KENTUCKY RIVER AREA DEVELOPMENT DISTRICT

(KRADD) REGIONAL HAZARD MITIGATION PLAN: 2017

CHAPTER 1: INTRODUCTION

Kentucky River Regional Jurisdiction Information

A. Jurisdictions (Counties/Cities) of the Kentucky River Regional Hazard Mitigation Plan

The planning area includes the following jurisdictions. The 2011 regional hazard mitigation plan used the then-recent 2010 Census figures to convey each jurisdictions' populations. This 2016 plan updates the populations by including along with the still-relevant 2010 Census figures the 2010 estimate bases that result from, essentially, post-2010 Census population adjustments (from surveys) and by including 2015 population estimates. The following table will compare 2015 population estimates with the 2010 population estimate bases. With the exception of two (2) jurisdictions, the entire Kentucky River region is estimated to experience population losses:

Table A.1: Kentucky River Region Jurisdictions and Population Changes Based on Census Estimates and 2010 Estimate Bases

Jurisdiction	2010 Population	2010 Population Estimate Base	2015 Population Estimate	Percent (%) Change in Estimated Population
Breathitt County	13,878	13,876	13,484	- 2.83%
Jackson, City of	2,231	2,228	2,152	- 3.41%
Knott County	16,346	16,346	15,693	- 3.99%
Hindman, City of	777	777	741	- 4.63%
Pippa Passes, City of	533	533	643	+20.64%
Lee County	7,887	7,889	6,752	- 14.41%
Beattyville, City of	1,307	1,307	1,244	- 4.82%
Leslie County	11,310	11,310	10,711	- 5.30%
Hyden, City of	365	365	351	- 3.84%
Letcher County	24,519	24,519	23,123	- 5.69%
Blackey, City of	120	120	158	+ 31.67%
Fleming-Neon, City of	770	771	728	- 5.58%
Jenkins, City of	2,203	2,234	2,103	- 5.86%
Whitesburg, City of	2,139	2,132	2,006	- 5.91%
Owsley County	4,755	4,755	4,461	- 6.18%
Booneville, City of	81	81	76	- 6.17%
Perry County	10,591	10,581	9,652	- 8.78%
Buckhorn, City of	162	164	159	- 3.05%
Hazard, City of	4,456	5,499	5,341	- 2.87%
Vicco, City of	334	334	320	- 4.19%
Wolfe County	7,355	7,355	7,259	- 1.31%
Campton, City of	441	436	431	- 1.15%

Total population for the multi-jurisdictional Planning Area still is 114,762, again, according to the official 2010 Census. 2010 estimate bases change this total population to 115,846. Population estimates for 2015 change the total regional population to 107,588. The 2015 population estimate represents a 7.13% *decrease* in total population (from the 2010 estimates bases) for the Kentucky River region.

Total square miles of the multi-jurisdictional Planning Area still is 2,563.4 square miles as reported from the 2010 Census.

B. Geographic and Economic Description of the Planning Area

The Kentucky River Area Development District covers an eight-county region comprised of 2,563.4 square miles in the mountains of eastern Kentucky. The topography ranges from extremely rugged mountains with narrow rivers and stream valleys in the eastern and southern five counties, to a combination of rugged mountains and rolling farmland in the northern and western counties. Much of the region is covered in hardwood forests and the Daniel Boone National forest covers much of Leslie County, parts of Owsley, Lee and Wolfe Counties. Most of the mountains are "fold" mountains, except for the Pine Mountain range, a "fault" range, following the eastern and southern borders of Letcher, and Leslie Counties.

The economy of the region has not significantly changed from the 2011 update. It still relies very heavily on the Coal and Timber industries, which provide more than half of the economy for the region. Agriculture plays a larger role in Breathitt, Owsley, Lee and Wolfe Counties than in the southern four counties[1]. Healthcare still is an ever-increasing percentage of the region's economy as evidenced by the number of hospitals within the region despite its low population density. Breathitt, Perry, Leslie, and Letcher counties all have hospitals. The cities of Jackson (in Breathitt County), Hazard (in Perry County), Hyden (in Leslie County), and Whitesburg and Jenkins (in Letcher County) also all have hospitals. Further, the percentage of its population not covered by health insurance is higher than the state average.[2] Overall the region remains in a depressed economic state[3]: The per capita income remains well below the state and national averages. The poverty level and unemployment rates remain well above state and national averages. All eight counties remain listed as "distressed" by the Appalachian Regional Commission[4]. A more detailed Economic Profile may be found in the Comprehensive Economic Development Strategy (CEDS) for the Kentucky River region.

[1] In order to claim that the region economically has not changed significantly since the previous plan update, Kentucky River ADD relied upon Community Profile reports that can be found on Kentucky's Cabinet for Economic Development's research and its "Select Kentucky" reporting tool. See: http://www.thinkkentucky.com/SelectKentucky/.
[2] See "The Appalachian Region: A Data Overview from the 2010-2014 American Community Survey" (https://www.arc.gov/assets/research_reports/DataOverviewfrom2010to2014ACS.pdf.
[3]The Kentucky State Data Center (KSDC) can produce datasets for the KRADD's communities that evidence the region's depressed economic state: http://www.ksdc.louisville.edu/.

Kentucky River ADD Jurisdictional Information

Jurisdiction	Class/Type	2015 Population Estimate	Type of Government
Breathitt	County	13,484	Judge/Executive and four Magistrates
City of Jackson	4	2,152	Mayor and six Council Members
Knott	County	15,693	Judge/Executive and four Magistrates
City of Hindman	5	741	Mayor and six Council Members
City of Pippa Passes	6	643	Mayor and five Commissioners
Lee	County	6,752	Judge/Executive and four Magistrates
City of Beattyville	5	1,244	Mayor and six council members
Leslie	County	10,711	Judge/Executive and four Magistrates
City of Hyden	6	351	Mayor and four Commissioners
Letcher	County	23,123	Judge/Executive and five Magistrates
City of Blackey	Dormant	158	Dormant
City of Fleming-Neon	5	728	Mayor and six Council Members
City of Jenkins	4	2,103	Mayor and six Commissioners
City of Whitesburg	4	2,006	Mayor and six Council Members
Owsley	County	4,461	Judge/Executive and four Magistrates
City of Booneville	6	76	Mayor and four Commissioners
Perry	County	9,652	Judge/Executive and three Magistrates
City of Buckhorn	6	159	Mayor and four Commissioners
City of Hazard	3	5,341	Mayor and four Commissioners
City of Vicco	6	320	Mayor and four Commissioners
Wolfe	County	7,259	Judge/Executive and three Magistrates
City of Campton	6	431	Mayor and four Commissioners

C. Regional Plan Development Activities Summary

Step One developed partnerships among the eight counties and twelve cities as well as the Disaster Emergency Managers for each participant, local schools, fire departments, emergency responders, and health departments, integrating information from the Comprehensive Economic Development Strategy plan for the eight county region, and established the public notification and solicitation of public input throughout the planning process.

[4] https://www.arc.gov/images/appregion/economic_statusFY2017/CountyEconomicStatusandDistressAreasFY2017Kentucky.pdf.

Step Two outlines the methods that have been utilized in identifying all hazards. Historical occurrences were reviewed and all hazards that have impacted the area with any significance were included in the identification process. Historical data from past FEMA Disaster Declarations, NOAA data, USGS data, National Flood Insurance Program Maps, Newspaper articles, local officials and DEM officers' knowledge of past events, were all utilized in the assessment of hazards and the potential for future damages. HAZUS MH was utilized to develop the loss estimates for flooding, and also used as a basis for development of the potential losses from all other identified hazards.

Step Three outlines the documentation of the planning process, showing the steps to achieve the local hazard mitigation goals, provides the method to develop an assessment tool to identify the capabilities of the community to meet their goals. And finally provides the process to identify and analyze potential mitigation actions.

Step Four outlines the various processes used to achieve adoption of the plan, how the implementation of the identified mitigation actions using existing mechanisms where feasible will be achieved. It also shows the methods used to ensure continued public involvement.

Step Five provides the activities utilized to achieve final approval of the adopted plan, outlines the plan of action for monitoring and updating the plan. It also outlines the factors that will be used to evaluate the plan.

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Regional Plan

CHAPTER 2: PREREQUISITES

2.1 44 CFR §201.6(c)(5) Adoption by the Local Governing Body:

This CFR ***does not apply***; this is a regional hazard mitigation plan serving the eight counties and thirteen cities of the KY River Area Development District.

2.2 44 CFR §201.6(c)(5) Multi-Jurisdictional Plan Adoption*:*

On the recommendation of the Regional Mitigation Planning Committee, the KY River ADD Board of Directors adopted by resolution the ***Kentucky River Regional Hazard Mitigation Plan*** during their regular monthly meeting of July 27, 2016.

The following represents the actions of the local jurisdictions in adopting the regional hazard mitigation plan as their local mitigation plan. Please see folder Attachments/Resolutions – Attachment G

Jurisdiction	Adopted (resolution #)	Date of Adoption
Breathitt County	County Resolution #06282016-A	June 28, 2016
City of Jackson	*City Resolution #072116*	*June 21, 2016*
Knott County	County Resolution	July 18, 2016
City of Hindman	*City Resolution*	*July 11, 2016*
City of Pippa Passes	*City Resolution*	*July 7, 2016*
Lee County	County Resolution	July 14, 2016
City of Beattyville	*City Resolution #7112016*	*July 11,2016*
Leslie County	County Resolution	July 27,2016
City of Hyden	*City Resolution #07-16-2*	*July 11, 2016*
Letcher County	County Resolution 2016-13	July 18, 2016
City of Fleming Neon	*City Resolution*	*July 12, 2016*
City of Jenkins	*City Resolution #71116*	*July 11, 2016*
City of Whitesburg	*City Resolution 2016-1*	*July 12, 2016*
Owsley County	County Resolution	July 11, 2016
City of Booneville	*City Resolution #7132016*	*July 13, 2016*
Perry County	County Resolution	July 19, 2016
City of Buckhorn	*City Resolution #001-2016*	*July 18, 2016*
City of Hazard	*City Resolution*	*July 18, 2016*
City of Vicco	*City Resolution*	*July 12, 2016*
Wolfe County	County Resolution #16-07-12	July 12, 2016
City of Campton	*City Resolution*	*July 5, 2016*

All jurisdictions within the Kentucky River Area Development District participated within each phase of plan development either directly or through committee. This was accomplished through Regional Mitigation Planning Committee (RMPC) involvement, the involvement of its sub-committees, the Kentucky River Area Development District Board of Directors, and with the region's citizens' input. Copies of minutes of meetings and sign-in sheets are kept at the Kentucky River ADD District office located at 941 N. Main Street, 2nd Floor, Hazard, KY 41701.

Representatives from each participating jurisdiction were invited to participate in all sub-committees and on the Regional Mitigation Planning Committee (RMPC). Further, representatives from each participating jurisdiction comprise the Kentucky River ADD Board of Directors. A roster of each committee makeup is included: See **Attachment H** at the end of this document that also includes supporting documentation of attendance and participation. Also, the KRADD Board of Directors is comprised of all local jurisdictional units of government by virtue of their office and by the Kentucky River ADD incorporation under Kentucky Revised Statute (KRS). The Kentucky River ADD Board of Directors was involved in decision making, review of recommendations of the RMPC, and in the adoption and incorporation of all recommendations on a monthly basis.

2.3 44 CFR §201.6(a)(3) Multi-Jurisdictional Plan Participation:

Summary of the Multi-Jurisdictional Planning Process

The Kentucky River Area Development District (KRADD) Board of Directors – with authorization to enter into the Contract with the Commonwealth of Kentucky to complete the Regional Hazard Mitigation Plan – initiated the planning process. The KRADD Board was briefed on the requirements of the Disaster Mitigation Act of 2000. They provided directive to the Executive Director, who made staff assignments and planned for the oversight of all phases of plan updates by allocating duties to the Assistant Director and the Program Director.

The first step of the multi-jurisdictional planning process consisted of an overview of presenting the necessity of the hazard mitigation plan to the KRADD Board of Directors and developing the Regional Mitigation Planning Committee (RMPC) in August and September 2015. The public awareness/participation began with this first step. (Public participation continued at this KRADD Board of Directors level with three additional presentations throughout the plan development process to the KRADD Board of Directors in April, May, and June of 2016.) The Regional Mitigation Planning Committee (RMPC) was developed through, comprised partially of, and authorized by the KRADD Board of Directors. In addition to KRADD Board of Directors members (comprised of county and city local elected officials, local agency representatives, and the public), the RMPC targeted county and regional emergency management officers, county and city road foremen, and members of the regional Water Management Council[5] for inclusion in this multi-jurisdictional planning process. The Kentucky River ADD Staff coordinated the interaction of the various agencies and units of local government in order to develop the needed partnerships for completion of step one. From the RMPC, Subcommittees (comprised partially of each county's incorporated city's representatives) were created. The RMPC and Subcommittees assisted with the assignment of responsibilities, information exchange, and establishment of procedures for plan development.

The second part of the planning process was to reassess risks. Hazards were identified using existing best available data from a wide variety of sources. These sources included the Federal Emergency Management Agency (FEMA); the National Oceanic and Atmospheric Association

[5] Water Management Councils have been created in each Area Development District region.

(NOAA) and the National Weather Service (NWS); the National Flood Insurance Program; the United State Geological Survey (USGS); the Kentucky Geological Survey (KGS); the Kentucky Department of Natural Resources, Division of Water (DOW); the Kentucky Division of Forestry (KDF); the National Forest Service; local officials, local emergency management officers, county and city personnel, and the public citizenry. Along with quantitative sources, KRADD staff compiled the hazards database draft using the qualitative data gathered from these sources and presented the information first to the Subcommittees, then to the RMPC, and, finally, to the KRADD Board of Directors. The initial draft review was done with public input at the individual county (with incorporated city inclusion) level, and identified hazards were incorporated after this initial review and upon substantiation. From these meetings one additional hazard was determined to be of potential threat to the region/individual jurisdictions. This addition was the drought/extreme heat. The vulnerability assessments were conducted under this step and came from a combination of historical data and input from local leaders and Disaster and Emergency Management (DEM) personnel. The estimate of potential losses was calculated using historical data and formulae developed from local officials using existing known values as well as from HAZUS-MH for the flood module.

The third step of the multi-jurisdictional planning process evaluated past goals and, primarily, revised existing goals for the region, evaluated past priorities and, largely, kept existing priorities, assessed the capacity of Kentucky River region jurisdictions to meet the existing and revised goals, and updated the list of potential funding sources for each identified goal. It is relevant to note here (and elsewhere) that, primarily due to its socioeconomic and its prevalence of small and impoverished community status, the region has not been overly active in implementing past mitigation actions. There will not be significant change from the 2011 mitigation plan to the goals articulated and to the actions the region and its jurisdictions intend to pursue. It should also be noted that the mitigation strategy is articulated at the county level: Again, the Kentucky River region uniquely is comprised primarily of small and impoverished communities.

The final step in the planning process provided for formal adoption of the plan by updating mitigation actions for implementation. A revised list of mitigation actions deriving from revised goals was developed for this 2017 update. Actions from the 2011 plan that had been completed have been removed and new actions for the next five years have been added. Finally, the planning process outlined the mechanisms for monitoring, evaluating, and updating future iterations of this plan and provided for continued public participation through open meetings.

a.) Mission Statement:

In order to identify methods in which units of local government may reduce the threat to life, safety, and human suffering as well as the heavy economic burden of recovery from natural disasters; the Regional Mitigation Planning Committee is developing a comprehensive plan of action. The plan will identify natural hazards that may impact the area, assess the vulnerabilities of public and private structures and improvements, make an estimation of potential losses, and develop a mitigation strategy to reduce or eliminate the economic impacts of natural disasters where appropriate and economically feasible to do so. The plan will also identify potential methods to reduce where possible the threats to life, safety and human suffering. The plan will address the eight counties and its incorporated cities within the district.

b.) Individual Jurisdictional Planning Participation:

The Regional Mitigation Planning Committee (RMPC) is comprised of all the Kentucky River ADD region's mayors, judge/executives, disaster relief coordinators, appointed positions of the counties and incorporated cities, persons representing the regional offices of Kentucky Emergency Management (KYEM) and the Kentucky Transportation Cabinet (KYTC), and several private citizens. Representatives from FEMA also were invited to join and participate in RMPC committee meetings. The KRADD Community Resources Planner and Assistant Director/Physical Resources Planner attended all RMPC meetings.

Throughout the planning process, the RMPC provided direction and guidance to the Subcommittees deriving from it. The KRADD staff provided input to and received input from the RMPC in all phases of plan development. As the plan developed, the RMPC provided review and comment on plan content to the Subcommittees and to KRADD staff. The RMPC approved the draft plan and final plan. They submitted the final plan to the KRADD Board of Directors with a recommendation for adoption by the regional KRADD Board of Directors prior to submission to the Commonwealth of Kentucky for review and final submission to FEMA Region IV for approval.

The RMPC provided full oversight of the planning process. It worked directly with the sub-committees to produce and receive historical and anecdotal information relevant to the content of the mitigation plan. The RMPC in turn responded to the Subcommittees with additional data produced by it and in conjunction with KRADD staff. The RMPC and KRADD Board of Directors acted as the main focal group through all phases of plan development. The appointed local officials of the RMPC have the power to facilitate and expedite the resolutions and adoption measures of all units of local government. The RMPC gave reports, made recommendations, and provided information to the KRADD Board of Directors on a quarterly basis. Adoptions of the hazard mitigation plan were conducted after public input.

Again, given the size of the populations of both counties and cities within the Kentucky River region, the aforementioned Subcommittees were formed according to geographic sub-region characteristics (as opposed to forming them strictly at the county and/or city level): The Northwest Subcommittee consisted of representatives from Lee and Owsley Counties and their cities. The North Subcommittee consisted of representatives from Wolfe and Breathitt Counties and their cities. The East Subcommittee consisted of representatives from Letcher and Knott Counties and their cities. The West Subcommittee consisted of representatives from Leslie and Perry Counties and their cities. Each jurisdiction within each county had the opportunity to participate formally in the planning process by participating in their respective "sub-regional" Subcommittee. Members for the individual Subcommittees represented the mayors, judge/executives, magistrates, local flood-plain managers, disaster relief coordinators, emergency management service personnel, the city councils, community action agencies, local businesses, higher educational institutes, fire and police departments, and nonprofit organizations for their jurisdictions.

