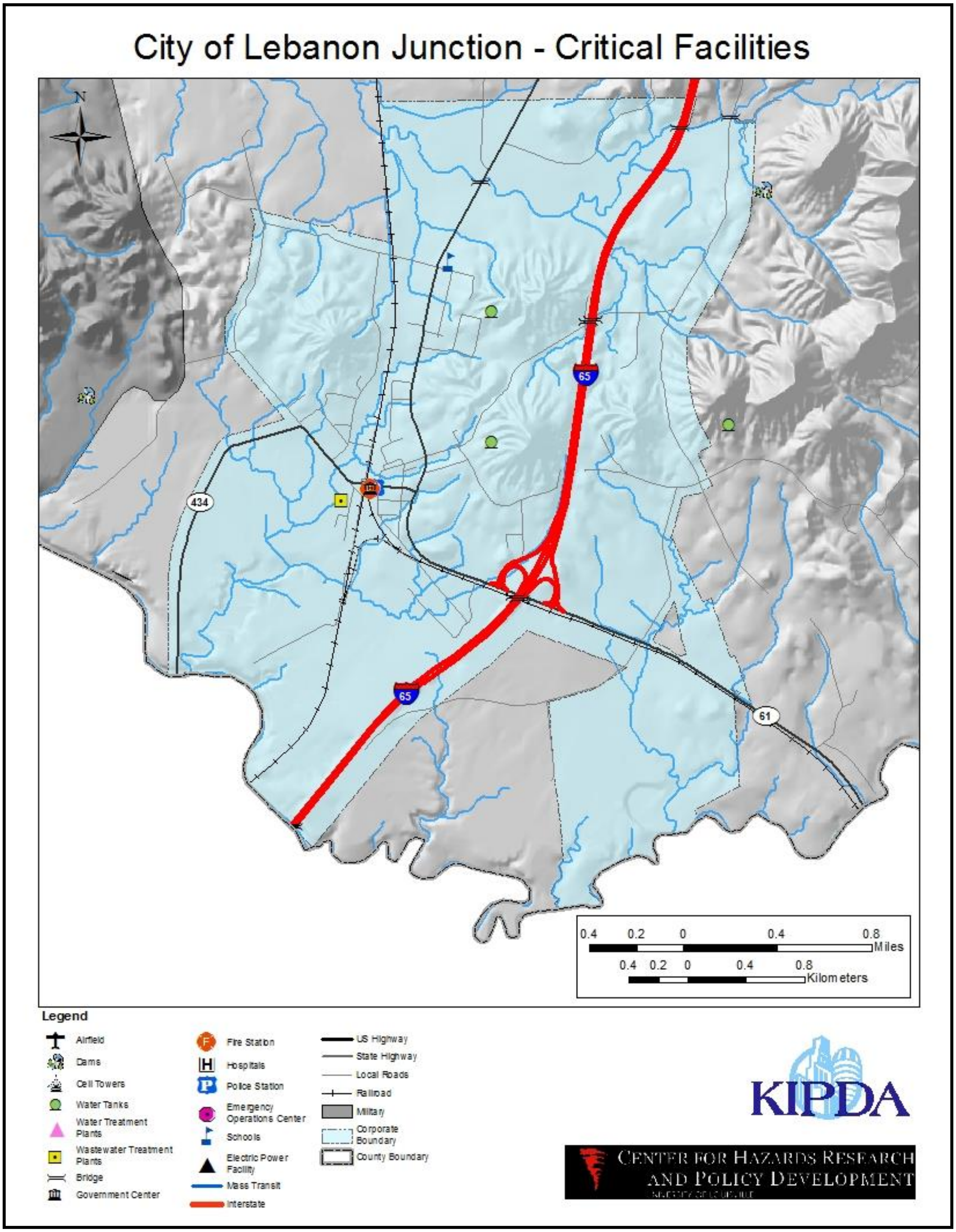
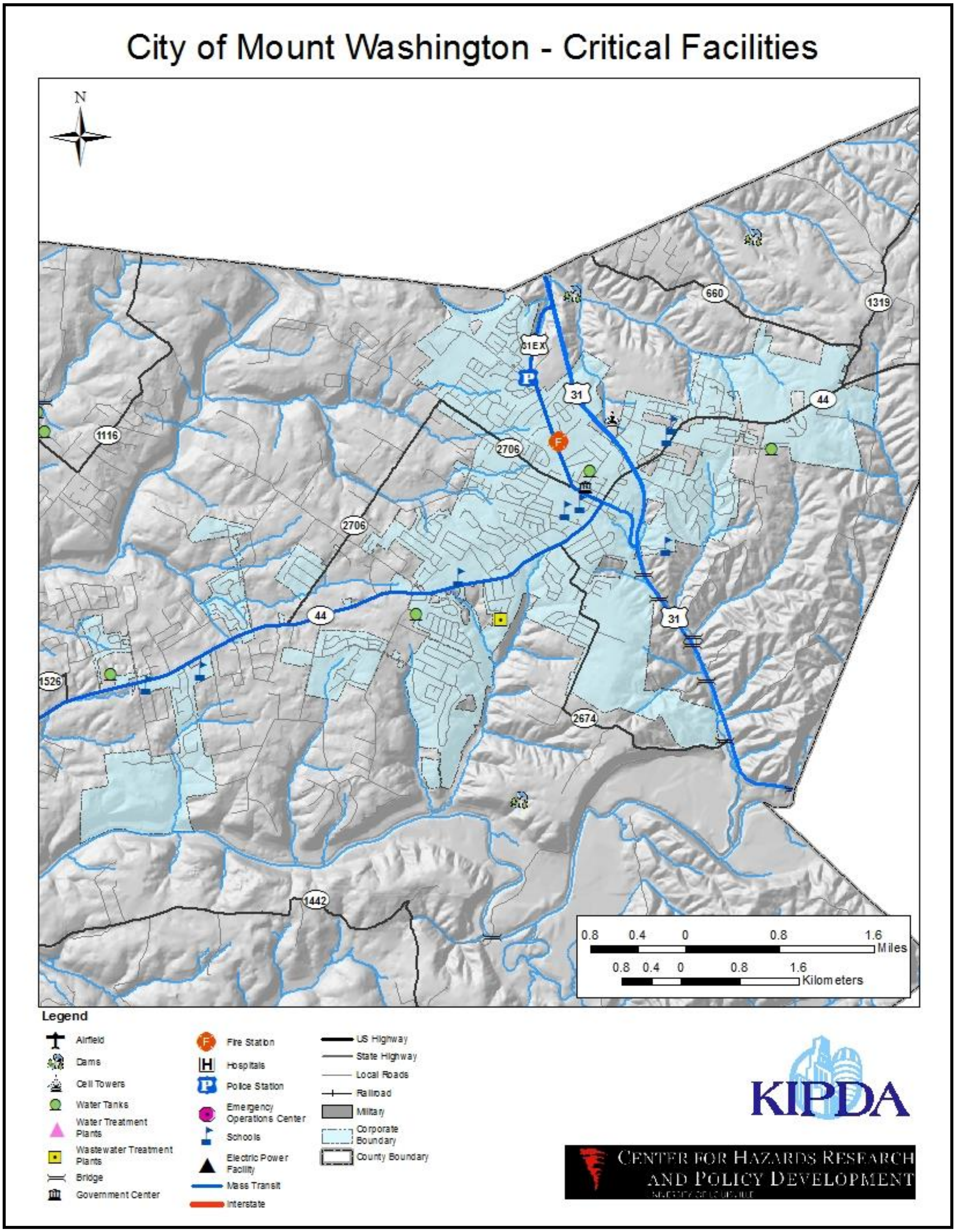
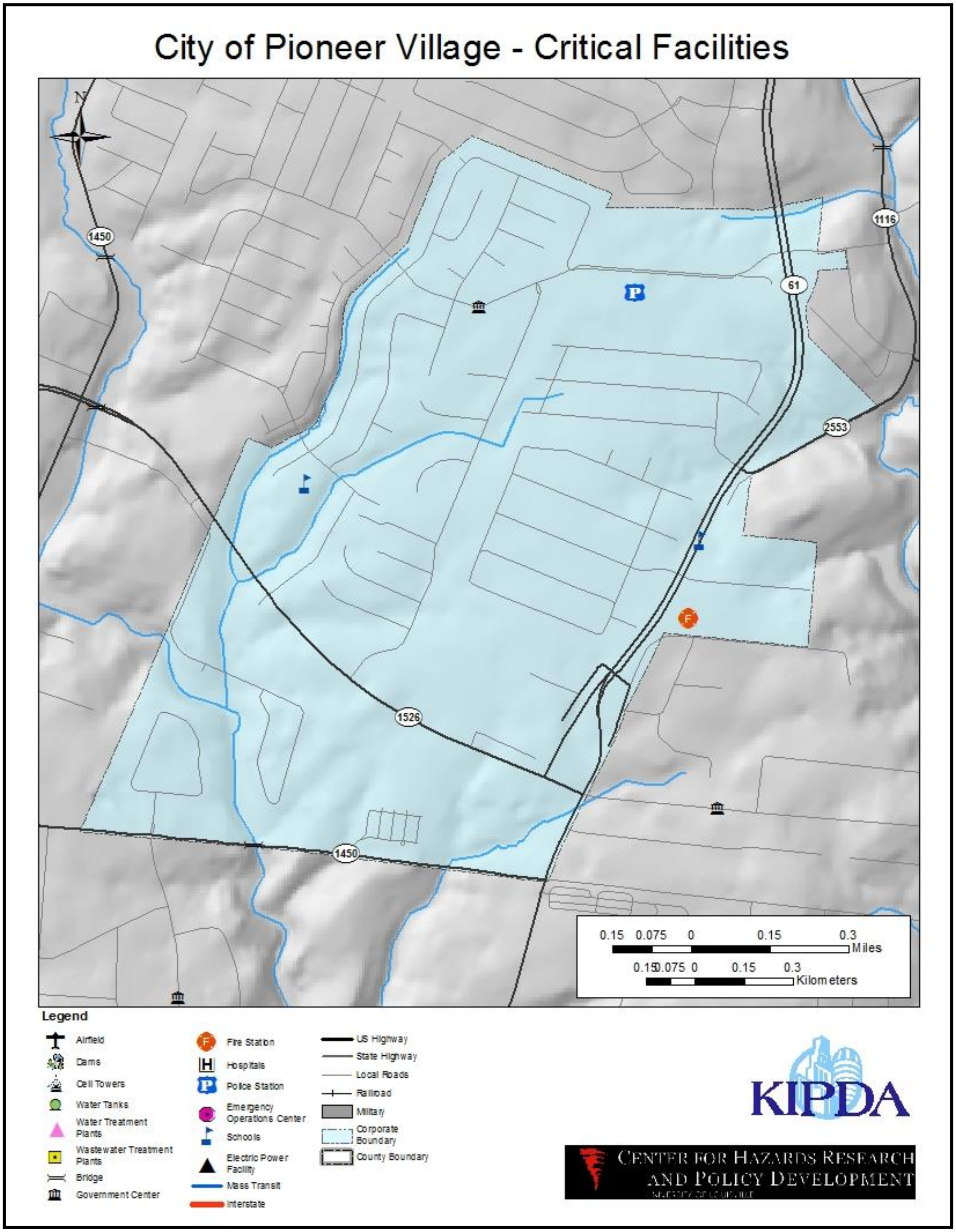
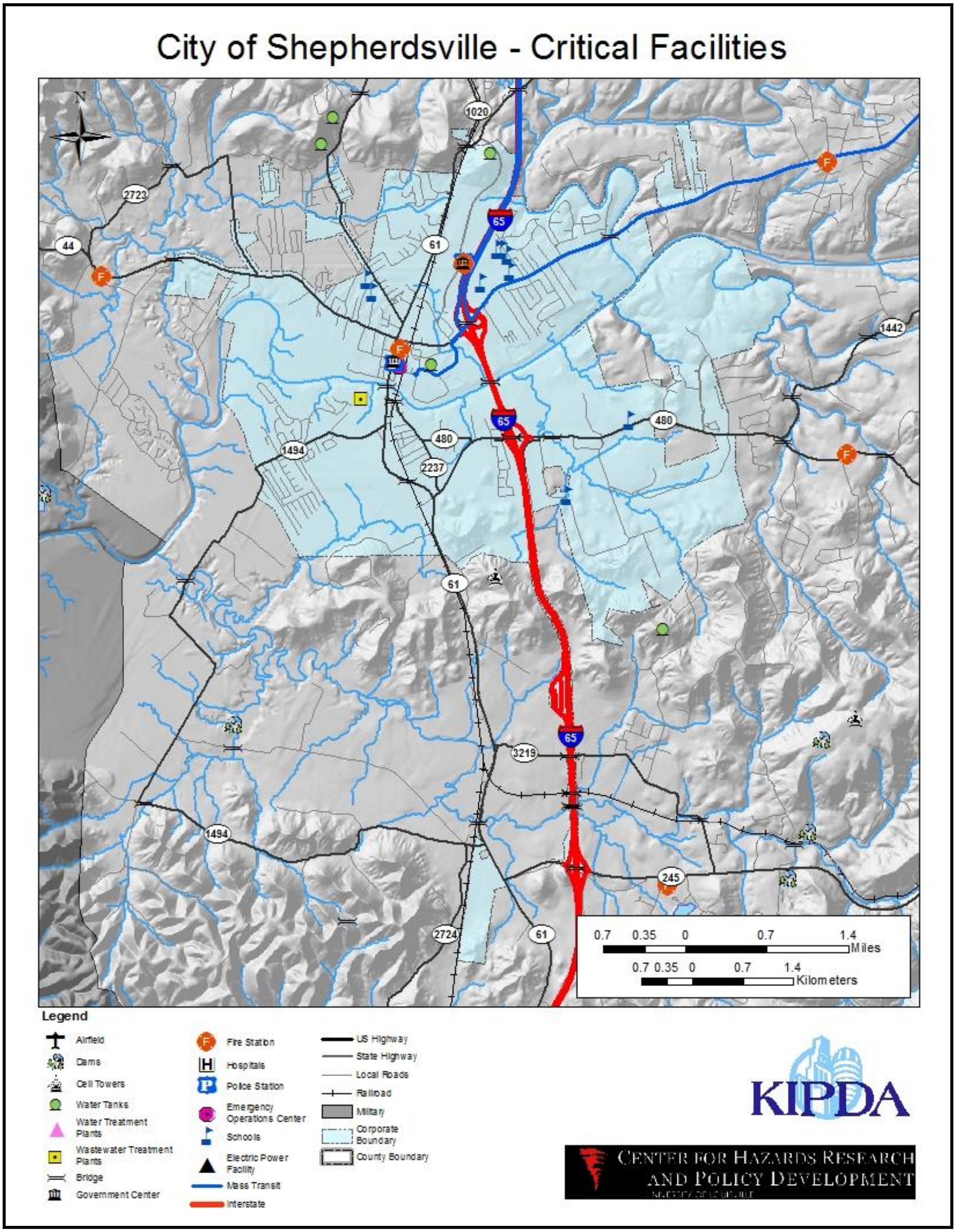
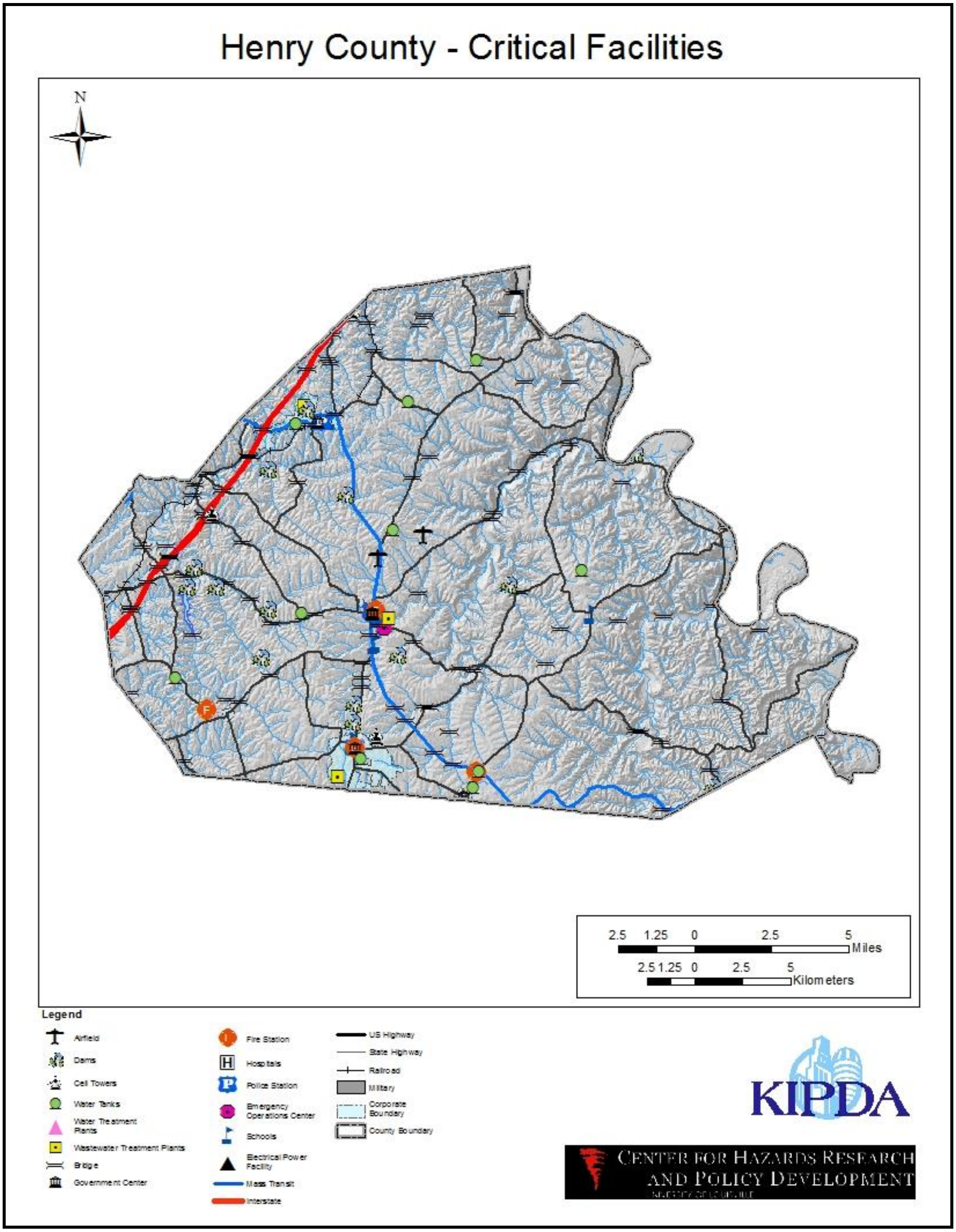

City of Lebanon Junction - Critical Facilities
N
65
434
61
0.4 0.2 0 0.4 0.8
Miles
0.4 0.2 0 0.4 0.8
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Mount Washington - Critical Facilities
N
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
0.8 0.4 0 0.8 1.6 Miles
0.8 0.4 0 0.8 1.6 Kilometers
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Pioneer Village - Critical Facilities
N
1450
1116
61
2553
1526
1450
0.15 0.075 0 0.15 0.3 Miles
0.15 0.075 0 0.15 0.3 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Shepherdsville - Critical Facilities
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
0.7 0.35 0 0.7 1.4 Miles
0.7 0.35 0 0.7 1.4 Kilometers
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


Henry County - Critical Facilities
N
2.5 1.25 0 2.5 5
Miles
2.5 1.25 0 2.5 5
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electrical Power Facility
Mass Transit
Interstate
US Highway
State Highway
Railroad
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County Boundary
KIPDA
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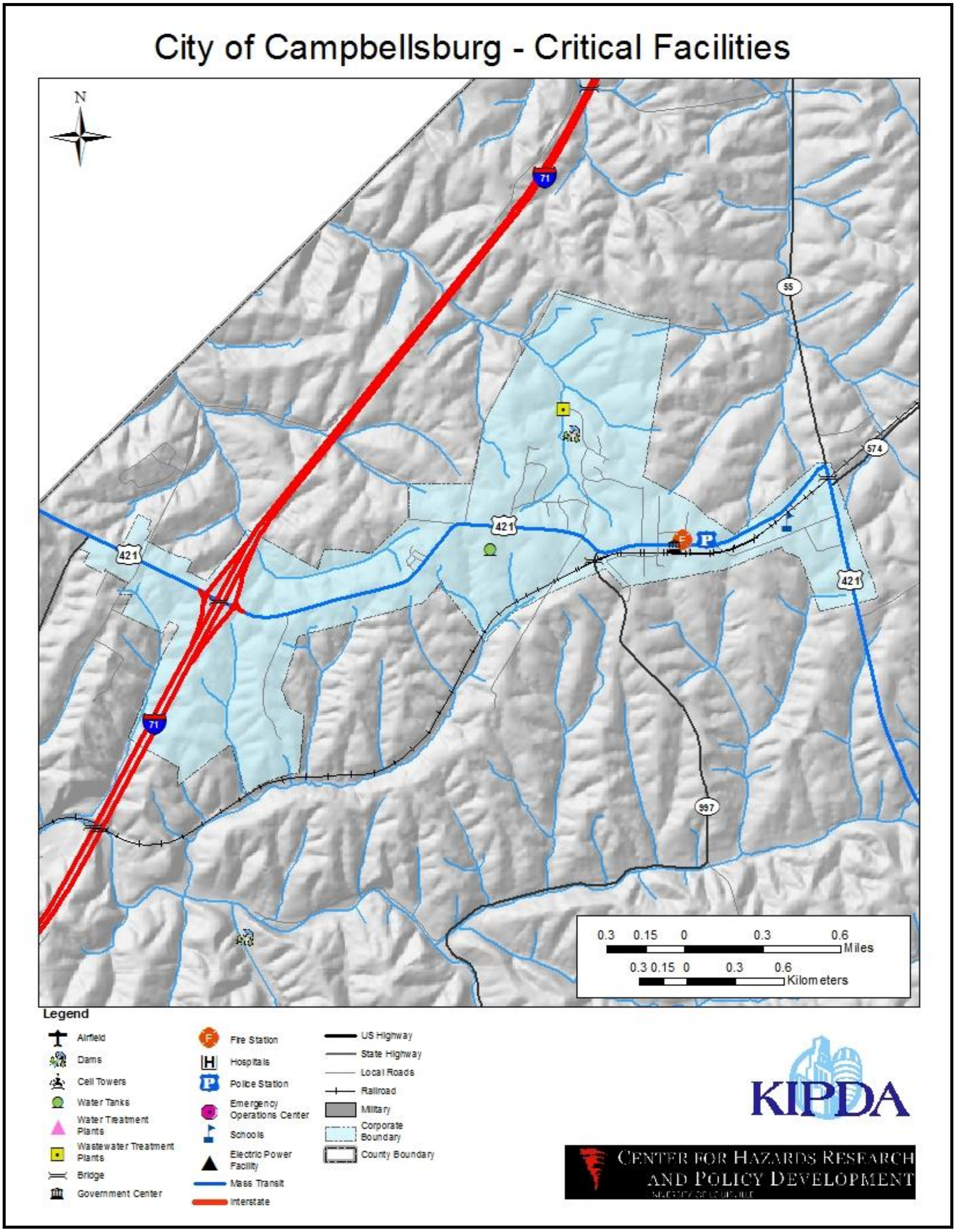
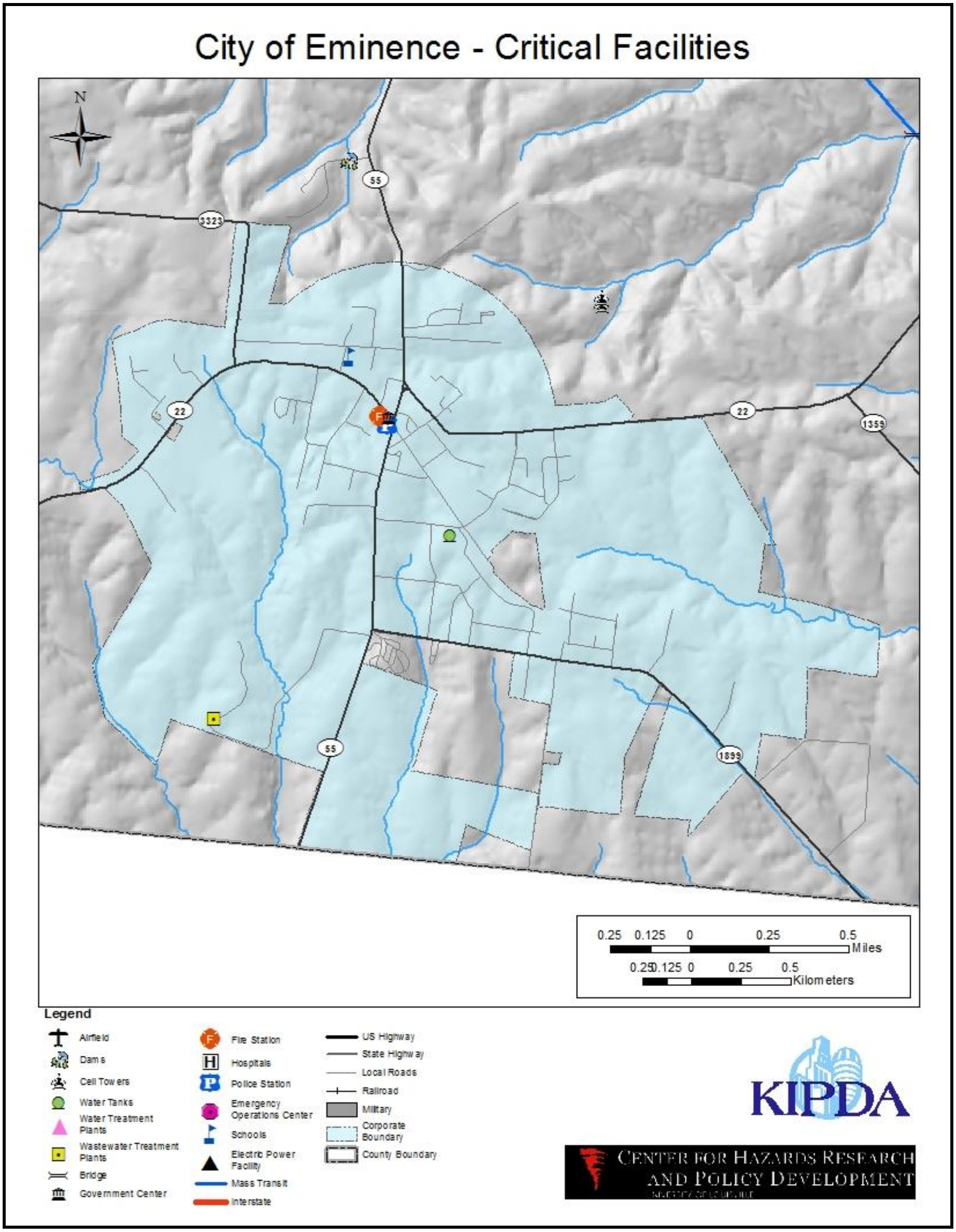


City of Campbellsburg - Critical Facilities
N
71
55
574
421
421
421
71
997
0.3 0.15 0 0.3 0.6
Miles
0.3 0.15 0 0.3 0.6
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
Interstate
US Highway
State Highway
Local Roads
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


City of Eminence - Critical Facilities
N
55
3323
22
1359
1899
0.25 0.125 0 0.25 0.5
Miles
0.25 0.125 0 0.25 0.5
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
Schools
Electric Power Facility
Mass Transit
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US Highway
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Local Roads
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Military
Corporate Boundary
County Boundary
KIPDA
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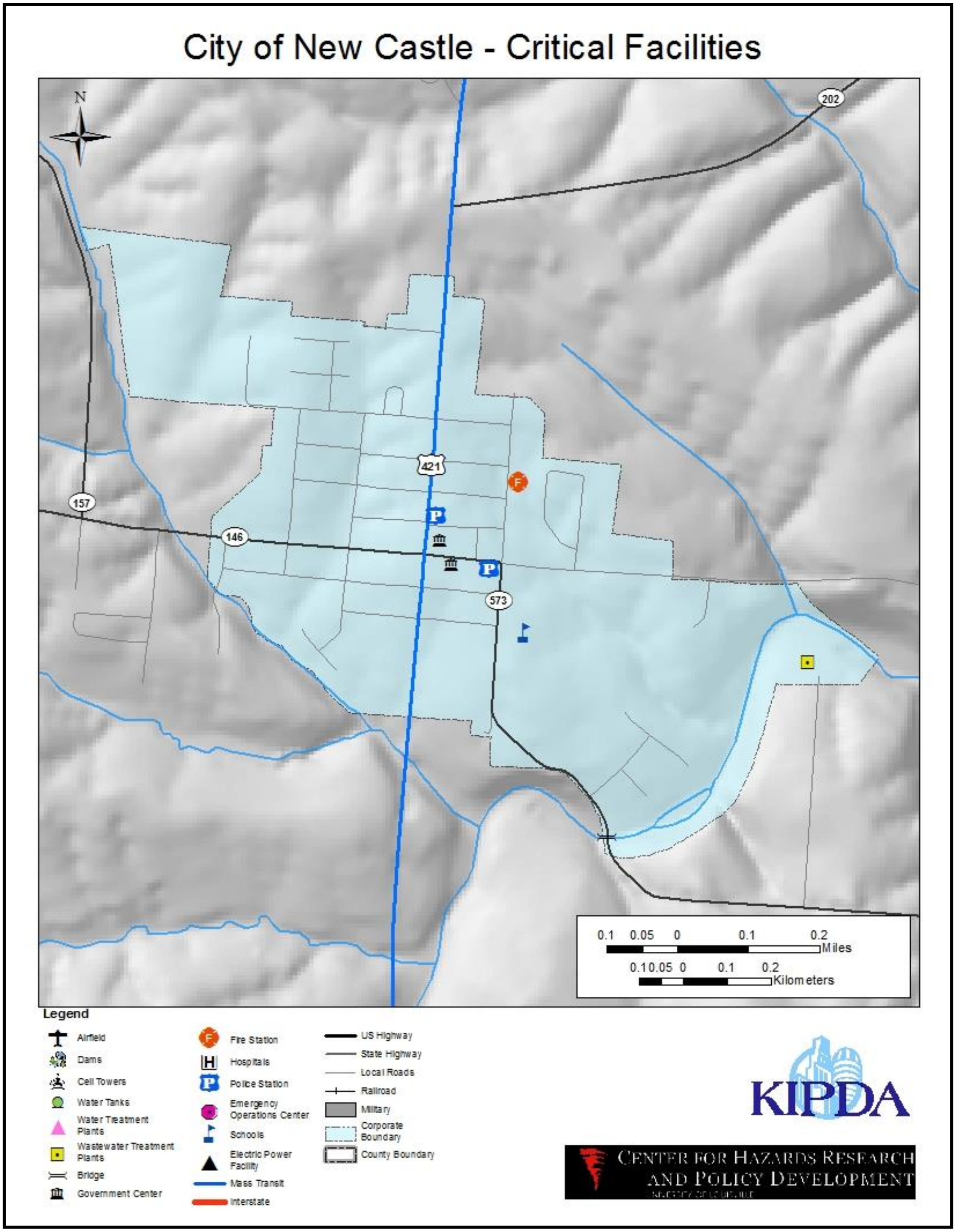
City of New Castle - Critical Facilities
N
202
421
157
146
573
0.1 0.05 0 0.1 0.2
Miles
0.1 0.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
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Mass Transit
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Railroad
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County Boundary
KIPDA
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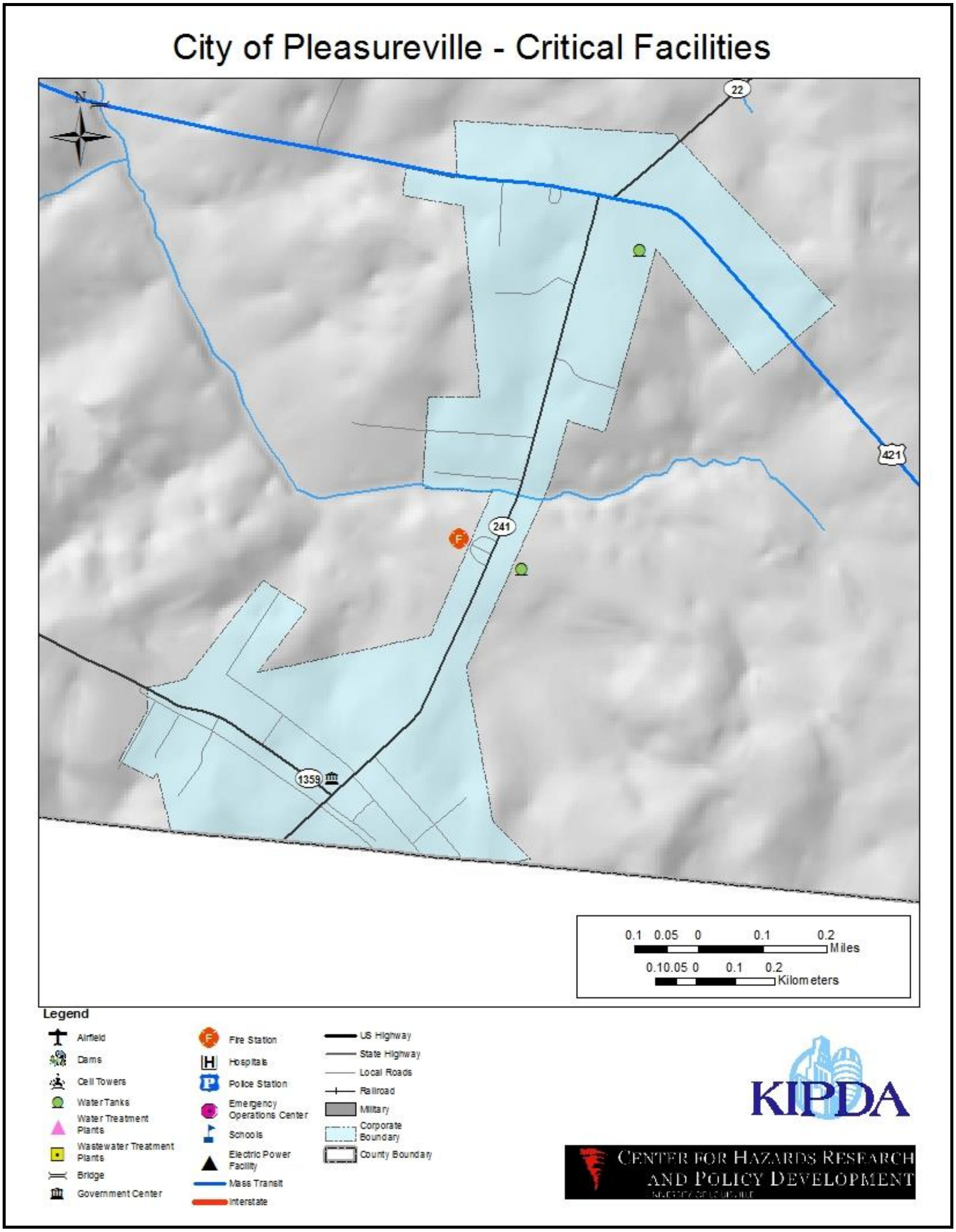
City of Pleasureville - Critical Facilities
22
421
241
1359
0.1 0.05 0 0.1 0.2
Miles
0.10.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
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Hospitals
Police Station
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Railroad
Military
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County Boundary
KIPDA
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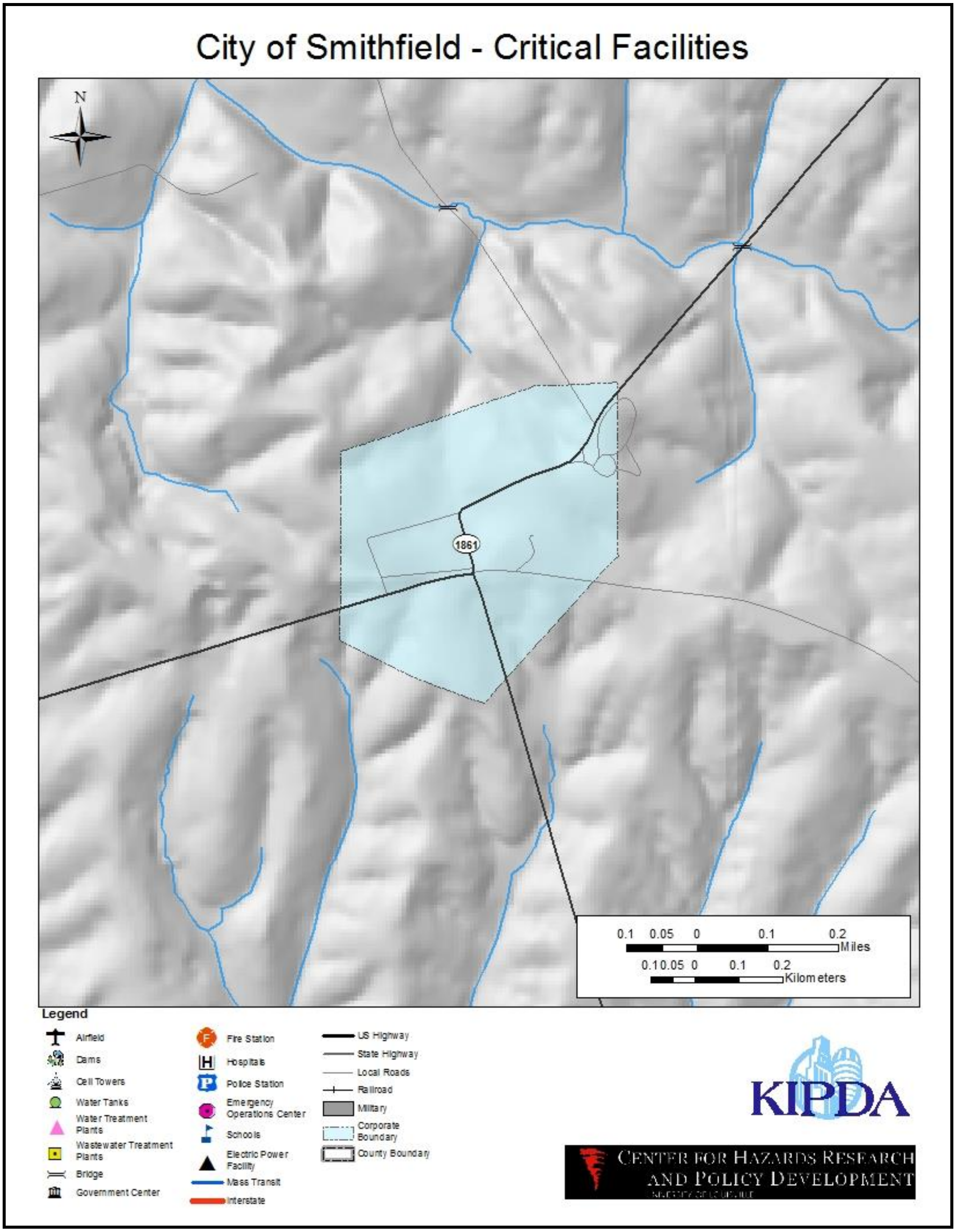
City of Smithfield - Critical Facilities
N
1861
0.1 0.05 0 0.1 0.2
Miles
0.1 0.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
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Police Station
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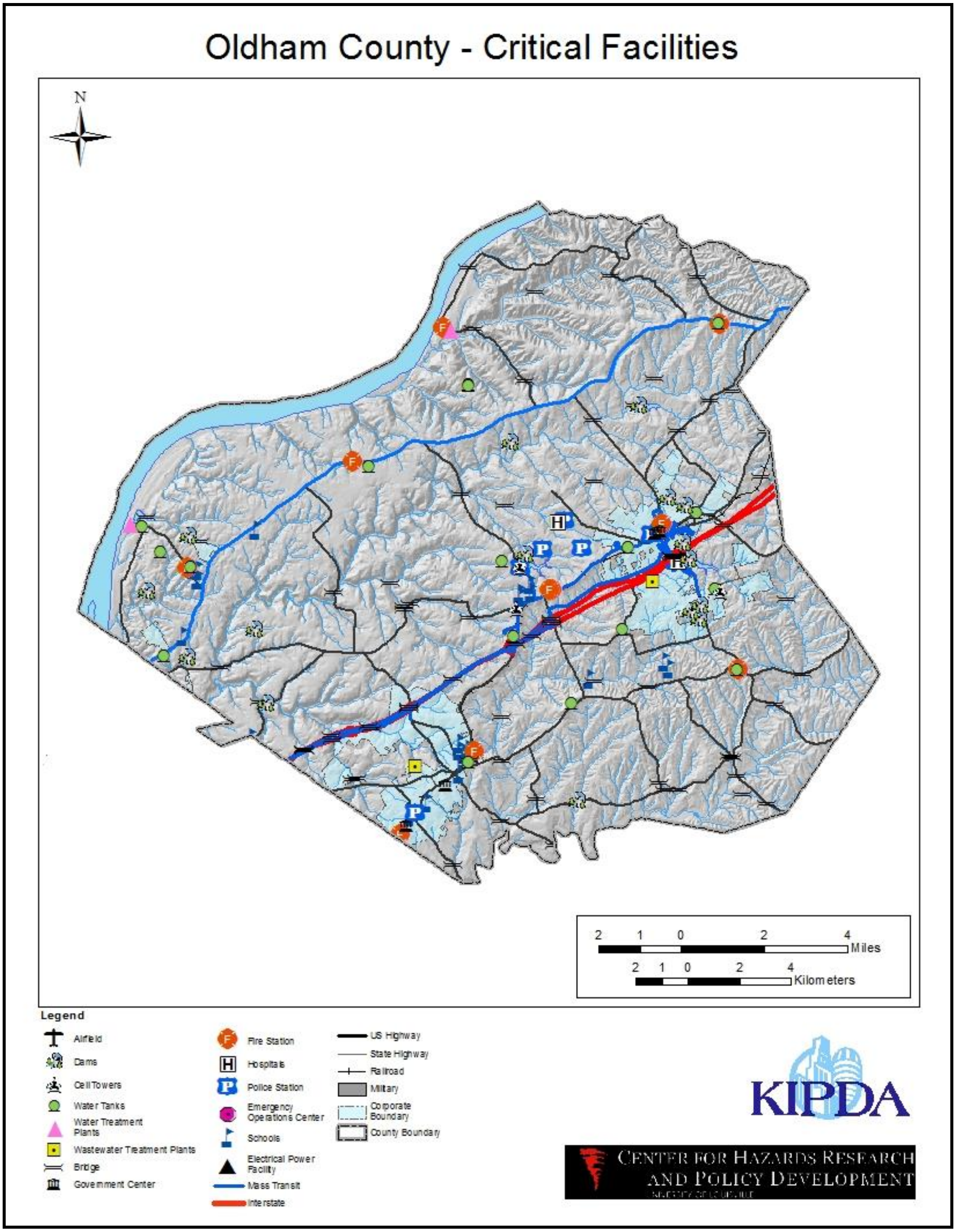
Oldham County - Critical Facilities
N
2 1 0 2 4 Miles
2 1 0 2 4 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
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Military
Corporate Boundary
County Boundary
KIPDA
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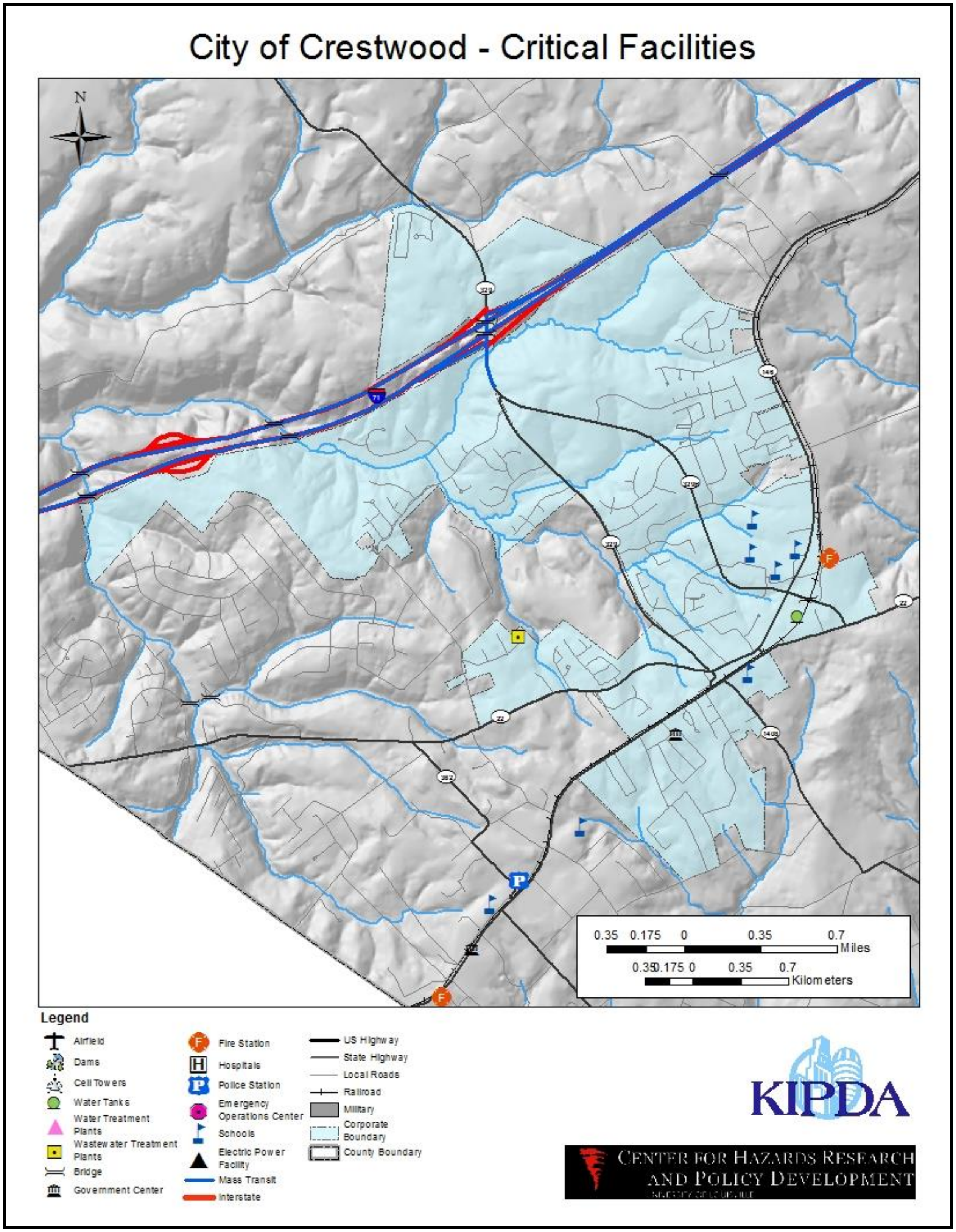
City of Crestwood - Critical Facilities
N
0.35 0.175 0 0.35 0.7
Miles
0.35 0.175 0 0.35 0.7
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
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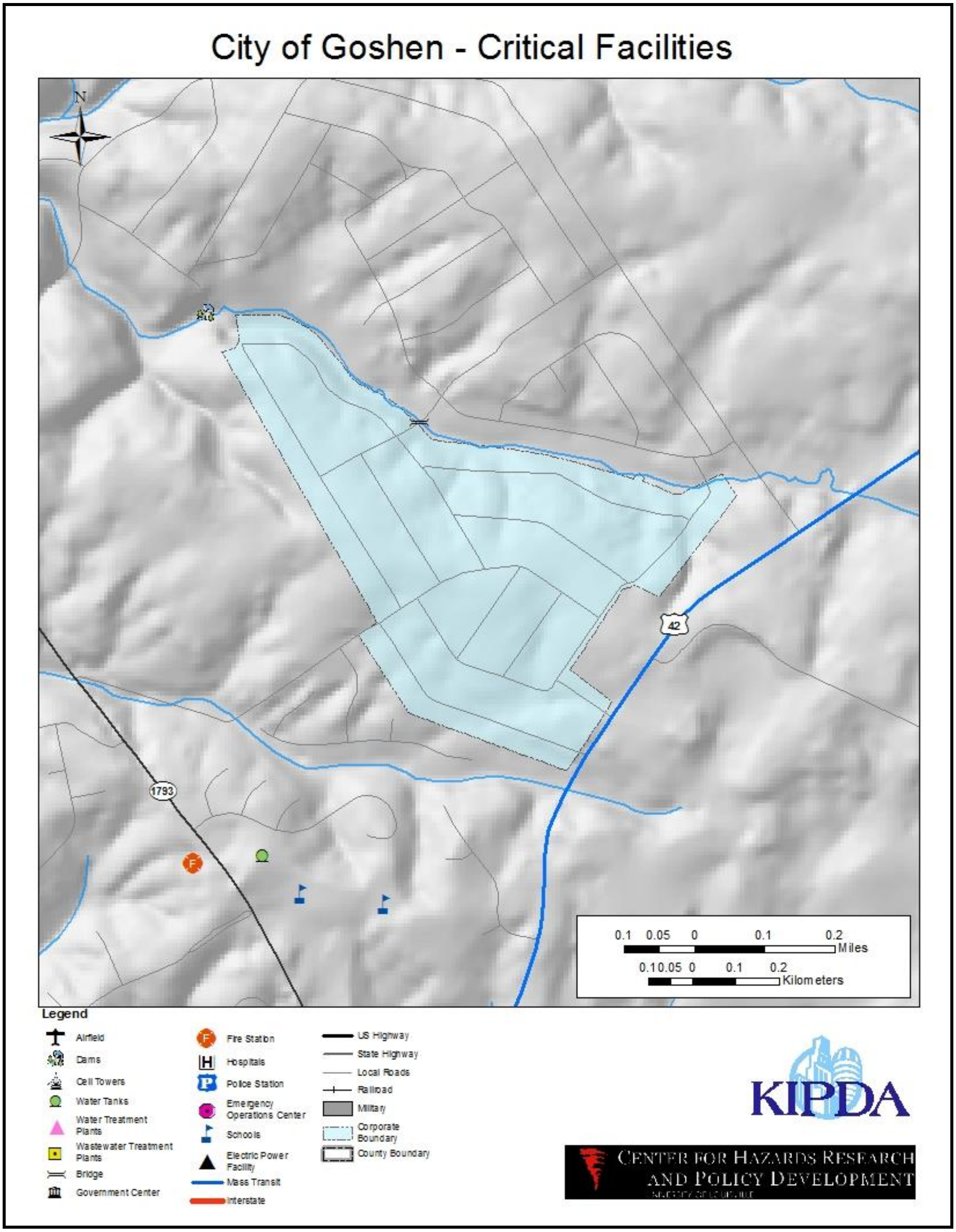
City of Goshen - Critical Facilities
N
42
1793
0.1 0.05 0 0.1 0.2 Miles
0.1 0.05 0 0.1 0.2 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
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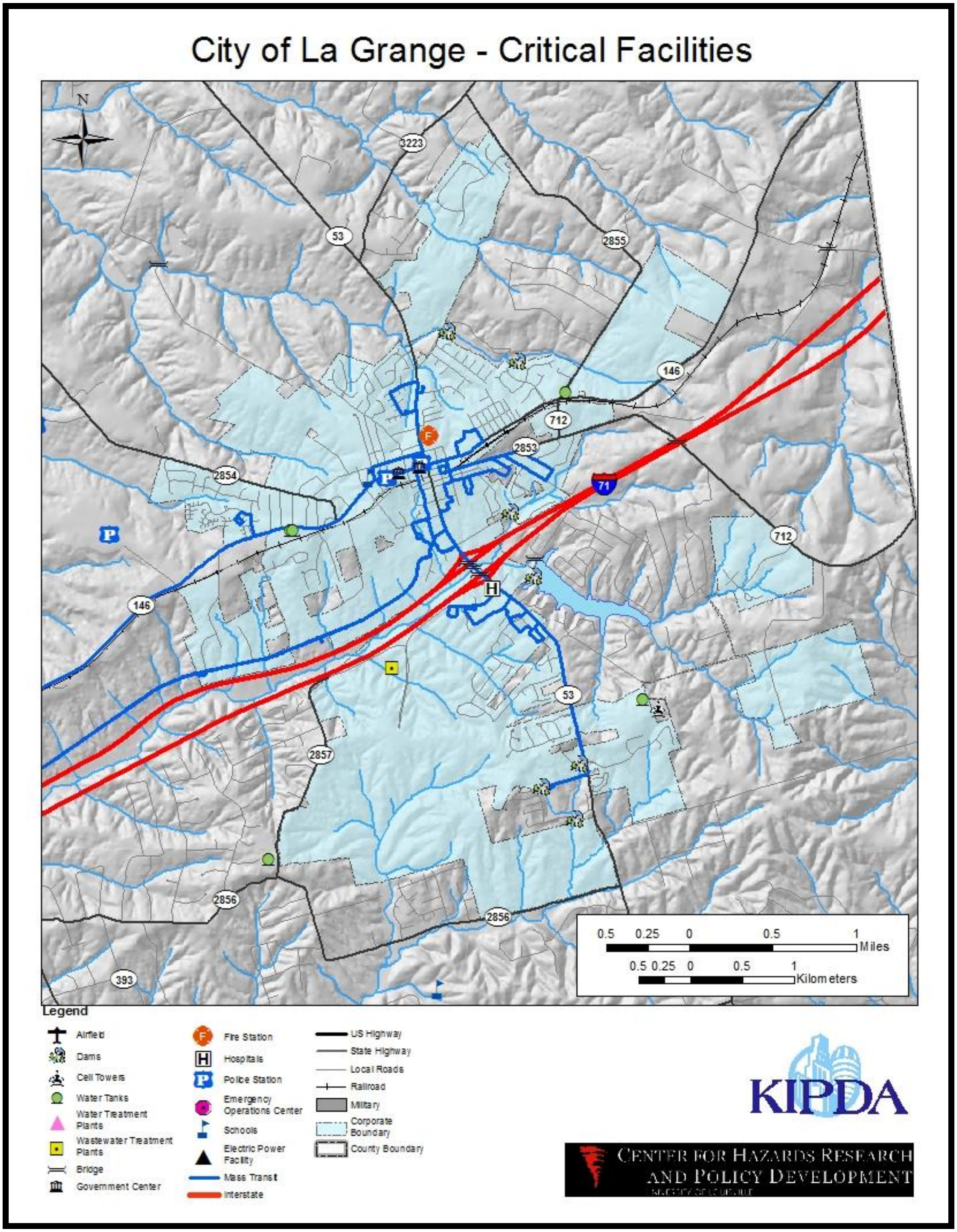
Corporate Boundary
County Boundary
KIPDA
Center for Hazards Research and Policy Development


City of La Grange - Critical Facilities
N
3223
53
2855
146
712
2853
2854
71
712
146
53
2857
2856
2856
393
0.5 0.25 0 0.5 1
Miles
0.5 0.25 0 0.5 1
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
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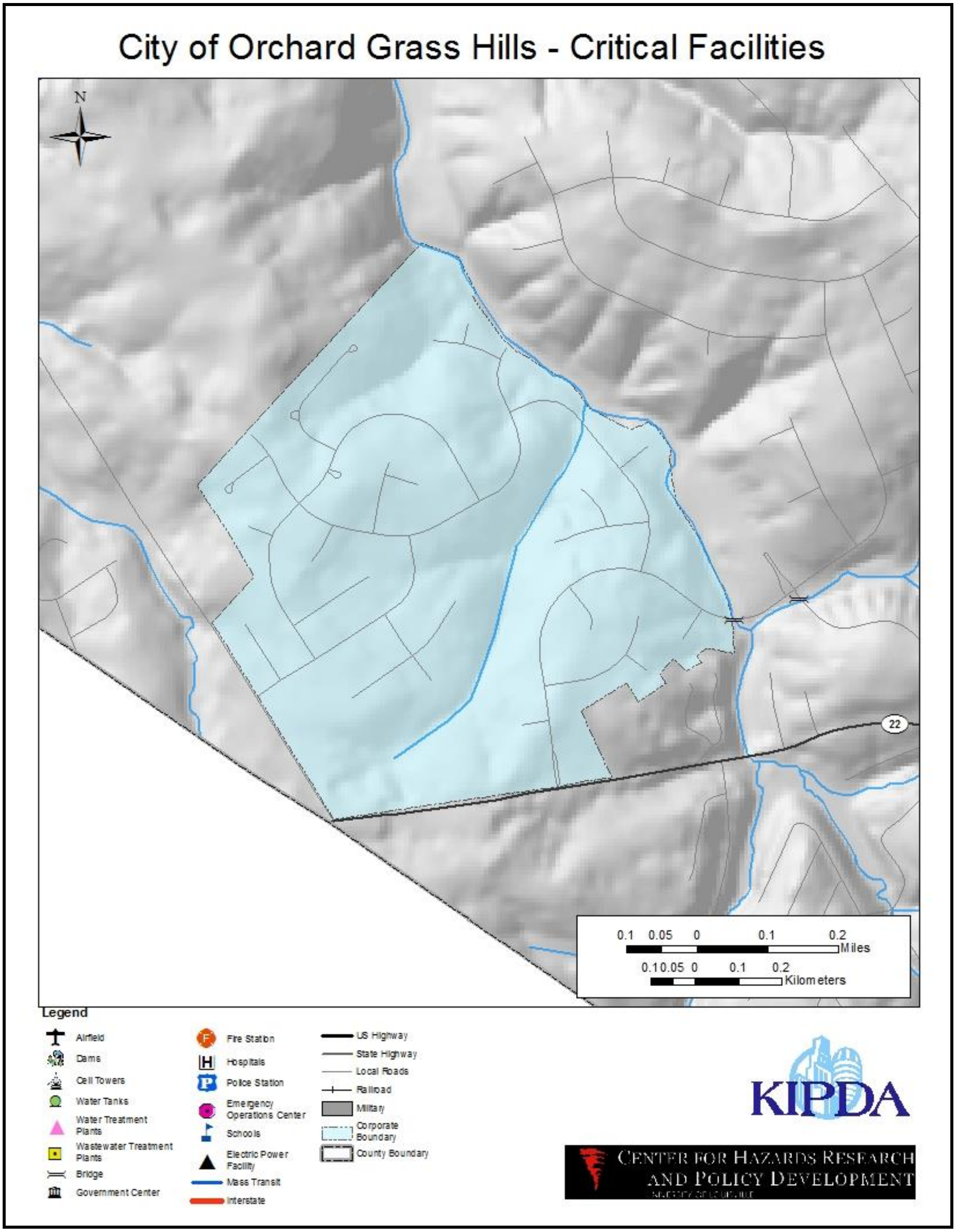
City of Orchard Grass Hills - Critical Facilities
N
22
0.1 0.05 0 0.1 0.2 Miles
0.1 0.05 0 0.1 0.2 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
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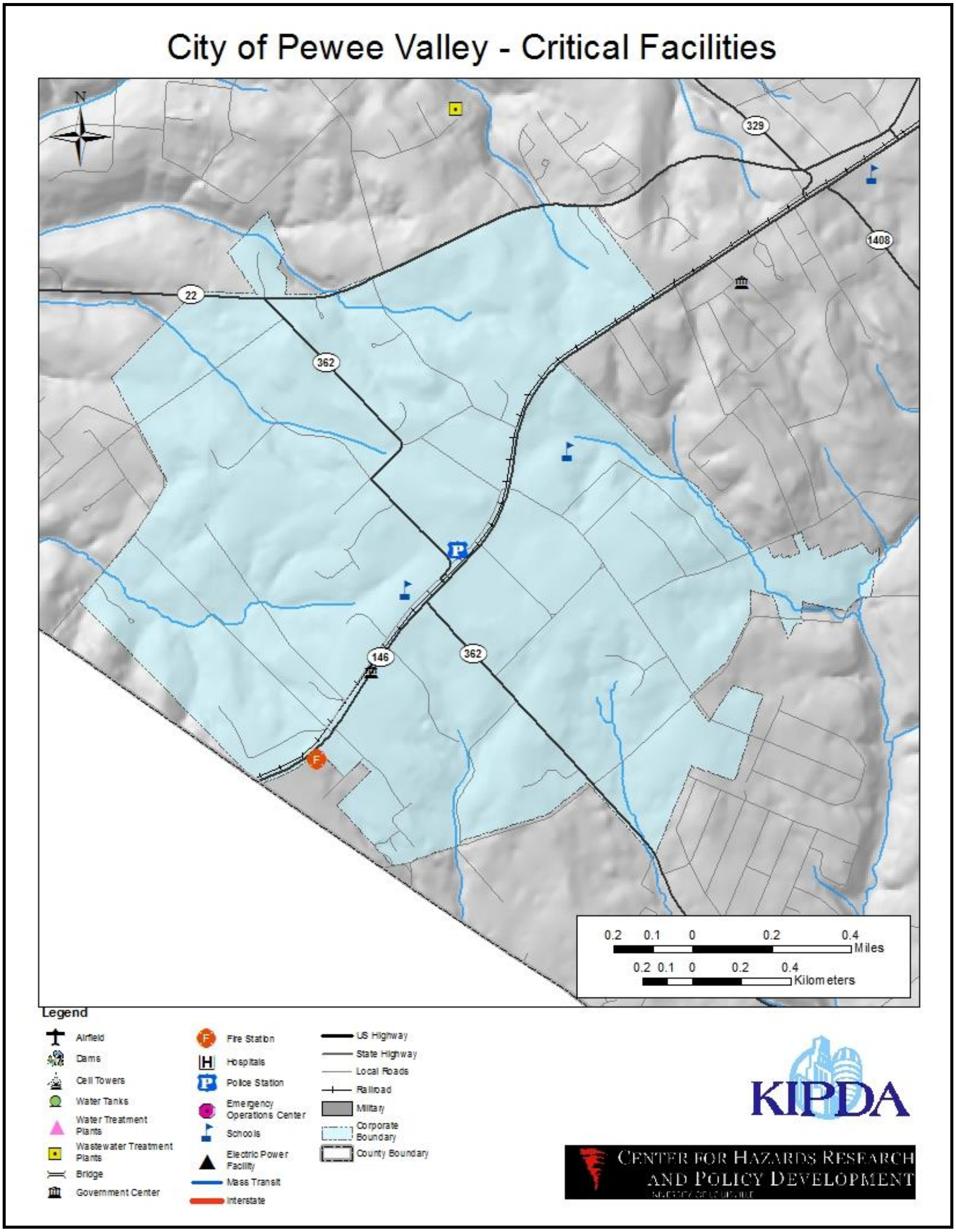
City of Pewee Valley - Critical Facilities
N
329
1408
22
362
146
362
0.2 0.1 0 0.2 0.4
Miles
0.2 0.1 0 0.2 0.4
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
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County Boundary
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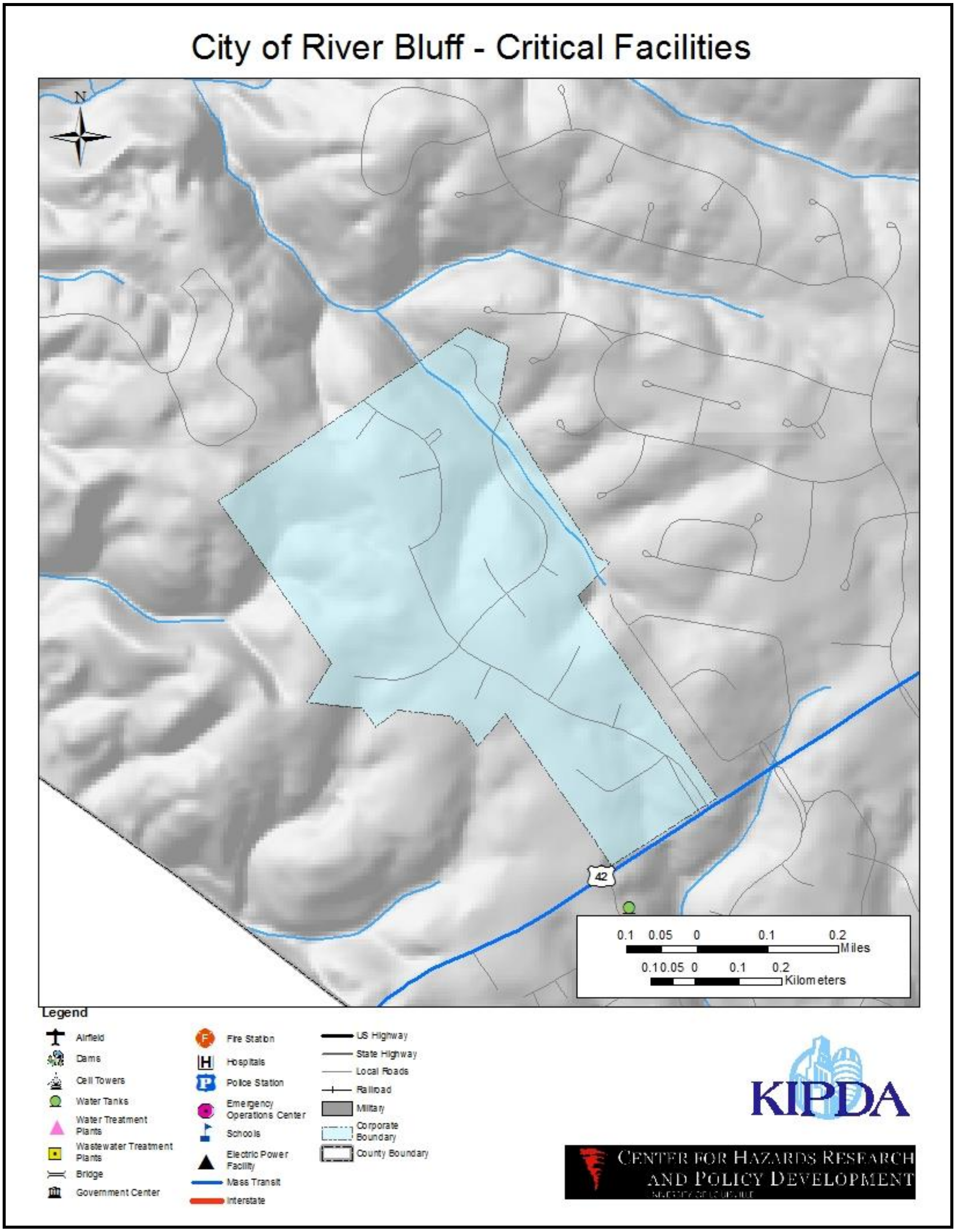
City of River Bluff - Critical Facilities
N
42
0.1 0.05 0 0.1 0.2
Miles
0.1 0.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
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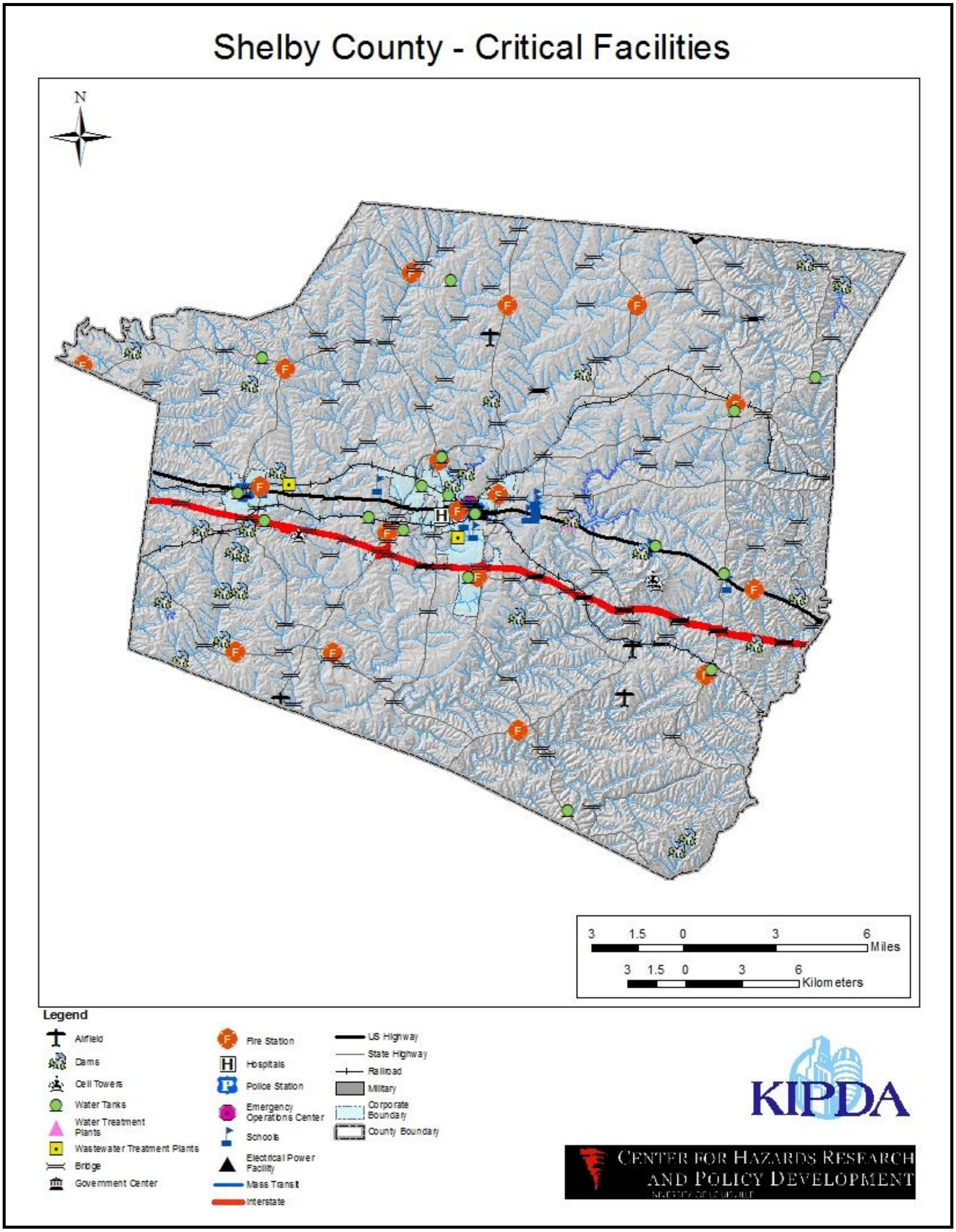
Shelby County - Critical Facilities
N
3 1.5 0 3 6 Miles
3 1.5 0 3 6 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
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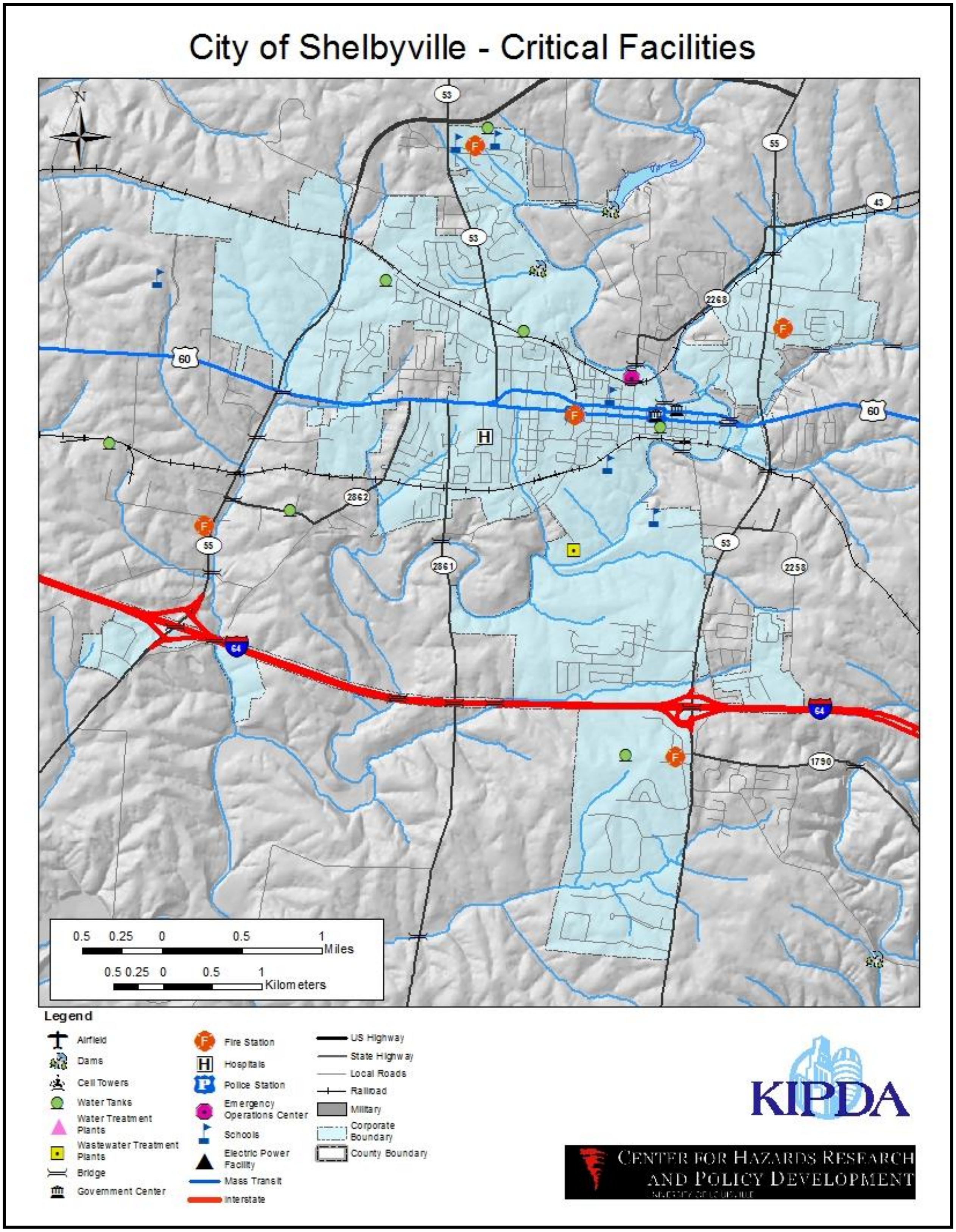
City of Shelbyville - Critical Facilities
N
0.5 0.25 0 0.5 1 Miles
0.5 0.25 0 0.5 1 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
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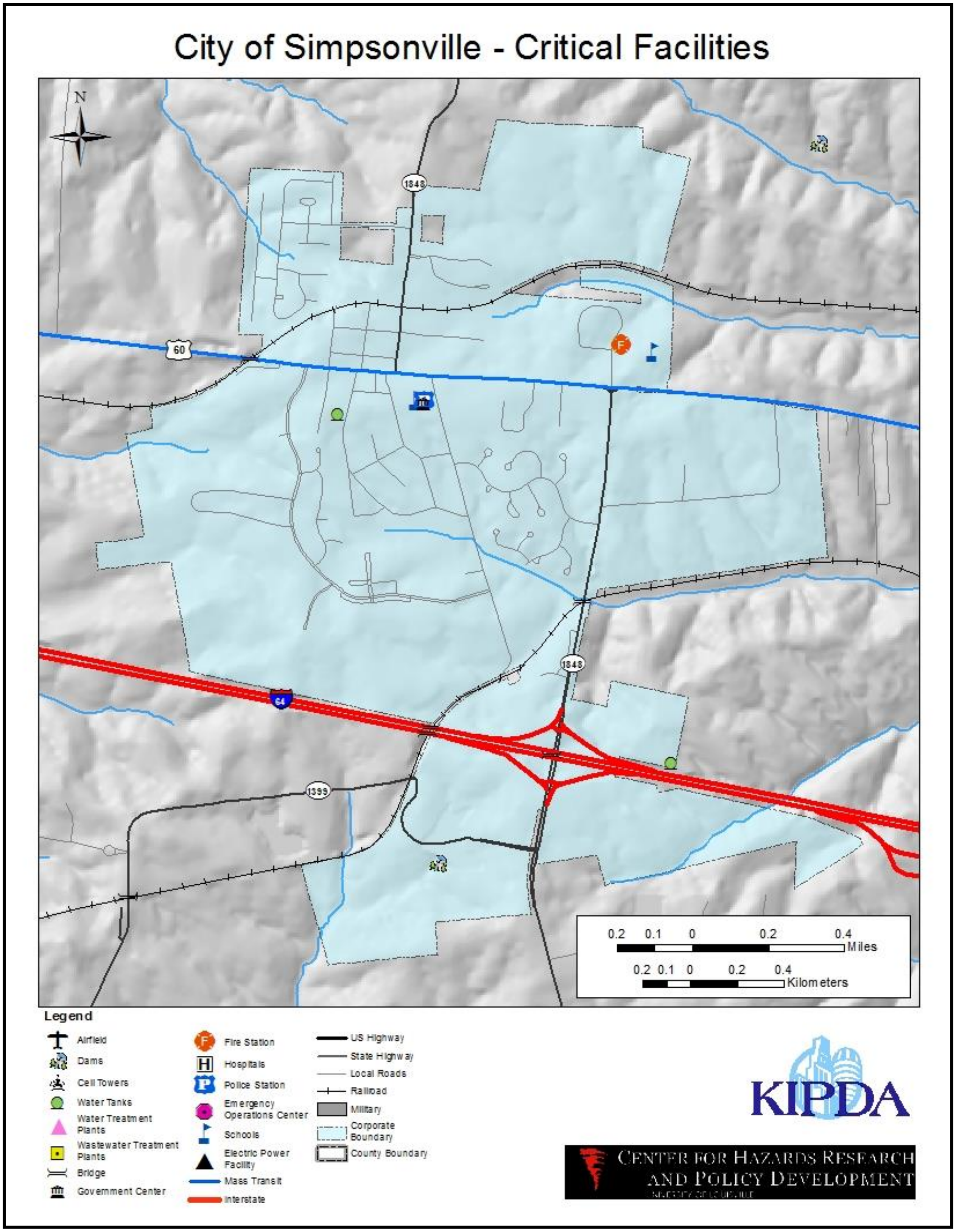
City of Simpsonville - Critical Facilities
N
1848
60
64
1399
0.2 0.1 0 0.2 0.4 Miles
0.2 0.1 0 0.2 0.4 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
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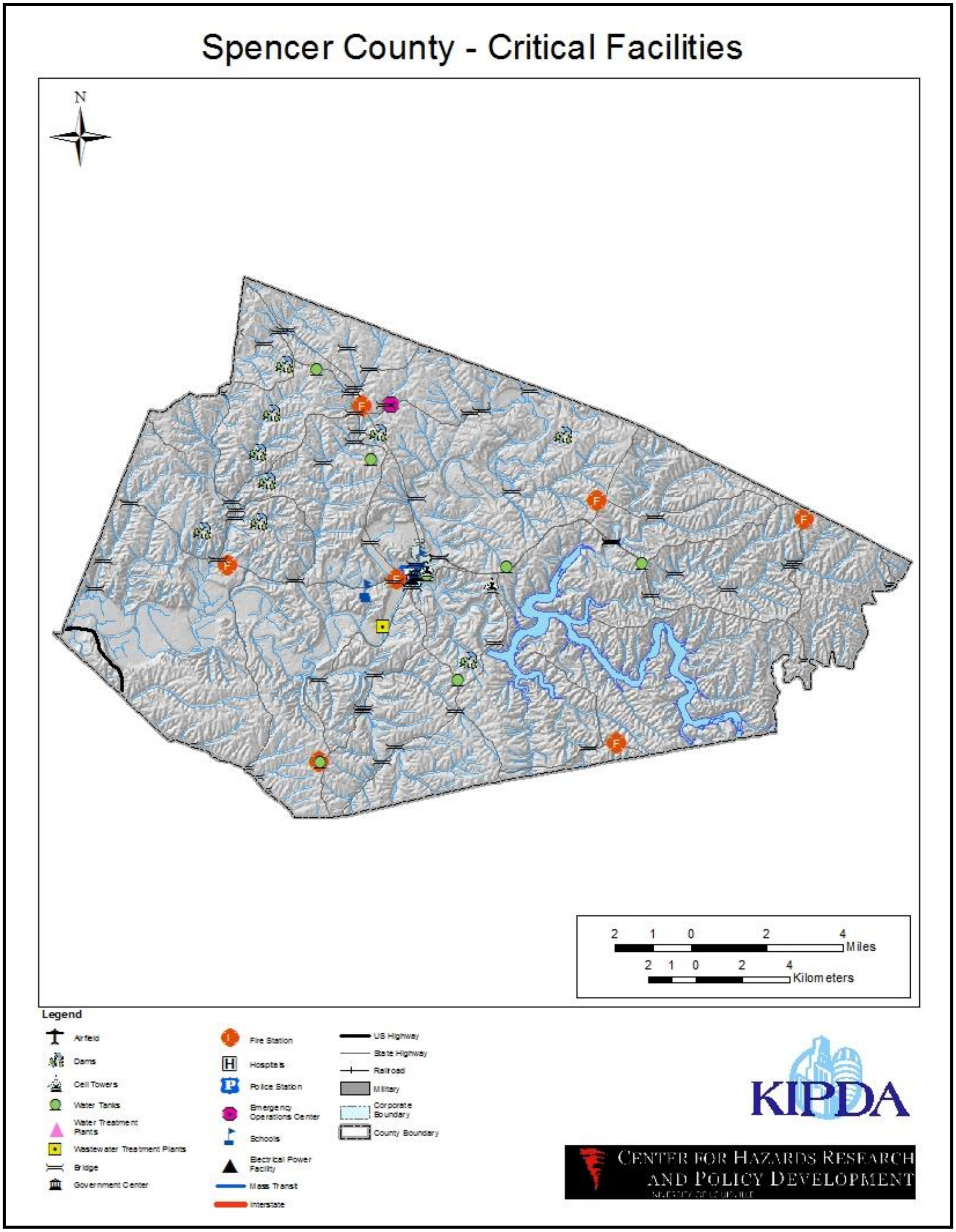
Spencer County - Critical Facilities
N
2 1 0 2 4
Miles
2 1 0 2 4
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
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Police Station
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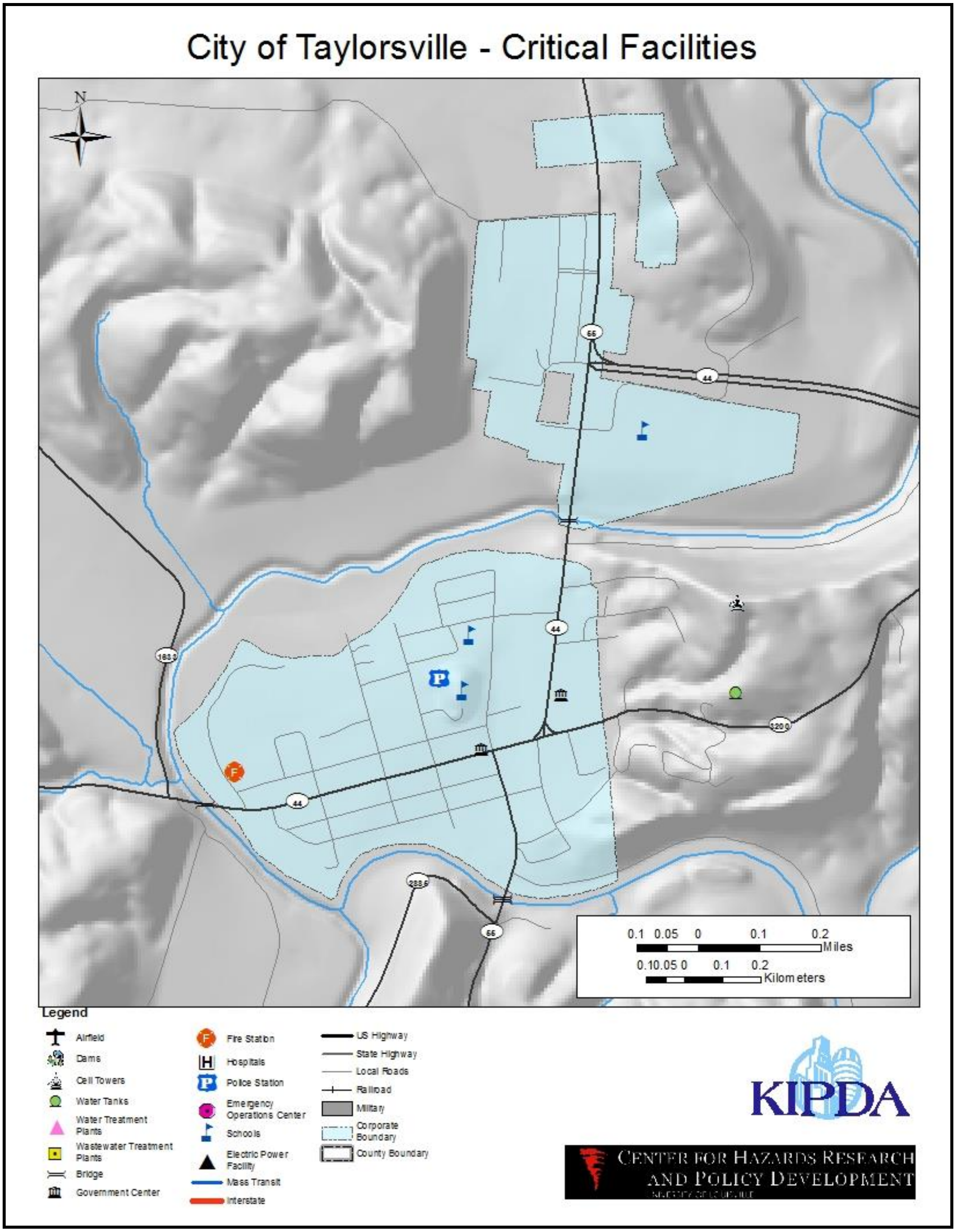
City of Taylorsville - Critical Facilities
N
55
44
44
1633
2200
44
2886
55
0.1 0.05 0 0.1 0.2
Miles
0.1 0.05 0 0.1 0.2
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
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County Boundary
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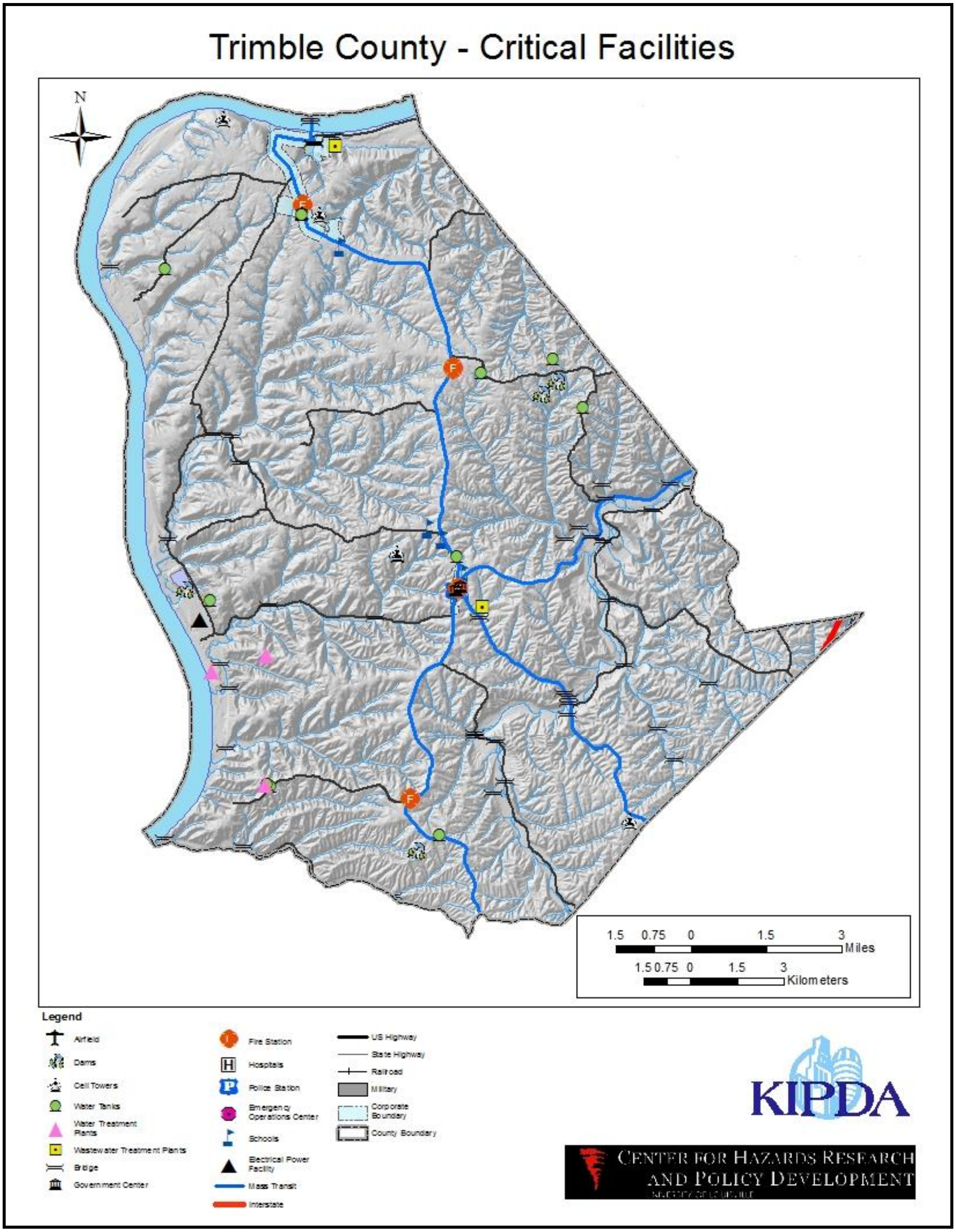
Trimble County - Critical Facilities
N
1.5 0.75 0 1.5 3
Miles
1.5 0.75 0 1.5 3
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
Government Center
Fire Station
Hospitals
Police Station
Emergency Operations Center
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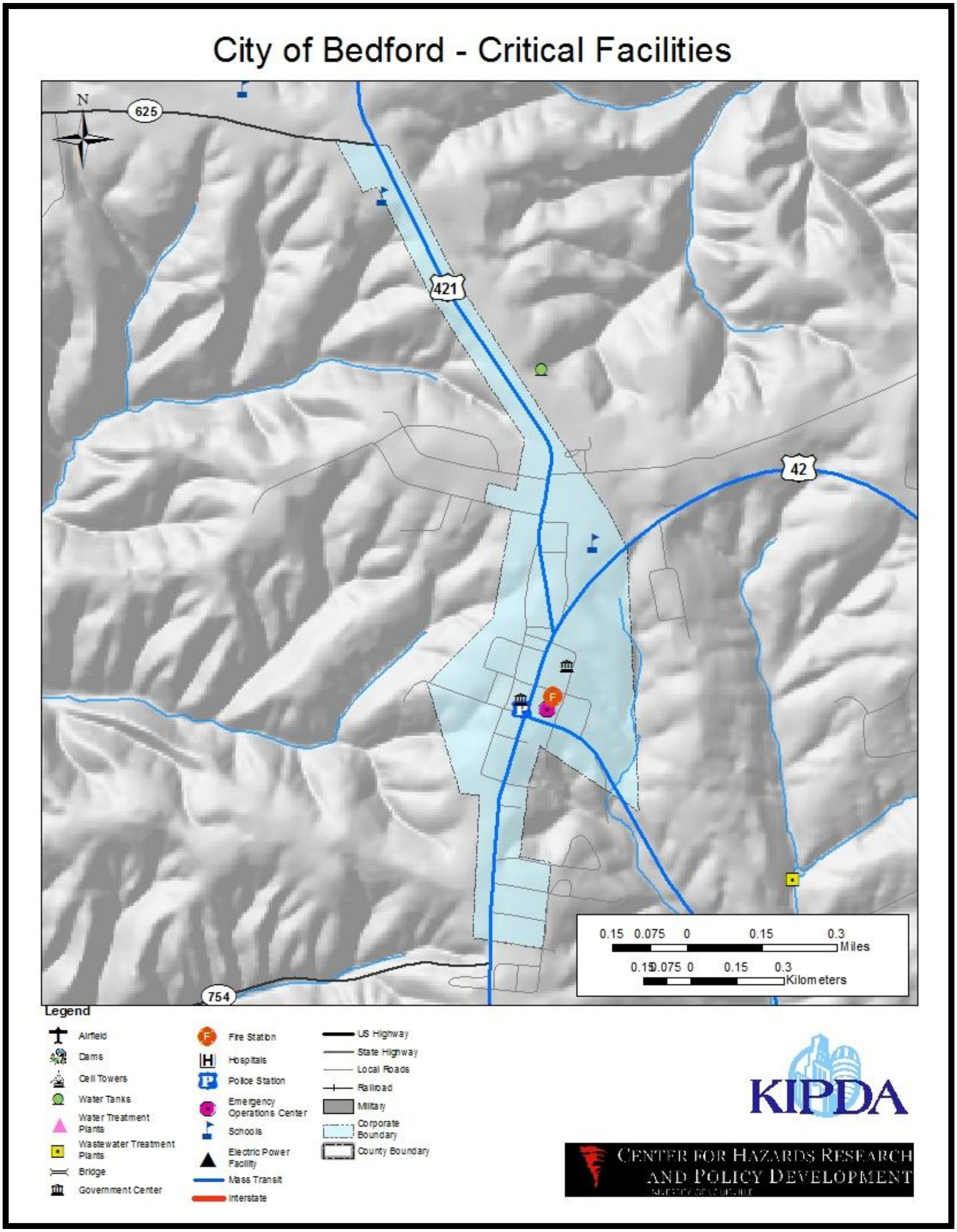
City of Bedford - Critical Facilities
N
625
421
42
754
0.15 0.075 0 0.15 0.3
Miles
0.15 0.075 0 0.15 0.3
Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
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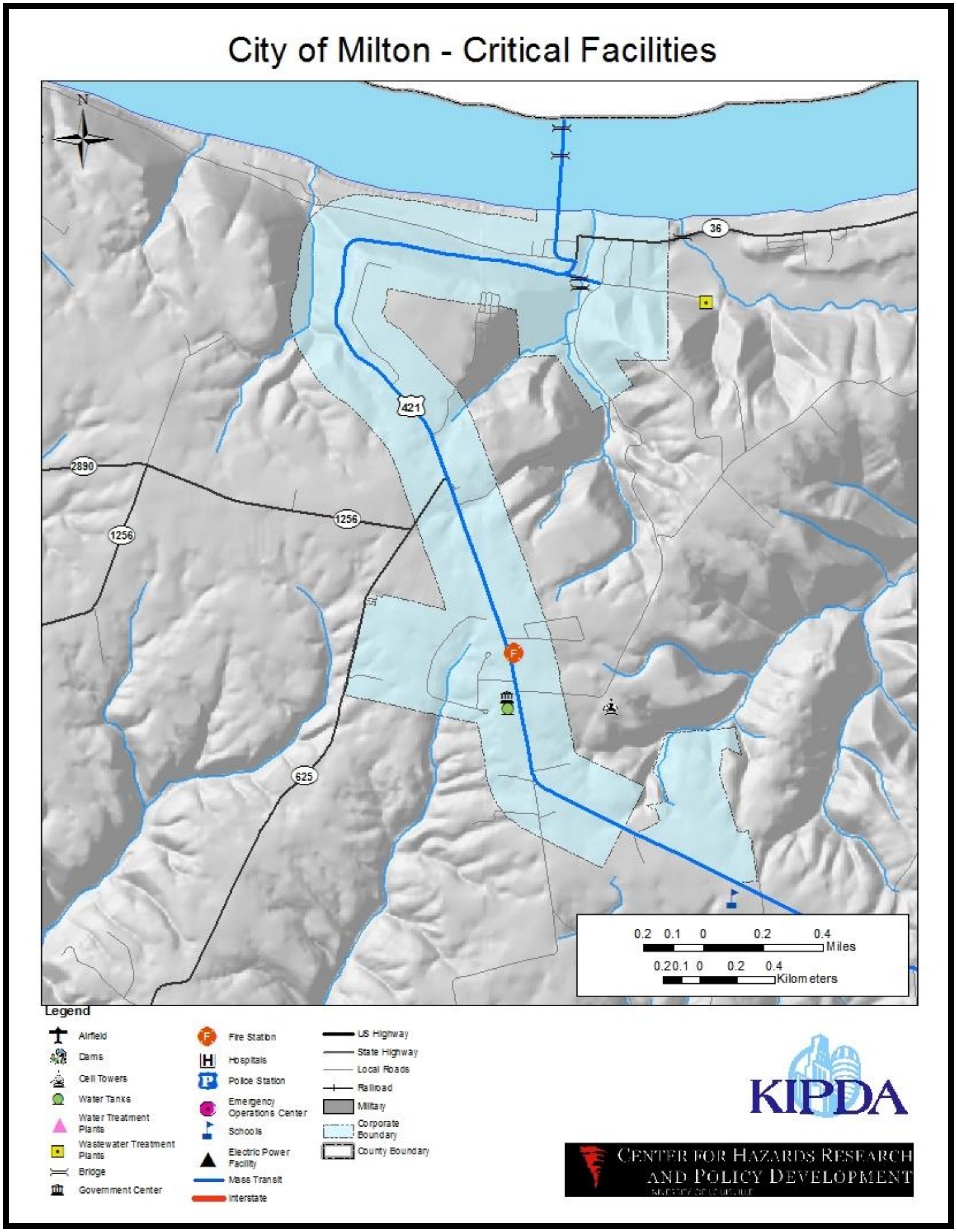
City of Milton - Critical Facilities
N
36
421
2890
1256
1256
625
0.2 0.1 0 0.2 0.4 Miles
0.2 0.1 0 0.2 0.4 Kilometers
Legend
Airfield
Dams
Cell Towers
Water Tanks
Water Treatment Plants
Wastewater Treatment Plants
Bridge
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ANALYZING DEVELOPMENT TRENDS

DEMOGRAPHIC

Using the 2014 Count and MSA population estimates released by the U.S. Census Bureau, the region covered by the KIPDA Regional Hazard Mitigation Plan grew 23.0% in population between 2000 and 2014. Over the period of 2000-2014, the state of Kentucky grew in population by 12%. The county with the highest percentage growth in the state of Kentucky was Spencer County with 33% from 2000-2014.

	2000	2014	% Change
Bullitt	61,236	77,955	21%
Henry	15,060	15,572	3%
Oldham	46,178	63,490	27%
Shelby	33,337	44,875	26%
Spencer	11,766	17,668	33%
Trimble	8,125	8,786	8%
Total	**175,702**	**228,346**	**23%**

The following tables compiled by the Kentucky State Data Center for Growth Trends in the KIPDA region follow:

- Population Projections by County out until 2050
- Components of Change by County from April 2000 until July 2050
- Detailed components of Change by County from April 2000 until July 2050

Total Population, Census 2000 and 2010, Projections 2015-2050: State, ADDs, and Counties										
	Census 2000	Census 2010	Projections							
			2015	2020	2025	2030	2035	2040	2045	2050
Bullitt	61,236	74,319	81,358	88,508	95,623	102,461	108,891	114,952	120,801	126,708
Henry	15,060	15,416	15,706	15,915	16,037	16,110	16,062	15,946	15,802	15,693
Jefferson	693,604	741,096	768,000	793,817	817,427	838,053	855,909	872,231	888,125	904,790
Oldham	46,178	60,316	67,412	74,990	82,306	89,639	96,668	103,223	109,294	115,096
Shelby	33,337	42,074	46,838	51,944	56,950	61,939	66,835	71,703	76,646	81,762
Spencer	11,766	17,061	20,157	23,655	27,189	30,861	34,587	38,301	41,988	45,725
Trimble	8,125	8,809	9,172	9,514	9,807	10,022	10,171	10,272	10,352	10,428
Total	869,306	959,091	1,008,643	1,058,343	1,105,339	1,149,085	1,189,123	1,226,628	1,263,008	1,300,202

Births	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Bullitt	4,087	4,402	4,659	4,861	5,020	5,227	5,488	5,780
Henry	994	1,011	1,047	1,045	1,026	1,010	1,019	1,031
Oldham	2,963	3,288	3,653	3,996	4,273	4,526	4,816	5,173
Shelby	3,238	3,575	3,929	4,267	4,590	4,924	5,308	5,728
Spencer	1,094	1,241	1,420	1,608	1,796	1,986	2,196	2,423
Trimble	547	571	576	575	580	590	607	616

Deaths	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Bullitt	2,682	3,377	4,183	5,095	6,039	6,891	7,704	8,344
Henry	815	913	1,017	1,117	1,200	1,245	1,267	1,247
Oldham	1,853	2,344	2,969	3,731	4,543	5,322	6,086	6,769
Shelby	1,612	1,934	2,343	2,837	3,344	3,774	4,148	4,474
Spencer	653	850	1,103	1,424	1,792	2,169	2,555	2,899
Trimble	402	458	529	603	676	728	765	781

Natural Increase	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Bullitt	1,405	1,025	476	-234	-1,019	-1,664	-2,216	-2,564
Henry	179	98	30	-72	-174	-235	-248	-216
Oldham	1,110	944	684	265	-270	-796	-1,270	-1,596
Shelby	1,626	1,641	1,586	1,430	1,246	1,150	1,160	1,254
Spencer	441	391	317	184	4	-183	-359	-476
Trimble	145	113	47	-28	-96	-138	-158	-165

Net Migration	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Bullitt	5,635	6,123	6,637	7,070	7,449	7,728	8,065	8,472
Henry	113	114	97	148	128	116	105	109
Oldham	5,988	6,631	6,994	7,450	7,701	7,766	7,764	7,823
Shelby	3,137	3,465	3,612	3,758	3,860	3,930	4,001	4,081
Spencer	2,657	3,105	3,380	3,670	3,914	4,106	4,270	4,437
Trimble	217	230	244	245	246	239	240	244

Population Growth	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Bullitt	7039	7150	7115	6838	6430	6061	5849	5907
Henry	290	209	122	73	-48	-116	-144	-109
Jefferson	26904	25817	23610	20626	17856	16322	15894	16665
Oldham	7096	7578	7316	7333	7029	6555	6071	5802
Shelby	4764	5106	5006	4989	4896	4868	4943	5116
Spencer	3096	3498	3534	3672	3726	3714	3687	3737
Trimble	363	342	293	215	149	101	80	76

Bullitt County: Projections of Total Population by Age

	Census 2000	Census 2010	Projections							
			2015	2020	2025	2030	2035	2040	2045	2050
All Persons	61,236	74,319	81,358	88,508	95,623	102,461	108,891	114,952	120,801	126,708
00-04	4,439	4,647	4,786	5,155	5,458	5,694	5,880	6,121	6,427	6,770
05-09	4,808	5,163	5,333	5,494	5,916	6,264	6,535	6,749	7,025	7,376
10-14	4,619	5,576	5,616	5,800	5,976	6,435	6,813	7,107	7,340	7,640
15-19	4,436	5,296	5,535	5,575	5,757	5,932	6,387	6,761	7,052	7,283
20-24	3,596	4,052	4,425	4,628	4,657	4,813	4,955	5,332	5,642	5,883
25-29	4,423	4,456	4,812	5,257	5,503	5,534	5,723	5,891	6,340	6,708
30-34	4,807	4,729	5,052	5,456	5,962	6,241	6,276	6,491	6,682	7,192
35-39	5,565	5,413	5,355	5,722	6,180	6,754	7,069	7,110	7,353	7,569
40-44	5,218	5,589	5,968	5,905	6,310	6,815	7,449	7,796	7,842	8,110
45-49	4,460	6,165	5,990	6,397	6,329	6,764	7,306	7,987	8,361	8,410
50-54	4,362	5,795	6,486	6,301	6,731	6,659	7,117	7,689	8,407	8,803
55-59	3,356	4,785	6,008	6,726	6,533	6,980	6,905	7,380	7,973	8,720
60-64	2,355	4,366	4,874	6,120	6,853	6,656	7,112	7,035	7,519	8,123
65-69	1,805	3,198	4,319	4,822	6,055	6,781	6,586	7,039	6,963	7,442
70-74	1,289	2,162	3,011	4,069	4,543	5,705	6,390	6,205	6,635	6,562
75-79	896	1,473	1,890	2,629	3,557	3,970	4,985	5,584	5,423	5,802
80-84	449	863	1,107	1,420	1,971	2,672	2,980	3,742	4,193	4,071
85+	353	591	791	1,032	1,332	1,792	2,423	2,933	3,624	4,244
Median Age	34.5	38.2	39.8	41.0	41.9	42.6	43.2	43.8	44.2	44.3

Henry County: Projections of Total Population by Age

	Census 2000	Census 2010	Projections 2015	2020	2025	2030	2035	2040	2045	2050
All Persons	15,060	15,416	15,706	15,915	16,037	16,110	16,062	15,946	15,802	15,693
00-04	1,017	940	942	959	993	990	973	959	967	978
05-09	1,075	1,133	962	964	981	1,017	1,014	996	981	990
10-14	1,096	1,059	1,137	964	966	983	1,020	1,017	998	983
15-19	1,010	1,048	1,067	1,145	970	973	990	1,027	1,024	1,005
20-24	809	736	790	802	864	732	734	748	775	773
25-29	938	822	844	905	918	991	839	842	857	889
30-34	1,044	862	861	884	947	962	1,037	878	882	897
35-39	1,218	968	875	873	898	961	977	1,053	892	895
40-44	1,279	1,080	985	890	888	913	978	994	1,072	907
45-49	1,088	1,193	1,094	999	902	900	925	992	1,007	1,087
50-54	1,091	1,269	1,200	1,100	1,005	907	905	931	998	1,013
55-59	826	1,097	1,259	1,190	1,091	997	900	898	924	990
60-64	715	1,019	1,068	1,226	1,159	1,063	972	878	876	901
65-69	536	767	951	997	1,145	1,082	993	908	820	818
70-74	458	546	675	838	877	1,010	954	876	801	724
75-79	380	377	445	551	685	715	825	780	716	655
80-84	289	249	281	331	410	511	533	616	582	534
85+	191	251	270	297	338	403	493	553	630	654
Median Age	37.2	40.6	41.9	42.6	42.7	42.4	42.3	42.3	42.4	42.4

Oldham County: Projections of Total Population by Age

	Census 2000	Census 2010	Projections							
			2015	2020	2025	2030	2035	2040	2045	2050
All Persons	46,178	60,316	67,412	74,990	82,306	89,639	96,668	103,223	109,294	115,096
00-04	3,036	3,420	3,669	4,073	4,479	4,853	5,143	5,400	5,698	6,072
05-09	3,608	4,883	4,958	5,319	5,717	6,197	6,618	6,919	7,171	7,474
10-14	3,824	5,374	5,712	5,799	6,081	6,495	6,995	7,427	7,722	7,960
15-19	3,200	4,374	4,515	4,799	4,883	5,169	5,569	6,047	6,469	6,775
20-24	2,170	2,509	2,814	2,894	3,182	3,335	3,608	3,961	4,373	4,761
25-29	2,420	2,790	3,095	3,464	3,661	3,973	4,123	4,412	4,793	5,238
30-34	3,357	3,360	3,543	3,964	4,393	4,610	4,969	5,112	5,431	5,860
35-39	4,659	4,485	4,509	4,771	5,237	5,761	5,986	6,395	6,509	6,851
40-44	4,855	5,422	5,749	5,781	5,977	6,513	7,117	7,326	7,766	7,835
45-49	4,097	5,662	6,207	6,586	6,500	6,684	7,246	7,878	8,070	8,513
50-54	3,674	5,017	6,013	6,601	6,935	6,818	6,990	7,559	8,202	8,378
55-59	2,502	4,001	4,962	6,002	6,566	6,894	6,755	6,914	7,480	8,120
60-64	1,529	3,446	3,978	4,953	5,973	6,528	6,844	6,691	6,836	7,386
65-69	1,092	2,326	3,211	3,729	4,655	5,633	6,160	6,458	6,299	6,430
70-74	838	1,330	2,124	2,937	3,402	4,240	5,129	5,602	5,874	5,721
75-79	582	850	1,127	1,799	2,488	2,880	3,588	4,342	4,736	4,974
80-84	391	552	641	848	1,351	1,874	2,168	2,699	3,269	3,562
85+	344	515	585	671	826	1,182	1,660	2,081	2,596	3,186
Median Age	36.6	39.0	40.8	42.1	42.9	43.4	43.7	44.1	44.2	44.2

Shelby County: Projections of Total Population by Age

	Census 2000	Census 2010	Projections							
			2015	2020	2025	2030	2035	2040	2045	2050
All Persons	33,337	42,074	46,838	51,944	56,950	61,939	66,835	71,703	76,646	81,762
00-04	2,288	2,769	2,987	3,298	3,639	3,967	4,281	4,608	4,982	5,394
05-09	2,310	3,008	3,204	3,457	3,787	4,150	4,494	4,823	5,162	5,550
10-14	2,277	2,886	3,177	3,384	3,616	3,952	4,322	4,671	5,005	5,346
15-19	2,426	2,790	3,036	3,324	3,521	3,753	4,087	4,455	4,803	5,136
20-24	1,983	2,311	2,597	2,811	3,083	3,276	3,503	3,820	4,172	4,509
25-29	2,271	2,645	2,881	3,261	3,529	3,843	4,049	4,295	4,651	5,043
30-34	2,543	2,736	3,010	3,283	3,653	3,935	4,265	4,473	4,723	5,092
35-39	2,918	2,999	3,034	3,343	3,606	3,998	4,288	4,632	4,839	5,091
40-44	2,740	3,076	3,350	3,390	3,701	3,977	4,393	4,693	5,051	5,255
45-49	2,507	3,321	3,351	3,649	3,653	3,972	4,253	4,682	4,984	5,345
50-54	2,338	3,051	3,496	3,528	3,815	3,804	4,128	4,411	4,846	5,147
55-59	1,833	2,825	3,158	3,626	3,632	3,917	3,894	4,217	4,495	4,931
60-64	1,313	2,597	2,907	3,250	3,705	3,702	3,983	3,949	4,264	4,535
65-69	1,072	1,849	2,579	2,891	3,211	3,654	3,640	3,908	3,864	4,165
70-74	880	1,206	1,743	2,433	2,715	3,005	3,413	3,391	3,633	3,589
75-79	704	847	1,060	1,531	2,130	2,376	2,621	2,970	2,947	3,150
80-84	501	604	645	805	1,159	1,614	1,800	1,980	2,242	2,223
85+	433	554	623	680	795	1,044	1,421	1,725	1,983	2,261
Median Age	36.0	38.3	39.2	39.7	40.1	40.1	40.1	40.1	40.0	39.7

Spencer County: Projections of Total Population by Age

	Census 2000	Census 2010	Projections							
			2015	2020	2025	2030	2035	2040	2045	2050
All Persons	11,766	17,061	20,157	23,655	27,189	30,861	34,587	38,301	41,988	45,725
00-04	854	1,106	1,227	1,393	1,584	1,783	1,982	2,181	2,399	2,635
05-09	941	1,240	1,338	1,483	1,648	1,860	2,077	2,292	2,505	2,739
10-14	867	1,260	1,468	1,585	1,728	1,906	2,137	2,370	2,600	2,823
15-19	803	1,194	1,317	1,535	1,639	1,786	1,967	2,201	2,437	2,669
20-24	617	740	924	1,020	1,202	1,302	1,438	1,604	1,814	2,028
25-29	773	898	1,011	1,262	1,394	1,620	1,732	1,887	2,078	2,323
30-34	1,017	1,084	1,236	1,392	1,690	1,843	2,115	2,235	2,407	2,623
35-39	1,094	1,332	1,355	1,544	1,698	2,043	2,206	2,510	2,633	2,813
40-44	1,061	1,412	1,612	1,640	1,834	2,001	2,389	2,561	2,891	3,013
45-49	899	1,559	1,647	1,879	1,880	2,088	2,264	2,684	2,863	3,212
50-54	748	1,401	1,773	1,874	2,108	2,096	2,313	2,492	2,938	3,118
55-59	572	1,126	1,579	1,997	2,082	2,325	2,299	2,522	2,701	3,169
60-64	447	961	1,230	1,726	2,154	2,231	2,479	2,437	2,661	2,833
65-69	344	690	993	1,273	1,767	2,199	2,266	2,508	2,451	2,671
70-74	266	418	665	960	1,217	1,681	2,088	2,140	2,364	2,299
75-79	211	300	365	582	838	1,056	1,457	1,807	1,844	2,038
80-84	130	175	231	282	448	647	811	1,119	1,386	1,411
85+	122	165	186	228	278	394	567	751	1,016	1,308
Median Age	35.1	38.9	40.6	41.9	42.8	43.2	43.4	43.7	43.7	43.7

Trimble County: Projections of Total Population by Age

	Census 2000	Census 2010	Projections							
			2015	2020	2025	2030	2035	2040	2045	2050
All Persons	8,125	8,809	9,172	9,514	9,807	10,022	10,171	10,272	10,352	10,428
00-04	548	552	551	576	581	580	586	596	612	622
05-09	612	591	595	594	621	626	625	631	643	659
10-14	642	655	614	618	617	645	650	649	655	668
15-19	541	592	622	583	587	585	612	617	616	622
20-24	427	473	492	517	485	488	486	508	512	511
25-29	562	472	494	516	543	506	513	511	534	538
30-34	642	519	538	563	588	618	578	584	581	608
35-39	648	632	540	559	585	611	643	601	607	604
40-44	660	645	649	554	574	600	626	660	617	622
45-49	582	691	668	672	575	595	622	649	684	640
50-54	589	689	705	682	685	587	607	634	662	698
55-59	392	590	693	709	686	689	591	611	638	666
60-64	354	568	587	688	704	681	684	587	607	633
65-69	252	391	543	562	659	674	651	655	561	580
70-74	233	298	357	496	513	601	615	593	598	511
75-79	193	177	246	294	409	423	495	507	488	493
80-84	130	141	131	182	218	302	313	365	374	359
85+	118	133	147	149	177	211	274	314	363	394
Median Age	35.7	39.5	41.1	42.1	42.6	42.9	43.1	43.3	43.4	43.1

LAND USE

Farmland remains as the predominant land us in many parts of the KIPDA Region outside of Louisville/Jefferson County. According to data from the US Department of Agriculture, National Agricultural Statistics Service, 57.1% of the 954,880 acres Bullitt Henry, Oldham, Shelby, Spencer and Trimble counties are listed as farmland.

	Land Area Acres	Land in Farm 2007	Land in Farm 2012	% of Farmland
Bullitt	191,360	51,148	46,149	24.12%
Henry	184,960	146,399	128,509	69.48%
Oldham	120,960	60,024	60,354	49.90%
Shelby	245,760	205,286	199,341	81.11%
Spencer	119,040	73,289	69,125	58.07%
Trimble	92,800	65,098	55,632	59.95%
Totals	954,880	601,244	559,110	57.10%

While farmland remains the predominant land use in the region as a whole and in every county other than Bullitt, it has seen a decrease in every county over a 15 year period from 1997-2012.

	Land in Farm 1997	Land in Farm 2007	Land in Farm 2012	Difference from 2007	% of Change from 1997
Bullitt	61,667	51,148	46,149	-4,999	-25.16%
Henry	150,585	146,399	128,509	-17,890	-14.66%
Oldham	74,265	60,024	60,354	330	-18.73%
Shelby	204,292	205,286	199,341	-5,945	-2.42%
Spencer	84,441	73,289	69,125	-4,164	-18.14%
Trimble	66,079	65,098	55,632	-9,466	-15.81%
Totals	641,329	601,244	559,110	-42,134	-12.82%

Tables on the following pages use data from the US Department of Agriculture, National Agricultural Statistics Service to provide detailed descriptions of agricultural land use from 1978 until 2012. This is the most current and best available data.

BULLITT COUNTY											
					Land Use						
					Cropland					Woodland	
Year	Number of Farms	Land in Farms (Acres)	Average Size of Farm	Average Value of Land & Buildings per Acre (dollars)	Harvested	Not Harvest/Not Pasture	Pasture	Other Pastures	Other Land	Pasture	Other
1978	621	74,324	120	$1,401	17,411	4,263	20,425	4,404	4,926	9,158	13,737
1982	688	72,693	106	$1,166	19,643	3,479	14,768	6,915	5,664	6,419	15,805
1987	596	67,058	113	$1,226	17,831	5,043	15,486	4,319	5,133	6,501	12,745
1992	599	60,911	102	$1,703	16,154	3,838	13,626	5,624	3,250	6,919	11,500
1997	654	61,667	94	$2,919	18,272	3,253	12,772	5,279	3,990	6,053	12,048
2002	616	61,342	100	$2,742	19,097	4,173	7,756	7,799	3,633	5,935	12,949
2007	519	51,148	99	$3,786	17,153	2,969	4,642	8,996	3,495	3,844	10,049
2012	488	46,149	95	$3,645	16,502	2,737	961	10,809	2,790	3,710	8,640
Source: US Department of Agriculture, National Agricultural Statistics Service											

HENRY COUNTY											
					Land Use						
					Cropland					Woodland	
Year	Number of Farms	Land in Farms (Acres)	Average Size of Farm	Average Value of Land & Buildings per Acre (dollars)	Harvested	Not Harvest/Not Pasture	Pasture	Other Pastures	Other Land	Pasture	Other
1978	1,110	154,650	139	$1,085	38,126	10,997	56,722	9,687	11,765	11,679	15,664
1982	1,108	155,947	141	$1,224	42,614	8,110	51,211	13,024	9,806	12,941	18,241
1987	1,093	166,376	152	$961	43,551	14,492	51,753	17,211	10,375	12,997	15,997
1992	1,071	159,966	149	$1,015	46,862	10,942	50,050	12,430	8,211	12,502	18,969
1997	1,022	150,585	147	$1,764	45,037	12,976	42,631	12,362	8,172	10,832	18,575
2002	883	141,592	160	$2,398	47,967	6,807	30,170	19,020	9,233	10,284	18,111
2007	962	146,399	152	$3,268	49,936	6,219	16,574	38,041	9,528	7,913	18,188
2012	869	128,509	148	$3,343	49,799	4,805	3,557	34,960	10,341	8,824	16,223
Source: US Department of Agriculture, National Agricultural Statistics Service											

OLDHAM COUNTY											
					Land Use						
					Cropland					Woodland	
Year	Number of Farms	Land in Farms (Acres)	Average Size of Farm	Average Value of Land & Buildings per Acre (dollars)	Harvested	Not Harvest/Not Pasture	Pasture	Other Pastures	Other Land	Pasture	Other
1978	450	91,022	202	$1,516	26,843	4,155	25,660	9,474	6,204	7,650	11,036
1982	496	83,843	169	$1,830	29,576	2,651	19,590	11,748	6,357	6,339	7,582
1987	479	81,450	170	$2,224	23,226	6,745	20,879	11,783	5,541	4,438	8,838
1992	468	84,434	180	$2,572	24,537	8,691	21,567	8,413	4,388	5,969	10,869
1997	449	74,265	165	$3,100	24,636	4,093	19,355	7,490	4,615	4,553	9,523
2002	481	62,561	130	$4,562	20,830	3,419	10,955	10,659	4,469	2,817	9,412
2007	461	60,024	130	$6,111	20,026	1,928	7,060	14,186	4,406	2,155	10,263
2012	419	60,354	144	$6,247	20,170	2,044	2,052	19,183	5,065	1,684	10,156
Source: US Department of Agriculture, National Agricultural Statistics Service											

SHELBY COUNTY											
					Land Use						
					Cropland					Woodland	
Year	Number of Farms	Land in Farms (Acres)	Average Size of Farm	Average Value of Land & Buildings per Acre (dollars)	Harvested	Not Harvest/Not Pasture	Pasture	Other Pastures	Other Land	Pasture	Other
1978	1,588	225,403	142	$1,270	79,328	14,330	77,093	14,008	16,810	11,127	12,707
1982	1,652	224,909	136	$1,717	89,255	9,112	65,631	16,579	17,818	11,417	15,097
1987	1,581	224,123	142	$1,395	77,475	18,133	62,792	21,664	15,430	11,524	17,105
1992	1,640	229,838	140	$1,760	83,373	18,192	62,515	18,934	16,027	11,762	19,035
1997	1,533	204,292	133	$2,567	79,705	10,505	53,058	17,539	15,259	11,270	16,956
2002	1,557	201,667	130	$3,221	89,373	10,671	40,465	20,432	16,115	7,931	16,680
2007	1,651	205,286	124	$4,432	93,994	8,633	21,581	39,896	14,289	9,498	17,395
2012	1,518	199,341	131	$4,881	98,726	8,292	4,240	47,624	15,958	6,751	17,750
Source: US Department of Agriculture, National Agricultural Statistics Service											

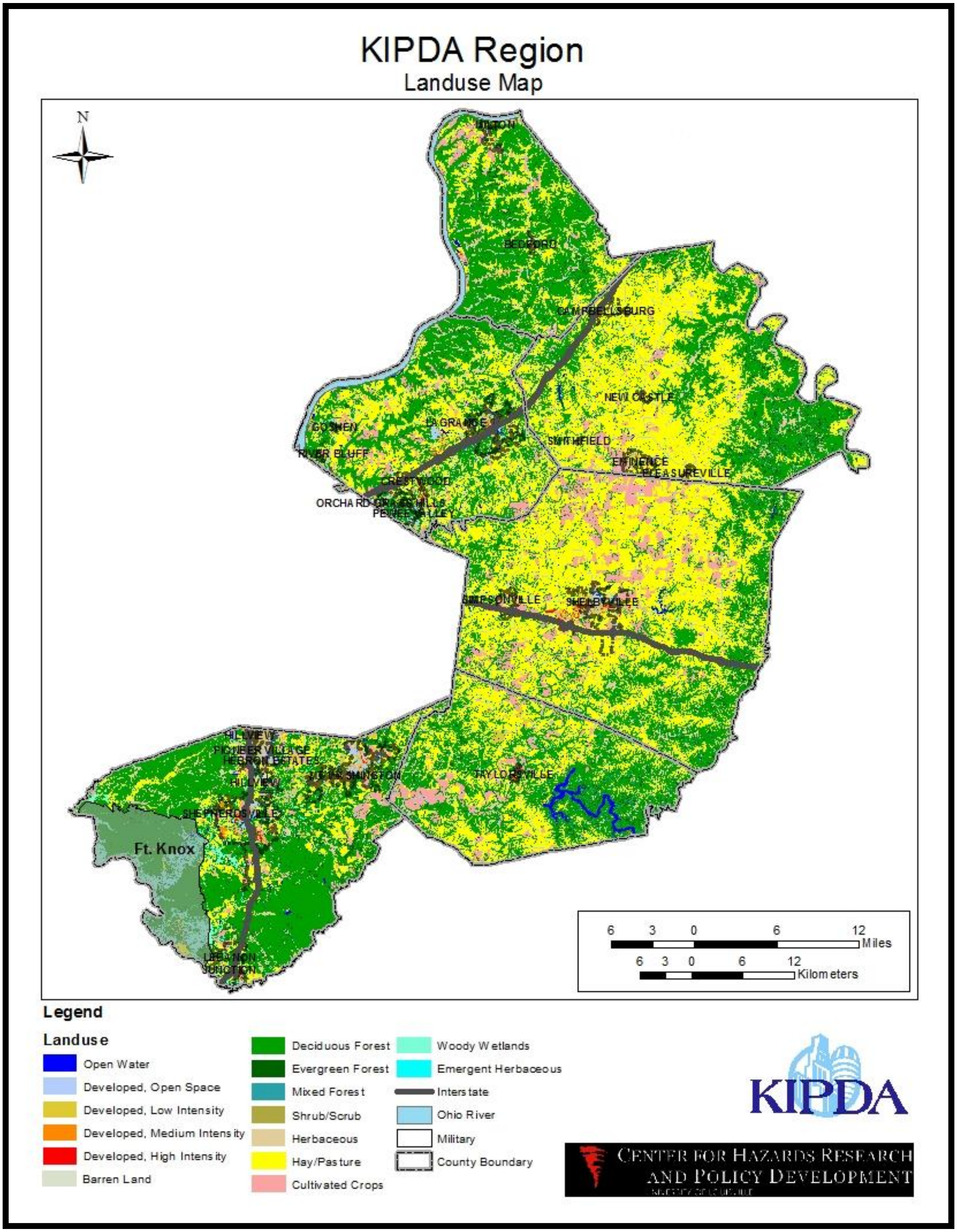
SPENCER COUNTY											
					Land Use						
					Cropland					Woodland	
Year	Number of Farms	Land in Farms (Acres)	Average Size of Farm	Average Value of Land & Buildings per Acre (dollars)	Harvested	Not Harvest/Not Pasture	Pasture	Other Pastures	Other Land	Pasture	Other
1978	665	105,137	158	$815	28,655	5,187	34,721	8,371	6,165	11,221	10,817
1982	651	100,922	155	$1,039	31,383	6,218	29,406	8,753	6,225	7,912	11,025
1987	659	99,927	152	$809	29,765	7,678	24,943	12,519	6,268	7,836	10,918
1992	648	93,887	145	$1,237	29,044	6,050	28,675	7,650	4,948	7,610	9,910
1997	646	84,441	131	$1,841	31,820	4,157	21,835	5,674	6,475	6,865	7,615
2002	623	77,525	124	$2,540	27,501	4,141	15,072	10,913	4,949	5,987	8,962
2007	596	73,289	123	$3,295	25,044	4,923	6,178	20,333	4,595	5,327	6,889
2012	529	69,125	131	$3,134	28,120	2,192	845	19,941	4,607	4,232	9,188
Source: US Department of Agriculture, National Agricultural Statistics Service											

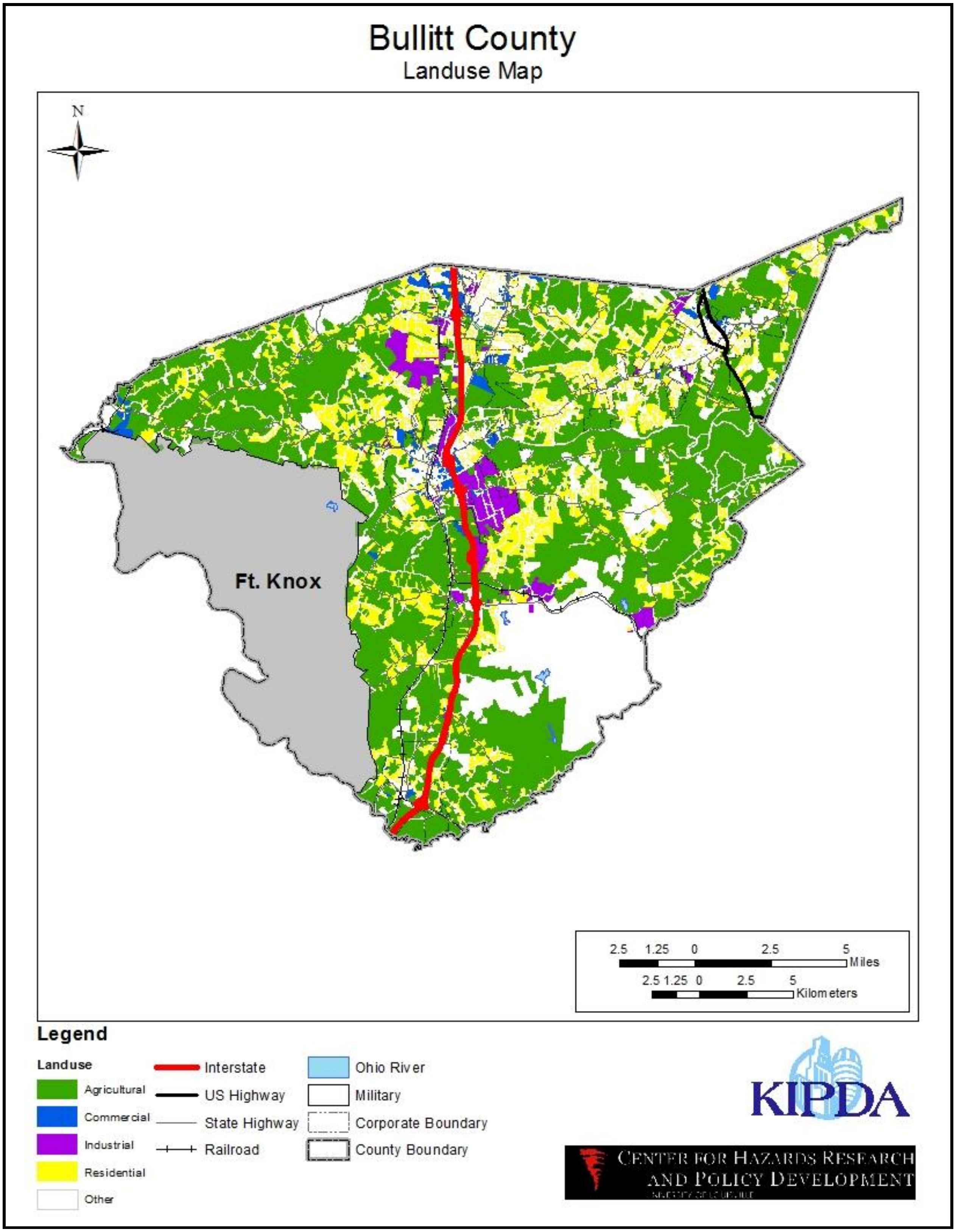
TRIMBLE COUNTY											
					Land Use						
					Cropland					Woodland	
Year	Number of Farms	Land in Farms (Acres)	Average Size of Farm	Average Value of Land & Buildings per Acre (dollars)	Harvested	Not Harvest/Not Pasture	Pasture	Other Pastures	Other Land	Pasture	Other
1978	573	69,837	122	$838	14,727	4,622	13,593	7,246	5,242	14,445	9,962
1982	620	70,837	114	$975	17,604	3,804	13,806	7,038	4,365	12,962	11,258
1987	591	68,976	117	$858	15,233	4,716	12,970	7,818	5,613	12,022	10,604
1992	603	71,324	118	$1,201	15,507	4,924	14,565	6,179	3,266	13,040	13,843
1997	572	66,079	116	$1,398	16,158	4,156	14,124	5,003	4,371	10,832	11,435
2002	562	64,528	115	$1,510	15,364	2,903	9,672	7,864	3,907	11,521	13,297
2007	489	65,098	133	$2,548	17,484	2,553	5,838	13,155	4,300	8,400	13,368
2012	439	55,632	127	$3,156	15,619	2,842	564	13,216	3,078	7,267	13,046
Source: US Department of Agriculture, National Agricultural Statistics Service											

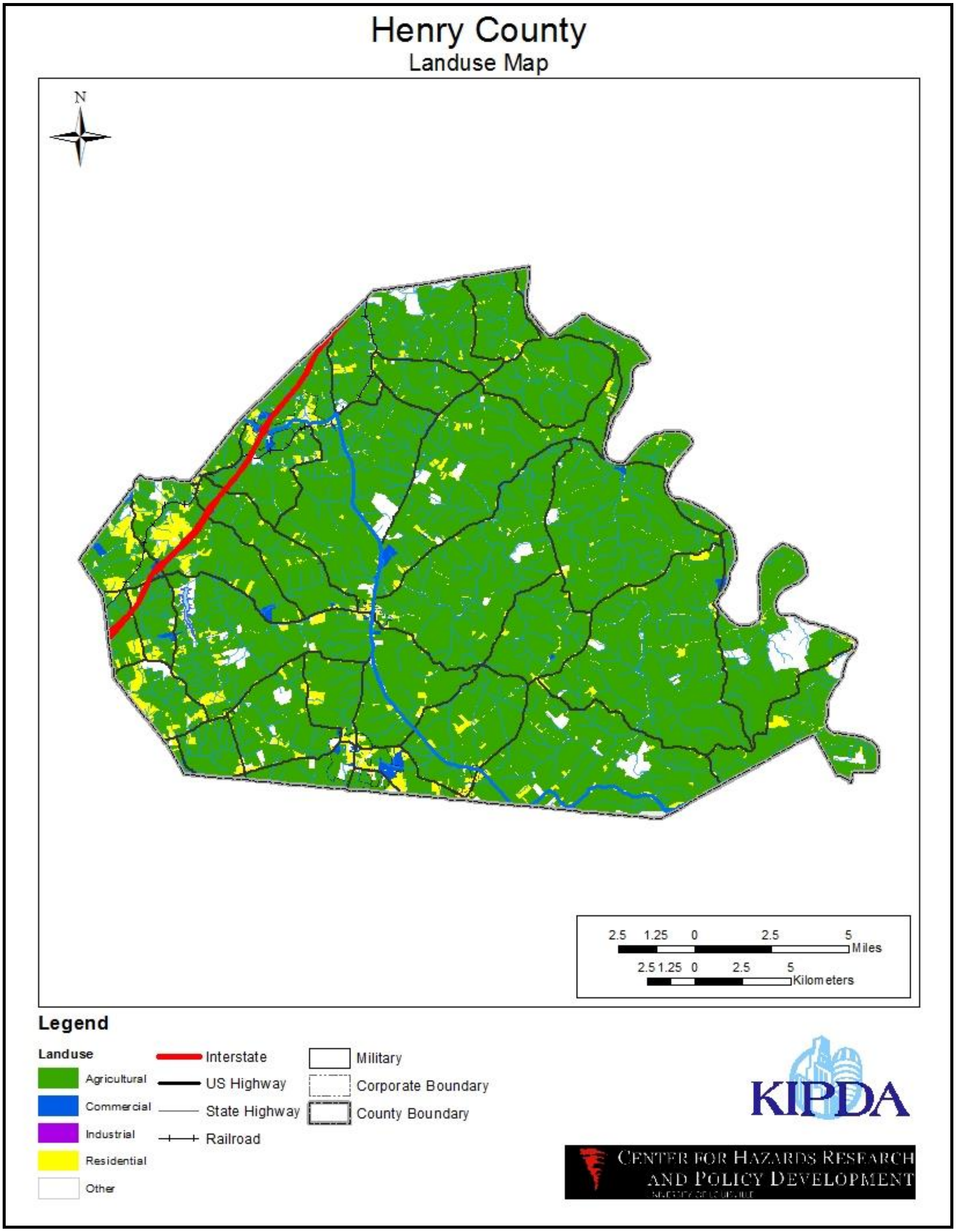
As the population increases and areas become more urbanized, the density of the population also increases. The following chart shows the Land Area and Density using 2014 estimates provided by the US Census Bureau.

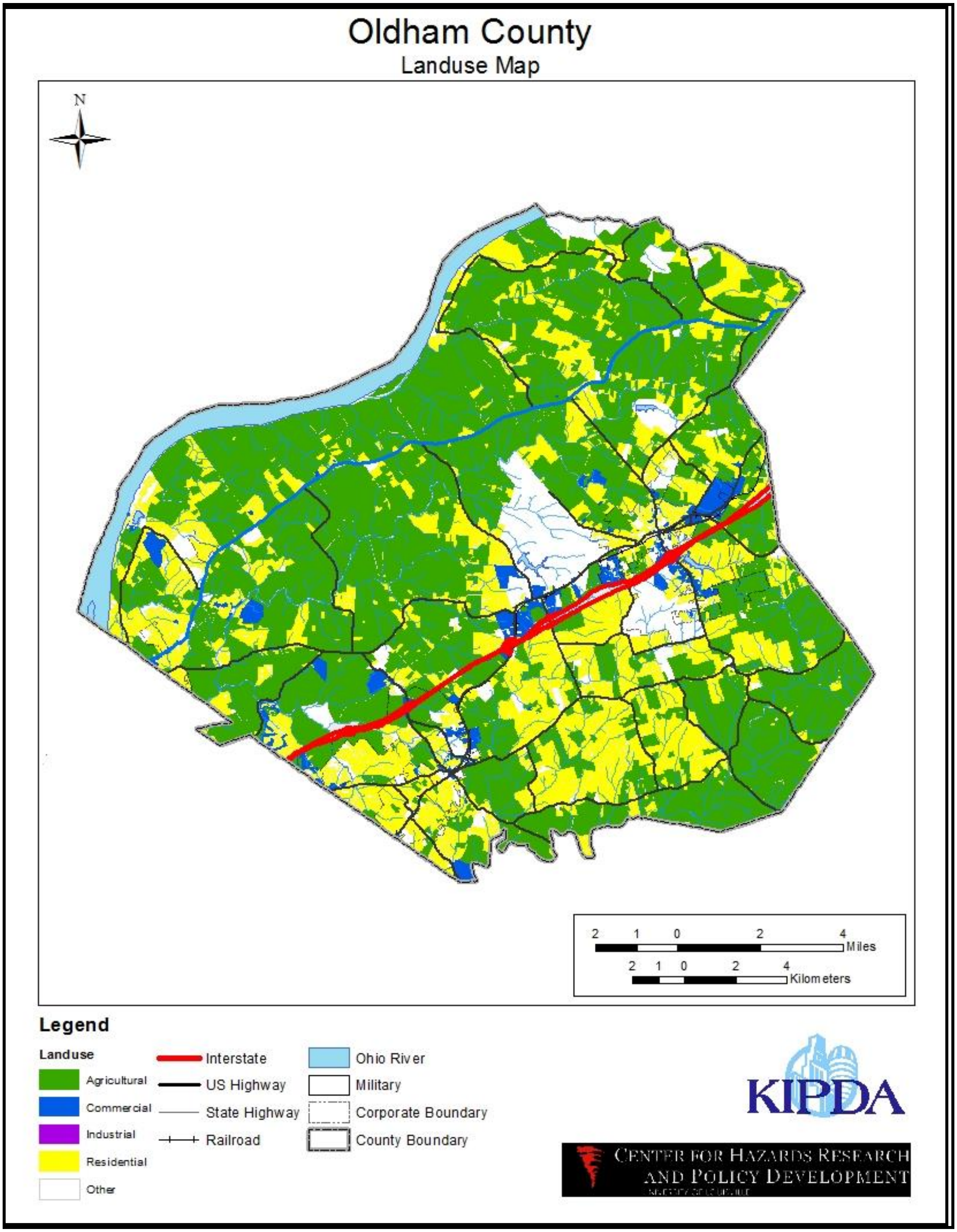
LAND AREA AND DENSITY - 2014			
	Area in Square Miles	**2014 Population**	**Person Per Square Mile**
Bullitt	299	77,955	260.7
Henry	289	15,572	53.9
Oldham	189	63,490	335.9
Shelby	384	44,875	116.9
Spencer	186	17,668	95.0
Trimble	149	8,786	59.0
Totals	**1496**	**228,346**	**152.6**

Using USGS coverages, KIPDA staff created maps depicting the current land use trends for the region.

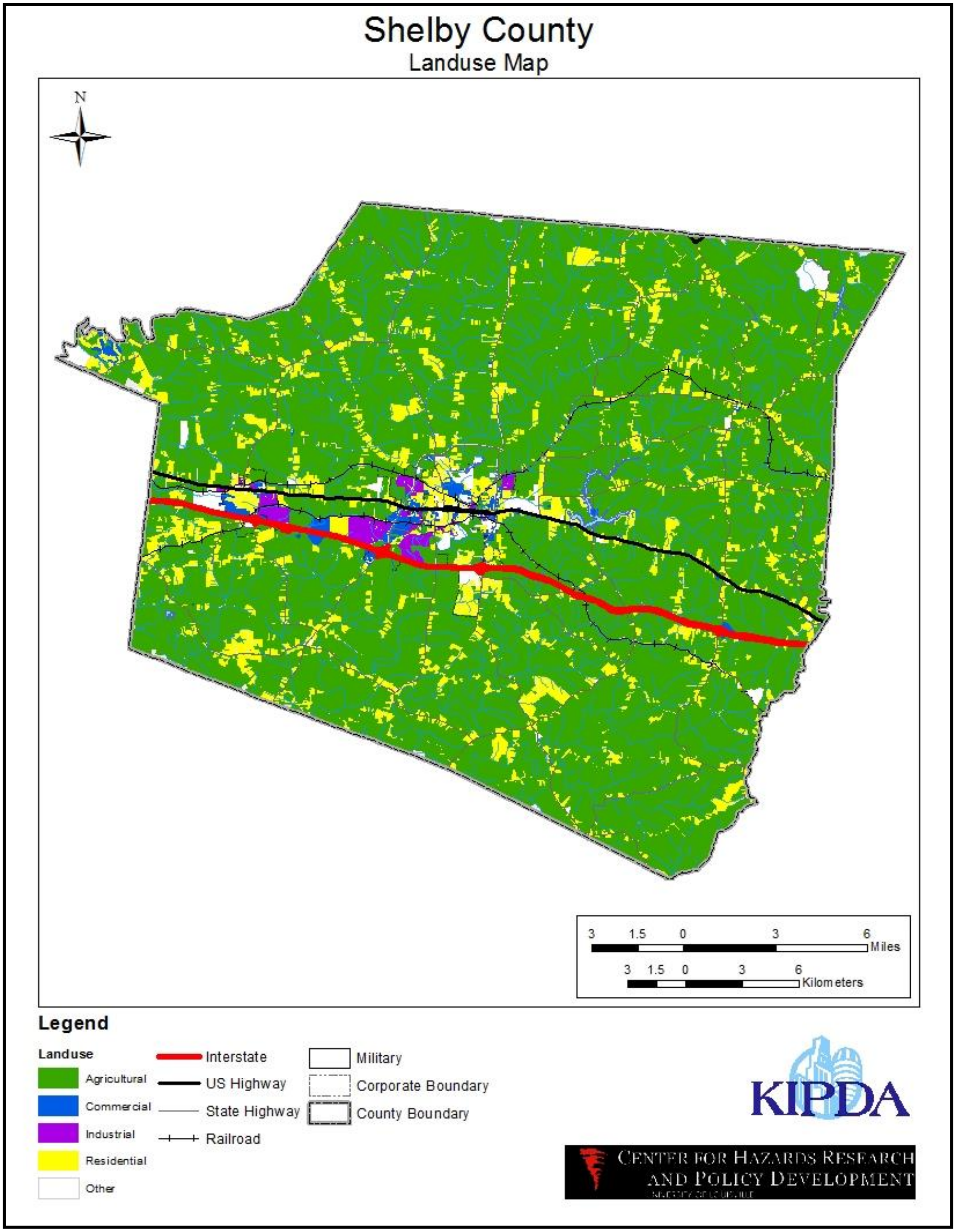

KIPDA Region
Landuse Map
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MOUNT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Landuse
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceous
Interstate
Ohio River
Military
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

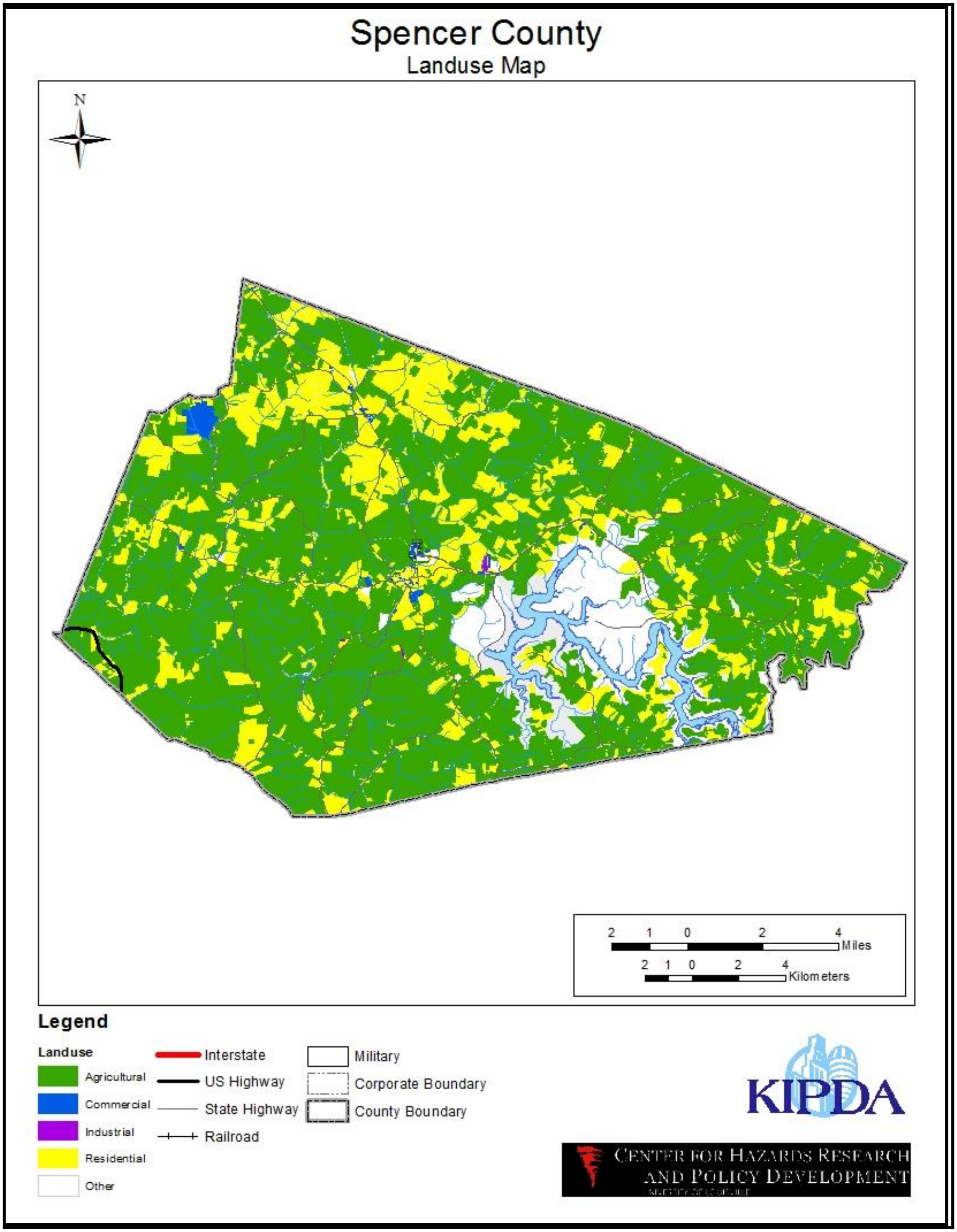

Bullitt County
Landuse Map
N
Ft. Knox
2.5 1.25 0 2.5 5
Miles
2.5 1.25 0 2.5 5
Kilometers
Legend
Landuse
Agricultural
Commercial
Industrial
Residential
Other
Interstate
US Highway
State Highway
Railroad
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

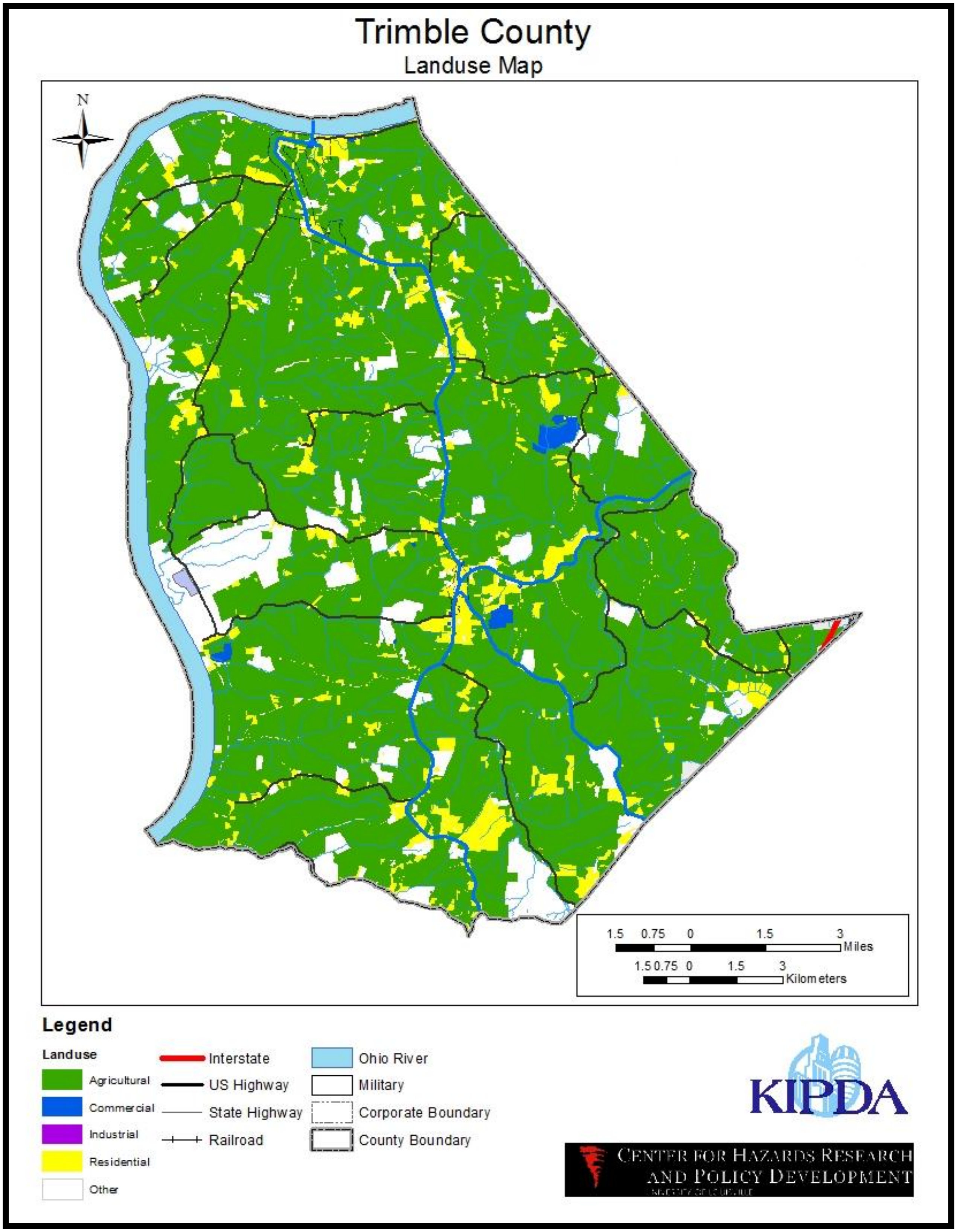

Henry County
Landuse Map
N
2.5 1.25 0 2.5 5
Miles
2.5 1.25 0 2.5 5
Kilometers
Legend
Landuse
Agricultural
Commercial
Industrial
Residential
Other
Interstate
US Highway
State Highway
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT



Oldham County
Landuse Map
N
2 1 0 2 4 Miles
2 1 0 2 4 Kilometers
Legend
Landuse
Agricultural
Commercial
Industrial
Residential
Other
Interstate
US Highway
State Highway
Railroad
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


Shelby County
Landuse Map
N
3 1.5 0 3 6 Miles
3 1.5 0 3 6 Kilometers
Legend
Landuse
Agricultural
Commercial
Industrial
Residential
Other
Interstate
US Highway
State Highway
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

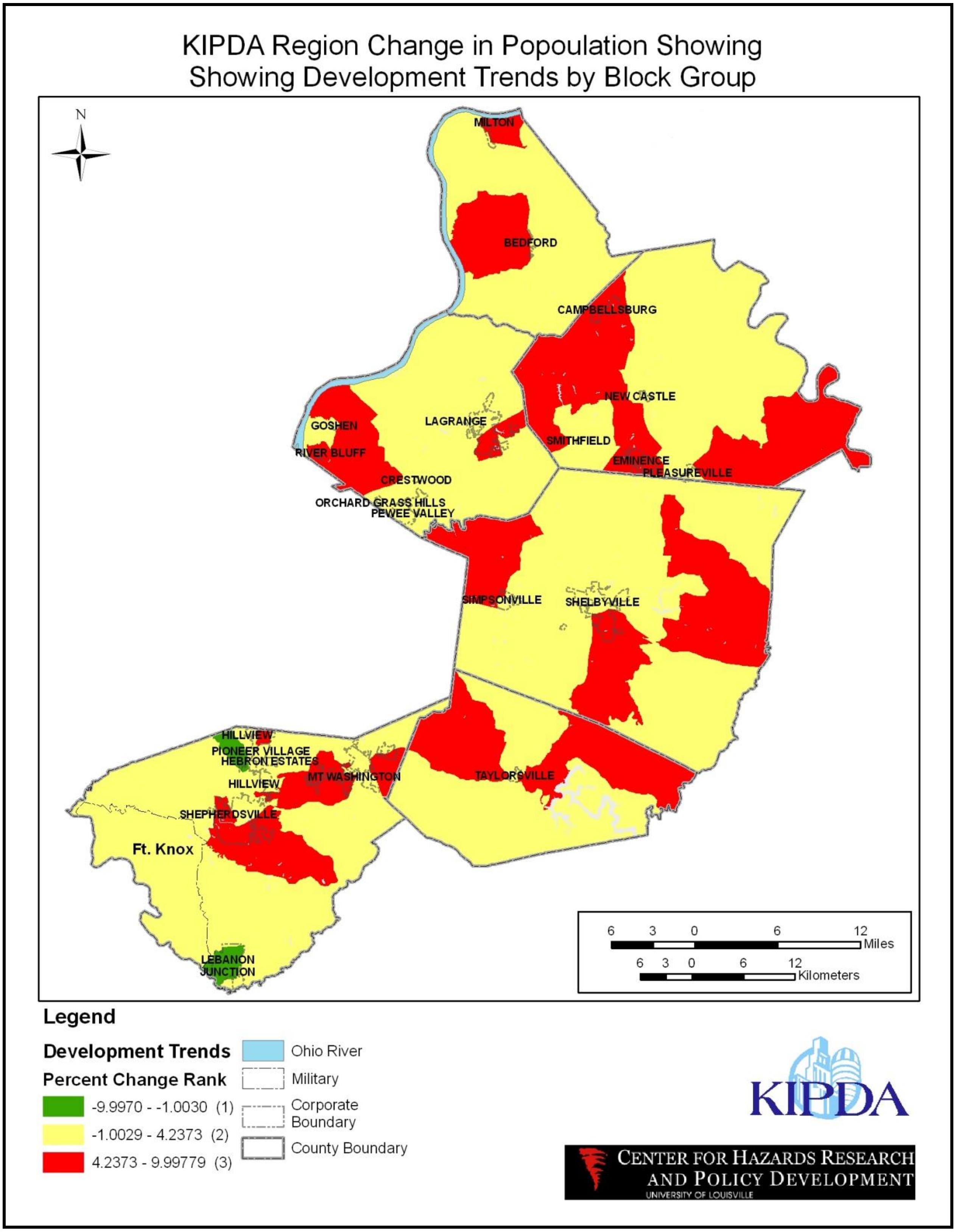

Spencer County
Landuse Map
N
2 1 0 2 4 Miles
2 1 0 2 4 Kilometers
Legend
Landuse
Agricultural
Commercial
Industrial
Residential
Other
Interstate
US Highway
State Highway
Railroad
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

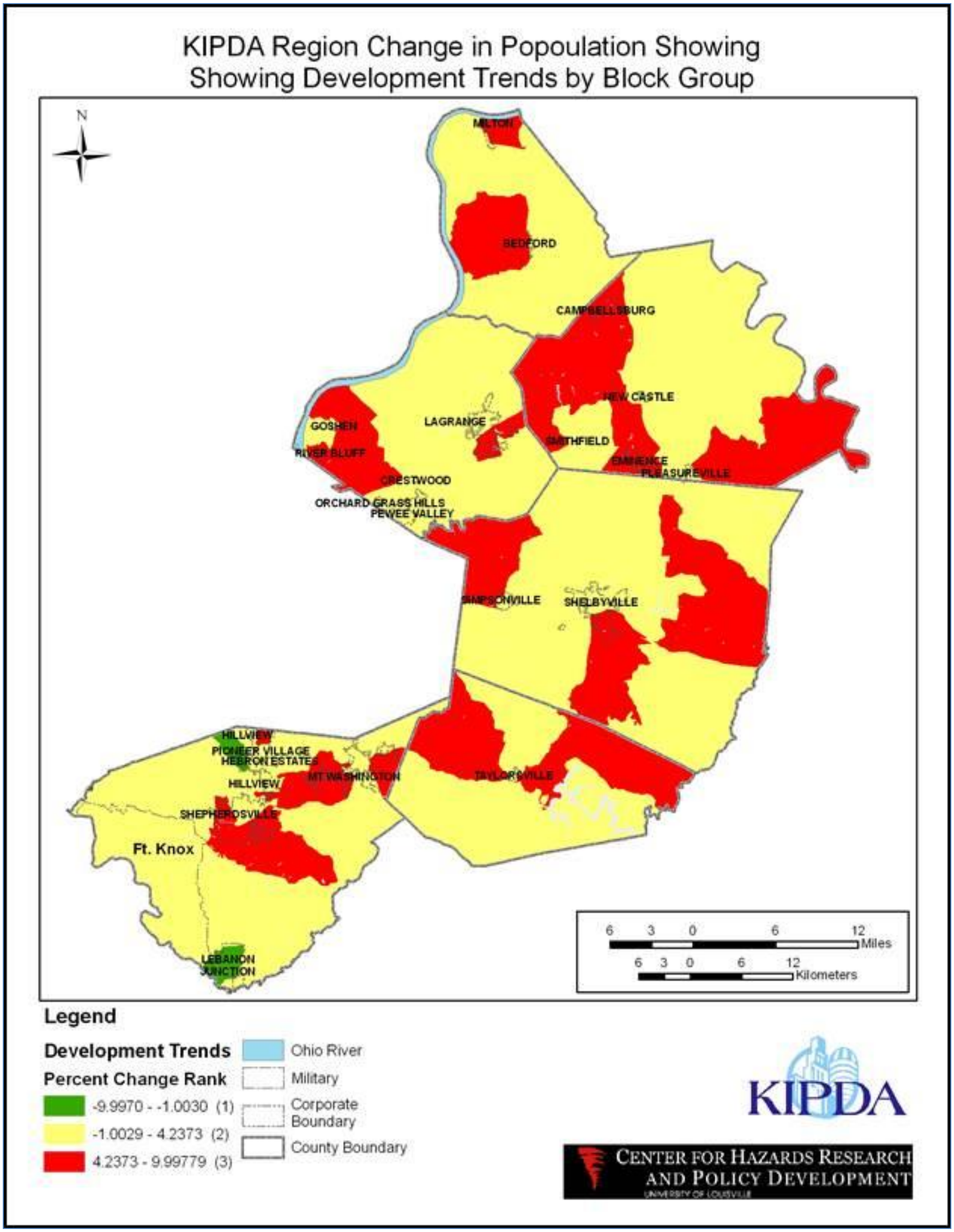

Trimble County
Landuse Map
N
1.5 0.75 0 1.5 3
Miles
1.5 0.75 0 1.5 3
Kilometers
Legend
Landuse
Agricultural
Commercial
Industrial
Residential
Other
Interstate
US Highway
State Highway
Railroad
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH
AND POLICY DEVELOPMENT

CHANGES IN DEVELOPMENT

To enhance the knowledge of areas with changing development is to identify them. KIPDA decided to identify areas which with significant growth using a similar model developed for the Vulnerability Score model described in section 4.1. Using Census Block Group data (which is the best available data to show population trends at this time); KIPDA developed a map which depicts areas showing high development based on population percent change from 2000-2014. The following map is very useful for local and state officials to review high growth areas versus areas that have high risk for each hazard (Vulnerability Score Data). In turn, these maps will promote sounder development in identified high growth areas and keep future development less vulnerable and safer from potential loss.

To add to the data source and use the best possible data available, the KIPDA Hazard Mitigation Committee also incorporated the 2014 Census data changes into another map to showcase even further development trends by block group. The KIPDA Region Change shows how the 2014 Census data is being used towards population trends. This is to add to the direction of the 2010 map. As of time of publication, only the 2014 Census projections were available for each specific city and county and are considered the best possible data.


KIPDA Region Change in Popoulation Showing
Showing Development Trends by Block Group
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
TAYLORSVILLE
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Development Trends
Percent Change Rank
-9.9970 - -1.0030 (1)
-1.0029 - 4.2373 (2)
4.2373 - 9.99779 (3)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT
UNIVERSITY OF LOUISVILLE


KIPDA Region Change in Popoulation Showing
Showing Development Trends by Block Group
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Development Trends
Percent Change Rank
-9.9970 - -1.0030 (1)
-1.0029 - 4.2373 (2)
4.2373 - 9.99779 (3)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
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ECONOMIC

The largest employment center in the state, Louisville/Jefferson County, is located within the KIPDA region. According to a Brookings Institute study, Louisville represents 80% of the employment base within the KIPDA region. However, Bullitt and Shelby counties have continued to attract light industrial jobs to their respected counties over the past twenty years. Since the 2011 plan, unemployment has gone down significantly over this period. Kentucky, as a state went from 8th in unemployment, to 24th.

In September of 2015, the state of Kentucky has the twenty-fourth (24) highest unemployment rate in the nation at 5.2%. At that time, the unemployment rate for the Louisville/Jefferson County MSA was 5.3%. Unemployment rates for the counties included in the KIPDA Hazard Mitigation Plan, using the US Department of Labor, Bureau of Labor Statistics for the time period January 2014– July 2015, are listed below.

Unemployment Rate By County January 2014 - July 2015 (not seasonally adjusted)	
County	**Unemployment Rate**
Bullitt	5.5
Henry	5.5
Oldham	4.6
Shelby	4.7
Spencer	5.1
Trimble	6.7

The listed tables follow presenting a detailed look at the economic climate in Bullitt, Henry, Oldham, Shelby, Spencer and Trimble counties:

- Employment by Major Industry by Place of Work, 2014 (US Department of Labor, Bureau of Labor Statistics)
- Major Business and Industry by County 2015 (Kentucky Cabinet for Economic Development)
- Recent Locations and Expansions by County, 2012-2015 (Kentucky Cabinet for Economic Development)

	Employment By Major Industry By Work Place 2014											
	Bullitt		Henry		Oldham		Shelby		Spencer		Trimble	
	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%
Total, all industries	21,545	100	2,672	100	14,433	100	15,026	100	1,809	100	1,036	100
Goods-producing	4,195	19.5%	619	23.2%	2,225	15.4%	4,705	31.3%	135	7.5%	68	6.6%
Natural resources and mining	70	0.3%	34	1.3%	205	1.4%	167	1.1%	0	0.0%	0	0.0%
Construction	1,163	5.4%	83	3.1%	923	6.4%	420	2.8%	109	6.0%	0	0.0%
Manufacturing	2,962	13.7%	502	18.8%	1,097	7.6%	4,118	27.4%	0	0.0%	36	3.5%
Trade, transportation, and utilities	7,487	34.8%	636	23.8%	1,864	12.9%	2,736	18.2%	277	15.3%	276	26.6%
Information	53	0.2%	15	0.6%	159	1.1%	114	0.8%	0	0.0%	0	0.0%
Financial activities	505	2.3%	78	2.9%	1,277	8.8%	470	3.1%	89	4.9%	85	8.2%
Professional and business services	1,963	9.1%	90	3.4%	1,416	9.8%	1,429	9.5%	170	9.4%	47	4.5%
Education and health services	1,043	4.8%	179	6.7%	2,072	14.4%	1,247	8.3%	256	14.2%	0	0.0%
Leisure and hospitality	2,111	9.8%	172	6.4%	1,753	12.1%	1,442	9.6%	211	11.7%	83	8.0%
Other services	1,315	6.1%	67	2.5%	387	2.7%	531	3.5%	0	0.0%	11	1.1%
Unclassified	3	0.0%	3	0.1%	13	0.1%	7	0.0%	0	0.0%	0	0.0%
*Source: U.S. Department of Labor, Bureau of Labor Statistics												

BULLITT COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Brooks			
ASD Specialty Group	Distribution center	100	2005
Geek Squad City	Computer products repair center	1068	2006
ICS	Distribution	80	2005
UPS Supply Chain Solutions Inc.	Distribution center	52	N/A
Clermont			
Beam Suntory	Headquarters, Visitor's Center, dried grain, vodka & bourbon whiskey distillation; cordial cocktails, bottling, shipping	368	1934
Lebanon Junction			
Publishers Printing Co LLC	Printing publications or magazines	737	1991
Shepherdsville			
Alliance Entertainment LLC	Marketer, distributor, and merchandiser of family entertainment products.	350	2003
Amazon.com KYDC LLC	Fulfillment center of online orders	2200	2006
APL Logistics Inc.	Third party logistics/ distribution / warehouse for Dow Corning	84	2002
Best Buy Co Inc. DC #1376	Warehousing and distribution of e-commerce services and regional product returns.	300	2010
eBay Enterprise	Electronic commerce fulfillment and distribution	300	N/A
Gilt Group	E-tailer and fulfillment center	225	2010
Gordon Food Service	Food service distribution center	450	2004
Hill Transportation Inc.	Trucking, except local, Freight transportation arrangement	55	N/A
Louisville Seating Systems	Manufacture and supply seating and seating components	502	2011

BULLITT COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Shepherdsville			
Nasty Gal	Distribution and call center for clothing	150	2012
Publishers Printing Co LLC	Printing publications or magazines	701	1866
RueLaLa	E-commerce marketing partner for world-class brands	250	2004
Sabert Corporation	Manufacture disposable plastic food packaging	104	2008
Tower International Inc.	Automotive structural components	75	2014
Source: Kentucky Cabinet for Economic Development			

HENRY COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Campbellsburg			
Arvin Sango Inc.	Automotive exhaust systems	56	2002
Eminence			
Eminence Speaker LLC	High frequency devices and professional audio and musical instrument loudspeakers not in enclosures	121	1966
Hussey Copper	Copper electrical bus bar: sawing, slitting, annealing, forming, edging, cut to length, tin plating & silver plating	160	1966
Hussey Fabricated Products	Copper and aluminum parts fabrication	120	2000
Steel Technologies LLC	Steel service center: steel rolling, annealing & slitting/ blanking	85	1971
Smithfield			
Safety-Kleen Systems Inc./Smithfield Recycling Center	Industrial waste management. Energy recovery/recycling of hazardous and non-hazardous wastes.	74	1968
Source: Kentucky Cabinet for Economic Development			

OLDHAM COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Buckner			
Aggressive Tool & Die Inc.	Tool & die, molds	8	1989
Caibe & Co	Solid surface counter tops and granite	10	1985
Carriage House Companies Inc.	Mexican salsas, barbeque steak sauces, chocolate & pancake syrups, jams & jellies	320	1869
Clayton & Lambert Manufacturing Co	Grain bins, storage silos, stainless steel panels for in ground pools and spas & pool structures, outdoor poster panels, standing seam roofs, above ground containment basins	8	1956
Fastline Publications	Monthly magazine publishing and printing	135	1978
Hartlage Manufacturing Inc.	Injection molded plastic parts	22	1992
OCTA Inc.	Tube specialist - cutting, bending, forming, etc. (I.e., copper, aluminum, etc.) Manufacturing of parts and assemblies for refrigeration, HVAC, etc.	82	1987
Crestwood			
Microdry	Industrial microwave design & manufacturing. Sales of magnetrons, parts and service on industrial machinery.	18	1988
Oldham County Stone Co	Crushed limestone for all construction and related uses. Coarse aggregates, fine aggregates, base stone, channel lining, aglime. Dolomitic limestone	19	1968

OLDHAM COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Crestwood			
The Nemeth Group Inc.	Design and manufacturing of radio frequency machinery and wood gluing machinery using radio frequency, dielectric and induction heating equipment. RF tubes and parts, service.	18	1975
Goshen			
Star Aviation	Specializes in the repair and customer specified manufacture of aircraft power plant and systems wire harnesses.	8	1995
La Grange			
Allstate Ready-Mix	Ready-mix concrete	18	1998
Encompass	Construction design and development	51	1999
Lesco Design & Manufacturing Co Inc.	Steel fabricators: conveyors, cranes and related material handling equipment and vehicle loading ramps	100	1961
Northland Corporation	Kiln dried hardwood lumber	80	1933
Parts Unlimited Inc.	Headquarters & warehouse/sales center; manufacture interior for muscle cars, automotive padded interior seats, door panels, headliners, window felts and other smaller interior parts for the US cars built in the 1960's 1970's 1980's and some from 1990	80	1977
Professional Fence Properties LLC	Fencing contractor	9	2001
Rawlings Group	Headquarters - Insurance subrogation and coordination of benefits services	803	1977

OLDHAM COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
La Grange			
Safai Enterprises Inc.	Roaster, packager, and distributor of specialty coffee products	21	2002
The Oldham Era	Weekly newspaper publishing	10	1876
Source: Kentucky Cabinet for Economic Development			

SHELBY COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Shelbyville			
Amcor Flexibles Shelbyville	Flexible packaging for pharmaceutical industry	115	1989
Bekaert Corporation	Preformed steel staple wire, fine wire, flat wire, nylon-coated wire, tin-coated wire and galvanized wire	96	1990
Bemiss Flexible Packaging - Curwood Division	Flexible packaging for food industry	240	1987
Class C Solutions Group	Packaging facility of automotive replacement parts & distribution to automotive dealers.	60	1974
Edwards Moving & Rigging	Trucking, except local	85	N/A
Ficosa North America Corp	Automotive trim parts	260	1987
Johnson Controls Inc.	Automobile seat assembling	215	1991
Katayama American Co Inc.	Automotive door sashes and moldings	270	1989
Martinrea	Automobile parts stamping & assembly	950	1988
Nifco America Corporation	Manufacture plastic injection molded fasteners for the automotive industry	180	2008
Ohio Valley Aluminum Co LLC	Aluminum extrusion billet	120	1955
Omega Plastics of KY	Plastic & high-density polyethylene bags; stretch wrap film, can liners	200	1980
Source: Kentucky Cabinet for Economic Development			

SHELBY COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Shelbyville			
Process Machinery Inc.	Engineer, manufacture and installation of processing plants for the mineral processing industry; OEM equipment distributor for products; full service parts and service	74	1979
Revere Packaging LLC	Aluminum foil containers & plastic dome food covers	51	1967
Roll Forming Corp	Headquarters; expertise in the design and production of roll formed products for a broad range of industries. From transportation and construction projects to renewable energy, aerospace, and everything in between.	220	1947
Stanley Black & Decker Corp	Circular saw blades	140	1977
Stelised Inc.	designs prototype plastic parts, injection molding and assembly	57	N/A
Simpsonville			
Brown Jordan Services Inc.	Distribution center for direct-to-consumer sales, replacement parts fulfillment operations and returns center.	59	2012
Neff Packaging Solutions Inc.	Headquarters: manufacture folding cartons	73	2007
Purnell Old Folks Sausage Inc.	Headquarters: Pork, turkey & chicken sausage products, sausage and biscuit sandwiches	270	1954
Source: Kentucky Cabinet for Economic Development			

SPENCER COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
N/A	**N/A**	**N/A**	**N/A**
Source: Kentucky Cabinet for Economic Development			

TRIMBLE COUNTY			
Major Business and Industry (Manufacturing & Service & Technical Firms Only)			
Firm	**Product(s)/Service(s)**	**Emp.**	**Year Established**
Milton			
Ikt LLC	Trucking, except local	28	N/A
Nugent Sand Co	Sand & gravel	10	1890
Source: Kentucky Cabinet for Economic Development			

BULLITT COUNTY			
Summary of Recent Locations and Expansions, 2012-2015			
		Reported	
	Companies	Jobs	Investment
Manufacturing Location	1	25-78	$36,453,975
Manufacturing Expansion	8	15-17	$22,313,959
Supportive/Service Location	2	180-400	$22,378,000
Supportive/Service Expansion	3	36-67	$2,422,106
Source: Kentucky Cabinet for Economic Development			

HENRY COUNTY			
Summary of Recent Locations and Expansions, 2012-2015			
		Reported	
	Companies	Jobs	Investment
Manufacturing Location	0	0	$0
Manufacturing Expansion	1	16	N/A
Supportive/Service Location	0	0	$0
Supportive/Service Expansion	0	0	$0
Source: Kentucky Cabinet for Economic Development			

OLDHAM COUNTY			
Summary of Recent Locations and Expansions, 2012-2015			
		Reported	
	Companies	Jobs	Investment
Manufacturing Location	0	0	$0
Manufacturing Expansion	3	240	$98,050,000
Supportive/Service Location	0	0	$0
Supportive/Service Expansion	2	4	$168,000
Source: Kentucky Cabinet for Economic Development			

SHELBY COUNTY			
Summary of Recent Locations and Expansions, 2012-2015			
		Reported	
	Companies	Jobs	Investment
Manufacturing Location	4	299-503	$152,711,789
Manufacturing Expansion	17	773-808	$106,497,127
Supportive/Service Location	0	0	$0
Supportive/Service Expansion	3	5	$4,355,396
Source: Kentucky Cabinet for Economic Development			

SPENCER COUNTY			
Summary of Recent Locations and Expansions, 2012-2015			
		Reported	
	Companies	Jobs	Investment
Manufacturing Location	0	0	$0
Manufacturing Expansion	0	0	$0
Supportive/Service Location	0	0	$0
Supportive/Service Expansion	0	0	$0
Source: Kentucky Cabinet for Economic Development			

TRIMBLE COUNTY			
Summary of Recent Locations and Expansions, 2012-2015			
		Reported	
	Companies	Jobs	Investment
Manufacturing Location	0	0	$0
Manufacturing Expansion	0	0	$0
Supportive/Service Location	0	0	$0
Supportive/Service Expansion	0	0	$0
Source: Kentucky Cabinet for Economic Development			

DAM FAILURE

HAZARD IDENTIFICATION: DAM FAILURE

DESCRIPTION

Dams provide flood control, water supply for drinking, irrigation for farming, recreational areas, and clean, renewable energy through hydropower. The purpose of a dam is to impound (store) water, wastewater or liquid borne materials for any of several reasons, e.g. flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, and recreation or pollution control. Many dams fulfill a combination of the above functions.

Dams, though providing many benefits, can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and significant property damage if there are people downstream of the dam. The National Dam Safety Program is dedicated to protecting the lives of citizens and their property from the risks associated with the development, operation, and maintenance of America's dams.

There are more than 87,000 dams in the United States, the majority of which are privately owned. Other owners are state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous; providing water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power and create lakes for fishing and recreation. Most importantly, dams are important mitigation efforts that save lives by preventing or reducing floods.

Dams, though providing many benefits, can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great damage if there are people and properties downstream of the dam. The National Dam Safety Program (NDSP), led by FEMA, is dedicated to protecting the lives of citizens and their property from the risks associated with the development, operation, and maintenance of America's dams.

TYPES

Manmade dams may be classified according to the type of construction material used, the methods used in construction, the slope or cross-section of the dam, the way the dam resists the forces of the water pressure behind it, the means used for controlling seepage and, occasionally the purpose of the dam. The materials used for construction of dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, miscellaneous materials (such as plastic or rubber) and any combination of these materials.

- **Embankment dams**—Embankment dams are the most common type of dam in use today. They have the general shape shown here. Materials used for embankment dams include natural soil or rock, or waste materials obtained from mining or milling operations. An embankment dam is termed an “earthfill” or “rockfill” dam depending on whether it is comprised of compacted earth or mostly compacted or dumped rock. The ability of an embankment dam to resist the reservoir water pressure is primarily a result of the mass weight, type and strength of the materials from which the dam is made.

- **Concrete dams**—Concrete dams may be categorized as gravity and arch dams according to the design used to resist the stress of reservoir water pressure. Typical concrete gravity dams are shown here and are the most common form of concrete dam. The mass weight of concrete and friction resist the reservoir water pressure. A buttress dam is a specific type of gravity dam in which the large mass of concrete is reduced, and the forces are diverted to the dam foundation through vertical or sloping buttresses. Gravity dams are constructed of vertical blocks of concrete with flexible seals in the joints between the blocks.

- **Concrete arch dams** - are typically rather thin in cross-section. The reservoir water forces acting on an arch dam are carried laterally into the abutments. The shape of the arch may resemble a segment of a circle or an ellipse, and the arch may be curved in the vertical plane as well. Such dams are usually constructed of a series of thin vertical blocks that are keyed together; barriers to stop water from flowing are provided between blocks. Variations of arch dams include multi-arch dams in which more than one curved section is used, and arch-gravity dams which combine some features of the two types of dams.

TYPES OF FAILURES

- **Hydraulic Failure:** Hydraulic failures result from the uncontrolled flow of water over the dam, around the dam and adjacent to the dam, and the erosive action of water on the dam and its foundation. Earth dams are particularly vulnerable to hydraulic failure since earth erodes at relatively small velocities.

- **Seepage Failure:** All dams exhibit some seepage that must be controlled in velocity and amount. Seepage occurs both through the dam and the foundation. If uncontrolled, seepage can erode material from the foundation of an earth dam to form a conduit through which water can pass. This passing of water often leads to a complete failure of the structure, known as piping.

- **Structural Failure:** Structural failures involve the rupture of the dam and/or its foundation. This is particularly a hazard for large dams and for dams built of low strength materials such as silts, slag, fly ash, etc. Dam failures generally result from a complex interrelationship of several failure modes. Uncontrolled seepage may weaken the soils and lead to a structural failure. Structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may lead to structural or piping failures.

SIGNS OF POTENTIAL FAILURE

- *Seepage.* The appearance of seepage on the downstream slope, abutments, or downstream area is cause for concern. If the water is muddy and is coming from a well-defined hole, material is probably being eroded from inside the embankment and a potentially dangerous situation can develop.

- *Erosion.* Erosion on the dam and spillway is one of the most evident signs of danger. The size of erosion channels and gullies can increase greatly with slight amounts of rainfall.

- *Cracks.* Cracks are of two types: traverse and longitudinal. Traverse cracks appear perpendicular to the axis of the dam and indicate settlement of the dam. Longitudinal cracks run parallel to the axis of the dam and may be the signal for a slide, or slump, on either face of the dam.

- *Slides and Slumps.* A massive slide can mean catastrophic failure of the dam. Slides occur for many reasons and their occurrence can mean a major reconstruction effort.

- *Subsidence.* Subsidence is the vertical movement of the foundation materials due to failure of consolidation. Rate of subsidence may be so slow that it can go unnoticed without proper inspection. Foundation settlement is the result of placing the dam and reservoir on an area lacking suitable strength, or over collapsed caves or mines.

- *Structural.* Conduit separations or ruptures can result in water leaking into the embankment and subsequent weakening of the dam. Pipe collapse can result in hydraulic failures due to diminished capacity.

- *Vegetation.* A prominent danger signal is the appearance of "wet environment" types of vegetation such as cattails, reeds, mosses and other wet area vegetation. These types of vegetation can be a sign of seepage.

- *Boils.* Boils indicate seepage water exiting under some pressure and typically occur in areas downstream of the dam.

- *Animal Burrows.* Animal burrows are a potential danger since such activity can undermine the structural integrity of the dam.

- *Debris.* Debris on dams and spillways can reduce the function of spillways, damage structures and valves, and destroy vegetative cover.

FACTS

- There are over 87,000 dams listed in the National Inventory of Dams (2013 edition)
- Federal Government owns 6% of the dams
- 81% of the dams in the inventory are earthen dams
- 14,726 dams are classified as high hazard potential
- 27,000 (32%) of dams listed in the NID, have a primary purpose of recreation
- Average age for a dam is 40 years

IMPACTS

Dam failures cause flooding much different from natural flooding. A flood from a dam failure may arrive before any warning or evacuation can take place and the resulting wall-of-water makes evacuation based on limited environmental cues very problematic. The failure of large dams results in flooding with enough energy to damage or destroy residences and other structures.

HAZARD PROFILE: DAM FAILURE

PROFILE RISK TABLE

Hazard: Dam Failure	
Period of occurrence:	Failure can occur at any time, but is often spurred but other events such as heavy flooding or seismic activity
Number of officially recorded events: SHELDUS and NPDP (1973-2015)	1
Annual Rate of Occurrence:	0.02
Warning time:	Warning time is minimal and can often be directly related to frequency and thoroughness of inspections
Potential impacts:	Impacts to human life, health, and public safety are possible. Economic loss, environmental damage, and disruption of lifeline facilities are also possibilities.
Recorded losses:	$0
Annualized Loss:	$0
Extent:	Impacts to human life, health, and public safety are possible. Utility damage and failure, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases are additional impacts. Class A, B, & C Measure Downstream Flow and loss of life.

GEOGRAPHIC LOCATIONS AFFECTED

The KIPDA region has 89 dams, with 13 dams being identified by FEMA as High Hazard - or Class C - dams. According to the National Performance of Dams Program's database, one (1) dam malfunction was reported in the KIPDA region since 1973.

Dam malfunctions and failures can occur at any time during the year, day or night and certain types of damages can be prevented with regular inspection and maintenance.

The following chart lists all of the dams in the KIPDA region followed by a map of their location.

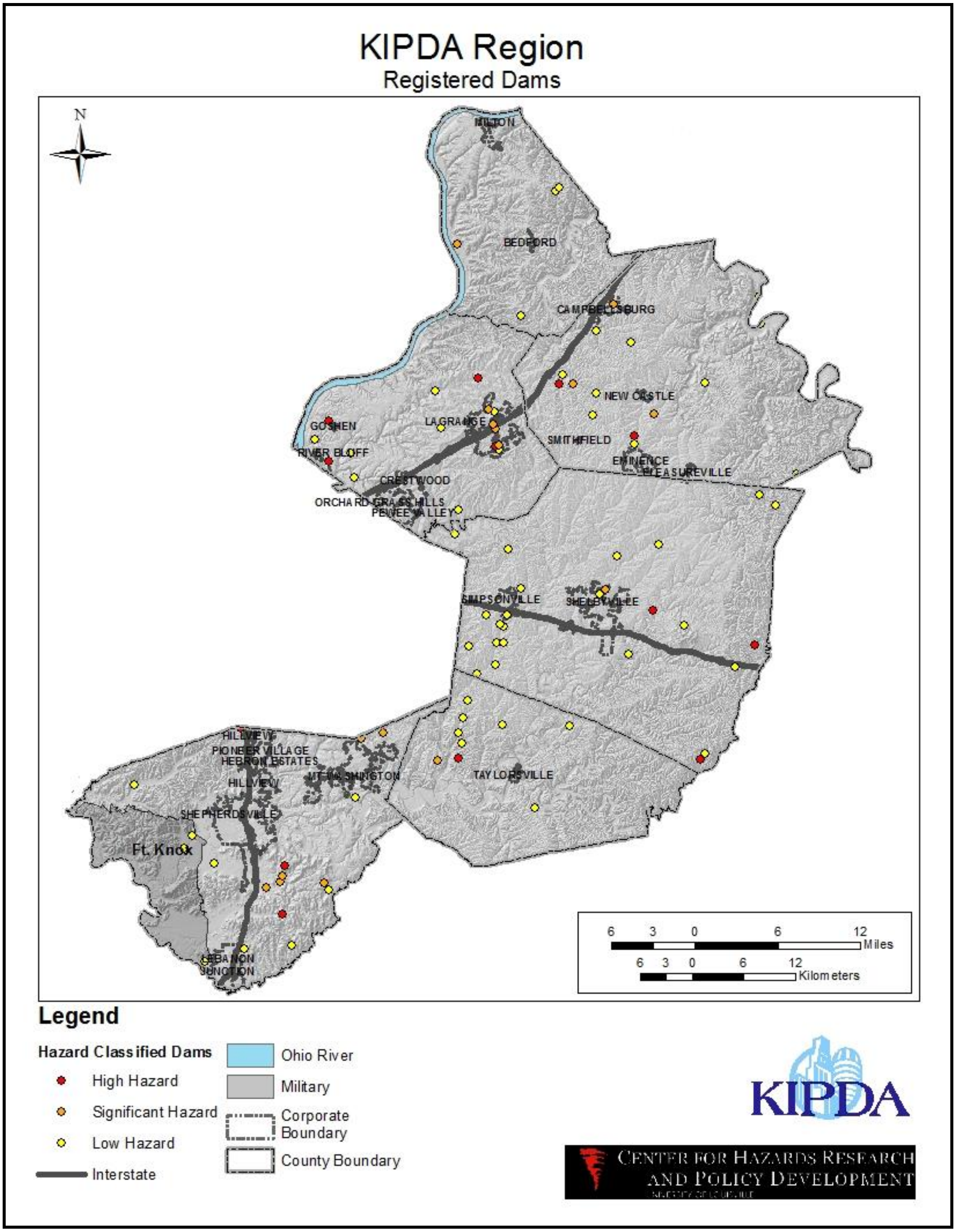
DAMS IN THE KIPDA REGION

KY ID	COUNTY	DAM NAME	HAZARD	RIVER	YEAR	HEIGHT	STORAGE
KY00093	BULLITT	BULLITT CO SPORTSMENS CLUB DAM	HIGH	LONG LICK	1950	35	171
KY01048	BULLITT	HIDDEN VALLEY CAMP DAM	HIGH	CROOKED CREEK	1986	40	726.6
KY01052	BULLITT	GILBERT DAM	HIGH	TRIB-MUD CREEK	1985	15	9.9
KY00018	BULLITT	SCUFFLETOWN HOLLOW DAM	LOW	WILSON CREEK	1950	32	354
KY00590	BULLITT	BENNETT LAKE	LOW	TR-KNOB CREEK	1957	22	53
KY00589	BULLITT	HICKORY PAY LAKE (LOWER)	LOW	TR-PRIOR BRANCH	1957	21	66.7
KY03063	BULLITT	WILCOX LAKE DAM	LOW	ROLLING FORK	1940	33	261
KY00706	BULLITT	CRESCENDO CAMP LAKE DAM	LOW	TR-CAIN RUN	1959	17	66.7
KY00709	BULLITT	LOTUS LAKE (LOWER) DAM	LOW	WEST FORK OF COX CREEK	1958	16	56
KY00710	BULLITT	CHARLES DENNIS LAKE DAM	LOW	SALT RIVER OFFSTREAM	1950	28	21
KY03035	BULLITT	LEBANON JUNCTION LAKE DAM	LOW	TR ROLLING FORK	1940	17	81
KY03063	BULLITT	WILCOX LAKE DAM	LOW	TR SALT RIVER	1940	33	261
KY82301	BULLITT	DUCK LAKE DAM	LOW	TR SALT RIVER	1992	20	458
KY00092	BULLITT	LAKE NEVIN DAM	SIGNIFICANT	LONG LICK CREEK	1959	28	450
KY00084	BULLITT	LOTUS LAKE DAM (UPPER)	SIGNIFICANT	WEST FORK COX CREEK	1965	42	620
KY00085	BULLITT	JIM BEAM DISTILLERY (CLERMONT) DAM	SIGNIFICANT	CAVE HOLLOW BRANCH	1940	19	67.9
KY00254	BULLITT	MOUNT WASHINGTON DAM	SIGNIFICANT	FLOYDS CREEK	1940	33	310
KY00388	BULLITT	JIM BEAM DISTILLERY DAM(NEW)	SIGNIFICANT	LONG LICK CREEK	1970	40	255
KY00591	BULLITT	WHITMAN DAM	SIGNIFICANT	TR-OLD MANS RUN	1963	30	99.1
KY00060	HENRY	EMINENCE LAKE DAM	HIGH	TOWN CREEK	1950	24	180.4
KY00061	HENRY	LITTLE KY RIVER MPS #1	HIGH	LITTLE KENTUCKY RIVER	1967	66	5257.2
KY00063	HENRY	LITTLE KY. RIVER FRS #4	LOW	LITTLE KENTUCKY RIVER	1963	42	53
KY00010	HENRY	HENRY CO ROD & GUN CLUB DAM	LOW	LITTLE KENTUCKY RIVER	1950	24	80

DAMS IN THE KIPDA REGION							
KY ID	COUNTY	DAM NAME	HAZARD	RIVER	YEAR	HEIGHT	STORAGE
KY00279	HENRY	LITTLE KENTUCKY RIVER FRS #5B	LOW	LITTLE KENTUCKY RIVER	1971	44	81
KY00379	HENRY	PENNINGTON DAM	LOW	LITTLE KY.	1965	35	73.2
KY00380	HENRY	I.C.SMITH LAKE DAM	LOW	WHITE SULPHER FORK	1954	29	101
KY00381	HENRY	COBB LAKE	LOW	TOWN CREEK	1958	27	56.1
KY00439	HENRY	NEVILLE DOWNEY LAKE	LOW	LITTLE SIX MILE CREEK	1964	28	25.7
KY00789	HENRY	YOUREE DAM	LOW	TR-FIVEMILE CREEK	1977	27	219.1
KY01106	HENRY	STEVE BOONE	LOW	TRIB-KENTUCKY RIVER	1992	26	119
KY03014	HENRY	KENTUCKY RIVER LOCK & DAM 2	LOW	KENTUCKY RIVER	1839	34	10,550
KY03015	HENRY	KENTUCKY RIVER LOCK & DAM 3	LOW	KENTUCKY RIVER	1844	22	19,580
KY00062	HENRY	LITTLE KY RIVER FRS #2	SIGNIFICANT	LITTLE KENTUCKY RIVER	1964	49	1530
KY00005	HENRY	CAMPBELLSBURG DAM	SIGNIFICANT	CARMON CREEK	1940	25	77.2
KY00869	HENRY	W.B.KEMPER LAKE DAM	SIGNIFICANT	TOWN CREEK	1964	21	26
KY00006	OLDHAM	HARMONY LAKE DAM	HIGH	LITTLE HUCKLEBERRY CREEK	1955	34	225
KY00302	OLDHAM	YAGER LAKE DAM	HIGH	HARRODS CREEK	1950	33	292.3
KY00716	OLDHAM	COVERED BRIDGE FARM LAKE DAM	HIGH	TR-HARRODS CREEK	1960	28	76.4
KY01004	OLDHAM	LAKEWOOD SHORES LAKE DAM	HIGH	S. FORK CURRYS FORK	1967	31	44.6
KY00024	OLDHAM	LAKEWOOD SHORES DAM	LOW	NORTH FORK CURRYS	1967	27	108
KY00025	OLDHAM	REYNOLD S MEADOWS DAM	LOW	FLOYDS FORK	1955	40	200
KY00007	OLDHAM	REFORMATORY DAM	LOW	CEDAR CREEK	1955	32	697
KY00008	OLDHAM	LAGRANGE RESERVOIR (UPPER) DAM	LOW	HARRODS CREEK	1955	23	85.4
KY00656	OLDHAM	WILLIG DAM	LOW	TR-POND CREEK	1977	31	43.2
KY00715	OLDHAM	SLEEPY HOLLOW LAKE DAM	LOW	SOUTH FORK HARRODS	1922	23	70.7
KY00890	OLDHAM	BROWN LAKE DAM	LOW	TR-HARRODS CREEK	1951	30	31

DAMS IN THE KIPDA REGION							
KY ID	COUNTY	DAM NAME	HAZARD	RIVER	YEAR	HEIGHT	STORAGE
KY01080	OLDHAM	ENGLISH DAM	LOW	TRIB. HARRODS CK	1990	38	81
KY00009	OLDHAM	LAGRANGE RESERVOIR (LOWER)DAM	SIGNIFICANT	HARRODS CREEK	1955	25	50.7
KY00095	OLDHAM	LAGRANGE L&N RAILROAD LAKE DAM	SIGNIFICANT	NORTH FORK CURRYS	1920	22	218.3
KY00300	OLDHAM	CRYSTAL LAKE DAM	SIGNIFICANT	CURRYS FORK	1965	34	829
KY00866	OLDHAM	GREEN VALLEY COUNTRY CLUB (LOWER DAM)	SIGNIFICANT	S. FORK CURRYS FORK	1967	30	13
KY00040	SHELBY	GUIST CREEK LAKE DAM	HIGH	GUIST CREEK	1961	960	9905.1
KY00846	SHELBY	MAGUIRE BROTHERS LAKE DAM	HIGH	TR GOOSE CREEK	1973	25	94
KY00124	SHELBY	PLUM CREEK FRS #1	LOW	PLUM CREEK	1960	26	310
KY00125	SHELBY	PLUM CREEK FRS #4	LOW	PLUM CREEK	1960	27	99
KY00126	SHELBY	PLUM CREEK FRS #11	LOW	PLUM CREEK	1960	25	57
KY00050	SHELBY	CEDARMORE LAKE DAM	LOW	SIX MILE CREEK	1954	30	2735
KY00104	SHELBY	MARY ROSS LAKE DAM	LOW	CLEAR CREEK	1940	29	190
KY00315	SHELBY	TRAILWOOD LAKE DAM	LOW	BACKBONE CREEK	1973	63	959.3
KY00377	SHELBY	HALLENBURG & ASSOCIATES LAKE	LOW	BENSON CK.	1973	30	72
KY00329	SHELBY	PLUM CREEK FRS #2	LOW	PLUM CREEK	1960	25	18
KY00330	SHELBY	PLUM CREEK FRS #3	LOW	PLUM CREEK	1960	31	44
KY00331	SHELBY	PLUM CREEK FRS #7	LOW	PLUM CREEK	1960	29	21
KY00639	SHELBY	WILSON WYATT DAM	LOW	BRASHEARS CREEK	1976	28	82.6
KY00712	SHELBY	WILLIAM PROCTOR LAKE DAM	LOW	TR-PLUM CREEK	1959	24	56.8
KY00794	SHELBY	CHENOWETH FARM LAKE DAM	LOW	TR-EAST CLEAR CREEK	1969	25	117.8
KY00795	SHELBY	BOHN FARMS LAKE DAM	LOW	TR-CLEAR CREEK	1966	18	63.8
KY00735	SHELBY	NEWTON LAKE DAM	LOW	TR-TICK CREEK	1974	30	42.3
KY00780	SHELBY	HUBER DAM	LOW	TR-GUIST CREEK	1977	30	31
KY00783	SHELBY	JIM SAYLOR DAM	LOW	TR-BEECH CREEK	1977	28	25.9

DAMS IN THE KIPDA REGION							
KY ID	COUNTY	DAM NAME	HAZARD	RIVER	YEAR	HEIGHT	STORAGE
KY00899	SHELBY	G.K. EISONBACK LAKE DAM	LOW	TR-CANE RUN	1971	28	43
KY00893	SHELBY	CONDON LAKE DAM	LOW	TR-FLOYDS FORK	1977	27	41
KY01085	SHELBY	LEONHARDT DAM	LOW	TRIB-PLUM CREEK	1990	34	44.9
KY01104	SHELBY	BENNINGFIELD FARM	LOW	TRIB-FLOYDS FORK	1992	23	107
KY01092	SHELBY	LEWIS DAM	LOW	TRIB-LONG RUN CK.	1990	24	88.5
KY00087	SHELBY	SHELBY LAKE DAM	SIGNIFICANT	CLEAR CREEK	1955	20	400
KY00336	SPENCER	PLUM CREEK FRS #18	HIGH	PLUM CREEK	1960	40	40
KY00051	SPENCER	TAYLORSVILLE LAKE DAM	HIGH	SALT RIVER	1983	162	291,670
KY00335	SPENCER	PLUM CREEK FRS #17	LOW	PLUM CREEK	1960	37	30
KY00332	SPENCER	PLUM CREEK FRS #12	LOW	PLUM CREEK	1960	28	16
KY00333	SPENCER	PLUM CREEK FRS #15	LOW	PLUM CREEK	1960	35	62
KY00334	SPENCER	PLUM CREEK FRS #16	LOW	PLUM CREEK	1960	39	39
KY00711	SPENCER	V.S. SHEWMAKER LAKE DAM	LOW	TR-BRASHEARS CREEK	1955	28	52.9
KY00624	SPENCER	WALLITSCH DAM	SIGNIFICANT	TR-PLUM CREEK	1968	27	42.6
KY00378	TRIMBLE	JOHN B. TAYLOR LAKE DAM	LOW	MORELAND CREEK	1970	27	309
KY00446	TRIMBLE	LAKE SHERWOOD DAM # 2	LOW	PATTONS CREEK	1973	27	25.1
KY00696	TRIMBLE	GEORGE ROLAND LAKE	LOW	TR-DRY FORK	1955	34	56.9
KY00697	TRIMBLE	JAMES PIRTLE LAKE	LOW	TR-DRY FORK	1950	33	34.7
KY00928	TRIMBLE	L.G.E. TRIMBLE CO. STA. ASH DAM	SIGNIFICANT	TR-OHIO	1980	100	-9.9
Dataset From the National Performance of Dams Program							

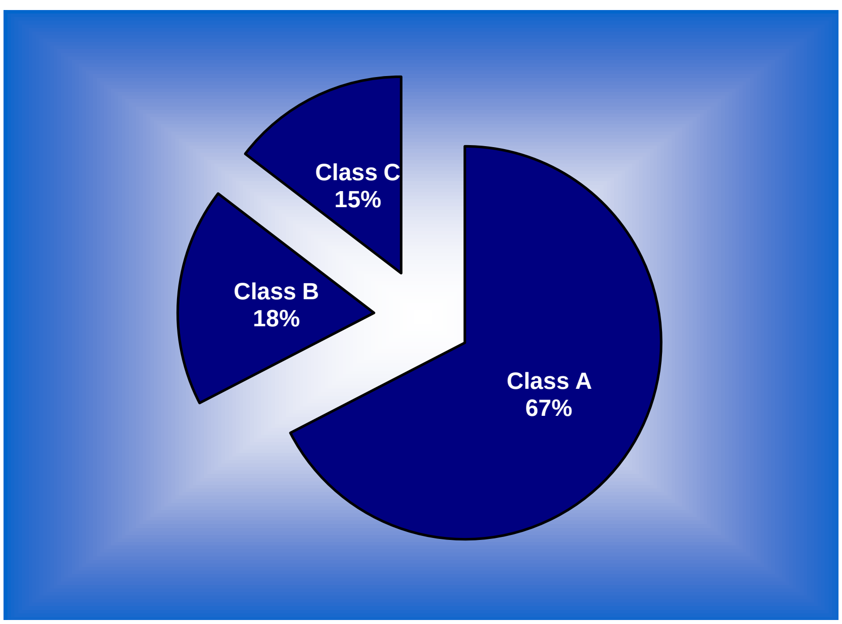

KIPDA Region
Registered Dams
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Hazard Classified Dams
High Hazard
Significant Hazard
Low Hazard
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

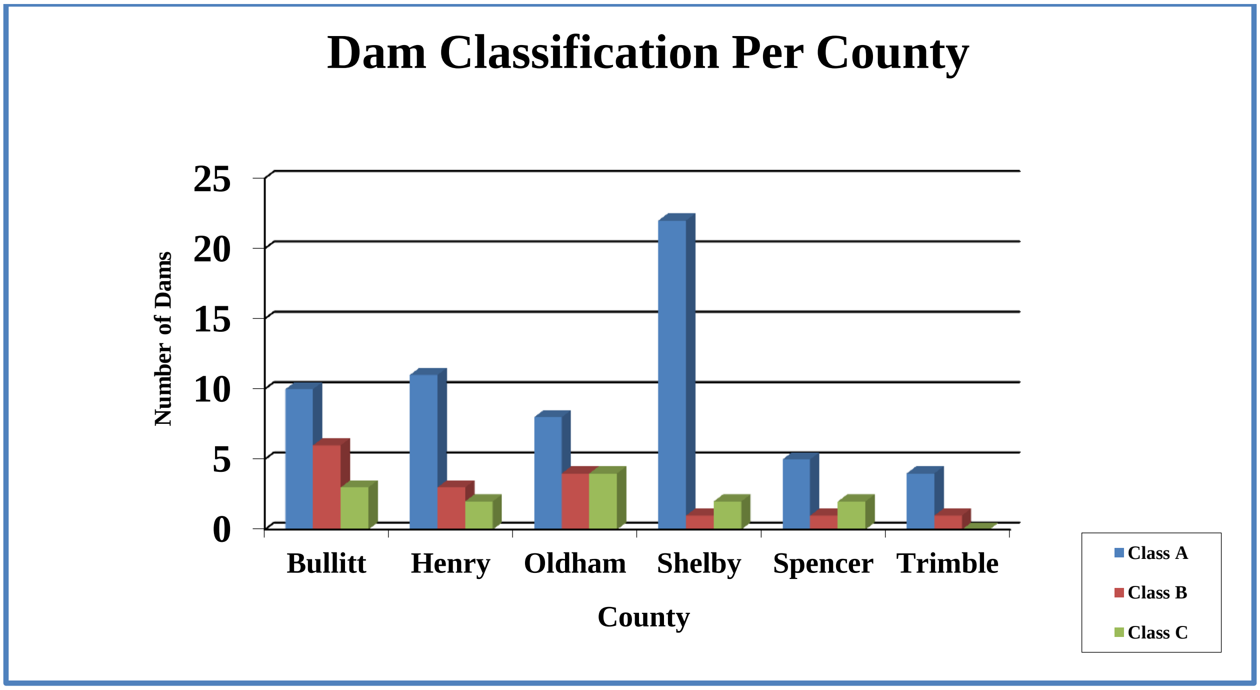
DAM CLASSIFICATIONS

Dams are classified based on the evaluation of damage possible downstream. The FEMA guide to DAM classifications uses the following system:

Classification of Dams	
Classification	**Description**
Class A (low)	No loss of human life is expected and damage will only occur to the dam owner's property in the event of dam failure
Class B (Moderate/Significant)	Loss of Human life is not probable, but economic loss, environmental damage; disruption of lifeline facilities can be expected.
Class C (High)	Loss of one or more human life is expected.
FEMA 333: ***Federal Guidelines for Dam***	

The following charts present a breakdown of the dam classifications in the KIPDA region by the region as a whole and by county.