The Subcommittees participated in each phase of the planning process for their jurisdictions. Subcommittee members provided input to the RMP Committee and KRADD staff in development of the public involvement process; each phase of the development of the risk assessment; the creation of the mitigation strategy, including the establishment of local mitigation goals, identification and analysis of mitigation measures, and the preliminary determination of the procedure for the implementation of mitigation measures; and in the establishment of plan maintenance procedures. The governing bodies of each local jurisdiction provided specific action items and priorities. The RMPC and KRADD Board of Directors provided the overall regional action items, goals, and priorities. As the plan developed, the Subcommittees provided review and comment on plan content to the RMP Committee and KRADD Staff. The RMPC took all of the

goals, objectives, action items, and maintenance/evaluation/monitoring procedures and made recommendations for them to be included in the plan update to the KRADD Board of Directors.

Public meetings were held in the county seat of each participating jurisdiction. These meetings provided information to the public at large as well as solicited comments from the general public. The information supplied included the multi-jurisdictional approach to hazard mitigation planning and helped to facilitate input in that context.

Final decisions were made at the KRADD Board of Directors with full representation of all participating jurisdictions. The RMPC currently has officers in place as does the KRADD Board of Directors. The officers in each case were nominated and selected to serve a one-year term, with successive terms possible on the RMPC (but not on the KRADD Board where one term as Chair is the limit). The Subcommittees chose to operate in a more “relaxed” manner, i.e., with no formal assignment of officers in order to allow a forum more conducive to general open comment. The Chair of both the KRADD Board and RMPC are limited to elected and/or appointed members. The Subcommittees acted independently, concentrating on the processes for their respective jurisdiction and “sub-region” only. The Subcommittees worked directly with the RMPC and KRADD Staff, which tied together all data and input from the Subcommittees to develop and include the relevant content for the multi-jurisdictional hazard mitigation plan.

Future updates to the plan will utilize the five-step process described above. The local jurisdictions will be provided equal opportunity to actively participate during all phases of the plan update. This approach assures that the maximum participation will be achieved through either direct participation by the local jurisdictions or through the representation from county participation for those smaller entities that wish to utilize the county’s section of the regional plan for their own jurisdictional guide in order to meet the requirements of the Disaster Act of 2000. Future participation will be documented in the same manner as in this plan. Sign-in sheets will be kept for each meeting of the Subcommittees to the KRADD Board of Directors. Lists of attendees (along with their title place of employment) and jurisdictional affiliations will also be maintained at the ADD. The supporting data for tracking participation will be used in order to develop a chart of participation as outlined below, following this document section. This same chart will be used in future updates as a summary of participation in the planning process of any such update. Sign-in sheets for plan participation are available upon request.

Jurisdictional Participation in the Planning Process

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 and Review	Adoption of the Plan
Breathitt County	X	X	X	X	X	X	X
City of Jackson	X	X	X	X	X	X	X
Knott County	X	X	X	X	X	X	X
City of Hindman	X	X	X	X		X	X
City of Pippa Passes	X	X	X	X		X	X
Lee County	X	X	X	X	X	X	X
City of Beattyville	X		X	X		X	X
Leslie County	X	X	X	X	X	X	X
City of Hyden	X	X	X	X		X	X
Letcher County	X	X	X	X	X	X	X
City of Fleming-Neon			X	X		X	X
City of Jenkins	X	X	X	X	X	X	X
City of Whitesburg	X	X	X			X	X
Owsley County	X	X	X	X	X	X	X
City of Booneville	X	X	X	X		X	X
Perry County	X	X	X	X	X	X	X
City of Buckhorn		X	X	X		X	X
City of Hazard	X	X	X	X		X	X
City of Vicco			X	X		X	X
Wolfe County	X	X	X	X	X	X	X
City of Campton			X	X		X	X
KRADD Board of Directors	X	X	X	X	X	X	X
Public Input	X	X	X	X	X	X	X

Summary

The Kentucky River Area Development District (ADD) is a regional planning agency established under Kentucky Revised Statute (KRS) in 1968. It is one of fifteen ADDs across the Commonwealth. The ADDs have served as regional planning agencies since their inceptions. The role of the Kentucky River ADD in the hazard mitigation plan process was two-fold: First, the personnel are trained and experienced in planning, administration, and coordination. Regarding this plan update, staff provided support as necessary to the Subcommittees, to the RMPC, and to the Board of Directors. Staff members provided direct assistance to all committees and the Board in every phase of plan development. The staff of the ADD acted as extended staff for the units of local government, the committees, and the ADD Board. The second role of the ADD was to provide the mechanism for the regional plan update development, its implementation, and its monitoring and evaluation.

CHAPTER 3: PLANNING PROCESS

An open, public planning process is essential to the development and update of an effective plan. In order to develop a more comprehensive approach to reducing the effects from natural disasters, the planning process included the following:

3.1 44 CFR §201.6(b) Open Public Involvement:

In order to enable the development of mitigation measures supported by a broad cross-section of public and private stakeholders that reflects the needs of the community, open public involvement has been integrated into all steps of this planning process. The private sector and general public were given opportunity to participate through public notices placed in the newspapers of highest circulation in the county where the meetings were held (the detail and dates of these may be accessed by following the guidance in Attachment F at the end of this document. All citizens were invited to and given opportunity through the public meetings to participate in the data gathering, plan development, risk assessments, and potential project identification. All meetings of the sub-committees, Regional Mitigation Planning Committee, and KRADD Board of Director's Meetings were open to the general public and encouraged public input and comment. Copies of the advertisements and affidavits from the publishers of all public notices are available at the KRADD office for inspection. To access these records see the instructions in Attachment F at the end of this document.

3.2 44 CFR §201.6(b)(1) Opportunity for Public Comment:

The general public was given opportunity to comment on the plan during the drafting stage and prior to plan approval and adoption by local jurisdictions. Public meetings were held along with the other mechanisms noted below. In addition, the public were provided with telephone numbers and a central mailing address listing, with questionnaires, and were provided with information as outlined in the advertisements for public meetings. A draft of the plan was made available at several public access locations across the district that included: the county libraries, courthouses, health departments, and City Halls. These locations had available places to make comments as well as the address and phone number to make written or verbal comments. The draft plan was posted on the KRADD web site, http://www.kradd.org/, along with a place to post comments. The Kentucky River ADD address of PO Box 239, 941 N. Main Street, Hazard, KY 41701 was used as the central mailing address and was provided to the public for any comments given in writing. No adverse comments were received. More information on public meetings is included in section 3.3.

All committee meetings, Board meetings, and Subcommittee meetings of the Kentucky River ADD are open public meetings. At each meeting the general audience is given an opportunity to comment and provide input. This was also extended to the RMPC and to the regional Sub-Committees.

KRADD staff – specifically the Geographic Information Specialist, the Public Administration Specialist, the Community Development Planners, and the Program Director – have been the first point of contact for the public comment, both written and oral. The public input information was gathered by these staff and presented to the appropriate committees for consideration of inclusion in the plan.

Decisions have been made on several levels, first at the Subcommittee level, which made recommendations to the RMPC. The RMPC then made decisions more relevant to the regional incorporation of the information and provided oversight for compilation of the draft and final plan

documents. The RMPC presented the draft and final plan documents to the KRADD Board of Directors for final approval and adoption regionally.

3.3 44CFR §201.6(b)(2) Opportunity for Public/Private Participation:

Neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, businesses, academia, and other private and non-profit interests were invited and encouraged to actively participate in the planning process.A detailed chart of meetings participation is included in Attachment F at the end of this document, along with the process to obtain copies of more detail participation including sign-in sheets and minutes of meetings. Letters of introduction were mailed to each neighboring Area Development District, DEM regional office, school district, and higher education facility. The draft plan was delivered to the area health departments, and public libraries.

The RMPC includes mayors, judge executives, magistrates, disaster relief coordinators, county road foremen, emergency management service personnel, city council, community action agencies, building inspectors, local businesses, higher educational institutes, fire and police departments, non-profit organizations and private citizens. The State and Federal representatives were notified and invited to attend scheduled RMPC meetings and KRADD Board Meetings. A presentation of the requirements of the Regional Mitigation Plan update process, an explanation of what will be expected of committee members, and a schedule of all KRADD Board meetings for the next 14 months were provided at the kickoff meeting.

Public meetings were held to inform and include the general public in the planning process. These meetings included one public meeting after the RMPC and subcommittees were established, one after the first draft was produced and one in each county after the draft was revised and before submission to the state for review. Interested parties identified in the public meetings were given an opportunity to participate in the subcommittees. Comments received from the public meetings were incorporated into the final plan as applicable.

The GIS Specialist, Public Administration Specialist, Community Resources Planners, Program Director and Executive Director facilitated the public meetings. They coordinated inputs from the public and provided information to the appropriate committee, and/or sub-committee members on an ongoing basis. Notices of public meetings were provided to local media, and to concerned citizens already listed on the KRADD mailing lists. At each public meeting information of the planning process and work completed was provided for review. Each attendee was given the opportunity to participate on all informational levels. Participation included the opportunity to voice their views, provide factual data, supply any supplemental historical data that they had, and to be active members of the sub-committees if they so desired.

Opportunities were given for meetings in each jurisdiction and were held in County Courthouses, City Halls and Community Facility buildings. Public notice information was provided to the local media in order to provide adequate notice for participation by any interested party. Additional public notices were provided through posting of the meeting information in public places, (post office, library, courthouse, city hall, etc.). The meetings were held during appropriate hours to provide the optimal participation of all identified target groups and the general public involvement.

3.4 44CFR §201.6(b)(3) Review and Incorporation of Existing Plans, Studies, Reports, and Technical Information

The Kentucky River ADD staff reviewed information from the US Army Corps of Engineers facilities at Buckhorn, and Carr Creek Reservoirs, HAZUS modeling took into account these structures during the analysis. Information from other measures such as the Cy-Bend cut through, (a Corps of Engineers project to facilitate the flow of the North Fork of the KY River downstream of Jackson), in Breathitt County and the floodwall project in Pineville, Bell County Kentucky, were also considered in the analysis of flood data and loss estimations. Currently there are no existing FMA or CRS plans, (none of the jurisdictions within the planning area participate in the CRS program).

Staff reviewed existing relevant mitigation material, including current mitigation studies, and reports along with the Comprehensive Economic Development Strategy, please see Attachments folder Attachment J-CEDS Document, of the KY River ADD. Region road plans developed by the KY River ADD Transportation Planning Committee, Please see the webpage http://www.kradd.org/Transportation/transportation.htm, were utilized where feasible and appropriate. The historic information compiled by NOAA specifically the National Climate Data Center Web, please go to the following website https://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=21%2CKENTUCKY, query for all the jurisdictions was utilized heavily and used for most of the included charts and graphs. Studies by the University Of Kentucky College Of Agriculture, please go to the following website http://wwwagwx.ca.uky.edu/ the University of Louisville State Data Center, please go to the following website http://www.ksdc.louisville.edu/, and Western Kentucky University, please go to the following website https://www.wku.edu/, were all utilized and incorporated into the plan where appropriate. FEMA past disaster declarations were utilized in the historical data, as well as used to assist in the calculations of potential loss estimations, and probability of future events. The Watershed Flood Protection Analysis, Economic Evaluation, and Resource Assessment for the Rockhouse Creek Watershed in Leslie County were also reviewed and pertinent data was incorporated into this plan. Inclusion of these existing plans, technical data, and studies are documented throughout the plan. The HAZUS MH Technical database was used during the risk assessment and corresponding analysis data sets were used in vulnerability and loss estimates of the risk assessment.

3.5 44CFR §201.6(c)(1) Documentation of the Planning Process*:*

The KRADD Board was briefed on the requirements of under the required five year update. They provided a directive to the Executive Director, who made staff assignments and planned for the oversight of all phases of plan development by allocating duties to the Assistant Director and the Program Director.

Step one consisted of an overview of the five year update process presented to the KRADD Board of Directors in February and March 2016 meetings. The public awareness/participation began here and continued with an RMPC and two more presentations at the KRADD Board of Directors Meetings one in April 2016 and another in May 2016. The members of the RMPC were briefed on the requirements of the five year update as representatives of their respective jurisdictions in matters relating to the specific sections of the Regional Hazard Mitigation Plan. This briefing along with the addition of appropriately necessary additional members including county and regional DEM officers and County and City Road foremen, created the Regional Mitigation Planning Committee (RMPC). The KY River ADD Staff coordinated the interaction of the various agencies and units of local government in order to develop the needed partnerships for completion of step one. The sub-committees were developed as outlined in section 3.1.3. The sub-committees and RMPC assisted with the assignment of responsibilities, information exchange, and establishment of procedures for plan development. The sub-committees held meetings in the County Seat of

each county and solicited public participation as well as participation of each jurisdiction located in the respective counties. The public input from these meetings resulted in the inclusion of information ranging from identification of hazards through local input, to historical data, development areas, critical facilities location review and updates, reoccurring damage areas, potential mitigation projects and mitigation activities. Documentation of this input including attendance sign-in sheets, minutes, completed survey documents, notes, working maps, and historical data sets are filed at the KY River ADD Office, 941 N. Main Street, Hazard, KY 41701. The RMPC provided oversight during each phase of the plan development, provided guidance to the sub committees and supplied information to the KRADD Board of Directors through reports prepared by staff. The RMPC also provided the thorough review of the risk assessment findings and mitigation strategy input from the KRADD staff and subcommittees. The draft update was mailed to the offices of the Big Sandy ADD, Bluegrass ADD, Cumberland Valley ADD, and the Gateway ADD, all representing the neighboring communities of the KRADD region.

Step two of the planning process was to assess risks. All components of the Risk Assessment were compiled using best available data in the Kentucky River ADD from several sources. Arc Map was used along with HAZUS-MH in the risk assessment process. The Regional Mitigation Planning Committee, with public input and local knowledge, was responsible for review of proposed goals and objectives, mitigation activities, development trend areas, prioritization of actions, maintenance procedures, evaluation steps, and monitoring of the plan. Hazards were identified using existing best available data. Data was obtained from the Federal Emergency Management Agency (FEMA); the National Oceanic and Atmospheric Association (NOAA); the National Flood Insurance Program; the United State Geological Survey; the Kentucky Geological Survey; the Kentucky Department of Natural Resources, Division of Water; the Kentucky Division of Forestry; the National Forest Service; the National Weather Service; local officials, local DEM officers, County and City personnel, and citizens at large. Staff compiled the hazards database draft using the data gathered from these sources among others and presented the information to the sub-committees, then to the RMPC and finally to the KRADD Board of Directors. The initial draft review was done with public input at the RMPC level, and identified hazards were updated after this initial review and upon substantiation. The Vulnerability assessments were conducted under this step and came from a combination of historical data, and input from local leaders, and Disaster and Emergency Management personnel. Census data, data from HAZUS, local input, NOAA data, Kentucky Division of Water data, FEMA data, Kentucky Division of Forestry data, USGS, KGS, and others were used in the compilation of the map data, identification data, critical facilities data, and historical data for the risk assessments. The estimate of potential losses was calculated using historical data, structure points that were mapped in all eight counties and thirteen cities and formulas developed from local officials using existing known values (2010 census average structure dollar valuation) as well as from HAZUS-MH for the flood module.

Step three reevaluated the regions goals for the plan, readdressed priorities, updated the capacity information for the communities to meet the goals and developed a list of potential funding sources for each identified goal. Projects that were in the original plan and have been completed either through construction or implementation were denoted within the plan as reflected in the individual projects database as well as reported in the regional section of the overall priorities.

Step four provided for formal adoption of the plan, identified actions for implementation, and outlined the mechanisms for monitoring, evaluating and updating the plan. It also provided for continued public participation through open meetings. The Regional Mitigation Plan update includes a timeline for regular review and monitoring of the plan, methods of following the developed maintenance procedures, an update timeline, including revised evaluation criteria.

CHAPTER 4: RISK ASSESSMENT

44 CFR §201.6(c)(2): Risk Assessment

All components of the risk assessment have been developed using best available data.