PREVIOUS OCCURRENCES

KIPDA Region Dam Malfunctions, 1973 - Present				
County	**Dam Name**	**Incident Date**	**Incident Type**	**Failure**
Shelby	Guist Creek Lake Dam	March 1, 1997	Inflow Flood- Hydrologic Event	No

*National Performance of Dams Program

ASSESSING VULNERABILITY BY JURISDICTION: DAM FAILURE

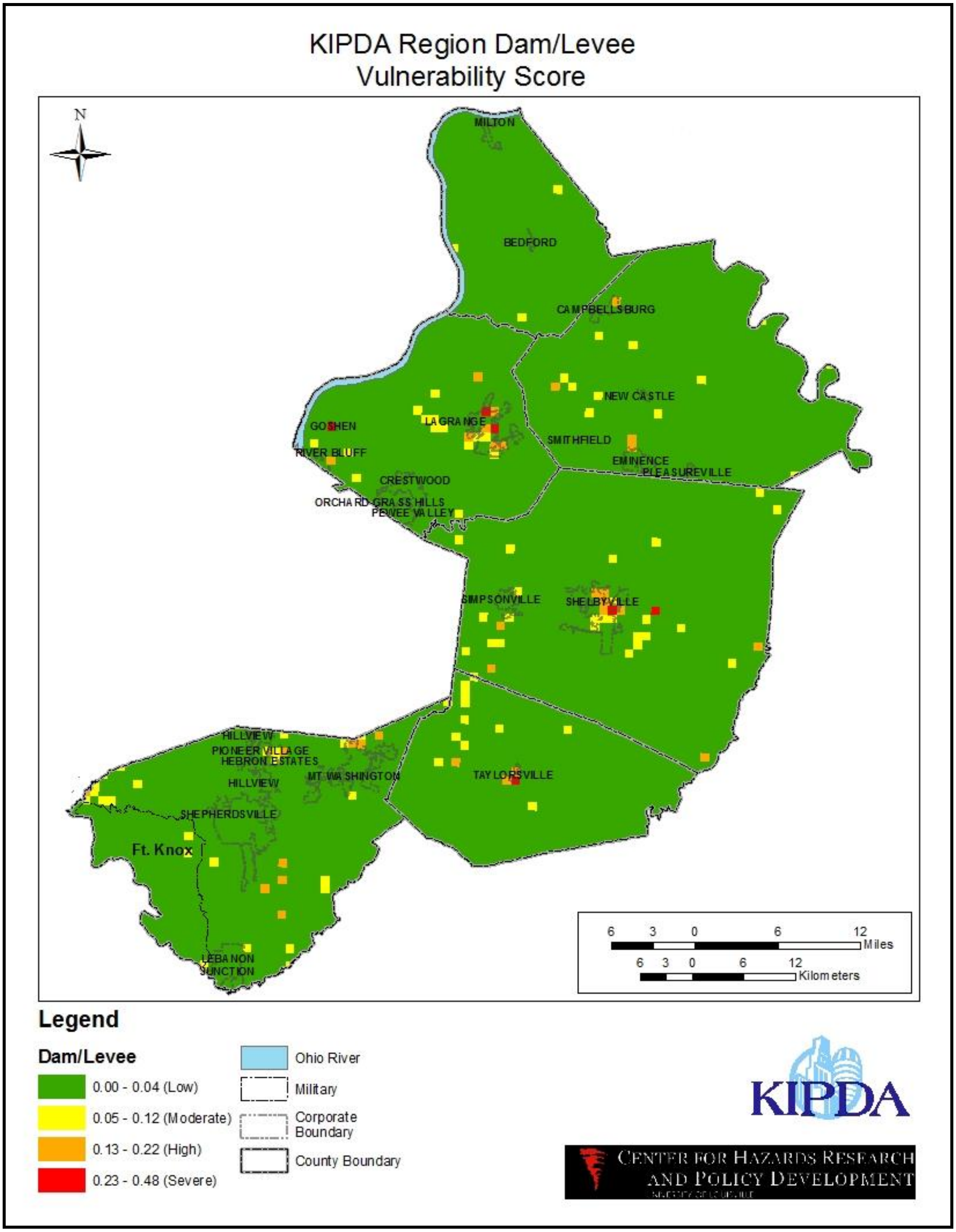
Dam Failure Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region’s vulnerability to Dam Failure was determined through first calculating the Dam Failure Hazard Score. The Dam Failure Hazard Score was calculated by studying three (3) sources of data in conjunction with SHELDUS data and NOAA data. The first layer used to create the Dam Failure Hazard Score was the newly created KDOW dam inundation maps along with the DFIRM mapped X zones that displayed areas protected by levees. These two (2) layers display a geo-referenced data that depicts where dam and levee failures could occur. To analyze the KIPDA Region’s risk to Dam Failure according to these data layers, they were overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the dam inundation and mapped levee areas covered within each grid. This percentage of area affected by the mapped layers was then calculated and scored 0-1 to develop 50% of the Dam Failure Hazard Score.

The next step was determined by counting the total number of dams located within each 1 KM MGRS grid. This data displayed where concentrations of Dam Failure events have occurred, thus producing areas of risk. In order to calculate different severities of risk based on dam risk classifications each dam was rated as high, medium, and low hazard dams according to Federal Guidelines for Dam Safety Classifications (2004). A high hazard dam was given a score of 3, medium a score of 2, and low a score of 1. Once all the scored dam location points were aggregated to their appropriate grid, each grid was giving a score 0-1 to create the other 50% of the Dam Failure Hazard Score.

The Dam Failure Hazard Score was then calculated by adding the two (2) scores together and scored 0-1. It is important to note if the Dam Failure Hazard Score inputs equaled 0, then the Dam Failure Hazard Vulnerability Score equaled 0.

Finally, the Dam Failure Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid’s Exposure Score by its Dam Failure Hazard Score and then scored 0-1. Once the final Dam Failure Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe), which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Dam/Levee
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LA GRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
TAYLORSVILLE
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Dam/Levee
0.00 - 0.04 (Low)
0.05 - 0.12 (Moderate)
0.13 - 0.22 (High)
0.23 - 0.48 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: DAM FAILURE

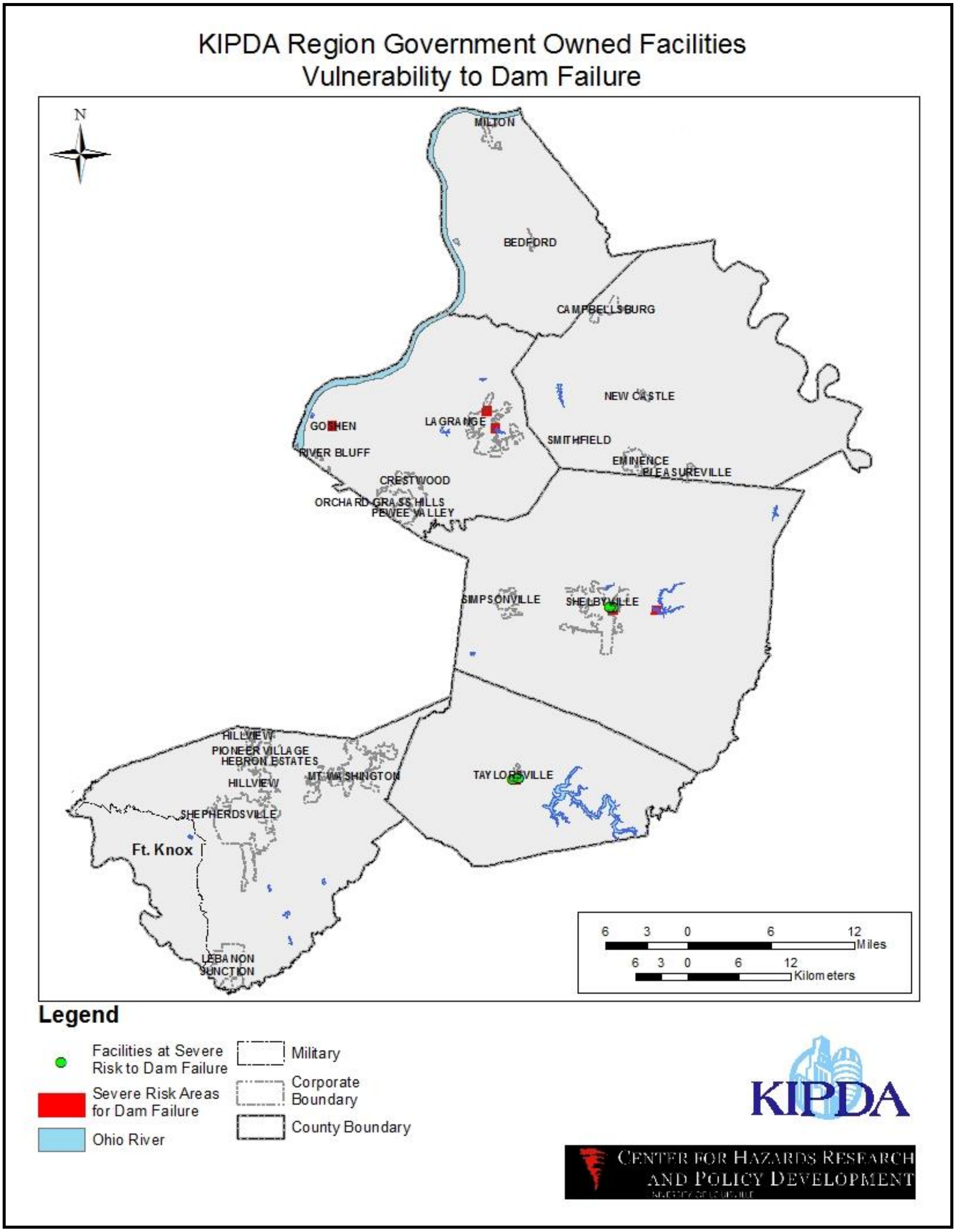
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Dam Failure. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Dam Failure.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Occurrences 1973-2015
Bullitt	Dam Failure	0	$0	0.00	$0	$0	42
Henry	Dam Failure	0	$0	0.00	$0	$0	42
Oldham	Dam Failure	0	$0	0.00	$0	$0	42
Shelby	Dam Failure	1	$0	0.02	$0	$0	42
Spencer	Dam Failure	0	$0	0.00	$0	$0	42
Trimble	Dam Failure	0	$0	0.00	$0	$0	42
Total		**1**	**$0**	**0.02**	**$0**	**$0**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: DAM FAILURE

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Dam Failure boundary map was used as the hazard layer for Dam Failure Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Dam Failure boundary map. The government owned facilities captured within each Dam Failure hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Dam Failure event. The chart below shows a county breakdown of how many government-owned facilities are located within a potential high risk Dam Failure hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	0	$0.00
Henry	0	$0.00
Oldham	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Dam Failure
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Dam Failure
Severe Risk Areas for Dam Failure
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

DROUGHT

HAZARD IDENTIFICATION: DROUGHT

DESCRIPTION

The National Oceanic and Atmospheric Administration defines drought as a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. Drought is a temporary aberration from normal climatic conditions, thus it can vary significantly from one region to another. Drought is different than aridity, which is a permanent feature of climate in regions where low precipitation is the norm, as in a desert.

Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region. Because of the interplay between a natural drought event and various human factors, drought means different things to different people. In practice, drought is defined in a number of ways that reflect various perspectives and interests.

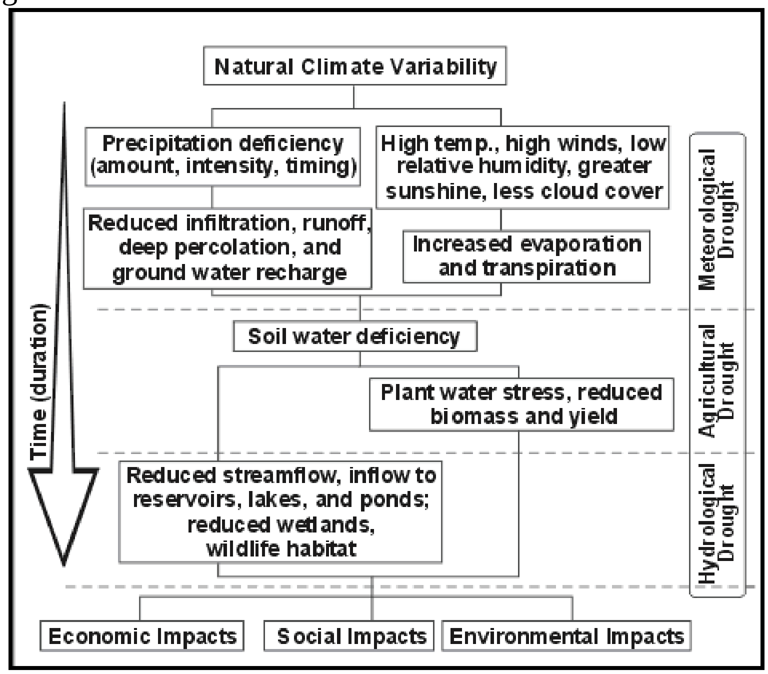
Part of the difficulty in detecting drought is in the lack of an obvious onset of drought conditions. A drought develops slowly and can appear to mimic a normal spell of dry weather in the summer, a time of the year when dry weather is accepted and expected. Short-term rainfall shortages create problems for agricultural crops, livestock, urban landscapes, and other activities that depend on stored soil moisture between rainfall events.

Despite all of the problems that droughts cause, drought has proven to be difficult to define. There is no universally accepted definition because drought, unlike flooding for example, is not a distinct event. Additionally, drought is often the result of many complex factors and has no well-defined start or end. The impacts of drought may again vary by affected sector, thus making definitions of drought specific to particular situations.

TYPES

There are four primary types of drought:

Meteorological drought – A period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area.



Agricultural drought – A climatic excursion involving a shortage of precipitation sufficient to adversely affect crop production or range production.

Hydrologic drought – A period of below average water content in streams, reservoirs, Groundwater aquifers, lakes and soils.

Socioeconomic drought – Socioeconomic drought refers to the situation that occurs when water shortages begin to effect people and their lives. It associates economic good with the elements of meteorological, agricultural, and hydrological drought.

The Palmer Drought Severity Index (PDSI) is currently used by the U.S. department of agriculture to help determine when grant assistance is needed. This index is also helpful for areas of widely similar topography. As Kentucky and the KIPDA region have a relatively similar topography and also a fair amount of agriculture, the PDSI will be used in the KIPDA Regional Hazard Mitigation Plan. The index measures the level of recorded precipitation against the average, or normal, amount of precipitation for a region.

Palmer Classifications System (PDSI)	
+4.0 in. or more	extremely wet
3.0 in to 3.99 in	very wet
2.0 in to 2.99 in	moderately wet
1.0 in to 1.99 in	slightly wet
0.5 in to 0.99 in	incipient wet spell
0.49 in to -0.49 in	near normal
-0.5 in to -0.99 in	incipient dry spell
-1.9 in to -1.99 in	mild drought
-2.0 in to -2.99 in	moderate drought
-3.0 in to -3.99 in	severe drought
-4.0 in or less	extreme drought

FACTS

- Between spring and early fall 2002, moderate to extreme drought conditions over large portions of 30 states resulted in an estimate of more than $ 10.0 billion in damages and costs.
- One of the most famous droughts occurred during the 1930s and lasted nearly a decade. It is referred to as the "dust bowl" (image at right). It was caused by a combination of drought and poor farming practices. Large areas of land without groundcover allowed winds to blow dust everywhere.

- Nationwide losses from the U.S. drought of 1988 exceeded $40 billion, exceeding the losses caused by Hurricane Andrew in 1992, the Mississippi River floods of 1993, and the San Francisco earthquake in 1989.
- Droughts can lead to economic losses such as unemployment, decreased land values, and agribusiness losses.
- In the Horn of Africa the 1984–1985 drought led to a famine which killed 750,000 people.

IMPACTS

Primary Impacts

- Crop failure is the most crucial effect of drought. Drought has a direct impact on the economy and in many cases the health of the population that is affected. Due to a lack of water and moisture in the soil, many crops will not produce normally or efficiently and in many cases, may be lost entirely.
- Water shortage is a very serious effect of drought. The availability of potable water is severely decreased when drought conditions persist. Springs, wells, streams, and reservoirs have been known to run dry due to the decrease in ground water, and, in extreme cases, rivers have become unsafe for navigation as a result of drought.

Secondary Impacts

- Fire susceptibility is increased with the absence of moisture associated with a drought. Dry conditions have been known to promote the occurrence of widespread wildfires.

Tertiary Impacts

- Environmental degradation via erosion and ecological damage can be additional results of drought. As moisture in topsoil dissipates and the ground becomes dryer, the susceptibility to windblown erosion increases. In prolonged drought situations loss of habitat for certain species native to that particular environment is possible. Prolonged drought conditions may also result in loss of food sources for certain species.
- In prolonged drought situations the soil surrounding structures subsides, sometimes creating cracks in foundations and separation of foundations from above ground portions of the structure. Forest root systems may be damaged or destroyed through a similar process.

HAZARD PROFILE: DROUGHT

Profile Risk Table

Hazard: Drought	
Period of occurrence:	Drought can occur at any time of the year in any part of Kentucky.
Number of officially recorded events: (1960-2015)	0
Annual Rate of Occurrence:	0
Warning time:	Warning times for drought are not applicable as they are for severe storms or winter weather. Drought is onset by a period of similar weather and precipitation conditions. Predictability and preparedness is based mostly on the awareness of populations drought conditions are affecting.
Potential impacts:	Impacts to human life, health, and public safety are possible. Utility damage and failure, infrastructure damage (transportation and communication systems), structural damage, potential increase in risk of wild fire, and the possibility of damaged or destroyed critical facilities are additional impacts. Most impacts result from wildfire, extreme dry conditions, or dust storms.
Recorded losses:	$0
Annualized Loss:	$0
Extent:	Impacts include loss of crops, no rain, and strains on water lines. Palmer Classification System measures wetness for Drought.

GEOGRAPHIC LOCATIONS AFFECTED

Drought conditions can occur anytime, anywhere. For this reason, past drought occurrences are not a good indicator of future occurrences or damage. Historically the Western and Southeastern United States have been prone to drought events.

In order to monitor for drought, the United States Geological Service has monitoring stations. These stations are set up on lakes, reservoirs and streams. The tables below list where in the KIPDA Region these monitoring stations are located. Real-time USGS stream gages used for drought monitoring.

DROUGHT MANAGEMENT REGION	USGS STREAM GAGE NAME	USGS NUMBER	COUNTY	BASIN
KIPDA ADD	Floyds Fork at Fisherville	3298000	Jefferson	Salt River
	Kentucky River at Lock 2 at Lockport	3290500	Henry	Kentucky River
	Middle Fork Beargrass Creek	3293000	Jefferson	Salt River
	Pond Creek near Louisville	3302000	Jefferson	Salt River
	Salt River at Shepherdsville	3298500	Bullitt	Salt River
	South Fork Beargrass Creek	3292500	Jefferson	Salt River

Lakes and reservoirs used for drought monitoring.

DROUGHT MANAGEMENT REGION	NAME	COUNTY	BASIN	MAP REFERENCE NUMBER
KIPDA ADD	Guist Creek Lake	Shelby	Salt River	116
	Taylorsville Lake	Spencer	Salt River	211

PREVIOUS OCCURENCES

Information and data on previous drought occurrences is limited mostly in the form of news reports and historical records. The Palmer Drought Severity Index is the most widely used measurement of drought severity. Significant figures and information regarding these periods is very limited if it even exists.

Viewing a timeframe of 1960- 2015, neither SHELDUS nor NOAA had any records of drought occurrence in the KIPDA Region. While there have been periods of extreme heat and lack of precipitation, none of the periods were considered by SHELDUS or NOAA to be drought conditions.

While the counties in the KIPDA region were not identified as having any past droughts, NOAA data indicated 31 events of drought data, where SHELDUS showed only two significant events since 1999; demonstrating the disparity in past information as it pertains to drought. Only two of the droughts were said to have caused severe damage to agricultural yields. The 1996 drought affected 20 counties in western Kentucky with crop damages assessed around $154 million. In 2002, 22 counties in Kentucky were affected with losses assessed at $70 million. There were no injuries or deaths reported as a result of these droughts.

During periods of drought in Kentucky, some activities which rely heavily on high water usage may be impacted significantly. These activities include agriculture, tourism, wildlife protection, municipal water usage, recreation, wildlife preservation, and electric power generation.

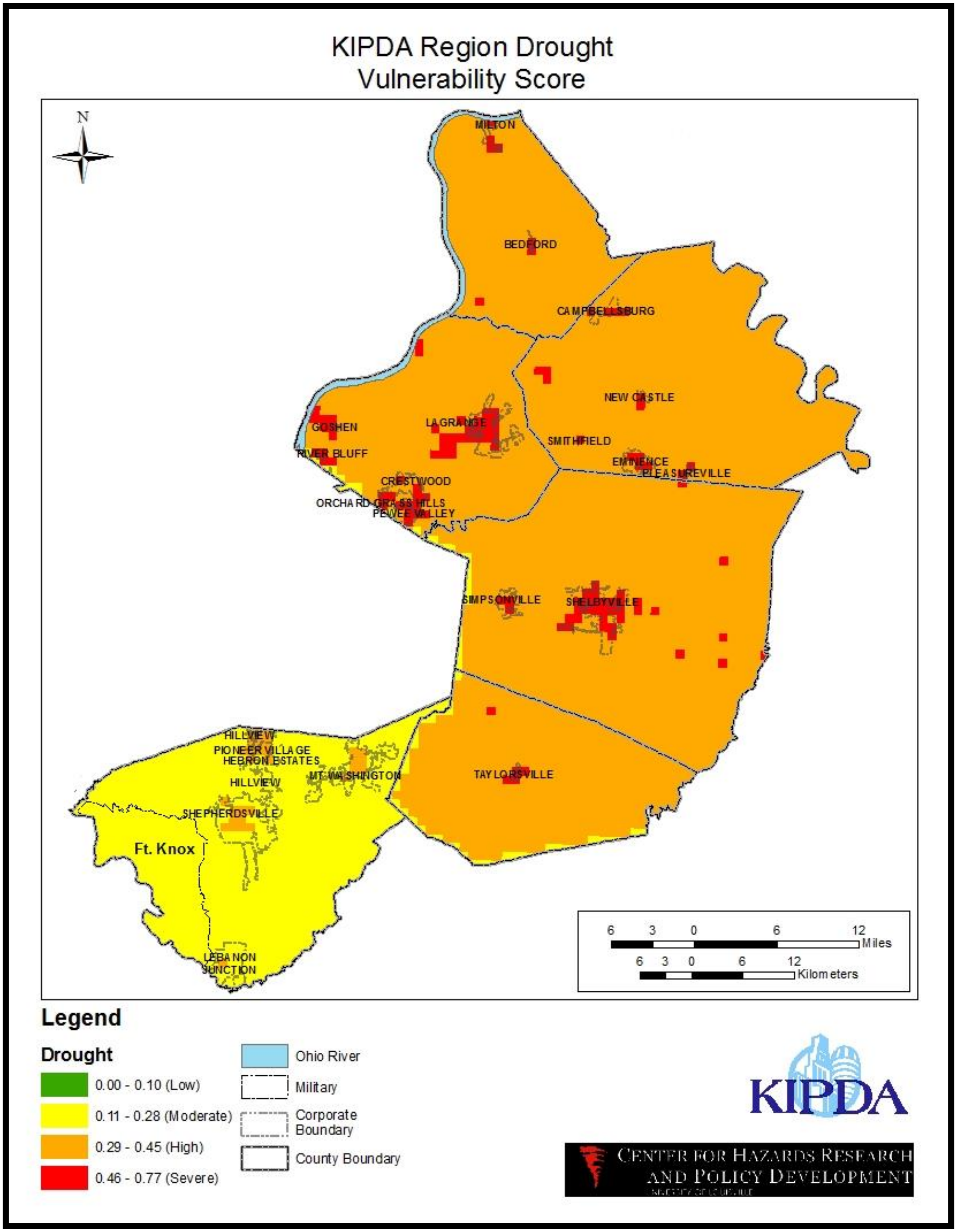
ASSESSING VULNERABILITY BY JURISDICTION: DROUGHT

Drought Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Drought was determined through first calculating the Drought Hazard Score. The Drought Hazard Score was calculated by studying one (1) specific source of data. The data layer used to create the Drought Hazard Score was data collected from the Palmer Drought Severity Index (PDSI) from 1895-2013. In order to use this data for the Drought Hazard Score an average PDSI was calculated for each of the four (4) PDSI regions in the KIPDA Region using the annual PDSI from 1895-2013. This created four (4) specific hazard areas to score from. To analyze the KIPDA Region's risk to Drought, the PDSI layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region.

Next, a calculation was computed based on the percent of the area the PDSI layer covered within each grid. This percentage of area affected by the mapped PDSI areas (4) was then calculated and scored 0-1 to develop the Drought Hazard Score.

The Drought Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Drought Hazard Score and then scored 0-1. Once the final Drought Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe) which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Drought
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Drought
0.00 - 0.10 (Low)
0.11 - 0.28 (Moderate)
0.29 - 0.45 (High)
0.46 - 0.77 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: DROUGHT

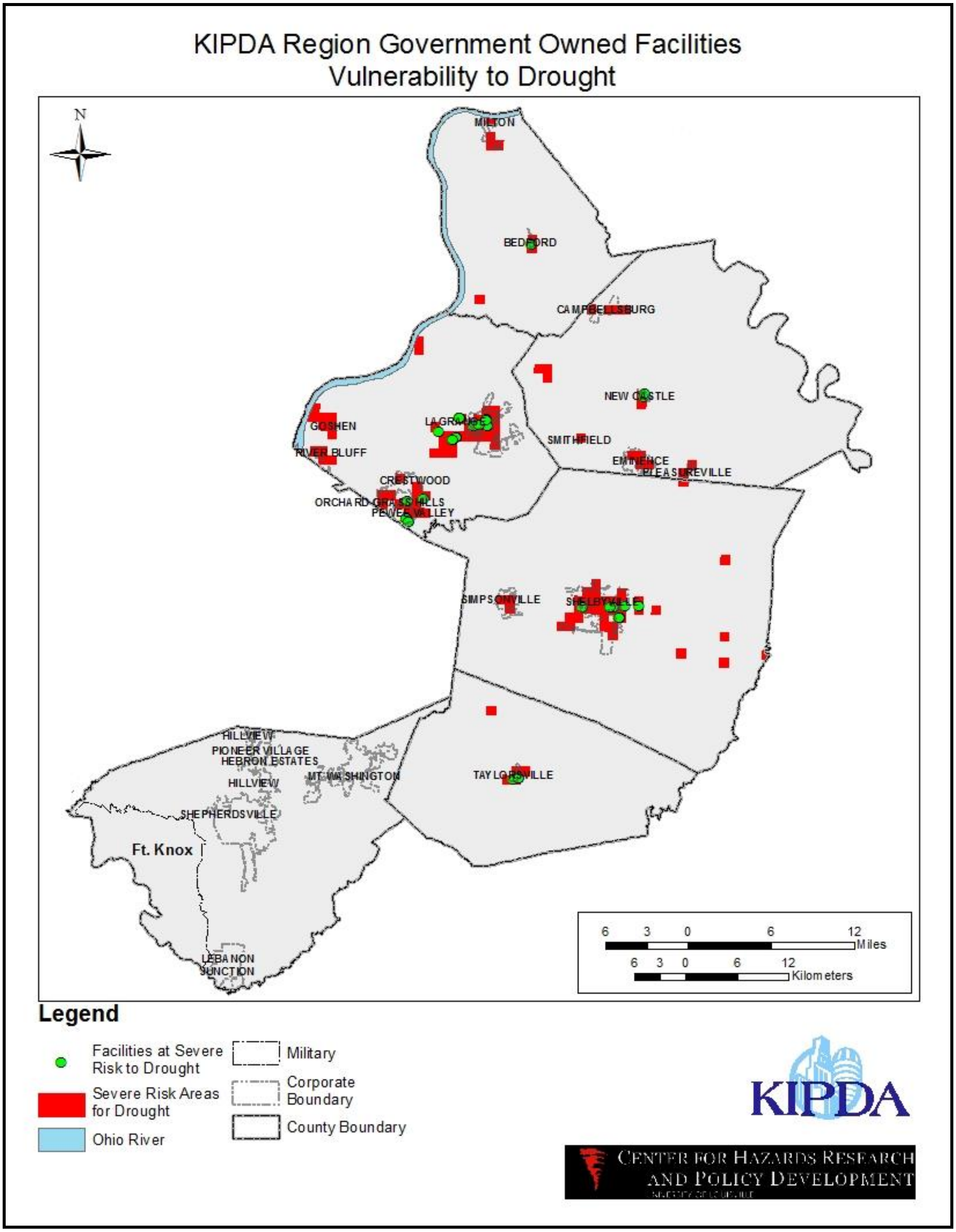
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Drought. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Drought.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Drought	0	$0.00	0.00	$0	$0	55
Henry	Drought	0	$0.00	0.00	$0	$0	55
Oldham	Drought	0	$0.00	0.00	$0	$0	55
Shelby	Drought	0	$0.00	0.00	$0	$0	55
Spencer	Drought	0	$0.00	0.00	$0	$0	55
Trimble	Drought	0	$0.00	0.00	$0	$0	55
Total		**0**	**$0**	**0.00**	**$0**	**$0**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: DROUGHT

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Drought boundary map was used as the hazard layer for Drought Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Drought boundary map. The government owned facilities captured within each Tornado hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Drought event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Drought hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	0	$0.00
Henry	0	$0.00
Oldham	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Drought
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT. WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Drought
Severe Risk Areas for Drought
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

EARTHQUAKE

HAZARD IDENTIFICATION: EARTHQUAKE

DESCRIPTION

The USGS describes an earthquake as the term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth.

For hundreds of millions of years, the forces of plate tectonics - massive, irregularly-shaped slabs of rock - have shaped the Earth as these huge plates that form the Earth's surface move slowly over time. When a substantial amount of energy has accumulated during these tectonic interactions, the plates move in a way which releases stored energy and produce the seismic waves which generate earthquakes. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves generating an earthquake.

The movement of the earth's surface during earthquakes (or explosions) is the catalyst for most of the damage during an earthquake. Produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source, ground motion travels both through the earth and along its surface, amplified by soft soils overlying hard bedrock; a phenomenon referred to as ground motion amplification. Ground motion amplification can cause a great deal of damage during an earthquake, even to sites very far from the epicenter; the epicenter being the point on the Earth's surface that is directly above the area where rock has broken on the tectonic plate below.

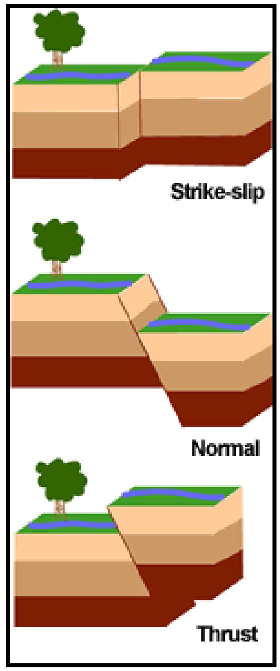
Earthquakes strike suddenly and without warning and can occur at any time of the year, any time of the day or night.

TYPES

There are three types of faults:

- **Strike-slip faults** have walls that move sideways, not up or down. That is, the slip occurs along the strike, not up or down the dip. In these faults the fault plane is usually vertical, so there is no hanging wall or footwall. The forces creating these faults are lateral or horizontal, carrying the sides past each other.

  Strike-slip faults are either **right-lateral** or **left-lateral**. That means someone standing near the fault trace and looking across it would see the far side move to the right or to the left, respectively. The one in the picture is left-lateral.



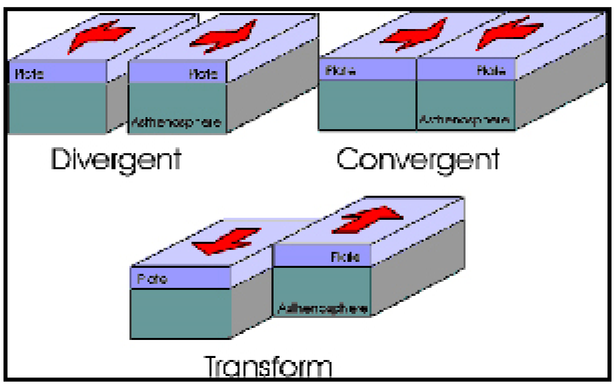
- **Normal faults** form when the hanging wall drops down. The forces that create normal faults are pulling the sides apart, or extensional.

- **Thrust faults** form when the hanging wall moves up. The forces creating thrust faults are compressional, pushing the sides together.

  Together, normal and thrust faults are called dip-slip faults, because the movement on them occurs along the dip direction – either down or up, respectively.

There are three different Tectonic Plate Boundaries

- **Convergent/Destructive Plate Boundary** – occurs when the two plate boundaries meet and one plate moves underneath the other.



- **Divergent/Constructive Plate Boundary** – occurs when the two plates' boundaries are moving away from one another forming new crust.

- **Transform Plate Boundary** – occurs when two plates slide past one another. Earthquakes are measured in terms of magnitude and intensity using the Richter Scale and Modified Mercalli Scale of Earthquake Intensity.

The Richter magnitude scale measures an earthquake‘s magnitude using an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. The earthquake‘s magnitude is expressed in whole numbers and decimal fractions. Each whole number increase in magnitude represents a 10-fold increase in measured wave amplitude, or a release of 32 times more energy than the preceding whole number value.

The Modified Mercalli Scale measures the effect of an earthquake on the Earth‘s surface. Composed of 12 increasing levels of intensity that range from unnoticeable shaking to catastrophic destruction, the scale is designated by Roman numerals. There is no mathematical basis to the scale; rather, it is an arbitrary ranking based on observed events. The lower values of the scale detail the manner in which the earthquake is felt by people, while the increasing values are based on observed structural damage. The intensity values are assigned after gathering responses to questionnaires administered to postmasters in affected areas in the aftermath of the earthquake.

Modified Mercalli Intensity Scale with Corresponding Richter Scale

Intensity	Verbal Description	Witness Observations	Maximum Acceleration (cm/sec^2)	Corresponding Richter Scale
I	Instrumental	Detectable on seismographs	<1	<3.5
II	Feeble	Felt by some people	<2.5	3.5
III	Slight	Felt by people resting	<5	4.2
IV	Moderate	Felt by people walking	<10	4.5
V	Slightly Strong	Sleepers awake; church bells ring	<25	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	<50	5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls	<100	6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures; poorly constructed buildings damaged	<250	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<500	6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<750	7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables destroyed; general triggering of other hazards	<980	8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>980	>8.1

FACTS

- A typical earthquake lasts under 60 seconds.
- Alaska has the most earthquakes of any states in the US
- The deadliest earthquake happened in Central China, killing over 800,000 in 1556. People during that time and region lived in caves and died from the caves collapsing
- Florida and North Dakota have the smallest number of earthquakes in the United States.
- The largest earthquake ever recorded occurred in Chile in 1960: it had a magnitude of 9.5
- There are about 500,000 earthquakes a year around the world, as detected by sensitive instruments. About 100,000 of those can be felt, and 100 or so cause damage each year. Each year the southern California area alone experiences about 10,000 earthquakes, most of them not felt by people.
- There is no such thing as "earthquake weather". Statistically, there is an equal distribution of earthquakes in cold weather, hot weather, rainy weather, etc.
- Most earthquakes occur at depths of less than 50 miles from the Earth's surface.
- RealFoot Lake, in Fulton County Kentucky was created by the December 1811 New Madrid earthquake.

IMPACTS

Ground shaking from earthquakes can collapse buildings and bridges, disrupt gas, electric, and phone service among other disruptions, and sometimes trigger landslides, avalanches, dam failure, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, and trailers and homes not tied to foundations are at risk of being shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths, injuries, and extensive property damage.

Between 2000 and 2008, an average of 28,600 people worldwide died annually due to earthquakes and other natural disasters triggered by an earthquake’s occurrence. Small tremors that occur after the initial earthquake has dissipated often make it difficult for those participating in rescue and rebuilding efforts to aid the populations most affected. These delays cause further loss of life and prolong the displacement of families and individuals. The January 1994 earthquake in Northridge, California, for example, killed 33, injured 9,000, and displaced over 20,000 people.

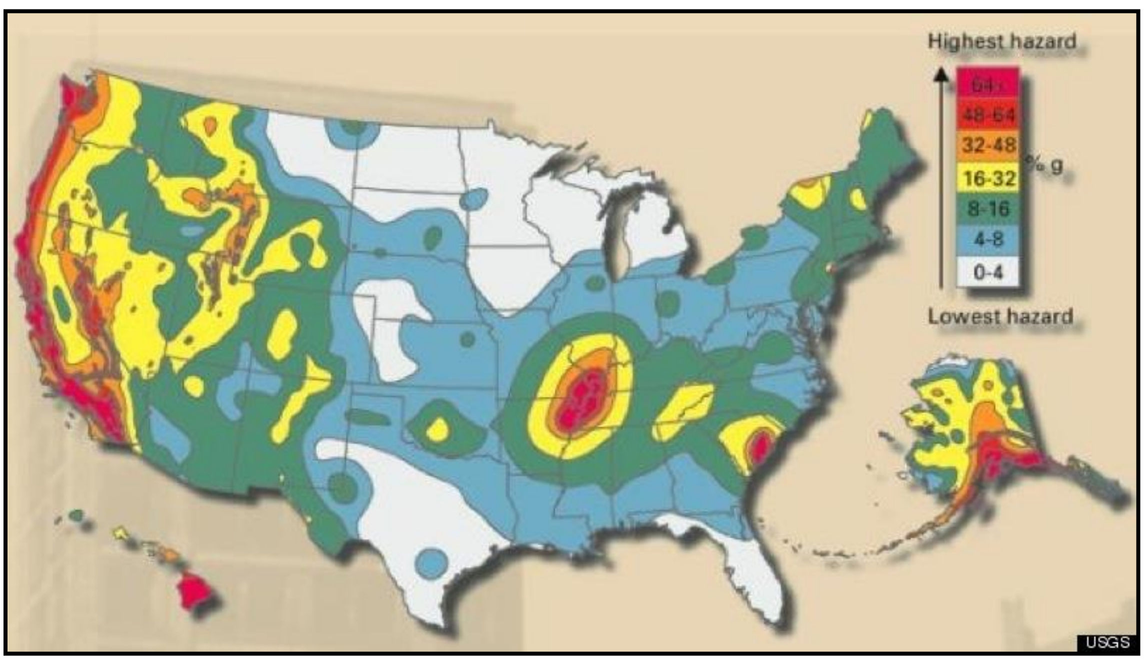
FEMA has estimated future losses due to earthquakes in the United States at $5.6 billion each year, with more earthquakes occurring on the West coast than the East coast, though the Central and Eastern portions of the country remain at a high risk of damage due to geologic factors, magnified by the lack of structures built to withstand such disasters. Thus, the USGS has named earthquakes the natural disaster most likely to cause catastrophic casualties, property damage, and economic disruption.

HAZARD PROFILE: EARTHQUAKE

PROFILE RISK TABLE

Hazard: Earthquake	
Period of occurrence:	Earthquakes can occur year-round, at any time of the day or the night
Number of officially recorded events: (1960-2015)	Multiple small earthquakes happen all the time
Annual Rate of Occurrence:	Currently, there are no probability ratios determined for earthquakes because of its unpredictable nature.
Warning time:	Warning time is essentially non-existent, as geologic activity at fault lines in the earth's crust happen sporadically
Potential impacts:	Earthquakes can heavily impact human life, health, and public safety. Large events can cause infrastructure damage, utility damage, and critical facilities damage. Secondary events often trigger landslides, dam failure/flooding, and may facilitate the release of hazardous materials from containment structures.
Recorded losses:	$0
Annualized Loss:	$0
Extent:	No Historic Data/ Richter Scale and Modified Mercalli Scale

GEOGRAPHIC LOCATIONS AFFECTED

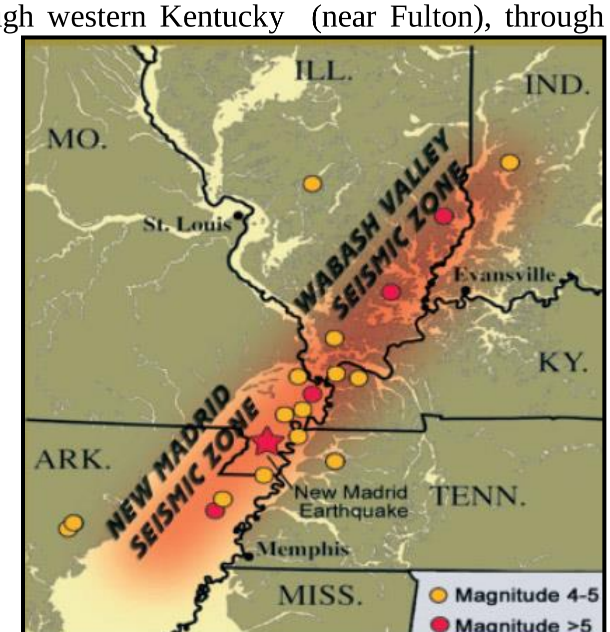


The following table from FEMA shows earthquake risk by State. Forty of the fifty states, or 80%, are represented. Nine states, 18%, are at very high risk while ten states, 20%, including Kentucky are at high risk.

EARTHQUAKE RISK BY STATE		
Moderate Risk	**High Risk**	**Very High Risk**
• Alabama	• Arizona	• Alaska
• Colorado	• Arkansas	• California
• Connecticut	• Illinois	• Hawaii
• Delaware	• Indiana	• Idaho
• Georgia	• **KENTUCKY**	• Montana
• Maine	• Missouri	• Nevada
• Maryland	• New Mexico	• Oregon
• Massachusetts	• South Carolina	• Washington
• Mississippi	• Tennessee	• Wyoming
• New Hampshire	• Utah	
• New Jersey		
• New York		
• North Carolina		
• Ohio		
• Oklahoma		
• Pennsylvania		
• Rhode Island		
• Texas		
• Vermont		
• Virginia		
• West Virginia		

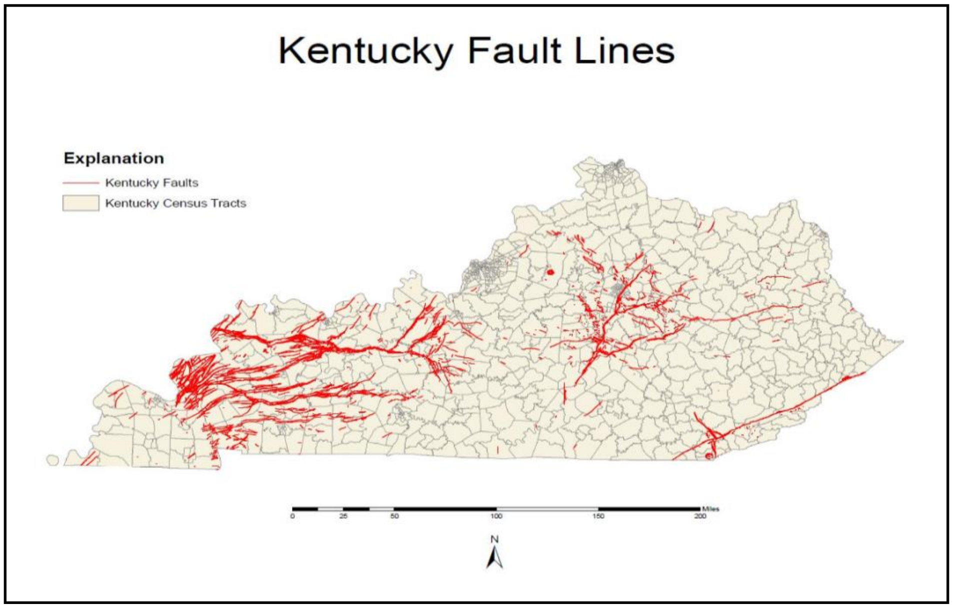
Kentucky has a variety of fault systems across the State. The two that affect Kentucky the most are in adjacent states: the New Madrid in Missouri and the Wabash in Indiana.

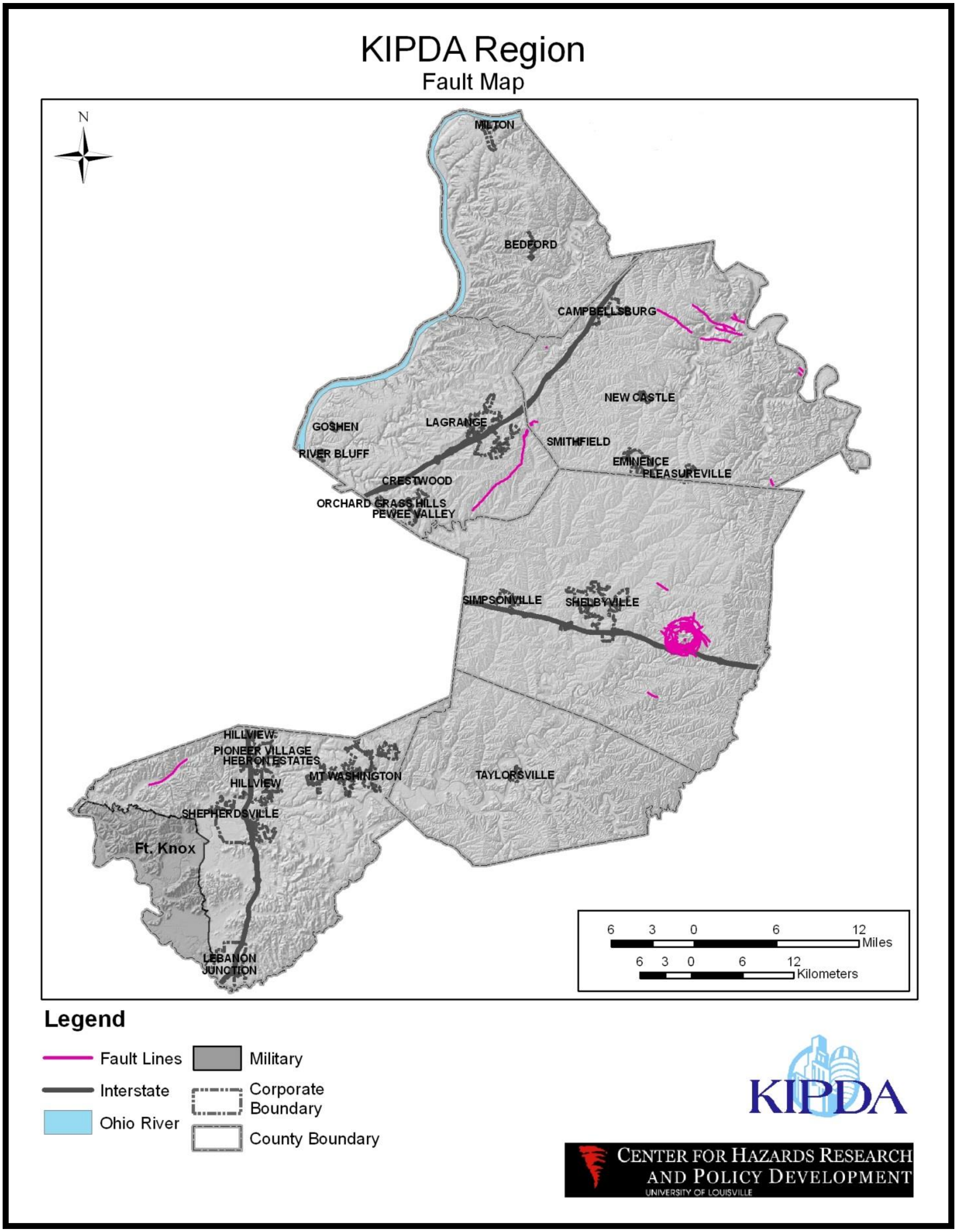
The New Madrid Seismic Zone (NMSZ), located in the central Mississippi Valley, is generally demarked on the north by the confluence of the Ohio and Mississippi Rivers. From this point in southern Illinois, the zone runs southwest, through western Kentucky (near Fulton), through eastern Missouri and western Tennessee and terminates in northeastern Arkansas, crossing the Mississippi River three (3) times.



The Wabash Valley Seismic Zone which threatens southern Illinois, Indiana, and Kentucky, shows evidence of large earthquakes in its geologic history. Since 1895, The Wabash Valley Fault Zone has experienced more moderate quakes than the New Madrid Seismic Zone. Some prehistoric quakes which occurred in this zone between 4,000 and 10,000 years ago may have been larger than M6.0. Earthquake ground shaking is amplified by lowland soils, and modern earthquakes of M5.5 to 6.0 in the Wabash Valley Fault Zone could cause substantial damage if they occur close to the populated river towns and cities along the Wabash River and tributaries.

In addition to the New Madrid and Wabash Valley Seismic Zones, fault lines throughout the state provide additional risk. The following maps show the fault lines throughout the state and a then specifically those located within the KIPDA Region.





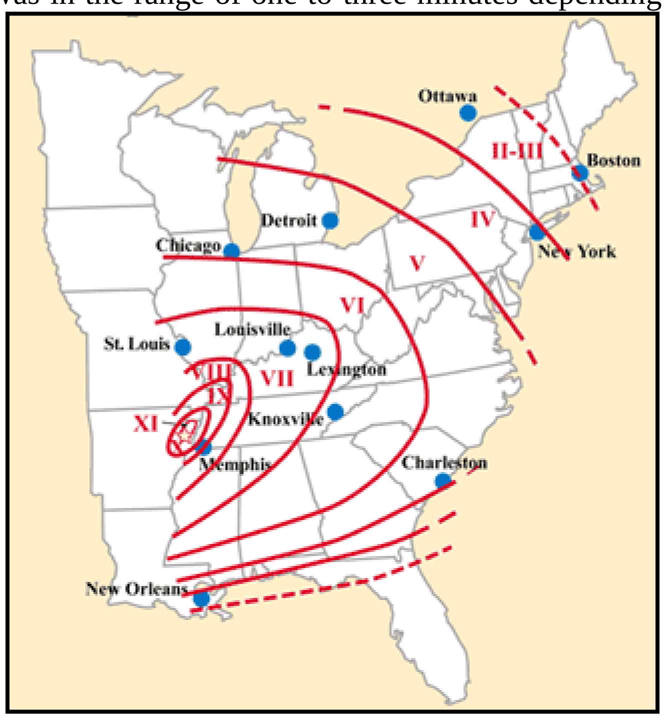
KIPDA Region
Fault Map
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Fault Lines
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT
UNIVERSITY OF LOUISVILLE

PREVIOUS OCCURENCES

In this section, significant earthquakes that affected the KIPDA region are profiled. Maps are provided showing the impact of these earthquakes. The Modified Mercalli Intensity Scale can be referenced to see how the earthquake impacted the KIPDA region and the possible effects on the public, property, and infrastructure.

Intensity	Description	Effects
IV	Moderate	Felt by people walking
V	Slightly Strong	Sleepers awake; church bells ring
VI	Strong	Trees sway; suspended objects sing; objects fall of shelves
VII	Very Strong	Mild alarm; walls crack; plaster falls

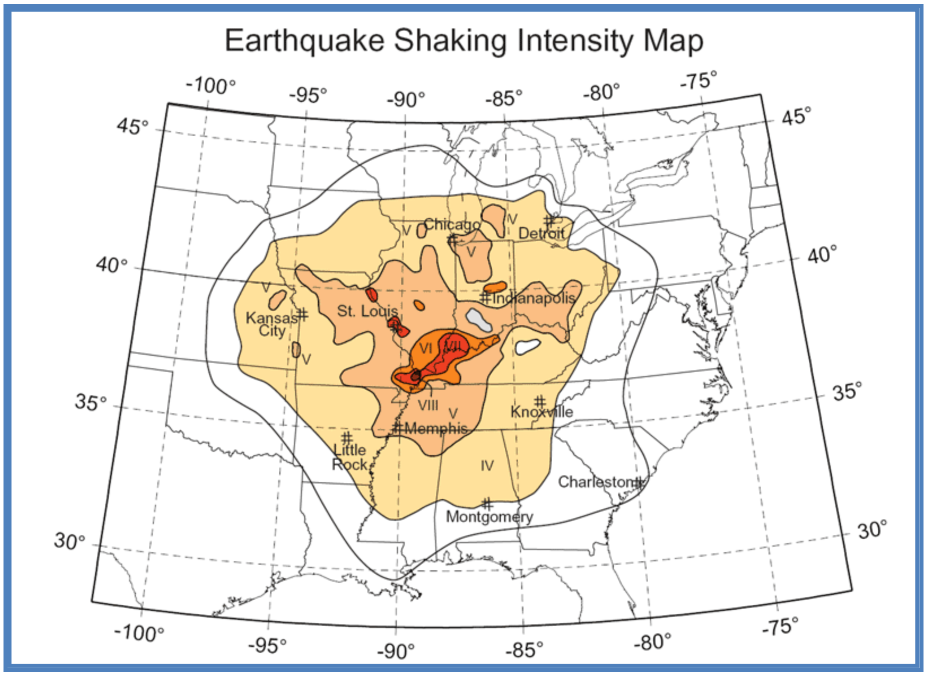
December 16, 1811 – The first of a series of earthquakes along the New Madrid seismic zone. These were some of the largest in the United States since European settlement and the largest east of the Rocky Mountains. The December 16,1811 earthquake was a 7.7 magnitude on the Richter Scale. This powerful earthquake was felt widely over the entire eastern United States. People were awakened by the shaking in New York City, Washington, D.C., and Charleston, South Carolina. Perceptible ground shaking was in the range of one to three minutes depending upon the observers' location. The ground motions were described as most alarming and frightening in places like Nashville, Tennessee, and Louisville, Kentucky. Reports also describe houses and other structures being severely shaken with many chimneys knocked down. In the epicentral area the ground surface was described as in great convulsion with sand and water ejected tens of feet into the air (liquefaction). Shortly after the initial earthquake, an aftershock of 7.0 was also felt on December 16.



What is known as the second earthquake in the series occurred on January 23, 1812 registering 7.5 and the third occurred on February 7, 1812 registering a 7.7. It is difficult to assign intensities to the principal shocks that occurred after 1811 because many of the published accounts describe the cumulative effects of all the earthquakes and because the Ohio River was iced over, so there was little river traffic and fewer human observers.

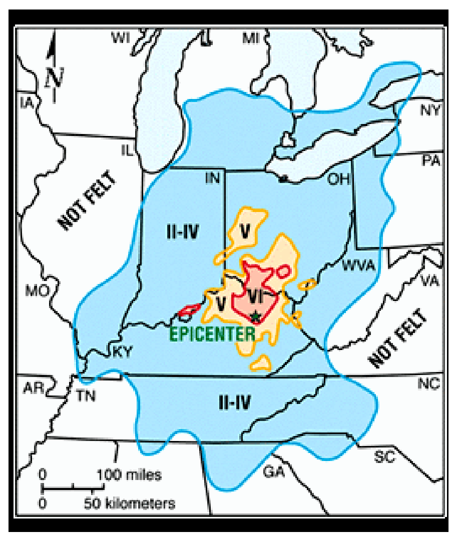
The inset map above shows the Modified Mercalli intensity for the first event of the 1811-1812 New Madrid earthquakes. The entire KIPDA Region experienced the Modified Mercalli intensity of VII. This is a very strong earthquake where walls will crack and plaster fall.

October 31, 1895 - The quake, centered in Charleston Missouri, had an estimated magnitude of 6.8 on the Richter scale. It was felt as far away as Pittsburgh, New Orleans and Topeka. Although this quake was widely felt throughout the midcontinent, it caused serious damage only in the epicentral area. No substantial buildings collapsed, no one was killed, and there were few injuries.



While a Modified Mercalli Intensity Scales of VI and V extended into small portions of the KIPDA region, primarily the region fell in category IV, or moderate, indicating it would cause only limited damage if any.

July 27, 1980 –The earthquake centered in Northeastern Kentucky near the community of Sharpsburg. The earthquake, with a Richter magnitude of 5.1, was the strongest in the history of Kentucky and was felt over all or parts of 15 States and in Ontario, Canada. Damage occurred in Indiana, Kentucky, and Ohio. In the earthquakes wake, At least 30 aftershocks were recorded; one on July 31 had a magnitude of 2.5. Maysville, Kentucky, located about 30 miles northeast of the epicenter, was particularly hard hit. Media reports issued a week after the tremor indicated damages of more than $1 million in Maysville; 59 homes and 27 businesses sustained major damage and 210 homes and 10 businesses sustained minor damage.

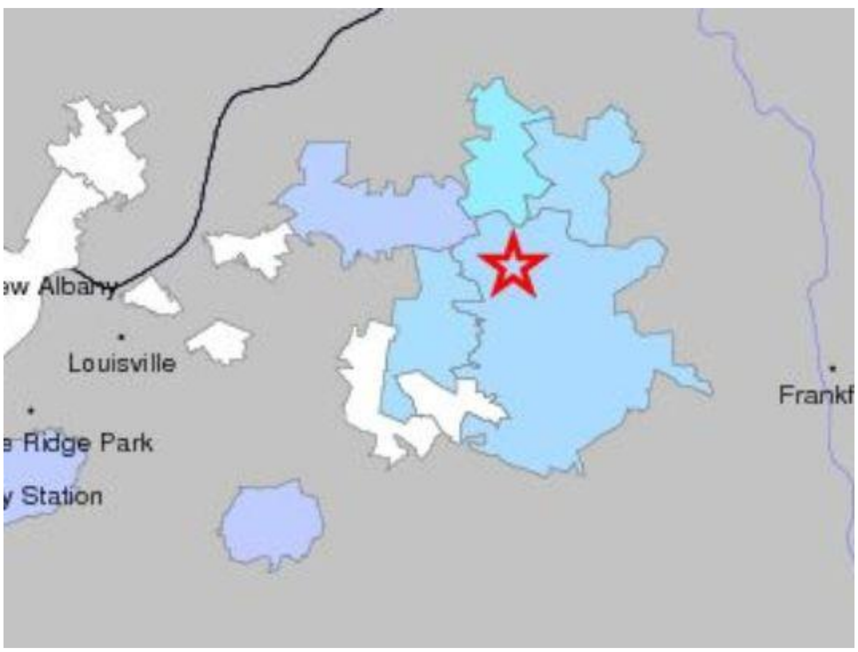


The Modified Mercalli Intensity Scale of V was felt in the KIPDA Region. It would have been felt as a slightly strong earthquake with the ability to wake people up from their sleep and cause church bells to ring.

October 5, 2015- It should be noted, though while no damage has occurred, the KIPDA Region does remain vulnerable to earthquakes within the area. On October 5, 2015, Shelby County experienced a minor earthquake with minimal damage. While no damage, was reported, the incident does indicate that future events can and will occur in the KIPDA Region.

According to the Courier Journal, October 6, 2015:

> A 2.7 magnitude earthquake struck about 4 miles northwest of Shelbyville Monday at 10:52 p.m., according to the U.S. Geologic Survey.
>
> There have been no reports of damage, according to the USGS website, but the quake was felt as far west as Southwest Louisville and New Albany, Ind.
>
> As of 8 a.m., about 30 people reported to the USGS that they had felt light shaking associated with the quake. The majority of those reports came from the immediate Shelbyville area.
>
> The USGS asks that anyone who felt the quake please report it on their website here, where you also can learn more about this earthquake.



ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF JURISDICTIONS AND STATE FACILITIES: EARTHQUAKE

HAZUS-MH MR4 was used for Earthquake to display vulnerabilities and loss estimations. HAZUS is a regional loss estimation tool that was developed by FEMA and the National Institute of Building Sciences. The primary purpose of the HAZUS software is to provide a methodology and software application to develop loss estimations at the regional (census tract) scale. KIPDA used HAZUS model to determine vulnerabilities and loss estimations for the Earthquake hazard. The results of the 100 Year Probability HAZUS Earthquake follows. KIPDA ran the report on August 10, 2015, incorporating FEMA data.

General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 6 counties from the following state:

Kentucky

**Note: Appendix A (In this section) contains a complete listing of the counties contained in the region.*

The geographical size of the region is 1,520.97 square miles and contains 52 census tracts. There are over 77 thousand households in the region which has a total population of 217,995 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 83 thousand buildings in the region with a total building replacement value (excluding contents) of 24,084 (millions of dollars). Approximately 92.00 % of the buildings (and 82.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 3,317 and 1,251 (millions of dollars), respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 83 thousand buildings in the region which have an aggregate total replacement value of 24,084 (millions of dollars).

**Note: Appendix B provides a general distribution of the building value by State and County.*

In terms of building construction types found in the region, wood frame construction makes up 76% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 163 beds. There are 80 schools, 29 fire stations, 14 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 43 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 4,568.00 (millions of dollars). This inventory includes over 532 kilometers of highways, 171 bridges, and 17,462 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	171	164.20
	Segments	134	2,966.70
	Tunnels	0	0.00
		Subtotal	**3,130.90**
Railways	Bridges	3	0.50
	Facilities	0	0.00
	Segments	45	174.40
	Tunnels	0	0.00
		Subtotal	**175.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	6	12.00
		Subtotal	**12.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**3,317.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	174.60
	Facilities	3	97.90
	Pipelines	0	0.00
		Subtotal	**272.50**
Waste Water	Distribution Lines	NA	104.80
	Facilities	16	1,044.30
	Pipelines	0	0.00
		Subtotal	**1,149.10**
Natural Gas	Distribution Lines	NA	69.90
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**69.90**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	1	107.80
		Subtotal	**107.80**
Communication	Facilities	12	1.20
		Subtotal	**1.20**
		Total	**1,600.40**

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	KIPDA Earthquake
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	Annualized
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	NA
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

HAZUS estimates that 0 buildings will be at least moderately damaged. This is over 0.00% of the total number of buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 3 below summaries the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Total										

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Total										

Essential Facility Damage

Before the earthquake, the region had 163 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	0	0	0
Schools	80	0	0	0
EOCs	0	0	0	0
PoliceStations	14	0	0	0
FireStations	29	0	0	0

Transportation and utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	134	0	0	0	0
	Bridges	171	0	0	0	0
	Tunnels	0	0	0	0	0
Railways	Segments	45	0	0	0	0
	Bridges	3	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	6	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

**Note: Roadway segments, railroad tracks, and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.*

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	3	0	0	0	0
Waste Water	16	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	0	0	0	0
Communication	12	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	8,731	0	0
Waste Water	5,239	0	0
Natural Gas	3,493	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	77,973	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi (0.00% of the region's total area). The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to hand the debris.

The model estimates that a total of 0.000 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 0.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@ 25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 217,995) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows:

- Severity Level 1: Injuries require medical attention but hospitalization is not needed
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated
- Severity Level 4: Victims are killed by the earthquake

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	0	0	0	0
2 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	0	0	0	0
5 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	0	0	0	0

Economic Loss

The total economic loss estimated for the earthquake is 0.45 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 0.45 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 59 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	0.02	0.00	0.00	0.02
	Capital-Related	0.00	0.00	0.01	0.00	0.00	0.01
	Rental	0.00	0.00	0.01	0.00	0.00	0.02
	Relocation	0.02	0.00	0.01	0.00	0.00	0.04
	Subtotal	**0.02**	**0.01**	**0.05**	**0.00**	**0.01**	**0.09**
Capital Stock Losses							
	Structural	0.04	0.01	0.02	0.01	0.01	0.09
	Non_Structural	0.13	0.02	0.04	0.01	0.01	0.21
	Content	0.03	0.00	0.01	0.01	0.00	0.06
	Inventory	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.20**	**0.03**	**0.07**	**0.03**	**0.02**	**0.36**
	Total	**0.22**	**0.04**	**0.13**	**0.03**	**0.03**	**0.45**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2,966.68	$0.00	0.00
	Bridges	164.18	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Subtotal	3130.90	0.00	
Railways	Segments	174.42	$0.00	0.00
	Bridges	0.55	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	175.00	0.00	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	0.00	0.00	
Bus	Facilities	0.00	$0.00	0.00
	Subtotal	0.00	0.00	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	11.98	$0.00	0.00
	Subtotal	12.00	0.00	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	0.00	0.00	
	Total	3317.80	0.00	

Table 13: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	97.90	$0.00	0.00
	Distribution Lines	174.60	$0.00	0.00
	Subtotal	**272.53**	**$0.00**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	1,044.30	$0.00	0.00
	Distribution Lines	104.80	$0.00	0.00
	Subtotal	**1,149.06**	**$0.00**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	69.90	$0.00	0.00
	Subtotal	**69.85**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	107.80	$0.00	0.00
	Subtotal	**107.80**	**$0.00**	
Communication	Facilities	1.20	$0.00	0.00
	Subtotal	**1.18**	**$0.00**	
	Total	**1,600.42**	**$0.00**	

Table 14. Indirect Economic Impact with outside aid
(Employment as # of people and Income in millions of $)

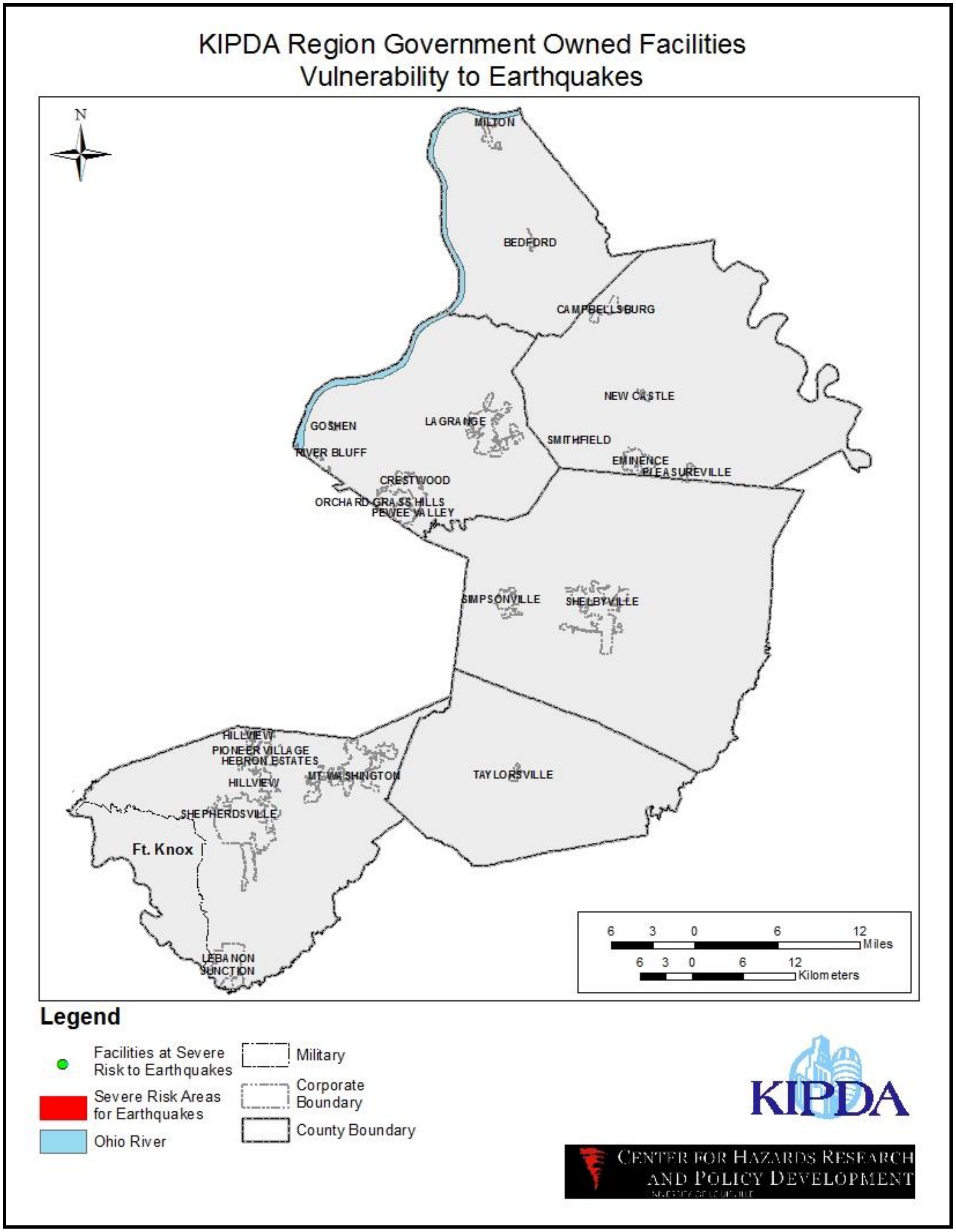
LOSS		Total	%

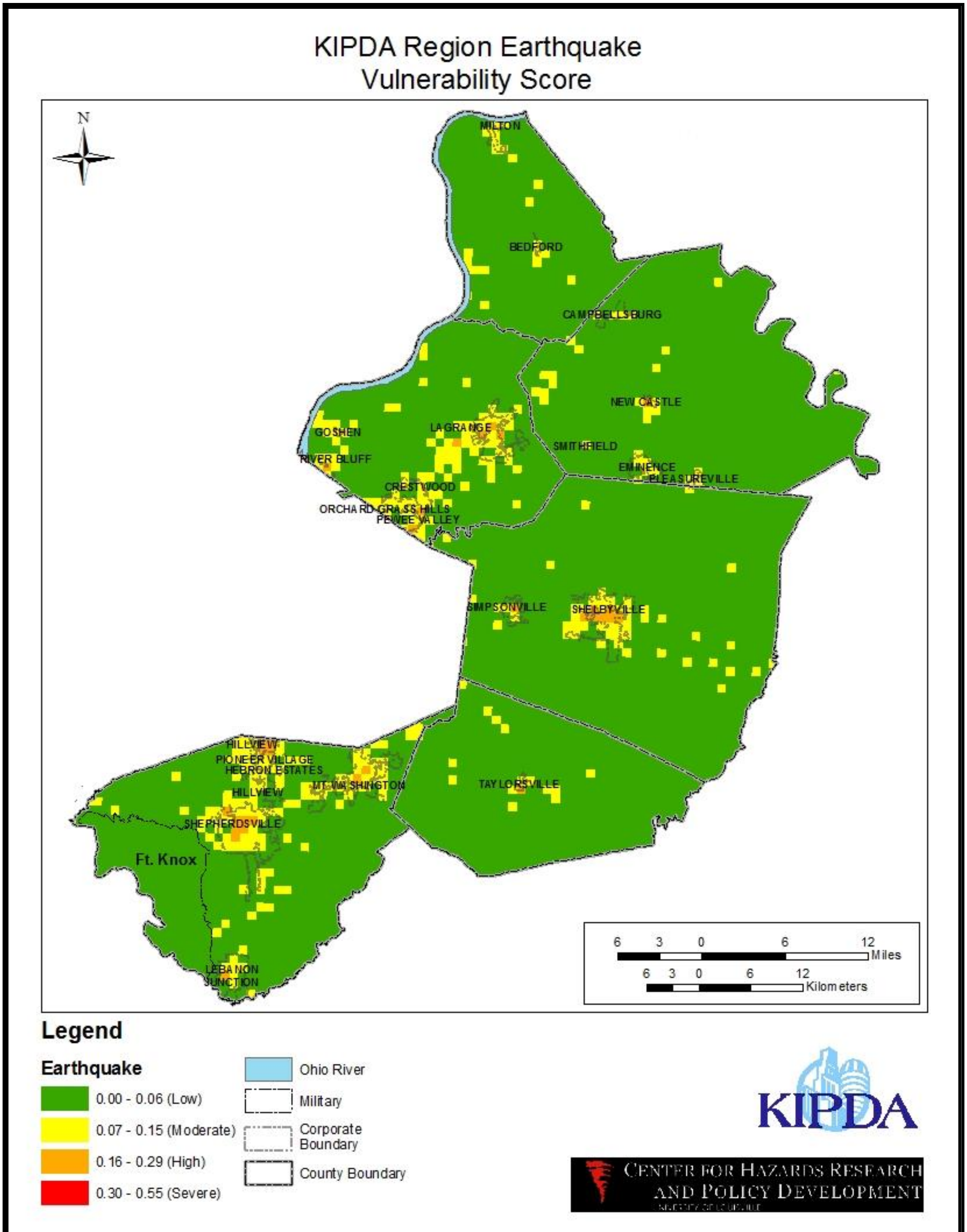
Appendix A: County Listing for the Region

Bullitt, KY
Henry, KY
Oldham, KY
Shelby, KY
Spencer, KY
Trimble, KY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Kentucky					
	Bullitt	74,319	6,034	1,218	7,252
	Henry	15,416	1,118	305	1,424
	Oldham	60,316	6,790	1,360	8,151
	Shelby	42,074	3,767	1,127	4,894
	Spencer	17,061	1,454	185	1,639
	Trimble	8,809	588	131	720
Total State		217,995	19,751	4,326	24,080
Total Region		217,995	19,751	4,326	24,080


KIPDA Region Government Owned Facilities
Vulnerability to Earthquakes
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
TAYLORSVILLE
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Earthquakes
Severe Risk Areas for Earthquakes
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT


KIPDA Region Earthquake
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT. WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Earthquake
0.00 - 0.06 (Low)
0.07 - 0.15 (Moderate)
0.16 - 0.29 (High)
0.30 - 0.55 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

EXTREME TEMPATURE

HAZARD IDENTIFICATION: EXTREME TEMPATURE

DESCRIPTION

EXTREME HEAT

Conditions of extreme heat are defined as temperatures that are substantially hotter and/or more humid than average for a location during a particular (usually summer) time of year. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground.

Wildfires/Forest Fires and droughts are aggravated and sometimes caused by periods of extreme heat. As drought and wildfires/forest fires have their own profiles, heat-related illness is the main focus of this hazard identification.

Heat-related illness most often occurs when the body's temperature control system is overloaded. The body normally cools itself by sweating, but sometimes lacks the capacity to keep the body cooled to a safe temperature. When the natural cooling process fails, a person's body temperature rises rapidly. Very high body temperatures may damage the brain or other vital organs. Several factors affect the body's ability to cool itself during extremely hot weather. When humidity is high, sweat will not evaporate as quickly, preventing the body from releasing heat quickly. This is a major concern in the KIPDA Region as significant humidity levels are common year round.

IMPACTS

(Listed in order of greatest to least severity)

• Heat Stroke: Heat stroke occurs when the body is unable to regulate its temperature. The body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided.

• Heat Exhaustion: Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. It is the body's response to an excessive loss of the water and salt contained in sweat. Those most prone to heat exhaustion are elderly people, people with high blood pressure, and people working or exercising in a hot environment.

• Heat Cramps: Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture. The low salt level in the muscles may be the cause of heat cramps. Heat cramps may also be a symptom of heat exhaustion.

• Sunburn: Sunburn should be avoided because it damages the skin. Although the discomfort is usually minor and healing often occurs in about a week, more severe sunburns may require medical attention.

• Heat Rash: Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. It can occur at any age but is most common in young children.

FACTS

• Heat is the number one weather-related killer in the United States and claims more lives each than floods, lightning, tornadoes, and hurricanes combined.

• In a normal year, hundreds of Americans die from extreme heat. Young children, elderly people, and those who are sick or overweight are more likely to become victims.

• Sunburn can significantly slow the skin's ability to release excess heat.

• Because men sweat more than women, men are more susceptible to heat illness because they become dehydrated more quickly.

• Between 1936 and 1975, nearly 20,000 people died as a result of heat and solar radiation.

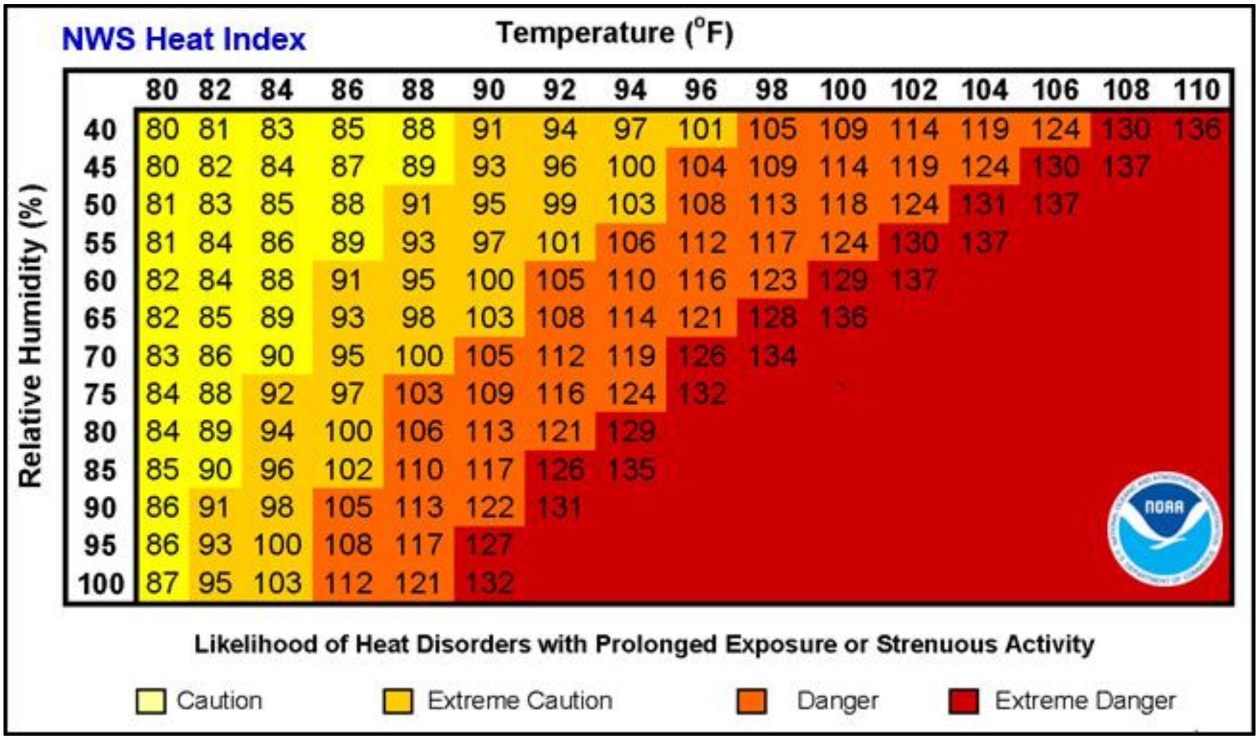
• In the disastrous heat wave of 1980, more than 1,250 people died nationwide.

• In the heat wave of 1995, more than 700 people died in the Chicago area.

• The record heat wave in August 2003 claimed an estimated 50,000 lives in Europe.

• From 1999 to 2010, a total of 7,415 deaths in the United States, an average of 618 per year, were associated with exposure to excessive heat.

The following graphic depicts the National Weather Services' "Heat Index". The Heat Index is the temperature the body feels when heat and humidity are combined. Although extreme heat can be either extremely humid or extremely dry, there are several types of heat-related illness that result due to exposure to this hazard. Potential impacts are also assumed to only involve the human factor (an individual's health) as additional information on drought and wildfires/forest fires are found in their respective identification sections.



NWS Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution · Extreme Caution · Danger · Extreme Danger

EXTREME COLD

What constitutes extreme cold and its effect varies across different areas of the United States. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." In the north, below zero temperatures may be considered as "extreme cold." Extreme cold often accompanies a winter storm or is left in its wake.

Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your body more rapidly. This weather related conditions may lead to serious health problems. Extreme cold is a dangerous situation that can bring on health emergencies in susceptible people, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat.

Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible.

Freezing temperatures can also cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat. Long cold spells can cause rivers to freeze, disrupting shipping. Ice jams may form and lead to flooding.

IMPACTS

• *Frostbite:* Frostbite is an injury to the body that is caused by freezing. Frostbite causes a loss of feeling and color in affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage the body, and severe cases can lead to amputation. The risk of frostbite is increased in people with reduced blood circulation and among people who are not dressed properly for extremely cold temperatures.

• *Hypothermia:* When exposed to cold temperatures, your body begins to lose heat faster than it can be produced. Prolonged exposure to cold will eventually use up your body’s stored energy. The result is hypothermia, or abnormally low body temperature. Body temperature that is too low affects the brain, making the victim unable to think clearly or move well. This makes hypothermia particularly dangerous because a person may not know it is happening and won’t be able to do anything about it. Hypothermia is most likely at very cold temperatures, but it can occur even at cool temperatures (above 40°F) if a person becomes chilled from rain, sweat, or submersion in cold water.

FACTS

• The National Weather Service refers to winter storms as the “Deceptive Killers” because most deaths are indirectly related to the storm. Instead, people die in traffic accidents on icy roads and of hypothermia from prolonged exposure to cold.

• Infants lose body heat more easily than adults and unlike adults; infants can’t make enough body heat by shivering.

• Older adults often make less body heat because of a slower metabolism and less physical activity.

During 1979-2002, a total of 16,555 deaths in the United States, an average of 689 per year, were attributed to exposure to excessive natural cold (hypothermia). During the winter, a breeze can make a cold day feel more uncomfortable. That's because wind drives heat away from exposed skin faster than calm air. High winds combined with very low temperatures create dangerously cold conditions. To help people understand the risk, NOAA's National Weather Service provides wind chill temperatures in reports of current conditions and in forecasts. While dangerous wind chills occur regularly in the northern plains, they can also affect almost any region in the United States. As temperatures drop below freezing, exposed skin is at risk of frostbite and you become more susceptible to hypothermia. The lower the wind chill temperature, the faster frostbite or hypothermia can occur.

NOAA's National Weather Service wind chill chart shows the increasing dangers as temperature drops and wind speed increases. In cold winter months, National Weather Service weather forecast offices routinely issue two types of alerts to warn people about dangerously low wind chill temperatures.

• A *Wind Chill Advisory* is issued when wind chill temperatures are potentially hazardous.
• A *Wind Chill Warning* is issued when wind chill temperatures are life threatening.

However, temperature criteria for an advisory or warning can vary from state to state to reflect regional climate differences.

NWS Windchill Chart

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill } (^\circ F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

HAZARD PROFILE: EXTREME TEMPERATURE

PROFLIE RISK TABLE

Hazard: Extreme Temperature	
Period of occurrence:	Extreme heat is most likely to occur in the months of July, August, or September. Extreme heat has been known to occur in May, June, and October. The likelihood of extreme heat occurring outside of these months is extremely small and unheard of December through March. Extreme cold is most likely to occur in the months of December, January or February.
Number of officially recorded events: SHELDUS and NOAA (1960-2015)	55
Annual Rate of Occurrence:	0.11
Warning time:	The National Weather Service will initiate alert procedures when the Heat Index is expected to exceed 105°- 110°F (depending on local climate) for at least two consecutive days. Currently, there are no officially warnings for extreme cold. This was tested in 2012 but later dropped.
Potential impacts:	Extreme heat, impacts human life, health, and public safety. Fires due to extremely dry conditions are possible. Can lead to economic losses such as decreased land values and agribusiness losses. Extreme cold, impacts human life, health, and public safety. Rivers and lakes freeze causing transportation issues. Energy consumption goes up and depending on the time of year extreme cold can have large impacts on agriculture. Cold temperatures can also cause ruptured pipes and stressed on engines and motors.
Recorded losses:	$59,422
Annualized Loss:	$1,080
Extent:	Date: 2012 Temperature: 94 degrees NWS Heat Index and NWS Wind Chill Chart

BACKGROUND

EXTREME HEAT

Temperatures that hover 10 degrees or more above the average high temperature for the region are defined by NOAA as extreme heat. A temperature of 90°F is significant in that it ranks at the "caution" level of the NOAA's Apparent Temperature chart even if humidity is not a factor.

The 1952 heat wave lacked the intensity of other heat waves but it did have duration. According to the Kentucky Division of Forestry, numerous acres burned in 1952 due to the lack of precipitation.

1990 and 1991 saw consecutive heat waves in which 1991 caused a statewide drought. 1991 is the third warmest year on record and also contained the third warmest summer as well as the second warmest spring.

During the last two weeks of July 1999, the Midwest experienced a lengthy series of days with temperatures higher than 90 degrees F. While only a relatively small number of maximum temperature records were set, the combination of high heat, record dew points, strong solar inputs, and weak winds led to a dangerous situation for people. Before it was over, some 232 deaths were attributed to the heat in the 9-state area served by the MRCC; there were additional health, infrastructure, and economic impacts that were quite significant.

The major loss of life was in large cities where the urban heat island amplified temperatures by 3 to 5 degrees or more. The majority of those who died were elderly persons, living alone in the inner city regions, which either was without air conditioning or without the funds to pay for continuous operation of their air conditioning units. Most of the people, who died on the 29th and 30th, lived in large cities with aging and old infrastructure consisting of non-air-conditioned brick buildings.

In August 2007, nearly 30 temperature records were set in central Kentucky. The average temperature for August in Kentucky is around 77 degrees, give or take a few degrees per location. In 2007, the average was 85 degrees. August 2007 became the hottest month ever recorded at Louisville and Bowling Green, and the 3rd hottest on record at Lexington. A federal disaster designation by the U.S. Department of Agriculture was declared allowing farmers in the state's $4 billion-a-year industry to seek emergency assistance, including low-interest loans to help pay for essential farm and living expenses.

The summer of 2010 was one of the hottest on record across Kentucky. This is true with respect to both average temperature and minimum daily temperature. The summer was the 2nd warmest on record with maximum daily temperature (1952 had higher maximum temps).

According to NOAA, 2012 was the hottest year on record for the continental United States. Every year from 2010 to 2012 was in the top four (4) warmest summers recorded in Kentucky. 2010 had the most days over ninety degrees (85 days) and 2012 had 10 days over one hundred degrees.

Although these events cover a broad time span, it is still important to note what accompanies extreme heat. Kentucky is always at risk for extreme heat during peak occurrence months. Extreme heat not only causes droughts and crop damage, but also the loss of human life. Several accounts of heat-related deaths populate headlines throughout warmer months for Kentucky.

There was a case in Louisville, August 20, 2008, where a young man died due to heat-related complications resulting from football practice in 94 degree weather. As stated in the description section of the state plan, elderly people, young people, and persons who are of unhealthy weights are all at constant risk from the dangers of extreme heat.

EXTREME COLD

As many incidents of extremely cold temperatures in Kentucky have accompanied other severe winter weather events and those events are discussed in their respective sections throughout this document, this section will focus only on the temperature element, of which there is little information available to report.

Along with the record snowfall in January 1994, Kentucky also set low temperature records across the state. The heavy snow set the stage for incredibly low temperatures, as behind the storm an intensely cold air mass dumped south out of Canada, sending temperatures plunging well below zero by Wednesday, January 19th. Not only did Louisville record an all-time low of -22 degrees, but Shelbyville set a new record low temperature for the entire state of Kentucky with a reading of -37 degrees. Lexington came within one degree of its all-time record low.

The great ice storm of 1951 also was accompanied by extremely low temperatures. From January 29-February 2, an extremely strong high-pressure system started making its way into the region, pulling harsh, cold, polar air in with it. In the meantime, a strong low pressure system was moving through areas farther south along a cold front, stretching from the Gulf of Mexico and up into the Northeast. This was the perfect set up for the development and occurrence of freezing rain and sleet along with freezing temperatures.

Bowling Green recorded a temperature of -20 degrees, the coldest official temperature ever recorded in February up to that time. Water pipes burst under the extreme cold, transportation remained halted, temperatures remained unbearable, and ten days later the area had yet to recover from the ice and the snow.

In 2007, an example of an out of the ordinary extremely cold weather event and the potential devastation it can cause occurred throughout Kentucky. After an unusually warm streak the lasted ten days of March, with temperatures topping out in the 70s and 80s each day, a cold front made its way into the Ohio Valley Region on April 3. With the cold front came extensive severe weather, and afterwards replaced the once high temperatures with an immense area of cold Canadian air. Temperatures dipped into the 20s and 30s in the mornings between the 5th and the 10th throughout Kentucky. Bowling Green spent a total of 47 non-consecutive hours below freezing, with their lowest temperatures of 22 degrees Fahrenheit on the 8th of the month. Louisville and Lexington both recorded impressive lows as well, with Louisville reporting 25 degrees on the 7th and Lexington 22 degrees for both the 7th and 8th. Before the cold streak, the spring crops and plant growth were getting an early start with the excessive warmth for the time of season. However, as the cold air set in for the week, the below freezing temperatures took advantage of the blooming vegetation. Nearly all crops suffered losses, including most of the state's peaches. Half the wheat crop was destroyed, estimated at 63 million dollars' worth of losses. The same was true for the area's corn crop, which reported 5 million dollars in losses. 16 million was reported in damages for a 20 million dollar fruit industry, nearly crippling it.

The massive ice storm of 2009 that swept destruction throughout the state was also coupled with extremely cold weather. Most areas of the state saw temperatures fall to below freezing and wind chills below zero. This exacerbated the challenge of recovering from the storm by allowing the ice to linger even longer and making it even more difficult for work crews to clean up the debris and restore power to peoples' homes.

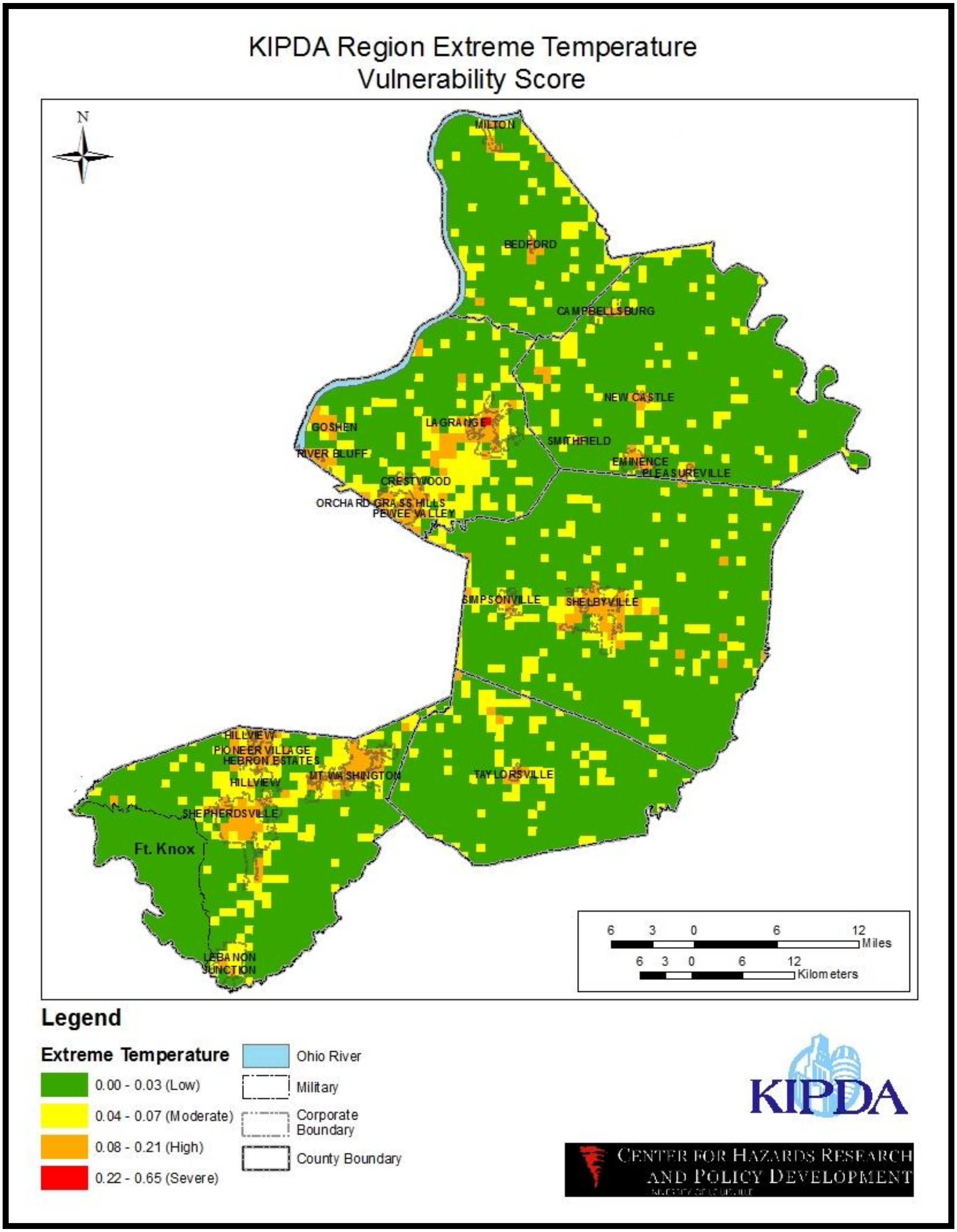
ASSESSING VULNERABILITY BY JURISDICTION: EXTREME TEMPERATURE

Extreme Temperature Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Extreme Temperature was determined through first calculating the Extreme Temperature Hazard Score. The Extreme Temperature Hazard Score was calculated by studying one (1) specific source of data. The data layer used to create the Extreme Temperature Hazard Score was data collected from the capturing county-level extreme temperature events. In order to use this data for the Extreme Temperature Hazard Score each county was assigned their maximum number of events and that data was aggregated to each grid within that county. SHELDUS and NOAA data were used for a range of 1960-2015 by using the best available data.

To analyze the KIPDA Region's risk to extreme temperature, the county extreme temperature layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the extreme temperature layer covered within each grid. This percentage of area affected by the extreme temperature layer was then calculated and scored 0-1 to develop the Extreme Temperature Hazard Score.

The Extreme Temperature Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Extreme Temperature Hazard Score and then scored 0-1. Once the final Extreme Temperature Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe), which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Extreme Temperature
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Extreme Temperature
0.00 - 0.03 (Low)
0.04 - 0.07 (Moderate)
0.08 - 0.21 (High)
0.22 - 0.65 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: EXTREME TEMPERATURE

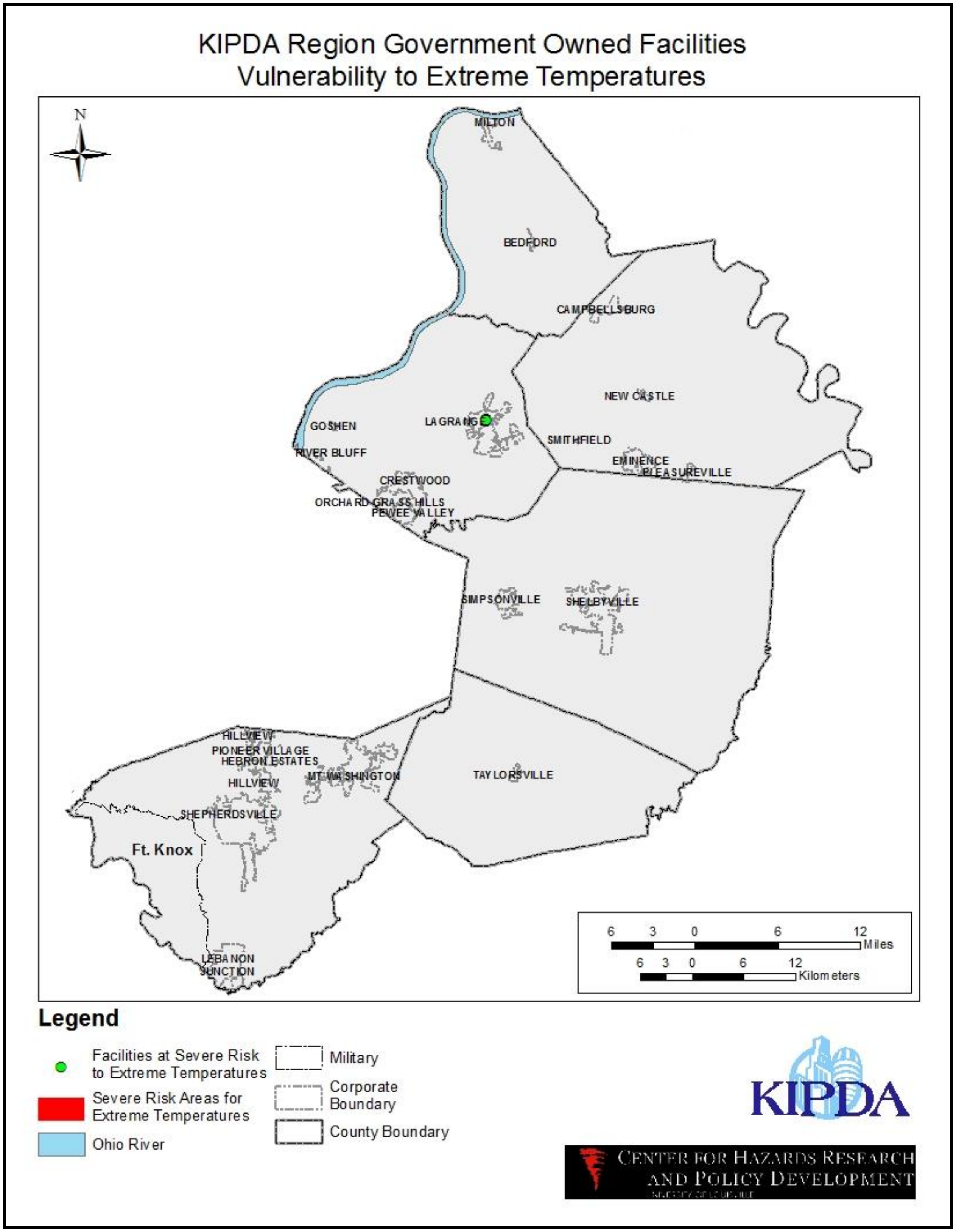
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Extreme Temperature. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Extreme Temperature.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Extreme Temperature	1	$9,904	0.02	$9,904	$180	55
Henry	Extreme Temperature	1	$9,904	0.02	$9,904	$180	55
Oldham	Extreme Temperature	1	$9,904	0.02	$9,904	$180	55
Shelby	Extreme Temperature	1	$9,904	0.02	$9,904	$180	55
Spencer	Extreme Temperature	1	$9,904	0.02	$9,904	$180	55
Trimble	Extreme Temperature	1	$9,904	0.02	$9,904	$180	55
Total		**6**	**$59,422**	**0.11**	**$59,422**	**$1,080**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: EXTREME TEMPERATURE

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Extreme Temperature boundary map was used as the hazard layer for Extreme Temperature Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Extreme Temperature boundary map. The government owned facilities captured within each Extreme Temperature hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during an Extreme Temperature event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Extreme Temperature hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	0	$0.00
Henry	0	$0.00
Oldham	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Extreme Temperatures
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Extreme Temperatures
Severe Risk Areas for Extreme Temperatures
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

FLOODING

HAZARD IDENTIFICATION: FLOODING

DESCRIPTION

As defined by USGS, flooding is *a relatively high stream flow that overflows the natural or artificial banks of a stream or that submerges land not normally below water level*, and, as a natural event, is caused in a variety of ways. Winter or spring rains, coupled with melting snows, can fill river basins too quickly. Torrential rains from decaying hurricanes or other tropical systems can also produce flooding. The excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto lowlands, adjacent to rivers, lakes, and oceans which are subject to recurring floods; most commonly referred to as floodplains. Currently, floodplains in the U.S. encompass over nine million households.

There are several factors that contribute to flooding with rainfall intensity and duration being key elements. Intensity refers to the rate of rainfall while duration is how long the rain event lasts. Topography, soil conditions, and ground cover also play important roles.

Factors determining the severity of floods include:

• Rainfall intensity and duration
  - A large amount of rain over a short time can result in flash flooding.
  - Small amounts may cause flooding where the soil is already saturated.
  - Small amounts may cause flooding if concentrated in an area of impermeable surfaces.
• Topography and ground cover
  - Water runoff is greater in areas with steep slopes and little vegetation.

Frequency of inundation depends on the climate, soil, and channel slope. In regions without extended periods of below-freezing temperatures, floods usually occur in the season of highest precipitation.

TYPES

There are a multitude of reasons that floods may occur, with each type of flooding having a variety of environmental effects post-flood, and are generally grouped into seven (7) types; regional, river or riverine, flash, ice-jam, storm surge, dam and levee failure, and debris, landslide, and mudflow flooding.

1. **Regional Flooding** can occur seasonally when winter or spring rains, coupled with melting snow, fill river basins with too much water too quickly. The ground may be frozen, reducing infiltration into the soil and thereby increasing runoff. Extended wet periods during any part of the year can create saturated soil conditions, after which any additional rain runs off into streams and rivers, until river capacities are exceeded. Regional floods are many times associated with slow-moving, low-pressure or frontal storm systems including decaying hurricanes or tropical storms.

2. **River or Riverine Flooding** is a high flow or overflow of water from a river or similar body of water, occurring over a period of time too long to be considered a flash flood.

3. **Flash Floods** are quick-rising floods that usually occur as the result of heavy rains over a short period of time, often only several hours or even less. Flash floods can occur within several seconds to several hours and with little warning. They can be deadly due to the rapid rises in water levels and devastating flow velocities produced.

4. **Ice-Jam Flooding** occurs on rivers that are totally or partially frozen. A rise in stream stage will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur. Backwater upstream from the ice dam can rise rapidly and overflow the channel banks. Flooding moves downstream when the ice dam fails, and the water stored behind the dam is released. At this time the flood takes on the characteristics of a flash flood, with the added danger of ice flows that, when driven by the energy of the flood-wave, can inflict serious damage on structures. An added danger of being caught in an ice-jam flood is hypothermia, which can quickly kill.

5. **Storm-surge flooding** is water which is pushed up onto otherwise dry land by onshore winds. Friction between the water and the moving air creates drag which, depending upon the distance of water (fetch) and the velocity of the wind, can pile water up to depths greater than 20 feet. Intense, low-pressure systems and hurricanes can create storm-surge flooding. The storm surge is unquestionably the most dangerous part of a hurricane as pounding waves create very hazardous flood currents.

6. **Dam-and Levee-Failure Flooding** are potentially the worst flood events. A dam failure is usually the result of neglect, poor design, or structural damage caused by a major event such as an earthquake. When a dam fails, an excess amount of water is suddenly released downstream, destroying anything in its path. Dams and levees are built for flood protection. They usually are engineered to withstand a flood with computed risk of occurrence. For example, a dam or levee may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If a larger flood occurs, then that structure will be overtopped. If during the overtopping the dam or levy fails or is washed out, the water behind it is released and becomes a flash flood. Failed dams or levees can create floods that are catastrophic to life and property because of the tremendous energy of the released water.

7. **Debris, Landslide, and Mudflow Flooding** is created by the accumulation of debris, mud, rocks, and logs in a channel, forming a temporary dam. Flooding occurs upstream as water becomes stored behind the temporary dam and then becomes a flash flood when the dam is breached and rapidly washes away. Landslides can create large waves on lakes or embankments and can be deadly. Mudflow floods can occur when volcanic activity rapidly melts mountain snow and glaciers, and the water mixed with mud and debris moves rapidly down slope.

FACTS

- Flooding causes approximately $6 billion in damage and 140 deaths annually.
- Hurricanes and storms are the principal causes of floods in the Eastern United States and Gulf Coast while snowmelts and rainstorms are the principal causes in the Western United States.
- 80% of flood deaths occur in vehicles, and most happen when drivers make a single, fatal mistake trying to navigate through flood waters.
- Flooding brought on by Hurricane Katrina in 2005 caused more than $200 billion in losses making it the costliest natural disaster in United States history.
- Flooding is the only natural hazard for which the Federal government provides insurance: National Flood Insurance Program (NFIP).
- Since 1978, the NFIP has paid over $36 billion for flood insurance claims and related costs (as of 3/22/10).
- You are eligible to purchase flood insurance as long as your community participates in the NFIP.
- In 2009, about 25% of all claims paid by the NFIP were for policies in moderate-to-low risk communities.

IMPACTS

Advanced warning systems have helped reduce the number of deaths annually due to flooding, but according to the USGS the annual number of deaths is over 200. While deaths have declined, the annual monetary costs of flooding have increased dramatically with urbanization and coastal development being driving factors. The annual loss caused by flooding is $6 billion according to the USGS. Damage to infrastructure also results in indirect losses due to disruption of economic activity. The Insurance Information Institute claims, "Flooding is the most common and costly natural disaster in the United States, causing an average of $50 billion in economic losses each year. Most U.S. natural disasters declared by the president involve flooding."