The plan includes a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. The risk assessments provide information to enable the jurisdictions to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment includes:

4.1 44 CFR §201.6(c)(2)(i) Identified Hazards:

1. **Floods:**

Definition:

[1]flood
Pronunciation: 'flood
Function: *noun*
Etymology: Middle English, from Old English *flOd;* akin to Old High German *fluot* flood, Old English *flOwan* to flow
1 a : a rising and overflowing of a body of water especially onto normally dry land; *also* **:** a condition of overflowing <rivers in *flood*> **b** *capitalized* **:** a flood described in the Bible as covering the earth in the time of Noah
2 : the flowing in of the tide
3 : an overwhelming quantity or volume; *also* **:** a state of abundant flow or volume <a debate in full *flood*>

https://www.merriam-webster.com/dictionary/flood

2. **Winter Storms**

Definition:

snow·storm
Pronunciation: -"storm
Function: *noun*
a: a storm of or with snow
b: something that resembles a snowstorm
https://www.merriam-webster.com/dictionary/snowstorms

ice storm
Function: *noun*
: a storm in which falling rain freezes on contact

https://www.merriam-webster.com/dictionary/snowstorms

3. Tornados

Definition:

tor·na·do
Pronunciation: tor-'nA-(")dO
Function: *noun*
Inflected Form(s): *plural* **-does** *or* **-dos**
Etymology: modification of Spanish *tronada* thunderstorm, from *tronar* to thunder, from Latin *tonare* -- more at **https://www.merriam-webster.com/dictionary/thunder**
a *archaic* **:** a tropical thunderstorm
b a : a squall accompanying a thunderstorm in Africa **b :** a violent destructive whirling wind accompanied by a funnel-shaped cloud that progresses in a narrow path over the land
c : a violent windstorm **: https://www.merriam-webster.com/dictionary/whirlwind**

https://www.merriam-webster.com/dictionary/tornado

4. Lightning/Severe Thunderstorms/Hail

Definitions:

[1]light·ning
Pronunciation: 'lIt-ni[ng]
Function: *noun*
Etymology: Middle English, from gerund of *lightenen* to lighten
1: the flashing of light, **Please see https://www.merriam-webster.com/dictionary/light,** produced by a discharge of atmospheric electricity; *also*: the discharge itself
https://www.merriam-webster.com/dictionary/lightning

thun·der·storm
Pronunciation: -"storm
Function: *noun*
: a storm accompanied by lightning and thunder **Please see https://www.merriam-webster.com/dictionary/thunder**

https://www.merriam-webster.com/dictionary/thunderstorm

[1]hail
Pronunciation: 'hA(&)l
Function: *noun*
Etymology: Middle English, from Old English *hægl;* akin to Old High German *hagal* hail
1 : precipitation in the form of small balls or lumps usually consisting of concentric layers of clear ice and compact snow
2 : something that gives the effect of a shower of hail <a *hail* of rifle fire> **https://www.merriam-webster.com/dictionary/hail**

5. Drought/Extreme Heat

drought
Pronunciation: 'draut
Variant(s): *also* **drouth** /'drauth/
Function: *noun*
Etymology: Middle English, from Old English *drugath,* from *drugian* to dry up; akin to Old English *dryge* dry -- more at **https://www.merriam-webster.com/dictionary/dry**
1 : a period of dryness especially when prolonged that causes extensive damage to crops or prevents their successful growth
2 : a prolonged or chronic shortage or lack of something expected or desired
https://www.merriam-webster.com/dictionary/drought

6. Landslides

[1]land·slide

Pronunciation: 'lan(d)-"slId
Function: *noun*
1: the usually rapid downward movement of a mass of rock, earth, or artificial fill on a slope; *also*: the mass that moves down
https://www.merriam-webster.com/dictionary/landslide

7. Dam/Levee Failure

[2]lev·ee

Pronunciation: 'le-vE
Function: *noun*
Etymology: French *levée,* from Old French, act of raising, from *lever* to raise -- more at **https://www.merriam-webster.com/dictionary/lever**
1 a : an embankment for preventing flooding **b :** a river landing place **: https://www.merriam-webster.com/dictionary/pier**
2 : a continuous dike or ridge (as of earth) for confining the irrigation areas of land to be flooded
https://www.merriam-webster.com/dictionary/levee

8. Wildfires

wild·fire

Pronunciation: -"fIr
Function: *noun*
1: a sweeping and destructive conflagration especially in a wilderness **Please see https://www.merriam-webster.com/dictionary/wilderness** or a rural area
https://www.merriam-webster.com/dictionary/wildfire

9. Earthquakes

earth·quake

Pronunciation: '&rth-"kwAk
Function: *noun*
1: a shaking or trembling of the earth **Please see https://www.merriam-webster.com/dictionary/earth** that is volcanic or tectonic in origin
2: **UPHEAVAL** **https://www.merriam-webster.com/dictionary/upheaval**
https://www.merriam-webster.com/dictionary/earthquake

10. Hurricane

[1]hur·ri·cane

Pronunciation: 'h&r-&-"kAn, -i-k&n, 'h&-r&-, 'h&-ri-
Function: *noun*
Etymology: Spanish *huracán,* from Taino *hurakán*
1 : a tropical cyclone with winds of 74 miles (118 kilometers) per hour or greater that occurs especially in the western Atlantic, that is usually accompanied by rain, thunder, and lightning, and that sometimes moves into temperate latitudes -- see BEAUFORT SCALE table **https://www.merriam-webster.com/dictionary/Beaufort%20scale**
Please see https://www.merriam-webster.com/dictionary/hurricane
The eight county Kentucky River Area Development District has no coastal region and has not historically been directly impacted by hurricanes. The major contributing factors associated with the remnants of hurricanes have been high winds, tornados, and flooding, which will all be covered under the appropriate individual profiles.

11. Tsunamis

tsu·na·mi

Pronunciation: (t)su-'nä-mE
Function: *noun*
Inflected Form(s): *plural* **tsunamis** *also* **tsunami**
Etymology: Japanese, from *tsu* harbor + *nami* wave
: a great sea wave produced by submarine earth movement or volcanic eruption **: TIDAL WAVE**
Please see https://www.merriam-webster.com/dictionary/tidal%20wave https://www.merriam-webster.com/dictionary/tsunami
The Kentucky River ADD is not located in a coastal area and is not subject to damage from tsunamis. Therefore tsunamis are not identified as a hazard for the eight county planning region.

12. Volcanoes

vol·ca·no

Pronunciation: väl-'kA-('')nO, vol-
Function: *noun*
Inflected Form(s): *plural* **-noes** *or* **-nos**
Etymology: Italian or Spanish; Italian *vulcano,* from Spanish *volcán,* ultimately from Latin *Volcanus* Vulcan
1 : a vent in the crust of the earth or another planet from which usually molten or hot rock and steam issue; *also* **:** a hill or mountain composed wholly or in part of the ejected material
2 : something of explosively violent potential
https://www.merriam-webster.com/dictionary/volcano
The Kentucky River ADD has no historical occurrences of volcanic activity; therefore this hazard has not been identified as affecting the eight county planning region.

Table 4.1
Identified Hazards
(in order from Greatest to Least risk to the Kentucky River ADD Region)

Hazard	How Identified	Why Identified
1. Flooding (Flash Floods & Riverine)	• Review of FIRMS • Input from County Officials and DEM Personnel • Review of past disasters • Risk Assessments • Public Input • Identification of repetitive loss areas • Citizen Surveys	• All eight Counties have been impacted by flooding of various intensities over the past 100 years • The region contains many rivers and streams all prone to flooding • The region contains all three major tributaries to the Kentucky River • The topography particularly the steep terrain is conducive to flash-flooding
2. Winter Storms/Snow Ice Storms	• Past Disaster Declarations • Risk Assessments • Input from County Officials and DEM Personnel • Public Input • Citizen Surveys	• Past storms have resulted in multiple deaths • Takes extensive local resources to address cleanup and restoration of services • Has impacted all eight counties
3. Tornados	• Historical Events • News Articles • Input from County Officials and DEM Personnel • Public Input • Risk Assessments • Citizen Surveys	• Past occurrences have resulted in multiple deaths • All eight counties are susceptible • Localized damage has been very extensive
4. Severe Thunderstorms /Lightening/ Hail Storms	• Historical Events • News Articles • Input from County Officials and DEM Personnel • Public Input • Risk Assessments • Citizen Surveys	• Frequency of Occurrence • All eight counties are susceptible • Localized Damage • Resulting in injury and death

Table 4.1 (cont.)
Identified Hazards
(in order from Greatest to Least risk to the Kentucky River ADD Region)

Hazard	How Identified	Why Identified
5. Wildfires	• Review of KY Division of Forestry Data • Input from County Officials • Review of past events • Risk Assessments • Public Input • Citizen Surveys	• All eight Counties have been impacted by woodland fires over the past 50 years • The region contains 81% forestland all susceptible to fires • The cost of suppression far exceeds the costs associated with most other identified hazards
6. Landslides	• Historical Events • Input from County Officials and DEM Personnel • Public Input • Risk Assessments • Citizen Surveys	• High Cost of cleanup • All eight counties are susceptible • Significant Localized Damage
7. Drought/Extreme Heat	• Historical Events 4 in the last 100 years • 3 in recent history • 2 in the past seven years • Input from local officials/Public Input	• Increasing costs to water systems • Water shortages and economic impact • Little to no funds for projects from other sources

The Subcommittees and the RMPC relied upon local input and data to establish and to prepare the above priority listing of hazards. (This priority list was then agreed to by the Kentucky River ADD Board of Directors.) These priorities were established based upon 1) the overall hazard to public safety and 2) their respective financial impacts, first to the overall population, then to the units of local government, and, finally, to the region as a whole. The frequency of occurrence, potential impacts to public safety and wellbeing, and severity of the financial impacts from each hazard type all were considered and weighed in order to establish prioritization of hazard. These priorities are for the region, but also carry over to the priorities for each participating jurisdiction. From the previous hazard mitigation plan (2011), Drought and Extreme Heat were added to the hazards list from which to develop a mitigation strategy. Based upon recent experience and the potential for loss of water supplies and high economic impact, both regionally and on a local jurisdictional level, Drought was included even though there are relatively few historical event data sets for comparison and very little way to estimate future probabilities of severe to extreme drought conditions.

Table 4.2
Kentucky River ADD
Identified Hazards – Little to No Impact for Region

Hazard	How Identified	Why Identified
Earthquakes	• Historical Events 4 in the last 100 years • Input from local officials • Public Input	• Slight potential impact to southern Leslie County, southern Perry, and southern Letcher Counties • PGA Map shows the region as a PGA of .19 to .12 • According to FEMA Publication 386-2, Understanding your Risks, page 1-7, risk areas with <.20 PGA do not need to evaluate further.
Hurricanes	• Review of past disaster damage • Local DEM office Records • Local Officials Input • Public Input • Review of Existing Reports	• Region is not located in a coastal zone • Region has not historically been impacted by any hurricanes • Flooding from the resulting Heavy rains are the main area of concern for the region
Tsunamis	• Tsunami hazard map	• Region is not in a coastal zone
Dam/Levee Failure	• Kentucky Division of Water • Federal Mine Safety Admin. • Structure listings for the eight counties • Increased risks due to drought/flood • Potential for damage and loss of life • Existing structures identified to be at risk	• Even though potential damage/loss of life is high, potential for structure failures is low due to inspections and other state/federal requirements
Volcanoes	• USGS Volcano Hazards • Local Input	• No active volcanoes in the region • No historical evidence of volcanoes in the region

The Subcommittees – using local input, then established by the RMPC, and finally agreed upon by the KRADD Board of Directors – prepared this minimal impacting hazards list. The RMPC will re-evaluate the above minimal impacting hazard in order to determine if they should be upgraded to priority Hazards in future updates.

4.2 44 CFR §201.6(c)(2)(i) Profiling Hazard Events:

The purpose of the profile is to identify the probability of, magnitude (including variances in the magnitude of like hazard events) and extent of, the impacts from, and the vulnerabilities to those hazard events that have impacted the planning area and (to the extent possible) conditions within the planning area that may increase or reduce the effects of hazards, e.g. topography and soil conditions.

Determination of the probability of the occurrence of future events of each identified hazard was accomplished through analysis of data on past events and an analysis of data from sources mentioned in Chapter 3 and other information sources as listed in the references (later in the document) which may identify potential hazard events not identified by recent historic records. Attached are the hazards frequency tables which incorporate the data into table formats both for the region and the participating jurisdictions. The best available data was used for the hazard analysis and has been identified on a map showing the areas affected by each identified hazard along with reoccurring damage areas.

Each hazard event was first reviewed on a historical basis. What was (were) the event(s) of record? Each were evaluated and considered on the probability of a successive event of equal size, then upon the likelihood of an even larger event occurring. These variances were reviewed for each identified hazard determined to have a significant impact on the region. Impacts of recent human activity was reviewed and considered when compiling the data and for analyzing potential variances. Such things as coal mining – both strip mining and underground mining – were considered, as well as areas of heavy deforestation due to excessive logging, or recent development.

The impact on the citizens of the region were considered, using population densities and past events' impacts upon those populations. Interruption of services such as water, sewer, electrical, emergency services, and gas service were considered and incorporated as well as the potential displacement of residents and businesses. Loss of transportation routes and the subsequent needs of area residents were also considered in the overall evaluations as well as in the individual jurisdictional impacts from each identified hazard with potential for reoccurring events within the foreseeable future. Each identified hazard was reviewed for historical and potential future interruption of emergency services, ambulance, fire protection, and healthcare resources. Environmental impacts, where appropriate, were taken into account and included erosion, siltation, plant and wildlife disruption, and potential contamination of waterways from manmade pollutants. The historical and potential impacts upon roadways, bridges, rail transportation, and airport impacts have also been included. The following hazard profiles were developed using the best available data from a variety of sources either referenced by footnote and/or included in the general references at the end of this section.

RISK ASSESSMENT: HAZARD PROFILES
KENTUCKY RIVER ADD

FLOODS

A flood, as defined by the National Flood Insurance Program is[6]: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:

- Overflow of inland waters,
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- A mudflow

Or a collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood."

Description:

A flood is a natural event for rivers and streams. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains. **Floodplains** are lowlands, adjacent to rivers, and lakes that are subject to recurring floods. Floodplains in the Kentucky River Area Development District are home to over seven thousand households.

Flooding 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 river flooding.

Floods have been the number-one natural disaster in the Kentucky River Area Development District in terms of number of lives lost and value of property damage. Most communities in the eight counties have experienced some kind of flooding, after spring rains, heavy thunderstorms, or winter snow thaws. Floods are the number-one weather-related killer. Floods can be slow or fast-rising, but generally develop over a period of days.

In most years flooding accounts for or is involved with the greatest majority of Federal disaster declarations. Floods generally claim about one (1) life on average per year in the region and are responsible for more damage to property each year than any other type of weather hazard[7].

Factors determining the severity of floods:

- Rainfall Intensity and Duration:
    - Large amount over a short time can result in Flash Flooding
    - Small amounts may cause flooding where the soil is 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.

[6] https://www.fema.gov/national-flood-insurance-program
[7] Citation is National Severe Storms Laboratory

Types of Flooding:

Floods are the result of a multitude of naturally occurring and human-induced factors, but they all can be defined as the accumulation of too much water in too little time in a specific area. Types of floods that may affect the eight counties of KRADD include: river or Riverine floods; flash floods; dam- and levee-failure floods; and debris, landslide, and mudflow floods.

A. Regional Flooding

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 (Perry, 2000). 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 (Perry, 2000).

B. River or Riverine Floods

A river flood 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.

C. Flash Floods

Flash Floods are quick-rising floods usually occurring 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 minutes to several hours, with little warning. Flash floods can be deadly because they produce rapid rises in water levels and have devastating flow velocities.

Several factors can contribute to flash flooding. Among these are rainfall intensity, rainfall duration, surface conditions, and topography and slope of the receiving basin. Mountainous areas are susceptible to flash floods, as steep topography funnels runoff into narrow stream basins. Fire damage areas, strip mining, and logging operations can greatly increase the volume and debris flows associated with flash flooding. Floodwaters accelerated by steep stream slopes can cause the flood wave to move downstream too fast to allow escape, resulting in many deaths

Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods occur with little or no warning and can reach full peak in only a few minutes.

They can also be caused by ice jams on rivers in conjunction with a winter or spring thaw, or occasionally even a dam break, though very few of these types of occurrences have been documented in the region. The constant influx of water finally causes a treacherous overflow; powerful enough to sweep vehicles away, roll boulders into roadways, uproot trees, level buildings, and drag bridges off their piers.

D. Debris, Landslide, and Mudflow Floods

Debris or landslide floods are created by the accumulation of debris, mud, rocks, and (or) 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 as the dam is breached and rapidly washes away. Landslides can create large waves on lakes and can be deadly (Perry, 2000).

Most lives are lost when people are swept away by flood currents, whereas most property damage results from inundation by sediment-laden water. Flood currents also possess tremendous destructive power, as lateral forces can demolish buildings and erosion can undermine bridge foundations and footings leading to the collapse of structures (Perry, 2000).

E. Flood Facts

- Most flood-related deaths are due to flash floods.
- Fifty percent of all flash-flood fatalities are vehicle related.
- Most homeowners' insurance policies do not cover floodwater damage.
- Approximately seven thousand homes are located in flood-prone areas within the eight county region.
- Flooding has caused the deaths of more than 100 people since 1900.
- More than $8 million in flood damages has occurred in the eight county region for the federally declared flood disasters of 1997-2003. Since 2009, the Commonwealth of Kentucky has experienced 15 presidential disaster declarations that involved flooding. Of those 15 since 2009 (to 2018), 12 have included at least one of the counties in the Kentucky River ADD region has been a part of the declaration. And considering one of those two declarations from which Kentucky River ADD counties were excluded was a Louisville/Jefferson County-only Individual Assistance (IA)-dependent declaration (DR-1855 in 2009), it is telling to revise that 12 of the 14 statewide presidential disaster declarations from 2009 to 2018 has included a county within the Kentucky River ADD region.
- There is about 1 death on average per year in the region due to flooding.
- About one-third of insurance claims for flood damages are for properties located outside identified flood hazard areas.
- Under normal conditions floods do not cause damage. Damage occurs when structures are built in flood-prone areas. The topography of eastern Kentucky greatly limits areas of development; because of this many, structures are located within flood prone areas.

Conditions that may exacerbate the effects of floods:

Impermeable Surfaces	Contamination
Steeply sloped Watersheds	Soil Saturation
Constrictions	Velocity
Obstructions	Development without adequate elevation or flood proofing
Debris	
Storm Sewer Backup	

Common Terms:

100-Year Flood Plain: The area that has a 1 percent chance, on average, of flooding in any given year. Also known as the Base Flood.

500-Year Flood Plain: The area that has a 0.2% chance, on average, of flooding in any given year.

Base Flood: represents a compromise between minor floods and the greatest flood likely to occur in a given area. The elevation of water surface resulting from a flood that has a 1% chance of occurring in any given year.

Floodplain: A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess floodwater. The floodplain is made up of two sections: the floodway and the flood fringe.

Floodway: The NFIP floodway definition is "the channel of a river or other watercourse and adjacent land areas that must be reserved, in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot". The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties. Floodways are not mapped for all rivers and streams but are generally mapped in developed areas. Unlike floodplains, floodways do not reflect a recognizable geologic feature.

Flood Fringe: The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward. Land area outside of the stream or river floodway, but is subject to inundation by regular flooding.

Annual flooding occurs much more frequently than the 100-year flood and, over time, may in fact produce a much greater risk to the structure.

Flooding In the Kentucky River ADD

History of Flooding

Flooding is the most significant natural hazard in the Kentucky River ADD in terms of reoccurring damage and total annualized loss. Major flooding occurs within the region almost every year and it is not unusual for several floods to occur in a single year. In recent history, significant floods occurred in 1977, 1978, 1989, 1997, three times in 2001 and 2002, in 2003 (in which all eight counties were declared disaster areas), in 2015, and in 2018. For particularly telling perspective, in 2015, the President declared three disaster events that each included flooding as severe enough to warrant Public Assistance and the subsequent HMGP program. These disaster declarations in 2015 occurred within days of each other: DR-4216 was declared on April 29, 2015; DR-4217 was declared on May 1, 2015; and DR-4218 was declared on May 12, 2015. In all three (3) of these declarations, Kentucky River ADD counties were involved. And in DR-4218, all of Kentucky River ADD's counties save Wolfe County was a part of the declaration that allowed for Public Assistance. At the time of this plan revision for FEMA (April 12, 2018), Kentucky River ADD's counties have been involved in another presidential disaster declaration, DR-4358. All eight (8) of Kentucky River ADD's counties were a part of the April 12, 2018 declaration.