According to scientists at the National Center for Atmospheric Research, dramatic increases in annual U.S. flood damages from the 1940's to the 1990's were due more to social changes than increased precipitation. The scientists determined that population growth alone accounted for 43% of the rise in flood damages from 1932 to 1997. The annual loss caused by flooding is $6 billion according to the USGS. Damage to infrastructure also results in indirect losses due to disruption of economic activity. Additionally, they determined that the other increase was due to enlarged national wealth and more detailed reporting.

Even though most homeowners' insurance policies don't offer flood insurance, only 17% have a flood insurance policy despite Congress creating the National Flood Insurance Program in 1968. According to a 2007 Insurance Information Institute study:

- The average amount of flood coverage was $201,598.
- The average premium was $505.
- The average flood claim was $24,579.
- Flood loss payments totaled $523 million.

2014 CHANGES

According to Insurance Information Institute, Legislative changes in 2014 undid much of a 2012 attempt to put the NFIP on a sounder financial footing. Congress passed the Biggert-Waters Flood Insurance Reform Act of 2012 as part of a bill reauthorizing the NFIP. It attempted to make rates charged accurately reflect the true flood risk of each property, thus making the program actuarially sound.

The 2012 law put a 5 percent surcharge on all but the lowest-risk policies to create a reserve fund to cushion against future losses. But the most controversial measure intended to drastically reduce the discount received by insurers of older properties in high-risk areas, a discount generally called a subsidy.

Starting in October 2013, three formerly subsidized groups saw the phase-out begin:

- Businesses.
- Non-primary residences (typically vacation homes).
- Structures with severe repeated flood losses.

Rates for these groups were scheduled to increase 25 percent per year until actuarially sound rates were reached. Other subsidized policyholders would keep their subsidies until the property was sold, the policy lapsed, a new policy was purchased or the property suffered “severe, repeated flood losses where the owner refuses an offer to mitigate.”

The plan was unpopular, particularly in the Southeast, where many subsidized policies existed. Congress responded with the 2014 rollback.

The new law repealed and modified parts of Biggert-Waters, as well as making additional changes to the flood insurance program. Other parts of Biggert-Waters remained unchanged.

While flood insurance is not federally required for people in moderate-to-low risk areas, nearly 25 percent of all NFIP flood claims occur in these areas.

HAZARD PROFILE: FLOODING

PROFILE RISK TABLE

Hazard: Flooding	
Period of occurrence:	For river flooding - January through May For flash flooding - Anytime, but primarily during summer rains
Number of officially recorded events SHELUDS and NOAA: (1960-2015)	217
Annual Rate of Occurrence:	3.95
Warning time:	River flooding - 3-5 days Flash flooding - minutes to several hours Out-of-bank flooding - several hours/days
Potential impacts:	Impacts human life, health, and public safety. Utility damages and outages, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases. Can lead to economic losses such as unemployment, decreased land values, and agribusiness losses. Floodwaters are a public safety issue due to contaminants and pollutants.
Recorded losses:	$118,150,478
Annualized Loss:	$2,148,191
Extent:	Date: March 1997 Damage: $400 M Location: 100 counties/statewide Scale: 68 knots (kts.) Discharge/Stage/Flood Stage/Crest Damages: $168 M property, $69 M crop, 1 death, 46 injuries

Flooding, which is one of the most significant natural hazards in Kentucky and the KIPDA Region, occurs within the state every year, with several substantial floods occurring annually. Since 2010, seven (7) Presidential disaster declarations have been made for the KIPDA Region that was from flooding.

Kentucky's topography contains 13 major drainage basins to accommodate 40-50 inches of average rainfall (maximum during winter and spring, minimum during late summer and fall), The state contains 89,431 miles of rivers and streams, 637,000 acres of wetlands, 18 reservoirs over 1,000 acres in size, and 228,382 acres of publicly-owned lakes and reservoirs.

The following is a list of flood-related Presidential Declarations in the KIPDA Region from 1970 to the present. Because only major disasters are included, a number of isolated, smaller events are not listed.

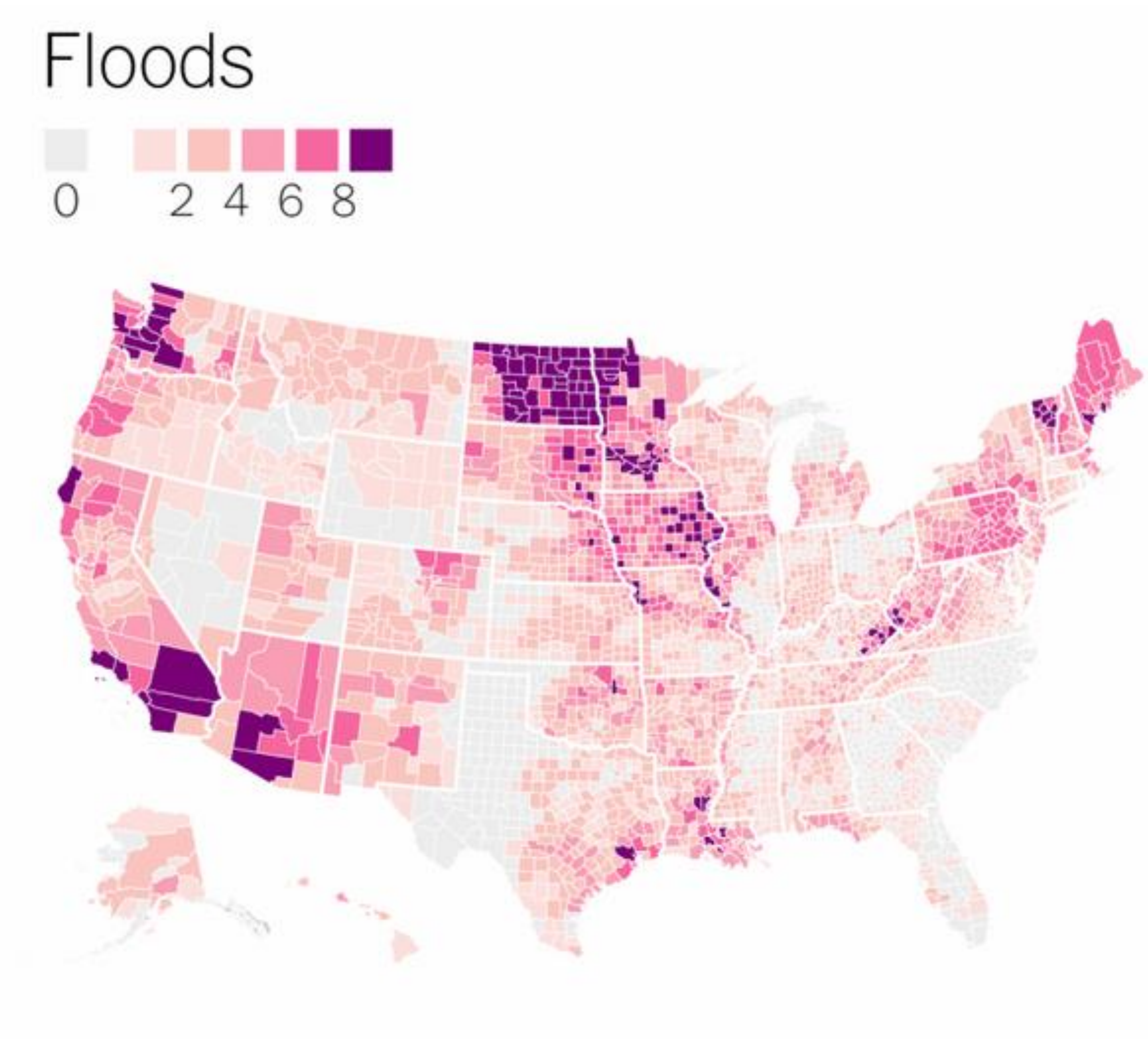
Disaster Declaration Number	Declaration Date	Incident Type	Counties Receiving Individual or Public Assistance
4239-DR	August 12, 2015	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Henry, Spencer, Trimble
4218-DR	May 12, 2015	Flooding	Bullitt, Spencer
4217-DR	May 1, 2015	Flooding	Bullitt, Spencer
4057-DR	March 6, 2012	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Trimble
1976-DR	May 4, 2011	Severe Storms, Tornadoes, and Flooding	Henry, Oldham, Spencer, Trimble
1925-DR	July 23, 2010	Severe Storms, Flooding, and Mudslides	Shelby
1912-DR	May 11, 2010	Severe Storms, Flooding, Mudslides, and Tornadoes	Henry, Trimble
1855-DR	August 14, 2009	Severe Storms, Straigh-line Winds, and Flooding	Trimble
1818-DR	February 5, 2009	Severe Winter Storm and Flooding	Henry, Trimble (Bullitt, Oldham Shelby, Spencer debris rmoval and emergency protective measures including direct Federal assistance under the Public Assistance program at 75% Federal Funding)
3302-EM	January 28, 2009	Severe Winter Storm and Flooding	Henry, Shelby, Spencer
1757-DR	May 19, 2008	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	Spencer
1746-DR	February 21, 2008	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Shelby, Spencer
1537-DR	August 6, 2004	Severe Storms and Flooding	Shelby, Spencer
1523-DR	June 10, 2004	Severe Storms, Tornadoes, Flooding, and Mudslides	Bullitt, Henry, Oldham, Shelby, Spencer, Trimble
1471-DR	June 3, 2003	Severe Storms, Flooding, mud and Rock Slides, and Tornadoes	Bullitt
1454-DR	March 14, 2003	Severe Winter Ice and Snow Storms, Heavy Rain, Flooding, Tornadoes, and Mud and Rock Slides	Shelby, Spencer
1320-DR	February 28, 2000	Severe Storms and Flooding	Oldham
1310-DR	January 10, 2000	Tornadoes, Severe Storms, Torrential Rains, and Flash Flooding	Spencer
1163-DR	March 4, 1997	Severe Storms and Flooding	Bullitt, Henry, Oldham, Shelby, Spencer, Trimble
893-DR	January 29, 1991	Severe Storms and Flooding	Trimble
821-DR	February 24, 1989	Severe Storms and Flooding	Bullitt, Henry, Trimble
568-DR	December 12, 1978	Severe Storms and Flooding	Bullitt, Henry, Oldham, Trimble
332-DR	May 15, 1972	Severe Storms and Flooding	Bullitt
288-DR	June 5, 1970	Severe Storms and Flooding	Bullitt

GEOGRAPHIC LOCATIONS AFFECTED

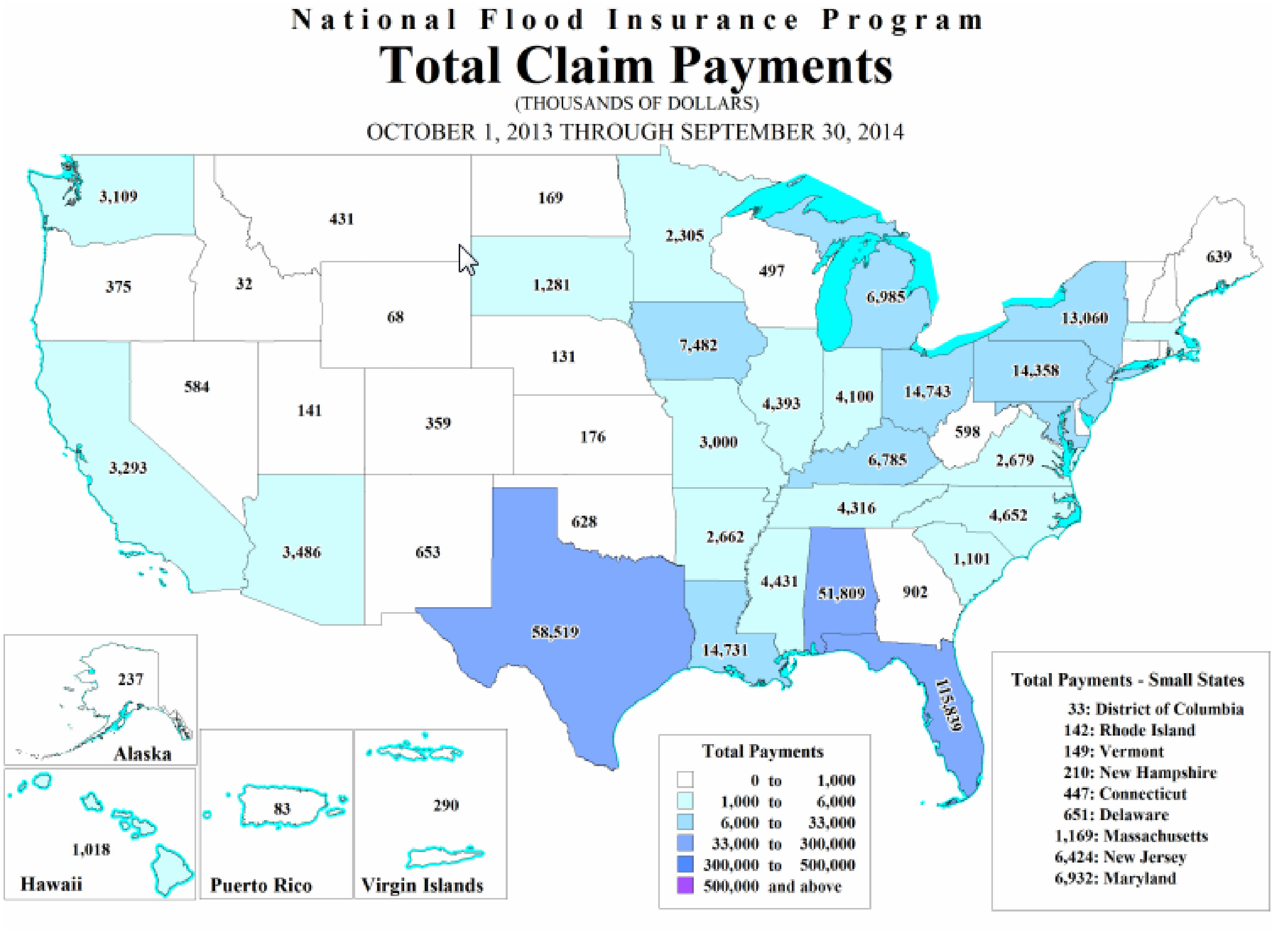
Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. As much as 90 percent of the damage related to all natural disasters (excluding droughts) is caused by floods and associated debris flows. Most communities in the United States can experience some kind of flooding.

The following map shows the number of Presidential Declarations between, 1964 and 2014 related to flooding in the United States shown by county: It shows that nearly every county in the United States has had at least one Presidential Declaration related to flooding in the time period, with more than 8 disasters in parts of Kentucky.

FLOODS – PRESIDENTIAL DECLERATIONS 1964-2014



The following table and map shows the National Flood Insurance Program claim payment and statistics between October 1, 2013 and September 30, 2014. Kentucky has almost $7,000,000 in payments from this 1 year cycle.



Source Report: W2RC1040

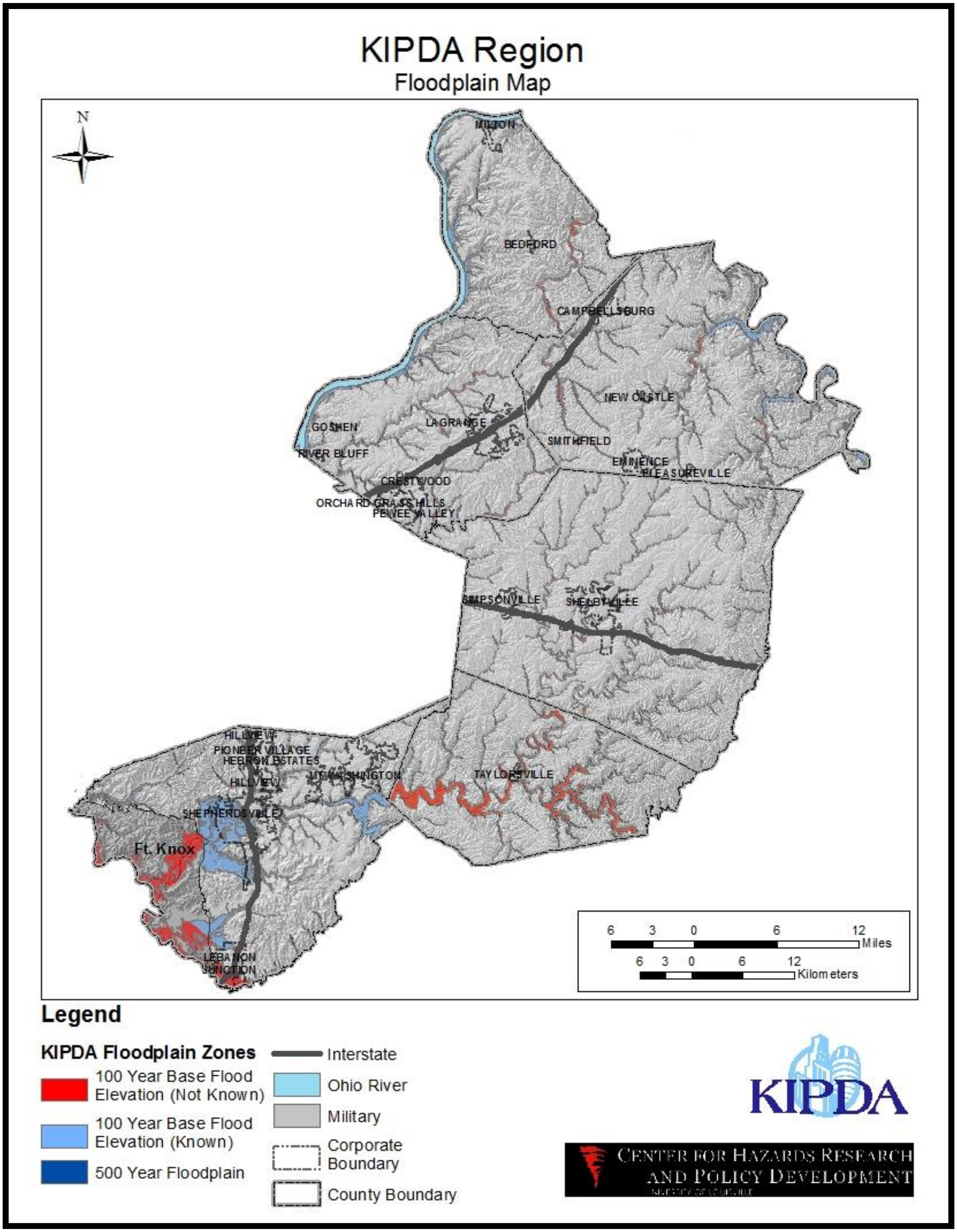
State Name	Total Claim Payments
Mississippi	$4,431,367.72
Missouri	$2,999,802.06
Montana	$430,802.12
Nebraska	$131,351.14
Nevada	$584,288.33
New Hampshire	$210,003.90
New Jersey	$6,424,146.96
New Mexico	$653,021.72
New York	$13,060,259.85
North Carolina	$4,651,549.50
North Dakota	$169,003.91
Ohio	$14,743,296.15
Oklahoma	$627,601.44
Oregon	$374,724.58
Pennsylvania	$14,358,294.89
Puerto Rico	$83,275.20
Rhode Island	$141,836.19
South Carolina	$1,100,583.68
South Dakota	$1,280,801.11
Tennessee	$4,316,335.84
Texas	$58,519,231.24
Unknown	$0.00
Utah	$140,765.94
Vermont	$149,025.41
Virgin Islands	$290,125.40
Virginia	$2,679,268.21
Washington	$3,109,494.72
West Virginia	$598,289.54
Wisconsin	$496,797.82
Wyoming	$68,024.26

State Name	Total Claim Payments
Alabama	$51,808,848.31
Alaska	$237,205.37
Arizona	$3,485,664.49
Arkansas	$2,662,189.71
California	$3,292,828.25
Colorado	$358,538.24
Connecticut	$447,249.34
Delaware	$651,369.28
District of Columbia	$32,998.52
Florida	$115,839,230.82
Georgia	$902,167.12
Guam	$25,564.80
Hawaii	$1,018,491.18
Idaho	$31,609.99
Illinois	$4,392,771.84
Indiana	$4,100,238.54
Iowa	$7,482,016.92
Kansas	$176,384.63
Kentucky	$6,785,165.34
Louisiana	$14,730,696.85
Maine	$639,370.82
Maryland	$6,931,705.11
Massachusetts	$1,168,619.73
Michigan	$6,984,881.68
Minnesota	$2,304,815.21

Using a GIS overlay analysis using FEMA Digital Q3 data and county geographic boundary layers, the percentage of the County or City located within a 100 year floodplain and 500 year floodplain were determined. This information is followed by whether the community participates in the National Flood Insurance Program (detailed information is provided if they do), and the floodplain mapping. This was completed for the both the regional and county level.

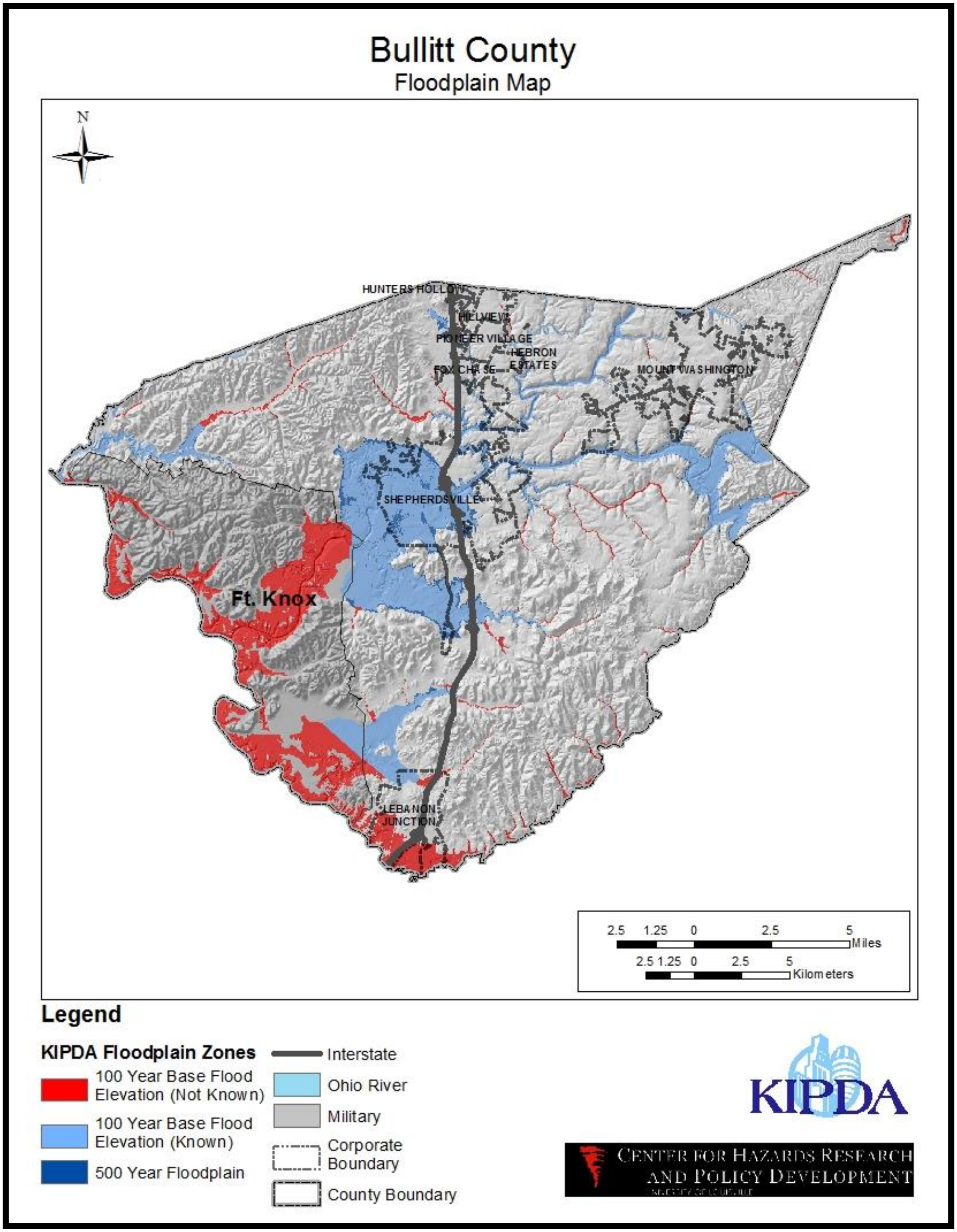
% of Area Impact						
	Counties					
Zone	**Bullitt**	**Henry**	**Oldham**	**Shelby**	**Spencer**	**Trimble**
100-yr BFE not known	9.63%	2.85%	3.11%	3.22%	10.88%	2.12%
100-yr BFE known	6.82%	3.74%	5.20%	0.00%	0.00%	7.50%
Total 100-yr floodplain	16.45%	6.59%	8.31%	3.22%	10.88%	9.62%
500-yr floodplain	1.51%	0.21%	0.21%	0.00%	0.00%	0.26%
Total	17.96%	6.79%	8.52%	3.22%	10.88%	9.88%

	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
BULLITT	210273#	5/20/1977	7/1/1991	12/6/2004	7/1/1991
HENRY	210110#	10/18/1974	1/1/1986	1/1/1986 (L)	1/1/1986
OLDHAM	210185#	16/6/1974	8/19/1987	9/20/2006	8/19/1987
SHELBY	210209#	10/18/1974	9/1/2001	9/2/2009 (M)	9/1/2001
SPENCER	210211#	10/21/1977	6/3/1986	8/3/2009 (M)	6/3/1986
TRIMBLE	210300#	1/14/1977	9/1/2001	3/18/2008	9/1/2001
(L) - Original FIRM by Letter - All Zone A, C, and X, **(M)** - No Elevation Determined - All Zone A, C, and X					


KIPDA Region
Floodplain Map
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

% of Area Impact					
		ZONE			
COUNTY	CITY	100-yr BFE not known	100-yr BFE known	500-yr floodplain	TOTAL
BULLITT	FOX CHASE	0%	7.16%	2.19%	9.35%
	HEBRON ESTATES	1.84%	0%	0%	1.84%
	HILLVIEW	3.83%	0.91%	0.47%	5.21%
	HUNTERS HOLLOW	0%	0%	0%	0%
	LEBANON JUNCTION	35.72%	4.10%	0%	39.82%
	MOUNT WASHINGTON	0.48%	0.10%	0.01%	0.59%
	PIONEER VILLAGE	0%	1.41%	0.31%	1.72%
	SHEPHERDSVILLE	2.78%	42.92%	19.05%	64.75%

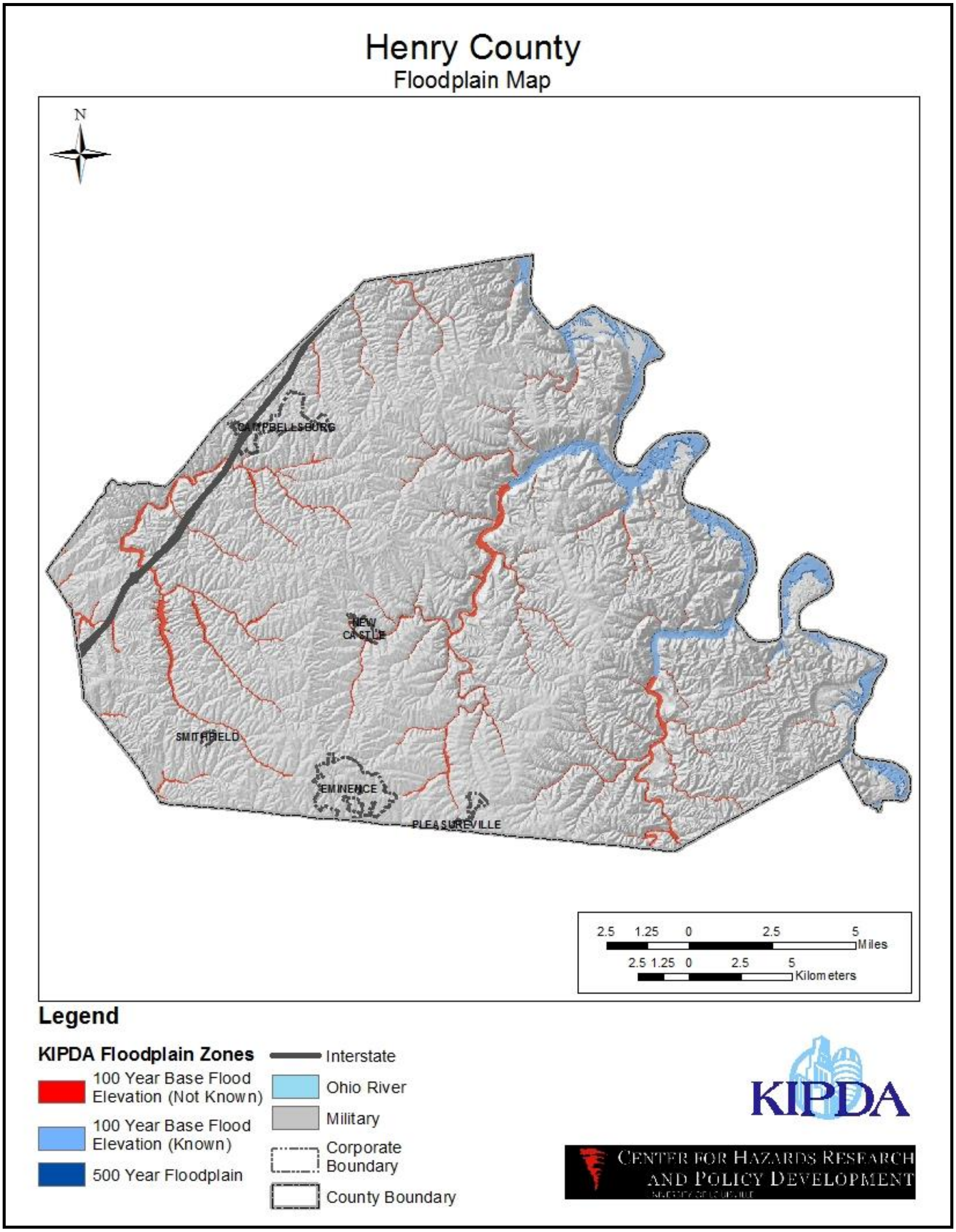
	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
FOX CHASE	-	-	-	-	-
HEBRON ESTATES	-	-	-	-	-
HILLVIEW	210384#	N/A	12/16/2004	12/16/2004	11/24/2009
HUNTERS HOLLOW	-	-	-	-	-
LEBANON JUNCTION	210304#	3/15/1974	7/16/1987	12/16/2004	7/16/1987
MOUNT WASHINGTON	-	-	-	-	-
PIONEER VILLAGE	210383#	N/A	12/16/2004	12/16/2004	9/14/2006
SHEPHERDSVILLE	210028#	5/24/1974	1/2/1987	12/16/2004	1/2/1987



Bullitt County
Floodplain Map
N
HUNTERS HOLLOW
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
FOX CHASE
MOUNT WASHINGTON
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
2.5 1.25 0 2.5 5 Miles
2.5 1.25 0 2.5 5 Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

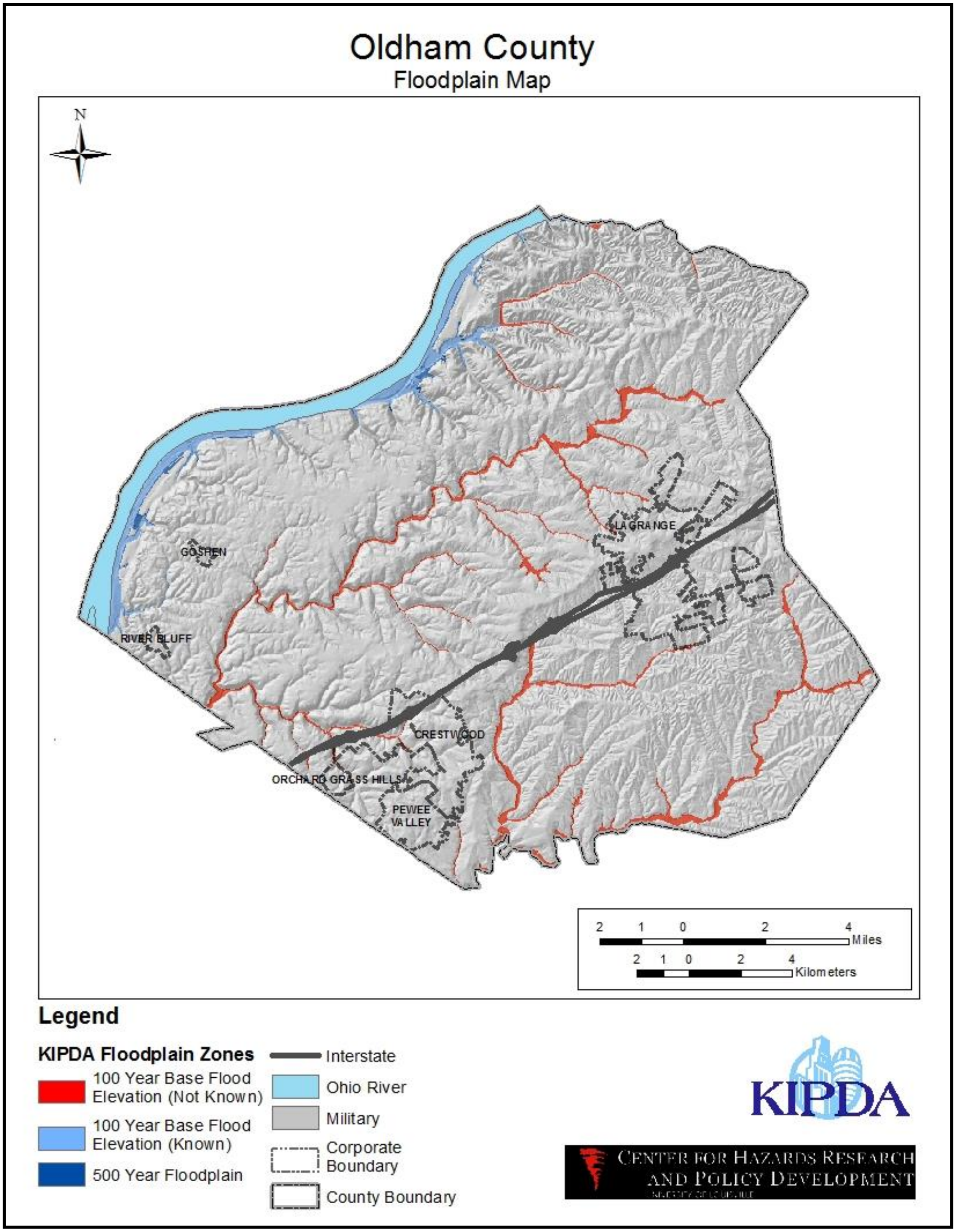
% of Area Impact					
		ZONE			
COUNTY	CITY	100-yr BFE not known	100-yr BFE known	500-yr floodplain	TOTAL
HENRY	CAMPBELLSBURG	0%	0%	0%	0%
	EMINENCE	0%	0%	0%	0%
	NEW CASTLE	7.32%	0%	0%	7.32%
	PLEASUREVILLE	0%	0%	0%	0%
	SMITHFIELD	0%	0%	0%	0%

	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
CAMPBELLSBURG	-	-	-	-	-
EMINENCE	-	-	-	-	-
NEW CASTLE	210403#	N/A	06/16/2011	06/06/2011 (M)	07/13/2011
PLEASUREVILLE	-	-	-	-	-
SMITHFIELD	-	-	-	-	-


Henry County
Floodplain Map
N
CAMPBELLSBURG
NEW CASTLE
SMITHFIELD
EMINENCE
PLEASUREVILLE
2.5 1.25 0 2.5 5 Miles
2.5 1.25 0 2.5 5 Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

% of Area Impact					
		ZONE			
COUNTY	CITY	100-yr BFE not known	100-yr BFE known	500-yr floodplain	TOTAL
OLDHAM	CRESTWOOD	0%	0%	0%	0%
	GOSHEN	0%	0%	0%	0%
	LAGRANGE	0%	0%	0%	0%
	ORCHARD GRASS HILLS	0%	0%	0%	0%
	PARK LAKE	0%	0%	0%	0%
	PEWEE VALLEY	0%	0%	0%	0%
	RIVER BLUFF	0%	0%	0%	0%

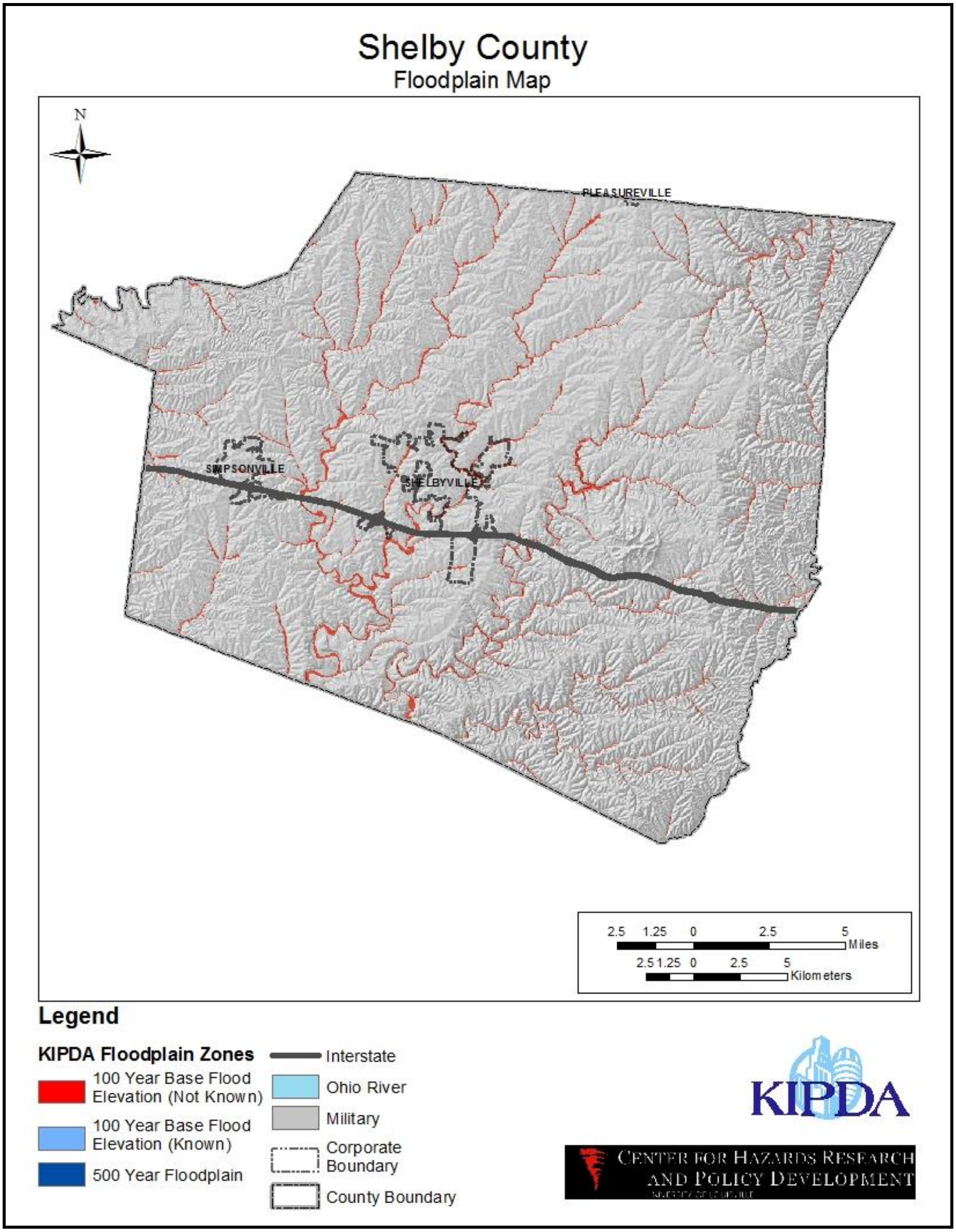
	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
CRESTWOOD	210027#	N/A	8/19/1987	9/20/2006 (M)	7/27/2006
GOSHEN	210397#	N/A	9/20/2006	(NSFHA)	5/10/2007
LAGRANGE	-	-	-	-	-
ORCHARD GRASS HILLS	210398#	N/A	9/20/2006	9/20/2006	11/28/2007
PARK LAKE	-	-	-	-	-
PEWEE VALLEY	-	-	-	-	-
RIVER BLUFF	-	-	-	-	-
(M) - No Elevation Determined - All Zone A, C, and X, **NSFHA** - No Special Flood Hazard Area - All Zone C					


Oldham County
Floodplain Map
N
LA GRANGE
GOSHEN
RIVER BLUFF
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
2 1 0 2 4 Miles
2 1 0 2 4 Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

		ZONE			
COUNTY	**CITY**	**100-yr BFE not known**	**100-yr BFE known**	**500-yr floodplain**	**TOTAL**
SHELBY	SHELBYVILLE	4.68%	0%	0%	4.68%
	SIMPSONVILLE	1.37%	0%	0%	1.37%

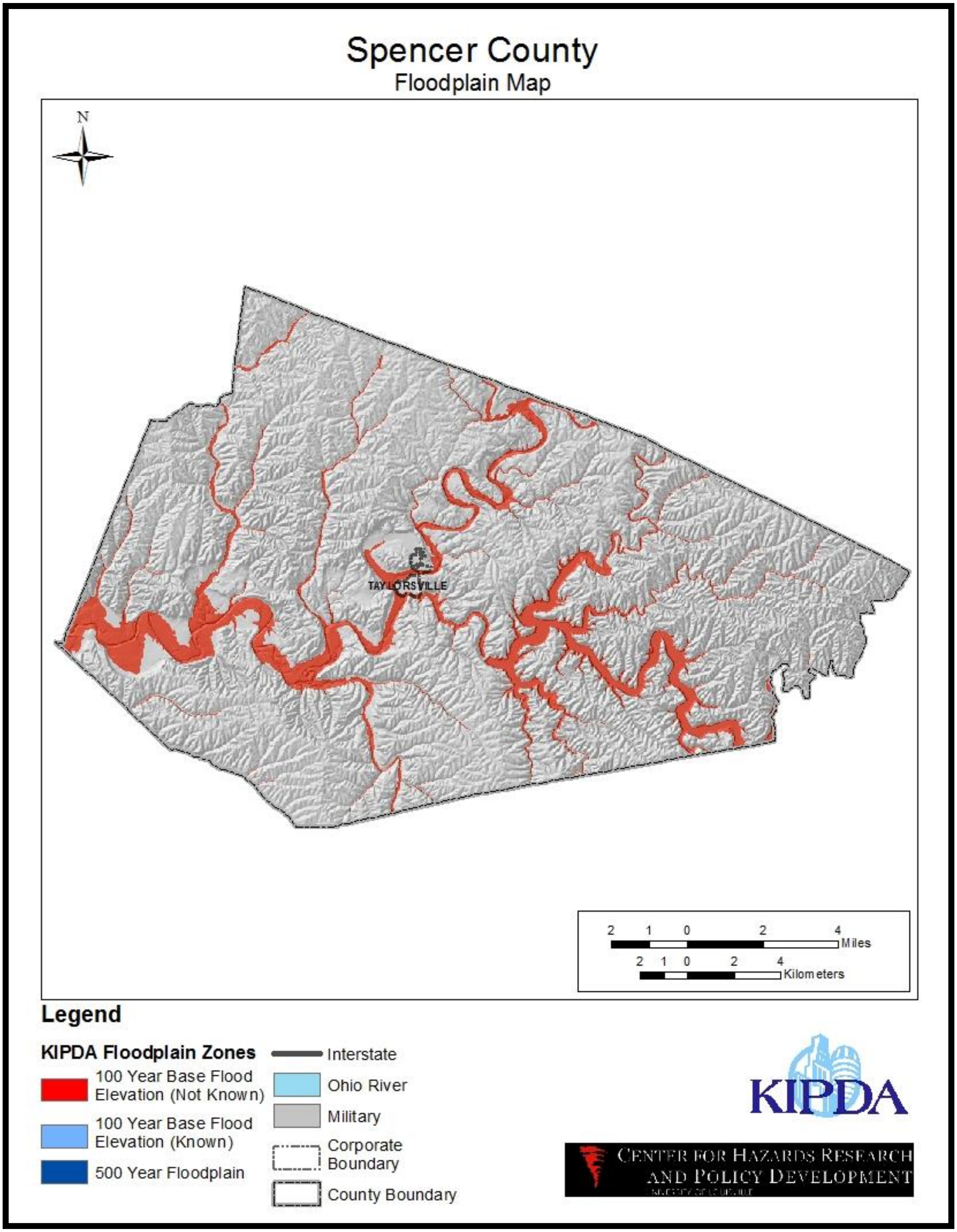
	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
SHELBYVILLE	2103763#	N/A	9/2/2009	9/2/2009 (M)	9/2/2009
SIMPSONVILLE	210431#	N/A	9/2/2009	9/2/2009 (M)	10/9/2009

(M) - No Elevation Determined - All Zone A, C, and X


Shelby County
Floodplain Map
N
PLEASUREVILLE
SIMPSONVILLE
SHELBYVILLE
2.5 1.25 0 2.5 5
Miles
2.5 1.25 0 2.5 5
Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

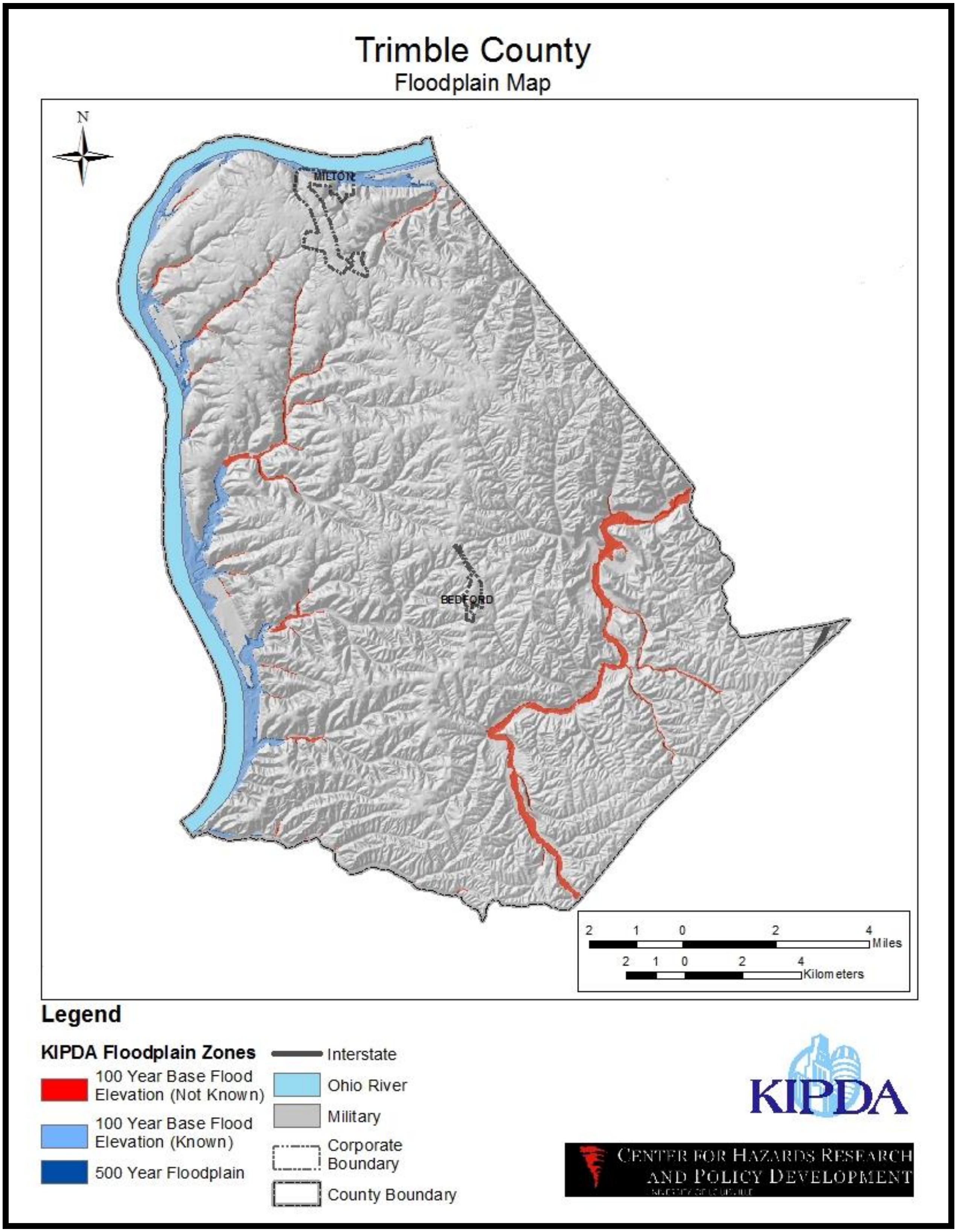
% of Area Impact					
COUNTY	CITY	100-yr BFE not known	100-yr BFE known	500-yr floodplain	TOTAL
SPENCER	TAYLORSVILLE	13.63%	0%	0%	13.63%

	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
TAYLORSVILLE	210247#	2/1/1974	6/4/1987	8/3/2009 (M)	6/4/1987
(M) - No Elevation Determined - All Zone A, C, and X					


Spencer County
Floodplain Map
N
TAYLORSVILLE
2 1 0 2 4
Miles
2 1 0 2 4
Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

% of Area Impact					
		ZONE			
COUNTY	CITY	100-yr BFE not known	100-yr BFE known	500-yr floodplain	TOTAL
TRIMBLE	BEDFORD	0%	0%	0%	0%
	MILTON	0%	14.76%	0.85%	15.61%

	Community Identification (CID) Number	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	Current Effective Date	Reg-Emer Date
BEDFORD	-	-	-	-	-
MILTON	210215#	3/15/1974	9/18/1986	3/18/2008	9/18/1986
(M) - No Elevation Determined - All Zone A, C, and X					

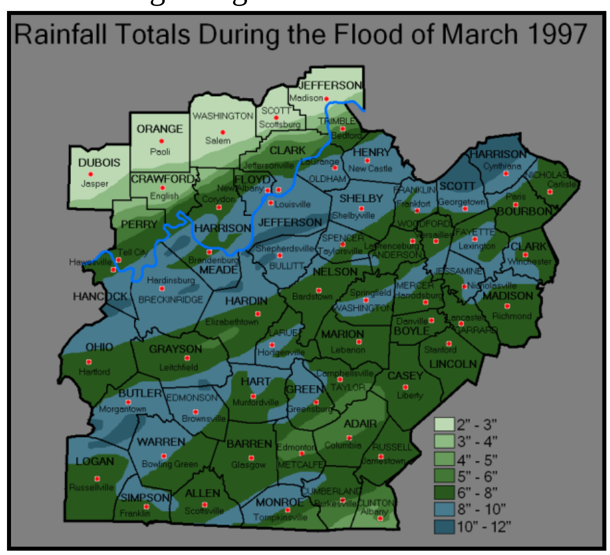

Trimble County
Floodplain Map
N
MILTON
BEDFORD
2 1 0 2 4 Miles
2 1 0 2 4 Kilometers
Legend
KIPDA Floodplain Zones
100 Year Base Flood Elevation (Not Known)
100 Year Base Flood Elevation (Known)
500 Year Floodplain
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

PREVIOUS OCCURENCES

Of the thirty (30) Presidentially Declared disasters affecting counties in the KIPDA region, twenty four (24) were related to flooding. Brief descriptions of two of the most damaging flood events in the area follow.

- The Ohio River Great Flood of January 1937 surpassed all prior floods during the previous 175 years of modern occupancy of the Ohio River Valley. The overall scope of the flood surpassed the major floods of 1884 and 1773, and geological evidence suggests the 1937 flood outdid any previous flood. Seventy percent of Louisville was submerged, forcing 175,000 residents to flee. A NOAA source estimated that damage was done to the tune of $250,000,000 in 1937 dollars, or over $3.3 billion in current dollars. Flood waters of the Salt and Rolling Fork Rivers covered much of Bullitt County including Shepherdsville, Lebanon Junction and Pitts Point. In Shepherdsville the flood waters "submerged every home, store, the bank, the Court House, jail and all other buildings."

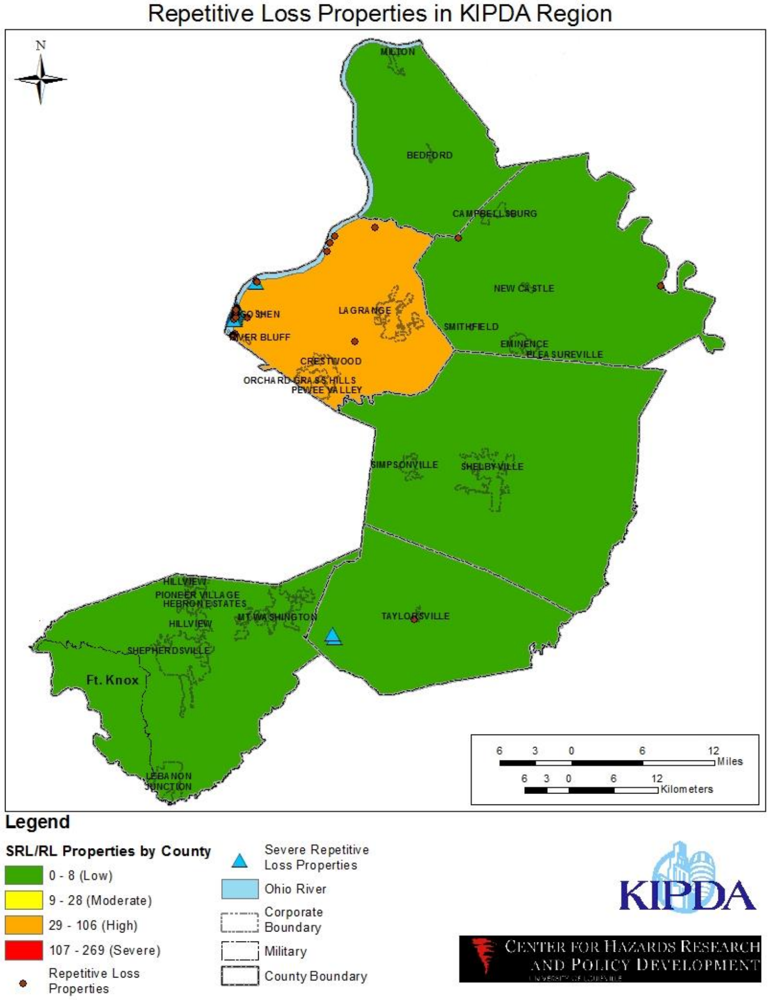
- In March 1997, thunderstorms and large areas of heavy rain repeatedly moved over the same areas producing large amounts of rainfall. The deluge resulted in record flooding along smaller streams and some of the worst flooding along the Ohio River since 1964 and in some places, since the Great Flood of 1937. Barge traffic was halted on the Ohio River due to the locks flooding. In the Louisville metro area about $200,000,000 in damage was attributed to the flooding, with 50,000 dwellings affected. Interstates 64 and 65 were closed. A 13 year old boy was killed as he drowned while trying to clean out a culvert in Shelby County. The Salt River in Shepherdsville was above flood stage from March 2 – March 9 cresting on March 3 at 8.9 feet above flood stage.



- In the week of July 13-17th, Trimble County experienced extreme flooding conditions that destroyed and damaged many homes and businesses in Trimble County. The Presidential Declaration 4329-DR was declared. Due the damages, which are still being assessed as of time of this publication, Trimble County is eligible for Public Assistance through FEMA and the Small Business Administration (SBA) to come in for aid to assist the citizens of Trimble County.

The Commonwealth has identified numerous Severe Repetitive Loss (SRL) and Repetitive Loss (RL) properties which both KYEM and KDOW considered to be of high priority for mitigation measures. KYEM and KDOW partnered in the fall of 2007 to initiate an effort to obtain accurate locations of SRL and RL properties. This project, funded by KDOW, focused on the identification of properties for potential acquisition and to define risk areas. Letters and AW501 forms were sent to local floodplain administrators. Administrators were asked to examine their respective communities to verify SRL and RL properties identified. This processed enhanced the SRL/RL database with improved addresses which were used to create the following map.

Severe Repetitive Loss and
Repetitive Loss Properties in KIPDA Region



	Total Number of Properties RL & SRL	Residential	Non-Residential
Bullitt	0	0	0
Henry	2	2	0
Oldham	98	96	2
Shelby	0	0	0
Spencer	8	8	0
Trimble	0	0	0
Total	**108**	**106**	**2**

* *See Appendix F for further clarification of RL and SRL properties by type*

ASSESSING VULNERABILITY BY JURISDICTION: FLOODING

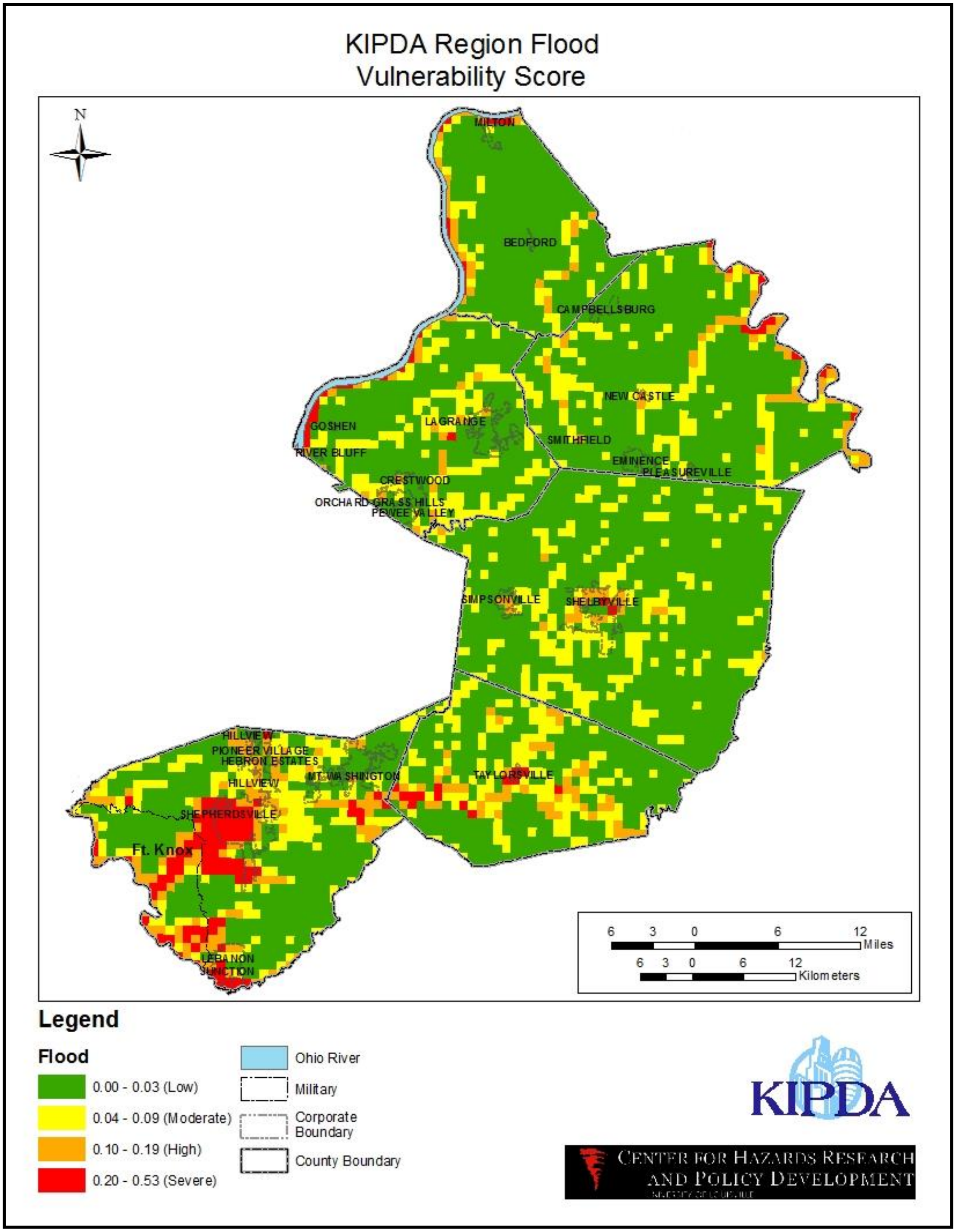
Flood Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to flood was determined through first calculating the Flood Hazard Score. The Flood Hazard Score was calculated by studying three (3) sources of data. Each of the datasets was provided by the Kentucky Division of Water (KDOW) and FEMA. The first data layer used to create the Flood Hazard Score was the Digital Flood Insurance Rate Map (DFIRM). The DFIRM displays a geo-referenced data layer that depicts where flooding could occur. To analyze the KIPDA Region's risk to flood according to the DFIRM data, the DFIRM layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the DFIRM covered within each grid. This percentage of area affected by the mapped flood potential area (DFIRM) was then calculated and scored 0-1 to develop 50% of the Flood Hazard Score.

The next step determined the total number of Severe Repetitive Loss (SRL) and Repetitive Loss (RL) properties within each 1 KM MGRS grid. This data displayed where concentrations of flood events have occurred, thus producing areas of risk. Once all the SRL and RL property points were aggregated to their appropriate grid, each grid was giving a score 0-1 to create the other 50% of the Flood Hazard Score.

The Flood Hazard Score was then calculated by adding the two (2) scores together and scored 0-1. It is important to note if the Flood Hazard Score inputs equaled 0, then the Flood Hazard Vulnerability Score equaled 0.

Finally, the Flood Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Flood Hazard Score and then scored 0-1. Once the final Flood Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe) which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Flood
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT. WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Flood
0.00 - 0.03 (Low)
0.04 - 0.09 (Moderate)
0.10 - 0.19 (High)
0.20 - 0.53 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: FLOODING

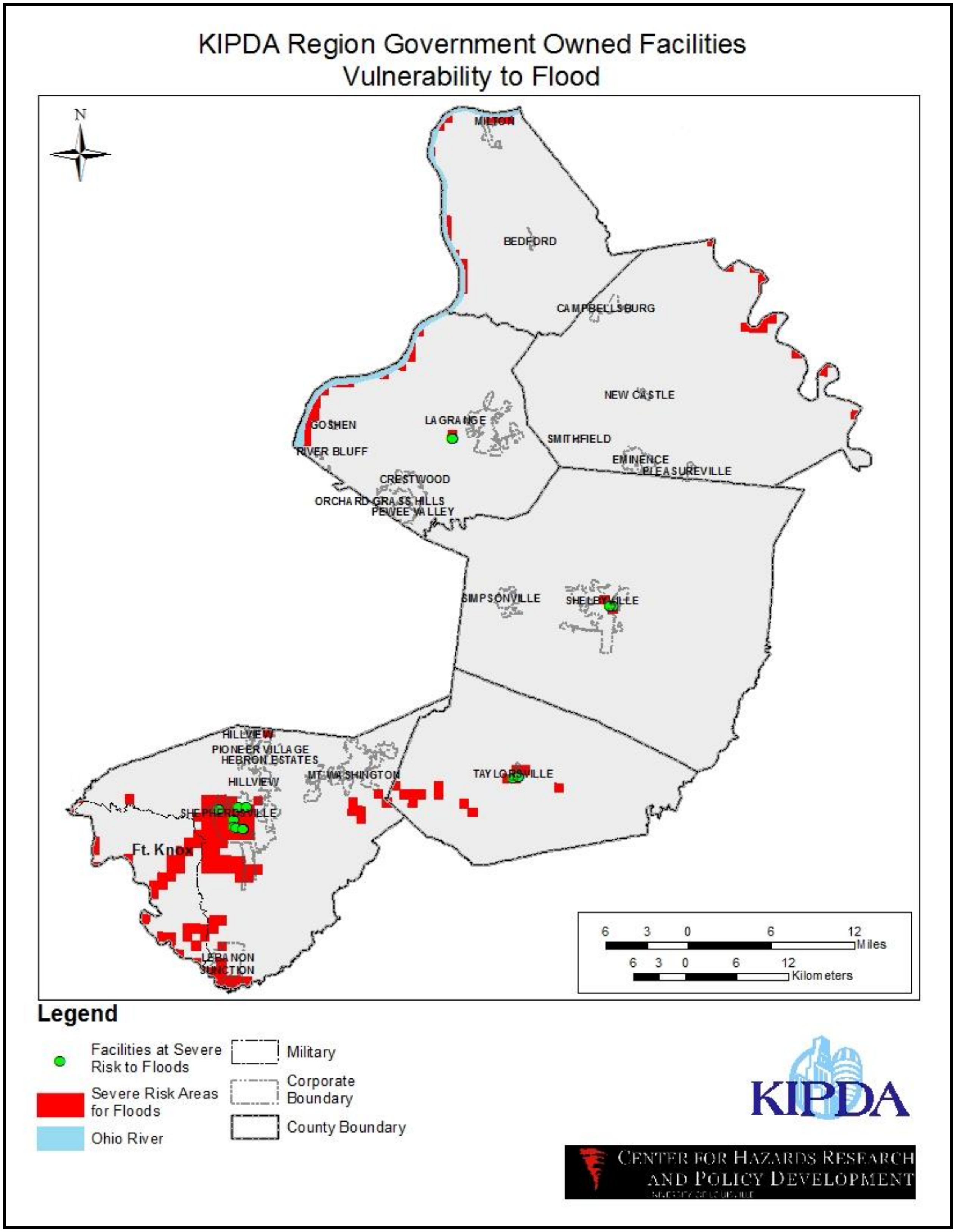
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Flooding. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Flooding.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Flood	31	$18,130,410	0.56	$584,852	$329,644	55
Henry	Flood	42	$11,832,596	0.76	$281,728	$215,138	55
Oldham	Flood	34	$36,536,089	0.62	$1,074,591	$664,293	55
Shelby	Flood	36	$11,895,372	0.65	$330,427	$216,279	55
Spencer	Flood	35	$3,234,540	0.64	$92,415	$58,810	55
Trimble	Flood	39	$36,521,469	0.71	$936,448	$664,027	55
Total		**217**	**$118,150,478**	**3.95**	**$3,300,462**	**$2,148,191**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: FLOODING

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Flooding boundary map was used as the hazard layer for Flooding Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Flooding boundary map. The government owned facilities captured within each Flooding hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Flooding event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Flooding hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	8	$2,299,094.00
Henry	0	$0.00
Oldham	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Flood
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LA GRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT. WASHINGTON
TAYLORSVILLE
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Floods
Severe Risk Areas for Floods
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

HAIL

HAZARD IDENTIFICATION: HAIL

DESCRIPTION

Hail is a type precipitation which is formed when updrafts in thunderstorms carry raindrops into extremely cold areas of the atmosphere and freezes them. These frozen raindrops grow by colliding with super-cooled water drops creating 'hailstones'. Thunderstorms which have a strong updraft keep lifting the hailstones up to the top of the cloud, increasing the amount of moisture they collect. The hail falls when the thunderstorm's updraft can no longer support the weight of the ice. The stronger the updraft, the larger the hailstone can grow.

TYPES

While the TORRO Hail Scale is used, NOAA has provided the following comparisons to identify hail size with common items. Below is the TORRO Hail Scale. The National Weather Service (NWS/NOAA) validates that hail diameters are as follows:

Diameter Size	Description
0.25"	Pea Size
0.75"	Penny Size
0.88"	Nickel Size
1.0"	Quarter Size
1.25"	Half Dollar Size
1.5"	Walnut or Ping Pong Ball Size
1.75"	Golf Ball Size
2.0"	Hen Egg Size
2.5"	Tennis Ball Size
2.75"	Baseball Size
3.0"	Teacup Size
4.0"	Grapefruit Size
4.5"	Softball Size

The National Weather Service asks to be notified when hailstones are spotted a 0.5" in diameter or larger and Severe Thunderstorm Warnings are issued when hailstones are 1.0" in diameter or greater. Prior to January 5, 2010, the classification for severe thunderstorms was 3/4" hail. The change was based on research which indicated significant damage doesn't occur until hail reaches 1.0" in size. Additionally, there was worry the public would be desensitized to severe thunderstorm warnings due to the frequency being issued for penny-size and nickel size hail; particularly in the Central part of the country.

FACTS

- The heaviest recorded hailstone, which fell in Coffeyville, Kansas on September 3, 1970, weighed 1.67lbs.
- The largest hailstone ever recovered at 7 inches in diameter and 10.75 inches in circumference fell in Nebraska on June 22, 2003.
- Large hailstones can fall at speeds greater than 100 mph.
- Hailstones can contain foreign matter such as pebbles, leaves, twigs, nuts, and insects.
- Hail storms cause nearly one billion dollars in damage annually to property and crops in the United States.
- The most damaging hailstorm in United States history occurred in Denver, Colorado on July 11, 1990 caused $625 million in damage.

IMPACTS

The primary impacts of hail are mainly property and infrastructure damages and personal injuries. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail.

Hail has been known to cause injury to humans, and occasionally has been fatal. The most deadly hailstorm on record occurred in India on April 30, 1988, killing 246 people and 1600 domesticated animals.

Although extensive damage occurs as a result of hail, the event by itself causes few if any additional hazards.

HAZARD PROFILE: HAIL

PROFILE RISK TABLE

Hazard: Hail	
Period of occurrence:	Frequented with severe storms which are most prevalent in Kentucky from April to June. Severe storms can occur whenever conditions are favorable however. As such, hail can occur at any time of the year, although it is a rarity in off season months.
Number of officially recorded events: SHELDUS and NOAA (1960-2015)	243
Annual Rate of Occurrence:	4.42
Warning time:	Warning time is essentially non-existent, as geologic activity at fault lines in the earth's crust happen sporadically
Potential impacts:	Impacts to human life, health, and public safety are possible. Utility damage and failure, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases are additional impacts.
Recorded losses:	$6,727,190
Annualized Loss:	$122,313
Extent:	Date: April 16, 1998 Size: 2.75 inches Damage $714 M/Measured in Torro Scale: Quarter Inch Diameter

GEOGRAPHIC LOCATIONS AFFECTED

Hail affects the entire country though some areas, such as those in the Central United States, experience more instances of hailstorms. In an effort to see which parts of the country are most affected by hailstorms, insurance claims were analyzed.

According to Verisk Analytics, a leading insurance underwriter, the following is a list of states in the US with the highest number of paid claims from 2000-2013:

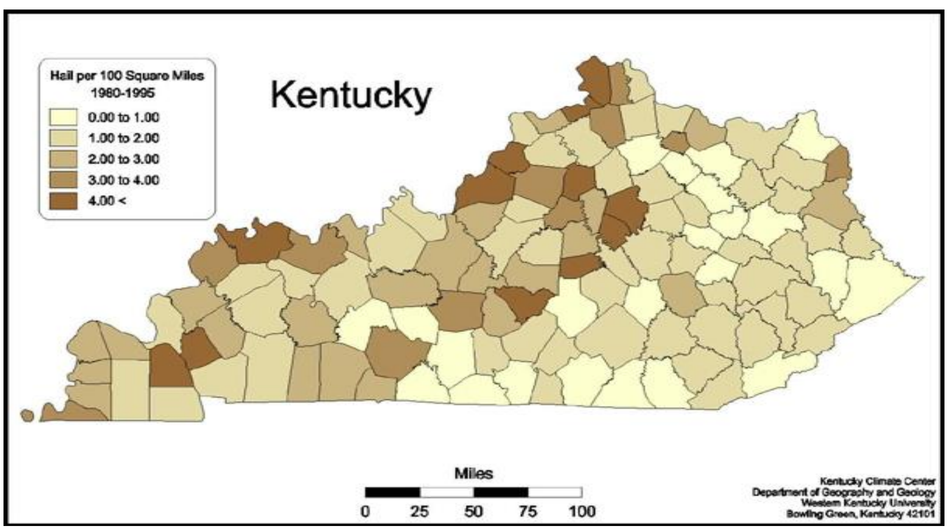
States with the largest increases of paid claims from 2000-2013	
1	AZ
2	MA
3	MS
4	MT
5	CT
6	NY
7	VA
8	LA
9	MI
10	FL

The National Insurance Crime Bureau compiled the number of hail loss claims, a total of 2,018,466, between 2010 and 2012. Most of the hail loss claims occurred in the spring and summer months, between April and July. This is likely due to increased numbers of thunderstorms during this time period. In the table below, the numbers of claims each year are listed by State. The top five states with the highest hail loss claims are listed in addition to Kentucky's position nationally, which was number 3 in claims in 2012.

	2010		2011		2012	
Rank	State	Count	State	Count	State	Count
1	AZ	81,378	TX	121,613	TX	150,474
2	TX	48,736	KS	60,242	MO	91,981
3	OK	41,448	TN	45,942	**KY**	**72,585**
4	CO	34,851	OH	35,657	IN	59,827
5	KS	23,795	SC	33,370	CO	57,753
	KY (30)	**1,392**	**KY (28)**	**3,862**		

While the entire state of Kentucky is vulnerable to the effects of hail, the amount of large hail events (hail with a diameter of 0.75" or greater) varies greatly by county across the state.

Hail is the result of two general weather conditions. First, hail may be caused by meso-scale thunderstorms that are usually frontal and widespread. Second, physiographic features, large bodies of water, and localized convection can develop localized thunderstorms that can be conducive to hail. For this reason, the Eastern part of the state would be expected to receive fewer hail events, because the mountains inhibit severe thunderstorms from forming. This was further evidenced by the number of hailstorms per 100 square miles mapped below.



PREVIOUS OCCURENCES

Detailing the severity of hail events by County is difficult due to a lack of documented data. SHELDUS data was used to document the past hail events in the KIPDA region and was broken up by County. SHELDUS and NOAA had 243 hail events in the KIPDA region since 1960 causing $ $6,727,190 in damage. This damage is associated with the hazard date in the tables that follows in the Annualized Loss Chart. As can be seen in the data below, the number of events is fairly consistent between the jurisdictions in the KIPDA region. All counties experience some type of Hail event annually, and can be quite a disruption to the area.

ASSESSING VULNERABILITY BY JURISDICTION: HAIL

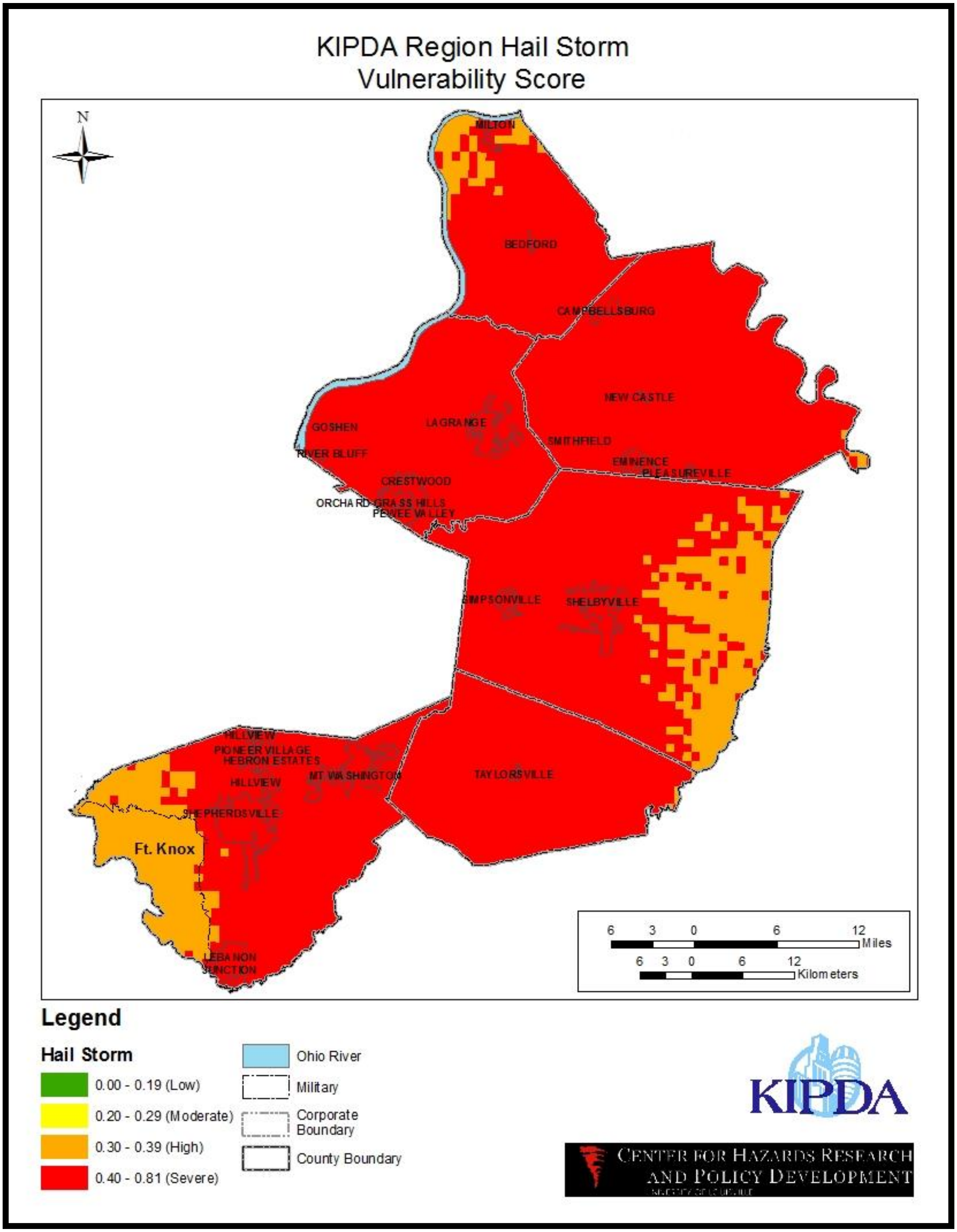
Hail Storm Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Hail Storm was determined through first calculating the Hail Storm Hazard Score. The Hail Storm Hazard Score was calculated by studying the best available data. The data layer used to create the Hail Storm Hazard Score was collected from the National Weather Service NEXRAD Level-III Radar data. The radar data provided a new and improved capture of hail occurrences using radar to capture when and where hail events were occurring from 2000-2012, SHELDUS data from 1960-2014 and NOAA data from 2014-2015. As with all new technologies this data does come across with some caveats. Currently the radar is not 100% accurate when capturing images so the data comes with probabilities assigned to each data point captured. For this process CHR used anything with a 50% or greater probability as a counted hail occurrence.

For analyzing this data CHR used a 25 mile radius to calculate each 1 KM MGRS grids geographic risk from a hail event. The 25-mile radius was selected because that is the distance that the National Weather Service uses when producing severe weather alerts and probability maps. Basically, the 25 mile radius reduces the white noise and randomness present in atmospheric event data, which enables a meaningful picture of the risk to each grid, built based on historic rates of occurrence in the area. These 25 mile radiuses create map layers that were used as the base map layer for Hail Storm Hazard Score.

To analyze the KIPDA Region's risk to Hail Storm, the county 25 mile radius Hail Storm layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the total number of hail events that occurred within a 25 mile radius of each grid. Each grid was then calculated and scored 0-1 to develop the Hail Storm Hazard Score.

The Hail Storm Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Hail Storm Hazard Score and then scored 0-1. Once the final Hail Storm Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe), which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Hail Storm
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Hail Storm
0.00 - 0.19 (Low)
0.20 - 0.29 (Moderate)
0.30 - 0.39 (High)
0.40 - 0.81 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: HAIL

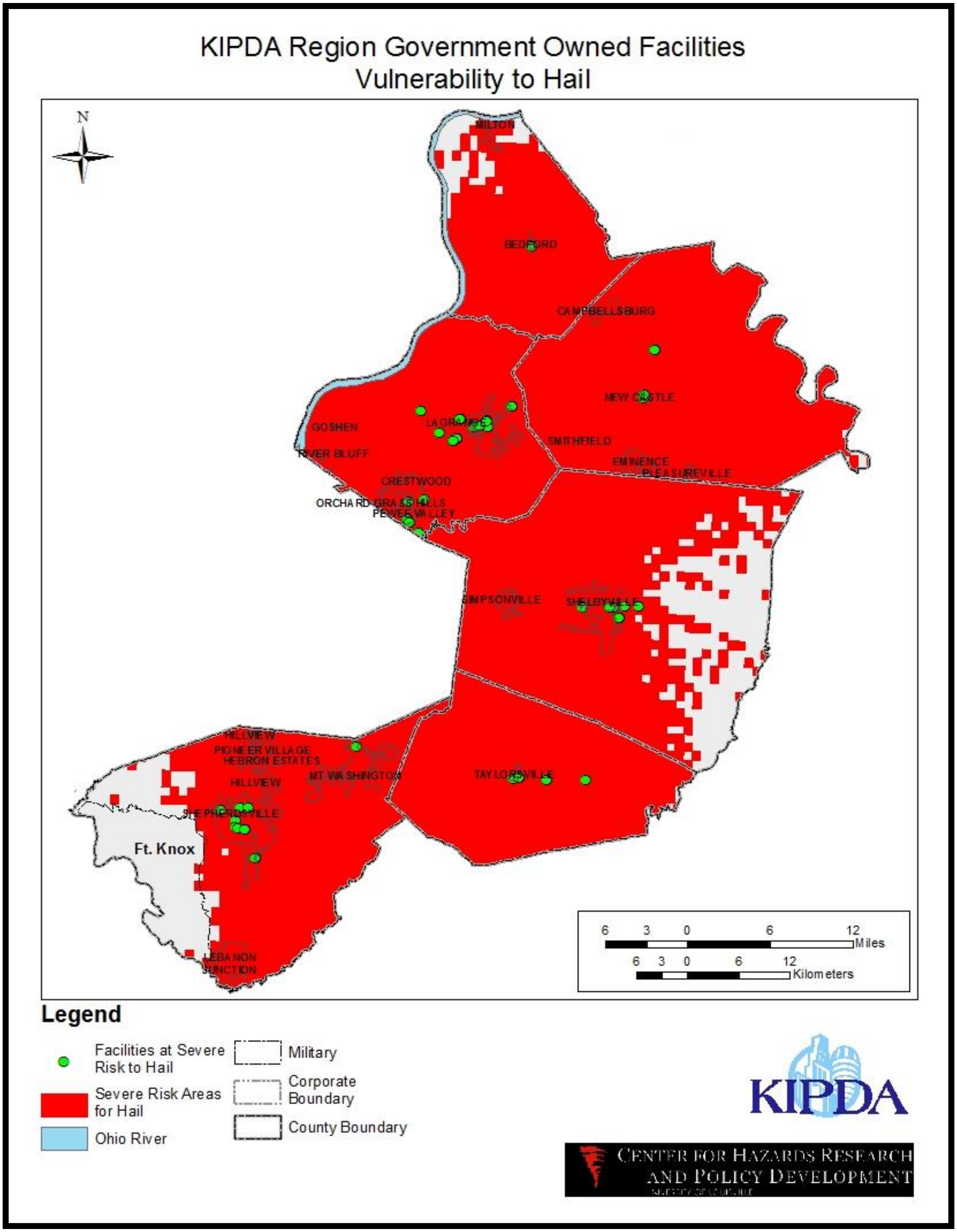
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Hail. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Hail.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Hail	39	$518,327	0.71	$13,290	$9,424	55
Henry	Hail	41	$1,384,267	0.75	$33,763	$25,168	55
Oldham	Hail	45	$508,290	0.82	$11,295	$9,242	55
Shelby	Hail	41	$3,228,805	0.75	$78,751	$58,706	55
Spencer	Hail	39	$552,115	0.71	$14,157	$10,038	55
Trimble	Hail	38	$535,386	0.69	$14,089	$9,734	55
Total		**243**	**$6,727,190**	**4.42**	**$165,346**	**$122,313**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: HAIL

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Hail boundary map was used as the hazard layer for Hail Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Hail boundary map. The government owned facilities captured within each Hail hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Hail event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Hail hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	19	$5,046,717
Henry	5	$327,459
Oldham	222	$226,854,105
Shelby	15	$13,621,048
Spencer	10	$1,453,539
Trimble	1	$3,500


KIPDA Region Government Owned Facilities
Vulnerability to Hail
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Hail
Severe Risk Areas for Hail
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

KARST/SINKHOLE

HAZARD IDENTIFICATION: KARST/SINKHOLE

DESCRIPTION

Karst is defined as “a terrain, generally underlain by limestone or dolomite, in which the topography is chiefly formed by the dissolving of rock and which may be characterized by sinkholes, sinking streams, closed depressions, subterranean drainage, and caves.”

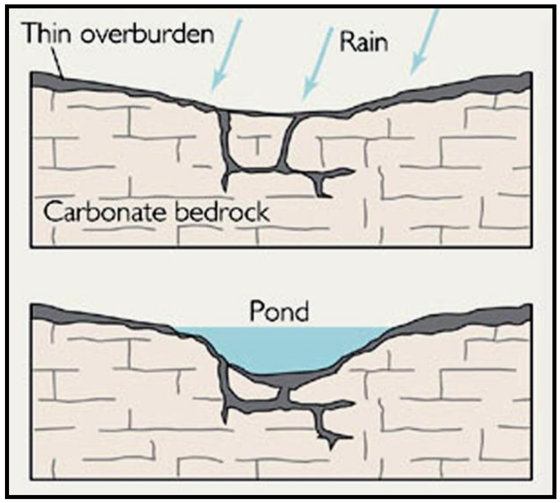
A sinkhole is defined as a "natural depression or hole in the surface landscape caused by the removal of soil or bedrock, often both, by water."

Sinkholes can vary in size from less than a meter to several hundred meters in diameter and depth and can be formed suddenly or gradually. Often sinkholes are formed when underground limestone is dissolved by rain or when the surface materials collapse into underlying cavities in the rock. Currently the state of Florida is known for having one of the highest frequencies of sinkholes, especially in the central part of the state.

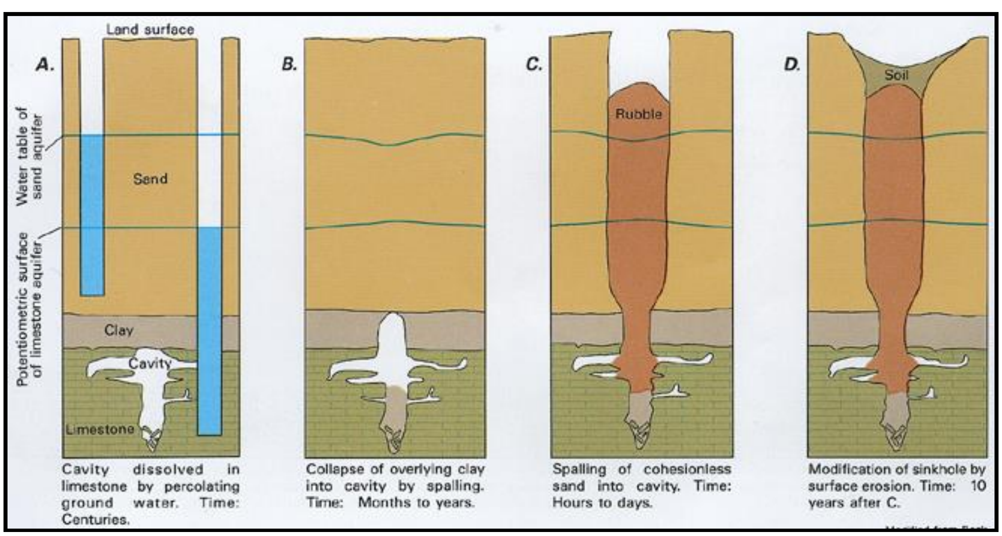
TYPES

There are three general types of sinkholes:

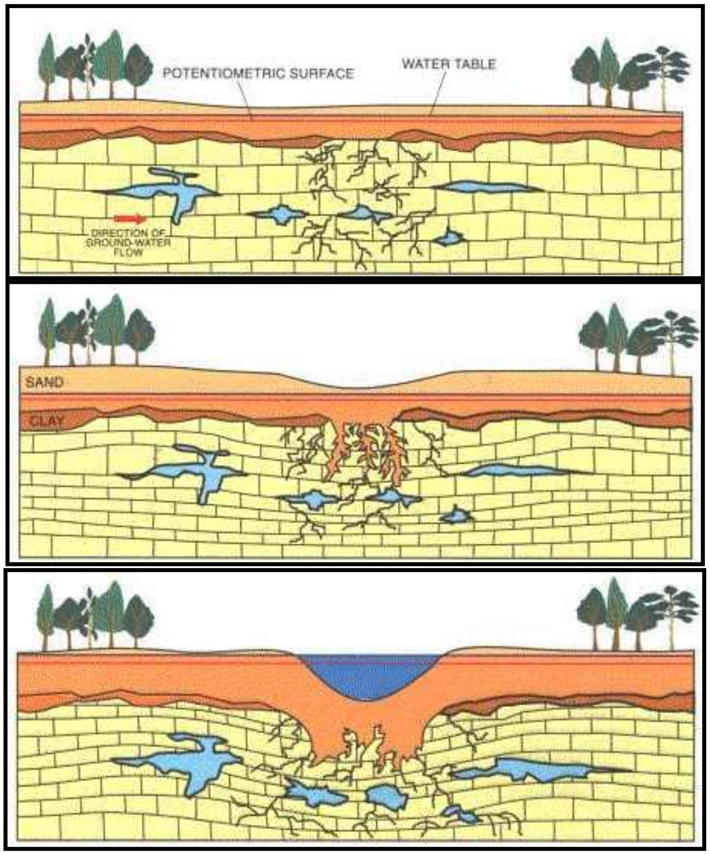
Solution Sinkholes – Formed by the weathering by dissolution of exposed soluble bedrock (limestone, dolomite, marble, and rock salt) at the land surface. Surface water collects in the natural depressions and slowly dissolves a sinkhole.



Collapse Sinkholes – Form when the surface materials suddenly sink into a subsurface cavity or cave. Cavities form slowly over time as groundwater moves along fractures in soluble bedrock which enlarges them through dissolution. Collapses may occur when the cavity gets sufficiently large and the "roof" becomes too thin to support the weight of any overlying rock or sediment causing the cavity to collapse; or if groundwater levels are lowered causing the overlying sediment to first erode and then collapse into the dewatered cavity.



Subsidence Sinkholes – Similar to solution sinkholes, except the soluble bedrock is covered by a thin layer of soil and/or sediment. Surface water infiltration dissolves cavities where the bedrock is most intensely fractured resulting in the overlying sediment to gradually move downward into the expanding cavity.



FACTS

- Approximately 15 percent of the Earth’s land surface is karst.
- Evaporite rocks underlie about 35 to 40 percent of the United States, though in many areas they are buried at great depths.
- Karst topography is named for the Kras plateau region of eastern Italy and western Slovenia (Kras is Karst in German for "barren land").
- Mammoth Cave, the world’s largest cave system, was formed by karst topography.
- More than 25 percent of the world's population either lives on or obtains its water from karst aquifers.
- In the United States, 20 percent of the land surface is karst and 40 percent of the groundwater used for drinking comes from karst aquifers.
- Qattara Depression near Cairo, Egypt is the largest natural sinkhole in the world. Its 50 miles long and 74 miles wide.
- Sinkholes can range from a few feet to over 300 feet deep.

IMPACTS

The effects of sinkholes and other features typically present in karst terrain vary from the mild to the extreme and can, no doubt wreak havoc on infrastructure in urban areas. Storm-water drainage is of major concern in urban areas underlain by karst geology, as the ground surface area necessary for the even infiltration of rainwater into the groundwater supply system is covered with impervious substances such as blacktop and cement. This imbalance can often have serious consequences, leading to movement of the ground which may rupture sewer lines, natural gas lines, or effect underground utility lines.

In 2009, a fire truck in a Los Angeles suburb, for example, was pulled into a sinkhole which was caused by a series of pipe ruptures which stemmed from geologic phenomena. And in 1994, an area underlain by karst produced a sinkhole the size of a small house that jeopardized Allentown, Pennsylvania's newest office building and thoroughfare. Allentown filled the sinkhole using over 700 cubic yards of concrete.

Groundwater contamination is also more prevalent in acres of karst geology, as percolation occurs more quickly. Contaminants such as oil from automobiles in parking lots, pesticides and herbicides from lawns, and urine and feces from cattle feed lots end up in water supplies used by surrounding communities. This type of contamination is particularly dangerous in areas where private wells are used instead of water that comes from public works. If allowed to filter naturally, an underground water source will take up to 100 human generations to filter its impurities. Some states now have enacted insurance legislation which provides property owners affected by sinkholes some piece of mind, but many states have yet to specifically address the issue.

HAZARD PROFILE: KARST/SINKHOLE

PROFILE RISK TABLE

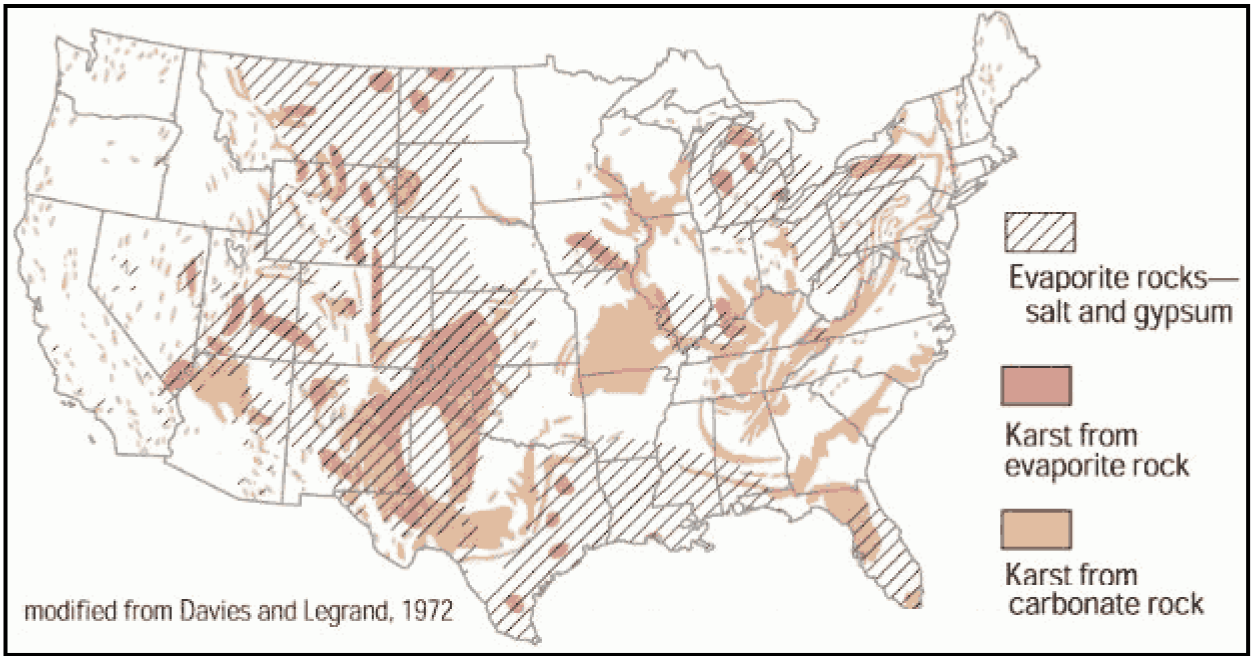
Hazard: Karst/Sinkhole	
Period of occurrence:	At any time
Number of officially recorded events: Unknown (Kentucky Geological Survey)	1,653 Identified Sinkholes in Region
Annual Rate of Occurrence:	Unknown due to lack of start and end dates
Warning time:	Weeks to months, depending on monitoring and maintenance
Potential impacts:	Economic losses such as decreased property value and agribusiness losses, and may cause minimal to severe property damage and destruction, may cause geological movement, causing infrastructure damages
Recorded losses:	Unknown
Annualized Loss:	Unknown due to lack loss data captured on Karst/Sinkhole events
Extent:	Size: On average ft. diameter* Measurements from USGS and KGS

*As karst more describes terrain and the eventual or probabilistic cause of hazards, a statistical average has been used to describe "extent." In the spirit of "extent" and like using a scale or an historical extreme, the statistical average diameter of karst terrain acts a standard by which to compare individual "karst hazard events."

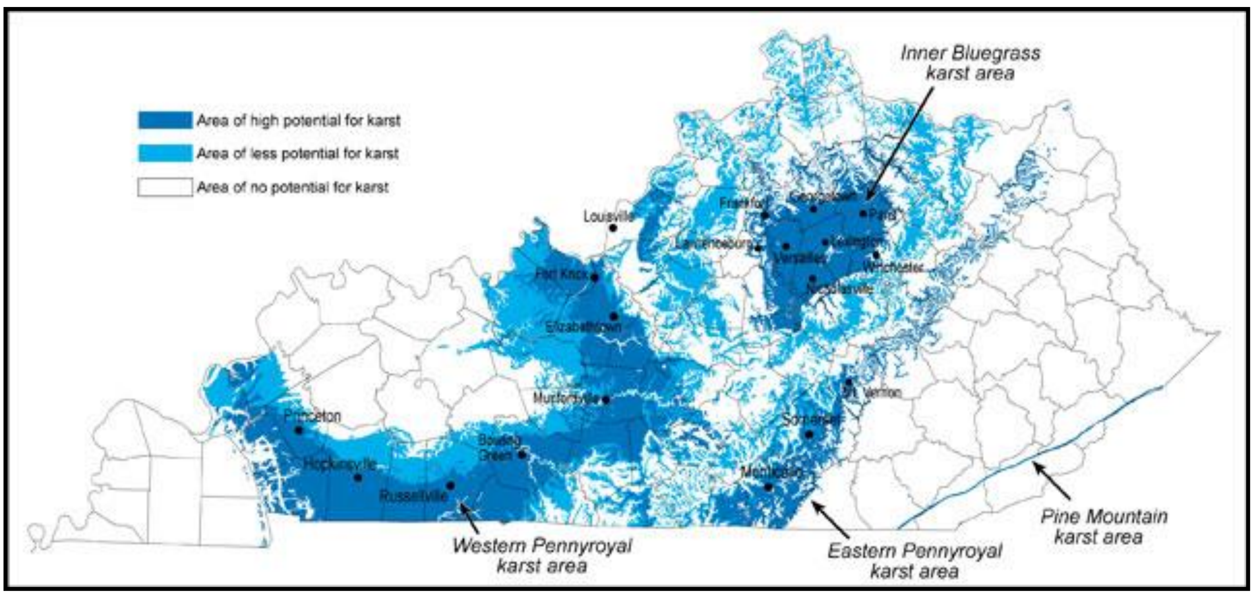
GEOGRAPHIC LOCATIONS AFFECTED

The most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Florida has more sinkholes than any other state in the nation. They are an obvious feature of Florida's natural karst topography. Sinkholes provide a primary pathway for rainwater to replenish subsurface groundwater; they are an important part of the aquifer system that supplies 95% of Florida's drinking water.

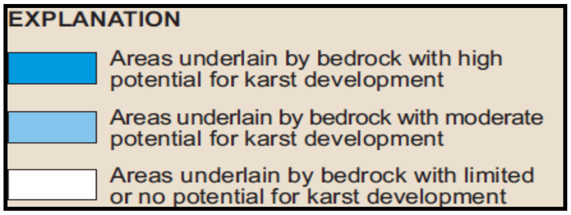
The following maps show the potential for karst development. In the first map you can see that the majority of the state of Kentucky is covered by carbonate rock, a class of sedimentary rock composed primarily of carbonate minerals. There are two types of carbonate rock, dolostone and limestone; predominately the latter.

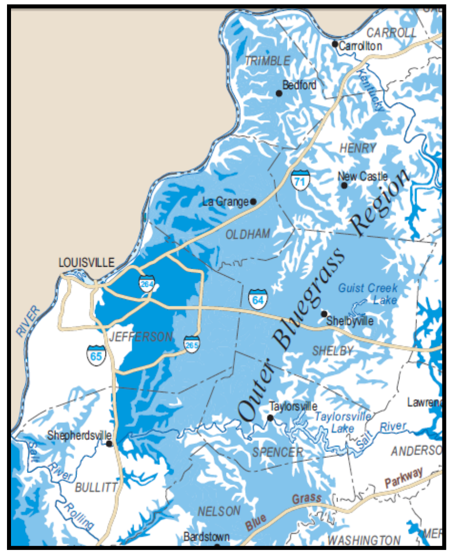


Kentucky is one of the most famous karst areas in the world. Much of the state's beautiful scenery, particularly the horse farms of the Inner Bluegrass, is the result of development of karst landscape. Viewing the Karst potential map for the State, the highest potential for karst occurs in the Inner Bluegrass, Western Pennyroyal and Easter Pennyroyal regions of the state. The outcrop area of the limestone bedrock in Kentucky has been used to estimate the percentage of karst terrain or topography in the state. About 55 percent of Kentucky is underlain by rocks that could develop karst terrain, given enough time. About 38 percent of the state has at least some karst development recognizable on topographic maps, and 25 percent of the state is known to have well-developed karst features.



Focusing on the KIPDA region, karst is present in all six counties covered by the KIPDA Regional Hazard mitigation plan. Nearly all of Oldham County is underlain by bedrock with potential for karst development, some areas with high potential. There is also a significant portion of eastern Bullitt County with High potential for karst development. The map shows the outcrop of limestone and dolostone and closely represents the karst areas.