An Overview of Kentucky River ADD Waters

- Major Drainage Basins: 6
- Average Rainfall: 45 to 48 inches
  - o Maximum during winter and spring
  - o Minimum during late summer and fall
- Miles of Rivers and Streams: 5,766
- Acres of wetlands: < 20
- Number of Reservoirs > 1,000 acres in size: 1
- Acres of public-owned lakes & reservoirs: 1,945

KY NREPC Division of Water. Please see website http://www.water.ky.gov

Two types of flooding have historically occurred in the eight county Kentucky River ADD region: flash floods and river basin or riverine floods.

Flash flooding occurs in all parts of the eight county area as the result of excessive rainfall over a short time. Flash flooding prevails in the region where it is abetted by mountainous terrain, many narrow gorges and many streams and riverbeds. Flash floods can happen any time of the year, but are more prevalent during spring and summer months. Flash flooding has impacted every jurisdiction within the region.

River basin flooding is more common during winter and early spring (February to April). This flooding is common along the Kentucky and upper Cumberland River basins. Cities such as Whitesburg, Fleming-Neon, Hazard, Hyden, Jackson, Hindman, and Booneville have been seriously affected by and are particularly susceptible to flooding from these sources and during these seasons. Portions of all of the eight counties are subject to river flooding. Every two to three years, serious flooding occurs along one or more of the Kentucky River's major streams and it is not unusual for this to occur several years in succession.

All of the Kentucky River ADD's eight counties currently have digital floodplain maps available, current to at least 2006[8]. The information used for this plan was the best available and developed using information provided during the Subcommittee meetings and the RMPC meetings. Local officials, DEM officers, and regional DEM personnel provided information on the floodplain areas and estimates of potential flood prone structures.

[8] Knott and Letcher Counties' Flood Insurance Rate Maps (FIRMs) for All Jurisdictions are current to 2015. Owsley County's FIRM is current to 2009. Breathitt, Lee, and Wolfe Counties' FIRMs are current to 2008. Leslie County's FIRM is current to 2007. It is Perry County's FIRM that is current to 2006.

1939

During the period of July 4th and 5th of 1939 the worst flash flood to hit the state of Kentucky occurred on the small watershed of Frozen Creek in Breathitt County. A total of 57 area residents lost their lives. The estimated total damage for Breathitt and Rowan County was $5,000,000 in 1939 dollars.

(Louisville Courier-Journal, July 6, 1939)

1957

In the 1957 flood, the water engulfed homes and businesses in Hazard on January 29. Every business felt the tremendous surge of thousands of tons of water from the Kentucky River. Cars were tossed like matchsticks, store windows were crushed, and merchandise was scattered through the streets. The WKIC Studios in the basement of People's Bank were completely submerged.

Please see this website http://hazardky.gov/

1957 Flood North Fork River, Main Street, Hazard, Perry County, Kentucky

1977

During the period April 2-5, 1977, widespread rains fell over the Appalachian region of Kentucky. The heaviest rain fell on April 4 over the headwater areas of the Kentucky River. Major damages occurred along the North Fork of the Kentucky River. Five of the eight Kentucky River ADD counties received a federal disaster declaration because of this flood. Estimated damages were more than $3 million.

1978

The pattern of rainfall and resultant flooding which occurred in December 1978 was similar to other floods that have occurred in Kentucky. Heavy flood producing rains occur more frequently during the months of December through March. Various conditions influenced the intensity of the flooding that resulted from the December 7-10 storm. The storm entered the southwest corner of Kentucky River ADD and moved northeast across the region producing large rainfall totals for the counties of Breathitt, Leslie, and Lee of the eight county district. The soils throughout the area were saturated and stream flows were above normal base flows. Severe flooding occurred on the Kentucky River. Lesser flooding was reported in the Cumberland River basin. Three counties received a federal disaster declaration because of this flood and property damage at approximately $2 million.

1989

Precipitation was above normal in the Kentucky River ADD district for the months of December 1988 and January 1989 following an extreme drought during the summer and fall of 1988. By the end of January 1989, minor flooding had occurred on most rivers and streams in Region, setting the stage for major flooding in February 1989. During the time period of February 12th through February 16th rain totals were 3 to 6 inches for the eight county region. The heaviest rainfall occurred in the watersheds of Kentucky River. Another storm developed four days later resulting in an additional 1 to 2 inches of rain during the 24 hours ending the morning of February 21.

The river basin most severely affected was the Kentucky. Flood control measures are in place at Buckhorn on the Middle Fork and Carr Creek on the North Fork which helped reduce flood damage. However, there was extensive flood damage along the tributaries to these rivers due to the excessive rainfall and the inability of the streams to handle the large volume of water.

The first part of June1989 was extremely wet which made rivers and streams in southeastern Kentucky higher than normal. During the 24-hours ended 7:00 a.m., E.D.T. on June 15th, between one and one-and-a-half inches of rain fell over sections of the region. That afternoon thunderstorms and showers again moved into the area and dumped another one to one-and-a-half inches of rain. By the evening of the 15th, the ground was saturated and small streams were high. Additional showers moved over the ridge that separates the Upper Cumberland River Basin from the three forks of the upper Kentucky River. Over the next several hours, steady rain fell which resulted in the worst flash flooding the area had experienced since 1984. The magnitude of the flash flood indicated that up to five inches fell in a 12-hour period. The center of the heaviest rain may have occurred in the area where Leslie, Clay and Bell Counties adjoin. The flash flooding in this area later triggered river flooding in Booneville, Hazard, Jackson and Heidelberg in the upper Kentucky River basin. The flash flooding not the river flooding caused the majority of the damage.

Damages were reported in Knott, Leslie, and Letcher Counties. Much of the damages were due to roads and bridges being washed out and mudslides effecting roads and homes. Over fifty homes were damaged and more than a half dozen were destroyed. Many of the homes were manufactured homes.

Initial estimates of damages from this flood were over $3 million. No loss of life or fatal injuries could be attributed to this disaster. On June 30, 1989, the President declared that a disaster existed and federal assistance would be made available to the counties of Knott and Leslie. On July 8, 1989, Letcher County was added to the declaration, with Breathitt and Owsley being added on July 12, 1989. This made a total of five of the area's eight counties receiving assistance under this Presidential declaration.

Widespread heavy rains began to fall over most of Kentucky on October 16, 1989 as remnants of Hurricane Jerry moved into the Ohio River Valley. On October 17th, rainfall totaling 4 inches was reported in many locations across the state while some locations reported as much as 6 inches within 36 hours. Flooding was reported in Letcher, Leslie, Perry, Owsley, and Knott counties. Flooding was reported in the basins of the Kentucky, and Cumberland Rivers. Evacuations were reported in Leslie, Perry, and Letcher Counties. Preliminary reports indicated that over 50 homes had been seriously impacted. Widespread damage to roads and bridges was also reported.

On October 19th, the Governor formally requested FEMA to conduct a joint federal/state survey of

damages to determine needs for federal assistance. When joint surveys were conducted on October 21st, damages were noted in the counties of Knott, Perry, Leslie, and Owsley. Preliminary estimates indicated public damages totaling over $3 million with private damages of over $1 million. In addition, the business losses were approximately $100,000. On October 23rd, the Governor forwarded a request to the President that a major disaster be declared in Kentucky. Notification was received on October 30th that the President had approve the request for a Presidential declaration for the counties of Knott, Leslie, Letcher, Owsley, and Perry.

1997

Starting on February 28, 1997, heavy rainfall associated with a cold front brought significant precipitation to the Ohio River Valley from western Kentucky and continuing on in to West Virginia. The counter clockwise rotation of the low brought moisture up from the Gulf of Mexico, dropping up to 4 inches of rain in some parts of Kentucky River ADD Counties. Out of the 8 KRADD counties, 6 were declared federal disaster areas with total damage exceeding $2.3 million for the event.

2001

Three of the eight KRADD Counties received disaster declarations: Knott, Letcher and Perry sustaining approximately $1.4 million in damages.

2002

Thirty counties declared state wide with seven of those in the KY River ADD region; Breathitt, Knott, Lee, Leslie, Owsley, and Perry a total damage of more than $4.4 million was documented.

2003

A total of 32 counties declared statewide with all eight counties in the region being declared in at least one of three declarations for the year. Designated Counties for Kentucky Severe Storms, Flooding, Mud and Rock Slides, and Tornadoes Declaration Date: July 2, 2003; Incident Type: Severe Storms, Flooding, Mud and Rock Slides, and Tornadoes included: Breathitt, Knott, Leslie, Owsley, Perry, and Letcher Counties were included in the presidential declaration.
May 4-27, 2003 flooding impacted Breathitt, Perry and Owsley Counties.
February 15-26, 2003, winter storm with flooding and wind damage; all eight counties were declared. Almost 1.5 million in damages were reported for public facilities alone. The most affected facilities were public roadways, bridges and culverts.

2004

Damages from severe storms, tornadoes and flooding occurred between May 26 and June 18 resulted in 78 disaster-declared counties and $12,904,182 approved for repairing disaster-damaged, uninsured or underinsured homes to a safe, sanitary and functional condition and for temporary disaster rental assistance; $6,767,195 approved for other needs assistance, which may include grants for medical, funeral, personal property, transportation and other eligible expenses. 401 applications for U.S. Small Business Administration (SBA) low-interest home and business disaster loans approved, totaling almost $17.3 million. Another 161 Public Assistance projects

totaling almost $1.5 million for reimbursement to state, local and public sector agencies for disaster-related costs has also been approved. All eight (8) Kentucky River ADD counties were included in this disaster declaration.

2007
Federal Emergency Management Agency (FEMA) declared that federal disaster aid has been made available for Kentucky to supplement commonwealth and local recovery efforts in the area struck by severe storms, flooding, mudslides and rockslides during the period of April 14 -15, 2007. The counties impacted in the Kentucky River Region included Leslie, Perry and Knott.

2009
Kentucky Severe Storms, Tornadoes, Flooding, and Mudslides –FEMA-1841-DR
Declared May 29, 2009
In a letter dated May 13, 2009, and an amended letter dated May 22, 2009, Governor Steven L. Beshear requested a major disaster declaration due to severe storms, heavy rain, flooding, high winds, tornadoes, and mudslides during the period of May 3-20, 2009. The Governor requested a declaration for Individual Assistance for 12 counties; Public Assistance, including direct Federal assistance for 22 counties; and Hazard Mitigation for the entire Commonwealth. The Governor further requested 100 percent Federal funding for Public Assistance (Categories A and B), including direct Federal assistance, for the first seven days. During the period of May 22-24, 2009, joint Federal, Commonwealth, and local Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the State and the affected local governments, and that Federal assistance is necessary.

On May 29, 2009, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration made Individual Assistance requested by the Governor available to affected individuals and households in Breathitt, Floyd, Owsley, and Pike Counties. This declaration also made Public Assistance requested by the Governor available to Commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornadoes, flooding, and mudslides in 22 counties. Direct Federal assistance also was authorized. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for the entire Commonwealth.
Commonwealth of Kentucky (**FEMA-1912-DR**), dated May 11, 2010, and related determinations President Obama determined that the damage in certain areas of the Commonwealth of Kentucky resulting from severe storms, flooding, mudslides, and tornadoes beginning on May 1, 2010, and continuing, is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 et seq. (the "Stafford Act"). Therefore, I declare that such a major disaster exists in the Commonwealth of Kentucky.

2010

WASHINGTON, D.C. -- Then head of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA), Craig Fugate, announced that federal disaster aid had been made available to supplement Commonwealth and local recovery efforts in the area struck by severe storms, flooding, mudslides, and tornadoes that began on May 1, 2010. Counties included in the declaration were Knott, Lee, Leslie, and Wolfe.

2011

On July 13, 2011, Governor Steven L. Beshear requested a major disaster declaration (FEMA-4008-DR) due to severe storms and tornadoes, and flooding during the period of June 19-23, 2011. The Governor requested a declaration for Individual Assistance for five counties, Public Assistance for seven counties and Hazard Mitigation for the entire Commonwealth of Kentucky. The Governor further requested 100 percent Federal funding. During the period of June 23 to July 10, 2011, joint Federal, Commonwealth, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the Commonwealth and the affected local governments, and that Federal assistance is necessary.[1]

On July 25, 2011, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration made Public Assistance requested by the Governor available to Commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornadoes, and flooding in Breathitt, Knott, Lee, and Perry
Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for the entire Commonwealth.[2]

2014

On September 22, 2014, Governor Steven L. Beshear requested a major disaster declaration (FEMA-4196-DR) due to severe storms, flooding, landslides, and mudslides during the period of August 18-23, 2014. The Governor requested a declaration for Individual Assistance for Floyd County; Public Assistance for four counties; and Hazard Mitigation throughout the commonwealth. During the period of September 10-12, 2014, joint federal, commonwealth, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the commonwealth and the affected local governments, and that Federal assistance is necessary.[1]
On September 30, 2014, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration made Public Assistance requested by the Governor available to commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, flooding, landslides, and mudslides in Knott County. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures throughout the commonwealth.[2]

2015

On April 17, 2015, Governor Steven L. Beshear requested a major disaster declaration (FEMA-2016-DR) due to severe winter storms, snowstorms, flooding, landslides, and mudslides during the period of February 15-22, 2015. The Governor requested a declaration for Public Assistance, including snow assistance for 64 counties and Hazard Mitigation for the entire commonwealth. During the period of March 30 to April 14, 2015, joint federal, commonwealth, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the commonwealth and the affected local governments, and that Federal assistance is necessary.[1]

On April 30, 2015, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration made Public Assistance requested by the Governor available to commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storms, snowstorms, flooding, landslides, and mudslides in Knott, Lee, Letcher, Perry, and Wolfe Counties. This declaration also authorized snow assistance for a period of 48 hours for the counties of Knott, Lee, and Wolfe. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for the entire commonwealth.[2]

On April 23, 2015, Governor Steven L. Beshear requested a major disaster declaration (FEMA-2017-DR) due to severe storms, tornadoes, flooding, landslides, and mudslides during the period of April 2-17, 2015. The Governor requested a declaration for Individual Assistance for 10 counties, Public Assistance for 19 counties and Hazard Mitigation for the entire commonwealth. During the period of April 10-23, 2015, joint federal, commonwealth, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the commonwealth and the affected local governments, and that Federal assistance is necessary.[1]

On May 1, 2015, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration made Public Assistance requested by the Governor available to commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornadoes, flooding, landslides, and mudslides in Breathitt, Lee, Owsley, and Wolfe Counties. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for the entire commonwealth.[2]

On April 27, 2015, Governor Steven L. Beshear requested a major disaster declaration (FEMA-4218-DR) due to a severe winter storm, snowstorm, flooding, landslides, and mudslides during the period of March 3-9, 2015. The Governor requested a declaration for Public Assistance for 68 counties; snow assistance for 44 counties; and Hazard Mitigation for the entire commonwealth. During the period of March 30 to April 12, 2015, joint federal, commonwealth, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity

and magnitude that effective response is beyond the capabilities of the commonwealth and the affected local governments, and that Federal assistance is necessary.[1]

On May 12, 2015, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration made Public Assistance requested by the Governor available to commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storm, snowstorm, flooding, landslides, and mudslides in Breathitt, Knott, Lee, Leslie, Letcher, Owsley, and Perry Counties. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for the entire commonwealth.[2]

On July 24, 2015, Governor Steven L. Beshear requested a major disaster declaration (FEMA-4239-DR) due to severe storms, tornadoes, straight-line winds, flooding, landslides, and mudslides during the period of July 11-20, 2015. The Governor requested a declaration for Individual Assistance for four counties, Public Assistance for 34 counties, and Hazard Mitigation for the entire commonwealth. During the period of July 18 to August 6, 2015, joint federal, commonwealth, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the commonwealth and the affected local governments, and that Federal assistance is necessary.[1]

On August 12, 2015, President Obama declared that a major disaster exists in the Commonwealth of Kentucky. This declaration also made Public Assistance requested by the Governor available to commonwealth and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornadoes, straight-line winds, flooding, landslides, and mudslides in Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, and Wolfe Counties. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for the entire commonwealth.

Kentucky River Basin Total Flood Damage[9] (millions of US dollars/current) Listed by Year*

Flood Damage in the United States, 1926-1974 A Reanalysis of National Weather Service Estimates. NOAA NCDC Tables/FEMA

1955	0.798
1956	0.568
1957	11.761
1958	0.000
1959	0.000
1960	0.003
1961	0.000
1962	4.762
1963	5.913
1964	1.500
1965	0.000
1966	0.00
1967	1.932
1968	0.135
1969	0.118
1970	0.199
1971	0.438
1972	5.026
1973	0.000
1974	0.950
1975	-
1976	-
1977	-
1978	-
1979	-
1980	-
1981	-
1982	-
1983	-
1984	-
1985	-
1986	-
1987	-
1988	-
1989	-
1990	-
1991	-
1992	-

[9] Additional citation of gage data using Peak Flow recordings from USGS gages in order to satisfy "extent" is appended to this plan document.