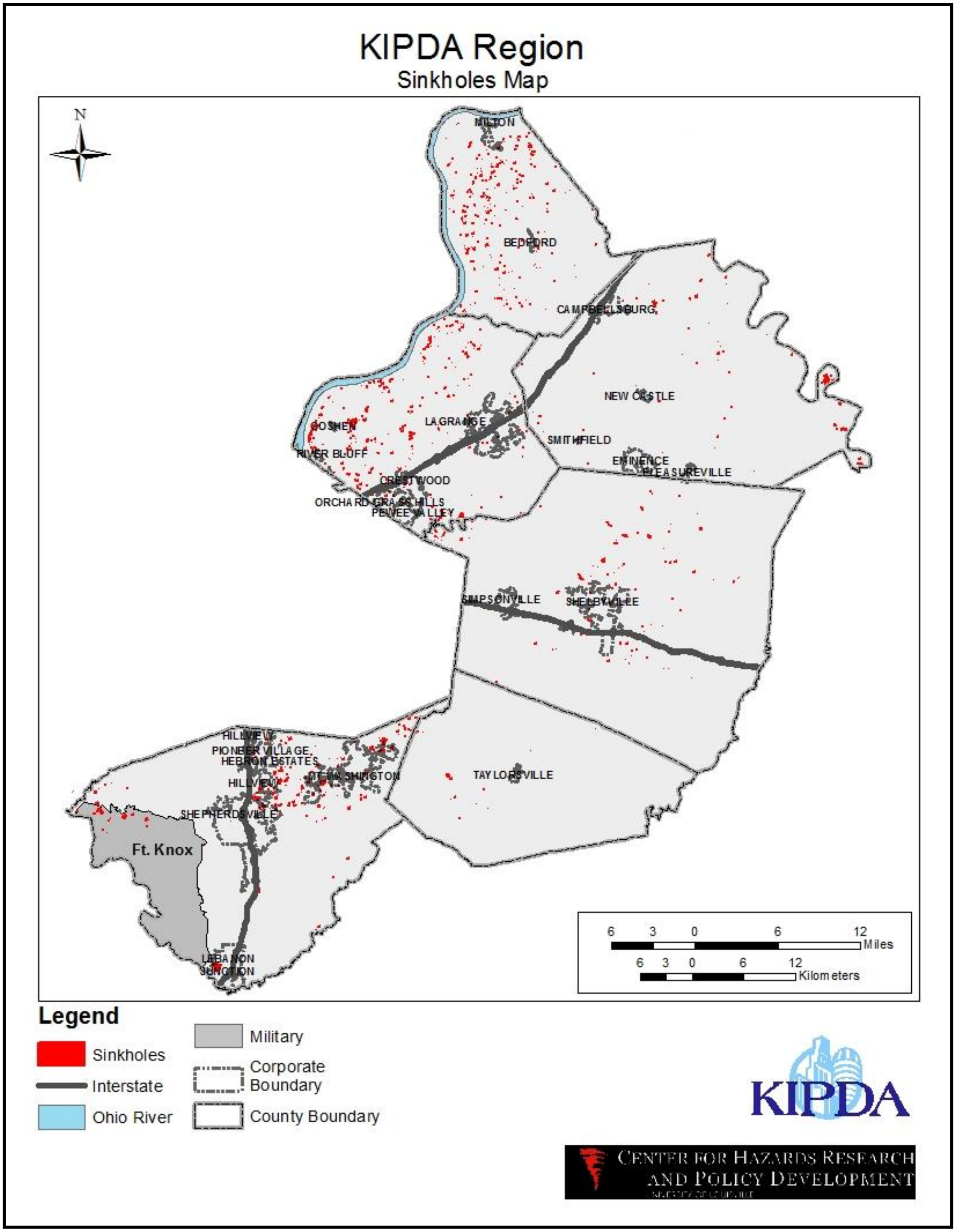


PREVIOUS OCCURENCES

The data and information for past occurrences of karst and sinkholes is limited. Often times the damage goes unreported. Damage throughout the state has occurred in the form of damage to dams built in Karst regions, most famously to the Wolf Creek Dam on Cumberland Lake in southeastern Kentucky. Throughout the state, many other reservoirs of all sizes have leaking dams or leakage through carbonate bedrock around the dam, including leakage through caves passing under the dam of Shanty Hollow Lake in Warren County and leakage through bedrock that forms the abutment bank of Spa Lake in Logan County.

Highways are also vulnerable. In the mid-1990s, a cover-collapse sinkhole appeared overnight in the northbound lane of Interstate 65 near Elizabethtown. Fortunately, no one drove into it, but it did require extensive repairs. Exceptional costs for highway construction projects and repairs to existing roadways since 1995 are estimated to exceed a half million dollars a year.

The following map compiled with data from the Kentucky Geological Survey displays the locations of known sinkholes throughout the KIPDA region.


KIPDA Region
Sinkholes Map
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Sinkholes
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ASSESSING VULNERABILITY BY JURISDICTION: KARST/SINKHOLE

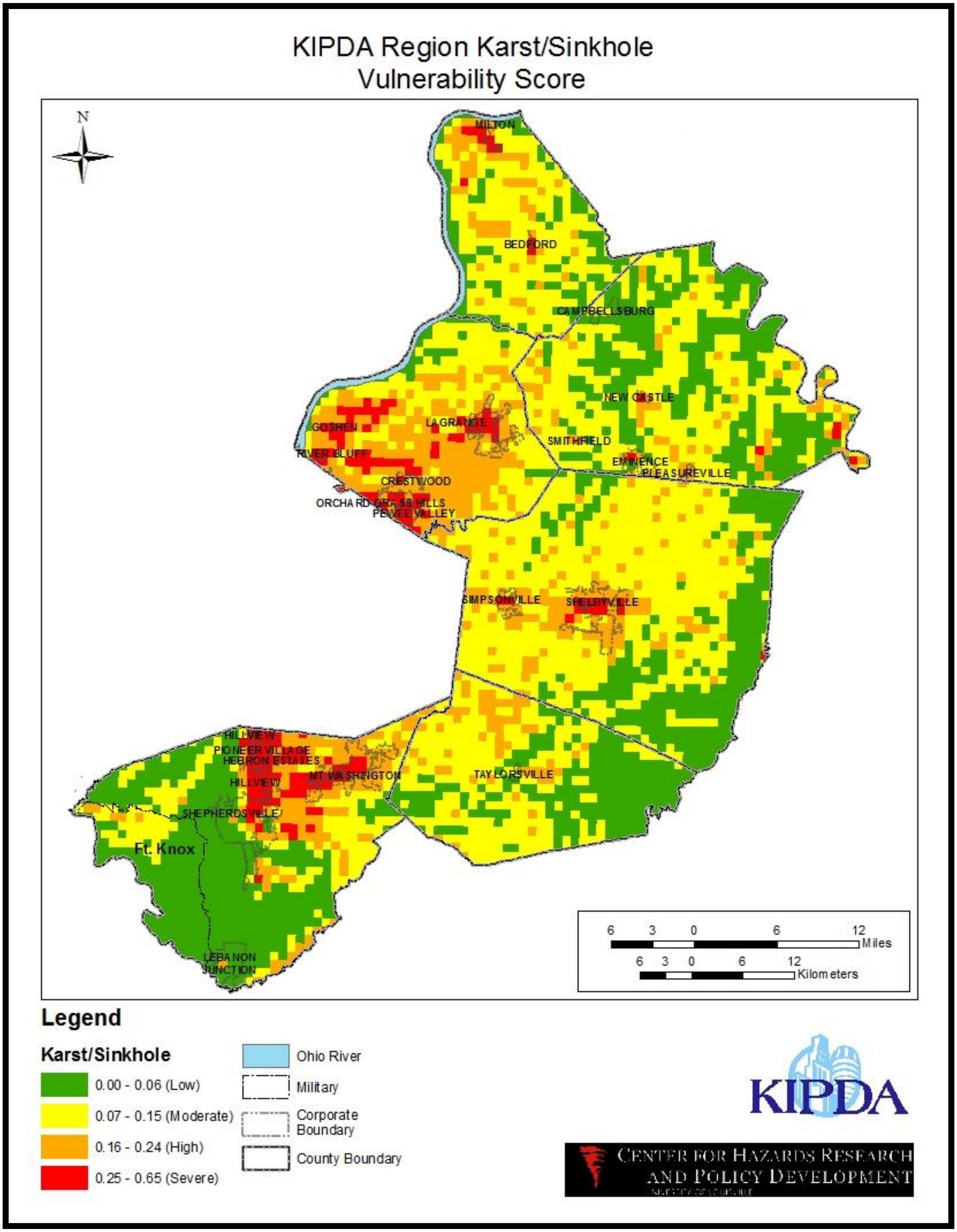
Karst/Sinkhole Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to karst/sinkhole was determined through first calculating the Karst/Sinkhole Hazard Score. The Karst/Sinkhole Hazard Score was calculated by studying two (2) sources of data. Each of the datasets was provided by the Kentucky Geological Survey (KGS). The first layer used to create the Karst/Sinkhole Hazard Score was the KGS developed Minor and Major karst GIS layer. The KGS karst layer displays a geo-referenced data layer that depicts where karst is located. To analyze the KIPDA Region's risk to karst/sinkhole, the karst layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the karst layer covered within each grid. This percentage of area affected by the mapped karst potential area was then calculated and scored 0-1 to develop 50% of the Karst/Sinkhole Hazard Score.

The next step was determined by calculating the percent area affected by a sinkhole polygon GIS layer provided by KGS. This data displayed where concentrations of sinkhole events have occurred, thus producing areas of risk. The KGS sinkhole layer displays a geo-referenced data layer that depicts where sinkholes have occurred. To analyze the KIPDA Region's risk to karst/sinkhole, the sinkhole layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the sinkhole layer covered within each grid. This percentage of area affected by the mapped sinkhole areas was then calculated and scored 0-1 to develop 50% of the Karst/Sinkhole Hazard Score.

The Karst/Sinkhole Hazard Score was then calculated by adding the two (2) scores together and scored 0-1. It is important to note if the Karst/Sinkhole Hazard Score inputs equaled 0, then the Karst/Sinkhole Hazard Vulnerability Score equaled 0.

Finally, the Karst/Sinkhole Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Karst/Sinkhole Hazard Score and then scored 0-1. Once the final Karst/Sinkhole Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, and 4. Severe) which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Karst/Sinkhole
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Karst/Sinkhole
0.00 - 0.06 (Low)
0.07 - 0.15 (Moderate)
0.16 - 0.24 (High)
0.25 - 0.65 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: KARST/SINKHOLE

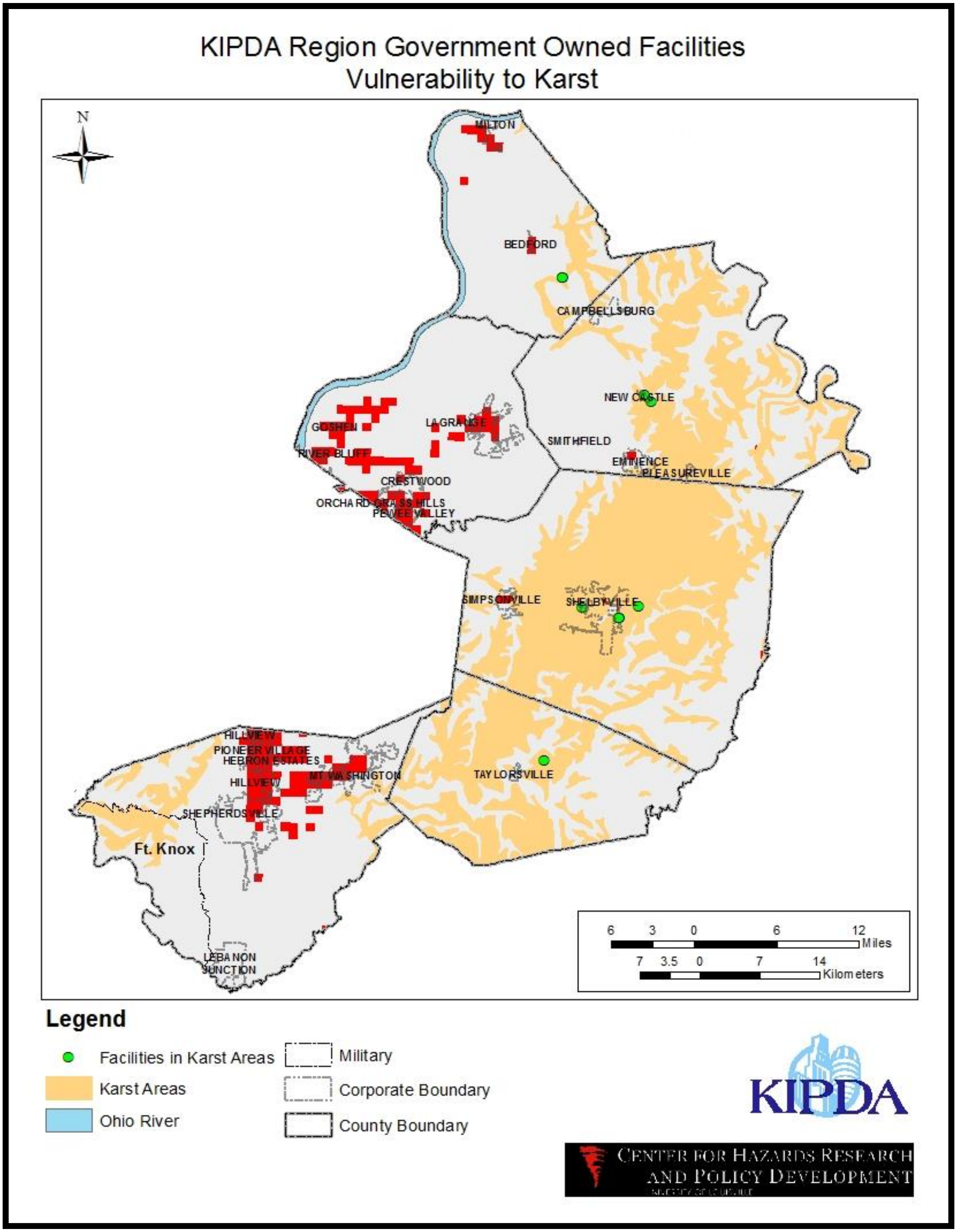
The process for potential loss vulnerability and loss estimation is very similar to the process explained above. The chart below shows an individual county estimate that includes the Number of Occurrences, Total Losses for the County, Annual Rate of Occurrence, Average Loss, Average Annual Risk, and Years measured. Due to lack of start and end dates, the ability to calculate an exact amount for losses and time cannot be accurately measured.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Karst	402	Unknown	Unknown	Unknown	Unknown	55
Henry	Karst	113	Unknown	Unknown	Unknown	Unknown	55
Oldham	Karst	495	Unknown	Unknown	Unknown	Unknown	55
Shelby	Karst	138	Unknown	Unknown	Unknown	Unknown	55
Spencer	Karst	21	Unknown	Unknown	Unknown	Unknown	55
Trimble	Karst	484	Unknown	Unknown	Unknown	Unknown	55
Total		**1653**	**$0**	**0.00**	**$0**	**$0**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF GOVERNMENT OWNED FACILITIES: KARST/SINKHOLE

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The KGS Karst boundary map was used as the hazard layer for Karst. The government owned facilities were placed into a GIS mapping session and overlaid onto the KGS Karst boundary map. The government owned facilities captured within each Karst hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Karst event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Karst hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	1	$448,596.00
Henry	0	$0.00
Oldham	43	$42,510,282.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Karst
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12
Miles
7 3.5 0 7 14
Kilometers
Legend
Facilities in Karst Areas
Karst Areas
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH
AND POLICY DEVELOPMENT

LANDSLIDE

HAZARD IDENTIFICATION: LANDSLIDE

DESCRIPTION

Landslides are the downslope movement of rock, soil, or both under the influence of gravity. This type of mass movement and the type of earth material involved can vary. Landslides can occur in landscapes ranging from gentle slopes to steep cliffs. Velocity of landslide movement can also vary from slow to very rapid.

Landslides occur when gravity exceeds the strength of earth materials that compose the slope. Some landslide triggering mechanisms include:

Intense rainfall – Soil and rock material on slopes may have high moisture levels, increasing pore-water pressure, which destabilizes the slope and causes slides. Subsequently, surface-water erosion may also cause landslides.

Earthquakes – Ground shaking during earthquakes can cause landslides in many different topographic and geologic settings.

Water-level change – Rapid lowering of groundwater against a slope can trigger landslides, especially along dams, coastlines, reservoirs, and rivers. The pore pressure in soil or rock material may not be able to adjust to a sudden drawdown of water causing slope instability.

Human activities – Many destabilizing activities may trigger landslides. These include vegetation removal, surface and underground mining, excavation of toe slopes, loading on a slope, and leakage from pipes.

Geology – Easily weathered rock types and soils, especially on steep slopes, combined with the triggers listed above are susceptible to landslides.

TYPES

The type of landslide can be determined by the material involved and the mode of movement. The following table provides a classification system based on these parameters.

TYPE OF MOVEMENT		TYPE OF MATERIAL		
		BEDROCK	ENGINEERING SOILS	
			Predominantly coarse	Predominantly fine
FALLS		Rock fall	Debris fall	Earth fall
TOPPLES		Rock topple	Debris topple	Earth topple
SLIDES	ROTATIONAL	Rock slide	Debris slide	Earth slide
	TRANSLATIONAL			
LATERAL SPREADS		Rock spread	Debris spread	Earth spread
FLOWS		Rock flow (deep creep)	Debris flow (soil creep)	Earth flow
COMPLEX		Combination of two or more principal types of movement		

A following are descriptions of the different landslide types with a corresponding diagram.

SLIDES - Although many types of mass movements are included in the general term "landslide," the more restrictive use of the term refers only to mass movements, where there is a distinct zone of weakness that separates the slide material from more stable underlying material. The two major types of slides are rotational slides and translational slides. Rotational slide: This is a slide in which the surface of rupture is curved concavely upward and the slide movement is roughly rotational about an axis that is parallel to the ground surface and transverse across the slide (A). Translational slide: In this type of slide, the landslide mass moves along a roughly planar surface with little rotation or backward tilting (B). A block slide is a translational slide in which the moving mass consists of a single unit or a few closely related units that move downslope as a relatively coherent mass (C).

FALLS - Falls are abrupt movements of masses of geologic materials, such as rocks and boulders that become detached from steep slopes or cliffs (D). Separation occurs along discontinuities such as fractures, joints, and bedding planes, and movement occurs by free-fall, bouncing, and rolling. Falls are strongly influenced by gravity, mechanical weathering, and the presence of interstitial water.

TOPPLES - Toppling failures are distinguished by the forward rotation of a unit or units about some pivotal point, below or low in the unit, under the actions of gravity and forces exerted by adjacent units or by fluids in cracks (E).

FLOWS - There are five basic categories of flows that differ from one another in fundamental ways.

a. Debris flow: A debris flow is a form of rapid mass movement in which a combination of loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope (F). Debris flows include <50% fines. Debris flows are commonly caused by intense surface-water flow, due to heavy precipitation or rapid snowmelt that erodes and mobilizes loose soil or rock on steep slopes. Debris flows also commonly mobilize from other types of landslides that occur on steep slopes, are nearly saturated, and consist of a large proportion of silt- and sand-sized material. Debris-flow source areas are often associated with steep gullies, and debris-flow deposits are usually indicated by the presence of debris fans at the mouths of gullies. Fires that denude slopes of vegetation intensify the susceptibility of slopes to debris flows.

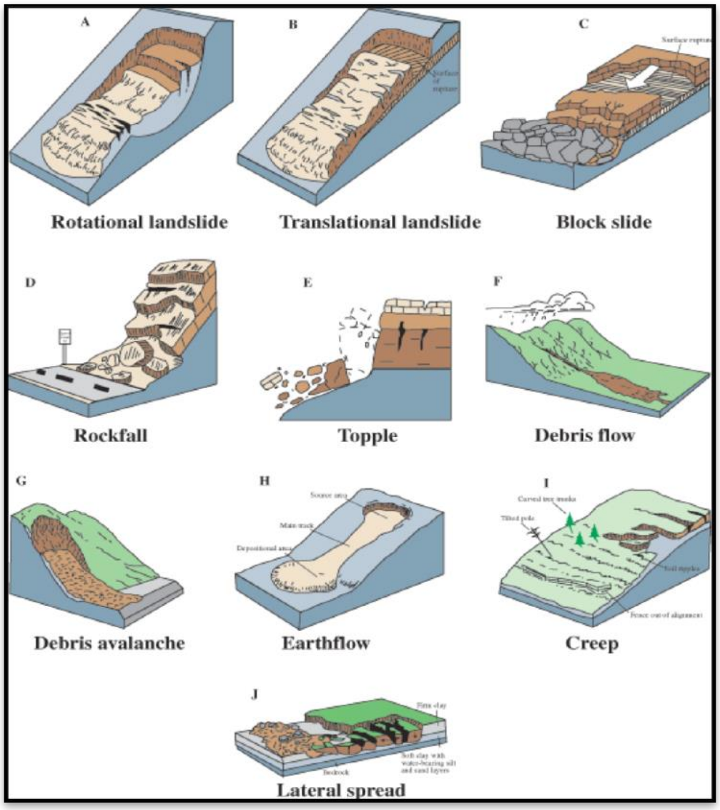
b. Debris avalanche: This is a variety of very rapid to extremely rapid debris flow (G).

c. Earthflow: Earthflows have a characteristic "hourglass" shape (H). The slope material liquefies and runs out, forming a bowl or depression at the head. The flow itself is elongate and usually occurs in fine-grained materials or clay-bearing rocks on moderate slopes and under saturated conditions. However, dry flows of granular material are also possible.

d. Mudflow: A mudflow is an earthflow consisting of material that is wet enough to flow rapidly and that contains at least 50 percent sand-, silt-, and clay-sized particles. In some instances, for example in many newspaper reports, mudflows and debris flows are commonly referred to as "mudslides."

e. Creep: Creep is the imperceptibly slow, steady, downward movement of slope-forming soil or rock. Movement is caused by shear stress sufficient to produce permanent deformation, but too small to produce shear failure. There are generally three types of creep: (1) seasonal, where movement is within the depth of soil affected by seasonal changes in soil moisture and soil temperature; (2) continuous, where shear stress continuously exceeds the strength of the material; and (3) progressive, where slopes are reaching the point of failure as other types of mass movements. Creep is indicated by curved tree trunks, bent fences or retaining walls, tilted poles or fences, and small soil ripples or ridges (I).

LATERAL SPREADS- Lateral spreads are distinctive because they usually occur on very gentle slopes or flat terrain (J). The dominant mode of movement is lateral extension accompanied by shear or tensile fractures. The failure is caused by liquefaction, the process whereby saturated, loose, cohesionless sediments (usually sands and silts) are transformed from a solid into a liquefied state. Failure is usually triggered by rapid ground motion, such as that experienced during an earthquake, but can also be artificially induced. When coherent material, either bedrock or soil, rests on materials that liquefy, the upper units may undergo fracturing and extension and may then subside, translate, rotate, disintegrate, or liquefy and flow. Lateral spreading in fine-grained materials on shallow slopes is usually progressive. The failure starts suddenly in a small area and spreads rapidly. Often the initial failure is a slump, but in some materials movement occurs for no apparent reason. Combination of two or more of the above types is known as a complex landslide.



(United States Geological Survey)

FACTS

- Landslides are a serious geologic hazard common to nearly every state in the United States.
- While mudflows are covered by flood insurance policies from the National Flood Insurance Program, landslides are not.
- An estimated 40% of the U.S. population has been exposed to the direct or indirect effects of landslides.
- Landslides are often caused by land mismanagement
- Landslide warning signs include cracks opening on hillslopes, evidence of slow downhill movement of rock and soil, and tilting of trees, poles, or walls.
- The typical speed of a landslide is 10 mph, but can exceed 35 mph.

IMPACTS

The primary impact of a landslide is the damage it can cause acres of property and the destruction of buildings and homes; additionally a landslide event can result in death. On average, 25 to 50 deaths a year in the United States are attributed to landslides while an estimated $2 billion in damages occur annually.

Direct costs of landslides include repair and maintenance of roads and property. Indirect costs are in the form of loss of tax revenue on property devalued because of the landslide, loss of real estate value in landslide-prone area, and environmental effects such as water quality are all significant and may even exceed direct costs. Landslides can provoke associated dangers such as broken electrical, water, gas, and sewage lines and can disrupt roadways and railways.

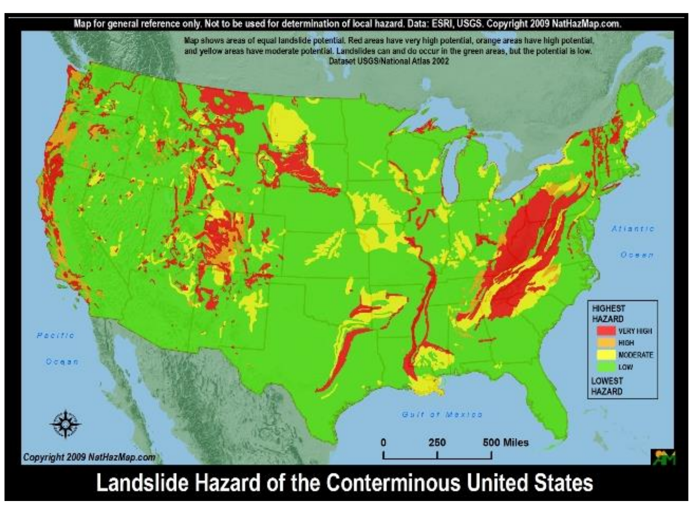
HAZARD PROFILE: LANDSLIDE

PROFILE RISK TABLE

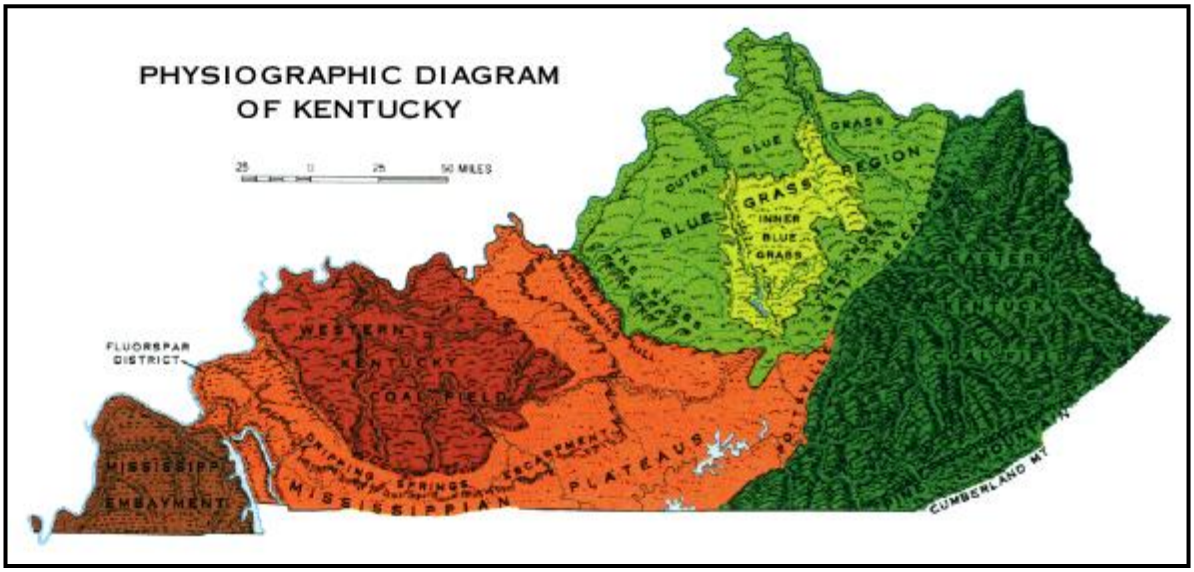
Hazard: Landslide	
Period of occurrence:	At any time. Chance of occurrence increases after heavy rainfall, snow melt, or construction and mining activities.
Number of officially recorded events: SHELDUS and KY Geological Survey (1975-2015)	40
Annual Rate of Occurrence:	0.73
Warning time:	Days to months, depends on inspection for weakness in rock and soil.
Potential impacts:	Economic losses such as decreased land values, infrastructure damage, and agro-business losses. May cause minimal to severe property damage and destruction.
Recorded losses:	$4,555
Annualized Loss:	$651
Extent:	Data Currently Unavailable related to a physical standard by which to compare landslide hazard events: Measured in Mercalli Scale

GEOGRAPHIC LOCATIONS AFFECTED

Landslides in the United States occur in all 50 States. The primary regions of landslide occurrence and potential are the coastal and mountainous areas of California, Oregon, and Washington, the States comprising the intermountain west in the Rocky Mountains, and the mountainous and hilly regions of the Eastern United States along the Appalachian Mountains. Alaska and Hawaii also experience all types of landslides. Any area composed of very weak or fractured materials resting on a steep slope can and will likely experience landslides. The map below shows landslide susceptibility in the Continental United States.

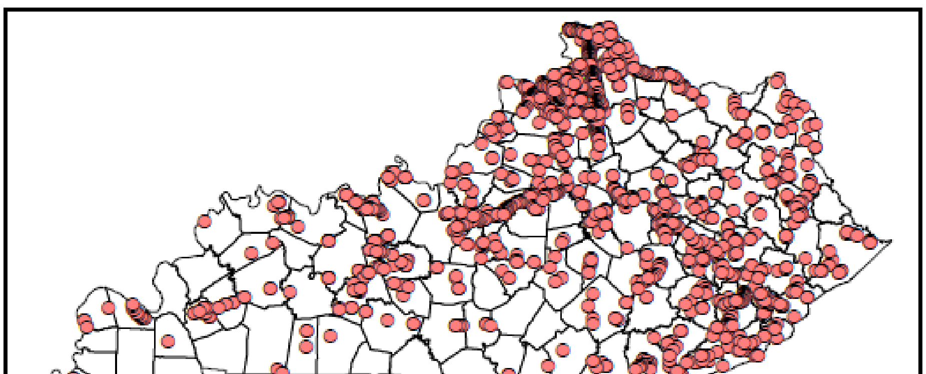


Landslides in Kentucky occur in all regions of the state, but mostly in the Ohio River Valley, the Knobs, the Outer Bluegrass, and the majority occurring in the Eastern Kentucky Coal Field



PREVIOUS OCCURRENCES

Since the early 1970’s, the Kentucky Transportation Cabinet has received reports of approximately 3,000 landslides, displayed in the figure below. The costs to repair damage caused by these landslides have exceeded $2 million annually. There are still thousands of slides that are unrelated to transportation and often these go unreported although they still pose a significant hazard to citizens and infrastructure. From 2005-2007 alone, the Kentucky State Emergency Management office spent $617,466.



Over 3,000 landslide locations from the Kentucky Transportation Cabinet. However, there are many landslides that are unrelated to roads or highway construction and go unreported.

Of the approximately 3,000 landslides reported to the Kentucky Transportation Cabinet, 20 occurred in the KIPDA region and there were 2 additional landslides in the region that were reported by the Kentucky Geological Survey. The transportation landslide events and the estimated cost to repair are documented in the chart below followed by map of their location.

County	Year	Cost to Repair	Route Label
Bullitt	2005	$90,000	KY-44
Bullitt	2010	$131,760	KY-1417
Henry	1989	n/a	I-71
Henry	1994	$628,646	KY-389
Henry	1994	$10,000	KY-389
Henry	2004	$168,750	KY-389
Oldham	1991	n/a	KY-1664
Oldham	1998	$5,850	KY-1694
Oldham	2007	$24,750	KY-524
Oldham	2008	$45,450	KY-524
Shelby	1990	$100,000	I-64
Shelby	1991	n/a	KY-1848
Shelby	1993	n/a	I-64
Shelby	2006	n/a	US-60
Spencer	1978	$4,550	KY-55
Spencer	1992	n/a	KY-44
Spencer	1997	$64,800	KY-55
Spencer	2008	n/a	KY-1060
Trimble	1992	n/a	US-421
Trimble	2008	n/a	US-421

2014-2015

It should be noted that landslides need to be reported in order to show the impact to the region. According to the Kentucky Geological Survey (KGS), no landslides were documented for 2014 and 2015 for the KIPDA Region. This does not mean they did not occur; only that occurrences could be associated with other hazard events. Also, reporting for Kentucky, which is done through KGS, has been challenging due to other portions of the state, such as Eastern Kentucky, having several landslide events.

While the KIPDA Region does not experience high landslide events very often, one event details the hazards associated with the profile. A landslide event occurred in the early part of April in 2014 in Spencer County. While this event was recorded, it has yet to be placed in to the KGS database.

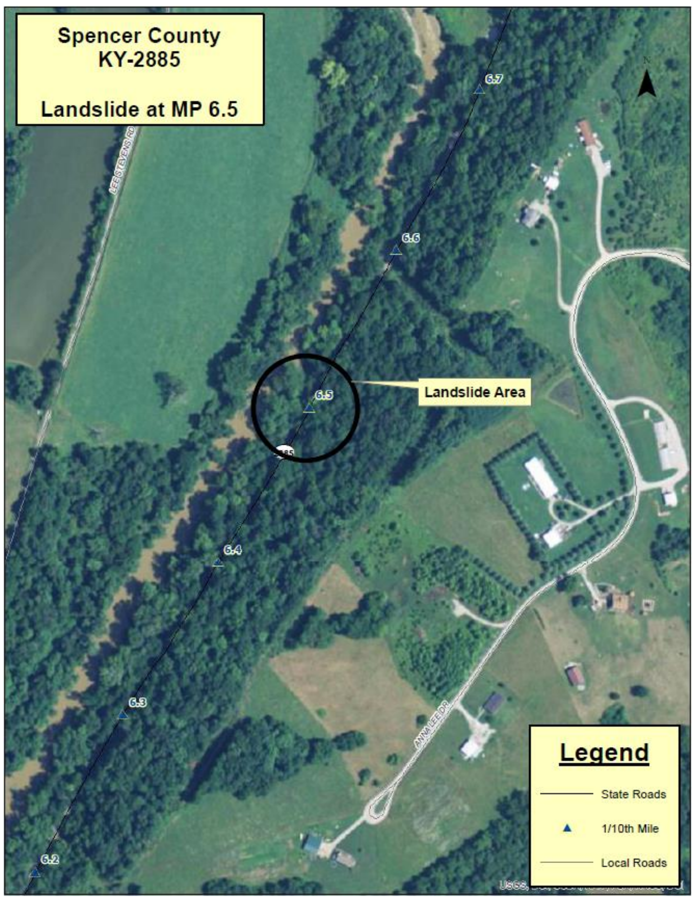
A memorandum describing the event suggested recommendations of railings reads:

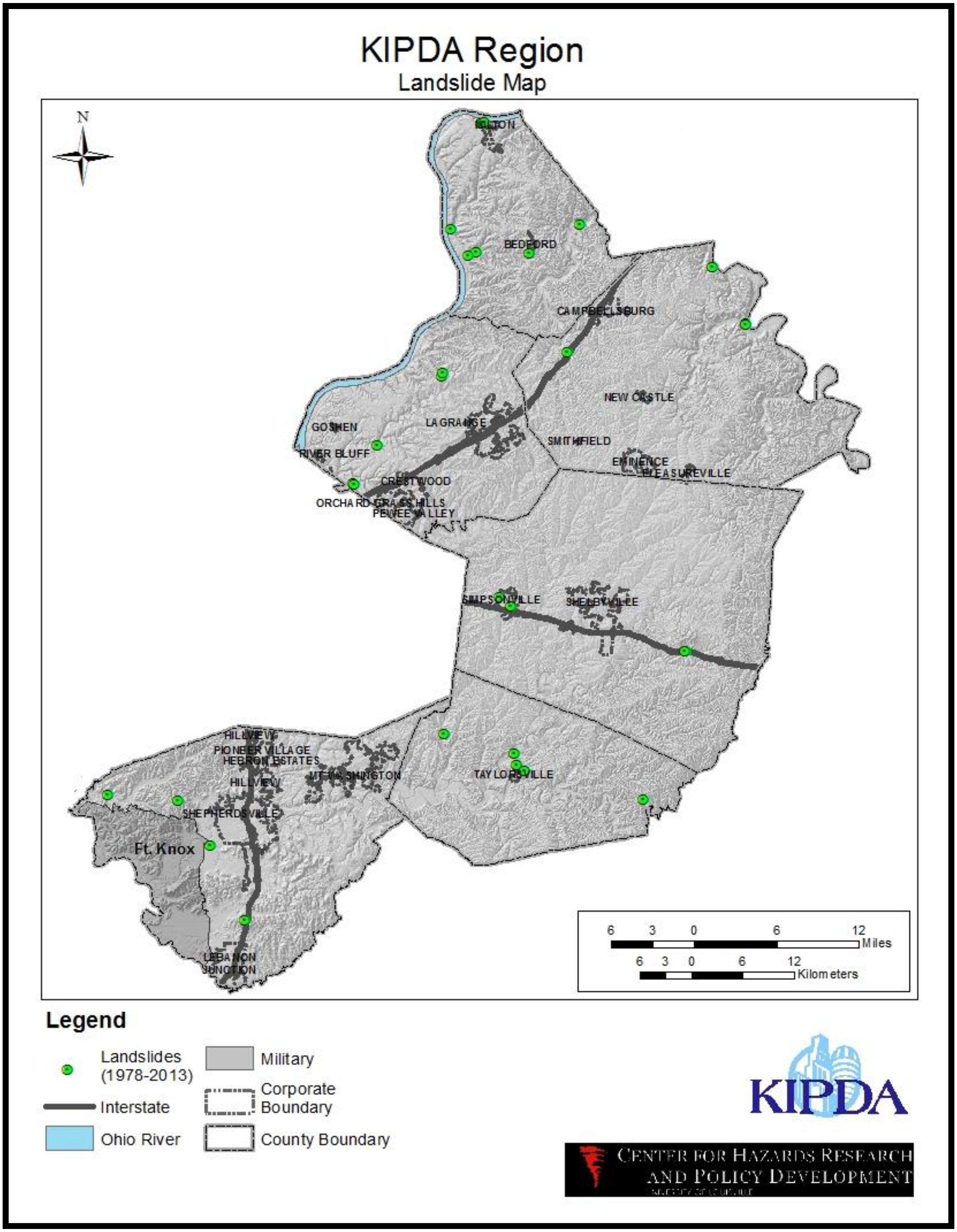
> At the request of the District, the Geotechnical Branch conducted an evaluation of a landslide located on KY 2885 in Spencer County at approximately mile point 6.5. The landslide is affecting approximately 125 feet of the roadway.

As part of the evaluation, a total of 4 rock line soundings were performed along the shoulder of the roadway to determine the depth to bedrock. Three soundings w ere performed along the southbound lane were the depths ranged from 12.8 to 13.5 and one was performed on the northbound lane were the depth was 8.5. A drawing is attached showing the results of the drilling.

The Geotechnical Branch recommends installing a single row of Drilled-In Recycled Railroad Rails at 2.0 foot centers. The rails shall have minimum nominal weight of 136 lb/yd. Use a minimum of 30 foot rails. The rails shall extend 10 feet either side of the slide. Placement from centerline shall be determined by the Engineer.

While no cost has been associated with repairing the location, the event goes to demonstrate that landslide events remain a concern in the KIPDA Region. Below is a map of the landslide event.




KIPDA Region
Landslide Map
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LA GRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT. WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Landslides (1978-2013)
Interstate
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ASSESSING VULNERABILITY BY JURISDICTION: LANDSLIDE

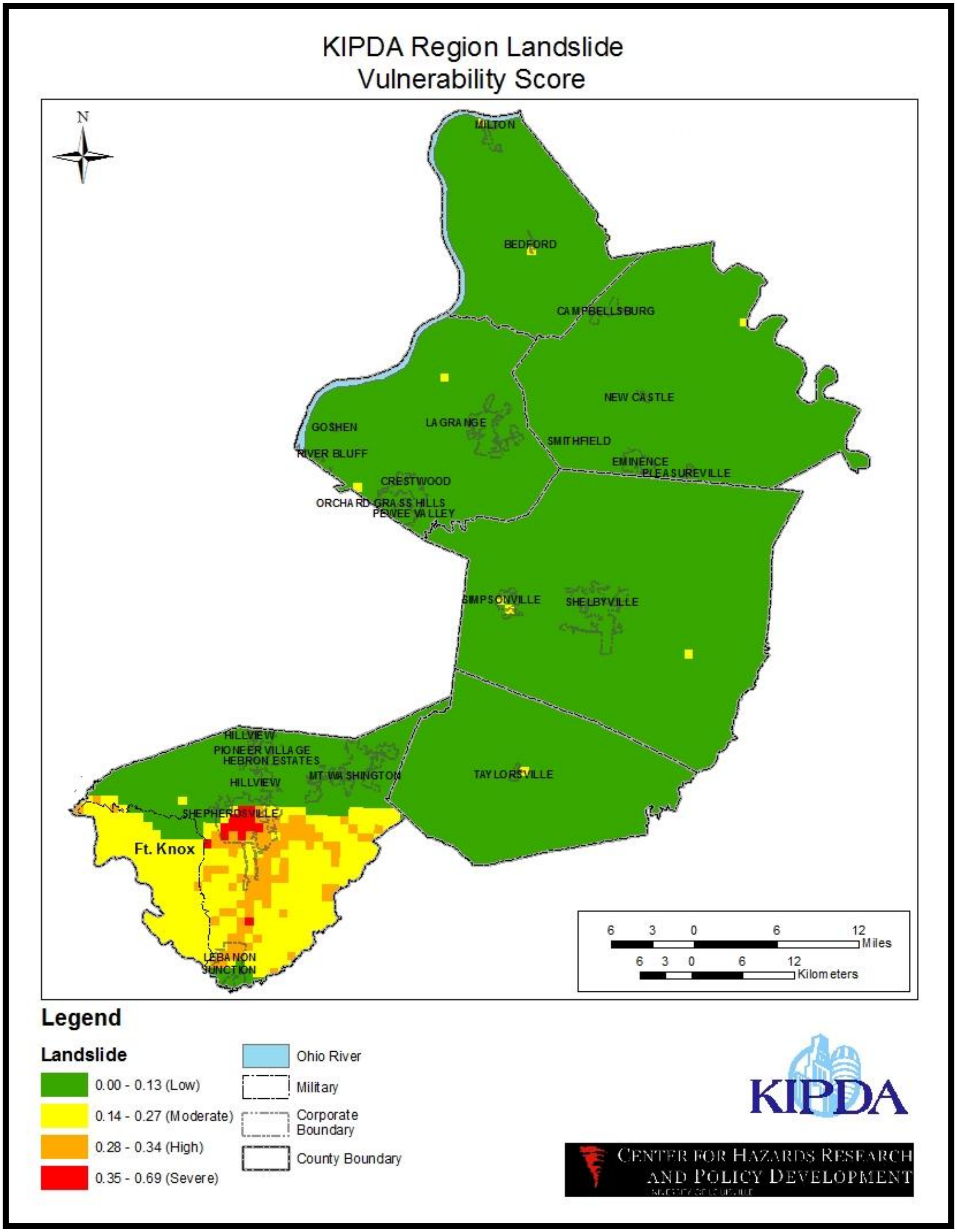
Landslide Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Landslide was determined through first calculating the Landslide Hazard Score. The Landslide Hazard Score was calculated by studying two (2) sources of data. The first layer used to create the Landslide Hazard Score was derived from the USGS Landslide Overview GIS map layer. The landslide layer displays a geo-referenced data layer that depicts where landslide susceptibility is located throughout United States. To analyze the KIPDA Region's risk to Landslide, the landslide layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the landslide layer covered within each grid. This percentage of area affected by the landslide potential areas was then calculated and scored 0-1 to develop 50% of the Landslide Hazard Score.

The next step was determined by calculating the number of landslide points. This point data acquired from KGS, displayed where concentrations of landslides have occurred, thus producing areas of risk. The KGS landslide point layer displays a geo-referenced data layer that depicts where landslides have been identified by KGS through a multitude of methods. To analyze the KIPDA Region's risk to landslide, the KGS landslide point layer was overlaid onto a map of 1 KM MGRS grids in Kentucky. Next, a calculation was computed based the total number of landslides that have occurred within each grid. The total number was then calculated for each grid and scored 0-1 to develop 50% of the Landslide Hazard Score.

The Landslide Hazard Score was then calculated by adding the two (2) scores together and scored 0-1. It is important to note if the Landslide Hazard Score inputs equaled 0, then the Landslide Hazard Vulnerability Score equaled 0.

Finally, the Landslide Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Landslide Hazard Score and then scored 0-1. Once the final Landslide Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, and 4. Severe) which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Landslide
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
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SHELBYVILLE
HILLVIEW
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MT WASHINGTON
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TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Landslide
0.00 - 0.13 (Low)
0.14 - 0.27 (Moderate)
0.28 - 0.34 (High)
0.35 - 0.69 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: LANDSLIDE

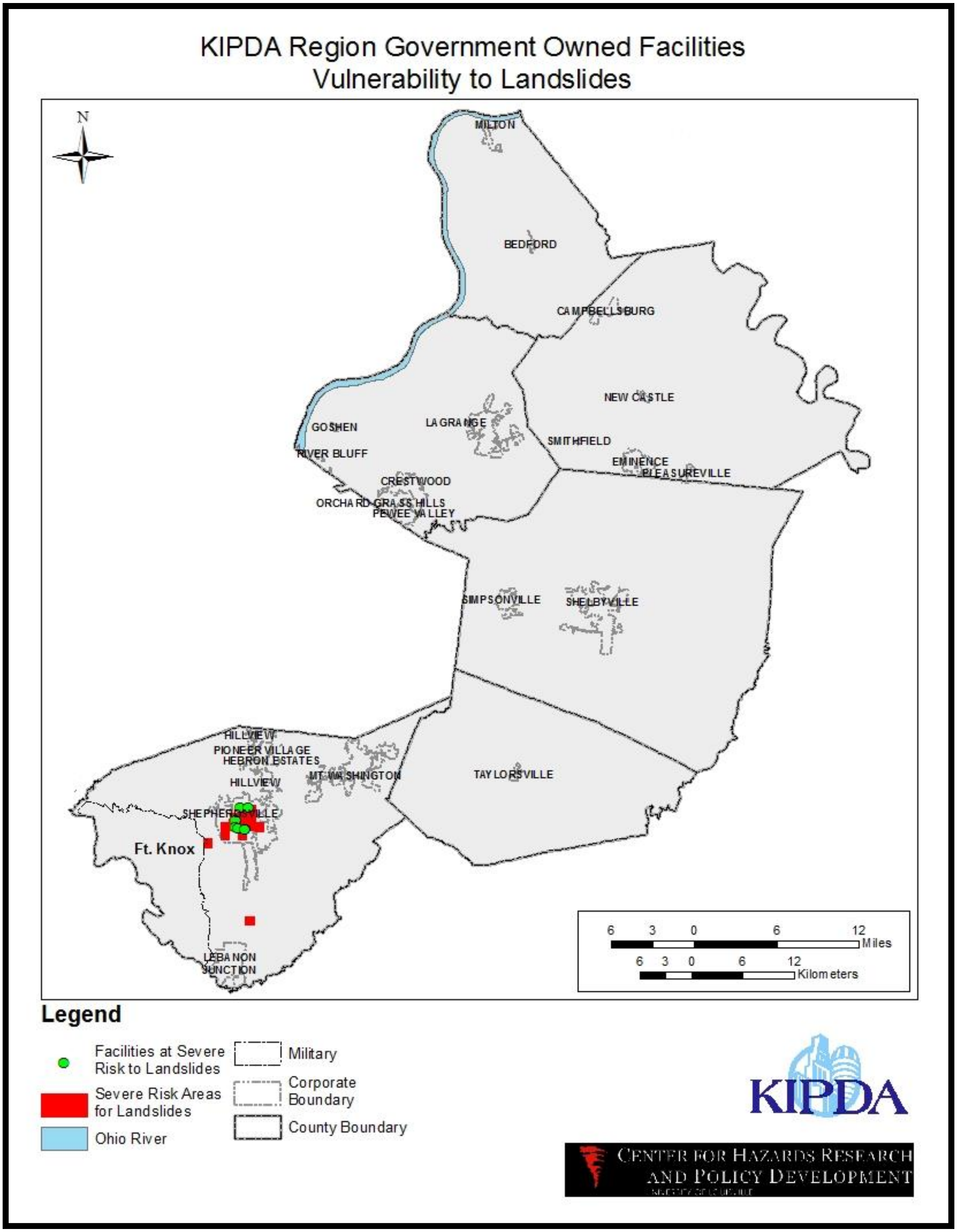
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Landslide. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Landslide.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1975-2015
Bullitt	Landslide	4	$0	0.10	$0	$0	40
Henry	Landslide	4	$0	0.10	$0	$0	40
Oldham	Landslide	5	$0	0.13	$0	$0	40
Shelby	Landslide	4	$0	0.10	$0	$0	40
Spencer	Landslide	5	$0	0.13	$0	$0	40
Trimble	Landslide	7	$4,555	0.18	$0	$114	40
Total		**29**	**$4,555**	**0.73**	**0**	**$114**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: LANDSLIDE

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Landslide boundary map was used as the hazard layer for Landslide Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Tornado boundary map. The government owned facilities captured within each Landslide hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Tornado event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Landslide hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	17	$4,062,975.00
Henry	0	$0.00
Oldham	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Landslides
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LA GRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Facilities at Severe Risk to Landslides
Severe Risk Areas for Landslides
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

SEVERE STORM

HAZARD IDENTIFICATION: SEVERE STORM

DESCRIPTION

The National Weather Service defines a *Severe Thunderstorm* as A thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or hail at least ¾" in diameter. Structural wind damage may imply the occurrence of a severe thunderstorm. A thunderstorm wind equal to or greater than 40 mph (35 knots) and/or hail of at least ½" is defined as approaching severe.

Thunderstorms are typically caused by convection that occurs when the sun has heated a large body of moist air near the ground. This air rises and is cooled by expansion. The cooling condenses the water vapor present in the air, forming a cumulus cloud aggregation of minute particles of water or ice suspended in the air. If this process continues, the summit of the cloud often attains a height of 4 miles above the base, and the top spreads out in the shape of an anvil.

The turbulent air currents within the cloud cause a continual breaking up and reuniting of the raindrops, which may form hail, and builds up strong electrical charges that result in lightning. As the storm approaches an area, the gentle flow of warm air feeding the cloud gives way to a strong, chilly gust of wind from the opposite direction, blowing from the base of the cloud. Intense rain begins and then gradually diminishes as the storm passes.

Lightning is a component of all thunderstorms and is a potential hazard to infrastructure as well has human life. Cloud-to-ground lightning can injure or kill people and destroy objects with the dangerously abundant energy it carries. Lightning may cause fires in structures or in nature given favorable conditions. Flash flooding, hail, and serious wind damage are also potential dangers associated with severe thunderstorms.

TYPES

Types of Thunderstorms as described by the National Weather Service:

- **Ordinary Cell** – As the name implies, there is usually only one cell with this type of thunderstorm. Also called a "pulse" thunderstorm, the ordinary cell consists of a onetime updraft and one time downdraft. In the towering cumulus stage, the rising updraft will suspend growing raindrops until the point where the weight of the water is greater than what can be supported.

  At which point, drag of air from the falling drops begins to diminish the updraft and, in turn, allow more raindrops to fall. In effect, the falling rain turns the updraft into a downdraft. With rain falling back into the updraft, the supply of rising moist air is cut-off and the life of the single cell thunderstorm is short.

  They are short lived and while hail and gusty wind can develop, these occurrences are typically not severe. However, if atmospheric conditions are right and the ordinary cell is strong enough, there is the potential for more than one cell to form and can include microburst winds (usually less than 70 mph) and weak tornadoes.

- **Multi-Cluster Cell** – Although there are times when a thunderstorm consists of just one ordinary cell that transitions through its life cycle and dissipates without additional new cell formation, thunderstorms often form in clusters with numerous cells in various stages of development merging together.

  While each individual thunderstorms cell, in a multi-cell cluster, behaves as a single cell, the prevailing atmospheric conditions are such that as the first cell matures, it is carried downstream by the upper level winds and new cell forms upwind of the previous cell to take its place.

  The speed at which the entire cluster of thunderstorms move downstream can make a huge difference in the amount of rain any one place receives. There are many times where the individual cell moves downstream but addition cells form on the upwind side of the cluster and move directly over the path of the previous cell. The term for this type of pattern when viewed by radar is "training echoes".

- **Multi-cell Line (Squall Line)** – Sometimes thunderstorms will form in a line which can extend laterally for hundreds of miles. These "squall lines" can persist for many hours and produce damaging winds and hail.

  Updrafts, and therefore new cells, continually re-form at leading edge of system with rain and hail following behind. Individual thunderstorm updrafts and downdrafts along the line can become quite strong, resulting in episodes of large hail and strong outflow winds which move rapidly ahead of system.

While tornados occasionally form on the leading edge of squall lines they primarily produce "straight-line" wind damage. This is damage as a result of the sheer force of the down draft forms a thunderstorm spreading horizontally as it reaches the earth's surface.

- **Supercell Thunderstorms** – Supercell thunderstorms are a special kind of single cell thunderstorm that can persist for many hours. They are responsible for nearly all of the significant tornadoes produced in the U.S. and for most of the hailstones larger than golf ball size. Supercells are also known to produce extreme winds and flash flooding.

  Supercells are highly organized storms characterized updrafts that can attain speeds over 100 miles per hour, able to produce extremely large hail and strong and/or violent tornadoes, downdrafts that can produce damaging outflow winds in excess of 100 mph - all of which pose a high threat to life and property.

  Dynamically, all supercells are fundamentally similar. However, they often appear quite different visually from one storm to another depending on the amount of precipitation accompanying the storm and whether precipitation falls adjacent to, or is removed from, the storm's updraft.

Additional types of severe storms include straight line winds. There are several terms that mean the same as straight-line winds and they are convective wind gusts, outflow and downbursts. Straight-line wind is wind that comes out of a thunderstorm. If these winds meet or exceed 58 miles per hours then the storm is classified as severe by the National Weather Service. These winds are produced by the downward momentum in the downdraft region of a thunderstorm. An environment conducive to strong straight-line wind is one in which the updrafts and thus downdrafts are strong, the air is dry in the middle troposphere and the storm has a fast forward motion

FACTS

- There are about 1800 thunderstorms occurring at any moment across the world.
- All thunderstorms produce lightening which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area.
- About 10 percent of thunderstorms are classified as severe—one that produces hail at least three-quarters of an inch in diameter, has winds of 58 miles per hour or higher, or produces a tornado.
- Chances of being struck by lightning are estimated to be 1 in 600,000, but could be reduced even further by following safety precautions.
- The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes.
- Lightning causes an average 93 deaths and 300 injuries each year

IMPACTS

Depending on the severity of the thunderstorm, there is a great risk to infrastructure that could result in total loss. Several million dollars in damage is possible.

Severe storms also put human life at risk. Lightning, potential fire hazards, structural failure due to high winds, and flash flooding re all potential hazards which may result from a severe storm all of which put the public at risk.

Dangers Associated with Thunderstorms

- Lightning
- Flash floods
- Hail
- Outflow
- Tornadoes
- Winds
- Downbursts or strong down drafts which can cause an outburst of potentially damaging winds at or near the ground
- Micro or macro-bursts

Effects of Lightning

- Fires may occur in structures such as storage and processing units, aircraft, and electrical infrastructure and components.
- Forest fires may be initiated by lightning. Half the wildfires in the western U.S. are caused by lightning.
- Injury and death to people
- 85% of lightning victims are children and young men ages 10 to 35.
- 25% of victims die and 70% of survivors suffer long term effects

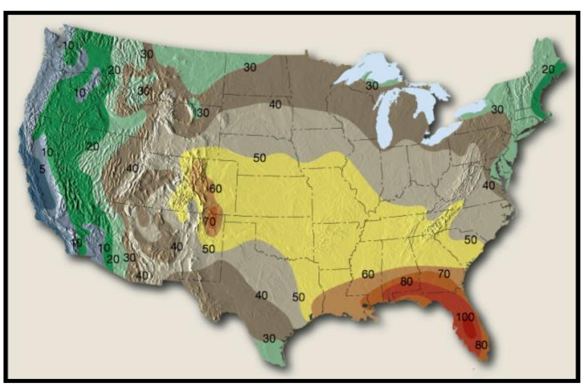
HAZARD PROFILE: SEVERE STORM

PROFILE RISK TABLE

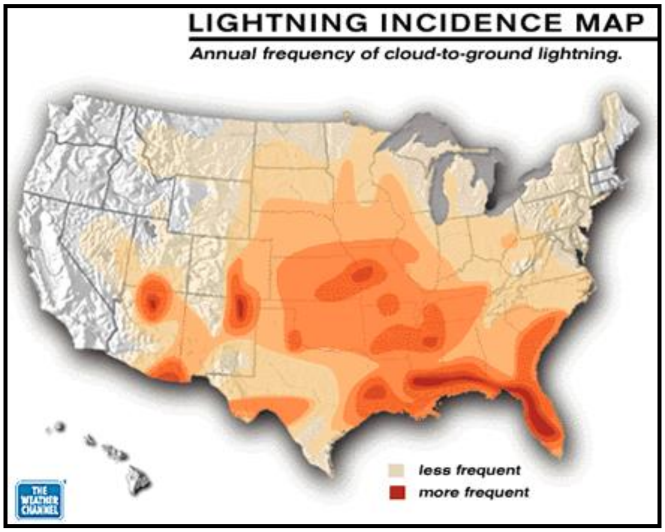
Hazard: Severe Storm	
Period of occurrence:	Spring, Summer, and Fall
Number of officially recorded events SHELUDS and NOAA: (1960-2015)	975
Annual Rate of Occurrence:	17.73
Warning time:	Minutes to hours
Potential impacts:	Utility damage and outages, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases. Impacts human life, health, and public safety
Recorded losses:	$18,865,760
Annualized Loss:	$343,014
Extent:	Date: September 14, 2008 Scale: 68 knots (kts.) Mercalli Scale/Number of Lighting Strikes/Wind Damage Damages: $168 M property, $69 M crop, 1 death, 46 injuries

GEOGRAPHIC LOCATIONS AFFECTED

The map below plots the number of annual thunderstorms across the nation. There is a high level of occurrence throughout the state of Kentucky with the Western through South Central part of the state experiencing more thunderstorms than the remainder of the state. The KIPDA region falls in the area of approximately 40 each year.



As can be seen in the map below, Kentucky and the KIPDA Region fall in an area of high occurrence of thunder storms. Severe storms present the greatest threat of all hazards to the KIPDA region in terms of frequency.

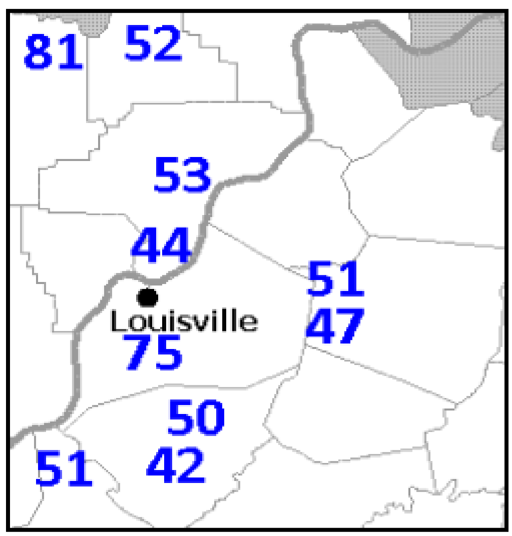


The Weather Channel map to the right shows the annual frequency of cloud-to-ground lightning. In correlation with the annual number of thunderstorms, the frequency is higher in Western through the South Central parts of the State. Cloud-to-ground lightning is the most damaging and dangerous form of lightning. Often, cloud-to-ground lightning bolts strike the highest object, like the top of a building or the top of a tall tree. The lightning strikes can cause fire and property damage. If a person is the highest object in the lightning bolt's path, the lightning may strike the person. Lightning strikes can cause severe injury or death.

PREVIOUS OCCURRENCES

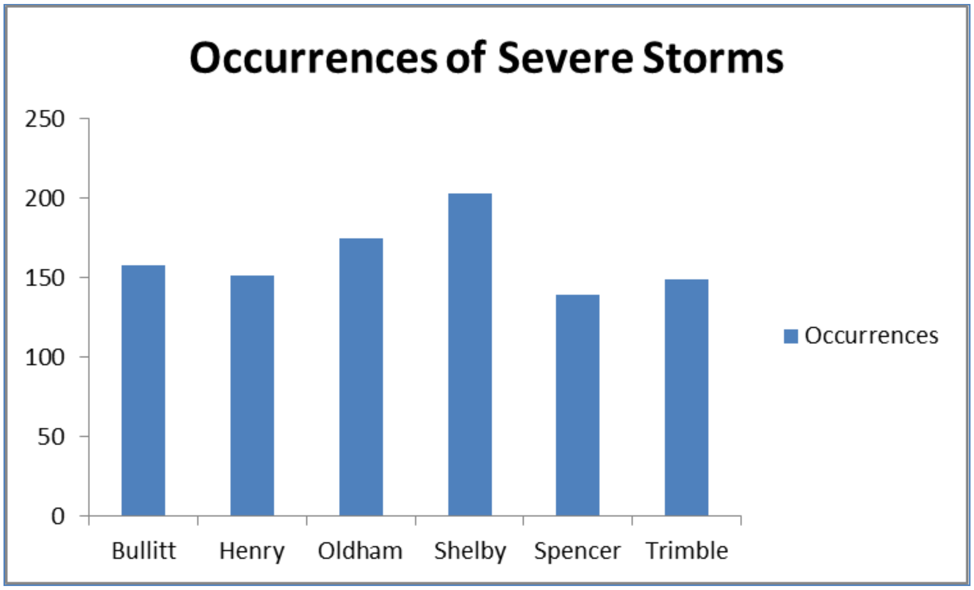
Kentucky is affected every year by severe thunderstorm systems which move across the region. As climate change and global warming continue to be areas of debate, one thing is certain: severe weather is more destructive and dangerous with each passing year.

According to NOAA's assessment of peak severe storm periods in the State, April through August have historically been the months with the highest number of severe storms, but severe storms have occurred in every month.



One of the most significant severe storms in the region was the windstorm that occurred on September 14, 2008. Remnants of Hurricane Ike combined with a cold front crossing the Ohio Valley to cause extremely strong surface winds to blow through the region. Hurricane-force wind gusts in Louisville felled countless trees and power lines. At one point, 60% of LG&E customers in the Louisville area were without power, with some folks expected to remain in the dark for up to a week. Four fatalities occurred due to falling trees and limbs. Wind gusts for this storm, shown in the onset map, reached speeds of 75 mph in Jefferson County and in the lower 50's in Bullitt and Shelby County.

Using the best possible data, according to the SHELDUS and NOAA dataset, there were 975 distinct severe storm events in the KIPDA region between 1960 and 2015 causing a total of $18,865,760 in damages. The graph below shows the number of events per county.



The KIPDA Region experiences more Severe Storm Events more than any other recorded Events (excluding Karst, whose impacts can be unknown due to damage loss). Out of the 30 Presidential Disaster Declarations since 1970 in the KIPDA Region, 23 have been because of Severe Storms, or a combination of other hazard events. The chart below demonstrates which Declared Disasters have impacted the KIPDA Region.

Disaster Declaration Number	Declaration Date	Incident Type	Counties Receiving Individual or Public Assistance
4239-DR	August 12, 2015	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Henry, Spencer, Trimble
4057-DR	March 6, 2012	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Trimble
1976-DR	May 4, 2011	Severe Storms, Tornadoes, and Flooding	Henry, Oldham, Spencer, Trimble
1925-DR	July 23, 2010	Severe Storms, Flooding, and Mudslides	Shelby
1912-DR	May 11, 2010	Severe Storms, Flooding, Mudslides, and Tornadoes	Henry, Trimble
1855-DR	August 14, 2009	Severe Storms, Straight-line Winds, and Flooding	Trimble
1802-DR	October 9, 2008	Severe Wind Storm Associated with Tropical Depression Ike	Bullitt, Shelby, Trimble
1757-DR	May 19, 2008	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	Spencer
1746-DR	February 21, 2008	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Shelby, Spencer
3231-EM	September 10, 2005	Hurricane Katrina Evacuation	Bullitt, Henry, Oldham Shelby, Spencer, Trimble
1537-DR	August 6, 2004	Severe Storms and Flooding	Shelby, Spencer
1523-DR	June 10, 2004	Severe Storms, Tornadoes, Flooding, and Mudslides	Bullitt, Henry, Oldham, Shelby, Spencer, Trimble
1471-DR	June 3, 2003	Severe Storms, Flooding, mud and Rock Slides, and Tornadoes	Bullitt
1454-DR	March 14, 2003	Severe Winter Ice and Snow Storms, Heavy Rain, Flooding, Tornadoes, and Mud and Rock Slides	Shelby, Spencer
1320-DR	February 28, 2000	Severe Storms and Flooding	Oldham
1310-DR	January 10, 2000	Tornadoes, Severe Storms, Torrential Rains, and Flash Flooding	Spencer
1163-DR	March 4, 1997	Severe Storms and Flooding	Bullitt, Henry, Oldham, Shelby, Spencer, Trimble
1117-DR	June 1, 1996	Severe Storms and Tornadoes	Bullitt, Spencer
893-DR	January 29, 1991	Severe Storms and Flooding	Trimble
821-DR	February 24, 1989	Severe Storms and Flooding	Bullitt, Henry, Trimble
568-DR	December 12, 1978	Severe Storms and Flooding	Bullitt, Henry, Oldham, Trimble
332-DR	May 15, 1972	Severe Storms and Flooding	Bullitt
288-DR	June 5, 1970	Severe Storms and Flooding	Bullitt

ASSESSING VULNERABILITY BY JURISDICTION: SEVERE STORM

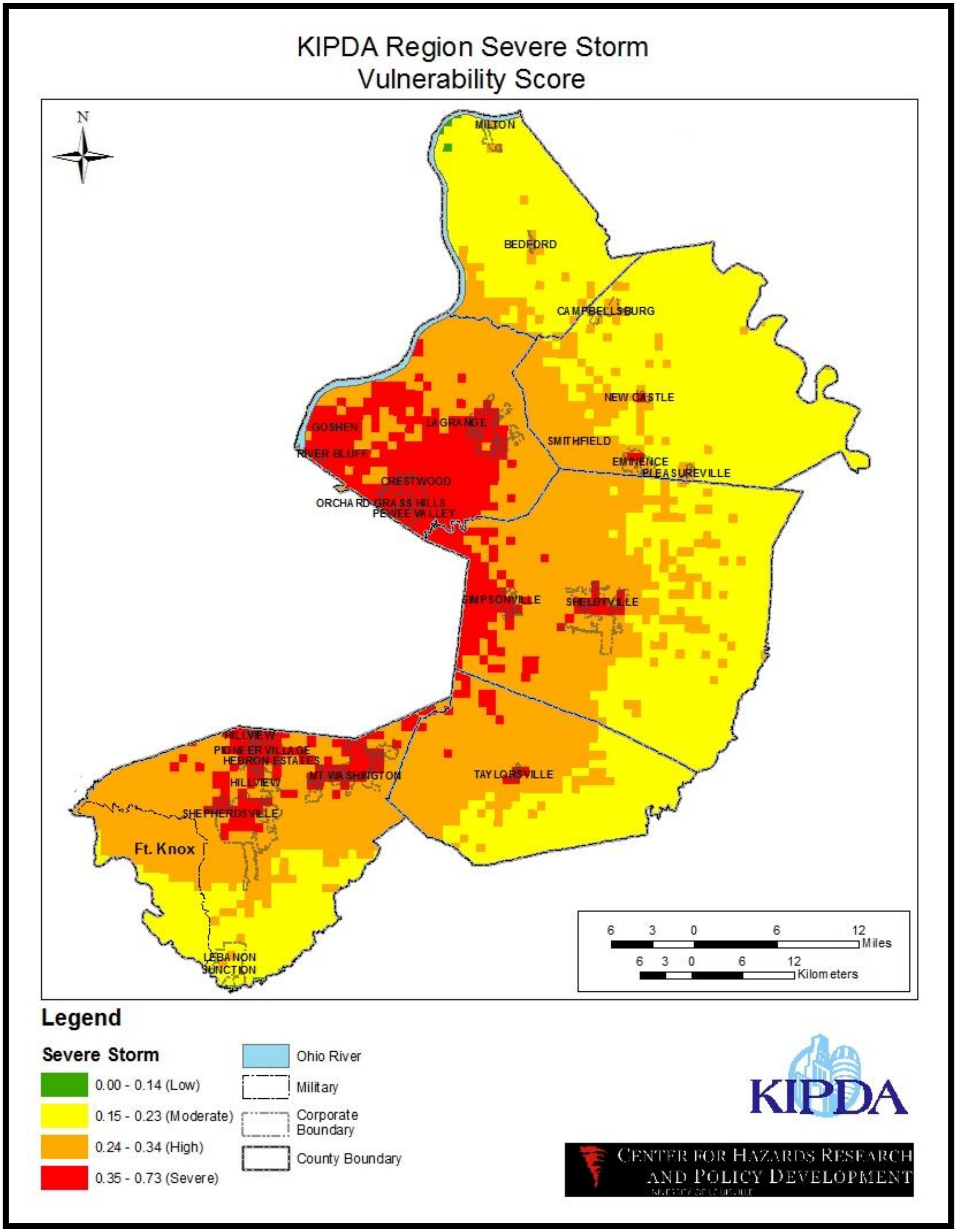
Severe Storm Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Severe Storm was determined through first calculating the Severe Storm Hazard Score. The Severe Storm Hazard Score was calculated by studying two (2) specific sources of data. The two (2) data layers used to create the Severe Storm Hazard Score were collected from the National Weather Service SVRGIS wind point (1955-2012) and wind swath (2006-2012) GIS data layers. This GIS point data was combined to create the baseline for the Severe Storm Hazard Score.

For analyzing this data CHR and the KIPDA Hazard Mitigation Committee used a 25 mile radius to calculate each 1 KM MGRS grids geographic risk from a severe storm event. The 25-mile radius was selected because that is the distance that the National Weather Service uses when producing severe weather alerts and probability maps. Basically, the 25 mile radius reduces the white noise and randomness present in atmospheric event data, which enables a meaningful picture of the risk to each grid, built based on historic rates of occurrence in the area. These 25 mile radiuses create map layers that were used as the base map layer for Severe Storm Hazard Score.

To analyze the KIPDA Region's risk to Severe Storm, the county 25 mile radius Severe Storm layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the total number of severe storm events that occurred within a 25 mile radius of each grid. Each grid was then calculated and scored 0-1 to develop the Severe Storm Hazard Score.

The Severe Storm Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Severe Storm Hazard Score and then scored 0-1. Once the final Severe Storm Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe), which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Severe Storm
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON
JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Severe Storm
0.00 - 0.14 (Low)
0.15 - 0.23 (Moderate)
0.24 - 0.34 (High)
0.35 - 0.73 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: SEVERE STORM

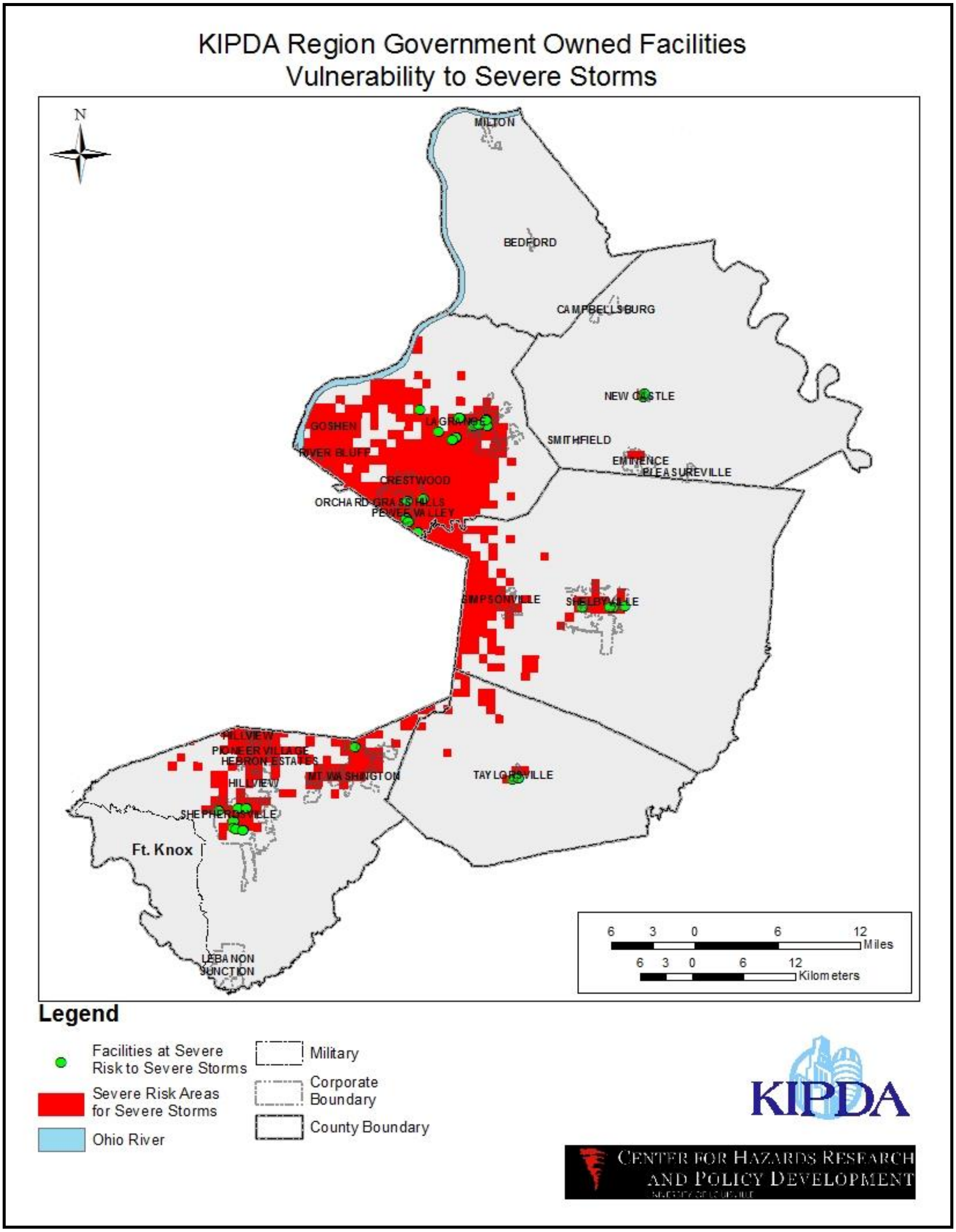
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Severe Storm. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Severe Storm.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Severe Storm	158	$2,916,686	2.87	$18,460	$53,031	55
Henry	Severe Storm	151	$3,810,068	2.75	$25,232	$69,274	55
Oldham	Severe Storm	175	$3,539,769	3.18	$20,227	$64,359	55
Shelby	Severe Storm	203	$3,779,263	3.69	$18,617	$68,714	55
Spencer	Severe Storm	139	$1,743,812	2.53	$12,545	$31,706	55
Trimble	Severe Storm	149	$3,076,162	2.71	$20,645	$55,930	55
Total		**975**	**$18,865,760**	**17.73**	**$115,727**	**$343,014**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: SEVERE STORM

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Severe Storm boundary map was used as the hazard layer for Severe Storm Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Tornado boundary map. The government owned facilities captured within each Severe Storm hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Tornado event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Severe Storm hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	0	$0.00
Henry	0	$0.00
Oldham	206	$226,089,355.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Severe Storms
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
SMITHFIELD
EMINENCE
PLEASUREVILLE
GOSHEN
LAGRANGE
RIVER BLUFF
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
SHEPHERDSVILLE
TAYLORSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Severe Storms
Severe Risk Areas for Severe Storms
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

SEVERE WINTER STORM

HAZARD IDENTIFICATION: SEVERE WINTER STORM

DESCRIPTION

Severe winter storms can produce an array of hazardous weather conditions, including **heavy snow, freezing rain and ice, high winds** and **extreme cold.** Severe winter storms are usually extra-tropical cyclones (storms that form outside of the warm tropics) fueled by strong temperature gradients and an active upper-level cold jet stream. Winter storms can paralyze a community by shutting down normal day-to-day operations, as accumulating snow and ice result in downed trees, power outages and blocked or hazardous transportation routes. Heavy snow can also lead to the collapse of weak roofs or unstable structures. Frequently the loss of electric power means loss of heat for residents, which poses a significant threat to human life, particularly the elderly. Winter Storms also make the response and recovery efforts more difficult and needs for specialized equipment.

A severe storm is defined as one that produces six inches or more of snow in 48 hours or less, or damaging ice over 5,000 square miles.

TYPES

There are two types of winter storms that affect Kentucky and the KIPDA Region.

Blizzards are characterized by low temperatures, usually following below 20 degrees Fahrenheit, and accompanied by winds that are 30 mph or greater. The amount of following and/or blowing snow reduces visibility to ¼ mile or less for at least three hours. During a *severe blizzard*, temperatures are at or below 10 degrees Fahrenheit with winds exceeding 45 mph and visibility reduced to zero due to snow. These storm systems most often form when the jet stream dips far to the south, allowing cold air from the north to clash with warm air from the south. The blizzard conditions develop on the Northwest Side of these storm systems.

Ice Storms occur when freezing rain accumulate to at least ¼ inch or more. The freezing rain is caused by rain droplets that encounter freezing or sub-freezing temperatures on the surface. The rain freezes on contact with the ground or on objects near the surface. Ice accumulates on roads, tree limbs, power lines, etc. as the rain freezes creating hazardous driving conditions and power outages.

FACTS

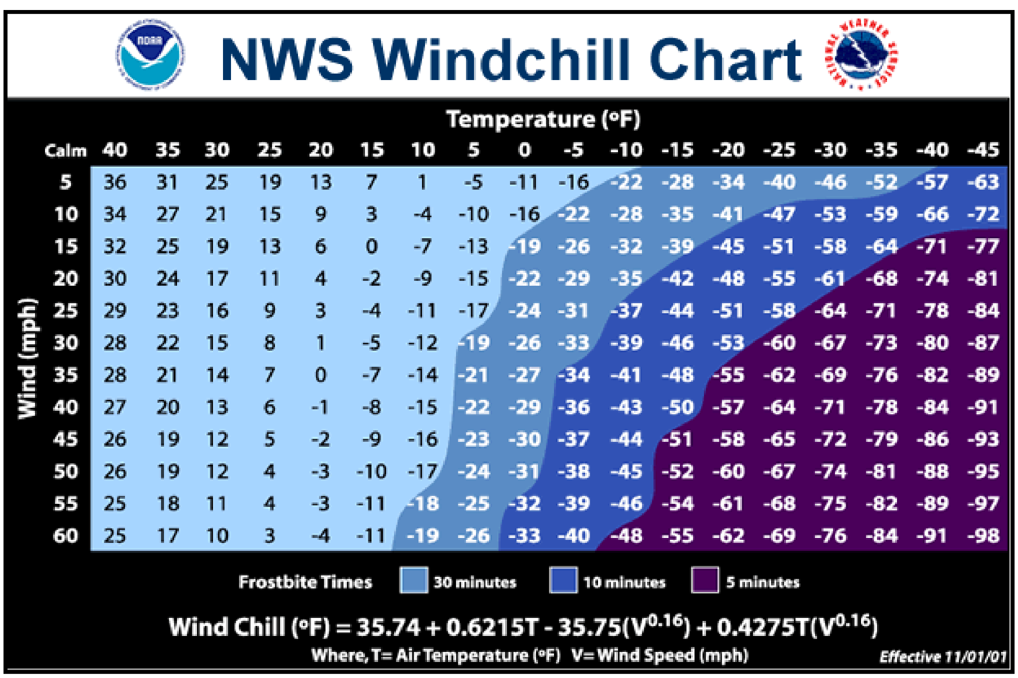
- Heavy snowfall and extreme cold can immobilize an entire region. Even areas which normally experience mild winters can be hit with a major snow or ice storm or by extreme cold.
- A *WINTER STORM WATCH* means hazardous winter weather conditions may affect your area.
- A *WINTER STORM WARNING* means hazardous winter weather conditions are threatening your area.
- Every state in the continental United States and Alaska has been impacted by severe winter storms.
- Of ice and snow related deaths, 70% are automobile related while 25% are people caught out in the storm.
- Of deaths related to exposure to the cold, 50% are over 60 years old and 70% are male with 20% occurring in the home.
- Power outages can result when snow and ice accumulation on trees cause branches and trunks to break and fall onto vulnerable power lines. Blackouts vary in size from one street to an entire city.
- Extreme cold temperatures may lead to frozen water mains and pipes, damaged car engines, and prolonged exposure to cold resulting in frostbite.
- Flooding may occur after precipitation has accumulated and then temperatures rise once again which melts snow and ice. In turn, as more snow and ice accumulate, the threat of flooding increases.
- Snow and ice accumulation on roadways can cause severe transportation problems in the form of extremely hazardous roadway conditions with vehicles losing control, collisions, and road closures.

IMPACTS

Heavy snow and ice accumulation on trees and power lines can result in power outages that can vary in size with the possibility of them affecting anywhere between street level to an entire city. Depending on the severity of the outage, it could last from only hours to weeks. The snow and ice accumulation on roadways can result in severe transportation problems due to the extremely dangerous road conditions. Vehicular accidents and road closures are common. Additionally, the snow and ice accumulation can shutdown air travel due to unsafe runway conditions.

The impact of a winter storm may be felt well after the storm itself has passed. Critical infrastructure failure can cause additional hazards and/or hardships for people. The supply of water can be affected by frozen or broken waterlines, power outages expose people to the cold, and transportation issues could make getting to shelters and receiving emergency services difficult. Once the temperatures rise and the snow and ice begin to melt, flooding may become an issue.

The high winds associated with severe winter storms along with the cold temperatures present very hazardous situations. Our body gives off a layer of heat that protects the skin from cold temperatures. A strong wind can blow this layer away from our skin, taking away our natural defense to the cold. Thus, the wind chill temperature is the temperature that our bodies will feel when our skin is exposed to the cold temperatures and the winds of winter. Wind chill is a great predictor of such dangers as frostbite and hypothermia. Being exposed to below zero wind chills can induce frostbite within five minutes. While wind chills below minus 20 degrees can result in frostbite within a minute of exposure.


NWS Windchill Chart

Temperature (°F)

Wind (mph)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

Wind Chill (°F) = $35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

HAZARD PROFILE: SEVERE WINTER STORM

PROFILE RISK TABLE

Hazard: Severe Winter Storm	
Period of occurrence:	Historically, severe winter weather is generally experienced from December through March in Kentucky. Situations of extreme circumstance (such as snow during summer months) have occurred but are not common enough to list any other months in this period.
Number of officially recorded events SHELUDS and NOAA: (1960-2015)	249
Annual Rate of Occurrence:	4.53
Warning time:	Winter storms tend to develop and move at varying speeds across the region. Unlike thunderstorms and tornadoes, severe winter weather is less spontaneous. It is not unheard of however, for a severe winter storm system to develop quickly. Warning times vary from several days to a matter of hours, depending on weather conditions. Minutes to hours for ice
Potential impacts:	Impacts human life, health, and public safety, utility damage and outages, infrastructure damage (transportation and communication systems), structural damage, damaged or destroy critical facilities (caused by weight of precipitation: snow/ice), and hazardous material releases. Can lead to economic losses such as unemployment, decreased land values, and agribusiness losses.
Recorded losses:	$19,562,704
Annualized Loss:	$355,686
Extent:	Date: January 26 – February 13, 2009 Damages: $307 M, multiple injuries and 35 fatalities Scale: 2.5 inches of ice Scale: 13 inches of snow Inches of Ice/Inches of Snow/Freezing Temperature

GEOGRAPHIC LOCATIONS AFFECTED

Winter Storms affect, to some degree, the entire continental United States and Alaska. Different storms affect the different areas of Country. The Northeastern Seaboard experiences Nor'easters while the States around the Great Lakes are subject to the Lake Effect as cold winds move across the warmer water of the Great Lakes.

The snowiest cities and coldest cities in the Continental United States are listed below.

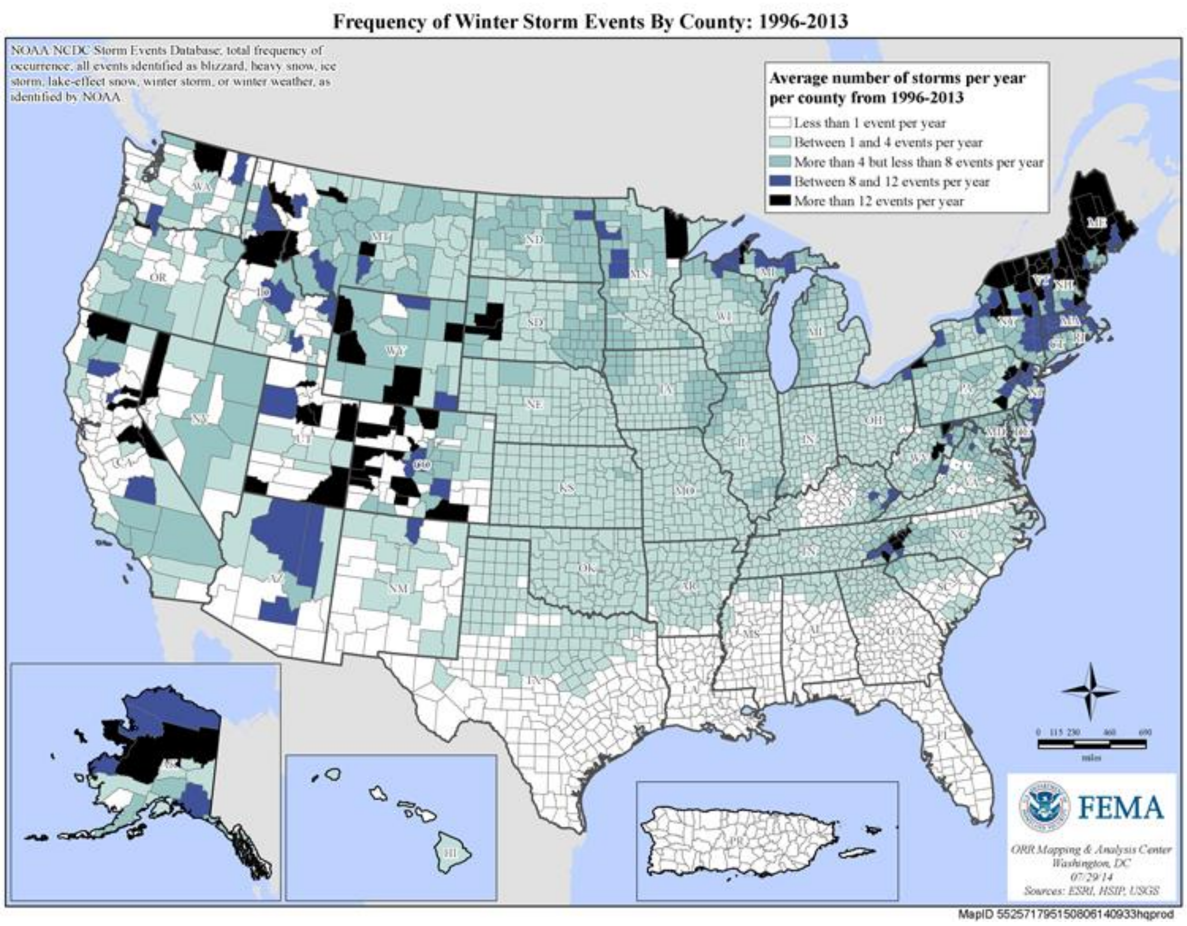
Most Annual Snowfall 2014-2015

1. Lowell, MA (120.6 in)
2. Worcester, MA (119.7 in)
3. Syracuse, NY (119.7 in)
4. Buffalo, NY (112.9 in)
5. Boston, MA (110.6 in)

Coldest Cities (Average Min Temp) 2015

1. Grand Forks, MN (-3.1°F)
2. Fargo, ND (0.1°F)
3. Williston, ND (0.1°F)
4. Duluth, MN (1.5°F)
5. Aberdeen, SD (1.5°F)

The map below is a 1996-2013 publication by FEMA showing the number of recorded Winter Storm Occurrences by County.



Kentucky's location makes it vulnerable to heavy snowfall. Its proximity to the Gulf of Mexico provides a necessary moisture source for precipitation all year. Kentucky is also north enough to be influenced by polar air masses. Depending on atmospheric conditions during the winter, Kentucky can have cool, wet winter or suffer the ill effects of heavy snow fall and ice accumulation. Winter storms affect a large area and for this reason affect the entire KIPDA region equally.

PREVIOUS OCCURENCES

The state of Kentucky and the KIPDA region have experienced numerous severe winter weather events. Profiles of some of the more notable occasions are detailed below.

January 1978- Cold air passed through the central and eastern United States throughout the month of January making it one of the top five coldest months on record in Southern Indiana and Central Kentucky. A blizzard dropping 12-15" across the KIPDA region concluded a month that had seen several small snows. Some residents were trapped in their homes for several days and the entire region was under a state of emergency.

January 17-19, 1994- Large amounts of snow fell throughout the region particularly a heavy snow setup from Shelbyville through Cynthiana where nearly two feet fell. A single day record for snow fall of 15" was set in Louisville while Shelbyville set a new record low temperature for the state of Kentucky with a reading of -37.

February 3-6, 1998- On the evening of February 3 snow began to fall in Louisville and continued until the evening of February 6. Power lines were down throughout the region and many roads were closed due to impassible conditions. Reported snow falls varied from 10" to a recorded 25" in New Castle, Henry County.

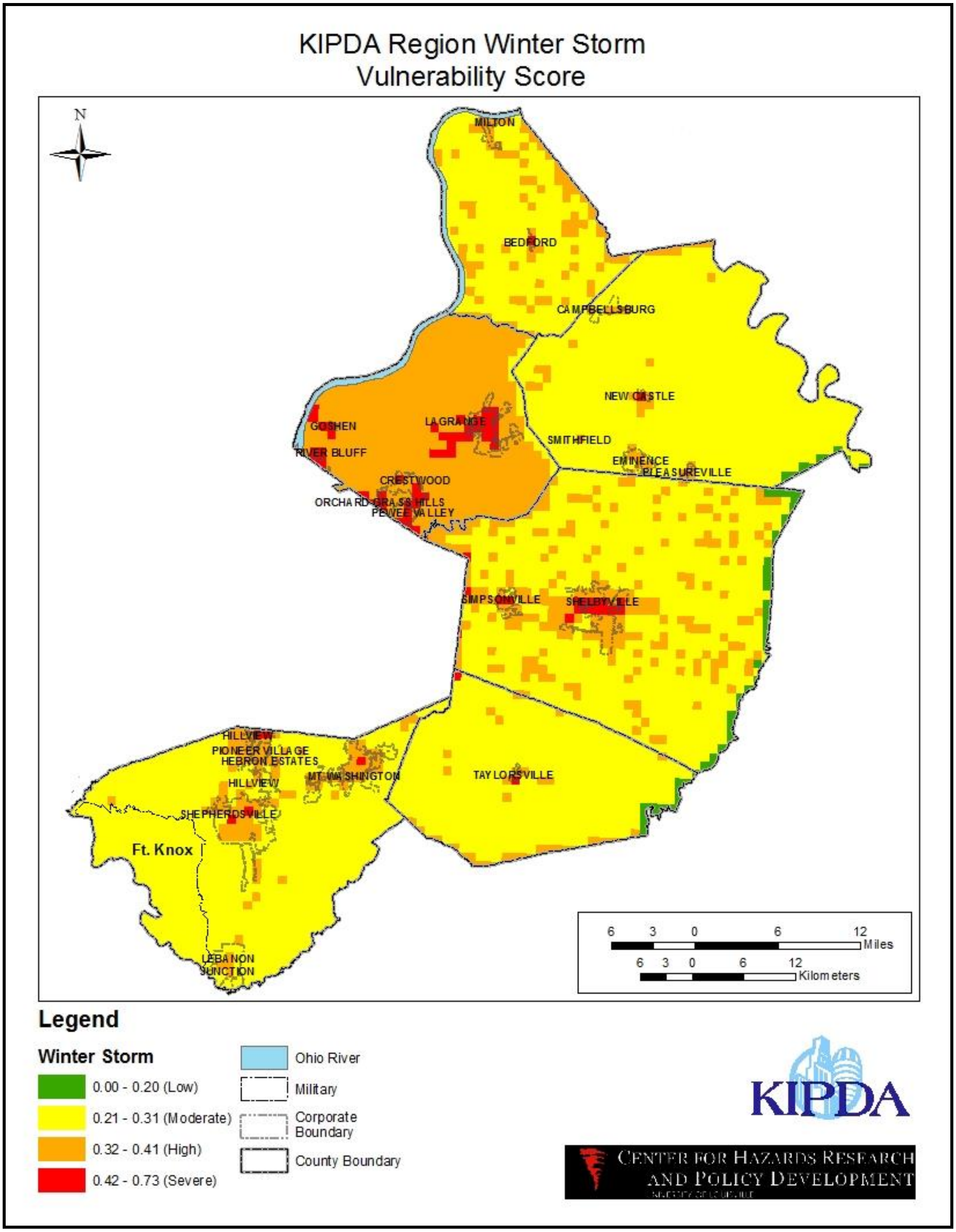
January 27, 2009- Kentucky experienced its worst modern day natural disaster in the form of an ice storm with a state of emergency declared on January 28 and disaster declaration on February 5. Federal assistance was made available to 104 counties in Kentucky including the 6 counties included in the KIPDA Regional Hazard Mitigation Plan. Trees and utility lines fell under the weight of ice causing extensive damage and power outages. Outages reportedly lasted in some areas up to four weeks. Utility companies from across the nation responded to the area in an effort to restore power. Kentucky experienced 2.5 inches of ice and 13 inches of snow. Further impacts from 2009 included 65 people nationwide dying, while Kentucky had 35 of those 65 deaths.

ASSESSING VULNERABILITY BY JURISDICTION: SEVERE WINTER STORM

Severe Winter Storm Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Severe Winter Storm was determined through first calculating the Severe Winter Storm Hazard Score. The Severe Winter Storm Hazard Score was calculated by studying one (1) specific source of data. The data layer used to create the Severe Winter Storm Hazard Score was data collected from the capturing county-level Severe Winter Storm events. In order to use this data for the Severe Winter Storm Hazard Score each county was assigned their maximum number of events and that data was aggregated to each grid within that county. To analyze the KIPDA Region's risk to Severe Winter Storm, the county Severe Winter Storm layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the Severe Winter Storm layer covered within each grid. This percentage of area affected by the Severe Winter Storm layer was then calculated and scored 0-1 to develop the Severe Winter Storm Hazard Score.

The Severe Winter Storm Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Severe Winter Storm Hazard Score and then scored 0-1. Once the final Severe Winter Storm Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe), which demonstrates different levels of vulnerability displayed on the map.



KIPDA Region Winter Storm
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
SMITHFIELD
EMINENCE
PLEASUREVILLE
GOSHEN
LA GRANGE
RIVER BLUFF
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
TAYLORSVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Winter Storm
0.00 - 0.20 (Low)
0.21 - 0.31 (Moderate)
0.32 - 0.41 (High)
0.42 - 0.73 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: SEVERE WINTER STORM

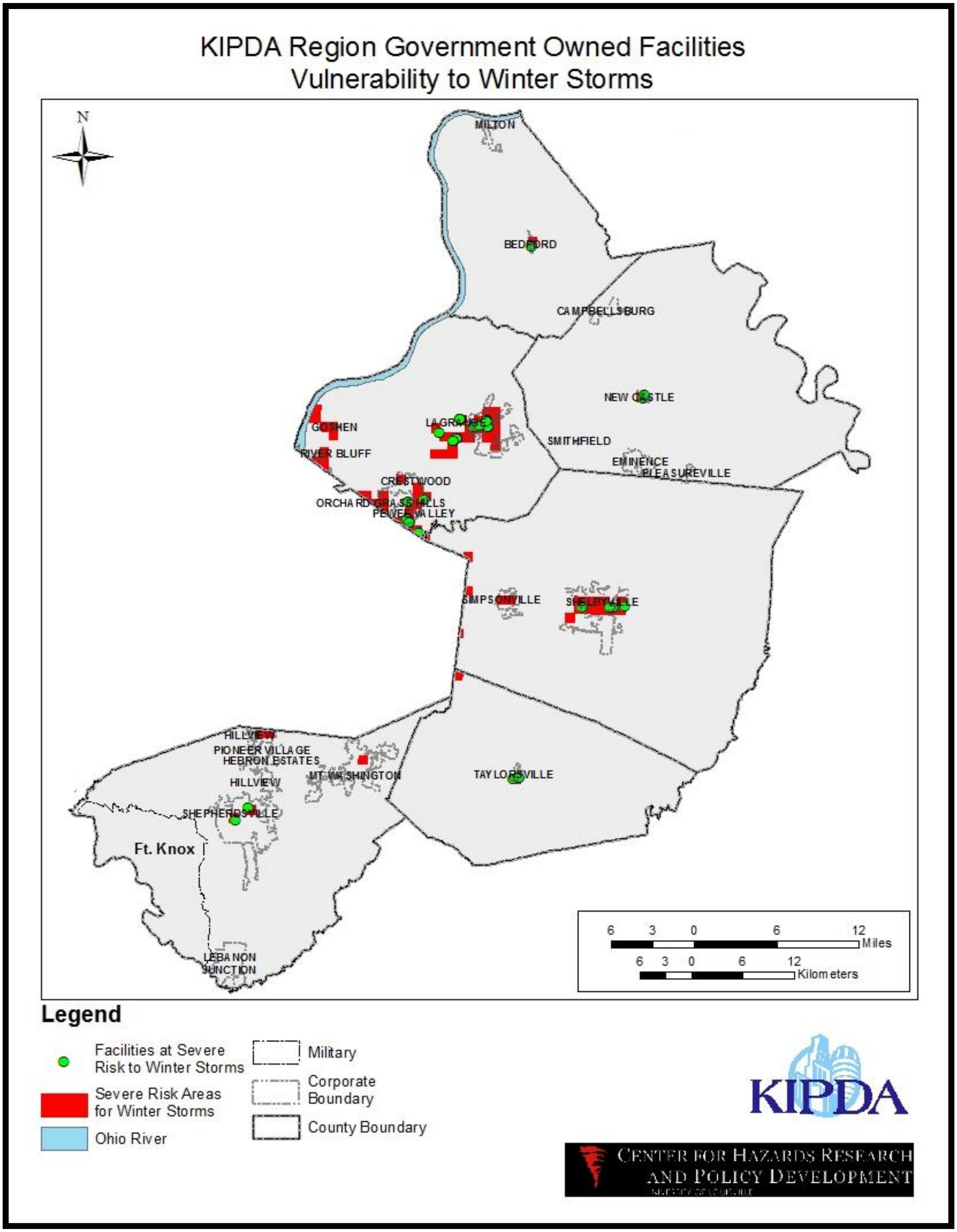
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Severe Winter Storm. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Severe Winter Storm.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Winter Storm	42	$3,278,932.00	0.76	$78,070	$59,617	55
Henry	Winter Storm	42	$3,197,725.32	0.76	$76,136	$58,140	55
Oldham	Winter Storm	43	$3,271,396.28	0.78	$76,079	$59,480	55
Shelby	Winter Storm	40	$3,280,383.94	0.73	$82,010	$59,643	55
Spencer	Winter Storm	40	$3,278,941.61	0.73	$81,974	$59,617	55
Trimble	Winter Storm	42	$3,255,324.85	0.76	$77,508	$59,188	55
Total		**249**	**$19,562,704**	**4.53**	**$471,776**	**$355,686**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: SEVERE WINTER STORM

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Severe Winter Storm boundary map was used as the hazard layer for Severe Winter Storm Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Tornado boundary map. The government owned facilities captured within each Severe Winter Storm hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Tornado event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Severe Winter Storm hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	0	$0.00
Henry	0	$0.00
Oldham	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Winter Storms
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LA GRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
TAYLORSVILLE
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Facilities at Severe Risk to Winter Storms
Severe Risk Areas for Winter Storms
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

TORNADO

HAZARD IDENTIFICATION: TORNADO

DESCRIPTION

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. It is most often generated by a thunderstorm (but sometimes result from hurricanes or nor'easters) and produced when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly.

The damage from a tornado is a result of the high wind velocity and wind-blown debris, although they are commonly accompanied by large hail as well. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction, including uprooting trees and well-made structures, and turning normally harmless objects into deadly missiles.

Most tornadoes are just a few dozen yards wide and touch down only briefly, but highly destructive tornadoes may carve out a path over a mile wide and several miles long. The destruction caused by tornadoes may range from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction, such as residential homes, and are quite localized in impact.

The United States has the highest incidence rate of tornadoes worldwide, with more than 1,000 occurring every year. Peak months of tornado activity for Kentucky and south central Indiana are usually April, May, and June. However, tornadoes have occurred in every month and at all times of the day or night.

TYPES

The Fujita-Pearson Scale for Tornadoes was introduced in 1971 by Ted Fujita and Allen Pearson. The scale was applied retroactively to tornado reports from 1950 on for the National Oceanic and Atmospheric Administration's National Tornado Database for the United States and for significant tornado events dating back to 1880. The devised scale was based on six categories and coverts the degree and type of damage caused by a tornado into an estimation of the wind speeds inside the funnel.

Fujita-Pearson Scale for Tornadoes			
F-Scale Number	**Intensity Phrase**	**Wind Speed**	**Type of Damage Done**
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	Moderate Tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant Tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe Tornado	158-206 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	Devastating Tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible Tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable Tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

(The Tornado Project)

The Fujita-Pearson Scale for Tornadoes had several deficiencies in addition to the limitations of weak structures in conveying strong tornado damage:

- Rankings are subjective and based solely on the damage caused by a tornado
- Difficult to apply with no damage indicators (if a tornado does not hit structures, large trees, etc.)
- No account of construction quality and variability
- Subject to biases of the surveyors
- No definitive correlation between damage and wind speed

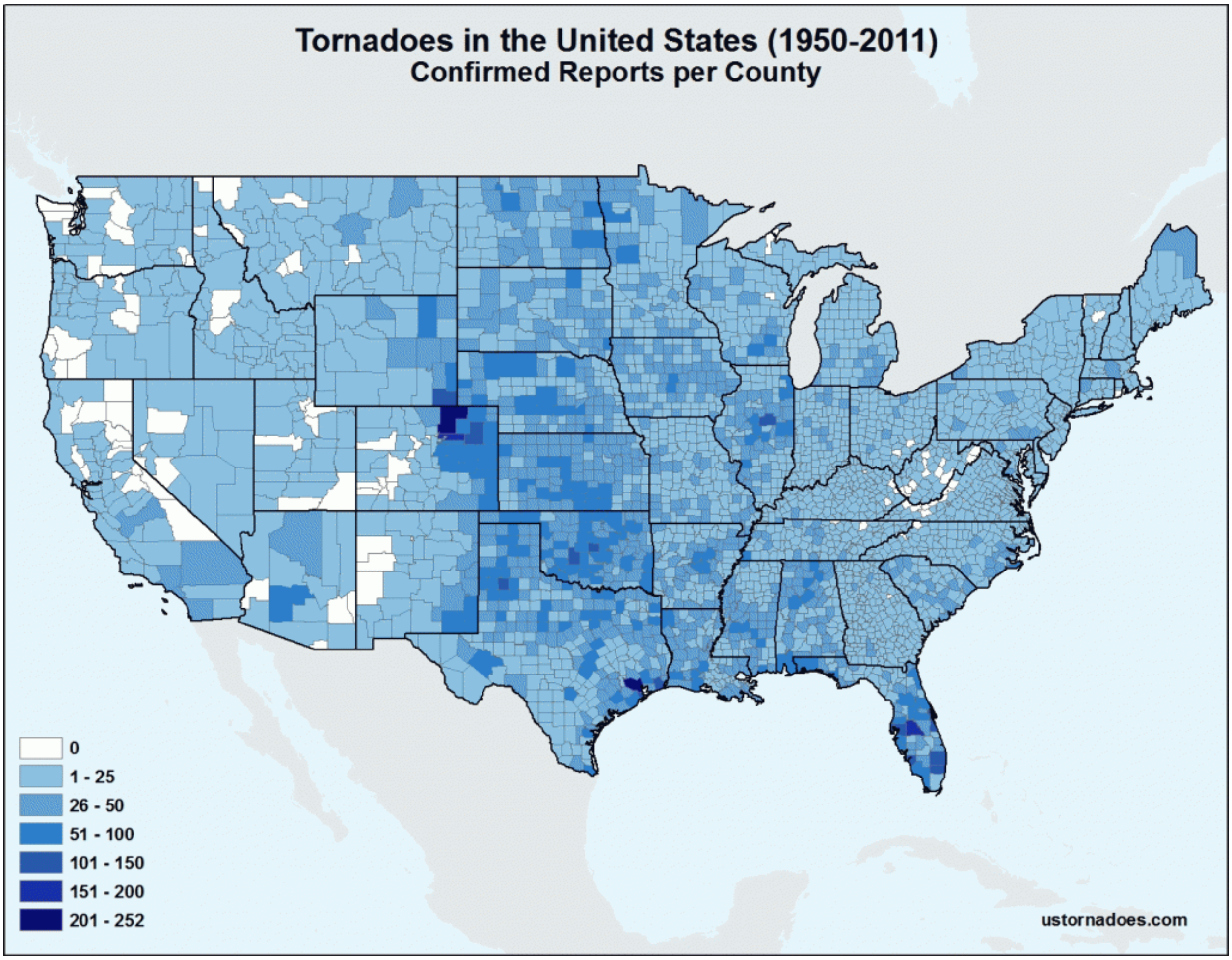
In an effort to address the deficiencies in the Fujita scale, the National Weather Service developed the Enhanced Fujita scale and it was implemented on February 1, 2007. The Enhanced Fujita scale is set of wind estimates, not measurements, based on damage. The enhanced scale takes into account quality of construction and standardizes different kinds of structures. The wind speeds on the original scale were deemed by meteorologists and engineers as being too high and engineering studies indicated that slower winds than initially estimated cause the respective degrees of damage. The wind estimates are still based on 8 levels of damage to 28 different types of structures and vegetation. A comparative chart of the original Fujita scale and the Enhanced Fujita scale follows.

FUJITA SCALE		OPERATIONAL EF SCALE	
F Number	**3 Second Gust (mph)**	**EF Number**	**3 Second Gust (mph)**
0	45-78	0	65-85
1	79-117	1	86-110
2	118-161	2	111-135
3	162-209	3	136-165
4	210-261	4	166-200
5	262-317	5	Over 200

FACTS

- The most powerful Tornadoes occur in the United States.
- A typical tornado only lasts for a few minutes.
- Every tornado has its own color, sound and shape.
- The chances that a tornado is a F5, the highest classification for a tornado on the F-scale, is less than 0.1%
- Tornadoes have been reported in every state in the US and also in every season.
- A Tornado can occur at any time, but most often between 3pm and 9pm.
- About 1,000 tornadoes occur in the US each year. However, this number is a rough estimate, as many tornadoes go unreported.
- There is no world-wide system to track and record tornadoes, or even to compare data.
- On average, 60 people are killed by tornadoes each year, mainly due to flying debris.
- The “Tri-State Tornado” of March 18, 1925, killed 695 people in Missouri, Illinois, and Indiana.

- Effects of tornadoes may include crop and property damage, power outages, environmental degradation, injury, and death.
- Powerful tornadoes have lifted and moved objects weighing more than 300 tons a distance of thirty feet and have tossed homes greater than 300 feet away from their foundations.



IMPACTS

The primary impacts of tornado events are the loss of human life and monetary losses due to the destruction of infrastructure, personal property, livestock, and cropland. The loss of critical infrastructure may result in hazards and additional problems well after the tornado. Citizens may be left without shelter, power, or running water for days, depending on the severity of the tornado.

HAZARD PROFILE: TORNADO

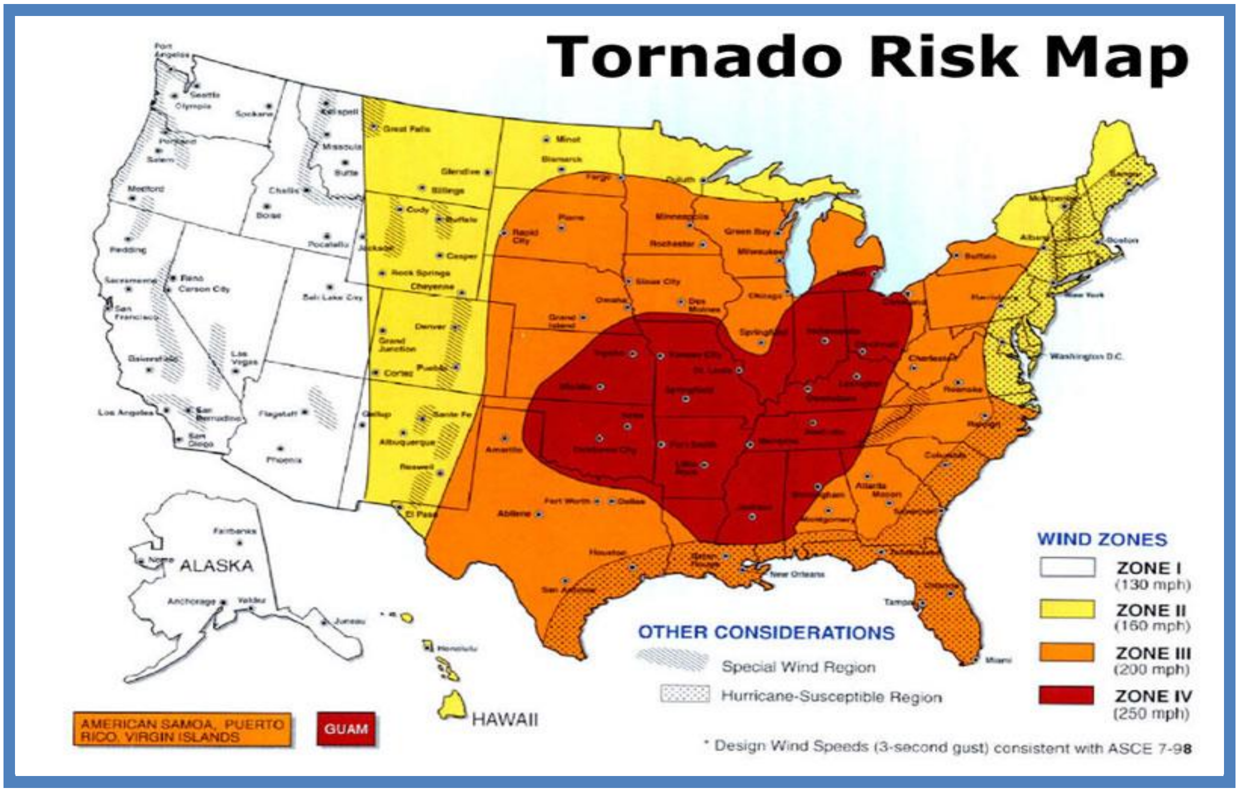
PROFLIE RISK TABLE

Hazard: Tornado	
Period of occurrence:	According to the 2008 National Weather Forecasting Service, peak months of tornado activity for Kentucky and south central Indiana are usually April, May, and June. However, tornadoes can occur at any given time throughout the year.
Number of officially recorded events: SHELDUS and NOAA Data (1960-2015)	74
Annual Rate of Occurrence:	1.33
Warning time:	Minutes to Hours
Potential impacts:	Storm-Based Tornado Warning Time (NOAA 2008) – 14 minutes Monitored Storm Systems or Weather Systems w/History of Tornadoes – Anywhere from 20 to 60 minutes in advance.
Recorded losses:	$189,688,121
Average Annual Loss:	$3,448,875
Extent:	Impacts human life, health, and public safety. Utility damage and outages, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroy critical facilities, and hazardous material releases. Can lead to economic losses such as unemployment, decreased land values, and agribusiness losses. Scale: Fujita/Pearson Scale/EF Operational Scale

GEOGRAPHIC LOCATIONS AFFECTED

Tornadoes are somewhat common throughout the state of Kentucky and have occurred in every month of the year. Unfortunately, the occurrence of a tornado is highly unpredictable. Forecasting the exact time and location a tornado will touch down and the path it will take is nearly impossible.

The Federal Emergency Management Agency (FEMA) has classified nearly the entire state of Kentucky, and all of the KIPDA Region, in the wind zone IV. This is the highest classification of wind zones and signifies the greatest threat. Wind zone IV translates to a threat of winds up to 250 miles per hour during a severe storm.



(Federal Emergency Management Agency, FEMA)

PREVIOUS OCCURENCES

To gain a better understanding of the magnitude of tornado impacts on the KIPDA Region, information regarding significant tornado events in the area follows.

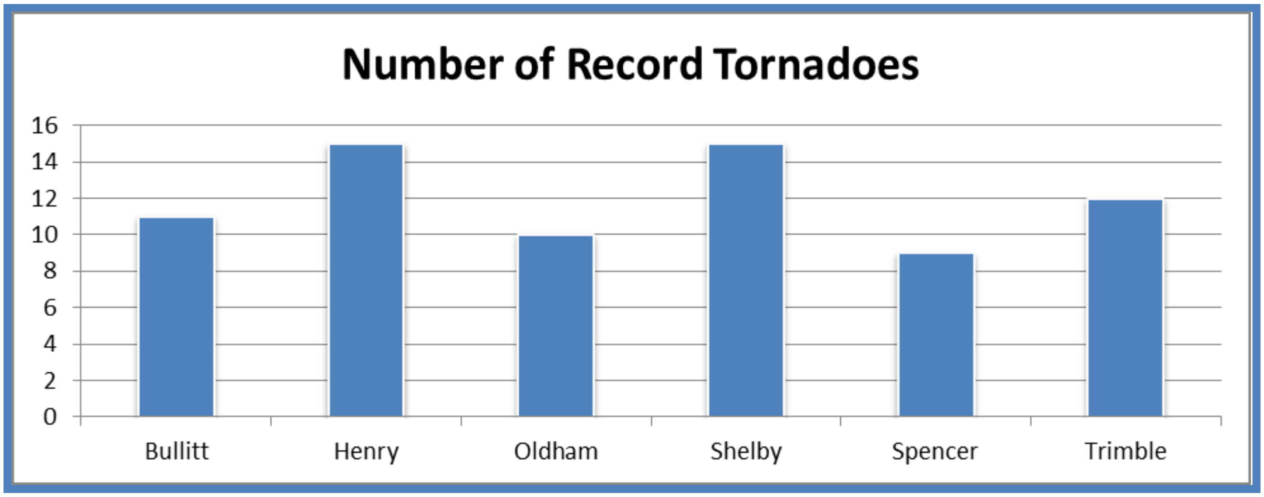
March 27, 1890 – A tornado, category F3 passed through Shelby and Henry counties. The tornado had a width of 150 yards and length of 5 miles. The tornado moved northeast from four miles south of Eminence passing one mile north of Pleasureville. Four from houses were destroyed with three family members losing their lives in one of them; ten others were injured.

April 1, 1974 – A category F3 tornado with the a width of 300 yards and length of three miles touched down in Henry County leaving approximately 100 of the 500 residents of Campbellsburg homeless. Nineteen homes and 23 businesses were destroyed or damaged. Twenty people were injured and one lost their life.

May 28, 1996 – A category F4 tornado began in the Jefferson Memorial Forest in southern Jefferson County before strengthening and moving Southeast across Bullitt County. The tornado caused a remarkable amount of damage while passing through Brooks, Hillview and Mount Washington totaling over $100 million in damages.

February 6, 2005 – A category EF2 tornado with a width of 250 yards and length of 7 miles passed through Shelby County with the majority of the damaged concentrated in the Flood Road area. A large well-built barn was destroyed after the structure was thrown approximately 50 yards. An 18,000 pound trailer was moved four feet and turned over while another barn was destroyed with every shingle blown off a well-constructed roof. Several other homes suffered some degree of room damage while about 40 large hardwood trees were uprooted along the tornado's path.

Every county in the KIPDA Region has experienced a tornado. The number varies by county with Shelby and Henry County having the most recorded incidences of tornado events.

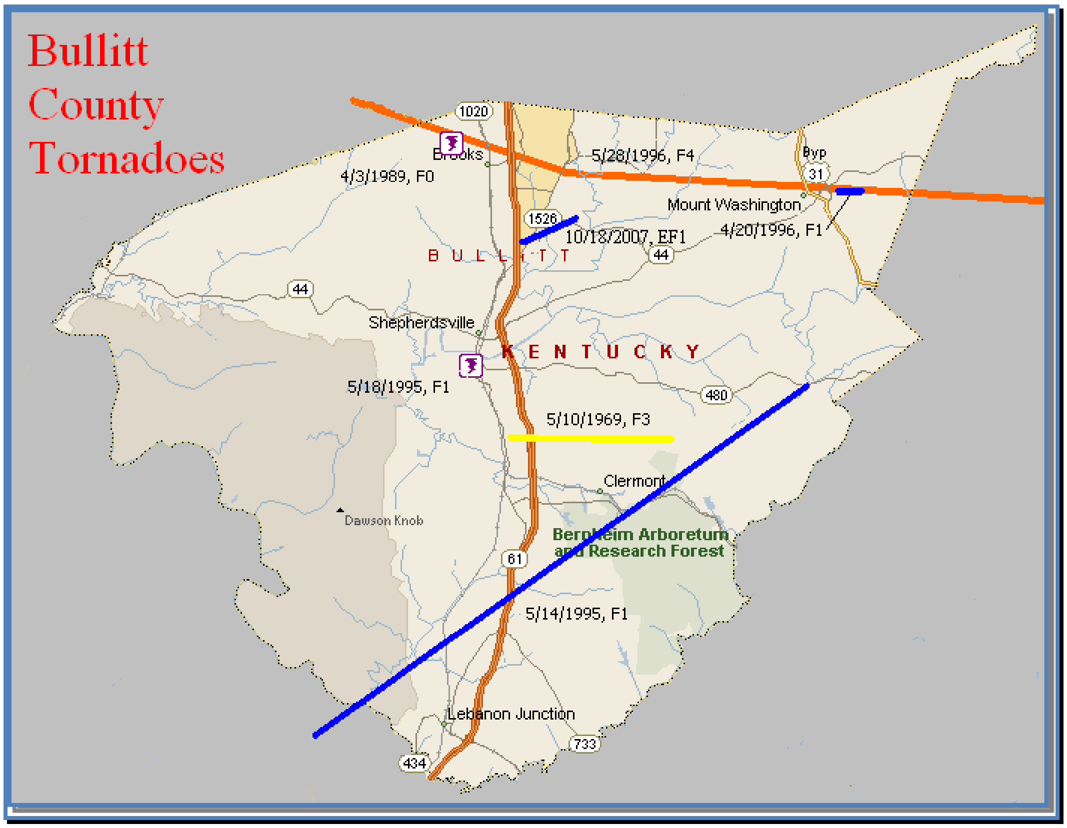


County	Total
Bullitt	11
Henry	15
Oldham	10
Shelby	15
Spencer	9
Trimble	12

Using information collected through Spatial Hazard Events and Losses Database for the United States (SHELDUS) and National Oceanic and Atmospheric Administration (NOAA), the following charts display all recorded tornado events for each county with and are accompanied by a map showing the tornado's path.

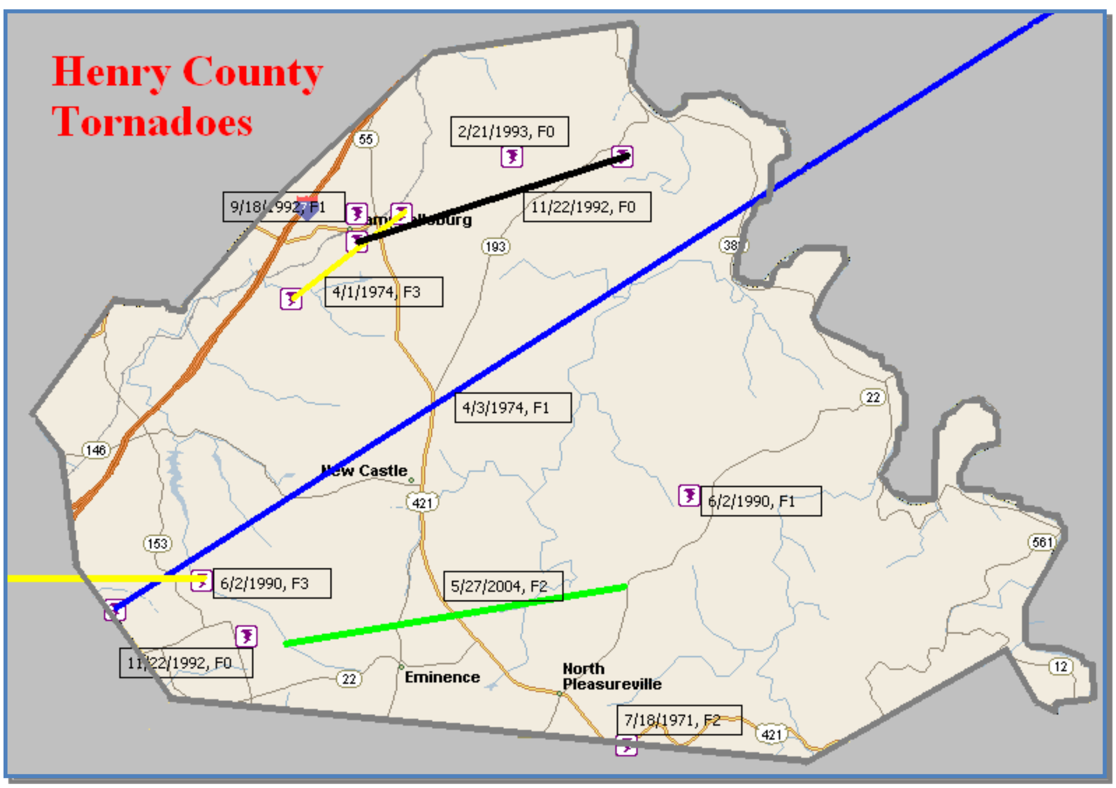
BULLITT COUNTY

County Name	Hazard	Year	Crop damage	Property Damage	Injuries	Fatalities	Records
Bullitt	Tornado	1960	$0	$108,079	0	0	1
Bullitt	Tornado	1967	$0	$9,844	0	0	1
Bullitt	Tornado	1969	$0	$322,529	14	0	1
Bullitt	Tornado	1989	$0	$95	0	0	1
Bullitt	Tornado	1995	$0	$8,155	0	0	2
Bullitt	Tornado	1996	$0	$151,336,015	10	0	2
Bullitt	Tornado	2007	$0	$39,962	0	0	1
Bullitt	Tornado	2010	$0	$16,285	0	0	1
Bullitt	Tornado	2014	$0	$15,000	0	0	1
Bullitt	Tornado	2015	$0	$15,000	0	0	1
Total			**$0**	**$151,870,965**	**24**	**0**	**12**



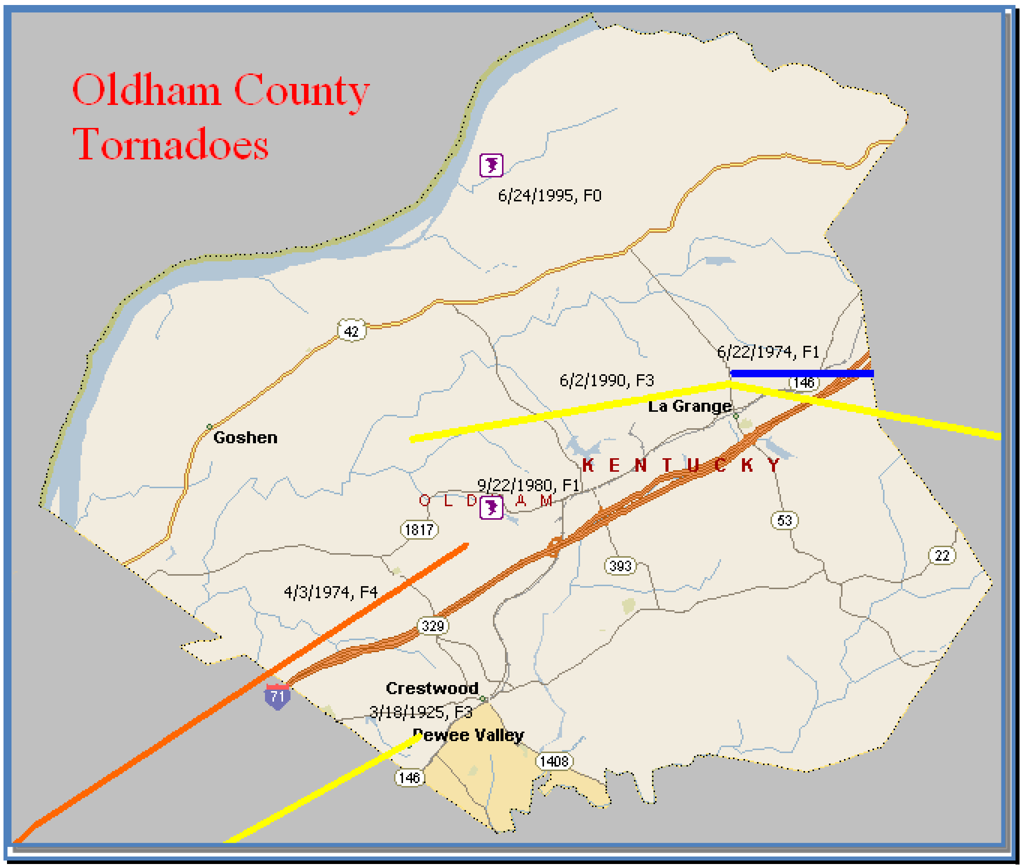
HENRY COUNTY

County Name	Hazard	Year	Crop damage	Property Damage	Injuries	Fatalities	Records
Henry	Tornado	1960	$0	$108,079	0	0	1
Henry	Tornado	1963	$0	$416	0	0	1
Henry	Tornado	1964	$0	$95,458	0	0	1
Henry	Tornado	1967	$0	$9,844	0	0	1
Henry	Tornado	1971	$0	$14,613	0	0	1
Henry	Tornado	1974	$0	$7,202,921	71	1	2
Henry	Tornado	1990	$362	$1,812,199	0	0	2
Henry	Tornado	1992	$0	$11,390	0	0	3
Henry	Tornado	1993	$0	$8,192	0	0	1
Henry	Tornado	2004	$0	$3,133,086	2	0	1
Henry	Tornado	2011	$0	$526,223	1	0	1
Total			**$362**	**$12,922,420**	**74**	**1**	**15**



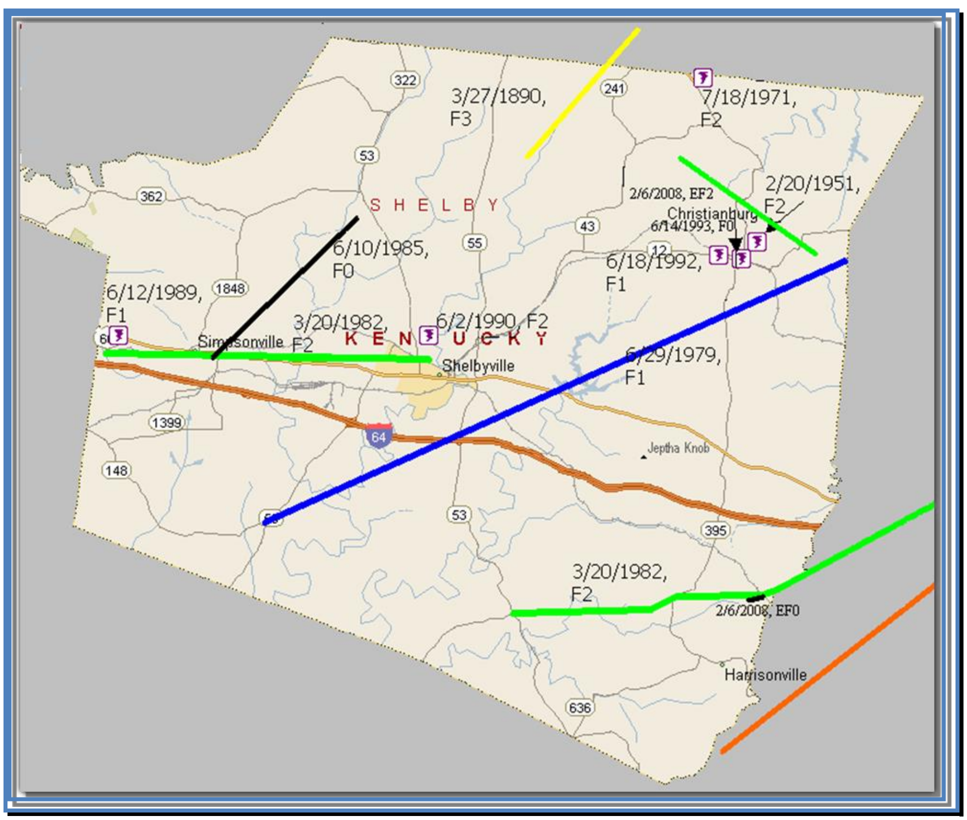
OLDHAM COUNTY

County Name	Hazard	Year	Crop damage	Property Damage	Injuries	Fatalities	Records
Oldham	Tornado	1960	$0	$108,079	0	0	1
Oldham	Tornado	1963	$0	$416	0	0	1
Oldham	Tornado	1967	$0	$9,844	0	0	1
Oldham	Tornado	1974	$0	$7,226,931	71	0	3
Oldham	Tornado	1980	$14,365	$143,650	0	0	1
Oldham	Tornado	1990	$272	$1,811,293	5	0	1
Oldham	Tornado	1995	$0	$77,669	0	0	1
Oldham	Tornado	2014	$0	$20,000	0	0	1
Oldham	Tornado	2015	$0	$20,000	0	0	1
Total			**$14,637**	**$9,417,883**	**76**	**0**	**11**



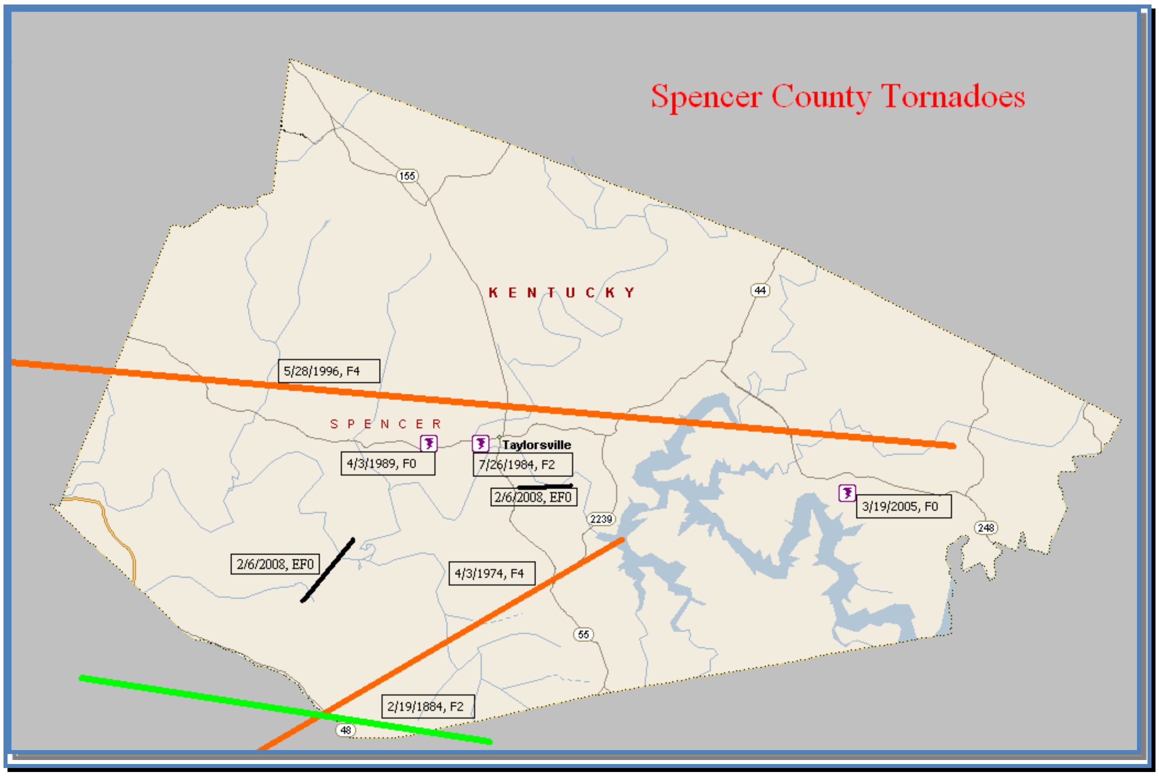
SHELBY COUNTY

County Name	Hazard	Year	Crop damage	Property Damage	Injuries	Fatalities	Records
Shelby	Tornado	1960	$0	$108,079	0	0	1
Shelby	Tornado	1963	$0	$416	0	0	1
Shelby	Tornado	1967	$0	$9,844	0	0	1
Shelby	Tornado	1971	$0	$14,613	0	0	1
Shelby	Tornado	1973	$0	$2,666	0	0	1
Shelby	Tornado	1979	$0	$163,041	0	0	1
Shelby	Tornado	1982	$1,227	$6,746,363	4	0	2
Shelby	Tornado	1985	$11,001	$1,100,074	0	0	1
Shelby	Tornado	1989	$0	$95,458	0	0	1
Shelby	Tornado	1990	$0	$1,811,293	0	0	1
Shelby	Tornado	1992	$8,437	$843,678	0	0	1
Shelby	Tornado	2008	$0	$258,394	0	0	2
Shelby	Tornado	2012	$0	$25,778	0	0	1
Total			**$20,664**	**$11,179,697**	**4**	**0**	**15**



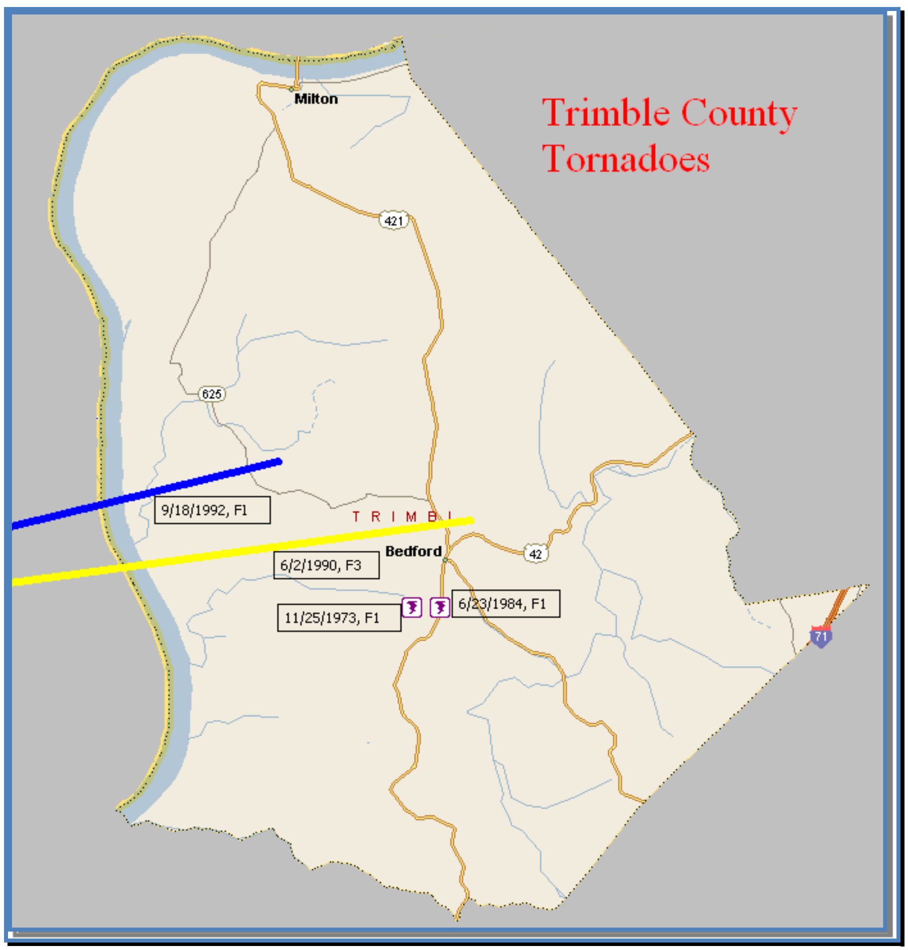
SPENCER COUNTY

County Name	Hazard	Year	Crop damage	Property Damage	Injuries	Fatalities	Records
Spencer	Tornado	1960	$0	$108,079	0	0	1
Spencer	Tornado	1967	$0	$9,844	0	0	1
Spencer	Tornado	1974	$0	$342,996	29	0	1
Spencer	Tornado	1984	$113,925	$113,925	0	0	1
Spencer	Tornado	1989	$0	$95,458	0	0	1
Spencer	Tornado	1996	$0	$1,508,834	0	0	1
Spencer	Tornado	2005	$0	$3,637	0	0	1
Spencer	Tornado	2008	$109,955	$384,842	1	0	2
Total			**$223,880**	**$2,567,615**	**30**	**0**	**9**



TRIMBLE COUNTY

County Name	Hazard	Year	Crop damage	Property Damage	Injuries	Fatalities	Records
Trimble	Tornado	1960	$0	$108,079	0	0	1
Trimble	Tornado	1963	$0	$416	0	0	1
Trimble	Tornado	1967	$0	$9,844	0	0	1
Trimble	Tornado	1973	$0	$26,659	0	0	1
Trimble	Tornado	1984	$0	$1,139	1	0	1
Trimble	Tornado	1990	$906	$905,647	1	0	1
Trimble	Tornado	1992	$0	$2,109	0	0	1
Trimble	Tornado	2010	$0	$5,428	0	0	1
Trimble	Tornado	2012	$0	$670,220	0	0	4
Total			**$906**	**$1,729,541**	**2**	**0**	**12**



ASSESSING VULNERABILITY BY JURISDICTION: TORNADO

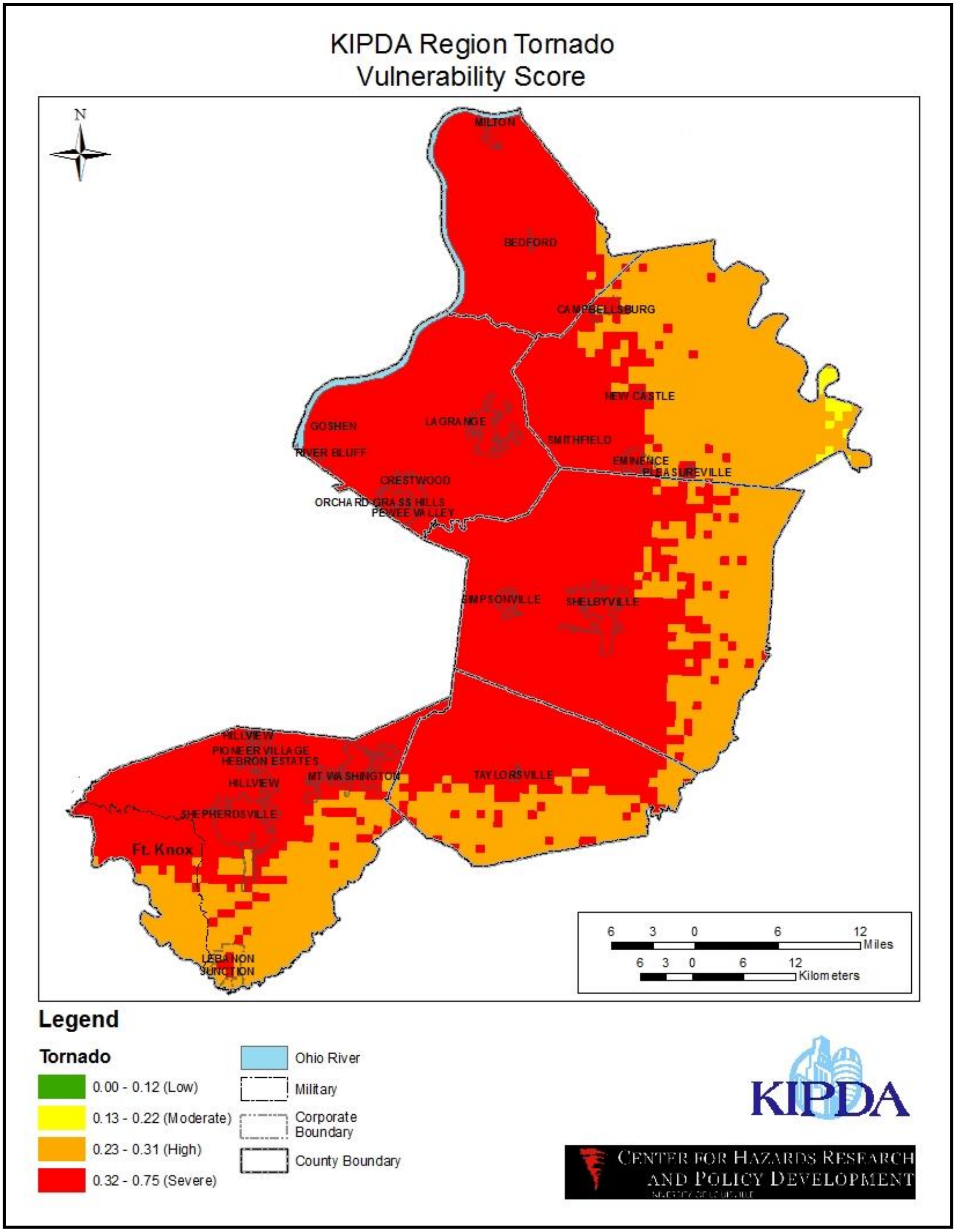
Tornado Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Tornado was determined through first calculating the Tornado Hazard Score. The Tornado Hazard Score was calculated by studying three (3) specific data sources that combined the best available data. The data layer used to create the Tornado Hazard Score was collected from the National Weather Service SVRGIS tornado path (1950-2012) GIS data layer, SHELDUS by calculating Tornado occurrences and loss data (crop and property) over a 55 year time frame and the NOAA. Each county's Average Annual Loss was calculated from this data and ranked 0-4 (1=low, 2=moderate, 3=high, 4=severe) and then aggregated down to the 1 KM blocks of each county.

For analyzing this data, the KIPDA Region Hazard Mitigation Committee and CHR utilized a 25 mile radius to calculate each 1 KM MGRS grids geographic risk from a tornado event. The 25-mile radius was selected because that is the distance that the National Weather Service uses when producing severe weather alerts and probability maps. Basically, the 25 mile radius reduces the white noise and randomness present in atmospheric event data, which enables a meaningful picture of the risk to each grid, built based on historic rates of occurrence in the area. These 25 mile radiuses create map layers that were used as the base map layer for Tornado Hazard Score.

To analyze the KIPDA region's risk to Tornado, the 25 mile radius tornado path layer was overlaid onto a map of 1 KM MGRS grids in the counties in the KIPDA Region. Next, a calculation was computed based on the total number of tornado events that occurred within a 25 mile radius of each grid. Each grid was then calculated and scored 0-1 to develop the Tornado Hazard Score.

The Tornado Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Tornado Hazard Score and then scored 0-1. Once the final Tornado Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4. Severe), which demonstrates different levels of vulnerability displayed on the map.


KIPDA Region Tornado
Vulnerability Score
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
TAYLORSVILLE
HILLVIEW
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Tornado
0.00 - 0.12 (Low)
0.13 - 0.22 (Moderate)
0.23 - 0.31 (High)
0.32 - 0.75 (Severe)
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: TORNADO

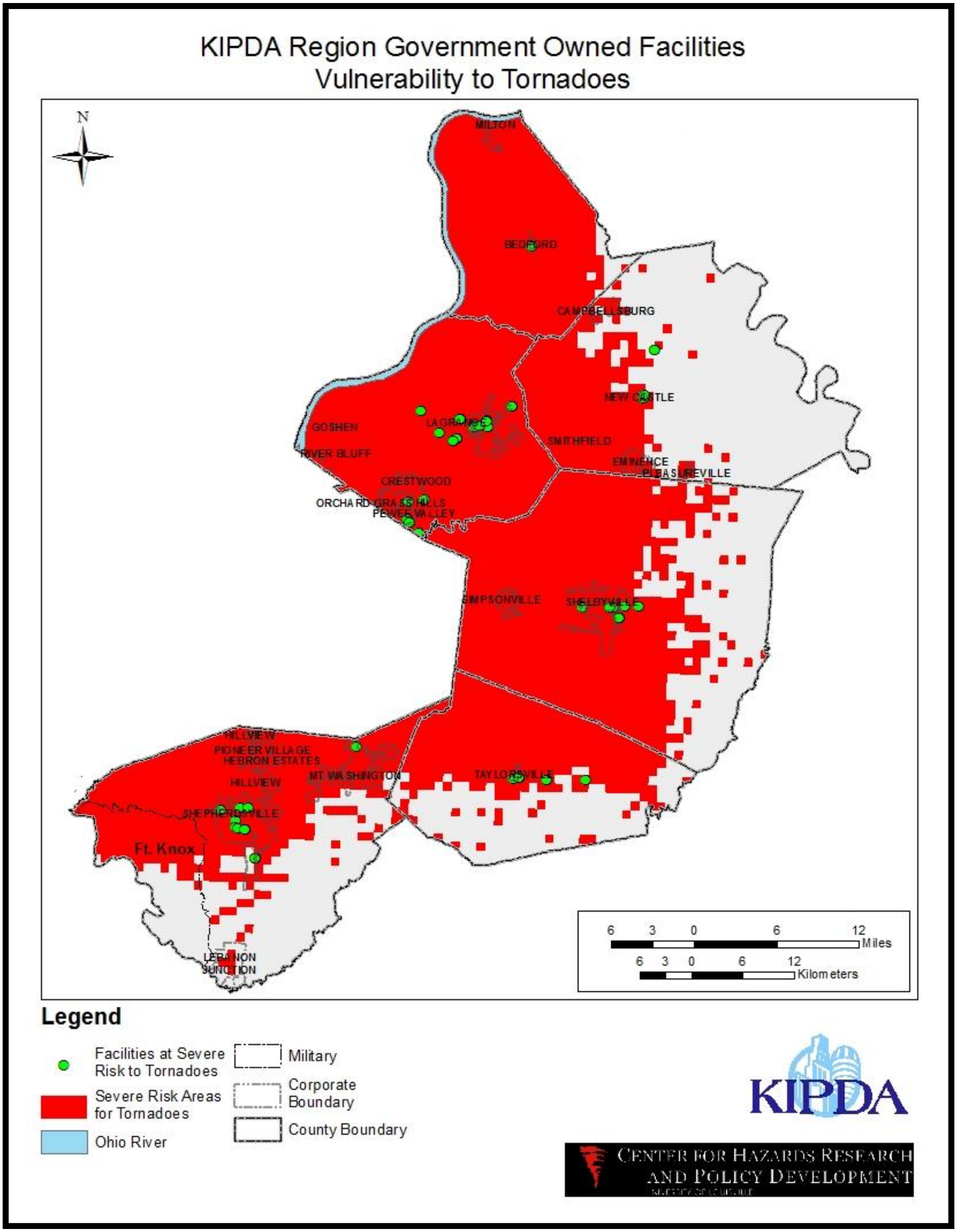
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Tornado. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Tornado.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1960-2015
Bullitt	Tornado	12	$151,870,965	0.22	$12,655,914	$2,761,290	55
Henry	Tornado	15	$12,922,420	0.27	$861,495	$234,953	55
Oldham	Tornado	11	$9,417,883	0.20	$856,171	$171,234	55
Shelby	Tornado	15	$11,179,697	0.27	$745,313	$203,267	55
Spencer	Tornado	9	$2,567,615	0.16	$285,291	$46,684	55
Trimble	Tornado	12	$1,729,541	0.22	$144,128	$31,446	55
Total		**74**	**$189,688,121**	**1.35**	**$15,548,312**	**$3,448,875**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: TORNADO

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Tornado boundary map was used as the hazard layer for Tornado Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Tornado boundary map. The government owned facilities captured within each Tornado hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Tornado event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Tornado hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	19	$5,046,717.00
Henry	5	$327,459.00
Oldham	222	$226,854,105.00
Shelby	15	$13,621,048.00
Spencer	10	$1,453,539.00
Trimble	1	$3,500.00


KIPDA Region Government Owned Facilities
Vulnerability to Tornadoes
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
LAGRANGE
GOSHEN
RIVER BLUFF
SMITHFIELD
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12
Miles
6 3 0 6 12
Kilometers
Legend
Facilities at Severe Risk to Tornadoes
Severe Risk Areas for Tornadoes
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

WILDFIRE/FOREST FIRE

HAZARD IDENTIFICATION: WILDFIRE/FOREST FIRE

DESCRIPTION

A Forest Fire or Wildfire is an unplanned fire, a term which includes grass fires, forest fires, and scrub fires either man caused or natural in origin. According to USGS, a Forest Fire is defined as combustion, marked by flames or intense heat, in natural, settings, often ignited by lightning or human activities and poses a growing threat to most regions of the United States. Though often a beneficial occurrence, fires are frequently suppressed by various agencies to prevent structural loss. This suppression of Wildfires/Forest Fires, however, eventually leads to more severe fires, as vegetation becomes denser.

Though structures may be destroyed or heavily damaged by Wildfires/Forest Fires, the long-term secondary effects may be of more consequence. These include erosion, landslides and flooding, the introduction of invasive species, and changes in water quality in the surrounding areas.

The average forest fire kills most trees up to 3-4 inches in diameter on the area burned. These trees represent approximately 20 years of growth. In the case of up-slope burning, under severe conditions, almost every tree is killed, regardless of size or type. When the trees are burned and everything is killed, then the forest is slow to reestablish itself, because of the loss of these young seedlings, saplings, pole and saw timber trees.

Included in the destruction by fires are the leaf and other litter on the forest floor. This exposes the soil to erosive forces, allowing rain-storms to wear away the naked soil and wash silt and debris downhill, to clog the streams and damage fertile farmlands in the valleys. Once the litter and humus--or spongy layer of decaying matter--is destroyed, water flows more swiftly to the valleys to increase flood danger.

Another consequence to Wildfires/Forest Fires is the death and loss of habitat to the forest's wildlife. Even when the adult creatures escape, the young are left behind to perish. The heaviest wildlife lost is felt by game birds since they have ground nesting habits. Fish life also suffers as a result of the removal of stream shade and the loss of insect and plant food is destroyed by silt and lye from wood ashes washed down from burned hillsides

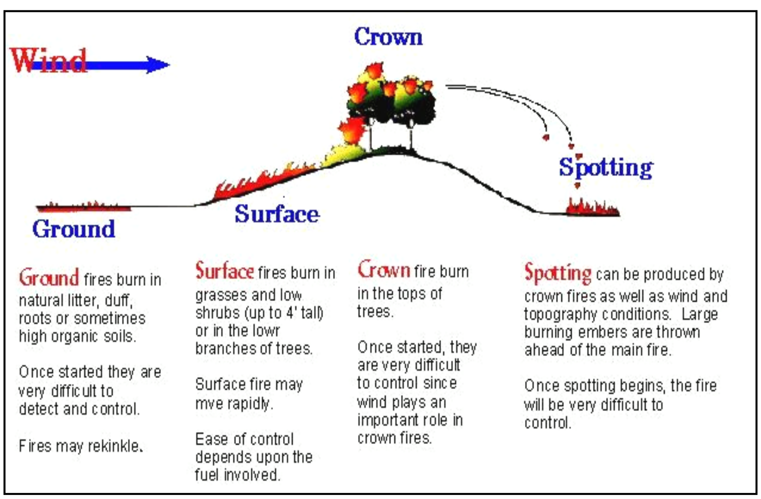
Wildfires/Forest Fires in areas of the Northeast and the eastern Midwest can occur at any time in the year without warning, but are more likely to occur during droughts in the spring and early summer. The Forest Fire season is generally defined as March thru November, with most Forest Fires occurring in April or May when large amounts of dry, winter debris are left are still present as fuel. As plants become greener late into May and June, the risk of Forest Fire is reduced. Uncontrollable fires which burn during this "green-up" time of year and are not associated with drought or lightening are almost always anthropogenic in nature, being started by campers or homeowners burning lawn debris who don't properly extinguish fires.

TYPES

There are three classifications of wildland fires.

1. A *surface fire* is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees.
2. A *ground fire* is usually started by lightning and burns on or below the
3. *Crown fires* spread rapidly by wind and move quickly by jumping along the tops of trees.

Fire behavior is influenced by three primary environmental factors. These are fuel, weather, and topography.



Fuel: The material that ignites and supports combustion. On the Daniel Boone National Forest in Kentucky, the fuel is primarily hardwood leaf litter on the forest floor. The continuity, arrangement, and fuel bed depth all influence fire intensity. The moisture content of the fuels is the principle factor determining whether they are available for combustion. Small fuels (leaves, needles, grass) respond most quickly to changes in temperature and humidity. Large fuels (branches, logs) are most affected by periods of drought after which they can significantly increase fire severity.

Weather: Weather is typically the most critical factor influencing fire intensity and spread. Temperature, relative humidity, precipitation, and wind all affect the moisture content of the fuels, influencing availability. Additionally, wind provides the oxygen needed to sustain combustion, as well as most of the energy needed for fire spread. Weather is constantly changing, making it the most difficult of the environmental factors to predict. The Daniel Boone NF and its cooperators maintain a network of fire weather stations in and around eastern Kentucky which help us to determine fire danger and potential fire behavior.

Topography: Topography refers to the landscape of a given area. Steep slopes offer greater potential for increased fire intensity than flat ground. Additionally, steep slopes make fire suppression more difficult by limiting strategies and tactics which can be utilized. South and southwest facing slopes typically will have lower fuel moisture regimes as a result of solar heating. Topographic features which channel wind and heat energy such as chutes, saddles, and box canyons all are potentially dangerous situations for firefighters.

In terms of fuels for fires, there are four primary types:

- *Grass*: found in most areas, but more dominant as a fuel in desert and range areas where other types of fuel are less prevalent. It can become prevalent in the years after a fire in formerly timbered areas.
- *Shrub* (brush): found throughout most areas of the United States. Some examples of highly flammable shrub fuels are the palmetto/gall berry in the Southeast, sagebrush in the Great Basin, and chaparral in the Southwest.
- *Timber litter:* This type of fuel is most dominant in mountainous topography, especially in the Northwest.
- *Logging slash:* Found throughout the country, this is the debris left after logging, pruning, thinning, or shrub-cutting operations. It may include logs, chunks, bark, branches, stumps, and broken understory trees or shrubs.

Fuel Characteristics

Fuel moisture is the amount of water (moisture) in a fuel. This measurement is expressed as a percentage. The higher the percentage, the greater the content moisture contained within the fuel. How well a fuel will ignite and burn is dependent, to a large extent, on its moisture content. Dry fuels will ignite and burn much more easily than the same fuels when they are wet (contain a high moisture content). As fuel's moisture content increases, the amount of heat required to ignite and burn that fuel also increases. Remember that light fuels take on and lose moisture faster than heavier fuels.

- *Wet Fuels*: fuels that have high moisture content because of exposure to precipitation or high relative humidity.
- *Dry Fuels*: fuels that have low moisture content because of prolonged exposure to sunshine, dry winds, drought, or low relative humidity.

The physical characteristics of fuel: Basically, fuels can be divided into two categories on the basis of their size and shape.

- Light fuels such as shrubs, grasses, leaves, and pine needles (any fuel having a diameter of one-half inch or less) burn rapidly and are quickly ignited, as they are surrounded by plenty of oxygen. Fires in light fuels spread rapidly but burn out quickly, are easily extinguished, and fuel moisture changes more rapidly than in heavier fuels.

- Heavy fuels such as limbs, logs, and tree trunks (any fuel one-half inch or larger in diameter) warm more slowly than light fuels, and the interiors are exposed to oxygen only after the outer portion is burned.

FACTS

- An average of 1.2 million acres of U.S. woodland burn every year.
- More than four out of every five Forest Fires are caused by people.
- A large Forest Fire, or conflagration, is often capable of modifying the local weather conditions or producing "its own weather."
- During the past 200 years, Forest Fire frequency has decreased, while Forest Fire intensity has increased.
- Many land management agencies use controlled “prescribed fires” to manage forested areas.

IMPACTS

According to the Federal Emergency Management Agency, (FEMA), approximately 106,000 Forest Fires break out each year in the United States. In 2004, Forest Fires burned roughly 7 million acres and cost over $8.9 billion to suppress. The expense of fighting Forest Fires has exceeded the appropriated funds for Forest Fire suppression nearly every year since 1990.

The financial impact of Wildfires/Forest Fires go beyond suppression also affecting property losses, insurance costs, grazing impacts, business and recreation losses, utility costs, watershed impacts and wildlife habitat losses.

According to the National Interagency Fire Center, there have been 1008 fatalities as a result of Forest Fires since 1910. There are additional health hazards resulting from Forest Fires. With poor air quality, breathing trouble is an issue due to the high amount of fine particulate matter that is being inhaled as a result of the Wildfires/Forest Fires. Other health factors attributed to Wildfires/Forest Fires include increased eye, nose and throat irritations. For those with heart disease, rapid heartbeat and fatigue may be experienced more readily under smoky conditions.

HAZARD PROFILE: WILDFIRE/FOREST FIRE

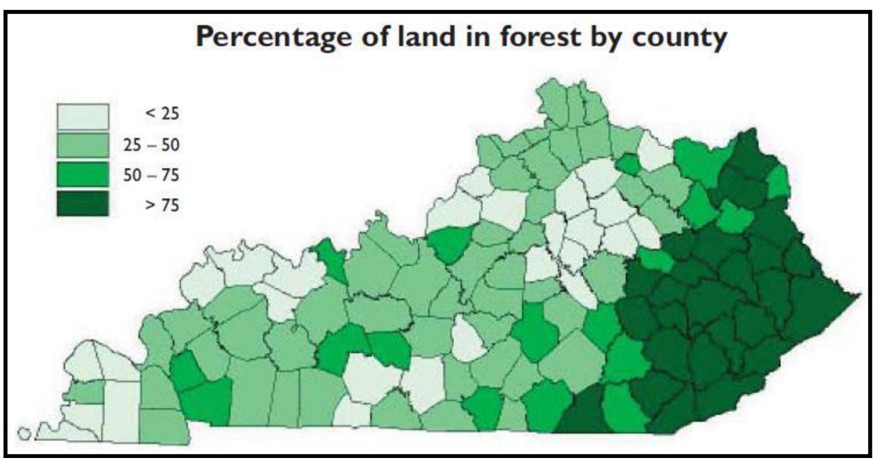
PROFILE RISK TABLE

Hazard: Wildfire/Forest Fire	
Period of occurrence:	Spring Forest Fire Hazard Season: Feb. 15 through April 30 Fall Forest Fire Hazard Season: Oct. 1 through Dec. 15
Number of officially recorded events: SHELDUS, NOAA and KY State Forestry (1997-2015)	184
Annual Rate of Occurrence:	10.2
Warning time:	None, unless associated with drought
Potential impacts:	Utility damage and outages, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases.
Recorded losses:	$0
Annualized Loss:	$0
Extent:	Year: 2010 Scale: 54,577 acres burned Acreage Burned

GEOGRAPHIC LOCATIONS AFFECTED

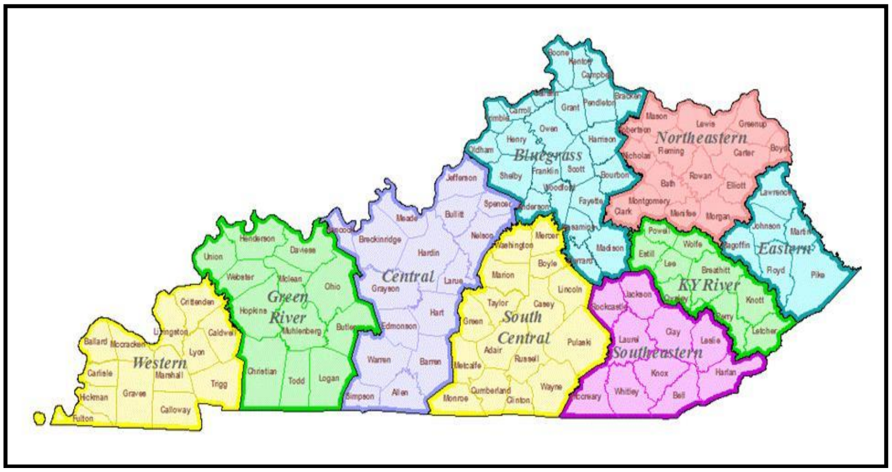
Only Florida has a more diverse hardwood species mix than Kentucky which is forty-seven percent forested, or 11.9 million acres. Eight

Oak-hickory is the dominant forest cover and covers 8.4 million acres, or 72 percent of the state's forested land. Oak-pine forests make up 9 percent, maple-beech-birch and aspen-birch make up 7 percent, oak-gum-cypress and elm-ash-cottonwood make up 6 percent, softwood makes up 5 percent and non-stocked, 1 percent.



(Kentucky Division of Forestry)

The Kentucky Division of Forestry breaks the state up into nine distinct districts. Counties in the KIPDA Region lie in two of these districts. Bullitt and Spencer counties are in the Central District while Henry, Oldham, Shelby, and Trimble counties are in the Bluegrass District.

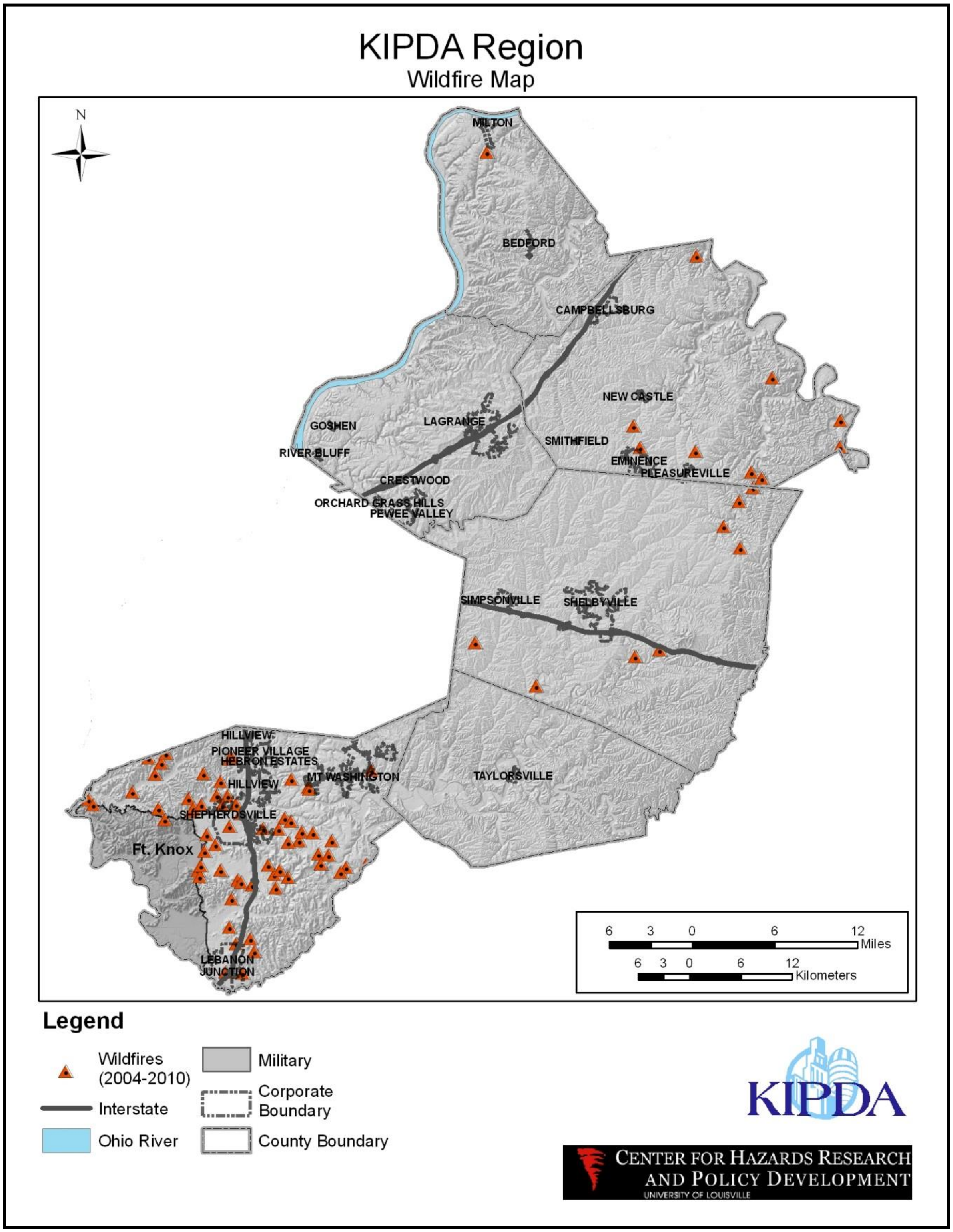


(Kentucky Division of Forestry)

PREVIOUS OCCURENCES

From 1945 to the present, Kentucky has experienced over 126,000 Forest Fires which burned 5,003,952 acres statewide. Since 2000, there have been 15,290 Forest Fires burning 589,021 acres. According to the National Interagency Fire Center there have been 13 recorded fatalities as a direct result of Forest Fire in the state. Humans are responsible for 99% of the Forest Fires in the state with arson being the leading reason followed by uncontrolled debris burning.

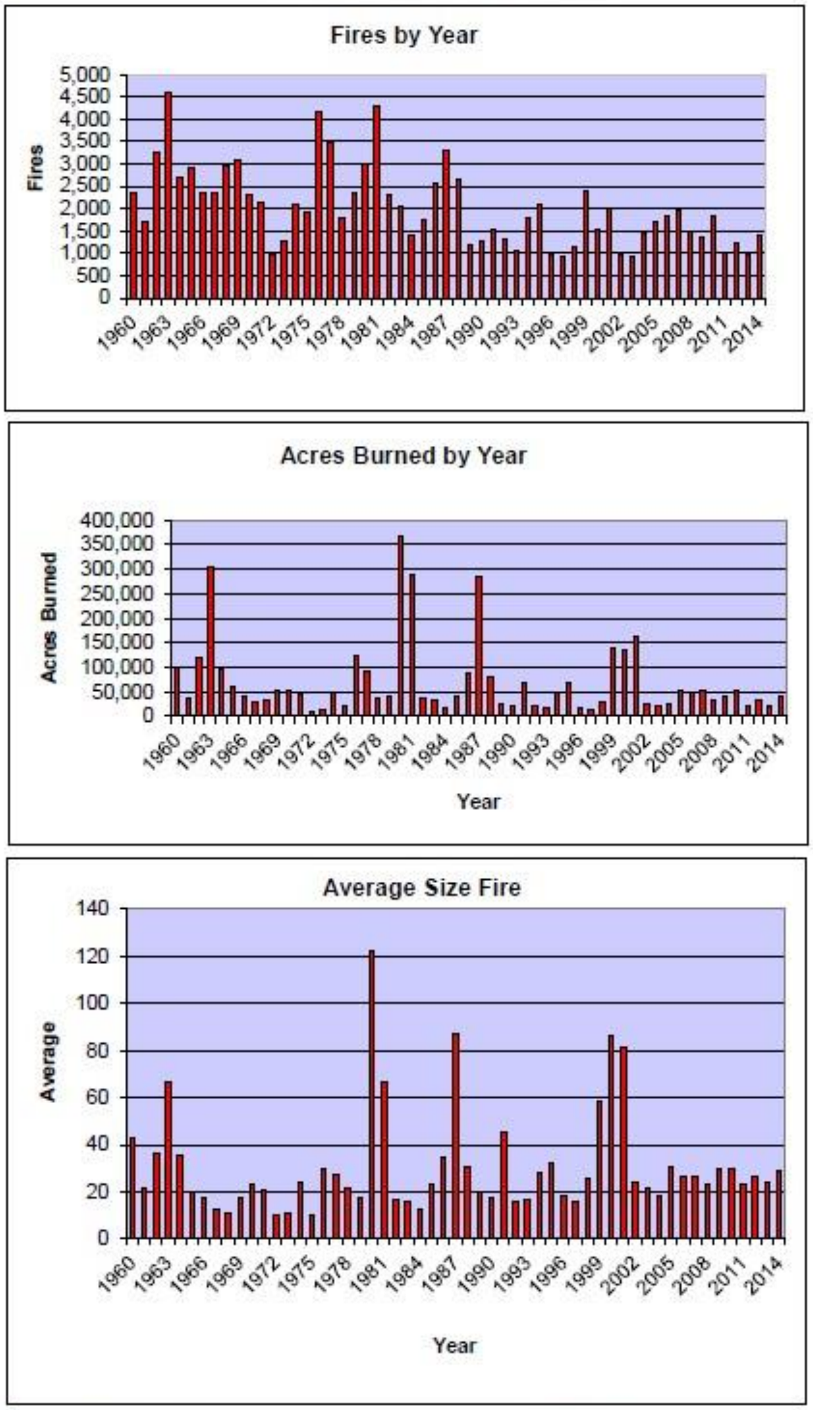
From 1997 to 2015, counties represented in the KIPDA Regional Hazard Mitigation Plan have experienced 184 events according to SHEDLUS, NOAA, and the Kentucky Division of Forestry.


KIPDA Region
Wildfire Map
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LAGRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
HILLVIEW
MT WASHINGTON
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Wildfires (2004-2010)
Military
Interstate
Corporate Boundary
Ohio River
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT
UNIVERSITY OF LOUISVILLE

Below is a list of fires in Kentucky from 1960-2014:

Year	Fires	Acres	Average
1960	2,339	99,823	43
1961	1,713	36,177	21
1962	3,277	119,566	36
1963	**4,579**	306,253	67
1964	2,710	95,198	35
1965	2,911	58,635	20
1966	2,358	41,039	17
1967	2,352	30,158	13
1968	2,965	33,122	11
1969	3,079	54,000	18
1970	2,298	53,008	23
1971	2,153	44,567	21
1972	977	**9,424**	**10**
1973	1,258	13,396	11
1974	2,073	49,775	24
1975	1,900	19,021	**10**
1976	4,185	123,789	30
1977	3,485	94,106	27
1978	1,816	38,440	21
1979	2,364	41,480	18
1980	3,011	**367,019**	**122**
1981	4,298	287,568	67
1982	2,302	37,561	16
1983	2,041	31,702	16
1984	1,422	17,728	12
1985	1,730	40,533	23
1986	2,565	88,735	35
1987	3,283	285,036	87
1988	2,643	80,452	30
1989	1,188	23,755	20
1990	1,266	22,437	18
1991	1,514	68,904	46
1992	1,297	20,574	16
1993	1,068	18,126	17
1994	1,802	50,263	28
1995	2,097	67,828	32
1996	976	18,066	19
1997	**913**	14,475	16
1998	1,140	29,224	26
1999	2,396	139,110	58
2000	1,545	133,347	86
2001	2,010	163,327	81
2002	976	23,542	24
2003	926	19,681	21
2004	1,470	26,916	18
2005	1,710	51,586	30
2006	1,857	49,716	27
2007	1,965	52,506	27
2008	1,480	34,381	23
2009	1,369	40,934	30
2010	1,830	54,593	30
2011	1,002	23,090	23
2012	1,234	32,855	27
2013	980	23,212	24
2014	1,419	41,037	29
5av	1,293	34,957	26
10av	1,485	40,391	27
20av	1,465	51,971	33
53av	2,028	69,833	31

Fire Summary 1960-2014 Report



blue = lowest

red = highest

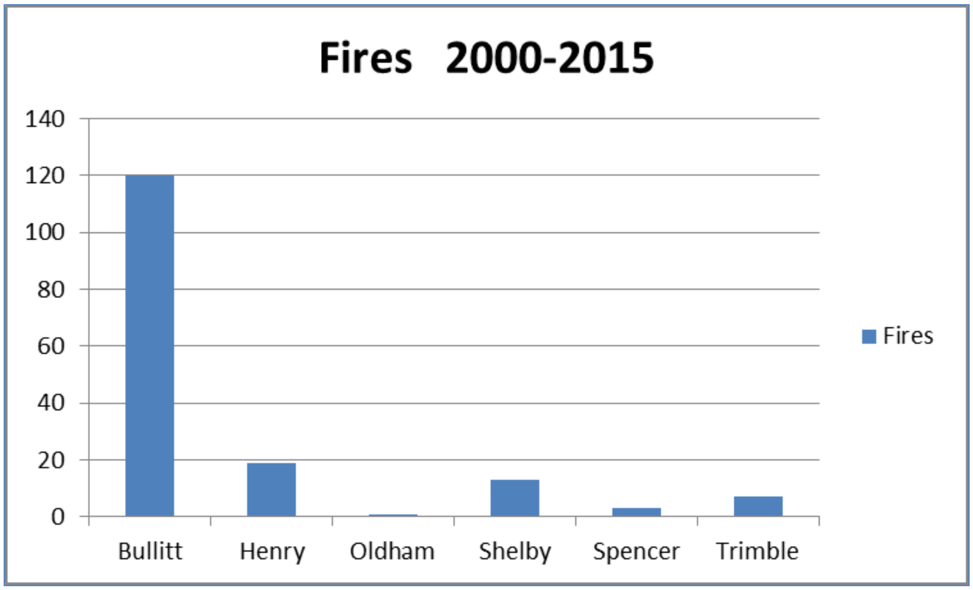
Ten Year Summary

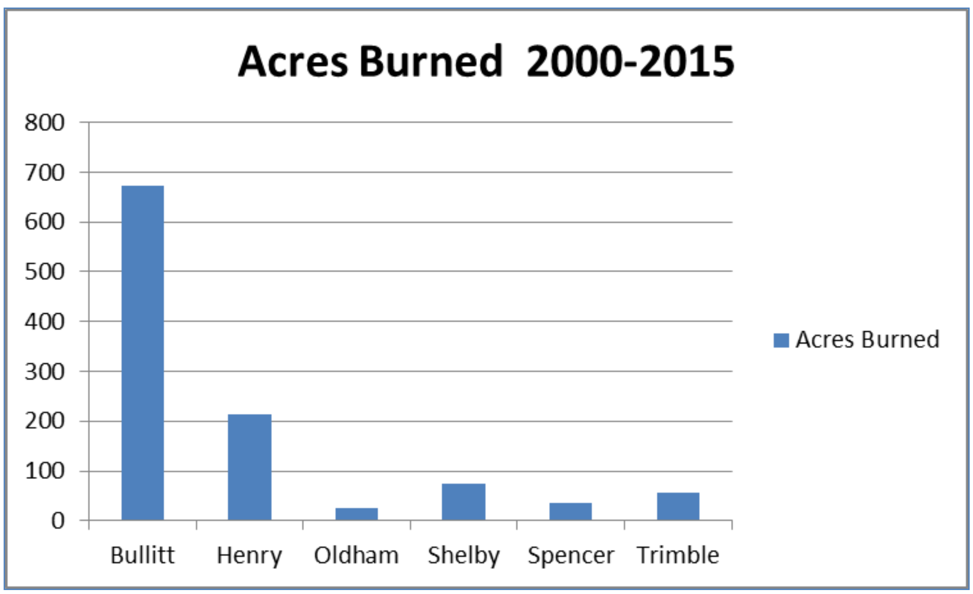
Fire and Acres Burned 2005 - 2014

Year	Number of Fires	Acres Burned
2005	1,710	51,586
2006	1,857	49,759
2007	1,956	52,506
2008	1,480	34,381
2009	1,369	40,934
2010	1,830	54,578
2011	1,002	23,090
2012	1,234	32,855
2013	980	23,212
2014	1,419	41,037
Totals	**14,837**	**403,938**

Breaking down the KIPDA Region, the number from 2000-2015, the area expereinced 163 fires with 1,075 acres burned. While the losses were not great from the events, the KIPDA Region has experienced forest fires in the past and contains heavily wooded areas that are susceptible to Wildfires/Forest Fires. Bullitt County has been the most susceptible in years past.

Fires from 2000-2015		
County	Fires	Acres Burned
Bullitt	120	673
Henry	19	213
Oldham	1	25
Shelby	13	74
Spencer	3	35
Trimble	7	55


Fires 2000-2015
140
120
100
80
60
40
20
0
Bullitt
Henry
Oldham
Shelby
Spencer
Trimble
Fires


Acres Burned 2000-2015
800
700
600
500
400
300
200
100
0
Bullitt
Henry
Oldham
Shelby
Spencer
Trimble
Acres Burned

ASSESSING VULNERABILITY BY JURISDICTION: WILDFIRE/FOREST FIRE

Wildfire/Forest Fire Vulnerability Score = Exposure Score + Hazard Score

Assessing the KIPDA Region's vulnerability to Wildfires/Forest Fires was determined through first calculating the Wildfires/Forest Fire Hazard Score. The Wildfires/Forest Fire Hazard Score was calculated by studying two (2) sources of data. The first layer used to create the Wildfire/Forest Fire Hazard Score was derived from the USGS NLCD land cover GIS map layer. This layer was used to calculate three (3) acre or higher forested areas to display forest fire potential. The NLCD land cover layer displays a geo-referenced data layer that depicts where forest fire potential could be based on three (3) acre forest coverage. To analyze the KIPDA Region's risk to forest fire, the forest fire layer was overlaid onto a map of 1 KM MGRS grids in the KIPDA Region. Next, a calculation was computed based on the percent of the area the forest fire layer covered within each grid. This percentage of area affected by the forest fire potential areas was then calculated and scored 0-1 to develop 50% of the Wildfires/Forest Fire Hazard Score.

The next step was determined by calculating the number of wildfire/forest fire points. This point data acquired from Kentucky Division of Forestry (KDF), displayed where concentrations of forest fires have occurred, thus producing areas of risk. The KDF forest fire point layer displays a geo-referenced data layer that depicts where forest fires have been identified. To analyze the KIPDA Region's risk to forest fire, the KDF forest fire point layer was overlaid onto a map of 1 KM MGRS grids in Kentucky. Next, a calculation was computed based the total number of forest fires that have occurred within each grid. The total number was then calculated for each grid and scored 0-1 to develop 50% of the Wildfires/Forest Fire Hazard Score.

The Forest Fire Hazard Score was then calculated by adding the two (2) scores together and scored 0-1. It is important to note if the Forest Fire Hazard Score inputs equaled 0, then the Forest Fire Hazard Vulnerability Score equaled 0.

Finally, the Wildfires/Forest Fire Vulnerability Score was calculated for each 1 KM MGRS grid by adding each grid's Exposure Score by its Wildfires/Forest Fire Hazard Score and then scored 0-1. Once the final Forest Fire Vulnerability Scores were calculated the composite scores were broken into four (4) categories, using the Natural Breaks classification system (1. Low, 2. Moderate, 3. High, 4..

ESTIMATING POTENTIAL LOSSES BY JURISDICTION: WILDFIRE/FOREST FIRE

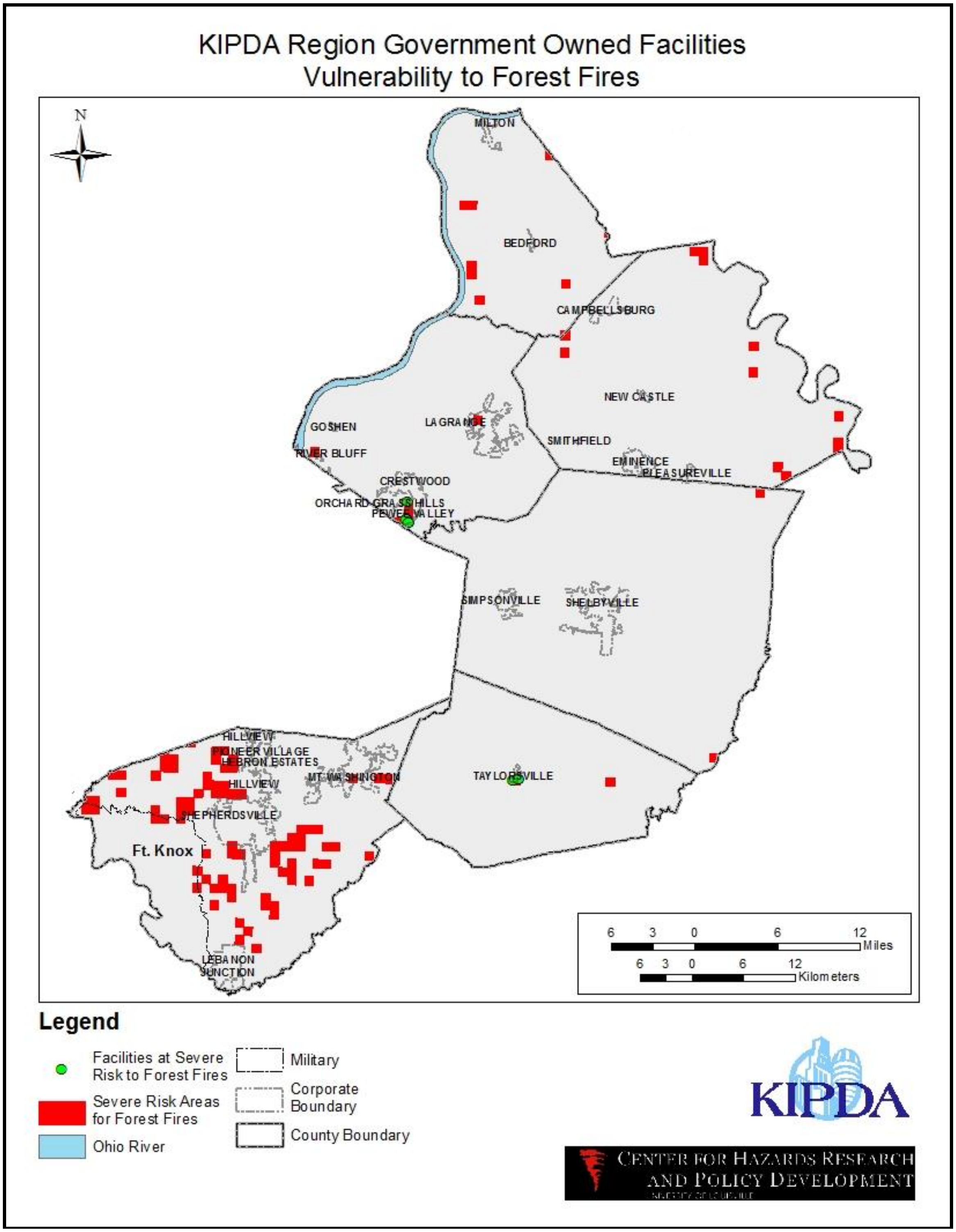
The *Average Annual Loss (AAL) estimate model* was used to estimate losses for Wildfires/Forest Fire. Potential loss for jurisdictions can be calculated by using the AAL created from the Average Losses and Occurrence data captured for each county. This produces a loss estimation model based on actual loss and occurrence data that has occurred over a set period of time. The following chart shows the jurisdictional (county) loss estimate for Wildfires/Forest Fire.

County	Hazard	Occurrences	Total Losses	Annual Rate of Occurrence	Average Losses	Average Annual Risk	Years of Measure 1997-2015
Bullitt	Wild/Forest Fire	141	$0	7.83	$0	$0	18
Henry	Wild/Forest Fire	22	$0	1.22	$0	$0	18
Oldham	Wild/Forest Fire	1	$0	0.06	$0	$0	18
Shelby	Wild/Forest Fire	12	$0	0.67	$0	$0	18
Spencer	Wild/Forest Fire	3	$0	0.17	$0	$0	18
Trimble	Wild/Forest Fire	5	$0	0.28	$0	$0	18
Total		**184**	**$0**	**10.22**	**$0**	**$0**	

ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES: WILDFIRE/FOREST FIRE

The process for determining state facility vulnerability and loss estimation is very similar to the process explained above. The Hail boundary map was used as the hazard layer for Wildfires/Forest Fire Loss. The government owned facilities were placed into a GIS mapping session and overlaid onto the Wildfires/Forest Fire boundary map. The government owned facilities captured within each Hail hazard layer were pulled out of the database and deemed vulnerable and estimated to be damaged during a Wildfire/Forest Fire event. The chart below shows a county breakdown of how many state facilities are located within a potential high risk Wildfire/Forest Fire hazard boundary layer and therefore considered vulnerable and estimated to be damaged. The following chart indicates the potential damages to government owned buildings based on high risk damages.

County	Facilities	Cost
Bullitt	0	$0.00
Henry	0	$0.00
Shelby	0	$0.00
Spencer	0	$0.00
Trimble	0	$0.00


KIPDA Region Government Owned Facilities
Vulnerability to Forest Fires
N
MILTON
BEDFORD
CAMPBELLSBURG
NEW CASTLE
GOSHEN
LA GRANGE
SMITHFIELD
RIVER BLUFF
EMINENCE
PLEASUREVILLE
CRESTWOOD
ORCHARD GRASS HILLS
PEWEE VALLEY
SIMPSONVILLE
SHELBYVILLE
HILLVIEW
PIONEER VILLAGE
HEBRON ESTATES
MT WASHINGTON
HILLVIEW
TAYLORSVILLE
SHEPHERDSVILLE
Ft. Knox
LEBANON JUNCTION
6 3 0 6 12 Miles
6 3 0 6 12 Kilometers
Legend
Facilities at Severe Risk to Forest Fires
Severe Risk Areas for Forest Fires
Ohio River
Military
Corporate Boundary
County Boundary
KIPDA
CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

VULNERABILITY TO FUTURE DEVELOPMENT

Projected Increase of Residential Structures					
	2014*	**2020^**	**Population Change**	**Average Persons Per Household***	**New Residential Structures**
Bullitt	77,955	88,508	10,553	2.69	4345
Henry	15,572	15,915	343	2.55	190
Oldham	63,490	74,990	11,500	2.89	4338
Shelby	44,875	51,944	7,069	2.66	2889
Spencer	17,668	23,655	5,987	2.76	2144
Trimble	8,786	9,514	728	2.5	269
* U.S. Census Bureau 2014 Estimate					
^ Kentucky State Data Center Projection					

It’s imperative for local officials to anticipate the potential growth and development in their jurisdiction. While the methodology described has many limitations, it provides an idea of the requirements to meet future need. The location(s) for future development is essential in reducing its risk to natural hazards. While all new structures in the area will be vulnerable to widespread disasters (drought, earthquake, hail, severe storms, and tornadoes) vulnerability to other hazards (dam failure, flooding, karst/sinkhole, landslide, and wildfire/forest fire) is dependent on the structures’ location. Using measures to either limit development in high-risk areas or to require the use of approved mitigation measures in these areas; vulnerability to location specific hazards can be greatly reduced and even eliminated. Additionally, in order to accommodate the new development, infrastructure updates will be required to provide essential services; examples include new water and sewer lines to handle the increased demand.

Once the 2020 U.S. Census figures are available, KIPDA staff will review population projections and development trends. With a more recent dataset, growth trends and potential for vulnerability to specific hazards can be better analyzed.

CONSEQUENCE ANALYSIS

The Emergency Management Accreditation Program (EMAP) standard for a Hazard Identification Risk and Assessment (HIRA) requires the state program to include a consequence and analysis for hazards identified in state HIRA's. The consequence analysis should consider the impact on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and the public confidence in the state's governance.

For the update of the KIPDA Regional Hazard Mitigation Plan, a consequence analysis has been performed for all identified hazards included in the plan. The analysis is shown in the table on the following page.

KIPDA Regional Hazard Mitigation Plan Consequence and Analysis							
	Impact to the Public	**Impact to the Responders**	**Continuity of Operations**	**Impact to Property, Facilities, and Infrastructure**	**Impact to the Environment**	**Impact to the Jurisdiction Economic Condition**	**Impact to Reputation or Confidence in Jurisdiction**
Dam Failure	Yes	Yes	No	Yes	Yes	Yes	No
Drought	Yes	No	No	No	Yes	Yes	Yes
Earthquake	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flooding	Yes	No	No	Yes	Yes	Yes	No
Hail	Yes	Yes	No	Yes	Yes	Yes	Yes
Karst/Sinkhole	Yes	No	No	Yes	Yes	Yes	No
Landslide	Yes	No	No	Yes	Yes	Yes	Yes
Severe Storm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Severe Winter Storm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tornado	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wildfire/Forest Fire	Yes	Yes	No	No	Yes	Yes	No
Extreme Temperature	Yes	Yes	Yes	Yes	Yes	Yes	No
1) In the Impact to Property, Facilities, and Infrastructure, it looks at the impact to all property, facilities, and infrastructure existing in the jurisdiction, not just to that owned by the jurisdiction							
2) The consideration for each of these hazards as to whether an individual hazard's consequences exist, or not, are based on a possible worst case scenario. It must also be understood that a [Yes] means that there is a good possibility that the consequence it refers to could happen as a result of the hazard, not that it will. Conversely a [No] means that it is highly unlikely that the consequence will have a major impact, not that there will be no impact at all.							

5 MITIGATION MEASURES

The Mitigation Strategy of this plan was created by the public input of the local Mitigation Plan subcommittees as a result of reviewing the finding of the hazard profiles and vulnerability assessment of this plan. Mitigation committees used the FEMA how to guide *FEMA 386-3 Developing the Mitigation Plan* as a guide to developing the Mitigation goals, objectives and actions.

CAPABILITY ASSESSMENT

Mitigation strategies have been developed in response to the hazard profiles and vulnerability of the assets in each jurisdiction. These strategies provides each jurisdiction a blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, resources, and its ability to expand on and improve these existing tools.

This capabilities assessment has been divided into the following three sections:

A. Existing Authorities, Policies, Programs, and Resources
B. Existing Governmental Structure
C. Existing Professional Staff Departments

The purpose of conducting this capabilities assessment is to identify potential hazard mitigation opportunities available to the jurisdictions through their daily operations as units of local government. Careful analysis should detect any existing gaps, shortfalls or weaknesses within existing government activities that could increase community vulnerability. The assessment will also highlight the positive measures already in place at the jurisdictional level, which should continue to be supported and enhanced through future mitigation efforts.

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for jurisdictions to pursue under this Plan, but ensures that those goals and objectives are realistically achievable under given local conditions.

A. EXISTING AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES

KIPDA staff and local subcommittees evaluated existing authorities, policies, programs, and resources of each jurisdiction. The following chart is a summary of each jurisdiction and the current status of these items. Local committee members evaluated this information to determine what goals, objectives, and actions are necessary to effectively mitigate vulnerabilities, and what resources each jurisdiction currently has to begin implementation of the Mitigation Strategies of this plan.

Committee members compiled a list of potential authorities, policies, programs and resources based upon the public input and research of the committee members. Committee members also consulted with State and Federal Agencies to determine what resources were available and proven effective for other jurisdictions.

MITIGATION MEASURES

Definitions Relating To Existing Authorities, Programs and Resources

Floodplain Management – is the operation of a community program of corrective and preventative measures for reducing flood damage. These measures can take a variety of forms and generally include Zoning, Subdivision or Building Requirements, and special purpose Floodplain Ordinances.

CRS Plan- the Community Rating System is a voluntary program that recognizes and encourages community Floodplain Management Activities that exceed the minimum National Flood Insurance Program requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flooding risk resulting from the community's actions. Currently, while all communities are eligible, none participate in CRS.

Zoning Regulations- are the tool a community uses to regulate land use, promote orderly growth and protect existing property owners by ensuring a convenient, attractive and functional community.

Subdivision Regulations- set standards for streets, drainage ways, sewage disposal, water systems and other aspects of public welfare.

Land Development Plans- identify where residential, commercial, institutional and recreational sites will be located and how essential municipal services such as water and sewer systems, roads and fire protection will be provided. These Plans also describe how many people are expected to live in an area and how development will be staged over time.

Fire Prevention Codes- are intended to make sure all fire protection systems are maintained as they were designed. Such systems may include detection and suppression systems, but also include special fire rated walls and doors, which may remain in place for the duration of the buildings life.

Stormwater Management Plans- are designed to manage stormwater runoff from new development in a coordinated wide approach with the thought in mind of decreasing the potential of flooding.

CERT Team- the Community Emergency Response Team are citizens who are educated about disaster preparedness for hazards that may impact their area and are trained in basic disaster response skills such as fire safety, light search and rescue, team organization and disaster medical operations. CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help.

NWS Storm Ready Program- is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather, from tornadoes to tsunamis.

Local Economic Development Council- is a group of citizens within a County, usually appointed, with diverse backgrounds in business, banking, education, social service, etc. who is charged with the preparation of infrastructure for and the recruitment of new industries or retail establishments and with the responsibility of retaining the already existing businesses and retail establishments within that County.

Regional Development Agency- is, for the purpose of this Plan, a paid group of professionals with experience in areas such as making business loans, improving the housing stock, providing services for the elderly/handicapped, preparing grant applications and administering economic development and transportation related projects, etc. The planning that is done by this Agency usually affects multi-counties. The KIPDA ADD serves as the Regional Development Agency for the KIPDA Region.

These existing authorities, policies and programs are further explained in relation to the existing governmental structure and powers of the local jurisdiction. It is the responsibility of each local jurisdiction to develop, enact, and enforce the authorities and programs described above.

The following charts below represent each community’s commitment towards hazard mitigation:

MITIGATION MEASURES

	Floodplain Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Bullitt County Fiscal Court	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
Fox Chase, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Hillview, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Hebron Estates, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Hunters Hollow, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Lebanon Junction, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Mt. Washington, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Pioneer Village, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Shepherdsville, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Henry County Fiscal Court	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Campbellsburg, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Eminence, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
New Castle, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Pleasureville, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Smithfield, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Oldham County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Crestwood, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Goshen, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Lagrange, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Orchard Grass Hills, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Pewee Valley, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
River Bluff, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Shelby County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Shelbyville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Simpsonville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Spencer County Fiscal Court	Yes	No	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Taylorsville, City of	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Trimble County Fiscal Court	Yes	No	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Bedford, City of	Yes	No	No	No	No	Yes	No	No	Yes	Yes	Yes
Milton, City of	Yes	No	No	No	No	Yes	No	No	Yes	Yes	Yes

B. EXISTING GOVERNMENT STRUCTURE

The following charts summarize the governmental structure for each jurisdiction in the KIPDA Region. Each jurisdiction will be responsible for implementation of the Mitigation Strategies for their service area. Committee members reviewed the governmental structure of each jurisdiction to determine their capabilities to implement and enforce existing and future authorities, policies, programs, and resources.

The following chart summarizes the governmental structure of the county governments.

County Governments in the KIPDA Region	
County	**Type of Government**
Bullitt	Judge/Executive and 4 magistrates
Henry	Judge/Executive and 6 magistrates
Oldham	Judge/Executive and 8 magistrates
Shelby	Judge/Executive and 7 magistrates
Spencer	Judge/Executive and 5 magistrates
Trimble	Judge/Executive and 4 magistrates

The following chart summarizes the governmental structure and class of each city jurisdiction.

City Governments in the KIPDA Region			
CITY	**CLASS**	**COUNTY**	**TYPE OF GOVERNMENT**
Fox Chase	Home Rule	Bullitt	Mayor/6 Council Members
Hebron Estates	Home Rule	Bullitt	Mayor/4 Commissioners
Hillview	Home Rule	Bullitt	Mayor/6 Council Members
Hunters Hollow	Home Rule	Bullitt	Mayor/4 Commissioners
Lebanon Junction	Home Rule	Bullitt	Mayor/6 Council Members
Mt. Washington	Home Rule	Bullitt	Mayor/6 Council Members
Pioneer Village	Home Rule	Bullitt	Mayor/6 Council Members
Shepherdsville	Home Rule	Bullitt	Mayor/6 Council Members
Campbellsburg	Home Rule	Henry	Mayor/6 Council Members
Eminence	Home Rule	Henry	Mayor/6 Council Members
New Castle	Home Rule	Henry	Mayor/4 Commissioners
Pleasureville	Home Rule	Henry	Mayor/4 Commissioners
Smithfield	Home Rule	Henry	Mayor/6 Council Members
Crestwood,	Home Rule	Oldham	Mayor/4 Commissioners
Goshen	Home Rule	Oldham	Mayor/4 Commissioners
LaGrange	Home Rule	Oldham	Mayor/8 Council Members
Orchard Grass Hills	Home Rule	Oldham	Mayor/6 Council Members
Pewee Valley	Home Rule	Oldham	Mayor/6 Council Members
River Bluff	Home Rule	Oldham	Mayor/4 Council Members
Shelbyville	Home Rule	Shelby	Mayor/6 Council Members
Simpsonville	Home Rule	Shelby	Mayor/4 Commissioners
Taylorsville	Home Rule	Spencer	Mayor/4 Commissioners
Bedford	Home Rule	Trimble	Mayor/4 Commissioners
Milton	Home Rule	Trimble	Mayor/4 Council Members

MITIGATION MEASURES

Legal Authority of Local Jurisdictions

Local governments in Kentucky have a wide range of tools available for implementing mitigation programs, policies and actions. A hazard mitigation program can utilize any or all of the four broad types of government powers granted by the State of Kentucky, which are (a) Regulation; (b) Acquisition; (c) Taxation; and (d) Spending.

A) REGULATION

GENERAL POLICE POWER

Local governments have been granted broad regulatory powers in their jurisdictions. Kentucky Revised Statutes bestow the general police power on local governments, allowing them to enact and enforce ordinances which define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances (including public health nuisances).

Since hazard mitigation can be included under the police power (as protection of public health, safety and welfare), towns, cities and counties may include requirements for hazard mitigation in local ordinances. Local governments may also use their ordinance-making power to abate "nuisances," which could include, by local definition, any activity or condition that threatens the general health and safety of the public.

All Jurisdictions in the planning area have enacted and enforces regulatory ordinances designed to promote the public health, safety and general welfare of its citizenry.

BUILDING CODES AND BUILDING INSPECTION

Many structural mitigation measures involve constructing and retrofitting homes, businesses and other structures according to standards designed to make the buildings more resilient to the impacts of natural hazards. Many of these standards are imposed through the use of building codes.

Jurisdictions have the opportunity and the power to develop and enforce building codes. Recently, the Spencer County became the latest jurisdiction within the planning area to hire a building codes enforcement officer.

LAND USE

Regulatory powers granted by the state to local governments are the most basic manner in which a local government can control the use of land within its jurisdiction. Through various land use regulatory powers, a local government can control the amount, timing, density, quality, and location of new development. All these characteristics of growth can determine the level of vulnerability of the community in the event of a natural hazard. Land use regulatory powers include the power to engage in planning, enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls.

MITIGATION MEASURES

Planning

Local jurisdictions have the authority to perform a number of duties related to planning, including: make studies of the area; determine objectives; prepare and adopt plans for achieving those objectives; develop and recommend policies, ordinances, and administrative means to implement plans.

Zoning

Zoning is the traditional and most common tool available to local governments to control the use of land. The statutory purpose for the grant of power is to promote health, safety, morals, or the general welfare of the community. Land "uses" controlled by zoning include the type of use (e.g., residential, commercial, industrial) as well as minimum specifications for use such as lot size, building height and setbacks, density of population, etc.

Subdivision Regulations

Subdivision regulations control the division of land into parcels for the purpose of building development or sale. Flood-related subdivision controls typically require that landowners and developers install adequate drainage facilities and design water and sewer systems to minimize flood damage and contamination. They prohibit the subdivision of land subject to flooding unless flood hazards are overcome through filling or other measures, and they prohibit filling of floodway areas. Subdivision regulations require that subdivision plans be approved prior to the division/sale of land. Subdivision regulations are a more limited tool than zoning and only indirectly affect the type of use made of land or minimum specifications for structures.

Floodplain Ordinance

The purpose of the local floodplain Ordinances is to (1) minimize the extent of floods by preventing obstructions that inhibit water flow and increase flood height and damage; (2) prevent and minimize loss of life, injuries, property damage and other losses in flood hazard areas; and (3) promote the public health, safety and welfare of citizens of the jurisdiction in flood hazard areas.

The ordinance also makes certain that they meet the minimum requirements of participation in the National Flood Insurance Program (NFIP). The incentive for local governments adopting such ordinances is that they will afford their residents the ability to purchase flood insurance through the NFIP and be eligible for state Hazard Mitigation funding.

The Commonwealth of Kentucky has taken several steps to reduce the hazard of flooding. Chapter 151 of the Kentucky Revised Statues (approved in 1966) is the state statute that addresses the development of floodplain areas. The most pertinent sections of KRS 151 are (1) KRS 151.250, which establishes the requirements for obtaining a floodplain development permit; (2) KRS 151.125, which establishes the authority and powers of the secretary of the Natural Resources and Environmental Protection Cabinet to administer KRS 151; and (3) KRS 151.320, which requires the judge/executive of each county or the mayor or chief executive officer of each city to concurrently enforce with the Cabinet, within their respective counties and cities, the provisions of KRS 151.250 or 151.280 and the rules and regulations issued relating to the statute.

Based on KRS 151, the Division of Water in the Kentucky Natural Resources and Environmental Protection Cabinet has been designated as the state coordinating agency for the National Flood Insurance Program (NFIP). As the coordinating agency, the Division of Water assists local governments and state agencies in answering all questions concerning the program.

B) ACQUISITION

The power of acquisition can be a useful tool for pursuing local mitigation goals. Local governments may find the most effective method for completely "hazard proofing" a particular piece of property or area is to acquire the property (either in fee or a lesser interest, such as an easement), thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development occurring. The state of Kentucky legislation empowers cities, towns, counties to acquire property for public purpose.

C) TAXATION

The power to levy taxes and special assessments is an important tool delegated to local governments by the State of Kentucky. The power of taxation extends beyond merely the collection of revenue, and can have a profound impact on the pattern of development in the community.

D) SPENDING

The fourth major power that has been delegated from the Kentucky General Assembly to local governments is the power to make expenditures in the public interest. Hazard mitigation principles can be made a routine part of all spending decisions made by the local government, including the adoption annual budgets.

POLITICAL WILLPOWER

Most residents of the jurisdictions have a general knowledge about the potential hazards that their community faces. However, residents have had very little education concerning actions that increase or decrease the communities' vulnerability to certain hazards. Education concerning mitigation strategies and potential losses will be a key factor for all jurisdictions in the planning area.

Because of the history with natural disasters in the past 10 years, it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies. Jurisdictions have faithfully attended and participated in the mitigation planning process, largely due to the fact that the region has been widely affected by these natural disasters.

C. EXISTING PROFESSIONAL STAFF DEPARTMENTS

Local subcommittee members also reviewed the existing capabilities of the governmental agencies based upon the existing professional staff departments that are currently available to each jurisdiction. The following chart provides a summary of the existing professional staff for each jurisdiction. In the areas of gray on the chart, these areas are provided to the cities through the county department.