1993	-
1994	-
1995	-
1996	-
1997	-
1998	-
1999	-
2000	-
2001	-
2002	-
2003	-
2004	-
2005	-
2006	-
2007	-
2008	-
2009	0.163
2010	0.40
2011	-
2012	-
2013	-
2014	-
2015	-

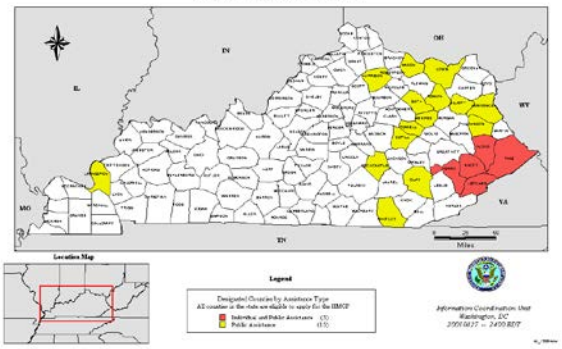
*Years from 1955 to 1974 are calendar years,
- denotes year with missing data
0.000 denotes no estimate was submitted by NWSFO

Recent Disaster Declarations

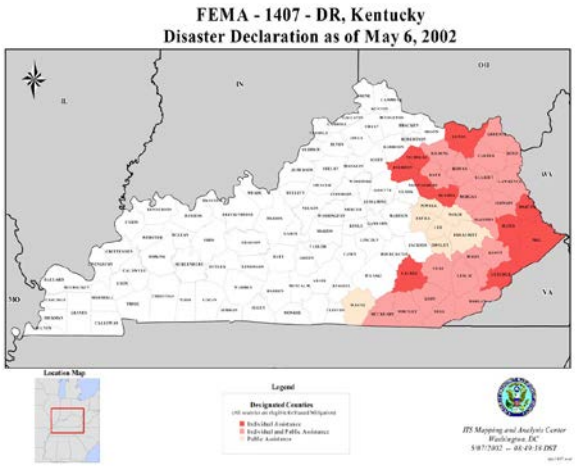
KRADD Counties include Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, and Wolfe. From 2008 to 2016, Kentucky received 18 presidential disaster declarations[10]. Of those 18 declarations, 11 designated counties within the Kentucky River ADD region. Additionally, in November 2016, Kentucky River ADD counties were twice designated for FEMA Fire Management Assistance Grants (FM-5158 and FM-5166).

[10] From 2008, Kentucky has received the following presidential disaster declarations: 1703-DR, 1746-DR, 1757-DR, 1802-DR, 1818-DR, 1841-DR, 1855-DR, 1912-DR, 1925-DR, 1976-DR, 4008-DR, 4057-DR, 4196-DR, 4216-DR, 4217-DR, 4218-DR, 4239-DR, 4278-DR. In 2018, Kentucky received two (2) additional declarations, 4358-DR and 4361-DR. Counties within the Kentucky River ADD region were designated for one of these two (2) 2018 declarations, 4358-DR.

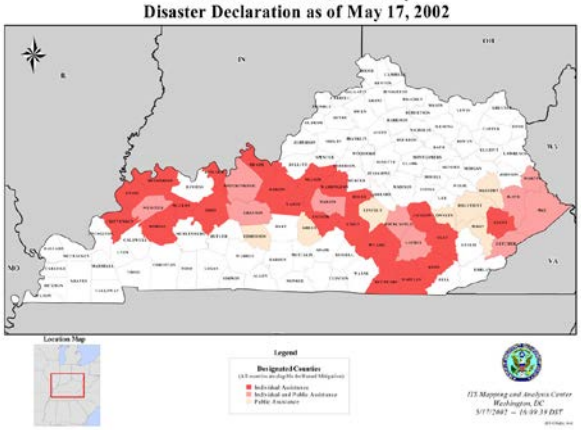
FEMA-1388-DR, Kentucky
as of August 27, 2001



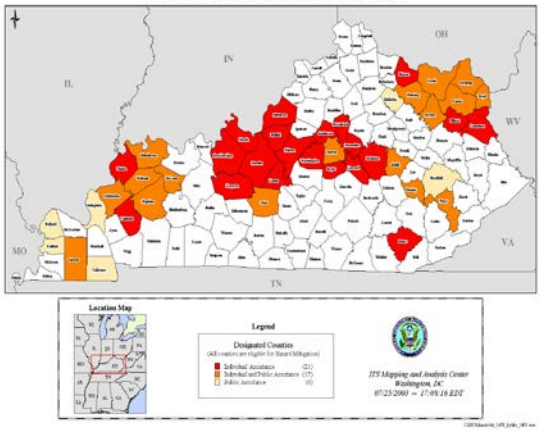
FEMA - 1407 - DR, Kentucky
Disaster Declaration as of May 6, 2002



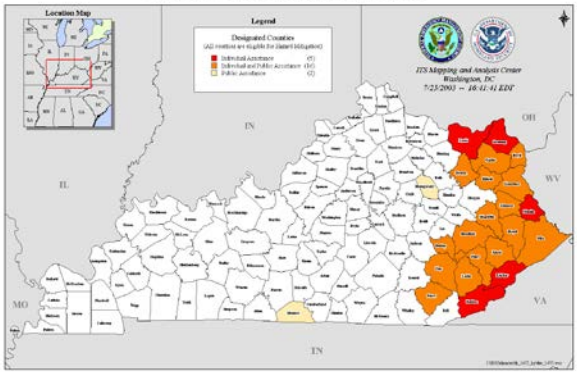
FEMA - 1414 - DR, Kentucky
Disaster Declaration as of May 17, 2002



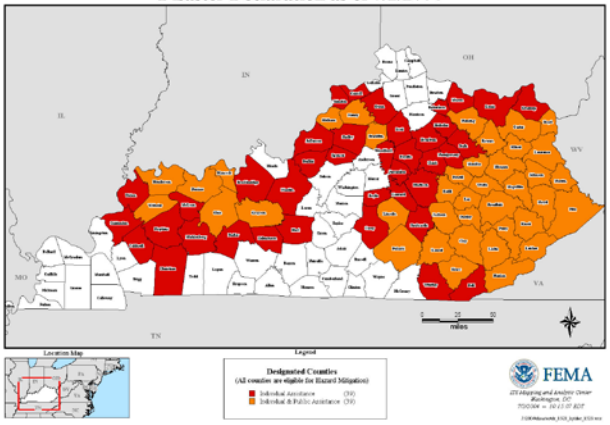
FEMA - 1471 - DR, Kentucky
Disaster Declaration as of 07/25/2003



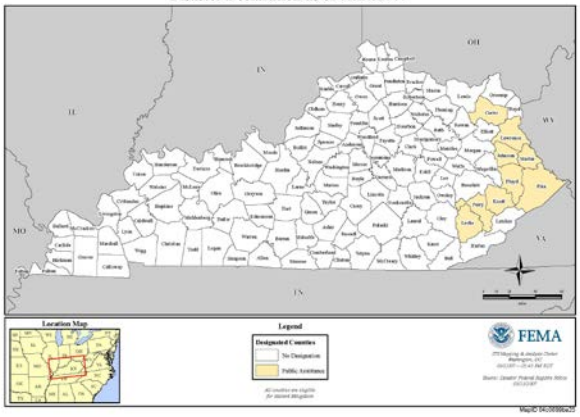
FEMA - 1475 - DR, Kentucky
Disaster Declaration as of 07/25/2003



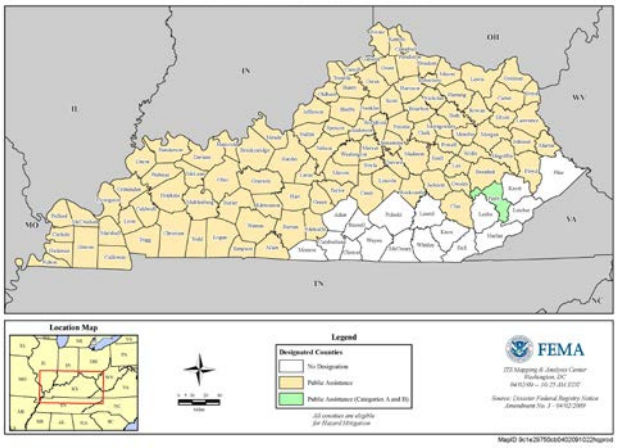
FEMA-1523-DR, Kentucky
Disaster Declaration as of 7/2/2004



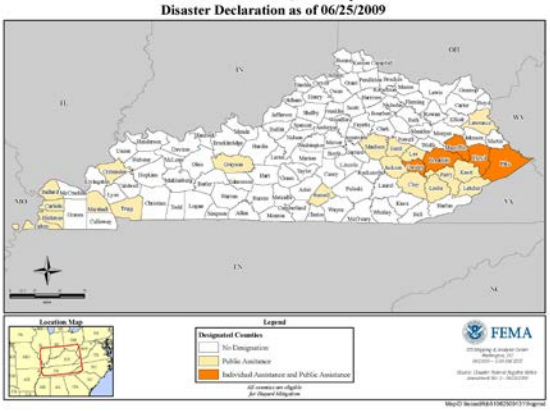
FEMA-1703-DR, Kentucky
Disaster Declaration as of 05/25/2007



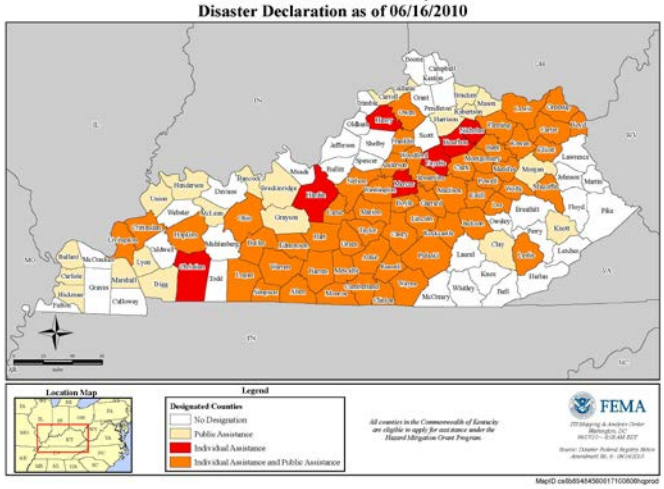
FEMA-1818-DR, Kentucky
Disaster Declaration as of 04/02/2009



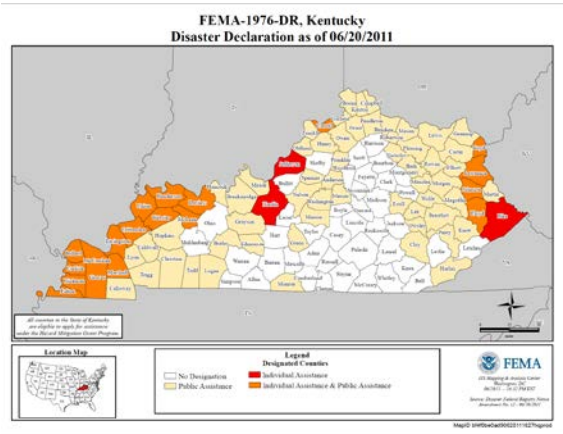
FEMA-1841-DR, Kentucky
Disaster Declaration as of 06/25/2009



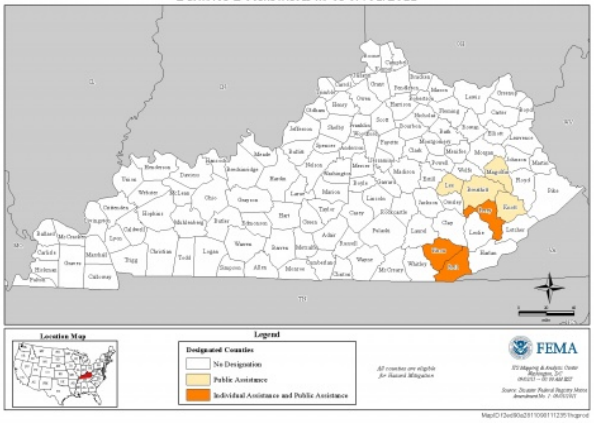
FEMA-1912-DR, Kentucky
Disaster Declaration as of 06/16/2010

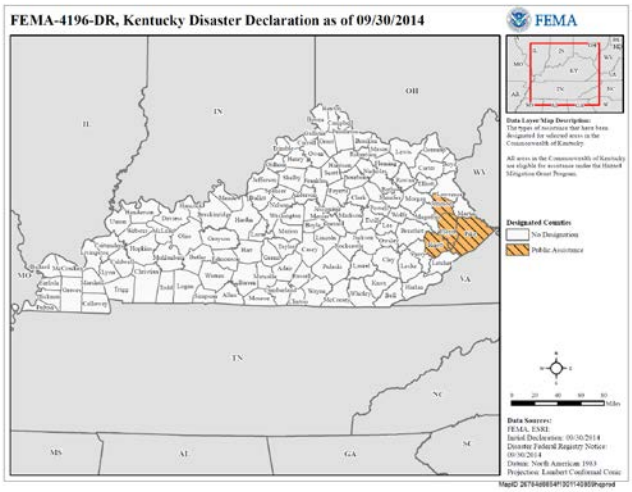


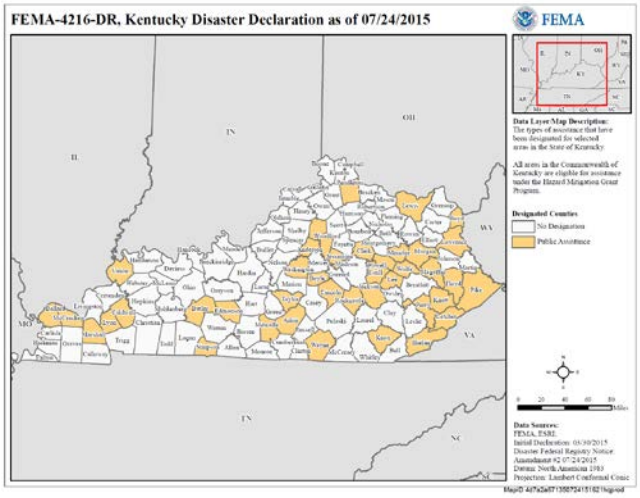
FEMA-1976-DR, Kentucky
Disaster Declaration as of 06/20/2011

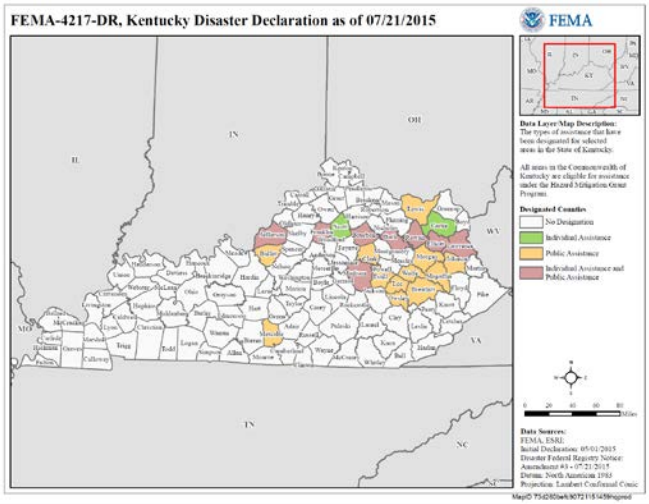


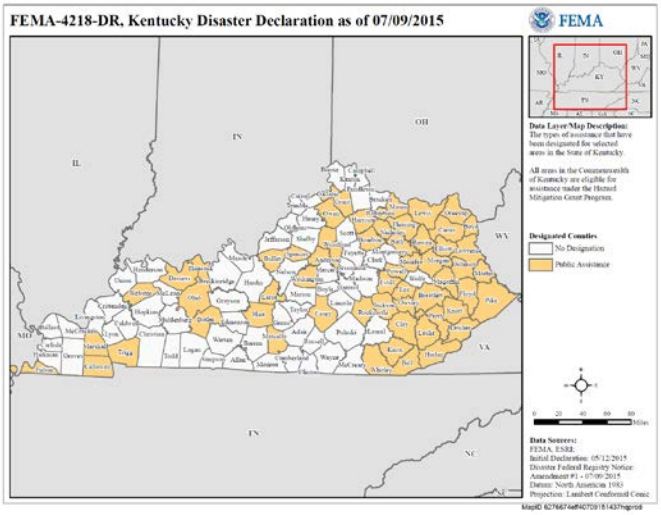
FEMA-4008-DR, Kentucky
Disaster Declaration as of 09/01/2011

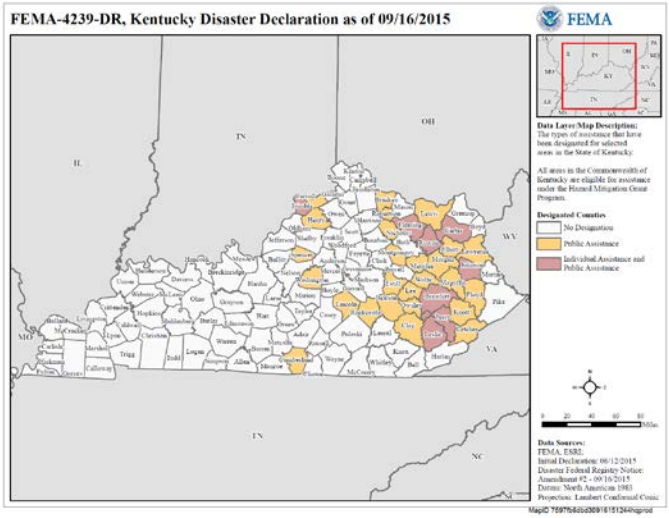



FEMA-4196-DR, Kentucky Disaster Declaration as of 09/30/2014
FEMA
Designated Counties
No Designation
Public Assistance


FEMA-4216-DR, Kentucky Disaster Declaration as of 07/24/2015
FEMA
Designated Counties
No Designation
Public Assistance


FEMA-4217-DR, Kentucky Disaster Declaration as of 07/21/2015
FEMA
Designated Counties
No Designation
Individual Assistance
Public Assistance
Individual Assistance and Public Assistance


FEMA-4218-DR, Kentucky Disaster Declaration as of 07/09/2015
FEMA
Designated Counties
No Designation
Public Assistance


FEMA-4239-DR, Kentucky Disaster Declaration as of 09/16/2015
FEMA
Designated Counties
No Designation
Public Assistance
Individual Assistance and Public Assistance

Severe Repetitive Loss Structure Information

Severe repetitive loss structures are residential buildings that have at least:

(a) Two separate claims payments with the cumulative amount of the claims exceeding the market value of the building; or

(b) Four claims payments over $5,000 each and the cumulative amount of such claims payments exceeds $20,000. The SRL Program is different from the other mitigation grant programs because property owners who decline offers of mitigation assistance may experience an increase in their flood insurance premium to more closely reflect the flood risk to the structure.

The Severe Repetitive Loss Program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (Public Law 108-264), which amended the National Flood Insurance Act of 1968, to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures and reduce claims under the National Flood Insurance Program. The Catalogue of Federal Domestic Assistance (CFDA) number for the SRL Program is 97.110.