MITIGATION MEASURES

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Bullitt County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Fox Chase, City of			Yes		Yes	Yes			Yes	No		No	No
Hillview, City of			Yes		Yes	Yes			Yes	Yes		No	Yes
Hebron Estates, City of			Yes		Yes	Yes			Yes	No		No	No
Hunters Hollow, City of			Yes		Yes	Yes			Yes	No		No	No
Lebanon Junction, City of			Yes		Yes	Yes			Yes	Yes		No	Yes
Mt. Washington, City of			Yes		Yes	Yes			Yes	Yes		Yes	Yes
Pioneer Village, City of			Yes		Yes	Yes			Yes	Yes		No	No
Shepherdsville, City of			Yes		Yes	Yes			Yes	Yes		Yes	Yes
Henry County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Campbellsburg, City of			No		Yes	Yes			No	Yes		Yes	Yes
Eminence, City of	Yes		No		Yes	Yes			No	Yes		Yes	Yes
New Castle, City of			No		Yes	Yes			No	No		Yes	Yes
Pleasureville, City of			No		Yes	Yes			No	No		Yes	Yes
Smithfield, City of			No		Yes	Yes			No	No		Yes	No
Oldham County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Crestwood, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	No
Goshen, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	No
Lagrange, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	Yes
Orchard Grass Hills, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		No	No
Pewee Valley, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	No
River Bluff, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		No	No
Shelby County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shelbyville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simpsonville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spencer County Fiscal Court		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Taylorsville, City of			Yes	Yes	Yes	Yes			Yes	Yes		No	Yes
Trimble County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Bedford, City of			Yes	Yes	Yes	Yes			No	Yes		Yes	Yes
Milton, City of			Yes	Yes	Yes	Yes			No	Yes		Yes	Yes

Committee members were directly involved in summarizing and analyzing the duties of each department. During the public input and committee meetings, it was determined that the implementation of mitigation actions would depend greatly on the capabilities of the departments of each jurisdiction.

The following information summarizes the duties and responsibilities each of the professional staff departments listed in the chart above.

The **Board of Education** is responsible for the operation of the county school system and is also elected at large by the people. County funds usually maintain the buildings and provide funds for other capital projects, with state funds paying salaries, purchasing textbooks and supplies.

The **Building Inspections Department** enforces the State Building Code and other applicable local codes through a program of inspection and permitting.

The **PVA, Clerk of Courts and the Sheriff** are elected every four years. The PVA is responsible for the valuation of property for tax purposes. The Clerk of Court is custodian of the court system in each county and that office is financed completely by the State of Kentucky. The Sheriff operates on a budget approved annually by the commissioners or magistrates of each county. The sheriff is responsible for the collection of taxes and enforcement of state and local laws.

The **County and City Police Departments** are responsible for the enforcement of local and state laws in their jurisdictions.

The **Road Departments** are responsible for the maintenance and care of public roadways.

The **Public Works Departments** are responsible for the maintenance and care of public roadways at the city level.

The **Emergency Management** office is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events. The formation of an emergency management office in each county is mandated under Kentucky Revised Statutes

The **County and City Treasurer** is responsible for the oversight and management of the County's budget and fiscal programs, including the administration of state and federal grants.

The **Mayor and County Judge** of each jurisdiction is responsible for the oversight of the daily operations of County and City government. Enforcement of County and City policies and regulations are their responsibility.

The **Health Department** and Social Services have separate boards that are appointed by the commissioners. Hiring of employees in these departments is approved by the commissioners with state personnel policies applying. These agencies protect the public health and provide social services in the areas of medical care and governmental social programs to families displaced from home or job.

Of the above-listed departments, the following have been assigned specifically delegated responsibilities to carry out mitigation activities or hazard control tasks: Emergency Management, Road Department, Building Inspections, Public Works Department, and the Planning and Zoning Department, where applicable.

Each of these departments has been involved in the development of this mitigation plan by participating on the local mitigation committees. The committees with these staff were able to identify gaps, weaknesses or opportunities for enhancement with existing mitigation programs.

For the most part, it was determined that each of these departments was short-staffed, and fulfilled multiple duties within their departments. All jurisdictions are limited in funding and resources for the hiring of additional staff. Each department staff member is adequately trained and funded to accomplish their current workloads. Increase in work activities will increase the need for additional staff to effectively perform tasks.

As a result of staffing and funding issues, KIPDA becomes the primary resource of technical assistance. KIPDA staff are professional staff trained in planning, GIS/GPS, fiscal management and project development. KIPDA is the regional planning agency that provides extended services and technical assistance to all jurisdictions in the planning area.

Summary of Findings

Expansion and improvement of existing authorities, policies, programs, and resources to reduce potential losses are depends upon the local jurisdictions staff and financial resources.

After reviewing the above summary tables, the local committees recognize that the county governments supply the majority services and professional departments that are responsible for implementing, maintaining and enforcing mitigation activities. Each county in the KIPDA region are equal in their ability to enforce and implement mitigation strategies. Mitigation planning committees are organized at the county level to include all jurisdictions in the county for this reason. Cities in the KIPDA region, except for Louisville and the city of Shepherdsville, depend largely upon the county government to support and combine resources to perform projects that improve the quality of life for residents. These projects include mitigation projects and activities. As a result, the mitigation committees have concluded from the capability assessment a key aspect of this plan that will greatly affect the prioritization and implementation of mitigation actions. All city jurisdictions depend on the County jurisdictions to assist with policies, authorities, and funding issues to implement projects.

Counties have the greatest resources to implement mitigation goals and objectives and insure success in the implementation of actions. Therefore, the mitigation committees have agreed through this planning process that the goals, objectives and actions need to be prioritized and implemented at the county level. Counties have a vested interest in the success of the cities in their jurisdictions, and have the ability to provide resources that otherwise would not be available. City jurisdictions will have the opportunity at any time to implement mitigation actions on their own in the future if their capabilities expand on the opportunities existing.

Due to the limitations described above, Mitigation committees were established on the county level. They were established to not only create the mitigation plan, but to fill in the gaps and enhance the capabilities of all jurisdictions to implement mitigation strategies that will reduce potential losses identified in the risk assessment. The KIPDA Regional Hazard Mitigation Committee felt that the local expertise would be best suited to addressing their own community needs, and thus during the planning process, mitigation techniques were solicited from various first responder agencies within the community. This process helped expand the scope and extent of the mitigation section of the plan.

All jurisdictions have participated in the local mitigation planning subcommittee in each county, and as explained in section 2 of this plan. In addition to local participation from each jurisdiction, the Kentuckiana Regional Planning and Development Agency staff has provided the professional assistance in GIS and plan development to fill in the gaps and enhance the local jurisdictions capability to implement mitigation strategies that will reduce potential losses that are identified in the risk assessment.

Therefore, the Local Hazard Mitigation Goals, Objectives and Actions were compiled on as a county jurisdiction including the city jurisdictions public input.

HAZARD MITIGATION GOALS UPDATE

In order to proceed ahead with the 2016 KIPDA Regional Hazard Mitigation Plan Update, the KIPDA Regional Hazard Mitigation Committee conducted and analyzed the best possible methods for updating the 2011 plan in accordance with FEMA regulations. This method included individual meetings with county Emergency Management Directors and county-wide mitigation meetings, where, mitigation actions were solicited from various stakeholders.

After conducting a lengthy risk assessment and updating all data with the best available data, the KIPDA Regional Hazard Mitigation Committee decided to look at all factors initiated with the 2011 plan and see how those mitigation goals compared with possible present actions.

Interviews took place with each individual Emergency Management Director, where every action from the 2011 KIPDA Regional Hazard Mitigation Plan was discussed and evaluated in terms of effectiveness and vitality. While some mitigation goals had been completed, such as GIS mapping of areas, it was determined through these meetings, the KIPDA Regional Hazard Mitigation Committee meetings, and the county wide mitigation meetings, that keeping the same actions would be paramount to continued successful implementation of the 2011 plan.

In addition to keeping the previous mitigation actions, it was determined through the planning process to add additional mitigation actions to make a more robust plan incorporating data learned from the last few years. Such new additions included using CHAMPS and social media into the plan.

CHAMPS, or Community Hazard Assessment and Mitigation Planning acts as the state portal for hazard mitigation grant submissions. It has become the Kentucky grant submission. While this centralized database is used by KYEM, it also has other long term practical planning implications.

Since CHAMPS is a centralized database, each county can use the system for long term planning and a “placeholder” for mitigation techniques and projects. Those projects do not have to be submitted for approval, but instead can be used, in addition too, storing and housing mitigation ideas. Once these projects are placed into the system, they can then be categorized by importance. This not only demonstrates to FEMA a communities planning capabilities, it shows how Kentucky communities, especially, the KIPDA Region value hazard mitigation planning by making active plans for the future. These projects also become justification for future funding opportunities.

Social media has become more prevalent in our society, as well as the KIPDA region. Many citizens, government officials, and private corporations now rely on social media as an acceptable form of communication. Programs and websites such as Facebook, Twitter, and Instagram have become household names. With the increase of smart phones, these applications or apps are literally a finger away.

The benefit from incorporating these applications into hazard mitigation is immense. The applications have a long reach, and affect citizens of all ages. Not only is the reach to citizens great, the cost is minimal. Facebook, Twitter, and Instagram all are free programs which is no cost to the user. This means that hazard warnings can be distributed to a high percentage of the community at little cost.

While adding new mitigation measurements to the plan, the KIPDA Regional Hazard Mitigation Committee opted to keep the mitigation measures the same for the plan update as the originally identified mitigation measures remain a high priority for all of the jurisdictions covered by the plan. This combination of new and old ensured past mitigation actions that were affective, were still a main priority, while addressing the unmet needs of the first plan.

LOCAL COUNTY MITIGATION MEETINGS

Through the planning process of the 2016 KIPDA Regional Hazard Mitigation Plan Update, one of the main focuses was to reach out to each county and solicit mitigation ideas and techniques from those who know the counties' needs best. This group of stakeholders *(See Appendix B)* included local emergency managers, KYEM, County Judge Executives, Red Cross, Local School Representatives, Planning and Zoning, Police, Fire, Search and Rescue, Dispatch, Kentucky State Police, Planners, mayors, national weather service, private businesses, and private citizens.

While the list above is not exhaustive, it does point to the various levels of stakeholder participation and how a community best knows its own needs. Though described in the planning process section of the plan, the meetings did touch upon improving mitigation actions from the 2011 KIPDA Regional Hazard Mitigation Plan and adding new actions. For example, while GIS mapping of the area has been completed, the county wide committees felt it was best to reevaluate hazard areas on a continuous basis, in order to improve future planning efforts. Another continuous action is upgrading the current technology and communications equipment with the changing technologies.

The ideas brought forth in this meeting, while included in the objectives and action section can best be separated into the 6 Goals, presented in the next section.

Prevention

- Street Signs Correction
- Wetland Preservation
- Culvert Cleanings
- Hazmat Clean Up
- Reflectors on Roads
- Storm Ready Communities
- Planning- Champs
- Risk Map- Mitigation Map

Property Protection

- Safe Room buildings and additions to public facilities

Natural Resource

- Tree removal from road ways and streams

Structural Projects

- Culverts addition requirements
- Dead Animal Pick Up for contaminated water supply

Emergency Services Communications

- Portable Signage for warning
- Gas Masks, SCBA suits
- Cameras for congested areas
- Non-Skid Road Coating
- Traffic Cones
- Drones for damage assessment and warning
- Invest in newer technologies and equipment

MITIGATION MEASURES

Public Awareness

- Schools and more interagency trainings
- Trainings for Public and Local Government Personnel
- Social Media Incorporation

See Appendix C for more detailed list

LOCAL HAZARD MITIGATION GOALS

KIPDA staff and the county mitigation committees analyzed the loss estimates in the risk assessment to establish goals and objectives for loss reduction based upon that analysis. These goals were established by the mitigation committees in each county, and when appropriate, were adopted by the city jurisdictions. These goals and objectives will be the blueprint for development of specific actions that will reduce the jurisdictions potential losses as identified in the risk assessment.

Mitigation Goals were designed to be general guidelines of what is to be achieved. These goals are for long-term and represent the overall vision of the mitigation plan. The Objectives define the strategies and implementation steps to attain the identified goals.

These objectives are specific, measurable, and have a defined completion. The Goals and Objectives were established and combined to make a complete list of goals and objectives for jurisdictions in the planning region to adopt. It should be noted that for the 2016 KIPDA Hazard Mitigation Plan, the Regional Planning Committee voted on and adopted the Goals and Objectives for this iteration.

The local mitigation committees met to review and analyze the risk assessment studies for each identified hazard. The following goals and objectives were determined to have the greatest benefit in hazard reduction in the KIPDA region.

While some mitigation actions have been completed, they do require ongoing maintenance to properly continue. It should be noted that additional mitigation actions came forth from the KIPDA Regional Hazard Mitigation Committee, Local Emergency Planning from first responder groups in county wide meetings, and individual meetings with county Emergency managers.

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

PURPOSE OF GOAL IN RELATION TO THE RISK ANALYSIS

During the review of the risk analysis, committee members determined that the greatest vulnerability is the affects that natural hazards have in providing essential services to the general public. For example, during a flood event, the most likely damages are the destruction of roadways and bridges caused by washouts, and stream overflow. Debris from tornados, severe thunderstorms and winter storms can disrupt needed utility services, as well as transportation roads for emergency first responders. Therefore, the following objectives were formulated as a result of this goal.

- **Objective 1.1** Minimize the disruption to and enhance rapid restoration of transportation systems.
- **Objective 1.2** minimizes the disruption and enhances rapid restoration of utility systems.
- **Objective 1.3** Reduce the number of critical facilities in hazard areas.

- **Objective 1.4** Minimize the damages to groundwater and the environment as a result of damages caused by hazards.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

PURPOSE OF GOAL IN RELATION TO THE RISK ANALYSIS

During the review of the risk analysis, committee members determined several structures, critical facilities, and at-risk populations that will need to have specific mitigation actions taken in order to be effective in reducing the vulnerability. During the risk assessment, structure has been identified as being in a particular hazard area, many of which are critical facilities. Structures need to be removed from the hazard area completely or built to appropriate standards to reduce the potential losses. Not only are these structures at risk, they put other structures at risk by becoming debris that can be thrown by wind and water. Each jurisdiction needs to consider mitigation actions that will reduce the number of these structures that are located in hazard areas, especially critical facilities.

- **Objective 2.1** Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.
- **Objective 2.2** Improve the resistance of structures in the community against natural hazards.
- **Objective 2.3** Coordinate service delivery to vulnerable members of the community.
- **Objective 2.4** Pursue new technology projects and new construction projects

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

PURPOSE OF GOAL IN RELATION TO THE RISK ANALYSIS

During the evaluation of the risk assessment and the documentation in the capability assessment, it was determined that the potential losses to the identified risks may be reduced simply by county and city policies that will regulate future development in hazard areas. The capability identifies the lacking existing authorities, policies, programs and resources that can reduce the potential losses in each city and county. Enforcement of existing policies may reduce the number of existing and future structures that are built in flood hazard areas. Policies that regulate and guide the development of future infrastructure such as transportation, lifeline utilities, and essential facilities will drastically reduce the vulnerability of these facilities. Therefore, the following objectives have been developed.

- **Objective 3.1** Enforce and enhance existing policies and authorities.
- **Objective 3.2** Revise existing and develop new regulations that promote mitigation activities.

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

PURPOSE OF GOAL IN RELATION TO THE RISK ANALYSIS

During the evaluation of the risk assessment, it was determined that in order to reduce the number of structures in hazard areas, the general public needs to be aware of the potential risks and high potential risk areas. Policies of the local governments can be developed, however, education will ensure those policies are effective to reduce the number of existing and future structures in hazard areas. Public awareness can serve two major points in the mitigation strategies. First, in an education capacity, the seriousness of the potential for disaster and damages can be communicated. The risk assessment clearly defines areas for potential disaster. The more the citizenry knows about the potential, the more likely they are to take appropriate steps in securing their property and protecting their families against the dangers that are associated with the identified hazards. Second, citizens and visitors alike can be made aware of evacuation routes, which physically remove people from the path of danger. The risk assessment identifies the fact that severe thunderstorms, tornados, and severe winter storms may occur at any place in the region and affect any jurisdiction. The potential for loss of life may be reduced simply by educating the public of when and how to evacuate the hazard areas. Therefore, the following objectives have been developed.

- **Objective 4.1** Educate the Public about hazards prevalent in their jurisdiction.
- **Objective 4.2** Increase the Public's understanding, support and awareness for Hazard Mitigation activities.
- **Objective 4.3** Develop, maintain and publicize evacuation routes.
- **Objective 4.4** Educate the public about the availability of Insurance options.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

PURPOSE OF GOAL IN RELATION TO THE RISK ANALYSIS

Reducing potential losses in identified hazard areas depends largely on the ability of the community to communicate, plan, and implement modern technologies to reduce potential losses. During review of the risk assessment, committee members determined that hazards simply will occur and some hazards will occur more often than others. Improving each jurisdiction's technical capabilities will provide the necessary equipment to effectively communicate the hazard risks to the general public, communicate with key critical services including emergency personnel, as well as locate potential losses and damages using modern technology. The hazard profile and risk assessment sections of this plan, identifies how future updates and information collection will be included in future plan updates using modern technologies. The development of this data will help to reduce damages to existing and future buildings by enhancing the ability to identify risks and hazard locations. Enhancing each jurisdictions technical capability may be to simply insure that all repetitive loss properties are identified, placed in a database and mapped. Developing such technical capability with databases can be costly and time consuming. This type of project will require grant funding and has the potential to require outside assistance to jurisdictions from the Kentuckiana Regional Planning and Development Agency for its implementation.

Regardless of the cost and time required to implement this strategy, mitigation committees for each jurisdiction have agreed that the data collected will provide them with invaluable information and will be a primary strategy in mitigating multiple hazards. Therefore, the following objectives have been developed.

- **Objective 5.1** Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.
- **Objective 5.2** Reduce the vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

PURPOSE OF GOAL IN RELATION TO THE RISK ANALYSIS Even though this goal does not directly reduce potential damages, this goal will increase the jurisdictions capability to effectively manage major emergencies more effectively. During the review of the capability assessment in concert with the vulnerabilities, mitigation committee members and public input identified the need for support for the limited professional staff. This is due to the inability of local jurisdictions to hire and maintain revenue to keep professional staff on hand. This goal will help to increase the capabilities and resources of the local jurisdictions.

- **Objective 6.1** Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.
- **Objective 6.2** Increase usage of social media to alert communities of possible dangers.

IDENTIFICATION AND ANALYSIS OF MITIGATION MEASURES

This section identifies, evaluates, and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard identified in the Risk Assessment. These actions are based on the evaluation of the risk assessment and in compliance with the mitigation goals and objectives in section 5.

The following is a list and description of the mitigation actions and techniques that have been considered by the mitigation committees. The available mitigation options were:

1. Prevention

Preventive activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial.

- Planning and Zoning
- Open space preservation
- Floodplain regulations
- Storm water management
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine / fault zone setbacks

2. Property Protection

Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations.

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., wind proofing, flood proofing, seismic design standards)
- Insurance
- Safe rooms

3. Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their mitigation functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies and organizations often implement these measures.

- Floodplain protection
- Beach and dune preservation

- Riparian buffers
- Fire resistant landscaping
- Fuel Breaks
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

4. Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event.

- Reservoirs
- Levees / dikes / floodwalls / seawalls
- Diversions / Detention / Retention
- Channel modification
- Beach nourishment
- Storm sewers

5. Emergency Services

Although not typically considered a "mitigation technique," emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event.

- Warning systems
- Portable signage for warning citizens
- Evacuation planning and management
- Sandbagging for flood protection
- Installing shutters for wind protection

6. Public Information and Awareness

Public information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property.

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials/ School children education
- Hazard expositions
- Social Media

MITIGATION MEASURES

Mitigation Goals and Objectives were established by the County and Regional Hazard Mitigation Committees. A comprehensive list of actions and projects were identified through the County Hazard Mitigation Committees, and adoption of the action was chosen by each jurisdiction.

The identified mitigation actions were chosen by the County Hazard Mitigation Committees based upon the limited capabilities of the jurisdictions given their geographical location and fiscal capabilities.

The County Hazard Mitigation Committees chose projects that would be effective, and potentially fundable with help of outside sources. Also, accomplishing these actions as outlined will allow each jurisdiction to evaluate, define, and implement future mitigation actions in future updates of this plan that will reduce potential losses. The following lists the Goals and Objectives as stated in Section 1, Plan Overview.

Each Mitigation Action section is described in the following manner:

Mitigation Action(s) Plan Structure

- **Jurisdiction(s)**: The names of the Cities/Counties adopting this recommended actions
- **Mitigation Action Category**: Mitigation Actions are classified as either Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, Public Education and Public Awareness
- **Hazard(s) Mitigated**: The Hazard or Hazards this action is designed to mitigate
- **Estimated Mitigation Costs**: The cost, which is an estimate only, if known, to mitigate this action
- **Funding Method**: The potential sources of funding for this action

MITIGATION MEASURES

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization
- Transportation for evacuees (those rendered immobile as a result of the disaster)
- Prioritize correct street markers to indicate correct address in more rural areas

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Flood, Severe Winter Storm, Tornado
Estimated Costs: $50,000-$100,000 annually
Funding Method(s): Local Funds, Prevention Grants,
Natural Resources Grants

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions
- Require regular maintenance of overgrown trees and growth on roads

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $50,000 annually
Funding Method(s): Local Utility Company funds, Disaster Funding, Local funds, State Funds

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings
- Construct or allocate funds for Tornado and Severe Storm Safe Rooms

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $350,000
Funding Method(s) Emergency Service Grants, Local funds

MITIGATION MEASURES

<u>Objective 1.3 Reduce the number of critical facilities in hazard areas.</u>

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction
- Coordination with State and Planning Committees on new hospital, government, and critical facility locations and construction

Jurisdictions: All Jurisdictions
Hazards Mitigated: Winter Storm, Tornado, Flood
Estimated Costs: None
Funding Methods: N/A

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions
- Increase non-skid coatings on main county roads

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: $150,000
Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

<u>Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.</u>

Mitigation Implementation Measure(s)

- Drainage Reviews for Stormwater Management Plan
- Culvert Reviews for groundwater stoppage and clearance
- Require dead animal removal ordinances for water supply protection

Jurisdictions: Cities of Shepherdsville, Shelbyville, Mount Washington; Bullitt, Oldham, and Shelby Counties
Hazards Mitigated: Flood
Estimated Costs: $50,000 - $70,000
Funding Methods: Local Funds

Mitigation Implementation Measure(s)

- Require construction for more water basins: Slow the process of flooding
- Identify clean water sources
- Require Wetland Preservation for slowing process of flooding
- Require county ordinances for building rain water drainage systems for new construction including basins and culverts

MITIGATION MEASURES

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Require Wetland Preservation for slowing process of flooding
- Require county ordinances for building rain water drainage systems
- Inclusion in NFIP program for cities
- Inclusion in CRS program for cities

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfire/Forest Fire, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Mitigation Implementation Measure(s)

- Hydraulics Plan requirements for new development submissions.
- Hazard warning systems for new builders to indicate hazards

Jurisdictions:	Bullitt, Oldham, Shelby, and Spencer
Hazards Mitigated:	Flood
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Mitigation Implementation Measure(s)

- Repetitive Loss home buyout program

Jurisdictions:	All Jurisdictions except Henry County and cities located within Henry County
Hazards Mitigated:	Flood
Estimated Costs:	$100,000 - $300,000 depending on number of homes
Funding Methods:	FEMA HMGP funds

Objective 2.2 Improve the resistance and increase structures in the community against natural hazards.

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters
- Increase Community Shelters through new construction of safe rooms or making new facilities safe room compatible

Jurisdictions: All Jurisdictions
Hazards Mitigated: Tornado, Flood, Severe Storm
Estimated Costs: $50,000
Funding Methods: State Emergency Management Grants, Local Funds

Objective 2.3 Coordinate service delivery to vulnerable members of the community.

Mitigation Implementation Measure(s)

- Implement the KIPDA Disaster Preparedness Plan
- Maintain quarterly LEPC meetings for county wide participation

Jurisdictions: All Jurisdictions
Hazards Mitigated: Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local Funds

Objective 2.4 Incorporate new technology and construction projects to aid in hazard mitigation.

Mitigation Implementation Measure(s)

- Purchase Cameras for area monitoring during hazard events
- Incorporate drones for monitoring hazard area
- Incorporate portable signage to let citizens know of hazard areas
- Hazmat equipment during contributory hazard damages
- Pursue new construction projects to mitigate hazard damages

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $30,000- $80,000
Funding Methods: Local Funds, HMGP, Homeland Security

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions and ordinances

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfires/Forest Fire, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more water basins: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements or raised structures
- Increase ordinances for including culverts and water basins for new construction
- Ordinances for dead animal pick up for potent water supplies protection

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.

Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
    - Rental Insurance for multifamily dwellers
    - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Community Trainings of Hazard Prevention and equipment training
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation
- Increase usage of Social Media to educate citizens on upcoming disasters: Including Facebook, Twitter, and Instagram
- Incorporate Apps for Smart Phones to warn citizens of impending disasters

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Increase cooperation with National Weather Service Storm Ready Communities
- Educational Programs regarding flooding
    - Coordinating efforts with:
        - Division of Water
        - FEMA

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Tornado, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers
- Increase usage of social media to educate citizens of insurance options
- Yearly review of NFIP procedures

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $240,000 at $40,000 per county
Funding Methods: Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update
- GIS Coordination with local county EMA Directors for hazard areas

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $50,000 - $80,000 per county
Funding Methods: State Division of Water

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

<u>Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.</u>

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Provide free county trainings on emergency rescue
- Increase social media usage to inform citizens
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$5,000 per county
Funding Methods:	CERT Grant, local funds

IMPLEMENTATION OF MITIGATION MEASURES

The County Emergency Managers were asked to prioritize actions for each County and review the capabilities of each County to describe implementation and administration activities with each action. This was updated since the 2011 plan.

The Emergency Managers prioritized each action based on the effect on the overall risk to life and property, ease of implementation, community support, and funding availability. Each of these items were rated using a scale of very high, high, medium, low, and very low. Actions were also evaluated based on being cost-effective, environmentally sound, and technically feasible. Throughout the implementation of these projects, the mitigation committees will continually review all mitigation actions in regards to these three criteria. The Emergency Managers used a scoring system of very high to low with projects that have a greater potential for implementation based on the above factors received a higher score than those that have less potential for being implemented.

Using the above criteria, Emergency Managers in each County evaluated each action and determined the jurisdictions priorities for mitigation actions for each County. Mitigation actions were reviewed and prioritized to plan for implementation. During the capability assessment, it was determined that city jurisdictions do not have the fiscal resources or personnel to insure mitigation implementation and effectiveness and rely on the County jurisdiction.

The following charts show the implementation plan and priorities for each County and the city jurisdictions with the County. These charts illustrate the actions considered and the benefit review of these actions. Committee members also determined an overall priority of the actions based on this review.

The County Emergency Mangers were asked to rank the categories: “Effect on Overall Risk to Life and Property,” “Community Support,” “Cost/Benefit,” and “Overall Priority” using the values Very High, High, Medium, Low, and Very Low. For example, if an action is viewed as being a great risk to life and property, receives overwhelming support from the community, produces a large benefit compared to its cost, or if the action is considered a top priority in mitigation activities for the County; the action should be assigned a value of Very High.

For the category “Ease of Implementation,” the County Emergency Managers were asked to use Hard, Medium, and Easy as the values. The value is to describe the difficulty in implementing the proposed action. If the action will be difficult to implement, it would receive classified as “Hard.” If the action can be implemented without any obstacles or problems, the value to be assigned would be “Easy.” If the ease of implementation falls in between the above, it was to be assigned “Medium.”

Bullitt County Mitigation Prioritization and Benefit Review Includes the cities of Fox Chase, Hillview, Hebron Estates, Hunters Hollow, Lebanon Junction, Mt. Washington, Pioneer Village, and Shepherdsville					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Medium	Medium	Medium	Medium
Develop and review a coordinated, interagency sustained debris removal plan	High	Medium	Medium	Medium	High
Work with utility companies to trim trees and debris away from overhead power lines and road ways	Medium	Medium	Medium	Medium	Medium
Provide Generators at Critical facilities that provide emergency services	Low	Low	Low	Low	Low
Encourage homeowners to have backup power sources or alternate sources of heating	High	Medium	Medium	High	High
Direct development and installation of new critical facilities out of hazard areas	High	Medium	Medium	High	High
Enforce the County's NFIP flood ordinances	High	Medium	Medium	Medium	Medium
Educate residents of their location in the Hazard areas by providing maps and information	Medium	Medium	Medium	Medium	Medium
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Medium	Medium	Medium	High
Develop and review evacuation plans, policies, and procedures for all hazards	High	Medium	Medium	Medium	High
Educate residents on the availability and importance of Flood Insurance	Medium	Easy	Low	Medium	Medium
Create a GIS database inventory of all critical facilities and structures in each hazard area	High	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Medium	Medium	Low	High	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	High	Medium	Medium	Medium	Medium
Upgrade the emergency services communication and technology equipment	High	Hard	High	High	High
Incorporate CHAMPS into planning tool	Low	Easy	Low	Medium	Medium
Incorporate the use of social media in hazard warning to citizens	High	Low	High	High	High

Henry County Mitigation Prioritization and Benefit Review Includes the cities of Campbellsburg, Eminence, New Castle, Pleasureville, and Smithfield					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Medium	Low	Low	Medium
Develop and review a coordinated, interagency sustained debris removal plan	Medium	Medium	Medium	Medium	Medium
Work with utility companies to trim trees and debris away from overhead power lines and road ways	Low	Medium	Low	Low	Low
Provide Generators at Critical facilities that provide emergency services	High	Medium	Medium	Medium	High
Encourage homeowners to have backup power sources or alternate sources of heating	Medium	Medium	Low	Medium	Medium
Direct development and installation of new critical facilities out of hazard areas	Medium	Easy	Low	Medium	Medium
Enforce the County's NFIP flood ordinances	Low	Easy	Low	Medium	Medium
Educate residents of their location in the Hazard areas by providing maps and information	Medium	Medium	Medium	Medium	Medium
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Medium	Medium	Medium	High
Develop and review evacuation plans, policies, and procedures for all hazards	High	Medium	Medium	Medium	Medium
Educate residents on the availability and importance of Flood Insurance	High	Hard	Medium	High	Medium
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Low	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Low	Easy	Low	Medium	Low
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Medium	Easy	Low	Medium	Medium
Upgrade the emergency services communication and technology equipment	Medium	Easy	Low	Medium	Medium
Incorporate CHAMPS into planning tool	Low	Easy	Low	Medium	Medium
Incorporate the use of social media in hazard warning to citizens	High	Low	Hugh	High	High

Oldham County Mitigation Prioritization and Benefit Review Includes the cities of Crestwood, Goshen, Lagrange, Orchard Grass Hills, Pewee Valley, and River Bluff					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Low	Easy	Low	Medium	Low
Develop and review a coordinated, interagency sustained debris removal plan	Low	Easy	Low	Medium	Low
Work with utility companies to trim trees and debris away from overhead power lines and road ways	Medium	Easy	Medium	Low	Low
Provide Generators at Critical facilities that provide emergency services	High	Medium	Medium	High	High
Encourage homeowners to have backup power sources or alternate sources of heating	Low	Hard	Low	High	Low
Direct development and installation of new critical facilities out of hazard areas	Low	Hard	Low	High	Low
Enforce the County's NFIP flood ordinances	Very High	Easy	High	High	High
Educate residents of their location in the Hazard areas by providing maps and information	Medium	Easy	High	Medium	High
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Easy	Medium	Medium	High
Develop and review evacuation plans, policies, and procedures for all hazards	Very High	Easy	Medium	Medium	High
Educate residents on the availability and importance of Flood Insurance	Very High	Medium	Medium	Medium	High
Create a GIS database inventory of all critical facilities and structures in each hazard area	High	Medium	Medium	High	High
Identify and map bridges that need to be elevated to prevent damage and flooding	High	Medium	Medium	High	High
Create a GIS database inventory of repetitive loss structures in each flood hazard area	High	Medium	Medium	High	High
Upgrade the emergency services communication and technology equipment	High	Hard	Low	High	High
Incorporate CHAMPS into planning tool	Low	Easy	Low	Medium	Medium
Incorporate the use of social media in hazard warning to citizens	High	Low	Hugh	High	High

Shelby County Mitigation Prioritization and Benefit Review Includes the cities of Shelbyville and Simpsonville					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Easy	Medium	Medium	Medium
Develop and review a coordinated, interagency sustained debris removal plan	Medium	Easy	Medium	Medium	Medium
Work with utility companies to trim trees and debris away from overhead power lines and road ways	High	Easy	High	High	High
Provide Generators at Critical facilities that provide emergency services	High	Easy	High	High	High
Encourage homeowners to have backup power sources or alternate sources of heating	Medium	Easy	Medium	Medium	Medium
Direct development and installation of new critical facilities out of hazard areas	Medium	Easy	Medium	Medium	Medium
Enforce the County's NFIP flood ordinances	High	Easy	High	High	High
Educate residents of their location in the Hazard areas by providing maps and information	High	Easy	High	Medium	High
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Easy	Medium	Medium	Medium
Develop and review evacuation plans, policies, and procedures for all hazards	High	Easy	High	High	High
Educate residents on the availability and importance of Flood Insurance	Medium	Easy	High	High	High
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Medium	Medium	Medium	Medium	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Medium	Medium	Medium	Medium	Medium
Upgrade the emergency services communication and technology equipment	High	Hard	High	High	High
Incorporate CHAMPS into planning tool	Low	Easy	Low	Medium	Medium
Incorporate the use of social media in hazard warning to citizens	High	Low	Hugh	High	High

Spencer County Mitigation Prioritization and Benefit Review Includes the city of Taylorsville					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Hard	Low	Medium	Low
Develop and review a coordinated, interagency sustained debris removal plan	Low	Medium	Low	Medium	Low
Work with utility companies to trim trees and debris away from overhead power lines and road ways	Medium	Easy	Medium	High	Low
Provide Generators at Critical facilities that provide emergency services	Medium	Hard	Medium	High	Low
Encourage homeowners to have backup power sources or alternate sources of heating	Low	Medium	Medium	Medium	Low
Direct development and installation of new critical facilities out of hazard areas	Low	Medium	Medium	Medium	Low
Enforce the County's NFIP flood ordinances	High	Medium	Low	High	High
Educate residents of their location in the Hazard areas by providing maps and information	Low	Easy	Medium	Medium	High
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Easy	Medium	Medium	Medium
Develop and review evacuation plans, policies, and procedures for all hazards	High	Easy	Medium	Medium	High
Educate residents on the availability and importance of Flood Insurance	Medium	Easy	Low	Medium	High
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Medium	Medium	Low	High	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Medium	Medium	Medium	Medium	Medium
Upgrade the emergency services communication and technology equipment	High	Hard	Medium	High	High
Incorporate CHAMPS into planning tool	Low	Easy	Low	Medium	Medium
Incorporate the use of social media in hazard warning to citizens	High	Low	Hugh	High	High

Trimble County Mitigation Prioritization and Benefit Review Includes the cities of Bedford and Milton					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Medium	Low	Medium	Low
Develop and review a coordinated, interagency sustained debris removal plan	Medium	Medium	Low	Medium	Medium
Work with utility companies to trim trees and debris away from overhead power lines and road ways	High	Medium	Medium	Medium	Medium
Provide Generators at Critical facilities that provide emergency services	High	Hard	Medium	High	Medium
Encourage homeowners to have backup power sources or alternate sources of heating	Medium	Medium	Medium	High	Medium
Direct development and installation of new critical facilities out of hazard areas	Medium	Medium	Medium	High	Medium
Enforce the County's NFIP flood ordinances	High	Medium	Low	Medium	Low
Educate residents of their location in the Hazard areas by providing maps and information	High	Medium	Medium	Medium	Medium
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Medium	Medium	Medium	High
Develop and review evacuation plans, policies, and procedures for all hazards	High	Easy	Medium	High	High
Educate residents on the availability and importance of Flood Insurance	Medium	Medium	Medium	High	Medium
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Low	Easy	Medium	Medium	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Low	Easy	Medium	Medium	Medium
Upgrade the emergency services communication and technology equipment	High	Medium	Low	High	Medium
Incorporate CHAMPS into planning tool	Easy	Easy	Low	Medium	Medium
Incorporate the use of social media in hazard warning to citizens	High	Low	Hugh	High	High

MITIGATION MEASURES

After reviewing the mitigation actions for overall cost-benefit and effectiveness to reducing the overall risk to life and property, County Emergency managers were asked to develop an implementation timeline for the noted actions. Funding sources for each action were identified in the action listing in the last portion of Section 5, Mitigation Measures. Financial resources and fiscal capabilities of each jurisdiction are the determining factors for the implementation of the proposed actions. Each jurisdiction will pursue outside funding from Federal and State agencies and a delay in funding awards may result in the delay of implementation of the mitigation actions.

The County Emergency Managers will guide and monitor hazard mitigation concepts and activities and implement within the general operations of governments and look to develop partnerships with organizations and agencies within the planning area. Partnerships have been created through this planning effort between cities and counties to implement mitigation actions. In addition, mitigation actions will promote using community resources in each jurisdiction to ease plan implementation and will continue to involve citizens to be a part of the mitigation processes and decisions through the mitigation committees and regular public meetings.

In accordance with the Plan Maintenance, each action will be reviewed yearly, and evaluated in terms of effectiveness for each community.

The following charts describe the overall priority as a result from the cost-benefit review of each action and the implementation timeline.

Bullitt County Action Implementation Includes the cities of Fox Chase, Hillview, Hebron Estates, Hunters Hollow, Lebanon Junction, Mt. Washington, Pioneer Village, and Shepherdsville			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste		As Needed
Develop a coordinated, interagency sustained debris removal plan and reevaluate	Local Gov, Emergency Mgmt	Medium	Continuous
Work with utility companies to trim trees and debris away from overhead power lines and roadways	Emergency Mgmt, Utilities	Medium	Continuous
Provide Generators at Critical facilities that provide emergency services	Local Gov, Emergency Mgmt	High	As Needed
Encourage homeowners to have backup power sources or alternate sources of heating	Local Gov, Emergency Mgmt	High	Continuous
Direct development and installation of all new critical facilities and government structures out of hazard areas	Local Gov	High	As Needed
Enforce the County's NFIP flood ordinances	Local Gov	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Local Gov, Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop and reevaluate evacuation plans, policies, and procedures for all hazards	Local Gov, Emergency Mgmt	High	Continuous
Educate residents on the availability and importance of Flood Insurance	Local Gov, Emergency Mgmt	Medium	Continuous
Create and update a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	High	Continuous
Identify, reevaluate, and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Local Gov	Medium	As Needed
Create and reevaluate a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	High	Continuous
Upgrade the emergency services communication equipment and technology equipment	Local Gov, Emergency Mgmt	High	Immediate
Incorporate CHAMPS into county services as a mitigation planning tool	Local Gov, Emergency Mgmt	High	Continuous
Integrate the use of social media in hazard warnings and updates to citizens	Local Gov, Emergency Mgmt	High	Immediate

Henry County Action Implementation Includes the cities of Campbellsburg, Eminence, New Castle, Pleasureville, and Smithfield			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Medium	As Needed
Develop a coordinated, interagency sustained debris removal plan and reevaluate	All City/County Departments	Medium	Continuous
Work with utility companies to trim trees and debris away from overhead power lines and roadways	Emergency Mgmt, Utilities	Low	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	High	As Needed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Medium	Annually
Direct development and installation of all new critical facilities and government structures out of hazard areas	Planning and Zoning	Medium	As Needed
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and Zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop and reevaluate evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	Medium	Continuous
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	High	Continuous
Create and update a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify, reevaluate, and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Low	As needed
Create and reevaluate a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Low	Continuous
Upgrade the emergency services communication equipment and technology equipment	Fiscal Court, Mayor, Emergency Mgmt	High	As Needed
Incorporate CHAMPS into county services as a mitigation planning tool	Local Gov, Emergency Mgmt	High	Continuous
Integrate the use of social media in hazard warnings and updates to citizens	Local Gov, Emergency Mgmt	High	Immediate

MITIGATION MEASURES

Oldham County Action Implementation Includes the cities of Crestwood, Goshen, Lagrange, Orchard Grass Hills, Pewee Valley, and River Bluff			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	As Needed
Develop a coordinated, interagency sustained debris removal plan and reevaluate	All City/County Departments	Low	Continuous
Work with utility companies to trim trees and debris away from overhead power lines and roadways	Emergency Mgmt, Utilities	Low	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	High	As needed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Low	Continuous
Direct development and installation of all new critical facilities and government structures out of hazard areas	Planning and Zoning	Low	As Needed
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	High	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop and reevaluate evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	Continuous
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	High	Continuous
Create and update a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	High	Continuous
Identify, reevaluate, and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	High	As Needed
Create and reevaluate a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	High	Continuous
Upgrade the emergency services communication equipment and technology equipment	Fiscal Court, Mayor, Emergency Mgmt	High	As Needed
Incorporate CHAMPS into county services as a mitigation planning tool	Local Gov, Emergency Mgmt	High	Continuous
Integrate the use of social media in hazard warnings and updates to citizens	Local Gov, Emergency Mgmt	High	Immediate

Shelby County Action Implementation Includes the cities of Shelbyville and Simpsonville			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	As needed
Develop a coordinated, interagency sustained debris removal plan and reevaluate	All City/County Departments	Low	Continuous
Work with utility companies to trim trees and debris away from overhead power lines and roadways	Emergency Mgmt, Utilities	High	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	Very High	As Needed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	High	Continuous
Direct development and installation of all new critical facilities and government structures out of hazard areas	Planning and Zoning	Medium	Continuous
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	Medium	Continuous
Develop and reevaluate evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	Continuous
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	Medium	Continuous
Create and update a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify, reevaluate, and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Medium	Continuous
Create and reevaluate a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Medium	Continuous
Upgrade the emergency services communication equipment and technology equipment	Fiscal Court, Mayor, Emergency Mgmt	High	As Needed
Incorporate CHAMPS into county services as a mitigation planning tool	Local Gov, Emergency Mgmt	High	Continuous
Integrate the use of social media in hazard warnings and updates to citizens	Local Gov, Emergency Mgmt	High	Immediate

Spencer County Action Implementation Includes the city of Taylorsville			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	As Needed
Develop a coordinated, interagency sustained debris removal plan and reevaluate	All City/County Departments	Low	Continuous
Work with utility companies to trim trees and debris away from overhead power lines and roadways	Emergency Mgmt, Utilities	Low	As Needed
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	Low	As Needed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Low	Continuous
Direct development and installation of all new critical facilities and government structures out of hazard areas	Planning and Zoning	Low	Continuous
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	High	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	Medium	Continuous
Develop and reevaluate evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	2 Years
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	High	Continuous
Create and update a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify, reevaluate, and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Medium	Continuous
Create and reevaluate a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Medium	Continuous
Upgrade the emergency services communication equipment and technology equipment	Fiscal Court, Mayor, Emergency Mgmt	High	As Needed
Incorporate CHAMPS into county services as a mitigation planning tool	Local Gov, Emergency Mgmt	High	Continuous
Integrate the use of social media in hazard warnings and updates to citizens	Local Gov, Emergency Mgmt	High	Immediate

Trimble County Action Implementation Includes the cities of Bedford and Milton			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	Continuous
Develop a coordinated, interagency sustained debris removal plan and reevaluate	All City/County Departments	Medium	Continuous
Work with utility companies to trim trees and debris away from overhead power lines and roadways	Emergency Mgmt, Utilities	Medium	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	Medium	As-Needed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Medium	Annually
Direct development and installation of all new critical facilities and government structures out of hazard areas	Planning and Zoning	Medium	As-Needed
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	Low	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop and reevaluate evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	Continuous
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	Medium	Continuous
Create and update a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify, reevaluate, and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Medium	As-Needed
Create and reevaluate a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Medium	Continuous
Upgrade the emergency services communication equipment and technology equipment	Fiscal Court, Mayor, Emergency Mgmt	High	As-Needed
Incorporate CHAMPS into county services as a mitigation planning tool	Local Gov, Emergency Mgmt	High	Continuous
Integrate the use of social media in hazard warnings and updates to citizens	Local Gov, Emergency Mgmt	High	Immediate

MULTI-JURISDICTIONIAL STRATEGY

Included in the KIPDA Regional Hazard Mitigation Plan are action items specific to each jurisdiction in the planning area requesting FEMA approval or credit of the plan. These actions are based on the risks identified in the risk assessment and in accordance with the regional mitigation strategy. The cities have joined with the county jurisdictions in mitigation actions in order to insure these actions are cost effective, environmentally sound, and technically feasible. As action items have been defined for the county and city jurisdictions to implement together, this allows for program funding to be used collectively and efficiently to meet the mitigation goals. The charts in section 5.1.4 illustrate and explain the action items being considered and implemented for each jurisdiction.

The mitigation committees work together with the KIPDA Regional Mitigation Planning Committee at the KIPDA Area Development District to implement mitigation actions taking into consideration existing building code standards, land use management, and comprehensive plans.

POTENTIAL FUNDING SOURCES

Potential funding sources for numerous types of hazard mitigation projects were identified and listed in the tables below. The funding sources are separated by State and Federal and list the grant name, purpose, and contact information.

Federal Funding Resources

Grant Name	Agency	Purpose	Hazard Mitigation Application	Contact Info
Community Assistance Program Sate Support Services Element	Homeland Security	To ensure that communities participating in the National Flood Insurance Program (NFIP) are achieving flood loss reduction measures consistent with program direction. The CAP-SSSE is intended to identify, prevent, and resolve floodplain management issues in participating communities before they develop into problems requiring enforcement action.	Provides funding to States to provide technical assistance to communities in the national Flood Insurance Program (NFIP) and to evaluate community performance in implementing NFIP floodplain management activities	Department of Homeland Security, Federal Emergency Management Agency (FEMA), c/o 245 Murray Lane - Bldg. #410, Washington, DC 20523. Telephone (800) 621-FEMA (3363). http://www.fema.gov/government/grant/government.shtm#4
Emergency Management Performance Grants (EMPG)	Homeland Security	To assist the development, maintenance, and improvement of State and local emergency management capabilities, which are key components of a comprehensive national emergency management system for disasters and emergencies that may result from natural disasters or accidental or man-caused events	EMPG provides the support that State and local governments need to achieve measurable results in key functional are of emergency management: 1) Laws and Authorities; 2) Hazard Identification and Risk Assessment; 3) Hazard Management; 4) Resource Management; 5) Planning; 6) Direction, Control and Coordination; 7) Communications and Warning; 8) Operations and Procedures; 9) Logistics and Facilities; 10) Training; 11) Exercises; 12) Public Education and Information; and 13) Finance and Administration	Department of Homeland Security, Federal Emergency Management Agency (FEMA), c/o 245 Murray Lane - Bldg. #410, Washington, DC 20523. Telephone (800) 621-FEMA (3363). http://www.fema.gov/government/grant/government.shtm#4

Federal Funding Resources

Grant Name	Agency	Purpose	Hazard Mitigation Application	Contact Info
Flood Mitigation Assistance Program	FEMA	To help Sates and communities plan and carry out activities designed to reduce the risk of flood damage to structures insurable under the NFIP.	The program provides planning, project and technical assistance grants for mitigation activities that are technically feasible and cost effective	Director, Program Support Division, Mitigation Directorate, FEMA, 500 C Street, S.W., Washington, DC 20472. Telephone: (202) 646-4621. http://www.fema.gov/mit.
Hazard Mitigation Grant Program (HMGP)	FEMA	To prevent future losses of lives and property due to disasters; to implement State or local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.	Project grants can be funded for such activities as acquisition, relocation, elevation, and improvements to facilities and properties to withstand future disasters.	Director, Program Support Division, Mitigation Directorate, FEMA, 500 C Street, S.W., Washington, DC 20472. Telephone: (202) 646-4621. http://www.fema.gov/government/grant/hmgp/index.shtm
Map Modernization Management Support	FEMA	The purpose of the MMMS program is to provide, through a Cooperative Agreement, a means to ensure that MMMS Partners can support the Map Modernization effort through activities that do not directly result in the production of new or revised flood hazard map. These support activities include administration and management activities.	Provides funding to supplement, not supplant, ongoing flood hazard mapping management efforts by local, regional, or State agencies.	FEMA Region IV, 3003 Chamblee Tucker Road Atlanta, GA 30341. Telephone: (770) 220-5200. http://www.fema.gov/about/contact/regioniv.shtm
National Dam Safety Program	FEMA	To provide vital support for the improvement of the state dam safety programs that regulates most of the 79,500 dams in the United States. To encourage research on existing dams and their history. To help train dam safety staff and inspectors on how to properly assess dams and prevent dam failure.	Provides financial assistance to the states for strengthening their dam safety programs through grant assistance	http://www.fema.gov/plan/prevent/damfailure/resources.shtm Association of State Dam Safety Officials, 450 Old Vine St, Lexington, KY 40507. Telephone: (859) 257-5140. http://www.damsafety.org/

Federal Funding Resources

Grant Name	Agency	Purpose	Hazard Mitigation Application	Contact Info
National Earthquakes Hazards Reduction Program	FEMA	The NEHRP's premise is that while earthquakes may not be inevitable, earthquake-related damages are not. Activities of the program include basic and applied research; technology development & transfer; and training, education, & advocacy for seismic risk reduction measures	FEMA administers a program of grants and technical assistance to States to increase awareness of earthquake hazards, foster plans, and implement mitigation actions to reduce seismic vulnerability.	FEMA Region IV, 3003 Chamblee Tucker Road Atlanta, GA 30341. Telephone: (770) 220-5200. http://www.fema.gov/plan/prevent/earthquake/nehrp.shtm
National Flood Insurance Program	Homeland Security	To enable persons to purchase insurance against physical damage to or loss of buildings and/or contents therein caused by floods, mudslide, or flood-related erosion, thereby reducing Federal disaster assistance payments, and to promote wise floodplain management practices in the Nation's flood-prone and mudflow-prone areas.	Enables property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. (States, localities, and individuals)	Department of Homeland Security, Federal Emergency Management Agency (FEMA), c/o 245 Murray Lane - Bldg. #410, Washington, DC 20523. Telephone (800) 621-FEMA (3363). http://www.fema.gov/government/grant/pdm/index.shtm
Pre-Disaster Mitigation Program	FEMA	The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.	Provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event	FEMA Region IV, Mitigation Division, 3003 Chamblee Tucker Road Atlanta, GA 30341. Telephone: (770) 220-5200. http://www.fema.gov/government/grant/pdm/index.shtm

Federal Funding Resources

Grant Name	Agency	Purpose	Hazard Mitigation Application	Contact Info
Repetitive Flood Claims Program	FEMA	Provides funding to States and communities to reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP that have had one or more claims for flood damages, and that cannot meet the requirements of the Flood Mitigation Assistance (FMA) program for either cost share or capacity to manage activities.	Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP)	FEMA Region IV, Mitigation Division, 3003 Chamblee Tucker Road Atlanta, GA 30341. Telephone: (770) 220-5200. http://www.fema.gov/government/grant/pdm/index.shtm
Severe Repetitive Loss Program	FEMA	Provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP)	Eligible flood mitigation projects include flood proofing (historical properties only); relocation; elevation; acquisition; mitigation reconstruction (demolition rebuild); and minor physical localized flood control projects	FEMA Region IV, Mitigation Division, 3003 Chamblee Tucker Road Atlanta, GA 30341. Telephone: (770) 220-5200. http://www.fema.gov/government/grant/pdm/index.shtm
Economic Adjustment Assistance	Department of Commerce, (Economic Development Administration)	To address the needs of distressed communities experiencing adverse economic changes that may occur suddenly or over time, and generally result from industrial or corporate restructuring, new Federal laws or requirements, reduction in defense expenditures, depletion of natural resources, or natural disaster.	Project grants can be in response to natural disasters including improvements and reconstruction of public facilities.	Director, Office of Economic Adjustment, Department of Defense, 400 Army Navy Drive, Suite 200, Arlington, VA 22202. Telephone: (703) 604-6020. Email:oeafeedback@wso.whs.mil

State Funding Resources

Funding Program	Purpose	Contact
State Flood Control Matching Program: Kentucky Governor's Office for Local Government	State bond funds available as grants to cities, counties, special districts and area development districts. The program is coordinated by the Flood Control Advisory Commission. Funds may be used to help meet cost-share match requirements associated with Corps of Engineers, FEMA, and Natural Resources Conservation Service (NRCS) flood control-program	Mike Hale Department for Local Government 1024 Capital Center Drive, Suite 340 Frankfort, KY 40601 (800) 346-5606 Email:mike.hale@ky.gov
Area Development Fund: Kentucky Governor's Office for Local Government	The Area Development Fund (ADF) is a state-funded program that provides financial support for capital projects. Local governments are struggling to provide services and facilities needed to ensure a high quality of life for residents. These state-allocated dollars allow communities to engage in project activities that they may not otherwise afford. Activities that can be funded with ADF dollars include: construction, reconstruction, renovation, and maintenance of buildings and other improvements to real estate; acquisition of real property; major equipment purchases; industrial site development; installation of water, gas, sewer and electrical lines to public facilities and industrial sites; solid waste management or disposal systems needed to comply with law and architectural, engineering, and legal fees in connection with such projects; and eligible project costs incurred within the previous five years may be retro actively funded. There is no maximum project amount or local match requirement.	Jamie Mangeot Department for Local Government 1024 Capital Center Drive, Suite 340 Frankfort, KY 40601 (800) 346-5606 Email:jamie.mangeot@ky.gov
Community Development block Grant (CDBG); Kentucky Small Cities Program	This program makes federal funds available to cities and counties in the form of state grants for community development. Funds are designated for separate program areas. All activities must meet at least one of three national objectives: benefit low to moderate income persons; prevention or elimination of slums or blight; or meeting particularly urgent community development needs. Eligible applicants are all cities and counties except "entitlement jurisdictions" which may receive similar federal funds directly. These include Ashland, Covington, Henderson, Hopkinsville, Owensboro, Fayette County, and Louisville plus some satellite Jefferson County communities	Lynn Littrell Department for Local Government 1024 Capital Center Drive, Suite 340 Frankfort, KY 40601 (800) 346-5606 Email:myraleesmith.cowley@ky.gov

State Funding Resources

Funding Program	Purpose	Contact
Kentucky Department of Insurance: State Fire and Tornado Insurance Fund	Provides insurance for real property and office contents. It is a self-insurance program that provides all risk coverage on an actual cash basis (ACV) or replacement cost basis (RCV) for state buildings and contents	Kentucky Department of Insurance 215 W. Main Street Frankfort, KY 40601 (800) 595-6053
CDBG Small Cities: Housing and Community Projects: Kentucky Office for Local Government	Funds are designated for projects that will generally enhance the community. Various activities are eligible; typical examples of funded projects include construction of senior citizen centers, community centers and small infrastructure projects. Projects should primarily benefit low to moderate-income persons. Maximum grant amount is $500,000	Cathy Figlestahler Department for Local Government 1024 Capital Center Drive, Suite 340 Frankfort, KY 40601 (800) 346-5606 Email:donna.grimes@ky.gov
Land and Water Conservation Fund (LWCF) KY Governor's Office for Local Government	Provides federal grant funds to acquire land for outdoor recreation and to develop or renovate public recreation facilities. Cities and counties are eligible. Maximum grant amount is $75,000	Jodie McDonald Department for Local Government 1024 Capital Center Drive, Suite 340 Frankfort, KY 40601 (800) 346-5606 Email:jodie.mcdonald@ky.gov
Drinking Water State Revolving Loan Fund (DWSRF): Kentucky Infrastructure Authority	EPA awards grants to states to capitalize their Drinking Water State Revolving Loan Fund (DWSRF) programs. States use a portion of their capitalization grants to set up a revolving fund from which loans are provided to eligible public water utilities (publicly and privately-owned) to finance the costs of infrastructure projects. States rank projects and offer loans to utilities based on a priority ranking system. Priority is given to eligible projects that 1) address most serious risk to human health; 2) are necessary to ensure compliance with requirements of the Safe Drinking Water Act; and 3) assist systems most in need on a per household basis, according to state-determined affordability criteria. States may also use up to 31 percent of their capitalization grants to fund set-aside activities that help to prevent contamination problems of surface and ground water drinking water supplies, as well as enhance water system management through source water protection, capacity development, and operator certification programs	Sandy Williams Kentucky Infrastructure Authority 375 Versailles Road Frankfort, KY 40601 (502) 573 0260 sandy.williams@ky.gov

State Funding Resources		
Funding Program	**Purpose**	**Contact**
Wastewater Revolving Fund - Revolving Loan Program: Kentucky Infrastructure Authority	Project must be on Kentucky Division of Water project priority list. If necessary, 201 Facilities Plan must be updated to correspond to project. Applicant must be a governmental agency. The project must be economically feasible. The beneficiary of the project must be the general public.	Sandy Williams Kentucky Infrastructure Authority 375 Versailles Road Frankfort, KY 40601 (502) 573 0260 sandy.williams@ky.gov
Infrastructure Revolving Loan Fund: Kentucky Infrastructure Authority	Applicant must be a governmental agency. The project must be economically feasible. The beneficiary of the project must be the general public. The project can be for any type of infrastructure including water or wastewater facilities	Sandy Williams Kentucky Infrastructure Authority 375 Versailles Road Frankfort, KY 40601 (502) 573 0260 sandy.williams@ky.gov
Environmental Justice Collaborative Problem-Solving Grant Program	In 2003, the Office of Environmental Justice (OEJ_ initiated the first Environmental Justice Collaborative problem-Solving (CPS) Grant Program. The purpose of the program is to provide financial assistance to affected local community-based organizations who wish to engage in constructive and collaborative problem-solving by utilizing tools developed by EPA and others to find viable solutions for their community's environmental and/or public health concerns.	Office of Environmental Justice Director: Barry E. Hill U.S. Environmental Protection Agency Mail Code: 2201A 1200 Pennsylvania Ave. NW Washington, DC 20460 (800) 962-6215
EPA Special Appropriation Grants	Each year, the EPA received a budget through an appropriations bill created by the US Congress. Since 1996 Kentucky communities have received grant funding for wastewater and drinking water infrastructure projects. EPA refers to these projects as Special Appropriations Projects (SPAPs). EPA's Region 4 has delegated the administration of Kentucky's projects to the Division of Water.	Kentucky Division of Water Maleva Chamberlin 14 Reily Road Frankfort, KY 40601 Email:maleva.chamberlain@ky.gov
Kentucky League of Cities (KLC)	The Financial Services Department of the KLC provides tax-exempt financing to Kentucky cities. By taking advantage of economies of scale through tax-exempt bond pools, the Financial Services Department provides access to low interest rate loans with low to no closing costs. Examples include: Water & Sewer Systems, Community Centers, Park projects, Natural Gas Projects, Fire Trucks, Police Cruisers, and Computer Equipment	Kentucky League of Cities 101 East Vine St. Suite 600 Lexington, KY 40507 (800) 876-4552 http://www.klc.org/index.asp

State Funding Resources

Funding Program	Purpose	Contact
Nonpoint Source Pollution Control Grant	Grants are available for watershed restoration projects and watershed implementation plan development as well as other nonpoint source (NPS) pollution control projects to help mitigate or prevent runoff pollution	US Environmental Protection Agency Mail Code: 2201A 1200 Pennsylvania Ave. NW Washington, DC 20460 (800) 962-6215
Kentucky Watersheds: Emergency Conservation Program	(ECP) Provides financial assistance to farmers and ranchers for the rehabilitation of farmlands damaged by floods, hurricanes, or other natural disasters. ECP also provides funds for carrying out emergency water conservation measures during periods of severe drought	Kentucky Watersheds Division of Water 14 Reilly Road Frankfort, KY 40601 (502) 564-3410 Email:water@ky.gov
Kentucky Watersheds: Flood Hazard Mitigation and Riverine Ecosystem Restoration Program (FEMA Disaster Prevention Relief)	Informally known as Challenge 21, this watershed-based program focuses on identifying sustainable solution to flooding problems by examining nonstructural solutions in flood-prone areas, while retaining traditional measures where appropriate. The program will create a framework for more effective federal coordination of flood programs and will create partnerships with communities to develop solutions to flooding problems. Eligible projects will meet dual purpose of flood hazard mitigation and riverine ecosystem restoration. Projects might include the relocation of threatened structures, conservation or restoration of wetlands and natural floodwater storage areas and planning for responses to potential future floods.	Kentucky Watersheds Division of Water 14 Reilly Road Frankfort, KY 40601 (502) 564-3410 Email:water@ky.gov
Kentucky Watersheds: Water Quality Cooperative Agreements	These EPA grants are provided to help states, Indian Tribes, interstate agencies, and other public or nonprofit organizations develop, implement, and demonstrate innovative approaches relating to the causes, effects, extent, prevention, reduction and elimination of water pollution. This includes watershed approaches for combined sewer overflow, sanitary sewer overflows, and stormwater discharge problems, pretreatment and sludge (biosolids) program activities, decentralized systems, and alternative ways to measure the effectiveness of point source programs.	Kentucky Watersheds Division of Water 14 Reilly Road Frankfort, KY 40601 (502) 564-3410 Email:water@ky.gov

State Funding Resources

Funding Program	Purpose	Contact
Kentucky Division of Conservation Equipment Loans	Provides loans to Kentucky's conservation districts for heavy and specialized conservation equipment. The equipment is used for the application of conservation and best management practices throughout the state. Through loan/lease agreements with local contractors and farmers, the districts ensure that this equipment is available at the local level to perform conservation work	Kentucky Division of Conservation 375 Versailles Road Frankfort, KY 40601 (502) 573-3080 Email:Steve.Coleman@ky.gov
Kentucky Transportation Cabinet Office of Rural and Secondary Roads: Rural Secondary Program	Funded by 22.2% of the Motor Fuel Tax receipts, these funds are allocated to the 120 counties on a fifths formual:1/5 equally, 1/5 rural road mileage, 1/5 rural population, 1/5miles, and 2/5 rural land area. Money assigned to a county is not transferable to another county. Projects are developed by recommendations of Transportation Cabinet officials, county fiscal courts as required by KRS 177.330, and the general public	Kentucky Transportation Cabinet Office of Rural and Secondary Roads 200 Mero Street, 6th Floor Frankfort, KY 40622 (502) 564-2060
Kentucky Transportation Cabinet Office of Rural and Secondary Roads: County Road Aid Co-op Program	Funded by 18.3% of the Motor Fuel Tax receipts. The funds are allocated to the 120 counties based on the fifths formula. County road funds are under the direct control of the county fiscal courts, which are responsible for maintaining all county roads within their respective counties	Kentucky Transportation Cabinet Office of Rural and Secondary Roads 200 Mero Street, 6th Floor Frankfort, KY 40622 (502) 564-2060
Kentucky Transportation Cabinet Office of Rural and Municipal Aid: Municipal Aid Co-op Program	Funded by 7.7 percent of the Motor Fuel Tax receipts. The funds are allocated to cities and unincorporated areas based on their populations. Municipal Aid funds are under the direct control of cities for incorporated areas and of counties for unincorporated urban areas. The money is used for maintaining all streets and roads in their respective cities and urban areas.	Kentucky Transportation Cabinet Office of Rural and Secondary Roads 200 Mero Street, 6th Floor Frankfort, KY 40622 (502) 564-2060

6 PLAN MAINTENANCE PROCEDURES

The KIPDA Regional Hazard Mitigation Planning Committee has developed a method to ensure that regular review and update of the Hazard Mitigation Plan occurs. The KIPDA Regional Hazard Mitigation Committee (RHMC) consists of members from the jurisdictions included in this plan as well as representatives from each local mitigation subcommittee. The KIPDA RHMC will meet once a year to review and evaluate the Mitigation Plan and activities associated with plan. The regional committee will also be responsible for monitoring and evaluating the progress of the mitigation strategies in the plan. During review of the plan, the committee will review each goal and objective to determine their relevance and effectiveness in light of changes within the county, state or federal policies, and to insure they are addressing current development trends. The regional committee will also accept the recommendations from the local committees concerning the risk assessment portion of the plan to determine if the information needs to be updated or modified.

The county emergency manager for each county will be responsible for working with the local mitigation subcommittees to evaluate the plan and activities on the county level, which can be done at local emergency planning committee meetings (LEPC). The county emergency manager will be responsible for plan progress and updates to the KIPDA RHMC. These meetings can be combined with other meetings; such as the Citizens Corp, KIPDA Regional Planning Council (RPC), Local Emergency Planning Committee (LEPC) and other various planning meetings. The agencies responsible for the various implementation actions will report on the status of their projects and will include which implementation processes worked well, any difficulties encountered, and if the actions failed. The county emergency manager for each county will recommend to the regional committee which strategies should be revised based on the findings of the local mitigation committees.

KIPDA staff will be available to the RHMC and local committees on a limited basis pending funding for such activities. KIPDA staff will assist the RHMC and the local subcommittees with project implementation as funding is available. KIPDA staff will be proactive in obtaining funding for administrative activities as well as funding for mitigation actions as outlined in the plan.

Updates to the KIPDA Regional Hazard Mitigation Plan will be completed by April 2016. The Regional Committee will be responsible for completing updates based on committee meetings during those 5 years. Committee members will update the mitigation plan and submit to the State Hazard Mitigation Officer. If no changes are necessary, the State Hazard Mitigation Officer will be given a justification of this determination.

IMPLEMENTATION THROUGH EXISTING PROGRAMS

Each of the jurisdictions in the KIPDA Region utilize a variety of authorities, policies and programs to guide and control development. These authorities, policies and programs as identifies in this plan vary from jurisdiction to jurisdiction. After each jurisdiction officially adopts the Hazard Mitigation Plan, these existing mechanisms will have hazard mitigation strategies integrated into them as they are applicable to the authority, policy, and program.

After adoption of the plan, the public officials will require their jurisdictions to address and continue hazards and hazard mitigation in their authorities, policies, and programs related to community planning and land use regulations. Specifically, many of the actions in the Mitigation Strategy in Section 5 address how the jurisdictions will develop and enforce existing authorities, policies, and programs as well as develop new policies. The county emergency manager for each county will be responsible to analyze the development of local plans and provide technical assistance to the agencies responsible for the existing authorities in implementing these requirements.

> The KIPDA Hazard Mitigation Plan is incorporated into each jurisdiction's planning process and hazard mitigation. It is also integrated into other community plans.

Upon adoption of this plan, local jurisdictions accept the responsibility to implement the strategies and actions of this plan in concert with all other community development plans and activities where applicable within the first year of plan adoption.

The county emergency manager in each county is assigned the responsibility to analyze the development of local mitigation plans and provide technical assistance to the planning commissions and agencies responsible for the existing authorities to implement the requirements of the Hazard Mitigation Plan upon adoption of the plan by each jurisdiction. The county emergency manager incorporates the Hazard Mitigation plan into each jurisdiction's Disaster Plans, Evacuation Plans, and Post Disaster Recovery Plans as required by Kentucky Emergency Management.

It should be noted, the KIPDA Hazard Mitigation is incorporated into other planning documents in the region as well, including:

- **The Comprehensive Economic Development Strategy (CEDS)**
- **Local Hazard Mitigation Plans (County Level)**
- **County Economic Development Plans (County Level)**
- **Planning and Zoning (County Level)**

CONTINUED PUBLIC INVOLVEMENT

The KIPDA Regional Hazard Mitigation Committee is dedicated to continuing public involvement with the Mitigation plan and activities that will be implemented. The Plan has been created with input from the local committees and citizens of each jurisdiction and the goal is to provide opportunities on a regular basis to facilitate their continued involvement.

The KIPDA Regional Hazard Mitigation Committee will meet once per year. The local mitigation committees in each county will continue to hold open public meetings. These meetings will be advertised as open public meetings and the public is encouraged to attend.

In addition to continued meetings, the Hazard Mitigation Plan will be made available for viewing on the KIPDA website. In addition, copies of the plan will be kept and available for Public review during the regular business hours in the offices of the county emergency managers. Contact information for the RHMC and the local subcommittee for that particular jurisdiction will be available along with the contact information for the county emergency managers.

UPDATES TO THE 2011 KIPDA REGIONAL HAZARD MITIGATION PLAN MAINTENANCE

The KIPDA Regional Hazard Mitigation Committee has incorporated multiple strategies to update the planning process and continue with plan maintenance. This includes several vehicles in which to discuss and improve upon the 2016 KIPDA Regional Hazard Mitigation Plan by incorporating various and different community stakeholder via way of public meetings.

Regional Planning Council (RPC)

The KIPDA Regional Planning Council enables local individuals and governments of the Kentucky portion of the KIPDA region to identify, evaluate, and recommend regional planning needs. The Council's membership is established in accordance with KRS 147A.125. The RPC meets quarterly. While not every meeting has been established to deal with the KIPDA Regional Hazard Mitigation Plan, the RPC did make a point to discuss upcoming events and hazard related mitigation activities and projects.

Local Emergency Planning Committees (LEPC)

Each county conducts a Local Emergency Planning Committee (LEPC) which involves all agencies that deal with first response in a hazard situation. This can include Police, Fire, Search and Rescue, Emergency Management, a member of KYEM, the Red Cross, Sheriff Department, KY State Police, Elected Officials (from mayors, magistrates, city council, county-judge executives, state representatives),Planning and Zoning, EMS, National Weather Service, School Boards, KIPDA representatives, Private Companies, Citizens and more. While the list is not exhaustive, it does showcase the diverse stakeholders present at each meeting

Various Planning and Zoning Meetings

Each county conducts various meetings to conduct official planning and zoning meetings. Since hazard mitigation crosses the realms of mitigation into everything from first responder agencies to planning, these meetings become a way to discuss hazard mitigation techniques and actions and will be employed in such a way.

Community Hazard Assessment and Mitigation Planning System (CHAMPS)

CHAMPS is the online portal for grant submission for KYEM. Incorporating this system into plain maintenance will assist by placing mitigation projects into the system. Each project will be specific to the county and a goal of each county. By placing individual mitigation projects, this will show continued long term mitigation planning and justification for future projects such as construction and other projects.

By placing mitigation projects into CHAMPS, it also gives the document elasticity and adaptability to adequately plan in real time.

7 UPDATES TO THE KIPDA REGIONAL HAZARD MITIGATION PLAN

When reviewing the FEMA approved 2011 KIPDA Hazard Mitigation Plan, committee members and KIPDA staff identified numerous aspects of the plan that could be improved upon. Formatting the plan to have more continuity throughout by creating more structure and conforming to the 2013 Kentucky State Hazard Mitigation Plan in Hazard Profiles and Risk Assessments were major goals of the Plan update. It should be also noted, that in Appendix D, a list of updates is included, which covers actions that have been performed in the time between cycles of plans. The information was considered crucial to evaluating techniques and actions that were successful.

Following is a description of the updates to the plan defined by section.

PLAN OVERVIEW

The original format was kept the same, but added more simplicity and aligned the goals and format of the 2013 Kentucky Enhanced Hazard Mitigation Plan.

KIPDA AREA PROFILE

Changes made to this section include:

- Updating the KIPDA Board of Directors
- Insertion of more demographic information for the KIPDA Region. This was included in the form of tables and graphs. The data was for all counties and cities in the KIPDA region, not limited to just the jurisdictions participating in the KIPDA Regional Hazard Mitigation Plan

PLAN DEVELOPMENT PARTICIPANTS

This was a new section added for the updated plan. It lists the jurisdictions that will be participating in the updated plan and a map identifying the jurisdictions' locations throughout the region. One noted change in participation from the original KIPDA Regional Hazard Mitigation Plan is omission of the City of Park Lake in Oldham County. The City had dissolved in the five years since the original plan's adoption. All mentions of the city have been deleted throughout the plan.

PREREQUISITES

ADOPTION BY THE LOCAL GOVERNING BODY

No changes were made to the section at this time. Upon FEMA approval, this section will be updated with the date of adoption of the updated plan.

UPDATES TO THE PLAN

MULTI-JURISDICTIONAL PLAN ADOPTION

No changes were made to the section at this time. Upon FEMA approval, this section will be updated with the date of adoption of the updated plan.

MULTI-JURISDICTIONAL PLANNING PARTICIPATION

Changes to this section included:

- Reviewing and updating the table of jurisdictional participation in the planning process
- Updating the membership of the KIPDA Regional Hazard Mitigation Committee
- Updating the membership of the Local Hazard Mitigation Committees

OVERALL SUMMARY OF MULTI-JURISDICTIONAL PLANNING PROCESS

Meeting dates during of committees were added.

THE PLANNING PROCESS

OPEN PUBLIC INVOLVEMENT

This section of the plan included a vast overhaul from previous years which included a more in-depth discussion of the process and stakeholder involvement from the KIPDA counties.

OPPORTUNITY FOR PUBLIC COMMENT

Changes for this process included website and newspaper publications.

OPPORTUNITY FOR PUBLIC/PRIVATE PARTICIPATION

For the update, it was noted the valuable input from Josh Human and staff at the Center for Hazards Research. This was essential in meeting the goal of having continuity between the KIPDA Regional Hazard Mitigation Plan and the Kentucky State Hazard Mitigation Plan. Each meeting was advertised and the public was encouraged to participate.

REVIEW AND INCORPORATION OF EXISSTING PLANS, STUDIES, REPORTS, TECHNICIAL INFORMATION

Added to the update was again mention of the goal of having continuity between the KIPDA Regional Hazard Mitigation Plan and the Kentucky State Hazard Mitigation Plan.

DOCUMENTATION OF THE PLANNING PROCESS

For the update, KIPDA staff members that worked on the updated plan were listed and what role they played. These staff members included Michael Clair, Adam Forseth, Jarrett Haley, and Eric Dennison.

Additionally, it was noted that the methodology for risk assessment was developed by the Center for Hazards Research, while the KIPDA staff ran the report for the Earthquake hazard.

This section as a whole was greatly expanded upon to accurately showcase the planning process involved with the 2016 KIPDA Regional Hazard Mitigation Plan. It includes a detailed section expanding upon meetings and the details of such. Appendix A, B, C, and E include details from the meetings.

FLOOD MITIGATION ASSISTANCE

This section addresses areas of the plan that specifically deal with FMA and Flooding for the KIPDA Region. To help address the issue, throughout the plan, the symbol was used to signifiy attention to FMA.

RISK ASSESSMENT OVERVIEW

This was a new section added for the updated plan. The only thing included in the previous plan was the Presidentially Declared Disasters. For the update, this list was updated to include declared disasters that occurred since the plan adoption.

CRITICAL FACILITIES

New maps were created showing critical facilities in all of the participating jurisdictions.

ANALYZING DEVELOPMENT TRENDS

This section was expanded upon for the updated plan.

HAZARD PROFILES

For the updated plan, KIPDA staff felt it best to start from scratch for each hazard in order to achieve the goal of continuity throughout the plan. In order to meet this goal, the following format was used for each hazard:

- Hazard Identification:
    - Description
    - Types
    - Facts
    - Impacts

- Hazard Profile:
  - Profile Risk Table
  - Geographic Locations Affected
  - Previous Occurrences
- Jurisdictional Vulnerability Assessment
- State Facility Vulnerability
- Jurisdictional Potential Loss Estimate
- State Facility Potential Loss Estimate

The Risk Assessment for each hazard was contained within the hazard profile as opposed to in a separate section as was done in the originally approved KIPDA Regional Hazard Mitigation Plan. The methodology used for the Jurisdictional Vulnerability Assessment, State Facility Vulnerability, Jurisdictional Potential Loss Estimate, and State Facility Potential Loss Estimate is described in section 4; Risk Assessment Overview. Earthquake was the only hazard that did not follow the above format instead using HAZUS for the Risk Assessment.

One new hazard, Extreme Temperature, was identified for inclusion in the updated plan that was omitted from the originally adopted plan.

CONSEQUENCE AND ANALYSIS

This was a new section added for the updated plan. It was inserted to fulfill a requirement of the local emergency managers.

MITIGATION MEASURES

Inclusion of more stakeholder participation and the addition of solicited mitigation measures were included to embrace a wider array of ideas. Appendix C includes a list of mitigation ideas and projects that were captured from the six counties.

CAPABILITY ASSESSMENT

Updates to this section were made to the tables showing authorities & programs and staff departments. These tables were updated by each county's emergency management staff for their county and its jurisdictions included in the KIPDA Regional Hazard Mitigation Plan. Tables were also reformatted to fit on Portrait rather than require Landscape to display.

LOCAL HAZARD MITIGATION GOALS

In the originally adopted plan, the goals section was included with the Identification and Analysis of Mitigation Measures section. For the updated plan, these were separated. In this section, goals and objectives were listed. The KIPDA Regional Hazard Mitigation Committee felt the identified goals identified for the original plan should remain.

UPDATES TO THE PLAN

IDENTIFICATION AND ANALYSIS OF MITIGATION MEASURES

The KIPDA Regional Hazard Mitigation Committee felt the mitigation measures should remain, as they were all still viable measures to address hazards that could affect the region. It was also decided to add additional measures based off of stakeholder participation.

IMPLEMENTATION OF MITIGATION MEASURES

Each county's emergency management staff updated the Prioritization and Benefit Review and Action Implementation tables for their county and its jurisdictions included in the KIPDA Regional Hazard Mitigation Plan.

MULTI-JURISDICTIONIAL STRATEGY

This section included a wider participation of community stakeholders.

POTENTIAL FUNDING SOURCES

This is a new section added for the updated plan. Provided are potential funding sources for mitigation activities.

PLAN MAINTENANCE PROCEDURES

IMPLEMENTATION THROUGH EXISTING PROGRAMS

The update to this plan was noting the KIPDA Hazard Mitigation Plan will be an agenda item annually, during LEPC meetings, when all county emergency managers will be in attendance. The RPC, KIPDA Regional Hazard Mitigation Committee, and Various Planning and Zoning Meetings will also be a vehicle to review the plan.

CONTINUED PUBLIC INVOLVEMENT

Added to this section were the locations where the KIPDA Regional Hazard Mitigation Plan will be available for public viewing.

CHAMPS

Inclusion of the online Kentucky State Portal for Hazard Grant Submissions through KYEM.

8 APPENDIX LIST

Appendix A

- Newspapers and Website Publications

Appendix B

- List of all Attendees at Meetings

Appendix C

- Ideas and Projects from Mitigation Meetings

Appendix D

- Plan Updates from 2011

Appendix E

- Presentation Material

Appendix F

- Severe Repetitive Loss and Repetitive Loss

APPENDIX A

Websites and Publications for Public Record and Involvement

Bullitt County

- Local Paper: The Pioneer News
- http://www.pioneernews.net/

Henry County

- Local Paper: The Henry County Local
- http://www.hclocal.com/

Oldham County

- Local Paper: The Oldham Era
- http://www.oldhamera.com/

Shelby County

- Local Paper: The Sentinel-News
- http://www.sentinelnews.com/

Spencer County

- Local Paper: The Spencer Magnet
- http://www.spencermagnet.com/

Trimble County

- Local Paper: The Trimble Banner
- http://www.mytrimblenews.com/

Regional

- http://www.kipda.org/

APPENDIX B

The planning process was very involved garnering participation from a wide array of participants from all the counties in the KIPDA Region: Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble.

The titles and participants included:

Road Departments, 911 Services, Public Health, Emergency Management Directors, Community Citizens, local politicians for County Judge Executives to city clerks. Animal Control, Public Works, Kentucky Crisis Coordinator, and a wide array of other participants also contributed to the plan.

Elected Officials included: County Judge Executives, Deputy County Judge Executives, A Kentucky State Representative, Chief Financial Operators, Magistrates, County and City Treasurers, Property Value Administrators, County and City Clerks.

Fire departments had representation in almost all meetings from every jurisdiction including Fire Chiefs and Volunteer Fire Members.

Police and Sherriff office deputies participated in the planning process by attending, which also included Sergeants, Police Chiefs, Lieutenants, and Deputies.

Public Works participation included Local Water companies, Local Utility Companies, Animal Control, Health Department, Red Cross, Environmental Engineers, Prison workers, Planning and Development, and local planners.

Emergency Management included: Kentucky Amateur Radio Emergency Services (ARES), County Emergency Management Directors, Deputy Emergency Management Directors, Kentucky Emergency Management Personnel, Search and Rescue, and Regional Coordinators.

Local Business participated by including LG&E, the local utility cooperative, Thornton’s, Katayama America,, Roll Forming Corporation, Purnell Sausage, local newspapers and even non-profit organizations such as Apple Patch, Cedar Lake Lodge, and Tri-County Action Partnership.

Almost all county meetings included at minimum one representative from each respected School Board, for the county the meeting was being held.

Private Citizens also participated in the plan from ex-military, ex-FEMA workers, to average citizens.

At least one member and most times more KIPDA representatives were present at every meeting.

APPENDIX B

List of Attendees

Bullitt County	LEPC	10/30/2015
First	**Last**	**Title**
Hyte	Rouse	Roads Director Bullitt Co.
Carla	Johnson	Deputy 911 Director Bullitt Co
Marke	Richardson	Deputy Director Bullitt CO
Don	Reann	Public Health Bullitt Co
Mike	Phillips	EMA Director
Bogart	Etherton	Deputy Director EMS
Larry	Hart	SW Director
Eric	Dennison	KIPDA
Keith	Griffee	CFO Bullitt Co
Candice	Renfro	Citizen
Mark	Williams	Animal Control
Melanie	Roberts	Judge Executive
Lora	Sloan	Citizen

Bullitt County	LEPC	12/09/2016
First	**Last**	**Title**
Eric	Dennison	KIPDA
Becky	Bundy	Med Immune
Rhonee	Rodgers	Med Immune
Layne	Troutman	Shepherdsville FD
Mark	Mitchell	Bullitt Co. Public Schools
Staci	Goedelle	Bullitt Co. Public Schools
Sarah	Hardin	Bullitt Co. Public Schools
Craig	Hampton	Shepherdsville FD
Ken	Porter	Gordon Food Services
Shane	Rummage	Gordon Food Services
Kody	Bradford	Gordon Food Services
Jake	Sharrock	Gordon Food Services
Bridget	Etherton	Bullitt Co. EMS
Lisa	Craddock	Bullitt Co. Dep. Judge Exec
Mike	Phillips	Bullitt Co. EMA Director

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Henry County	LEPC	9/29/2015
First	**Last**	**Title**
Scott	Tibbetts	Disaster Program Manager
Larry	Montgomery	District Tech and Safety
Marvin	Bowman	EC
Lloyd	Peniston	KY Crisis Coordinator
Martin	Washburn	Citizen
Larry	Wynn	Plant Manager
Michael	Lashley	Citizen
Zach	Woods	Teacher
Tim	Abrams	Superintendent
John	Brent	Judge Executive
Jody	Rucker	EMA Director
Eric	Dennison	PAS
Peggy	Bryant	Deputy Judge Exec
Kim	Boyer	Treasurer
Scott	Treece	Public Works
Travis	Buchanan	Henry Co. Parks

Henry County	LEPC	03/22/2016
First	**Last**	**Title**
Rick	Bobo	KYEM
Josh	Jamid	HCEMS
Charles	Rawlings	HCEMS
Hommer	Druid	ARC
Scot	Treece	City of New Castle
Shana	Crain	Health Department
Jodi	Rucker	Henry Co. EMA Director
Debra	Drury	Tri County Action
Amanda	Rickets	Henry Co. Fiscal Court
Kim	Boyer	Henry Co. Fiscal Court
Peggy	Bower	Henry Co. Fiscal Court
Eric	Dennison	KIPDA

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Oldham County	LEPC	7/2/2015
First	**Last**	**Title**
Kevin	Nuss	Oldham County EMA
Sue	Struck	WVFD
Jonathan	Heck	Ballardsville Fire
Todd	Early	Oldham County EMS
Rick	Bobo	KYEM
Kevin	Smith	Lagrange Fire Dept
Joey	Riddle	KDPH
Becky	Zochler	Oldham County Fiscal Court
Russ	Rose	Oldham County Water District
Eric	Dennison	KIPDA
Michael	Uber	ARES
Sheplen	Davis	Oldham County High Schools
Greg	Hammond	Pee Wee Valley Police
Edward	Turner	South Oldham Fire Department
Nathaniel	Meade	Cedar Lake Lodge
Anthony	Hillbrandt	KSR Dept of Correction
Rae	Roley	Oldham County Fair Board
Nancee	Berling	TCCAA
Keith	Alexander	LG&E
Dory	Livy	Oldham County Health Dept.
David	Voegele	Oldham County Judge Executive
Jim	Urban	Oldham County Planning and Development
Joe	Spoelker	Apple Patch
Anna	Hobbs	Oldham County Health Dept.
Greg	Smith	Oldham County Police Dept.
Tim	Wakefield	Oldham County Police Dept.
Greg	Collett	Oldham County Police Dept.
Tracy	Witt	Oldham County Police Dept.
Barbara	Yates	Kentucky State Police
Michael	Williams	Oldham County School Board
Tim	Conway	North Oldham Fire Department
Taylor	Riley	Oldham ERA
Justin	Reed	Oldham County Planning and Development

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Oldham County	LEPC	1/7/2016
First	**Last**	**Title**
Rick	Bobo	KYEM
Joey	Riddle	KDPH
Lisa	Clifton	LGE
Mike	Sewell	Red Cross
Eric	Dennison	KIPDA
Kevin	Nuss	Oldham County EMA Director
Webb	Strong	Luther Luckett
Keith	Smith	LaGrange FD
Tina	Schindler	Oldham County Dispatch
Stephen	Davis	Oldham County Hazard
Justin	Reed	GIS
Joe	Spoekler	Apple Patch
Sue	Stock	WVFD
Matt	Tolar	Oldham County Fiscal Court
Russ	Rose	Oldham County Water District
Barbara	Yates	Kentucky Dept. Public Health
Nancee	Berling	Tri-County Action Partnership
Stephen	Fonte	Ballardsville FD
Greg	Smith	Oldham County Police
Jim	Sitlzer	LaGrange FD
Greg	Lindsey	LGE
Ben	Zuecherduarf	Cedar Lake Lodge
Melissa	Horn	Oldham County Fiscal Court
Tim	Conway	North Oldham FD
Greg	Collett	Oldham County Police Dept.
Becky	Zockler	Oldham County Fiscal Court
Brian	Claypool	LGE
J	Wosoba	Oldham County Board of Education
Theresa	Gamsh	Oldham County Health Dept.
Michael	Uber	ARES
Glen	Jennings	Reporter
Josh	Stimson	Conagra Foods
Roy	Messerchmidt	Conagra Foods
Greg	Larimore	Peewee Valley Police
Michael	Meece	Oldham County Sheriff
Edward	Turner	South Oldham FD

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Shelby County	LEPC	9/16/2015
First	**Last**	**Title**
Tom	Hardesty	Mayor
Shaun	Powell	Captain
Paul	Whitman	EMA Director
Bobby	Cockerd	Chief
Tom	Doyle	Manager
Kevin	Baker	Chief
Jennifer	Herrell	City Engineer
Doug	Cook	EHS
Joe	Johnson	Director
Chris	Spaulding	Dep Director
Rick	Bobo	Manager
Eric	Dennison	PAS
Chip	Minnis	Chief of Police
Rob	Rothenburger	Judge Executive
Joey	Riddle	Regional Coordinator
Ricky	Cox	Manager
Scott	Tibbetts	Manager
Drew	Wagner	Manager
Danny	Wilkerson	Manger
Bernie	Anderson	Operations
Ryan	libke	Exec Director
Joe	Sullivan	Coordinator
Linda	Whitton	Director
Ernie	Tiax	Private Citizen
Scott	Roberts	Thornton’s

APPENDIX B

Shelby County	LEPC	2/24/2016
First	**Last**	**Title**
Tom	Hardesty	Mayor
Shaun	Powell	Captain
Paul	Whitman	EMA Director
Bobby	Cowherd	Chief
Eric	Dennison	PAS
Darin	Hunter	Evergreen AES
Raymond	Williams	Evergreen AES
Kevin	Baker	Shelbyville Fire
Chris	Spaulding	Deputy EMA Director
Yogi	Peyton	Purnell Suasage
Jon	Swindle	Shelby Co Public School
Cameron	Potts	Pharmco
Danny	Wilkerson	Pharmco
Bernie	Anderson	Atmos Energy
Doug	Hacker	KY Concrete
Rusty	Newton	Deputy Judge Executive
Doug	Cook	Stanley Black & Decker
Ray	Stucker	Stanley Black & Decker
Rick	Bobo	KYEM
Mike	Darst	Katayama American
Tom	Doyle	Shelbyville Water
Ricky	Cox	Roll Forming Corp
Tim	Huff	Purnell Suasage
Joe	Johnson	Shelby 911

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Spencer County	LEPC	6/5/2015
First	**Last**	**Title**
John	Riley	County Judge Executive
Mike	Todevich	KSP
Nathan	Nation	Chief
Kim	Stuup	PVA
Gary	Harris	Citizen
Eric	Dennison	KIPDA
Kenny	Stewart	Major
Hobert	Judd	Magistrate

Spencer County	LEPC	6/10/2015
First	**Last**	**Title**
Houston	White	Telecommunication
Phil	Crumpton	Chief
Jeff	Coulter	Director
Carl	Ressor	Major
Nathan	Nation	Chief
John	Riley	County Judge Executive
Gary	Harris	Citizen
Eric	Dennison	KIPDA

Spencer County	LEPC	12/08/2015
First	**Last**	**Title**
John	Riley	County Judge Executive
Kevin	Woosley	KSP
Brett	Beaverson	Spencer Co Shcools
Gary	Harris	Citizen
Greg	Langan	DOT
Todd	Burch	Spencer Co Roads
Richard	Morris	Spencer Co Police
Tony	Wheatly	Citizen
Lawrence	Trageser	Citizen
Nathan	Nation	Taylorsville FD
Doug	Herndon	Mt Edon Fire
Chris	Limpp	Spencer Co EMA
Phil	Crumpton	Taylorsville Police
Eric	Dennison	KIPDA

APPENDIX B

Trimble County	LEPC	5/18/2015
First	**Last**	**Title**
Jim	Mahoney	Trimble PVA
Ronnie	McCane	Trimble Co. EMA
Andrew	Stark	Trimble Co. Water/ Milton Fire Dept
Eric	Dennison	KIPDA
George	Griffith	Trimble Co. EMA
Jason	Lung	Milton Fire Dept
Kenneth	Murphy	Kentucky State Police
Shannon	Hoskins	Trimble Co. LEPC
Todd	Pollock	City of Bedford/Red Cross
Olivia	Edelen	LG&E/KU
Jerry	Powell	Trimble Co. Fiscal Court
Kenny	Green	Trimble Co. Fiscal Court
Cassie	James	Milton Fire Dept
Charles	Keaton	Kentucky State Police
Hannah	Hannon	LG&E/KU

Trimble County	LEPC	11/12/2015
First	**Last**	**Title**
George	Griffith	Search and Rescue
A.	Stark	Captain
Ronnie	McCane	EMA Director
Eric	Dennison	PAS
James	Snell	Lieutenant
Jason	Long	Chief
Olivia	Edelon	Environmental Engineer
Derrick	Foster	Search and Rescue
Katie	Sparkman	Fire Fighter
George	Gallentine	Fire Fighter
Kenneth	Murphy	Shift Supervisor
Phillip	Duermyer	TCESU
Jerry	Powell	Judge Executive

APPENDIX B

Regional Planning Council		10/13/2015
First	**Last**	**Title**
Jerry	Powell	Trimble Co Judge Executive
Matt	Gossom	SWC Trimble
Larry	Watkins	Citizen Bullitt
Roanne	Hammond	Administrator Bullitt Co
Craig	Myatt	Road Supervisor Shelby Co
Bev	Claxon	KIPDA
Felicia	Harper	KIPDA
Jarrett	Haley	KIPDA
Eric	Dennison	KIPDA
Brian	Davis	Louisville Metro Planning
Amy	Williams	TSW Design
Ryan	Libke	Ex. Director Triple S
Janet	Cuthrell	Field Rep. Sen McConnell

KAMM		1/14/2016
First	**Last**	**Title**
Mike	Griffin	USGS Director
Randy	Stambaugh	GRW Engineering
James	Inge	Amec Foster Wheeler
Paul	Whitman	Shelby Co EMA
Eric	Dennison	KIPDA
Sharlie	Khan	MSD
Lori	Rafferty	MSD
Ben	Conley	AECOM
Sarah	Taylor	Geomorphics
Chad	McCormick	LD&D
Jimmy	Stahl	AECOM
John	Carasseu	MSD
Thomas	Ruby	USGS
Jeff	Woods	USGS
Zach	Dettlinger	AECOM

APPENDIX B

Regional Meeting Attendance:

KIPDA Regional Hazard Mitigation Committee	#1	3/20/2015
First	**Last**	**Title**
Rick	Bobo	Area Manager
Jarrett	Haley	PAS Director
Rob	Rothenburger	Judge Executive
Kevin	Nuss	EMA Director
Paul	Whitman	EMA Director
Melanie	Roberts	Judge Executive
Jody	Rucker	EMA Director
Adam	Forseth	GIS
John	Riley	Judge Executive
Mike	Phillips	EMA Director
Nick	Grinstead	KYWM
Kristen	Loeser	Secretary
Eric	Dennison	PAS

KIPDA Regional Hazard Mitigation Committee	#2	7/23/2015
First	**Last**	**Title**
Paul	Whitman	EMA Director
Rob	Rothenburger	Judge Executive
Kevin	Nuss	EMA Director
Michael	Phillips	EMA Director
Melanie	Roberts	Judge Executive
Jarrett	Haley	PAS Director
John	Riley	Judge Executive
Eric	Dennison	PAS
Dennis	Horelander	KY State Representative

APPENDIX B

KIPDA Regional Hazard Mitigation Committee	#3	10/22/2015
First	**Last**	**Title**
Paul	Whitman	EMA Director
Chris	Spaulding	Deputy EMA
Rick	Bobo	Area Manager
Emily	Bartee	Training Specialist
Eric	Dennison	PAS
Ronnie	McCane	EMA Director
George	Griffith	Deputy EMA
Melanie	Roberts	Judge Executive
Jarrett	Haley	Director PAS
Chris	Limpp	EMA Director
Adam	Forseth	GIS Manager
Michael	Clair	GIS Specialist
John	Black	Deputy Judge Executive
Jody	Rucker	EMA Director
John	Riley	Judge Executive
Rob	Rothenburger	Judge Executive

KIPDA Regional Hazard Mitigation Committee	#4	01/07/2016
First	**Last**	**Title**
Ronnie	McCane	Trimble County EMA Director
Mark	Richardson	Bullitt County Deputy EMA Director
John	Riley	Spencer County Judge Executive
Chris	Limpp	Spencer County EMA Director
Lisa	Cissell	KIPDA
Paul	Whitman	Shelby County EMA Director
Chris	Spaulding	Shelby County Deputy EMA Director
Adam	Forseth	KIPDA
Michael	Clair	KIPDA
Jarrett	Haley	KIPDA
Eric	Dennison	KIPDA
Justin	Carter	KIPDA

APPENDIX B

KIPDA Board		1/28/2016
First	**Last**	**Title**
Rachael	Henry	HMB
Paul	Lincks	HMB
Felicia	Harper	KIPDA
Barbara	Gordon	KIPDA
Kelly	Casey	KIPDA
Molly	Dobson	KIPDA
Rob	Rothenburger	Shelby Co. Judge Exec
Mitzi	Wyrick	Wyatt Tarrant Combs
Stacey	Burton	KIPDA
Larry	Chaney	KIPDA
Robert	Augish	Representative
Eric	Dennison	KIPDA
Justin	Carter	KIPDA
Adam	Forseth	KIPDA
Paul	Sangalli	KIPDA
Jennifer	Wahle	KIPDA
Rusty	Newton	Shelby Co. Deputy Judge Exec
Keith	Griffee	Bullitt County
Jack	Coffman	Clark Co Commision
John	Brent	Henry Co Judge Exec
Debby	Mobley	Bullitt County CFO
John	Black	Oldham Co Dep. Judge Exec
David	Goodlett	Spencer Co. Magistrate
David	Scott	Trimble Co. Magistrate
Byron	Champman	Middletown Mayor
Sherry	Conner	Shively Mayor
Bernard	Bowling	St. Matthew Councilman
John	Riley	Spencer Co. Judge Exec
Jim	Mims	Dir. Development Metro Lou
Val	Shirley	Shelby Co. Solid Waste
Bill	Dieruf	Jeffersontown Mayor
Jerry	Powell	Trimble Co. Judge Executive

APPENDIX B

Bluegrass Meeting		1/19/2016
First	**Last**	**Title**
Eric	Dennison	KIPDA
George	Griffith	Search and Rescue
Ronnie	McCane	Trimble EMA
Andrew	Stark	Milton FD
Jason	Long	Milton FD
Brian	Claybern	LaGrange FD
Travis	German	South Oldham FD
Rick	Bobo	Shelby Co. Fire
Bobby	Cowherd	Shelby Co. Fire
Matthew	Franklin	Ballardsville FD
Thomas	Petschke Jr	Ballardsville FD
Garry	Key	LaGrange FD
Jim	Sitzler	LaGrange FD
Stephen	Fanter	LaGrange FD

APPENDIX C

Appendix C incorporates the LEPC meetings from the planning process and lists applicable mitigation techniques, projects, and ideas from the meetings. While some items appear in multiple meetings, duplicates were left out and the entire scope should represent a full idea of the ideas to add towards the existing plan and update.

Mitigation Ideas Bullitt County
Roadway Construction
Easements
County -Wipe Mobile App
Safe Rooms in Mobile Parks
Traveling Safe Room
Mobile Weather Stations
Mobile Radio Stations
Tri-marc Signs
Culvert Cleanings
Facebook
Hazmat Equipment
Trainings
Mitigation Planning on County Level
Lightening Protection

Mitigation Ideas Henry County
P25 Radio Compliance
Network Communication
Drones
Cell phone apps
Adding barriers to roadways
guardrails
nonstick coating
viaducts for rain
lightning detection during severe storms
alarm radius
generators
sirens
Facebook
portable signage
cameras
dams

APPENDIX C

Mitigation Ideas Oldham County
Tree Removal
Underpass for CSX in LaGrange
Improved Communication equipment
Apps for phones for community
PSA
Cameras
Drones
gas masks
Temporary signs that can be moved to let residents know of hazards
sirens
Traffic cones - portable
Rain gardens for flood control
barricades

Mitigation Ideas Shelby County
911 upgrades, increase taxes
Insurance for community structures
Facebook and Twitter incorporation
Early warning detection for hazards built by developers
Dead Animal Pick Up
Generators
Weather Stations
Storm Ready
Waste Management Hazardous Material pick up
Ordinances to preserve wetlands for flood mitigation
Clear Creek
Increase partnerships with schools for evacuation training

Mitigation Ideas Spencer County
Integration of Social Media
Newsletter
Sirens
P25 Licenses
Safe Rooms
Technology Upgrade for coordination with other first responder agencies
Levy
Cross Training
landmark/street sign- county understanding of area
GPS tracking for first responders
radio trainings
hand radios
App for citizens and phones of disasters
body cameras
cameras that show road condition and weather and cameras for ems and county vehicles
Color Coordinating system badges for access levels to disaster situations
reevaluate evacuation plan
Stream Restoration

APPENDIX C

Mitigation Ideas Trimble County
Standardized Street Signs and Location Identifiers
Communication System Upgrades
Generators
Public Education with schools for Hazards
Vehicle Upgrade- Ambulance
Storm Shelter
Safe Room
Stream Stabilization/ Improve Channel Flow
Fire Hydrant Upgrade
New Water Tower
Topography Maps for County Emergency Responders
211 PSA announcements
Non-skid Road Coating on dangerous Roads
Emergency Shelter
TCWD Generators
Education Materials
Firefighting Equipment
Social Media Usage to Promote Safety
Safe Rooms at Trailer Park
White Lines/Road Repair
Sirens
County Road Map for EM update
Bridge - Connector Rd
Guard Railing
Reflectors of Roads

APPENDIX D

Updated Past Mitigation Actions from each county:

Each County EMA Director was asked to look at the 2011 KIPDA Regional Hazard Mitigation Plan and update and evaluate the findings from the previous plan in order to update the 2016 KIPDA Regional Hazard Mitigation Plan. This Appendix serves as documentation of the changes from that plan and updates regarding practices since the 2011 KIPDA Plan.