The regulations for the SRL Program are codified at Title 44, Code of Federal Regulations Part 79. The goal of the program is to reduce or eliminate claims under the NFIP through activities that will result in the greatest savings to the National Flood Insurance Fund. Eligible activities include Flood-proofing (historical properties only); relocation; elevation; acquisition; mitigation reconstruction (demolition-rebuild); and minor physical localized flood control projects.

The region has a total of five identified severe repetitive loss structures, according to general information provided by the area/local DEM officials. All of those that have been reportedly identified by FEMA are shown to be in Breathitt County and/or the City of Jackson. The general locations are as follows: Rousseau, Smith Branch, and Quicksand in Breathitt County; Combs Street, and HWY 30 in the City of Jackson. These structures are detached single family homes, frame structures. The exact addresses are not available to this office or to the local governments as FEMA considers this data to be proprietary and not subject to access without several levels of security release forms and passwords which we have been unable to obtain. This is necessary to protect the homeowners' private information. The best available data shows these five structures to be frame houses that are of varying ages and values. The structures vary in size from just a little over 1,000 square feet up to approximately 2,200 square feet. All of these properties are well within the zone of the 100-year flood plain. They are highly vulnerable to suffer loss during general flooding events. Without specific data from FEMA we are unable to provide any estimates of potential loss for these structures other than the general data provided by our HAZUS MH model that generalizes loss estimates based upon the 100-year scenario event. The loss estimates generated through the HAZUS model indicate that the overall average cost of repair after an event would be approximately $11,022 each. These numbers are based upon a total of 5,722 structures in the hazard area for Breathitt County with an estimated total value of $315,976,000 value, which is approximately $55,000 value average per structure impacted. For conservative purposes and to provide an overall estimate of repetitive loss estimate the assumption of 20% loss per event was used. This formula was used to derive the $11,022 loss estimate per structure per event. As can be seen from this information the mitigation of removing these properties from the 100-year flood plain, or purchasing them and relocating the occupants would result in a positive cost benefit in very short order. Even if the total cost of the project were to be $80,000 per structure, the positive result would be achieved only after just over a seven-year period. A very quick rate could potentially be realized even with return given the estimated investment of $400,000. There have been no new developments within these areas within the past 10 to 20 years, according to local officials.

The first step identified by the local officials to begin the process of addressing the long-term solutions to existing severe repetitive loss structures as well as to develop solutions that can be applied to future severe repetitive loss structures is to a list of preferred mitigation methods specific to the types and locations of

impacted properties. These solutions may include identification of the willingness of property owners to mitigate their flood losses on a permanent basis; identify priority preferred methods that may include elevating the structures, flood proofing the structures, acquisition, relocation and other allowed mitigations. These would be prioritized in preferred order and each property addressed appropriately with the most cost-effective solution available. Each identified property could be assigned a unique identification number that could be used in day to day processing of the selected mitigation specific to the impacted property. The unique identity number would be used in lieu of proprietary personal information for project development and tracking, including analysis of the cost benefit of the proposed action(s) through the use of the FEMA approved BCA cost benefit analysis software. The results of the analysis may be used to weigh the most beneficial solution to each individual property that would be identified and processed, for mitigation by severe repetitive loss properties program, at the local government level. The local government could maintain a database of priority severe repetitive loss structures and use the priority list to address as many of the properties as could be fiscally managed within a given project grant period. All of these strategies will be developed into the initial plan of action for each local government that has identified severe repetitive loss properties within their jurisdictional boundaries.

NFIP Participation

Overview of Kentucky River ADD Floodplain Management Program

Number of flood-prone communities identified by FEMA:	8 counties out of 8 13 cities of 14
Number of communities that participate in the National Flood Insurance Program:	7 counties of 8 12 cities of 14
Number of communities that participate in the Community Ratings System CRS	0 Counties of 8 0 Cities of 14
Communities receiving comprehensive floodplain assessments since 1984:	4
Presidential flood declarations since 1970:	21

From An Overview of Kentucky's Waters, 2002. Dept. of Environmental Protection. Please see website http://www.water.ky.gov. See also the NFIP Community Status Book.

The City of Campton is currently suspended from the NFIP. Wolfe County was also identified to have areas prone to flooding through the DFIRM update process. Wolfe County does not currently participate in the NFIP. The recent FEMA Digital Flood Insurance Rate Map indicated the areas in Wolfe County with potential for flooding. Wolfe County has not yet adopted the appropriate ordinance in order to participate in the National Flood insurance program. They are currently reviewing a few of the surrounding counties' floodplain ordinances for possible use as models for their own ordinance development. The City of Pippa Passes in Knott Count is not listed anywhere in the FEMA NFIP reports as either having a flood hazard area or as being impacted significantly by flooding. Historically the City has had some minor impacts mainly from flash flooding; however, the extents of damage from these flash floods has not been very well documented and there is little to no substantiated data to utilize as a base for good future impact estimates. For the purpose of this report, we have utilized the HAZUS-MH model to provide the best available data for potential losses within the City of Pippa Passes, Knott County, Kentucky.

Communities Participating in the National Flood Insurance Program

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date
210023#	Breathitt County	Breathitt	01/03/1975	09/27/1985	04/02/2008	09/27/1985
210024#	Jackson, City of	Breathitt	05/17/1974	09/27/1985	04/02/2008	09/27/1985
210340B	Knott County	Knott	11/04/1977	02/01/1987	09/16/2015 (M)	02/01/1987
210130#	Hindman, City of	Knott	05/31/1974	07/01/1987	09/28/2007 (M)	07/01/1987
210135#	Lee County	Lee	10/18/1974	09/27/1985	10/16/2008	09/27/1985
210136#	Beattyville, City of	Lee	05/17/1974	07/03/1978	10/16/2008	07/03/1978
210324#	Leslie County	Leslie	07/29/1977	01/01/1986	09/28/2007	01/01/1986
210137#	Hyden, City of	Leslie	05/24/1974	09/01/1986	09/28/2007	09/01/1986
210289B	Letcher County	Letcher	09/02/1977	08/01/2005	03/16/2015	08/01/2005
210371#	Blackey, City of	Letcher		03/18/2008	03/18/2008 (M)	03/18/2008
210290#	Fleming-Neon, City of	Letcher	03/28/1975	08/19/1987	03/18/2008 (M)	08/19/1987
210138#	Jenkins, City of	Letcher	06/07/1974	06/03/1986	03/18/2008 (M)	06/03/1986
210140B	Whitesburg, City of	Letcher	01/18/1974	12/03/1987	03/16/2015	12/03/1987
210296#	Owsley County	Owsley	06/17/1977	08/05/1985	03/16/2009 (M)	08/05/1985
210187#	Booneville, City of	Owsley	02/01/1974	08/05/1985	03/16/2009 (M)	08/05/1985
215191#	Perry County	Perry	03/30/1973	03/30/1973	08/02/2006	03/30/1973
210005#	Buckhorn, City of	Perry		08/02/2006	08/02/2006	08/01/2013
215188#	Hazard, City of	Perry	03/10/1972	03/10/1972	08/02/2006	03/10/1972
210192#	Vicco, City of	Perry	05/10/1974	09/01/1986	08/02/2006	09/01/1986

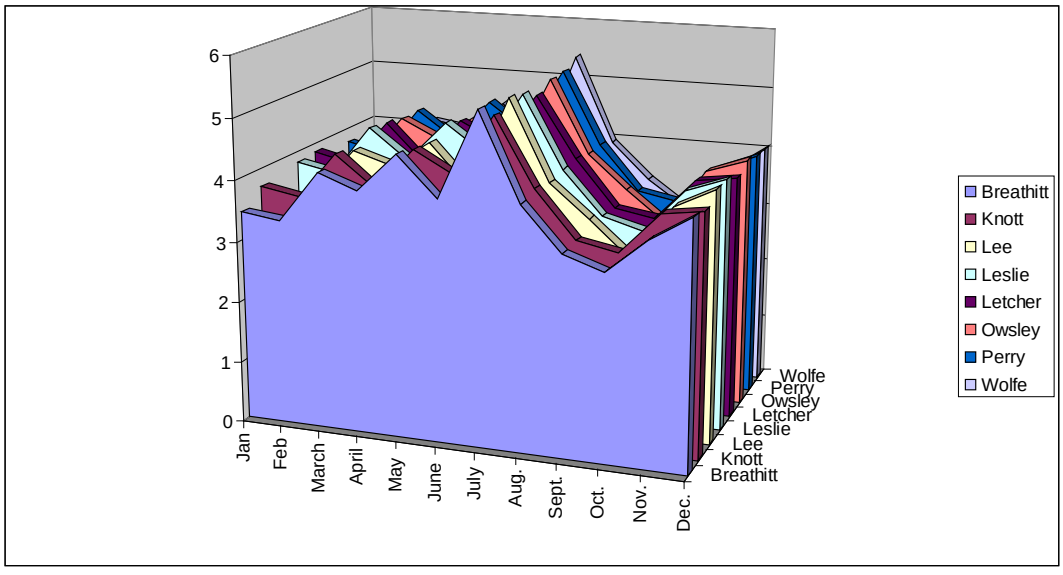
Communities NOT Participating in the National Flood Insurance Program

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Sanction Date
210457B	Pippa Passes, City of	Knott		09/28/2007	09/16/2015	09/28/2008
210349#	Wolfe County	Wolfe		09/17/2008	09/17/2008	09/17/2009
210229#	Campton, City of	Wolfe	05/17/1974	09/18/1985	09/17/2008	02/06/1991 (S)

PRESIDENTIAL FLOOD DISASTER DECLARATIONS BY COUNTY

COUNTY	YEAR OF DECLARATIONS
Breathitt	1970, -72, -77, -78, -84, -89 (twice), -91, -97; 2002 ,-03, -04, -09, -11 (twice), -15 (twice), 2018
Knott	1970, -72, -77, -84, -89 (thrice), -97; 2001, 2002, -03, -04, -07, -09, -10, -11 (twice), -14, 2015 (twice); -18
Lee	1978, -84, -89, -91, -97 ; 2002, -04, -09, -10, -11 (twice), -14, -15 (thrice), -18
Leslie	1970 (twice), -77, -78, -84, -89 (thrice), -97; 2002, -03, -04, -07, -09, -10, -15, -18
Letcher	1970, -72, -75, -77, -82, -84, -89 (thrice), 1997; 2001, -02, -03, -04, -09, -15 (twice)
Owsley	1970, -84, -89 (thrice), -91; 2002, -03, -04, 2009, -11, -15 (twice), -18
Perry	1975, -77, -84, -89 (twice), -91, -97; 2001, -02, -03, -04, -07, -09, -11 (twice), 2015 (twice), -18
Wolfe	1989, -91; 2004, -09, -10, -11, -12, 2015 (twice), -18

(Missing: 1995 that affected 69 counties and 1994 that affected 68 counties)



Average Monthly Rainfall Eight Counties[11]

County	Jan	Feb	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Annual
Breathitt	3.45	3.37	4.2	3.97	4.6	3.95	5.38	3.98	3.28	3.05	3.61	4.03	46.87
Knott	3.71	3.59	4.34	3.84	4.53	4.17	5.16	4.07	3.31	3.18	3.85	3.95	47.70
Lee	3.24	3.51	4.27	4.07	4.49	3.81	5.31	4	3.48	2.91	3.8	4.13	47.02
Leslie	3.82	3.69	4.5	4.02	4.68	4.23	5.24	4.07	3.36	3.19	3.89	4.13	48.82
Letcher	3.86	3.71	4.45	3.84	4.58	4.27	5.1	4.1	3.33	3.23	3.91	3.99	48.37
Owsley	3.43	3.64	4.39	4.09	4.53	3.93	5.24	4.03	3.49	2.98	3.9	4.14	47.79
Perry	3.75	3.59	4.4	3.96	4.65	4.18	5.26	4.05	3.31	3.18	3.8	4.07	48.20
Wolfe	3.17	3.3	4.11	4.01	4.5	3.74	5.4	3.95	3.35	2.91	3.59	4.03	46.06
							Eight County Average for Year						***47.60***

Summary:

All eight Counties and thirteen Cities within the Kentucky River Area Development District are susceptible to various types of flooding. Flash flooding has historically caused the greatest amount of localized flood damage to public roads, bridges, culverts as well as private property. Riverine flooding has from time to time caused extensive and widespread damage over several days. The flooding problem in southeastern Kentucky is compounded due to the step topography, narrow stream and river valleys and a lack of adequate usable property for development outside of flood zones and flood prone areas. A flood event of significant proportion (50- to 100-year event) occurs approximately every 12 to 15 years causing widespread damage over the entire region. Localized flash flooding and minor region-wide flooding occurs almost every year with some years having multiple events, examples are the three declarations of 2003 and six declarations of 2015.

Of all natural hazards flooding by far has caused the most significant losses to the built environment of the eight counties over the past 100 years. Several major flood control projects have been undertaken by the U. S. Army Corps of Engineers over the past 80 years. Flood control dams were constructed on the Middle Fork of the Kentucky River and on the Carr Creek watershed of the North Fork of the Kentucky River. Both of these projects have had moderate effects on the flood elevations within a reasonable zone of influence. There have also been two “cut-through” projects to re-route the North Fork of the Kentucky River. The first located at Jackson Kentucky and the second at Cy-Bend in Breathitt County.

The flash floods usually result in greater losses to public properties in the form of lost roadbeds, bridges and culverts, while the Riverine flooding usually results in more damage to private development, homes, businesses, and office buildings within the river’s floodplain. There is a 100 percent chance of having a flood of significant size in any given year within the eight-county region based upon the number of events in a 100-year record.[12]

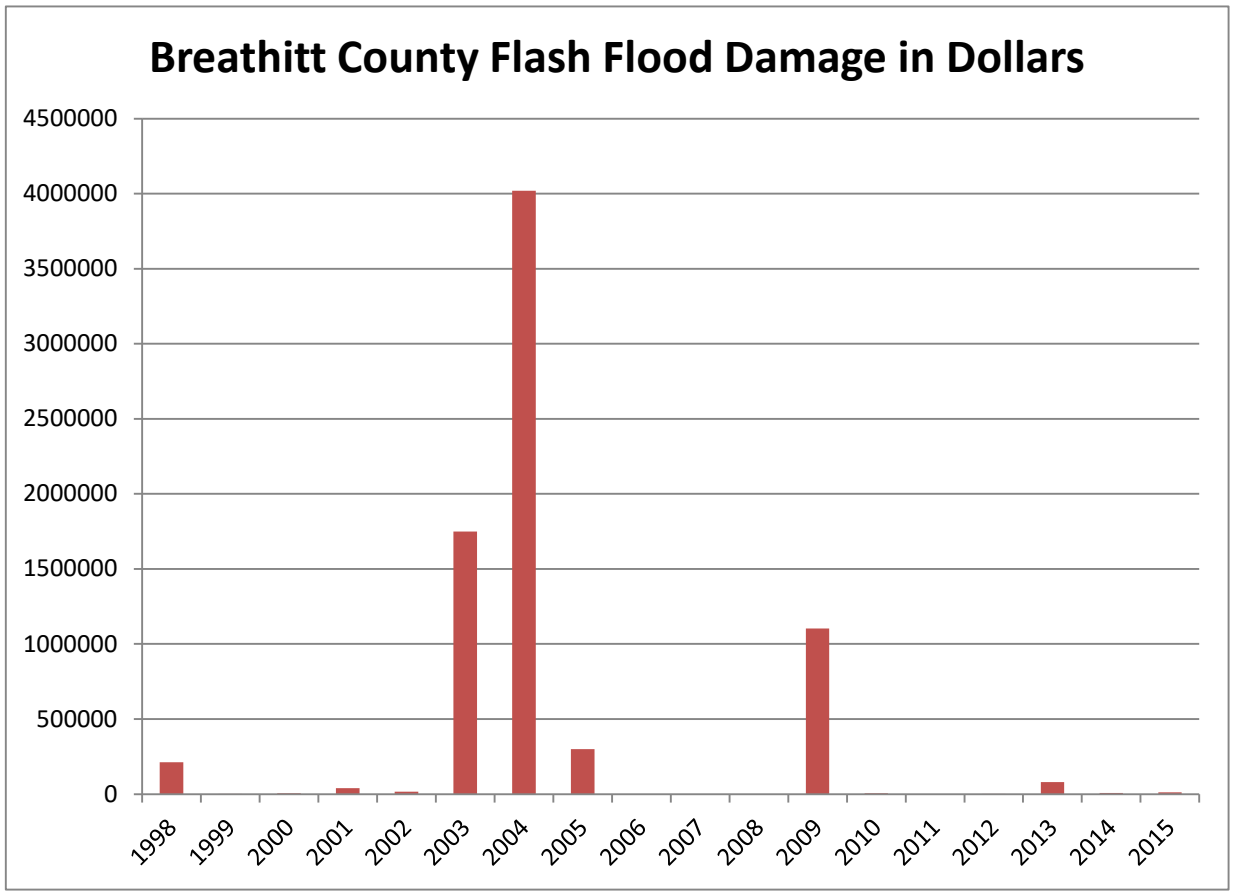
[11] Source: University of Kentucky Agricultural Weather Center: http://wwwagwx.ca.uky.edu/precip.html

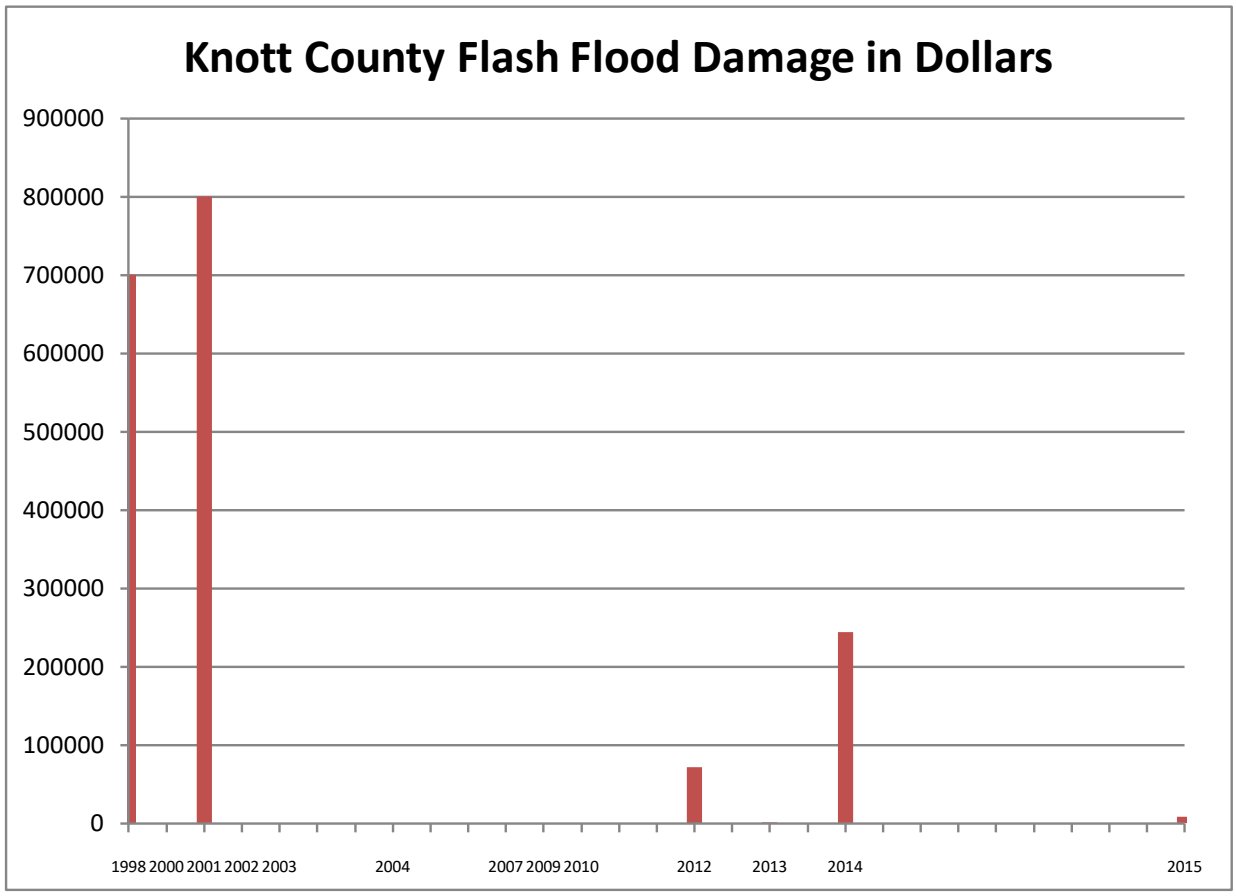
[12] See Flood Hazard Frequency Table at the end of this section.