BULLITT COUNTY

Formal Meeting Took Place with Bullitt County EMA Director Mike Phillips on:

05/15/2105

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Bullitt County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Fox Chase, City of			Yes		Yes	Yes			Yes	No		No	No
Hillview, City of			Yes		Yes	Yes			Yes	Yes		No	Yes
Hebron Estates, City of			Yes		Yes	Yes			Yes	No		No	No
Hunters Hollow, City of			Yes		Yes	Yes			Yes	No		No	No
Lebanon Junction, City of			Yes		Yes	Yes			Yes	Yes		No	Yes
Mt. Washington, City of			Yes		Yes	Yes			Yes	Yes		Yes	Yes
Pioneer Village, City of			Yes		Yes	Yes			Yes	Yes		No	No
Shepherdsville, City of			Yes		Yes	Yes			Yes	Yes		Yes	Yes

Bullitt County Mitigation Prioritization and Benefit Review Includes the cities of Fox Chase, Hillview, Hebron Estates, Hunters Hollow, Lebanon Junction, Mt. Washington, Pioneer Village, and Shepherdsville					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Medium	Medium	Medium	Medium
Develop a coordinated, interagency sustained debris removal plan	High	Medium	Medium	Medium	High
Work with utility companies to trim trees and debris away from overhead power lines	Medium	Medium	Medium	Medium	Medium
Provide Generators at Critical facilities that provide emergency services	Low	Low	Low	Low	Low
Encourage homeowners to have backup power sources or alternate sources of heating	High	Medium	Medium	High	High
Direct development and installation of new critical facilities out of hazard areas	High	Medium	Medium	High	High
Enforce the County's NFIP flood ordinances	High	Medium	Medium	Medium	Medium
Educate residents of their location in the Hazard areas by providing maps and information	Medium	Medium	Medium	Medium	Medium
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Medium	Medium	Medium	High
Develop evacuation plans, policies, and procedures for all hazards	High	Medium	Medium	Medium	High
Educate residents on the availability and importance of Flood Insurance	Medium	Easy	Low	Medium	Medium
Create a GIS database inventory of all critical facilities and structures in each hazard area	High	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Medium	Medium	Low	High	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	High	Medium	Medium	Medium	Medium
Upgrade the emergency services communication equipment	High	Hard	High	High	High

Bullitt County Action Implementation Includes the cities of Fox Chase, Hillview, Hebron Estates, Hunters Hollow, Lebanon Junction, Mt. Washington, Pioneer Village, and Shepherdsville			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Medium	Continuous
Develop a coordinated, interagency sustained debris removal plan	Local Gov, Emergency Mgmt	Medium	Complete
Work with utility companies to trim trees and debris away from overhead power lines	Emergency Mgmt, Utilities	Medium	Continuous
Provide Generators at Critical facilities that provide emergency services	Local Gov, Emergency Mgmt	High	Complete
Encourage homeowners to have backup power sources or alternate sources of heating	Local Gov, Emergency Mgmt	High	Continuous
Direct development and installation of new critical facilities out of hazard areas	Local Gov	High	As Needed
Enforce the County's NFIP flood ordinances	Local Gov	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Local Gov, Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop evacuation plans, policies, and procedures for all hazards	Local Gov, Emergency Mgmt	High	Completed
Educate residents on the availability and importance of Flood Insurance	Local Gov, Emergency Mgmt	Medium	Continuous
Create a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	High	Continuous
Identify and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Local Gov	Medium	Continuous
Create a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	High	Continuous
Upgrade the emergency services communication equipment	Local Gov, Emergency Mgmt	High	Immediate

APPENDIX D

	Floodplain Mgmt. Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Bullitt County Fiscal Court	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
Fox Chase, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Hillview, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Hebron Estates, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Hunters Hollow, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Lebanon Junction, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Mt. Washington, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Pioneer Village, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Shepherdsville, City of	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes

APPENDIX D

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization.
- Transportation for evacuees (those rendered immobile as a result of the disaster).

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Flood, Severe Winter Storm, Tornado
Estimated Costs:	$50,000-$100,000 annually
Funding Method(s):	Local Funds, Prevention Grants, Natural Resources Grants

Update

- Follows State Roadway Prioritization Plan for road clearings
- Works with State on new bridge design. Martin Hill Rd. Bridge was done under KY State Transportation Guidelines
- Evacuation Plan in place for disasters
- Transportation for evacuees: Contract with School Busses from Bullitt and Jefferson Counties and assistance from TARC (River City Transit Authority)

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$50,000 annually
Funding Method(s):	Local Utility Company funds, Disaster Funding, Local funds

Update

- Works with Salt River RECC and LG&E for power line clearance
- Guidelines in place with Builders for underline placement of lines

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $350,000
Funding Method(s) Emergency Service Grants, Local funds

Update

- 5 Generators placed since 2011
  - Bullitt County Courthouse- 300 S Buckman St., Shepherdsville, KY
  - EMS- 238 Saltwell Court, Shepherdsville, KY
  - Red Cross- 200 Saltwell Court (Shelter), Shepherdsville, KY
  - Bullitt County Road Department- 1769 S Preston Hwy
  - Radio Tower- 214 Hubbard Ln, Mt. Washington, KY

Objective 1.3 Reduce the number of critical facilities in hazard areas.

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction

Jurisdictions: All Jurisdictions
Hazards Mitigated: Winter Storm, Tornado, Flood
Estimated Costs: None
Funding Methods: N/A

Update

- 3 New Schools
  - List them here
- Floodplain Coordinator worked with Counties

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions

Update

- Lebanon Junction responsible for maintaining floodwall, including maintenance around surrounding area with mowing and brush.

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: $150,000

Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.

Mitigation Implementation Measure(s)

- Drainage Reviews for Stormwater Management Plan

Jurisdictions: Cities of Shepherdsville, Shelbyville, Mount Washington; Bullitt, Oldham, and Shelby Counties
Hazards Mitigated: Flood
Estimated Costs: $50,000 - $70,000
Funding Methods: Local Funds

Update

- Code Enforcement – Rudy Hawkins reviews Stormwater Management Plan and incorporated plan

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Identify clean water source

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Addressed in Bullitt County Comprehensive Plan, includes building of retention basins in subdivisions, and consulting with Louisville Water Company and Metropolitan Sewer District (MSD)
- Louisville Water Company Supplies water to the Bullitt County area.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Inclusion in NFIP program for cities

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfire, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Hired Flood Plan Coordinator for the county- Roanne Hammond
- Yearly training for Planning and Zoning and the Flood Plain Coordinator

Mitigation Implementation Measure(s)

- Hydraulics Plan requirements for new development submissions.

Jurisdictions:	Bullitt, Oldham, Shelby, and Spencer
Hazards Mitigated:	Flood
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Works in conjunction with Stormwater Management Coordinator and adopted ordinance for county that deals with water overflow of subdivisions.

Mitigation Implementation Measure(s)

- Repetitive Loss home buyout program

Jurisdictions: All Jurisdictions except Henry County and cities located within
Hazards Mitigated: Flood
Estimated Costs: $100,000 - $300,000 depending on number of homes
Funding Methods: FEMA HMGP funds

Update

- No Repetitive Loss or Severe Repetitive loss applied for in this period

Objective 2.2 Improve the resistance of structures in the community against natural hazards.

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters

Jurisdictions: All Jurisdictions
Hazards Mitigated: Tornado, Flood, Severe Storm
Estimated Costs: $50,000
Funding Methods: State Emergency Management Grants, Local Funds

Update

- Bullitt County works in conjunction with Red Cross to provide small shelters. 220 shelters in the county
- Hillview did review mitigation actions for safe rooms

Objective 2.3 Coordinate service delivery to vulnerable members of the community

Mitigation Implementation Measure(s)

- Implement the KIPDA Disaster Preparedness Plan

Jurisdictions: All Jurisdictions
Hazards Mitigated: Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local Funds

Update

- Bullitt County Formally adopted plan in 2013.

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfires, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Flood Plain Coordinator Roanne Hammond reviews requirements for the county; this includes training of all applicable offices.
- The county participates in NFIP.
- The county works with developers to ensure Hazard Mitigation as a factor in regulations.

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Bullitt County adopted pan for new developments in commercial, industrial and residential zones to include hazard mitigation requirements
- New subdivisions require hydraulics plan

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.

Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
  - Rental Insurance for multifamily dwellers
  - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Bullitt County offers Public Service Announcements (PSA) regarding training and community education.
- Bullitt County offers rental insurance for multifamily dwellers.
- Bullitt County works with the Red Cross to supply emergency kits to residents.
- Bullitt County offers a call in hotline and Facebook to hear from residents.
- Bullitt County works with all local media to warn of upcoming disasters, including television, radio, and internet.

Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Educational Programs regarding flooding
  - Coordinating efforts with:
    - Division of Water
    - FEMA

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Bullitt County works with the Bullitt Board of Education to offer tornado and fire drills, including walkthroughs and evacuation plans in emergency situations
- The Flood Plain Coordinator disseminates information regarding flood plain requirements.

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Update

- Bullitt County implemented an evacuation plan regarding evacuation
- Bullitt County partners with Bullitt County Public Schools, Jefferson County Public Schools, and River City Transit Authority to provide busing in case of emergency.
- Bullitt County Emergency Director reviews each plan annually.

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

Update

- Bullitt County does have agencies in the area that do provide rental insurance.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $240,000 at $40,000 per county
Funding Methods: Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Update

- Bullitt County EMA coordinates with KIPDA GIS department for mapping countywide facilities, and relevant information
- Bullitt County EMA coordinates with Louisville (LOGIC)

Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $50,000 - $80,000 per county
Funding Methods: State Division of Water

Update

- Bullitt County Flood Plain Coordinator works with FEMA and NFIP for updates to the region.

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $5,000 per county
Funding Methods: CERT Grant

Update

- Bullitt County EMA offers radio training to fire departments and citizen 2 to 3 times yearly.
- Bullitt County EMA offers weather spotting training to fire departments and citizen 2 to 3 times yearly.
- Bullitt County EMA offers Search and Rescue training to fire departments and citizen 2 to 3 times yearly.
- No city or county does CERT

HENRY COUNTY

Formal Meeting Took Place with Henry County EMA Director Jody Rucker on:

05/05/2105

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Henry County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Campbellsburg, City of			No		Yes	Yes			No	Yes		Yes	Yes
Eminence, City of	Yes		No		Yes	Yes			No	Yes		Yes	Yes
New Castle, City of			No		Yes	Yes			No	No		Yes	Yes
Pleasureville, City of			No		Yes	Yes			No	No		Yes	Yes
Smithfield, City of			No		Yes	Yes			No	No		Yes	No

APPENDIX D

Henry County Mitigation Prioritization and Benefit Review Includes the cities of Campbellsburg, Eminence, New Castle, Pleasureville, and Smithfield					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Medium	Low	Low	Medium
Develop a coordinated, interagency sustained debris removal plan	Medium	Medium	Medium	Medium	Medium
Work with utility companies to trim trees and debris away from overhead power lines	Low	Medium	Low	Low	Low
Provide Generators at Critical facilities that provide emergency services	High	Medium	Medium	Medium	High
Encourage homeowners to have backup power sources or alternate sources of heating	Medium	Medium	Low	Medium	Medium
Direct development and installation of new critical facilities out of hazard areas	Medium	Easy	Low	Medium	Medium
Enforce the County's NFIP flood ordinances	Low	Easy	Low	Medium	Medium
Educate residents of their location in the Hazard areas by providing maps and information	Medium	Medium	Medium	Medium	Medium
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Medium	Medium	Medium	High
Develop evacuation plans, policies, and procedures for all hazards	High	Medium	Medium	Medium	Medium
Educate residents on the availability and importance of Flood Insurance	High	Hard	Medium	High	Medium
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Low	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Low	Easy	Low	Medium	Low
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Medium	Easy	Low	Medium	Medium
Upgrade the emergency services communication equipment	Medium	Easy	Low	Medium	Medium

Henry County Action Implementation Includes the cities of Campbellsburg, Eminence, New Castle, Pleasureville, and Smithfield			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Medium	As Needed
Develop a coordinated, interagency sustained debris removal plan	All City/County Departments	Medium	Complete
Work with utility companies to trim trees and debris away from overhead power lines	Emergency Mgmt, Utilities	Low	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	High	Complete
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Medium	Annually
Direct development and installation of new critical facilities out of hazard areas	Planning and Zoning	Medium	As Needed
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	Medium	Complete
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	High	Continuous
Create a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Low	Continuous
Create a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Low	Continuous
Upgrade the emergency services communication equipment	Fiscal Court, Mayor, Emergency Mgmt	High	Complete

	Floodplain Mgmt. Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Henry County Fiscal Court	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Campbellsburg, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Eminence, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
New Castle, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Pleasureville, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Smithfield, City of	No	No	No	No	No	Yes	No	No	Yes	No	Yes

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization.
- Transportation for evacuees (those rendered immobile as a result of the disaster).

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Flood, Severe Winter Storm, Tornado
Estimated Costs: $50,000-$100,000 annually
Funding Method(s): Local Funds, Prevention Grants, Natural Resources Grants

Update

- Henry County follows the state prioritization of road clearings.
- Henry county constructed a new bridge on Long Branch Road, following the state Transportation Cabinet standards
- Henry County maintains a route prioritization plan in case of emergency situations.
- Henry County EMA maintains a partnership with Henry County Public Schools to utilize school buses during a hazardous/emergency situation.

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $50,000 annually
Funding Method(s): Local Utility Company funds, Disaster Funding, Local funds

Update

- Works with Louisville Gas and Electric (LG&E) for power line clearance
- Guidelines in place with Builders for underground placement of power lines

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $350,000
Funding Method(s) Emergency Service Grants, Local funds

Update

- Henry County Fiscal Court obtained a generator for the Campbellsburg Fire Department, Eminence City Hall, KY River Station, and New Castle City Hall
- Plans are in the work for Henry County Fiscal Court Building to obtain a generator.

Objective 1.3 Reduce the number of critical facilities in hazard areas.

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction

Jurisdictions: All Jurisdictions
Hazards Mitigated: Winter Storm, Tornado, Flood
Estimated Costs: None
Funding Methods: N/A

Update

- Henry County had no new construction of schools since the 2011 KIPDA Hazard Mitigation Plan
- Henry County EMA does have plans to work with the state of Kentucky on future site school locations.

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: $150,000
Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

Update

- Henry County worked with the Army Corp of Engineers in repairing Loch #2 and Loch #3 on the Kentucky River.

Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.

Mitigation Implementation Measure(s)

- Drainage Reviews for Stormwater Management Plan

Jurisdictions: Cities of Shepherdsville, Shelbyville, Mount Washington; Bullitt, Oldham, and Shelby Counties
Hazards Mitigated: Flood
Estimated Costs: $50,000 - $70,000
Funding Methods: Local Funds

Update

- Not applicable to Henry County

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Identify clean water source

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Henry County Water District maintains control of Henry County water sources and has identified clean water sources.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Inclusion in NFIP program for cities

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfire, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Jody Rucker, Henry County Emergency Manager Director, serves as the Flood Plain coordinator and does annual reviews.
- Mr. Rucker attends yearly trainings and provides yearly trainings to all departments.
- No new development has occurred in the past 5 years in Henry County.
- Henry County participates in the NFIP.

Mitigation Implementation Measure(s)

Objective 2.2 Improve the resistance of structures in the community against natural hazards.

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornado, Flood, Severe Storm
Estimated Costs:	$50,000
Funding Methods:	State Emergency Management Grants, Local Funds

Update

- Henry County reviews shelters on a continuous basis and works in conjunction with the Red Cross.
- Henry County has not conducted any wind resistance studies.

Objective 2.3 Coordinate service delivery to vulnerable members of the community

Mitigation Implementation Measure(s)

- Implement the KIPDA Disaster Preparedness Plan

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local Funds

Update

- Henry County Fiscal Court passed an ordinance approving the KIPDA Disaster Preparedness Plan.

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfires, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Henry County EMA Director Jody Rucker acts as the county's flood plain coordinator.
- Henry County participates in the NFIP.
- The flood plain coordinator conducts yearly trainings for all agencies in administering flood plain ordinances.
- Henry County has not built any subdivisions since the 2011 KIPDA Hazard Mitigation Plan.

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

APPENDIX D

- Henry County has not built any subdivisions since the 2011 KIPDA Hazard Mitigation Plan.

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.

Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
    - Rental Insurance for multifamily dwellers
    - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Henry County overs various hazard and emergency trainings for agencies and trainings throughout the year.
- Henry County offers rental insurance for citizens.
- Henry County works with the Red Cross to give citizens access to emergency kits.
- Henry County maintains a website page to inform citizens of information and uses Public Service Announcements (PSA) through radio, internet and television to inform citizens of emergency situations and trainings.
- Henry County uses local media to inform citizens of emergency situations.

Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Educational Programs regarding flooding
    - Coordinating efforts with:
        - Division of Water
        - FEMA

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Henry County uses its Local Emergency Planning Commission (LEPC) to help organize trainings programs with the local school district to train children about various disaster preparedness.
- Henry County coordinates with FEMA and Division of Water to educate citizens on flooding and the flood plain map.

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Update

- Henry County EMA implemented a route prioritization plan in case of emergency situations
- Henry County EMA coordinates with henry County Public Schools during emergencies to use school buses for transportation evacuees.
- Henry County Fiscal Court passed an ordinance adopting the henry County Emergency Operations Plan in 2012.

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

Update

- Henry County has access for its citizens to rental insurance.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$240,000 at $40,000 per county
Funding Methods:	Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Update

- Henry County coordinates with KIPDA GIS team to provide county mapping of geographical information of vulnerable structures and critical facilities.

Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$50,000 - $80,000 per county
Funding Methods:	State Division of Water

Update

- Henry County updated the flood plain map in 2012.

Mitigation Implementation Measure(s)

- Mapping of City of Shelbyville's 100yr. Floodplain

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$5,000 per county
Funding Methods:	CERT Grant

Update

- Henry County EMA offers yearly trainings to agencies and citizens on radio training.
- Henry County offers various Emergency First responder trainings throughout the year.
- No CERT teams are active in Henry County.

APPENDIX D

OLDHAM COUNTY

Formal Meeting Took Place with Henry County EMA Director Kevin Nuss on:

05/21/2105

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Oldham County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Crestwood, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	No
Goshen, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	No
Lagrange, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	Yes
Orchard Grass Hills, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		No	No
Pewee Valley, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes	No
River Bluff, City of		Yes	Yes		Yes	Yes		Yes	Yes	Yes		No	No

APPENDIX D

Oldham County Mitigation Prioritization and Benefit Review Includes the cities of Crestwood, Goshen, Lagrange, Orchard Grass Hills, Pewee Valley, and River Bluff					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Low	Easy	Low	Medium	Low
Develop a coordinated, interagency sustained debris removal plan	Low	Easy	Low	Medium	Low
Work with utility companies to trim trees and debris away from overhead power lines	Medium	Easy	Medium	Low	Low
Provide Generators at Critical facilities that provide emergency services	High	Medium	Medium	High	High
Encourage homeowners to have backup power sources or alternate sources of heating	Low	Hard	Low	High	Low
Direct development and installation of new critical facilities out of hazard areas	Low	Hard	Low	High	Low
Enforce the County's NFIP flood ordinances	Very High	Easy	High	High	High
Educate residents of their location in the Hazard areas by providing maps and information	Medium	Easy	High	Medium	High
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Easy	Medium	Medium	High
Develop evacuation plans, policies, and procedures for all hazards	Very High	Easy	Medium	Medium	High
Educate residents on the availability and importance of Flood Insurance	Very High	Medium	Medium	Medium	High
Create a GIS database inventory of all critical facilities and structures in each hazard area	High	Medium	Medium	High	High
Identify and map bridges that need to be elevated to prevent damage and flooding	High	Medium	Medium	High	High
Create a GIS database inventory of repetitive loss structures in each flood hazard area	High	Medium	Medium	High	High
Upgrade the emergency services communication equipment	High	Hard	Low	High	High

Oldham County Action Implementation Includes the cities of Crestwood, Goshen, Lagrange, Orchard Grass Hills, Pewee Valley, and River Bluff			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	Continuous
Develop a coordinated, interagency sustained debris removal plan	All City/County Departments	Low	1 Year
Work with utility companies to trim trees and debris away from overhead power lines	Emergency Mgmt, Utilities	Low	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	High	Completed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Low	Continuous
Direct development and installation of new critical facilities out of hazard areas	Planning and Zoning	Low	Continuous
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	High	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	Complete
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	High	Continuous
Create a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	High	Continuous
Identify and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	High	As needed
Create a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	High	Continuous
Upgrade the emergency services communication equipment	Fiscal Court, Mayor, Emergency Mgmt	High	Immediate

APPENDIX D

	Floodplain Mgmt. Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Oldham County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Crestwood, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Goshen, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Lagrange, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Orchard Grass Hills, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Pewee Valley, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
River Bluff, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization.
- Transportation for evacuees (those rendered immobile as a result of the disaster).

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Flood, Severe Winter Storm, Tornado
Estimated Costs: $50,000-$100,000 annually
Funding Method(s): Local Funds, Prevention Grants, Natural Resources Grants

Update

- Oldham County follows State Roadway Prioritization Plan for road clearings including long term closure plans.
- Oldham County works with State on new bridge design. Bridges on Harmony Village Rd. and Oldham Acres Road used guidelines by the state of Kentucky Transportation Cabinet.
- Oldham County does annual reviews of bridges, culverts and roadways within the floodplain.
- Oldham County maintains a route prioritization plan in case of emergencies.
- Oldham County uses transportation for evacuees by contracting with school busses from Oldham and Jefferson County Public Schools and assistance from Transit Authority of River City (TARC).

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $50,000 annually

Funding Method(s): Local Utility Company funds, Disaster Funding, Local funds

Update

- Oldham County works with Louisville Gas & Electric (LG&E) for as needed clearance of power lines.
- Oldham County requires all new subdivisions to have underground utility lines.

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$350,000
Funding Method(s)	Emergency Service Grants, Local funds

Update

- Oldham County has provided 3 emergency generators since the 2011 KIPDA Hazard Mitigation Plan:
    - 911 Center- 1020 Dispatchers Way, LaGrange, KY
    - Tri-County Senior Center- 1015 Dispatchers Way, LaGrange KY
    - Police Station- 1855 N Hwy 353 LaGrange, KY
- Oldham County plans to provide an emergency generator at the Fiscal Court Building in 2017.

<u>Objective 1.3 Reduce the number of critical facilities in hazard areas.</u>

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Winter Storm, Tornado, Flood
Estimated Costs:	None
Funding Methods:	N/A

Update

- Oldham County Emergency Management worked with Oldham County Public Schools and the Oldham County Environmental Authority for the 2013 expansion of Centerfield Elementary School, requiring permit and state classification.

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: $150,000
Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

Update

- Oldham County coordinates with the state of Kentucky and the Army Corp of Engineers for any repair and maintenance of the area.

Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.

Mitigation Implementation Measure(s)

- Drainage Reviews for Stormwater Management Plan

Jurisdictions: Cities of Shepherdsville, Shelbyville, Mount Washington; Bullitt, Oldham, and Shelby Counties
Hazards Mitigated: Flood
Estimated Costs: $50,000 - $70,000
Funding Methods: Local Funds

Update

- Oldham County Environmental Authority reviews stormwater drainage for the county.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Identify clean water source

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Oldham County requires culverts and other flood mitigation efforts in the process of building new subdivisions.

- Oldham County Water District works with the Louisville Water Company and has identified multiple areas of clean water.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Inclusion in NFIP program for cities

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Wildfire, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Oldham County reviews Floodplain management requirements and employs a Floodplain Coordinator.
- The Floodplain Coordinator is the head of Planning and Development for Oldham County and conducts trainings.
- All development in Oldham County must go through the Planning and Development, which discourages building in dry heavily forested areas.
- Oldham County Planning and Development require subdivision builders to utilize culverts and require retention basins in new developments to aid with water flow and prevent flooding.
- All of Oldham County's cities participate in the Nation Flood Insurance Program.

Mitigation Implementation Measure(s)

- Hydraulics Plan requirements for new development submissions.

Jurisdictions: Bullitt, Oldham, Shelby, and Spencer
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Oldham County Planning and Development require subdivision builders to utilize culverts and require retention basins in new developments to aid with water flow and prevent flooding. Any development in the floodplain requires engineering studies.

Mitigation Implementation Measure(s)

- Repetitive Loss home buyout program

Jurisdictions:	All Jurisdictions except Henry County and cities located within
Hazards Mitigated:	Flood
Estimated Costs:	$100,000 - $300,000 depending on number of homes
Funding Methods:	FEMA HMGP funds

Update

- Oldham County participates in the Repetitive Loss and the Severe Repetitive Loss home buyout program.
- Oldham County, in 2015, received a grant from FEMA to aid with homes along the Ohio River area for Repetitive Loss.

Objective 2.2 Improve the resistance of structures in the community against natural hazards.

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornado, Flood, Severe Storm
Estimated Costs:	$50,000
Funding Methods:	State Emergency Management Grants, Local Funds

Update

- Oldham County maintains multiple county-wide shelters with annual reviews.
- Oldham County conducted a wind resistance study and concluded all buildings were within code for shelter use.

Objective 2.3 Coordinate service delivery to vulnerable members of the community.

Mitigation Implementation Measure(s)

- Implement the KIPDA Disaster Preparedness Plan

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local Funds

Update

- Oldham County passed an ordinance implementing the KIPDA Disaster Preparedness Plan.

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Wildfires, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Oldham County reviews Floodplain management requirements and employs a Floodplain Coordinator.
- All of Oldham County's cities participate in the Nation Flood Insurance Program.
- The Floodplain Coordinator is the head of Planning and Development for Oldham County and conducts trainings.
- All development in Oldham County must go through the Planning and Development, which discourages building in dry heavily forested areas.
- Oldham County Planning and Development require subdivision builders to consider hazard mitigation in new development by requiring various ordinances from underground power lines, to building retention basins for flooding.

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Tornado, Dam/Levee Failure

Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- All development in Oldham County must go through the Planning and Development.
- Oldham County Planning and Development require subdivision builders to consider hazard mitigation in new development by requiring various ordinances from underground power lines, to building retention basins for flooding.

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

<u>Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.</u>
Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
  - Rental Insurance for multifamily dwellers
  - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Oldham County coordinates with Red Cross and its own first responder agencies to provide education to the community, schools, and citizens on disaster preparation.
- Oldham County uses social media, internet, local media, and radio to disseminate information to the community about disasters

<u>Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.</u>

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Educational Programs regarding flooding
  - Coordinating efforts with:
    - Division of Water
    - FEMA

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Oldham County coordinates with Oldham County Public Schools to educate students on flooding, tornado and levee failure disasters and what to do in such emergencies.

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Update

- Oldham County has developed and instituted a route prioritization plan for the county for the purposes of evacuation.
- Oldham County coordinates with Oldham County Public Schools and the Transit Authority of the River City (TARC) to provide transportation to evacuees.
- Oldham County maintains and reviews an Emergency Operations Plan.

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

Update

- Oldham County offers rental insurance through various businesses in the community, however there is no mandate.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $240,000 at $40,000 per county
Funding Methods: Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Update

- Oldham County employs a GIS staff and works with other offices such as the PVA, KIPDA, Planning and Development to assess important geographical information.

Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $50,000 - $80,000 per county
Funding Methods: State Division of Water

Update

- Oldham County has conducted a flood insurance study and is currently working on updating maps for the county.

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $5,000 per county
Funding Methods: CERT Grant

Update

- Oldham County offers monthly volunteer trainings for radio communications, including hand held operators.
- Oldham County coordinates with various county agencies such as EMS, the Health Department, Fire Department and MedCorp to offer first responder trainings.
- Oldham County no longer participates in CERT.

SHELBY COUNTY

Formal Meeting Took Place with Shelby County EMA Director Paul Whitman on:

05/15/2105

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Shelby County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shelbyville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simpsonville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Shelby County Mitigation Prioritization and Benefit Review Includes the cities of Shelbyville and Simpsonville					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Easy	Medium	Medium	Medium
Develop a coordinated, interagency sustained debris removal plan	Medium	Easy	Medium	Medium	Medium
Work with utility companies to trim trees and debris away from overhead power lines	High	Easy	High	High	High
Provide Generators at Critical facilities that provide emergency services	High	Easy	High	High	High
Encourage homeowners to have backup power sources or alternate sources of heating	Medium	Easy	Medium	Medium	Medium
Direct development and installation of new critical facilities out of hazard areas	Medium	Easy	Medium	Medium	Medium
Enforce the County's NFIP flood ordinances	High	Easy	High	High	High
Educate residents of their location in the Hazard areas by providing maps and information	High	Easy	High	Medium	High
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Easy	Medium	Medium	Medium
Develop evacuation plans, policies, and procedures for all hazards	High	Easy	High	High	High
Educate residents on the availability and importance of Flood Insurance	Medium	Easy	High	High	High
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Medium	Medium	Medium	Medium	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Medium	Medium	Medium	Medium	Medium
Upgrade the emergency services communication equipment	High	Hard	High	High	High

Shelby County Action Implementation Includes the cities of Shelbyville and Simpsonville			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	Continuous
Develop a coordinated, interagency sustained debris removal plan	All City/County Departments	Low	In Progress
Work with utility companies to trim trees and debris away from overhead power lines	Emergency Mgmt, Utilities	High	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	Very High	Completed
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	High	Continuous
Direct development and installation of new critical facilities out of hazard areas	Planning and Zoning	Medium	Continuous
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	Medium	Continuous
Develop evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	Continuous
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	Medium	Continuous
Create a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Medium	Completed
Create a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Medium	Continuous
Upgrade the emergency services communication equipment	Fiscal Court, Mayor, Emergency Mgmt	High	Continuous

	Floodplain Mgmt. Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Shelby County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Shelbyville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Simpsonville, City of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization.
- Transportation for evacuees (those rendered immobile as a result of the disaster).

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Flood, Severe Winter Storm, Tornado
Estimated Costs:	$50,000-$100,000 annually
Funding Method(s):	Local Funds, Prevention Grants, Natural Resources Grants

Update

- Shelby County follows State Roadway Prioritization Plan for road clearings including long term closure plans.
- Shelby County works with State on new bridge design.
- Shelby County does annual reviews of bridges, culverts and roadways within the floodplain.
- Shelby County maintains a route prioritization plan in case of emergencies.
- Shelby County uses transportation for evacuees by contracting with school busses from Shelby and Jefferson County Public Schools and assistance from Transit Authority of River City (TARC).

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$50,000 annually
Funding Method(s):	Local Utility Company funds, Disaster Funding, Local funds

Update

- Shelby County works with Louisville Gas & Electric (LG&E) and Kentucky Utilities (KU) for as needed clearance of power lines.
- Shelby County works with all new subdivisions and advises for subdivision builders in regards to hazard mitigation.

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings

Jurisdiction(s): All Jurisdictions
Hazard(s) Mitigated: Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs: $350,000
Funding Method(s) Emergency Service Grants, Local funds

Update

- Shelby County has provided 8 generators in county facilities since the 2011 KIPDA Regional Hazard Mitigation Plan.
  - Bagdad Fire Department
  - Waddy Fire Department
  - E60 Fire Department, city of Shelbyville
  - Seattle's Gym, Shelbyville
  - City of Simpsonville City Building
  - Mt. Edon #2 Fire Department
  - Shelby County EMS Station
  - Shelby County Judge Executive Office

<u>Objective 1.3 Reduce the number of critical facilities in hazard areas.</u>

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction

Jurisdictions: All Jurisdictions
Hazards Mitigated: Winter Storm, Tornado, Flood
Estimated Costs: None
Funding Methods: N/A

Update

- Shelby County coordinates all construction with Planning and Zoning, including school site construction.

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: $150,000
Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

Update

- Shelby County has repaired Guist Creek Dam, Lake Shelby Dam, Mary Ross Lake Dam since the 2011 KIPDA Regional Hazard Mitigation Plan.

<u>Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.</u>

Mitigation Implementation Measure(s)

- Drainage Reviews for Stormwater Management Plan

Jurisdictions: Cities of Shepherdsville, Shelbyville, Mount Washington; Bullitt, Oldham, and Shelby Counties
Hazards Mitigated: Flood
Estimated Costs: $50,000 - $70,000
Funding Methods: Local Funds

Update

- Shelby County conducts drainage reviews as part of its storm water management plan.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Identify clean water source

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Shelby County has placed ordinances in regards to new construction which require water retention basins.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Inclusion in NFIP program for cities

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Wildfire, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Shelby County reviews Floodplain management requirements and employs a Floodplain Coordinator.
- The Floodplain Coordinator is the head of Planning and Zoning for Shelby County and conducts trainings.
- All development in Shelby County must go through the Planning and Zoning, which discourages building in dry heavily forested areas.
- Shelby County Planning and Zoning advises subdivision builders to utilize culverts and require retention basins in new developments to aid with water flow and prevent flooding.
- All of Shelby County's cities participate in the Nation Flood Insurance Program.

Mitigation Implementation Measure(s)

- Hydraulics Plan requirements for new development submissions.

Jurisdictions: Bullitt, Oldham, Shelby, and Spencer
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Shelby County Planning and Zoning advises subdivision builders to implement a hydraulics plan when constructing new subdivisions.

Mitigation Implementation Measure(s)

- Repetitive Loss home buyout program

Jurisdictions:	All Jurisdictions except Henry County and cities located within
Hazards Mitigated:	Flood
Estimated Costs:	$100,000 - $300,000 depending on number of homes
Funding Methods:	FEMA HMGP funds

Update

- Shelby County participates in the Repetitive Loss and the Severe Repetitive Loss home buyout program.

Objective 2.2 Improve the resistance of structures in the community against natural hazards.

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornado, Flood, Severe Storm
Estimated Costs:	$50,000
Funding Methods:	State Emergency Management Grants, Local Funds

Update

- Shelby County maintains multiple county-wide shelters with annual reviews.
- Shelby County coordinates with the Red Cross for all shelter activities.

Objective 2.3 Coordinate service delivery to vulnerable members of the community

Mitigation Implementation Measure(s)

- Implement the KIPDA Disaster Preparedness Plan

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local Funds

Update

- Shelby County passed an ordinance implementing the KIPDA Disaster Preparedness Plan.

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Wildfires, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Shelby County reviews Floodplain management requirements and employs a Floodplain Coordinator.
- All of Shelby County's cities participate in the Nation Flood Insurance Program.
- Shelby County conducts trainings with other departments to ensure floodplain compliance.
- Shelby County Planning and Zoning requires subdivision builders to consider hazard mitigation in new development by requiring various ordinances from underground power lines, to building retention basins for flooding.

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Tornado, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- All development in Shelby County must go through Planning and Zoning.
- Shelby County Planning and Zoning requires subdivision builders to consider hazard mitigation in new development by requiring various ordinances from underground power lines, to building retention basins for flooding.

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

<u>Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.</u>

Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
  - Rental Insurance for multifamily dwellers
  - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Shelby County coordinates with Red Cross and its own first responder agencies to provide education to the community, schools, and citizens on disaster preparation.
- Shelby County uses social media, internet, local media, and radio to disseminate information to the community about disasters

<u>Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.</u>

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Educational Programs regarding flooding
  - Coordinating efforts with:
    - Division of Water
    - FEMA

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood, Tornado, Dam/Levee Failure
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Shelby County coordinates with Shelby County Public Schools to educate students on flooding, tornado and levee failure disasters and what to do in such emergencies.
- Shelby County conducts community outreach to train citizens on the impact of disasters and disaster preparedness.

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Update

- Shelby County has developed and instituted a route prioritization plan for the county for the purposes of evacuation.
- Shelby County coordinates with Shelby County Public Schools and the Transit Authority of the River City (TARC) to provide transportation to evacuees.
- Shelby County maintains and reviews an Emergency Operations Plan.

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

Update

- Shelby County offers rental insurance through various businesses in the community, however there is no mandate.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$240,000 at $40,000 per county
Funding Methods:	Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Update

- Shelby County employs a GIS staff and works with other offices such as the PVA, KIPDA, Planning and Zoning to assess important geographical information.

Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$50,000 - $80,000 per county
Funding Methods:	State Division of Water

Update

- Shelby County has conducted a flood insurance study and has completed updating maps for the county while working with Planning and Zoning, Property Value Administrator (PVA), and 911 dispatching.

Mitigation Implementation Measure(s)

- Mapping of City of Shelbyville's 100yr. Floodplain

Jurisdictions: City of Shelbyville
Hazards Mitigated: All
Estimated Costs: $50,000
Funding Methods: FEMA and State Division of Water funds

Update

- Shelby County has completed a mapping of Shelbyville's 100 year floodplain.

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $5,000 per county
Funding Methods: CERT Grant

Update

- Shelby County offers volunteer trainings for radio communications and has upgraded their radio communications.
- Shelby County coordinates with various county agencies such as EMS, the Health Department, and the Fire Department to offer first responder trainings.
- Shelby County no longer participates in CERT.

APPENDIX D

SPENCER COUNTY

Formal Meeting Took Place with Spencer County EMA Director Jeff Coulter on:

05/26/2105

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Spencer County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Taylorsville, City of			Yes	Yes	Yes	Yes			Yes	Yes		No	Yes

Spencer County Mitigation Prioritization and Benefit Review
Includes the city of Taylorsville

Action	Effect on Overall Risk to Life and Property	Ease of Implementation	Community Support	Cost/ Benefit	Overall Priority
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Hard	Low	Medium	Low
Develop a coordinated, interagency sustained debris removal plan	Low	Medium	Low	Medium	Low
Work with utility companies to trim trees and debris away from overhead power lines	Medium	Easy	Medium	High	Low
Provide Generators at Critical facilities that provide emergency services	Medium	Hard	Medium	High	Low
Encourage homeowners to have backup power sources or alternate sources of heating	Low	Medium	Medium	Medium	Low
Direct development and installation of new critical facilities out of hazard areas	Low	Medium	Medium	Medium	Low
Enforce the County's NFIP flood ordinances	High	Medium	Low	High	High
Educate residents of their location in the Hazard areas by providing maps and information	Low	Easy	Medium	Medium	High
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Easy	Medium	Medium	Medium
Develop evacuation plans, policies, and procedures for all hazards	High	Easy	Medium	Medium	High
Educate residents on the availability and importance of Flood Insurance	Medium	Easy	Low	Medium	High
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Medium	Medium	Low	High	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Medium	Medium	Medium	Medium	Medium
Upgrade the emergency services communication equipment	High	Hard	Medium	High	High

Spencer County Action Implementation Includes the city of Taylorsville			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	As Needed
Develop a coordinated, interagency sustained debris removal plan	All City/County Departments	Low	Completed
Work with utility companies to trim trees and debris away from overhead power lines	Emergency Mgmt, Utilities	Low	As Needed
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	Low	3-5 Years
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Low	Continuous
Direct development and installation of new critical facilities out of hazard areas	Planning and Zoning	Low	Continuous
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	High	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	High	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	Medium	Continuous
Develop evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	2 Years
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	High	Continuous
Create a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Medium	Continuous
Create a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Medium	Continuous
Upgrade the emergency services communication equipment	Fiscal Court, Mayor, Emergency Mgmt	High	Completed

APPENDIX D

	Floodplain Mgmt. Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Spencer County Fiscal Court	Yes	No	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Taylorsville, City of	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization.
- Transportation for evacuees (those rendered immobile as a result of the disaster).

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Flood, Severe Winter Storm, Tornado
Estimated Costs:	$50,000-$100,000 annually
Funding Method(s):	Local Funds, Prevention Grants, Natural Resources Grants

Update

- Spencer County follows State Roadway Prioritization Plan for road clearings including long term closure plans.
- Spencer County works with State on new bridge design.
- Spencer County does annual reviews of bridges, culverts and roadways within the floodplain.
- Spencer County maintains a route prioritization plan in case of emergencies.
- Shelby County uses transportation for evacuees by contracting with school busses from Spencer and Jefferson County Public Schools and assistance from Transit Authority of River City (TARC). Spencer County also coordinates with nursing homes in the area and maintains an evacuation plan for nursing homes.

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$50,000 annually
Funding Method(s):	Local Utility Company funds, Disaster Funding, Local funds

Update

- Spencer County works with Louisville Gas & Electric (LG&E) and Kentucky Utilities (KU) for as needed clearance of power lines.
- Shelby County works with all new subdivisions and advises for subdivision builders in regards to hazard mitigation, specifically, it has become common practice in Spencer County to have utility lines placed underground.

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$350,000
Funding Method(s)	Emergency Service Grants, Local funds

Update

- Spencer County has not added any new generators to public buildings in the past 5 years, however, many public buildings, including shelters and Emergency Operation Centers do possess generators.

<u>Objective 1.3 Reduce the number of critical facilities in hazard areas.</u>

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Winter Storm, Tornado, Flood
Estimated Costs:	None
Funding Methods:	N/A

Update

- Spencer County coordinates all construction with Planning and Zoning, including school site construction.

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood
Estimated Costs:	$150,000

Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

Update

- Spencer County has recertified the Flood Wall at Salt River and Brashear's Creek Dam in compliance with the 2011 KIPDA Regional Hazard Mitigation Plan.

Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Identify clean water source

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Spencer County has placed ordinances in regards to new construction which require water retention basins.
- Spencer County coordinates with Taylorsville Water District, Metropolitan Sewer District (MSD), and Louisville Water Company for clean water sources.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Inclusion in NFIP program for cities

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfire, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Spencer County reviews Floodplain management requirements and employs a Floodplain Commissioner.
- The Floodplain Commissioner is the head of the Floodwall Commission for Spencer County and conducts trainings.
- All development in Spencer County must go through the Planning and Zoning, which discourages building in dry heavily forested areas. Also, the Fire Department coordinates with Planning and Zoning for which areas are to be impacted by dry, heavily forested areas.
- Spencer County Planning and Zoning advise subdivision builders to utilize culverts and require retention basins in new developments to aid with water flow and prevent flooding.
- Spencer County and the city of Taylorsville participate in the Nation Flood Insurance Program.

Mitigation Implementation Measure(s)

- Hydraulics Plan requirements for new development submissions.

Jurisdictions:	Bullitt, Oldham, Shelby, and Spencer
Hazards Mitigated:	Flood

Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Spencer County Planning and Zoning regulate subdivision builders to implement a hydraulics plan when constructing new subdivisions through county ordinances.

Mitigation Implementation Measure(s)

- Repetitive Loss home buyout program

Jurisdictions: All Jurisdictions except Henry County and cities located within
Hazards Mitigated: Flood
Estimated Costs: $100,000 - $300,000 depending on number of homes
Funding Methods: FEMA HMGP funds

Update

- Spencer County participates in the Repetitive Loss and the Severe Repetitive Loss home buyout program.

Objective 2.2 Improve the resistance of structures in the community against natural hazards.

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters

Jurisdictions: All Jurisdictions
Hazards Mitigated: Tornado, Flood, Severe Storm
Estimated Costs: $50,000
Funding Methods: State Emergency Management Grants, Local Funds

Update

- Spencer County maintains multiple county-wide shelters with annual reviews.
- Spencer County coordinates with the Red Cross for all shelter activities and local churches during hazard and emergency events.

Objective 2.3 Coordinate service delivery to vulnerable members of the community

Mitigation Implementation Measure(s)

- Implement the KIPDA Disaster Preparedness Plan

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local Funds

Update

- Spencer County passed an ordinance implementing the KIPDA Disaster Preparedness Plan.

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfires, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Spencer County reviews Floodplain management requirements and employs a Floodplain Commissioner.
- Spencer County and the city of Taylorsville participate in the Nation Flood Insurance Program.
- The Floodplain Commissioner is the head of the Floodwall Commission for Spencer County and conducts trainings.
- Spencer County Planning and Zoning advise subdivision builders to utilize culverts and require retention basins in new developments to aid with water flow and prevent flooding and incorporate hazard mitigation in their projects.

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses

Funding Methods: Local funds

Update

- All development in Spencer County must go through Planning and Zoning.
- Spencer County Planning and Zoning requires subdivision builders to consider hazard mitigation in new development by requiring various ordinances from underground power lines, to building retention basins for flooding.

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

<u>Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.</u>

Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
    - Rental Insurance for multifamily dwellers
    - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Spencer County coordinates with Red Cross and its own first responder agencies to provide education to the community, schools, and citizens on disaster preparation.
- Spencer County uses social media, internet, local media, and radio to disseminate information to the community about disasters

<u>Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.</u>

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Educational Programs regarding flooding
    - Coordinating efforts with:
        - Division of Water
        - FEMA

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Spencer County coordinates with Shelby County Public Schools to educate students on flooding, tornado and levee failure disasters and what to do in such emergencies.
- Spencer County conducts community outreach to train citizens on the impact of disasters and disaster preparedness.

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Update

- Spencer County maintains a route prioritization plan in case of emergencies.
- Shelby County uses transportation for evacuees by contracting with school busses from Spencer and Jefferson County Public Schools and assistance from Transit Authority of River City (TARC). Spencer County also coordinates with nursing homes in the area and maintains an evacuation plan for nursing homes.
- Spencer County conducts a bi-annual Emergency Operation Plan review. It is currently being reviewed.

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

Update

- Spencer County offers rental insurance through various businesses in the community, however there is no mandate.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $240,000 at $40,000 per county
Funding Methods: Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Update

- Spencer County employs a GIS staff member in Planning and Zoning and works with other offices such as the PVA, KIPDA, Planning and Zoning to assess important geographical information.

Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update

Jurisdictions: All Jurisdictions
Hazards Mitigated: All
Estimated Costs: $50,000 - $80,000 per county
Funding Methods: State Division of Water

Update

- Spencer County conducted a Floodwall Study through the Spencer County Floodwall Commission.

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$5,000 per county
Funding Methods:	CERT Grant

Update

- Spencer County offers volunteer trainings for radio communications and has upgraded their radio communications.
- Spencer County coordinates with various county agencies such as EMS, the Health Department, and the Fire Department to offer first responder trainings.
- Spencer County no longer participates in CERT.

APPENDIX D

TRIMBLE COUNTY

Formal Meeting Took Place with Trimble County EMA Director Ronnie McCane on:

05/07/2105

	Board of Education (County wide)	Building Inspections	Clerk of Courts	Emergency Management	County/City Treasurer	Mayor/County Judge Executive	Health Department	Road Department	Sheriff Department	County/City Police Department	PVA (Tax Assessment)	Social Services	Public Works
Trimble County Fiscal Court	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Bedford, City of			No	Yes	Yes	Yes			Yes	No		Yes	Yes
Milton, City of			No	Yes	Yes	Yes			Yes	No		Yes	Yes

Trimble County Mitigation Prioritization and Benefit Review Includes the cities of Bedford and Milton					
Action	**Effect on Overall Risk to Life and Property**	**Ease of Implementation**	**Community Support**	**Cost/ Benefit**	**Overall Priority**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Medium	Medium	Low	Medium	Low
Develop a coordinated, interagency sustained debris removal plan	Medium	Medium	Low	Medium	Medium
Work with utility companies to trim trees and debris away from overhead power lines	High	Medium	Medium	Medium	Medium
Provide Generators at Critical facilities that provide emergency services	High	Hard	Medium	High	Medium
Encourage homeowners to have backup power sources or alternate sources of heating	Medium	Medium	Medium	High	Medium
Direct development and installation of new critical facilities out of hazard areas	Medium	Medium	Medium	High	Medium
Enforce the County's NFIP flood ordinances	High	Medium	Low	Medium	Low
Educate residents of their location in the Hazard areas by providing maps and information	High	Medium	Medium	Medium	Medium
Promote the use of NOAA 'all hazards' radios for early warning and post event information	High	Medium	Medium	Medium	High
Develop evacuation plans, policies, and procedures for all hazards	High	Easy	Medium	High	High
Educate residents on the availability and importance of Flood Insurance	Medium	Medium	Medium	High	Medium
Create a GIS database inventory of all critical facilities and structures in each hazard area	Medium	Medium	Medium	Medium	Medium
Identify and map bridges that need to be elevated to prevent damage and flooding	Low	Easy	Medium	Medium	Medium
Create a GIS database inventory of repetitive loss structures in each flood hazard area	Low	Easy	Medium	Medium	Medium
Upgrade the emergency services communication equipment	High	Medium	Low	High	Medium

Trimble County Action Implementation Includes the cities of Bedford and Milton			
Action	**Responsible Party**	**Overall Priority from Benefit Review**	**Implementation Timeline**
Remove Debris from Streams that cause damages to bridge and transportation facilities	Emergency Mgmt, Solid Waste	Low	Continuous
Develop a coordinated, interagency sustained debris removal plan	All City/County Departments	Medium	Continuous
Work with utility companies to trim trees and debris away from overhead power lines	Emergency Mgmt, Utilities	Medium	Continuous
Provide Generators at Critical facilities that provide emergency services	Fiscal Court, Emergency Mgmt	Medium	3-5 Years
Encourage homeowners to have backup power sources or alternate sources of heating	Emergency Mgmt	Medium	Annually
Direct development and installation of new critical facilities out of hazard areas	Planning and Zoning	Medium	As-Needed
Enforce the County's NFIP flood ordinances	Emergency Mgmt, Planning and zoning	Low	Continuous
Educate residents of their location in the Hazard areas by providing maps and information	Emergency Mgmt	Medium	Continuous
Promote the use of NOAA 'all hazards' radios for early warning and post event information	Emergency Mgmt	High	Continuous
Develop evacuation plans, policies, and procedures for all hazards	All Departments, Emergency Mgmt	High	Completed
Educate residents on the availability and importance of Flood Insurance	Planning and Zoning, Emergency Mgmt	Medium	Continuous
Create a GIS database inventory of all critical facilities and structures in each hazard area	PVA, KIPDA, Emergency Mgmt.	Medium	Continuous
Identify and map bridges that need to be elevated to prevent damage and flooding	KYTC, KIPDA, Planning/Zoning	Medium	3-5 Years
Create a GIS database inventory of repetitive loss structures in each flood hazard area	DOW, KIPDA	Medium	Continuous
Upgrade the emergency services communication equipment	Fiscal Court, Mayor, Emergency Mgmt	High	As-Needed

APPENDIX D

	Floodplain Mgmt. Ordinance(s)	CRS Eligible Community	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Codes	Stormwater Management Plan	CERT Teams	NWS Storm Ready Program	Local Economic Development Council	Regional Development Agency
Trimble County Fiscal Court	Yes	No	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Bedford, City of	Yes	No	No	No	No	Yes	No	No	Yes	Yes	Yes
Milton, City of	Yes	No	No	No	No	Yes	No	No	Yes	Yes	Yes

GOAL 1: TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD

Objective 1.1 Minimize the disruption to and enhance rapid restoration of transportation systems.

Mitigation Implementation Measure(s)

- Roadway clearing prioritization based on state highway classification
- Requiring new standards for bridge design and construction once bridge has been damaged based on state Transportation Cabinet standards
- Ingress/Egress route prioritization.
- Transportation for evacuees (those rendered immobile as a result of the disaster).

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Flood, Severe Winter Storm, Tornado
Estimated Costs:	$50,000-$100,000 annually
Funding Method(s):	Local Funds, Prevention Grants, Natural Resource Grant

Update

- Trimble County follows State Roadway Prioritization Plan for road clearings including long term closure plans.
- Trimble County works with State on new bridge design.
- Trimble County raised sides of bridge on Joyce Mill Rd. Bridge in Trimble County and raised elevation on State Rd. KY625 in Trimble County.
- Trimble County does annual reviews of bridges, culverts and roadways within the floodplain.
- Trimble County maintains a route prioritization plan in case of emergencies.
- Trimble County uses transportation for evacuees by contracting with school busses from Trimble County Public Schools.

Objective 1.2 minimizes the disruption and enhances rapid restoration of utility systems.

Mitigation Implementation Measure(s)

- Coordination with Utilities with power line clearance
- Require underground utility line placement for new subdivisions

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$50,000 annually
Funding Method(s): L	Local Utility Company funds, Disaster Funding, Local funds

Update

- Trimble County works with Louisville Gas & Electric (LG&E) for as needed clearance of power lines.
- Trimble County works with all new subdivisions and advises for subdivision builders in regards to hazard mitigation.

Mitigation Implementation Measure(s)

- Provide emergency generators for public buildings

Jurisdiction(s):	All Jurisdictions
Hazard(s) Mitigated:	Severe Winter Storm, Severe Storm, and Tornado
Estimated Costs:	$350,000
Funding Method(s)	Emergency Service Grants, Local funds

Update

- Trimble County has provided 2 generators to public building since the 2011 KIPDA Regional Hazard Mitigation Plan.
    - Trimble County Extension Service Office, 42 High Country Lane, Trimble County
    - EMS Building, Bedford, Trimble County

Objective 1.3 Reduce the number of critical facilities in hazard areas.

Mitigation Implementation Measure(s)

- Coordination with State on School site location and construction

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Winter Storm, Tornado, Flood
Estimated Costs:	None
Funding Methods:	N/A

Update

- Trimble County coordinates with new the state of Kentucky on school site construction.

Mitigation Implementation Measure(s)

- Repair and maintain existing dams, levees, and floodwalls in applicable jurisdictions

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood

Estimated Costs: $150,000
Funding Methods: HMGP funding, U.S. Army Corps of Engineer funds

Update

- Trimble County EMA works with the Army Corp of Engineers to repair and maintain existing dams, levees, and floodwalls.

Objective 1.4 Minimize the damages to groundwater and the environment as a result of damages caused by hazards.

Mitigation Implementation Measure(s)

- Drainage Reviews for Stormwater Management Plan

Jurisdictions: Cities of Shepherdsville, Shelbyville, Mount Washington; Bullitt, Oldham, and Shelby Counties
Hazards Mitigated: Flood
Estimated Costs: $50,000 - $70,000
Funding Methods: Local Funds

Update

- Trimble County conducts drainage reviews.
    - Trimble County EMA worked with the City of Bedford in its Sewage Treatment Plan construction.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Identify clean water source

Jurisdictions: All Jurisdictions
Hazards Mitigated: Flood
Estimated Costs: Minimal Operating Expenses
Funding Methods: Local funds

Update

- Trimble County does not mandate the construction of more watersheds, however, it does coordinate with builders for new subdivision construction when applicable.
- Trimble County EMA has identified the watershed of the Kentucky River as a clean source of water.

GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.

Objective 2.1 Utilize available mitigation measures to reduce the number of vulnerable structures in the hazard areas.

Mitigation Implementation Measures

- Review Floodplain Management requirements
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Discourage development near dry heavily forested areas
- Require construction for more watersheds: Slow the process of flooding
- Inclusion in NFIP program for cities

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfire, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Trimble County reviews Floodplain management requirements and employs a Floodplain Coordinator.
- The Floodplain Coordinator and Trimble County EMA conduct trainings for administering the floodplain ordinance.
- All development in Trimble County is discouraged to build in dry heavily forested areas.
- Trimble County EMA advises subdivision builders to utilize culverts and require retention basins in new developments to aid with water flow and prevent flooding.
- All of Trimble County's cities participate in the Nation Flood Insurance Program.

Mitigation Implementation Measure(s)

- Hydraulics Plan requirements for new development submissions.

Jurisdictions:	Bullitt, Oldham, Shelby, and Spencer
Hazards Mitigated:	Flood
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Trimble County did not participate in this objective.

Mitigation Implementation Measure(s)

- Repetitive Loss home buyout program

Jurisdictions:	All Jurisdictions except Henry County and cities located within
Hazards Mitigated:	Flood
Estimated Costs:	\$100,000 - \$300,000 depending on number of homes
Funding Methods:	FEMA HMGP funds

Update

- Trimble County participates in the Repetitive Loss home buyout program.

<u>Objective 2.2 Improve the resistance of structures in the community against natural hazards.</u>

Mitigation Implementation Measure(s)

- Review Community Shelters (location and construction)
- Wind Resistance study for buildings to be used as emergency shelters

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornado, Flood, Severe Storm
Estimated Costs:	\$50,000
Funding Methods:	State Emergency Management Grants, Local Funds

Update

- Trimble County reviews shelters within the county.
    - Bedford Elementary School and the Community center in Bedford act as community shelters for the county.
- No wind studies have been performed due to lack of funding.

<u>Objective 2.3 Coordinate service delivery to vulnerable members of the community</u>

Mitigation Implementation Measure(s)
- Implement the KIPDA Disaster Preparedness Plan

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Tornadoes, Flood, Severe Storm, and Winter Storm
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local Funds

Update

- Trimble County Fiscal Court adopted the KIPDA Disaster Preparedness Plan.

GOAL 3: ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.

Objective 3.1 Enforce and enhance existing policies and authorities.

Mitigation Implementation Measure(s)

- Review Floodplain Management requirements
- Inclusion in NFIP program for cities
- Floodplain Management Training for planning and zoning staff, building codes enforcement officers, and all others involved in administering the local floodplain ordinance
- Include hazard mitigation as a component to consider subdivision regulation decisions

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Wildfires, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Trimble County reviews Floodplain management requirements and employs a Floodplain Coordinator.
- All of Trimble County's cities participate in the Nation Flood Insurance Program.
- The Floodplain Coordinator and Trimble County EMA conduct trainings for administering the floodplain ordinance.
- Trimble County EMA advises subdivision builders to consider hazard mitigation when building and advises Trimble County Fiscal Court when adopting building ordinances.

Objective 3.2 Revise existing and develop new regulations that promote mitigation activities.

Mitigation Implementation Measure(s)

- Require construction for more watersheds: Slow the process of flooding
- Hydraulics Plan requirements for new development submissions.
- Requirement for new homes to have basements

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- While no new development has occurred in Trimble County since the 2011 KIPDA Regional Hazard Mitigation Plan, Trimble County EMA makes inputs into future planning efforts regarding hazard mitigation.

GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.

Objective 4.1 Educate the Public about hazards prevalent in their jurisdiction.

Mitigation Implementation Measure(s)

- Community education for Disaster Preparation
  - Rental Insurance for multifamily dwellers
  - Emergency Supply Kits - Red Cross
- Community outreach information gathering of flood incidents, as well as damage
- Utilize the local media to warn of upcoming disasters, as well as disaster preparation

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Trimble County conducts community outreach to train citizens on the impact of disasters and disaster preparedness through Local Planning Meetings, website, weather training, and utilizes the local media.

Objective 4.2 Increase Public understanding, support and awareness for Hazard Mitigation activities.

Mitigation Implementation Measure(s)

- Coordinate educational programs with the local school district
- Educational Programs regarding flooding
  - Coordinating efforts with:
    - Division of Water
    - FEMA

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Dam/Levee Failure
Estimated Costs:	Minimal Operating Expenses
Funding Methods:	Local funds

Update

- Trimble County coordinates with Trimble County Public Schools to educate students on flooding, tornado and levee failure disasters and what to do in such emergencies.

Objective 4.3 Develop, maintain and publicize evacuation routes.

Mitigation Implementation Measure(s)

- Ingress/Egress route prioritization for the purposes of evacuation.
- Transportation for evacuees (those rendered immobile as a result of the disaster).
- Emergency Operation Plan review

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm, Severe Winter Storm
Estimated Costs:	$20,000
Funding Methods:	HMGP Funds, Local Funds

Update

- Trimble County follows State Roadway Prioritization Plan for road clearings including long term closure plans.
- Trimble County maintains a route prioritization plan in case of emergencies.
- Trimble County uses transportation for evacuees by contracting with school busses from Trimble County Public Schools.
- Trimble County annually reviews its Emergency Operation Plan.

Objective 4.4 Educate citizens about the availability of insurance options.

Mitigation Implementation Measure(s)

- Provide Rental Insurance information for multifamily dwellers

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	Flood, Tornado, Severe Storm
Estimated Costs:	None
Funding Methods:	Red Cross volunteers

Update

- Trimble County offers rental insurance through various businesses in the community, however there is no mandate.

GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.

<u>Objective 5.1 Improve each jurisdictions capability to identify and map vulnerable structures and critical facilities.</u>

Mitigation Implementation Measure(s)

- Geographic Information Systems (G.I.S.) Mapping – countywide
- Coordinate efforts with the PVA offices, KIPDA GIS Staff, Floodplain Administrators and local wastewater utilities to collect geographic information of vulnerable structures and critical facilities.

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$240,000 at $40,000 per county
Funding Methods:	Funds from a variety of sources including: KY Transportation Cabinet, Federal Highway Administration, FEMA HMGP funds

Update

- Trimble County works with other offices such as the PVA, KIPDA, and the Kentucky State Police to assess important geographical information.

<u>Objective 5.2 Reduce vulnerability of future development by creating databases that identify risk areas and loss potentials in order to mitigate during development.</u>

Mitigation Implementation Measure(s)

- Flood Insurance Study and Map Update

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$50,000 - $80,000 per county
Funding Methods:	State Division of Water

Update

- Trimble County conducted a floodplain update in 2012.

Mitigation Implementation Measure(s)

GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS.

Objective 6.1 Train volunteers to support and implement mitigation activities that will enhance the response capabilities of the local jurisdictions.

Mitigation Implementation Measure(s)

- Communication (Radio) training
- Emergency First Responder Training
- Citizen Corps of volunteers to help disperse education materials on natural disasters and provide damage assessment in the event of a storm

Jurisdictions:	All Jurisdictions
Hazards Mitigated:	All
Estimated Costs:	$5,000 per county
Funding Methods:	CERT Grant

Update

- Trimble County offers volunteer trainings for radio communications and has upgraded their radio communications.
- Trimble County coordinates with various county agencies such as EMS, the Health Department, and the Fire Department to offer first responder trainings.
- Trimble County no longer participates in CERT.

MINUTES

KIPDA REGIONAL HAZARD MITIGATION PLAN UPDATE

KIPDA Burke Room

11520 Commonwealth Drive

Louisville, KY 40299

March 20, 2015

ATTENDEE	REPRESENTING
Rob Rothenburger	Judge Executive, Shelby County
Melanie Roberts	Judge Executive, Bullitt County
John Riley	Judge Executive, Spencer County
Jody Rucker	EMA Director, Henry County
Kevin Nuss	EMA Director, Oldham County
Paul Whitman	EMA Director, Shelby County
Michael Phillips	EMA Director, Bullitt County
Rick Bobo	Area Manager, KYEM
Nick Grinstead	Planning Grants Manager, UK-HMGP
Eric Dennison	KIPDA
Jarrett Haley	KIPDA
Adam Forseth	KIPDA

CALL TO ORDER

Mr. Dennison called the meeting to order at 11:30 a.m.

INTRODUCTIONS

Mr. Dennison bypassed the introduction.

IMPORTANCE AND CHANGES

Mr. Grinstead presented the changes for the third Hazard Mitigation Plan and what FEMA will be looking for from KIPDA. Things FEMA will be looking for include breadth of participation, project lists, and validation of risk assessment. FEMA is looking for new projects and wants every community to have a list of projects that they can fund and that can be funded through other grants as well. Part of KIPDA's role will be to identify capacities to funds projects. KIPDA will also be responsible for conducting a risk assessment and validating the risk assessment with examples, or narratives, of major disasters. This will provide assistance in funding mitigation goals.

Mr. Dennison advised he would like to have the mitigation plan finished by December so that it can be sent to Mr. Grinstead for review and sent back by January. Once this is completed, the CRS plan can be updated. More research will need to be conducted to determine how KIPDA will be able to assist counties with developing CRS plans.

Mr. Dennison clarified that CRS is a way to reduce costs and reduce flood plan insurance. There are a lot of reasons to want to reduce costs. There is a list of different things each community can do to acquire points. Once those points are in place, there is a scale system which will show each county's position. There is a 5% reduction in rates for each class completed.

NATIONAL DISASTER RESILIENCY COMPETITION

Mr. Dennison discussed the National Disaster Resiliency Competition. This is a competition that HUD put out for the community development block grant. Phase one consists of the application to show that there is unmet need in the region so that we can later apply in phase two for something specific.

PRESENTATION OF PLANNING PROCESS

Mr. Dennison presented the planning process. He explained hazard mitigation and hazard mitigation planning. The purpose of hazard mitigation planning is to mitigate damage and save lives in our local communities. Hazard mitigation planning is also cost effective and puts communities in better positions to apply for and receive grant funding. The current Hazard Mitigation plan expires on June 21, 2016. The FEMA required 5 year plan update needs to be reviewed, revised, and submitted for State and FEMA approvals by April 21, 2016.

The Risk Assessment is in place to identify hazards, profile hazards, and assess vulnerability. The Hazard Vulnerability Score = Exposure X Risk. CHAMPS (Community Hazard Assessment and Mitigation Planning System) is a disaster management system that is accessible across multiple levels and sectors for inventorying assets, conducting assessments, developing plans, applying for funding, and managing projects. This is basically an electronic grant system which will also be pushed in this plan.

REVIEW AND APPROVAL OF BYLAWS

Mr. Dennison requested approval for the bylaws. Judge Riley moved to accept the bylaws. Judge Rothenburger seconded. Motion carried unanimously on a voice vote.

REGIONAL COMMITTEE STRUCTURE/ELECTION OF OFFICERS

Mr. Dennison requested a Chairman and Vice Chairman be selected. It was decided that Judge Rothenburger will be Chairman and Mr. Phillips will be Vice Chairman. Judge Riley moved to accept the bylaws. Judge Roberts seconded. Motion carried unanimously on a voice vote.

COUNTY SUBCOMMITTEE STRUCTURE

Mr. Dennison discussed the county subcommittee structure. He advised that information will be open to the public and he would like to get all stake holders from different counties involved. The process will be similar to what has been done in the past.

METHODOLOGY APPROVAL

Mr. Dennison requested action for the Hazard Vulnerability Score. Mr. Whitman moved to accept the methodology. Mr. Nuss seconded. Motion carried unanimously on a voice vote.

SCHEDULE OF MEETINGS

Mr. Dennison would like the Steering Committee to meet every three months through December. The group agreed to meet before each board meeting for the months of June, September, and December. Judge Roberts motioned to accept the schedule. Judge Riley seconded. Motion carried unanimously on a voice vote.

ADJOURNMENT

Judge Roberts moved the meeting be adjourned. Judge Riley seconded. Motion carried unanimously on a voice vote. The meeting was adjourned.

_______________________________________ _______________________________

Name **Date**

Shelby County Judge Executive Rob Rothenburger_

Chairman of the Regional Hazard Mitigation

Plan Committee

APPENDIX E

MINUTES

KIPDA REGIONAL HAZARD MITIGATION PLAN UPDATE

KIPDA Burke Room

11520 Commonwealth Drive

Louisville, KY 40299

July 23, 2015

ATTENDEE	**REPRESENTING**
Rob Rothenburger	Judge Executive, Shelby County
Melanie Roberts	Judge Executive, Bullitt County
John Riley	Judge Executive, Spencer County
Kevin Nuss	EMA Director, Oldham County
Paul Whitman	EMA Director, Shelby County
Michael Phillips	EMA Director, Bullitt County
Eric Dennison	KIPDA
Jarrett Haley	KIPDA
Jennifer Martinez	KIPDA
Dennis Horlander	State Representative, 40^{th} District

CALL TO ORDER

Judge Rothenburger called the meeting to order at 10:30 a.m.

INTRODUCTIONS

Attendees introduced themselves around the table.

OVERVIEW AND UPDATE OF PLAN PROGRESS

Mr. Dennison reported that this is the second meeting of the KIPDA Regional Hazard Mitigation Plan. The first meeting was in March. He gave a PowerPoint Presentation and sections of the presentation are matched with the Agenda's titles. See next page. It should be noted that Judge Rothenburger asked to include Extreme Heat/Weather to the Hazard Profile. It will be included in the updated plan.

GOALS APPROVAL

Judge Riley moved to approve the Mitigation Goals. Mike Phillips seconded. Motion carried unanimously on a voice vote.

SCHEDULE OF NEXT MEETING

Mr. Whitman moved to approve that the next meeting will be held October 22, 2015 at the KIPDA office. Judge Riley seconded. Motion carried unanimously on a voice vote.

ADJOURNMENT

Mr. Phillips moved that the meeting be adjourned. Mr. Whitman seconded. Motion carried unanimously on a voice vote. The meeting was adjourned.

____ October 22, 2015

Name **Date**

Shelby County Judge Executive Rob Rothenburger_

Chairman, Regional Hazard Mitigation

Plan Committee

APPENDIX E

MINUTES

KIPDA REGIONAL HAZARD MITIGATION

PLAN UPDATE #3

KIPDA Burke Room

11520 Commonwealth Drive

Louisville, KY 40299

October 22, 2015

ATTENDEE	**REPRESENTING**
Rob Rothenburger	Judge Executive, Shelby County
Melanie Roberts	Judge Executive, Bullitt County
John Riley	Judge Executive, Spencer County
Paul Whitman	EMA Director, Shelby County
Chris Spaulding	EMA Deputy Director, Shelby County
Rick Bobo	Area Manager, KYEM
Emily Bartee	Training Specialist, KYEM
Ronnie McCane	Director, Trimble County
George Griffith	Deputy Director, Trimble County
Chris Limpp	Emergency Manager, Spencer County
John Black	Deputy Judge, Oldham County
Jody Rucker	Emergency Manager, Henry County
Eric Dennison	KIPDA
Jarrett Haley	KIPDA
Bev Claxon	KIPDA
Adam Forseth	GIS Manager, KIPDA
Michael Clair	GIS Specialist, KIPDA

APPENDIX E

CALL TO ORDER

Judge Rothenburger called the meeting to order at 10:30 a.m.

INTRODUCTIONS

Mr. Dennison bypassed the introductions.

APPROVAL OF MINUTES

Mr. Whitman moved to approve the minutes of the March 20, 2015 and July 23, 2015 meetings of the Hazard Mitigation Plan Update. Mr. Rose seconded. Motioned carried unanimously on a voice vote.

CHAMPS PRESENTATION

Ms. Bartee, of Kentucky Emergency Management, gave a presentation on CHAMPS. CHAMPS stands for the Community Hazard Assessment and Mitigation Planning System. It consists of five modules within it. The five modules are Project, Funding, Community Profiles, Plans, and Assessment. Each module deals with that respective part of emergency management.

All of these together will build your community's resiliency as a whole.

CHAMPS is stored on the Kentucky share point site, www.kyemweb.gov . Ms. Bartee explained what the system is used for and how to use it.

MITIGATION PRESENTATION

Mr. Dennison gave a presentation on mitigation. It begins on last pages, Meeting #3

MATCH UPDATE AND FMA

Mr. Dennison reported state and local share is 25% of the funding which equals about $25,000 of in-kind match. Local match includes staff time involved. We have approximately $17,000 in match. Staff is going back out to Spencer County and Trimble County to find out what the findings were from the mitigations.

Mr. Whitman explained that any planned participation that is not funded through some other source is counted as match.

Judge Rothenburger requested that, where Forest Fires is listed as item 11 in the Hazard Profiles, it be replaced with Wild Fires. After discussion, it was decided to list it as Forest Fires/Wild Fires.

PLANNING PROCESS UPDATE

Mr. Dennison reminded the committee that FEMA wants a plan. They will ask if projects on the plan were done within the five year cycle. The planning committee has taken on part of looking at the plan for the last five years. Mr. Dennison suggested having a yearly review of the plan.

The Regional Planning Council is another vehicle as a way to monitor by incorporating in the planning mechanisms. Meetings are going to have continued public involvement.

SCHEDULE OF NEXT MEETING

The fourth meeting is where the draft of the Mitigation Plan will be submitted to the committee for editing before it is sent to FEMA. Mr. Dennison requested that it be on January 7, 2016 at 10:30 a.m. in the Burke Room. The snow make-up day is January 21.

Judge Roberts moved to approve the date of the fourth meeting as shown above. Mr. Whitman seconded. Motion carried unanimously on a voice vote.

ADJOURNMENT

Mr. Whitman moved that the meeting be adjourned. Judge Powell seconded. Motion carried unanimously on a voice vote.

____ January 7, 2016

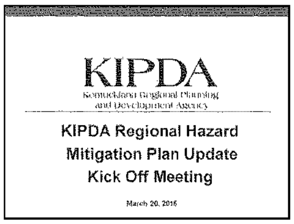
Name **Date**

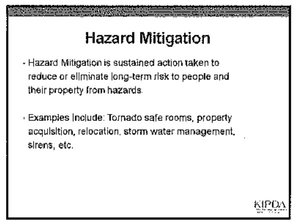
Shelby County Judge Executive Rob Rothenburger

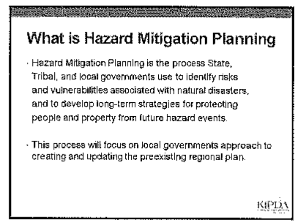
Chairman, Regional Hazard Mitigation Plan Committee

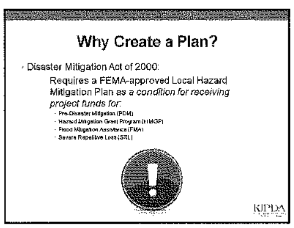
Regional Meeting #1 Presentation Material

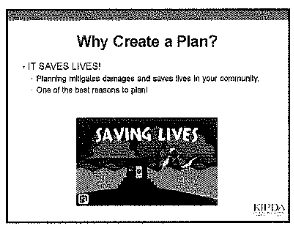
12/14/2015

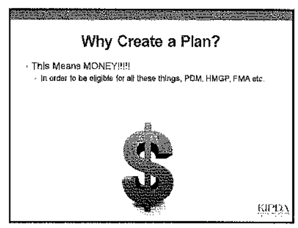


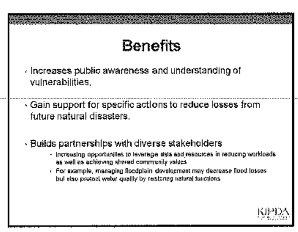


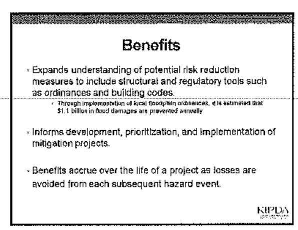


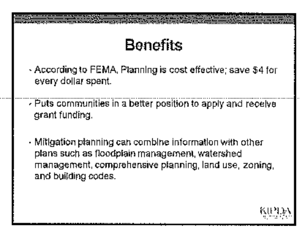












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APPENDIX E

12/14/2015

Current Hazard Mitigation Plan

- The current hazard mitigation plan approved by FEMA expires on June 21, 2016
- FEMA required five year plan update needs to be reviewed, revised, and submitted for State and FEMA approvals by April 21, 2016
- Adoption by end of 2015

KIPDA

Participants

- Bullitt County
  - Fox Chase
  - Hillview
  - Hebron Estates
  - Hunters Hollow
  - Lebanon Junction
  - Mt. Washington
  - Pioneer Village
  - Shepherdsville
- Henry County
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  - New Castle
  - Pleasureville
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KIPDA

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- Oldham County
  - Crestwood
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  - Simpsonville
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  - Bedford
  - Milton

KIPDA

Roles of Participants

- Participate in the planning process by:
  - Provide a primary contact
  - Attending meetings
  - Providing Information
  - Reviewing Planning Documents
- Adopting the Hazard Mitigation Plan
  - Adopting New Mitigation Goals
  - Adopting New Mitigation Actions
- Implementation and Review of Plan
  - Requires Plan Maintenance

KIPDA

Local Match

- The state and local share equals 25% of funding which equals $25,000. In-kind donations accepted.
- Local match documented by hours of staff time of all participating jurisdictions.
- Document attendance and duration of all meetings for FEMA submission to meet local match requirement.

KIPDA

Why Participate?

- The burden of each municipality is minimal, but the cost to do a single jurisdiction plan is not.
- By participating in a multi-jurisdictional plan, your municipality will gain all the benefits of a single jurisdiction plan with the minimum level of effort and cost in plan development.

KIPDA

Overview of Plan Development

- Research a full range of natural hazard events to determine which are the most prevalent
- Identifying the location and extent of hazard areas
- Identifying assets located within these hazard areas

KIPDA

Overview of Plan Development

- Drafting of plan based on risk assessment
- Creating goals and mitigation actions
- Evaluation of past mitigation actions
- Implementation of the plan and plan maintenance
- Biggest difference in past plans is evaluation of previous mitigation actions and goals

KIPDA

Overview of Plan Development

- Plan needs to include a separate action on Flooding for FMA funding.
- *Impact, Extent, Vulnerability!* Keywords and Focus for the plan update!

FEMA

KIPDA

2

APPENDIX E

12/14/2015

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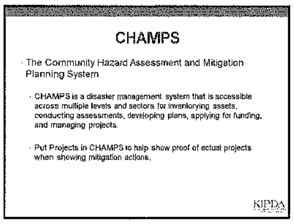
FEMA

KIPDA

2

12/14/2015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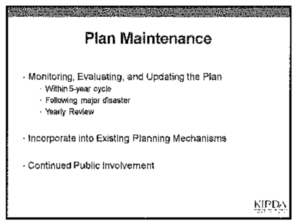
Put Projects in CHAMPS to help show proof of actual projects when showing mitigation actions.
KIPDA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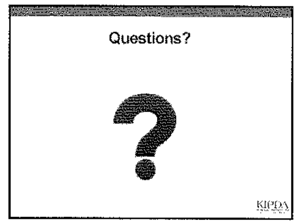
Continued Public Involvement
KIPDA

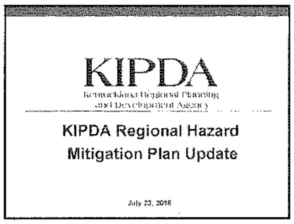

Questions?
KIPDA

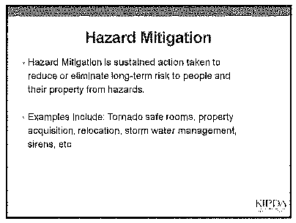
4

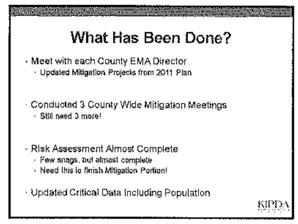
APPENDIX E

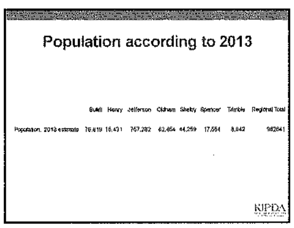
Regional Meeting #2 Presentation Material

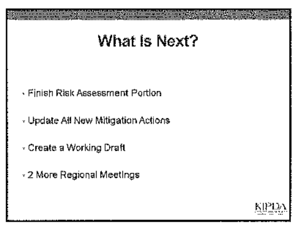
12/14/2015

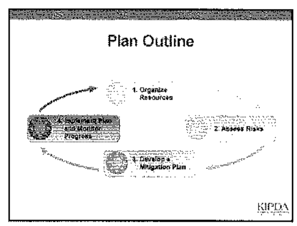


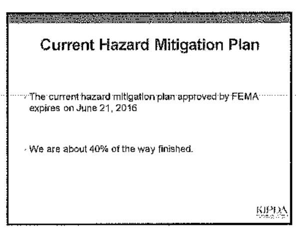


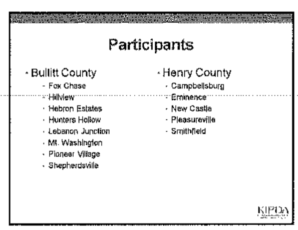


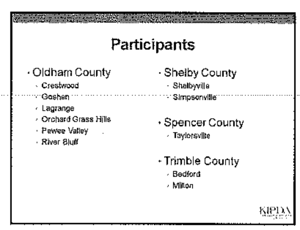












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- Local match documented by hours of staff time of all participating jurisdictions.
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- Being here helps us meet the match!

KIPDA

Risk Assessment

- The Risk Assessment looks at Critical Facilities in the Area, and determines the impact different hazard profiles will have on the region
- The Risk Assessment Justifies the Mitigation Action
- Ex: Why spend money on Earthquake protection, when it's a very small threat? Why not spend money on tornado protection?

KIPDA

Risk Assessment

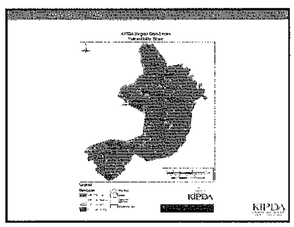
- Hazard Vulnerability Score = *Exposure X Risk*
  - Exposure Score = Population Rank + Property Rank + Essential Facilities Rank + Utility Rank + Transportation Rank + Government-Owned Facilities Rank + Hazardous Materials Rank
  - Risk Score = Annualized Loss Rank and/or Layer Rank

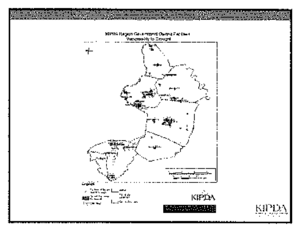
KIPDA

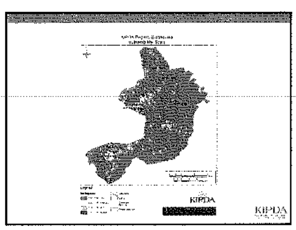
Hazard Profiles

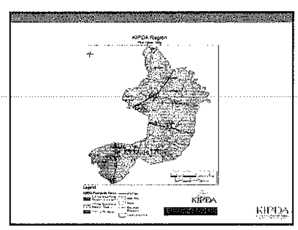
- 1. Dam Failure
- 2. Drought
- 3. Earthquake
- 4. Flood
- 5. Hailstorm
- 6. Karst (Sinkhole)
- 7. Landslide
- 8. Severe Storm
- 9. Severe Winter Storm
- 10 Tornado
- 11. Wildfire

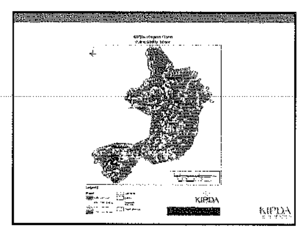
KIPDA











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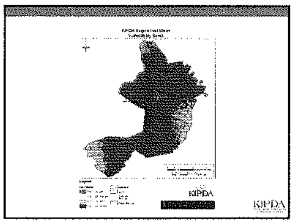
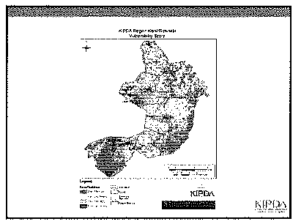
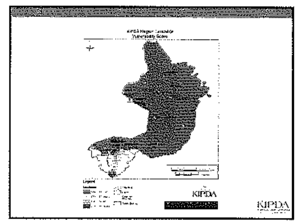
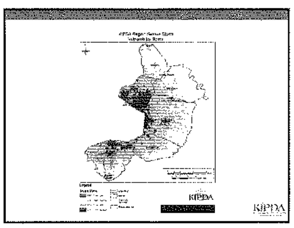
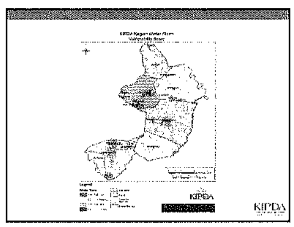
12/14/2015

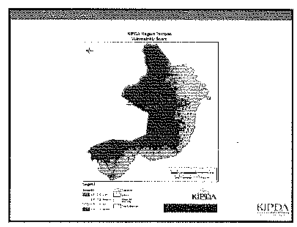


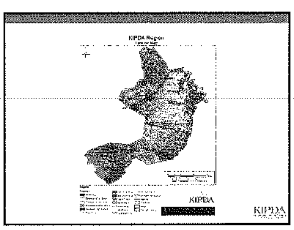












What Have We Learned?

- Met with Community First Responders
- Spoke on the merits of Hazard Mitigation
- Local LEPC Meetings
- Solicited Responses from different community members from Fire, EMS, Police, Sherriff, Local Citizens, County Judge Executives, EMA Directors, PVA, etc

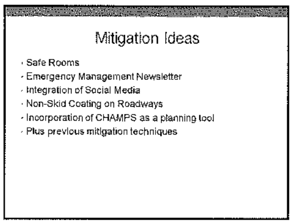
KIPDA

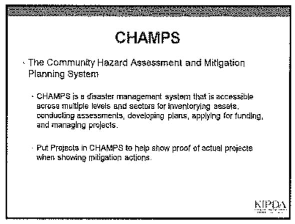
Mitigation Ideas

- Sirens
- Temporary Signs and Digital Message Boards
- Cameras for viewing heavy traffic areas for weather
- Drones to monitor damage
- Gas Mask and Equipment upgrades
- Smart Phone Apps to notify residents of Hazards
- Increase in PSA and trainings
- Legislation to standardize street signs and locations

3

12/14/2015


Mitigation Ideas
Safe Rooms
Emergency Management Newsletter
Integration of Social Media
Non-Skid Coating on Roadways
Incorporation of CHAMPS as a planning tool
Plus previous mitigation techniques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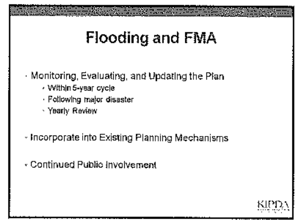
Flooding and FMA
Monitoring, Evaluating, and Updating the Plan
Within 5-year cycle
Following major disaster
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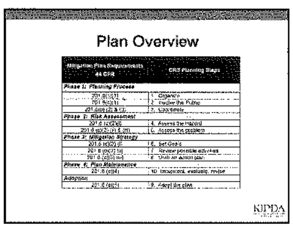
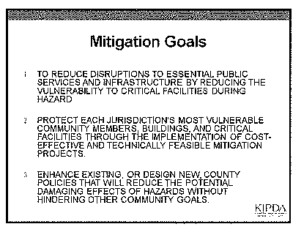
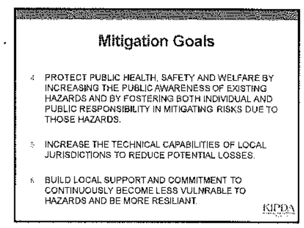
Continued Public Involvement
KIPDA


Plan Overview
Mitigation Plan Requirements 44 CFR
CRS Planning Steps
Phase 1: Planning Process
Phase 2: Risk Assessment
Phase 3: Mitigation Strategy
6. Set Goals
7. Review possible activities
Phase 4: Plan Maintenance
10. Implement, evaluate, revise
Adoption
9. Adopt the plan
KIPDA


Mitigation Goals
1. TO REDUCE DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD
2. PROTECT EACH JURISDICTION'S MOST VULNERABLE COMMUNITY MEMBERS, BUILDINGS, AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.
3. ENHANCE EXISTING, OR DESIGN NEW, COUNTY POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.
KIPDA


Mitigation Goals
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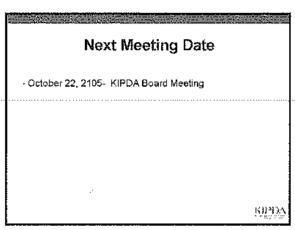
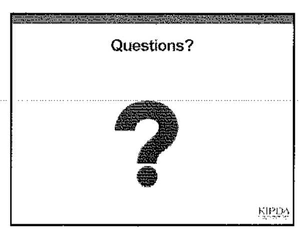
5. INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.
6. BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNRABLE TO HAZARDS AND BE MORE RESILIANT.
KIPDA


Next Meeting Date
October 22, 2105- KIPDA Board Meeting
KIPDA


Questions?
KIPDA

4

APPENDIX E

Regional Meeting #3 Presentation Material

12/14/2015

KIPDA
Kentuckiana Regional Planning and Development Agency

KIPDA Regional Hazard Mitigation Plan Update
Regional Meeting 3

October 22, 2015

Hazard Mitigation

- Hazard Mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards.
- Examples Include: Tornado safe rooms, property acquisition, relocation, storm water management, sirens, etc.

HAZARD MITIGATION

KIPDA

What is Hazard Mitigation Planning

- Hazard Mitigation Planning is the process State, Tribal, and local governments use to identify risks and vulnerabilities associated with natural disasters, and to develop long-term strategies for protecting people and property from future hazard events.
- This process will focus on local governments approach to creating and updating the preexisting regional plan.

KIPDA

What Has Been Done?

- Meetings with each County EMA Director
  - Updated Mitigation Projects from 2011 Plan
- Conducted 5 County Wide Mitigation Meetings
  - Still need 1 more!
- Risk Assessment Complete!
  - Draft sent to State for Review since largest section!
- Mitigation Almost Complete!

KIPDA

Current Hazard Mitigation Plan

- The current hazard mitigation plan approved by FEMA expires on June 21, 2016
- FEMA required five year plan update needs to be reviewed, revised, and submitted for State and FEMA approvals by April 21, 2016
- Adoption by start of 2016
- Draft Complete by early/mid November

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KIPDA

Population 2014 Estimate

	Bullitt County	Henry County	Oldham County	Shelby County	Spencer County	Trimble County	Regional Total
Population 2014 estimate	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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KIPDA

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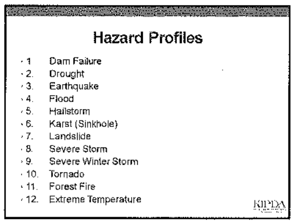
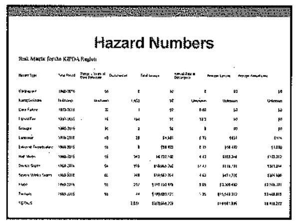
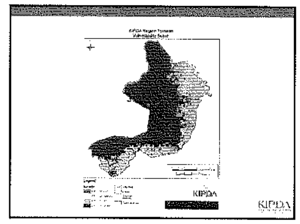
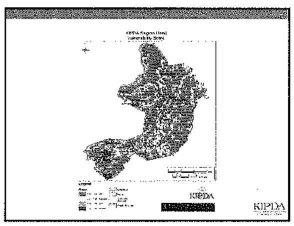
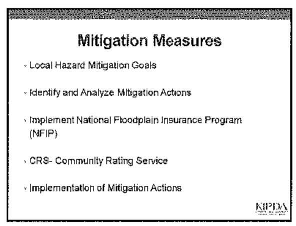
12/14/2015

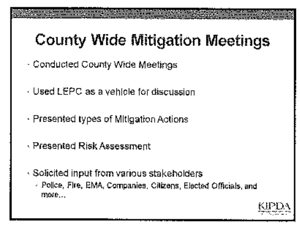


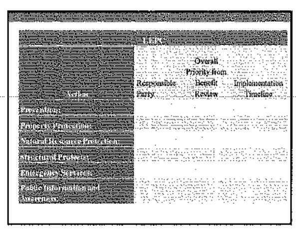


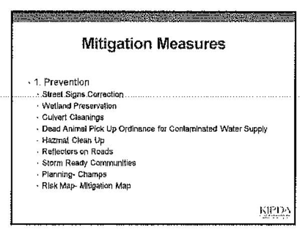


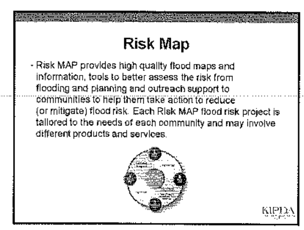












2

Mitigation Measures

- 2 Property Protection
  - Safe Room buildings and additions to public facilities, including new construction
- 3 Natural Resource
  - Tree removal from road ways and streams
- 4. Structural Projects
  - Culverts addition requirements
  - Retention Basins

KIPDA

Mitigation Measures

- 5. Emergency Services Communications
  - Portable Signage for Warning
  - Gas Masks
  - Cameras for Congested Areas
  - Non-Skid Road Coating
  - Traffic Cones
  - Drones for Damage Assessment and Warning

KIPDA

Mitigation Measures

- 6. Public Awareness
  - Schools and more interagency trainings
  - Trainings for Public and Local Government Personnel
  - Social Media Incorporation

KIPDA

Mitigation Measures

- Social Media
  - Reaches Out to More People
  - iPhone Introduced in 2007!
  - Warnings in Real Time
  - Free!
  - Facebook, Instagram, Twitter, etc.
  - 71% of online adults use Facebook

KIPDA

CHAMPS

- The Community Hazard Assessment and Mitigation Planning System
  - CHAMPS is a disaster management system that is accessible across multiple levels and sectors for inventorying assets, conducting assessments, developing plans, applying for funding, and managing projects.
  - Put Projects in CHAMPS to help show proof of actual projects when showing mitigation actions.

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Plan Maintenance

- Monitoring, Evaluating, and Updating the Plan
  - Within 5-year cycle
  - Following major disaster
- Yearly Review
- Incorporate into Existing Planning Mechanisms
- Continued Public Involvement

KIPDA

Local Match

- The state and local share equals 25% of funding which equals $25,000. In-kind donations accepted.
- Local match documented by hours of staff time of all participating jurisdictions
- Document attendance and duration of all meetings for FEMA submission to meet local match requirement.
- Being here helps us meet the match!

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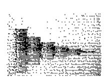
Local Match

- $15,000 of Match Completed
- County LEPC Meetings- Updates!
- On track to meet goals
- Participation!



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Questions?

KIPDA

APPENDIX E

LEPC Presentation Material

12/14/2015

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Kentuckiana Regional Planning and Development Agency

KIPDA Regional Hazard Mitigation Plan Update
LEPC

Hazard Mitigation

- Hazard Mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards.
- Examples Include: Tornado safe rooms, property acquisition, relocation, storm water management, sirens, etc.

HAZARD MITIGATION

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What is Hazard Mitigation Planning

- Hazard Mitigation Planning is the process State, Tribal, and local governments use to identify risks and vulnerabilities associated with natural disasters, and to develop long-term strategies for protecting people and property from future hazard events.
- This process will focus on local governments approach to creating and updating the preexisting regional plan.

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What Has Been Done?

- Meetings with each County EMA Director
  - Updated Mitigation Projects from 2011 Plan
- Conducted 12 County Wide Mitigation Meetings
- Risk Assessment Complete!
  - Draft sent to State for Review since largest section!
- Mitigation Almost Complete!
  - Need your help!

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Current Hazard Mitigation Plan

- The current hazard mitigation plan approved by FEMA expires on June 21, 2016
- FEMA required five year plan update needs to be reviewed, revised, and submitted for State and FEMA approvals by April 21, 2016
- Adoption by start of 2016
- Draft Complete by early/mid November

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Participants

- Bullitt County
  - Fox Chase
  - Hillview
  - Hebron Estates
  - Hunters Hollow
  - Lebanon Junction
  - Mt. Washington
  - Pioneer Village
  - Shepherdsville
- Henry County
  - Campbellsburg
  - Eminence
  - New Castle
  - Pleasureville
  - Smithfield

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Participants

- Oldham County
  - Crestwood
  - Goshen
  - Lagrange
  - Orchard Grass Hills
  - Pewee Valley
  - River Bluff
- Shelby County
  - Shelbyville
  - Simpsonville
- Spencer County
  - Taylorsville
- Trimble County
  - Bedford
  - Milton

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Population 2014 Estimate

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Risk Assessment

- The Risk Assessment looks at Critical Facilities in the Area, and determines the impact different hazard profiles will have on the region
- The Risk Assessment justifies the Mitigation Action
- Ex: Why spend money on Earthquake protection, when it's a very small threat? Why not spend money on tornado protection?

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1

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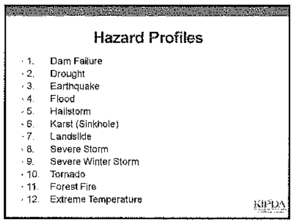
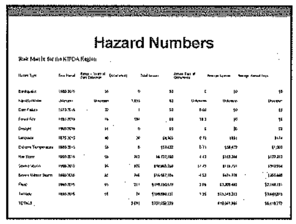
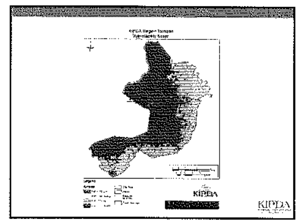
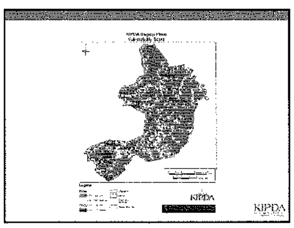
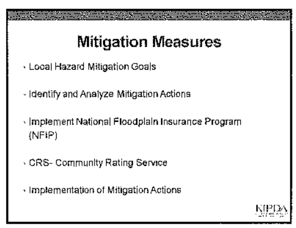
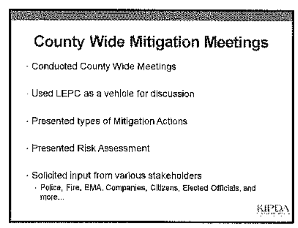

Hazard Profiles
1. Dam Failure
2. Drought
3. Earthquake
4. Flood
5. Hailstorm
6. Karst (Sinkhole)
7. Landslide
8. Severe Storm
9. Severe Winter Storm
10. Tornado
11. Forest Fire
12. Extreme Temperature
KIPDA


Hazard Numbers


KIPDA
KIPDA


KIPDA
KIPDA


Mitigation Measures
Local Hazard Mitigation Goals
Identify and Analyze Mitigation Actions
Implement National Floodplain Insurance Program (NFIP)
CRS- Community Rating Service
Implementation of Mitigation Actions
KIPDA


County Wide Mitigation Meetings
Conducted County Wide Meetings
Used LEPC as a vehicle for discussion
Presented types of Mitigation Actions
Presented Risk Assessment
Solicited input from various stakeholders
Police, Fire, EMA, Companies, Citizens, Elected Officials, and more...
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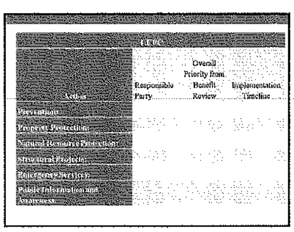
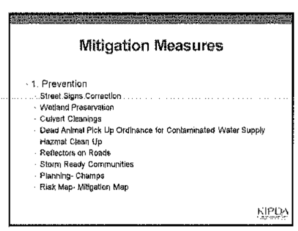
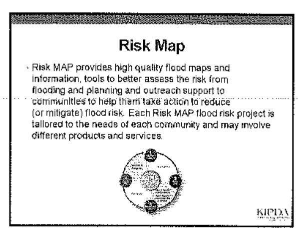

Action
Responsible Party
Overall Priority from Benefit Review
Implementation Timeline


Mitigation Measures
1. Prevention
Street Signs Correction
Wetland Preservation
Culvert Cleanings
Dead Animal Pick Up Ordinance for Contaminated Water Supply
Hazmat Clean Up
Reflectors on Roads
Storm Ready Communities
Planning- Champs
Risk Map- Mitigation Map
KIPDA


Risk Map
Risk MAP provides high quality flood maps and information, tools to better assess the risk from flooding and planning and outreach support to communities to help them take action to reduce (or mitigate) flood risk. Each Risk MAP flood risk project is tailored to the needs of each community and may involve different products and services.
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Mitigation Measures

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KIPDA

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KIPDA

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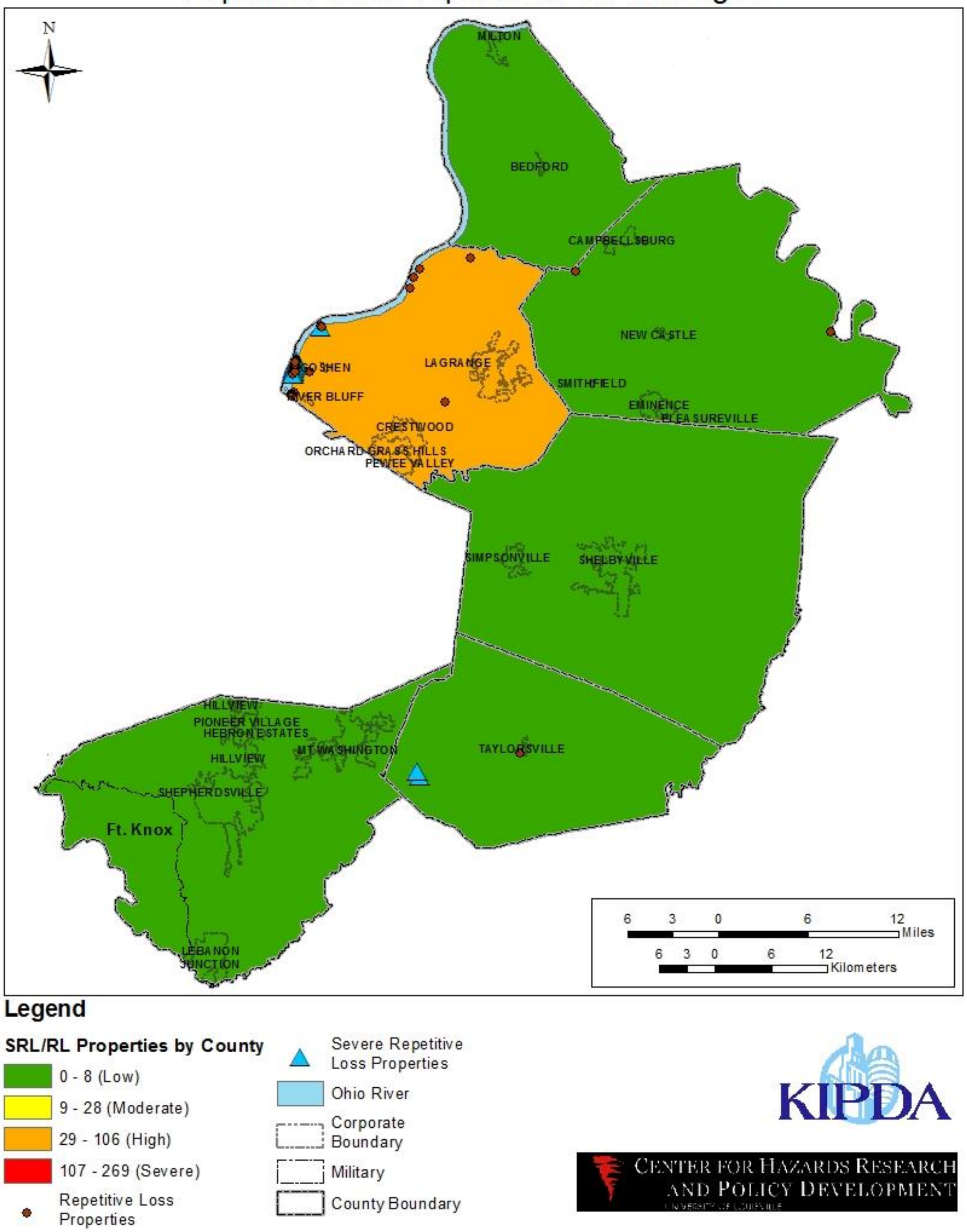
3

APPENDIX F

Severe Repetitive Loss and
Repetitive Loss Properties in KIPDA Region



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CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT

APPENDIX F

County	Total Number of Properties RL	Residential	Res- Single Family	Res- 2-4 Family	Res- Condo	Non-Residential
Bullitt	0	0	0	0	0	0
Henry	2	2	2	0	0	0
Oldham	78	76	76	0	0	2
Shelby	0	0	0	0	0	0
Spencer	4	4	3	1	0	0
Trimble	0	0	0	0	0	0
Total	**84**	**82**	**81**	**1**	**0**	**2**

County	Total Number of Properties SRL	Residential	Res- Single Family	Res- 2-4 Family	Res- Condo	Non-Residential
Bullitt	0	0	0	0	0	0
Henry	0	0	0	0	0	0
Oldham	20	20	20	0	0	0
Shelby	0	0	0	0	0	0
Spencer	4	4	2	2	0	0
Trimble	0	0	0	0	0	0
Total	**24**	**24**	**22**	**2**	**0**	**0**

County	Total Number of Properties RL & SRL	Residential	Non-Residential
Bullitt	0	0	0
Henry	2	2	0
Oldham	98	96	2
Shelby	0	0	0
Spencer	8	8	0
Trimble	0	0	0
Total	**108**	**106**	**2**