The soils and topography of eastern Kentucky greatly increase the impacts of flash flooding. The steep terrain, narrow river and stream valleys along with the limited usable property outside the floodplain all contribute to the overall damage to the constructed environment. Large amounts of silt are carried by the floodwaters and deposited in homes, businesses, and public facilities within the region. The surface mining activities in the region contribute to the overall siltation of area streams, as does the virtually unregulated logging industry. The large quantities of silt during a flood event greatly increase the damage as well as the costs of cleanup.

The graphs on the following pages reflect the severity scales of floods in terms of dollars of damage of each associated historical event[13].

[13] Graphs were created using National Climatic Data Center statistics.


Breathitt County Flash Flood Damage in Dollars
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Knott County Flash Flood Damage in Dollars
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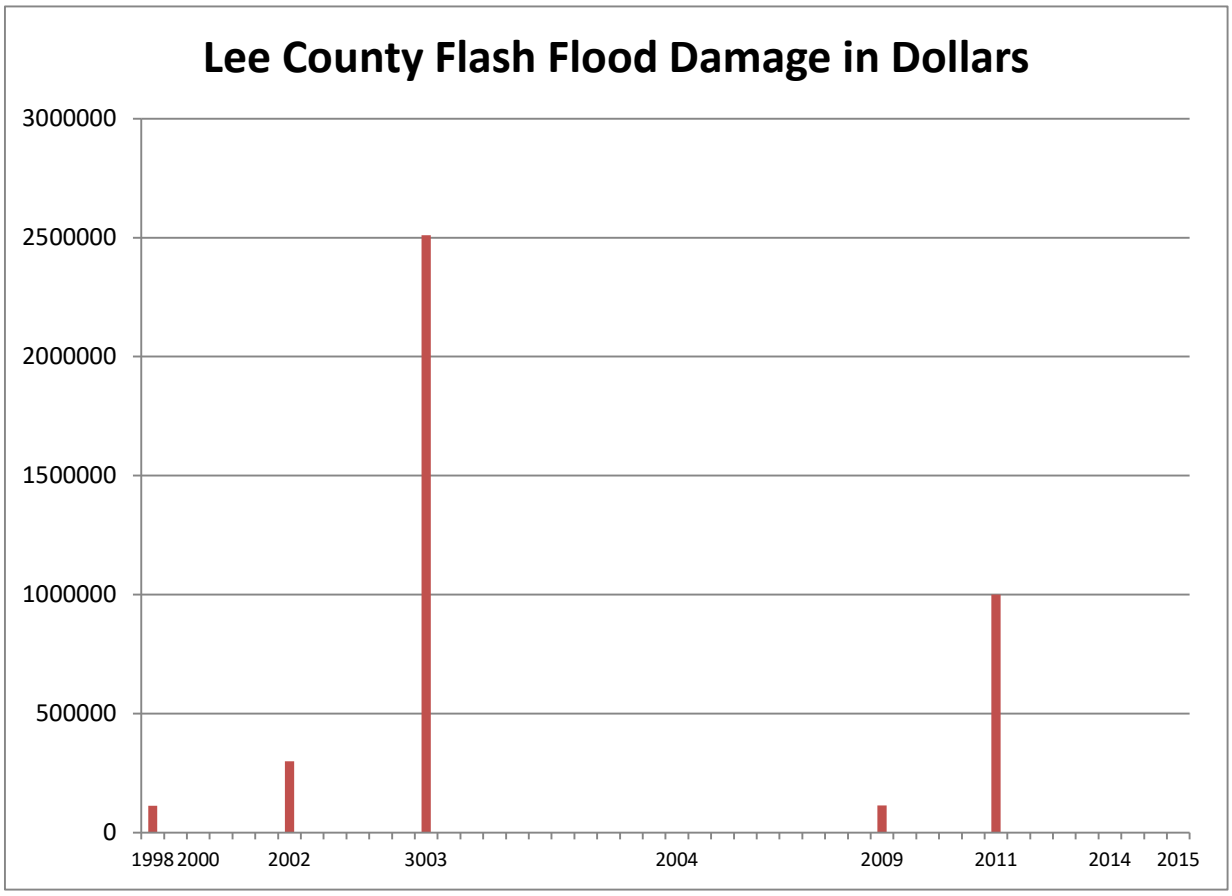
800000
700000
600000
500000
400000
300000
200000
100000
0
1998 2000 2001 2002 2003 2004 2007 2009 2010 2012 2013 2014 2015


Lee County Flash Flood Damage in Dollars
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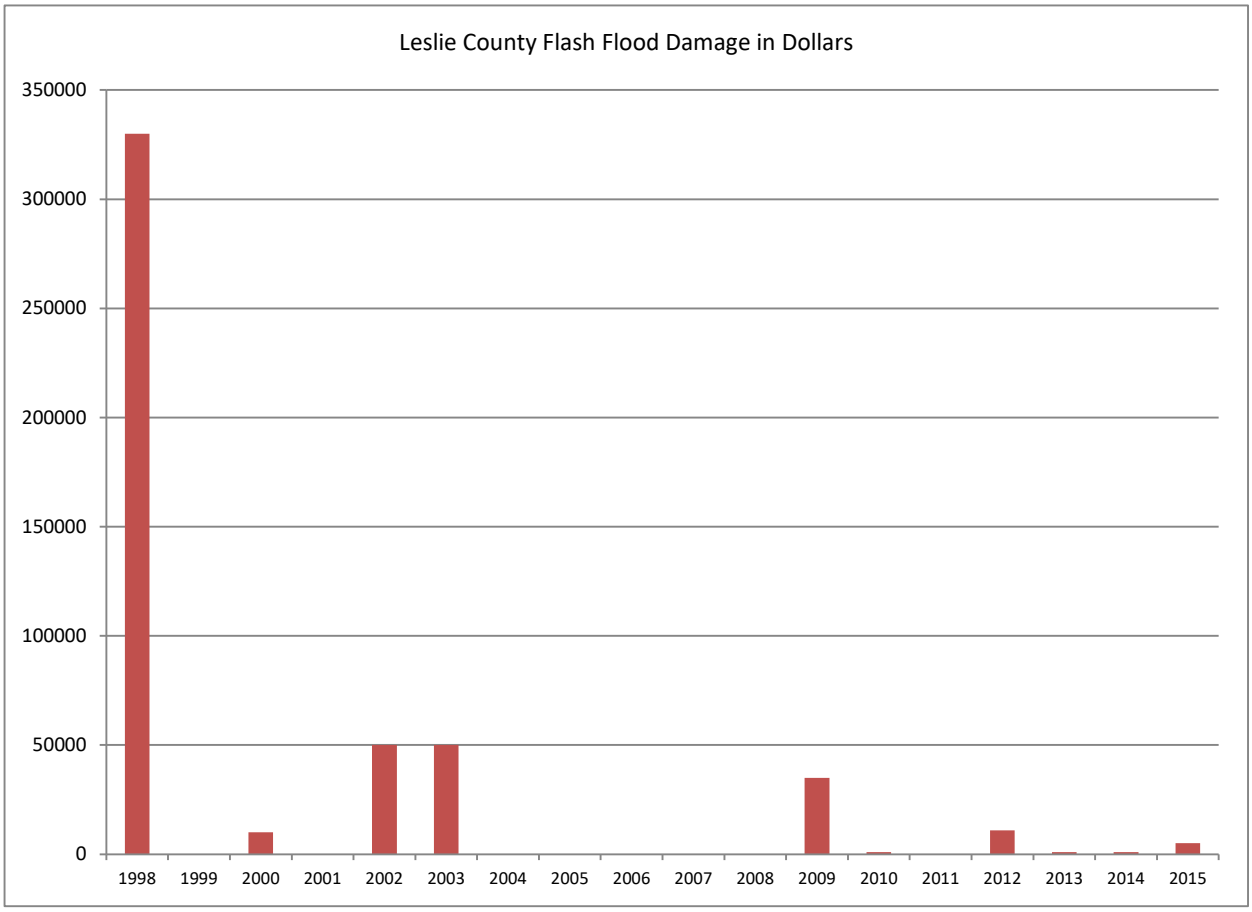
2500000
2000000
1500000
1000000
500000
0
1998
2000
2002
3003
2004
2009
2011
2014
2015


Leslie County Flash Flood Damage in Dollars
350000
300000
250000
200000
150000
100000
50000
0
1998
1999
2000
2001
2002
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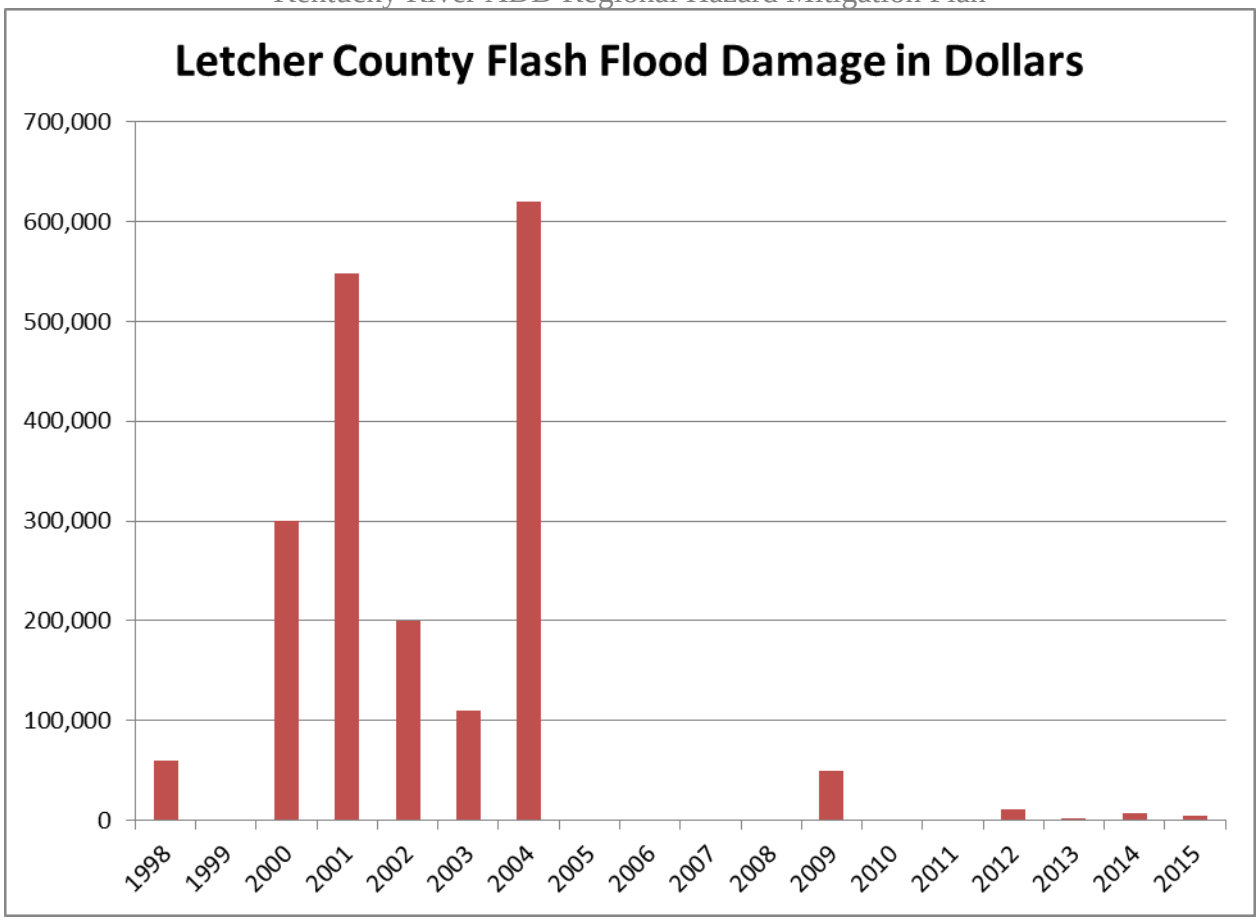
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Letcher County Flash Flood Damage in Dollars
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1998
1999
2000
2001
2002
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2006
2007
2008
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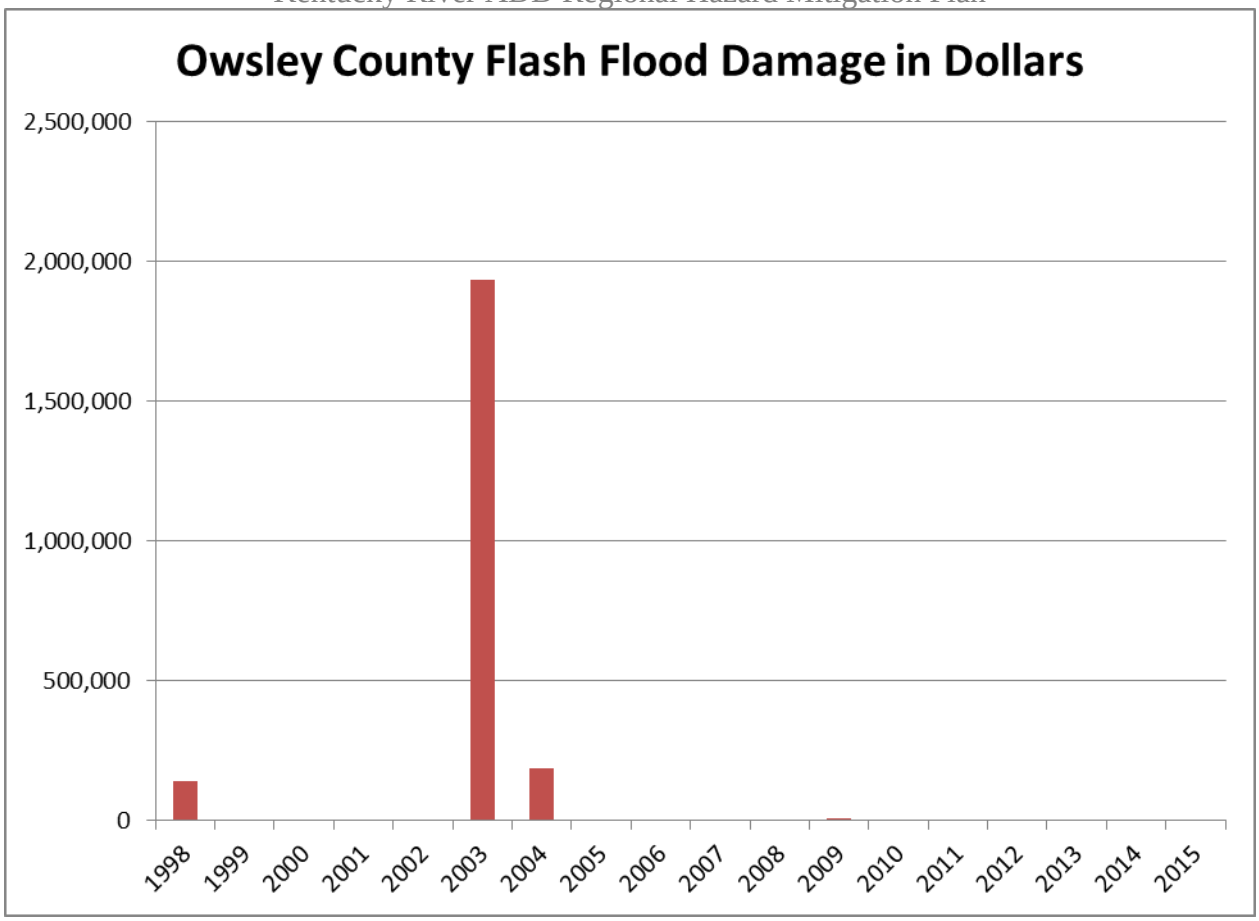
2011
2012
2013
2014
2015


Owsley County Flash Flood Damage in Dollars
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1998
1999
2000
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2004
2005
2006
2007
2008
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2012
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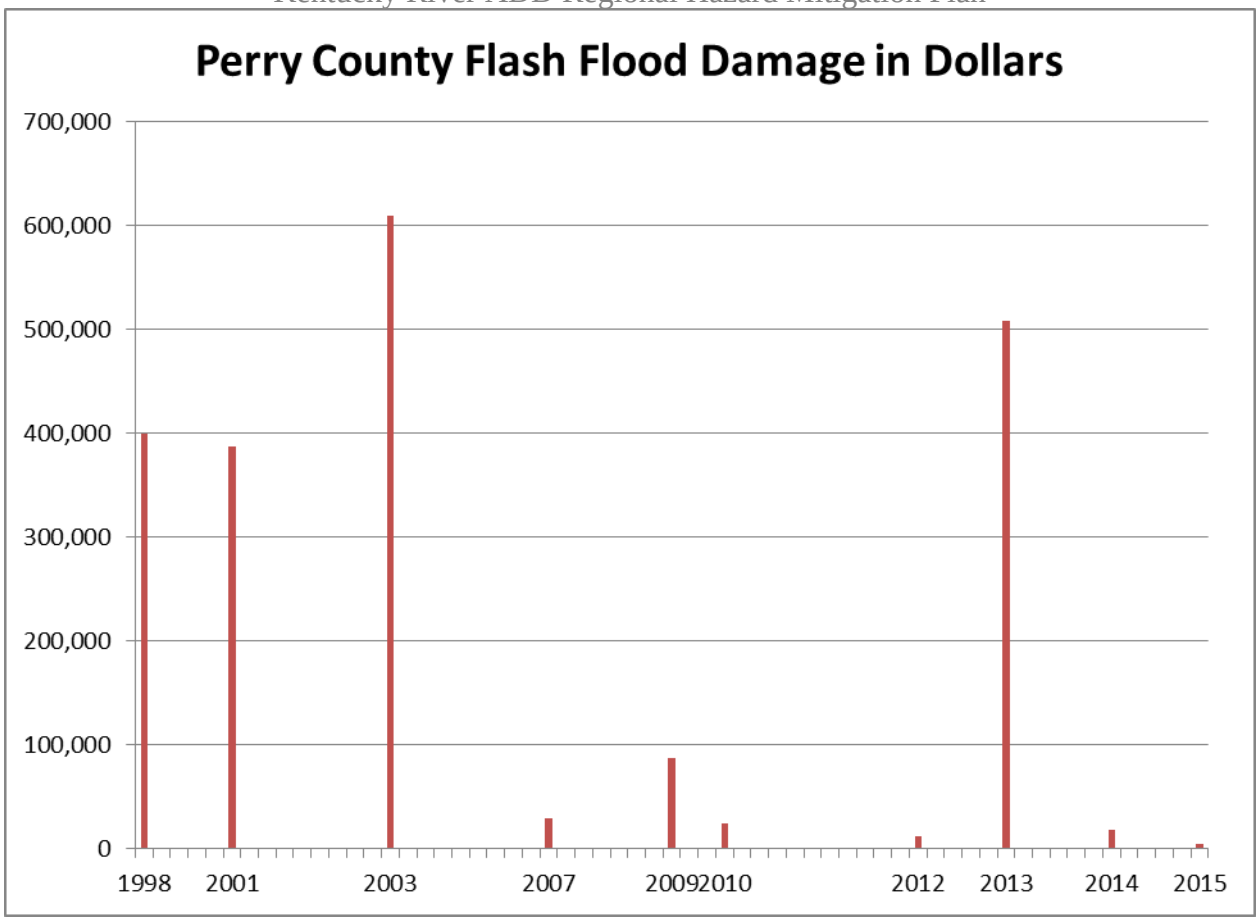
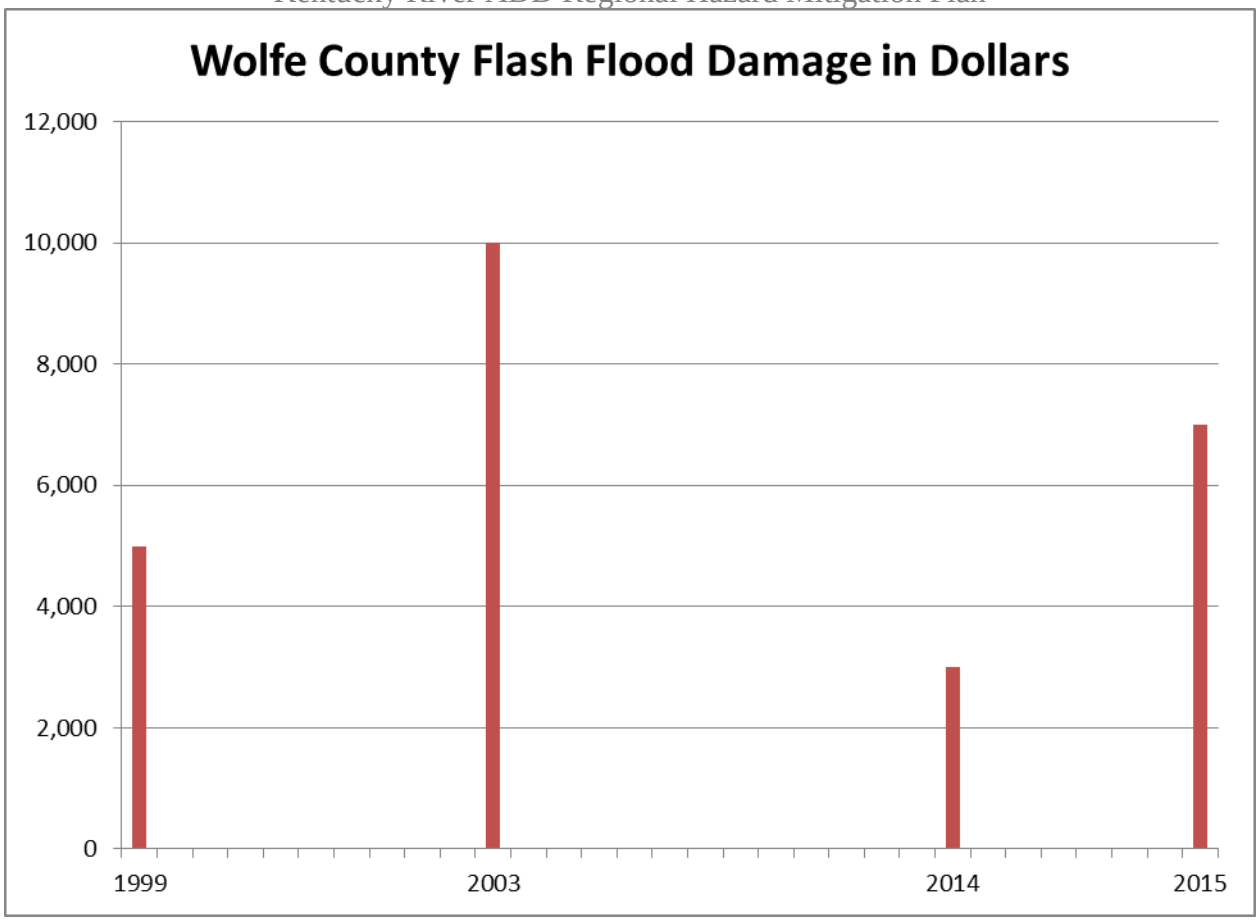
2014
2015


Perry County Flash Flood Damage in Dollars
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1998
2001
2003
2007
2009
2010
2012
2013
2014
2015



The following information lists the flooding events specific to the North Fork of the Kentucky River at the Hazard, KY USGS gage[14]. These events are listed in severity tied to flood elevations, flood stage in feet, and discharge at the peak of the flood event expressed in cubic feet per second, where available. To address flooding extent, in Attachment __ peak streamflow and gage height is recorded for all gages that either currently are or have been maintained by the United States Geological Survey (USGS) at a point within each of Kentucky River ADD's counties.

[14] Source: City of Hazard's website: http://www.hazardky.gov

Floods of the North Fork of the KY River at Hazard, KY in Chronological Order

Date of Crest	Stage Feet	Elevation (Mean Sea Level)	Discharge (Cubic Feet per Second)
May 30, 1927	34	873.76	
March 23, 1929	23.5	863.26	
January 30, 1932	21.5	861.26	
March 12, 1935	22.3	862.06	
February 3, 1939	29.95	869.71	
July 8, 1942	21.75	861.51	21,900
January 8, 1946	28.55	866.31	27,4000
August 5, 1947	25.94	865.70	26,700
February 1, 1951	27.20	866.96	28,100
May 19, 1953	23.88	863.04	24,300
March 6, 1955	20.16	859.92	20,000
February 18, 1956	24	863.76	24,400
March 14, 1956	20.71	860.47	20,700
April 16, 1956	21.29	861.05	21,300
January 29, 1957	37.54	877.30	47,800
February 27, 1962	20.90	860.66	22,100
March 12, 1963	35	874.76	43,700
March 17, 1963	23.31	863.07	25,600
March 26, 1965	21.74	861.50	23,200
March 7, 1967	29.85	869.61	35,500
December 30, 1969	24.32	864.08	
1970	20.05	859.81	
1971	24.93	864.69	
1972	19.44	859.20	
1977	32.07	871.83	
May 7, 1984	32.03	871.79	
March 6, 1989	17.98	857.74	
June 16, 1989	20.30	860.06	
October 17, 1989	27.10	866.86	
December 3, 1991	21.68	861.44	
February 12, 1994	17.99	857.75	
March 3, 1997	25.47	865.23	
April 17, 1998	22.78	862.54	
April 19, 1998	25.50	865.26	
March 18, 2002	24.26	864.02	
February 16, 2003	26.95	866.71	

FLOODS OF THE NORTH FORK

Flooding Event Listed by Elevation

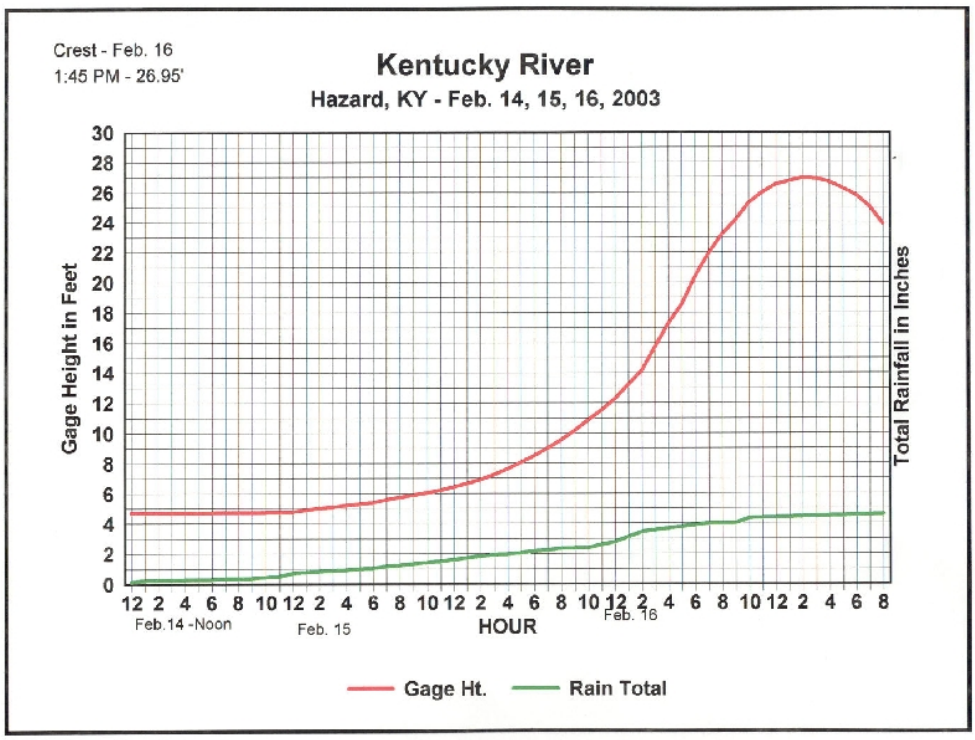
Hazard, Kentucky

Carr Creek Reservoir Dedicated August 7, 1976

Date of Crest		Stage Feet	Elevation MSL	Discharge cfs
January 29, 1957	57	37.54	877.30	47,800
March 12, 1963	63	35.00	874.76	43,700
May 30, 1927	27	34.00	873.76	
1977	77	32.07	871.83	
May 7, 1984	84	32.03	871.79	
February 3, 1939	39	29.95	869.71	
March 7, 1967	67	29.85	869.61	35,500
February 1, 1951	51	27.20	866.96	28,100
October 17, 1989	89	27.10	866.86	
Feb. 16, 2003	3	26.95	866.71	
January 8, 1946	46	26.55	866.31	27,400
August 5, 1947	47	25.94	865.70	26,700
April 19, 1998	98	25.50	865.26	
March 3, 1997	97	25.47	865.23	
1971	71	24.93	864.69	
December 30, 1969	69	24.32	864.08	
March 18, 2002	02	24.26	864.02	
February 18, 1956	56	24.00	863.76	24,400
May 19, 1953	53	23.88	863.04	24,300
March 23, 1929	29	23.50	863.26	
March 17, 1963	63	23.31	863.07	25,600
April 17, 1998	98	22.78	862.54	
March 12, 1935	35	22.30	862..06	
July 8, 1942	42	21.75	861.51	21,900
March 26, 1965	65	21.74	861.50	23,200
December 3, 1991	91	21.68	861.44	
January 30, 1932	32	21.50	861.26	
April 16, 1956	56	21.29	861.05	21,300
February 27, 1962	62	20.90	860.66	22,100
March 14, 1956	56	20.71	860.47	20,700
June 16, 1989	89	20.30	860.06	
March 6, 1955	55	20.16	859.92	20,000
1970	70	20.05	859.81	
1972	72	19.44	859.20	
February 12, 1994	94	17.99	857.75	
March 6, 1989	89	17.98	857.74	

Gage No. 03277500 Elev. 839.76

The North Fork of the Kentucky River normal levels at the Hazard gage range between 4 and 6 feet or around 845’ (Mean Surface Level) MSL elevation. The long term mean flow is 693 (cfs) cubic feet per second.



Please see website http://www.hazardky.gov

Summary: Frequency; Probability for all flooding types for the Kentucky River ADD Region

County	*# Years in Record*	*# Events in Record*	*# Events in Past 10 Years*	*# Events in Past 20 Years*	*# Events in Past 50 Years*	*100-Year Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*	*Frequency Per Year (20-Year)*	*Frequency Per Year (50-Year)*
REGION	100	272	188	236	251	0.37	100.00%	18.8	11.8	5.02
Breathitt	55	55	29	47	41	1.00	100.00%	2.9	2.35	0.82
Knott	55	30	18	23	27	1.83	54.55%	1.8	1.15	0.54
Lee	55	28	18	22	28	1.96	50.91%	1.8	1.1	0.56
Leslie	55	27	13	25	27	2.04	49.09%	1.3	1.25	0.54
Letcher	55	42	35	37	40	1.31	76.36%	3.5	1.85	0.80
Owsley	55	37	34	35	36	1.49	67.27%	3.4	1.75	0.72
Perry	55	36	28	32	35	1.53	65.45%	2.8	1.6	0.70
Wolfe	55	20	16	18	20	2.75	36.36%	1.6	0.9	0.40

WINTER STORMS

DESCRIPTION

A **winter storm** can range from moderate snow over a few hours to blizzard conditions with blinding wind-driven snow, sleet and/or ice that lasts several days. Some winter storms may be large enough to affect several states while others may affect only a single community. All winter storms are accompanied by low temperatures and blowing snow, which can severely reduce visibility. A **severe winter storm** is defined as an event that drops four or more inches of snow during a 12-hour period or 6 or more inches during a 24-hour span. All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can impact a community or region for days, weeks, or months.

Blizzards are by far the most dangerous of all winter storms. They are characterized by temperatures below twenty degrees Fahrenheit and winds of at least 35 miles per hour. In addition to the temperatures and winds, a blizzard must have a sufficient amount of falling or blowing snow. The snow must reduce visibility to one-quarter mile or less for at least three hours (3). With high winds and heavy snow, these severe storms can punish residents throughout much of the United States during the winter months each year. In Mid-March of 1993, a major blizzard struck the Eastern U.S., including parts of Kentucky (Kentucky Climate Center).

An **ice storm** occurs when freezing rain falls from clouds and freezes immediately on impact. Ice storms occur when cold air at the surface is overridden by warm, moist air at higher altitudes. As the warm air advances and is lifted over the cold air, precipitation begins falling as rain at high altitudes then becomes super cooled as it passes through the cold air mass below, and, in turn, freezes upon contact with chilled surfaces at temperatures of 32º F or below.

CONTEXT

- Winter storms generally occur in the time period between late November and early April.
- Winter storms are not limited to any specific geographic boundary within the region.
- Every county in the region has been impacted by severe winter storms.
- The super-storm of February 1998 caused over ten million dollars in property damage in eastern Kentucky. At least 2 deaths and several injuries in the eight-county area were attributed to this storm event.
- The ice storm of January 26-29, 2009 that consumed Kentucky (and Arkansas) has been ranked by the Weather Channel as the third worst[15] (in its list of the ten worst) ice storms in United States history: Freezing rain led to ice that accumulated to greater than two (2) inches for the Commonwealth. (A half-inch is considered "crippling[16]."") The National Weather Service stationed in Paducah and Louisville both ranked the event the worst weather event in of the decade for their respective regions[17] (i.e., western and central-northern Kentucky). The Weather Channel records that 609,000 homes and businesses were without power during this event. A CBS news report at the time of the event recorded

[15] Dolce, Chris; Jon Erdman. (January 11, 2017). "The Nation's Worst Ice Storms." The Weather Channel: https://weather.com/storms/winter/news/top-10-worst-ice-storms-20131205
[16] *Ibid.*
[17] *Ibid.*

closer to 700,000 homes and businesses without power[18]. Debris cleanup continued through the summer of 2009[19]. For the entire Commonwealth of Kentucky, 24 lives were lost due to hypothermia, carbon monoxide poisoning, and traffic accidents[20] as results of this ice storm. Ninety-three (93) of Kentucky's 120 counties and 71 of its cities declared a state of emergency due to the ice storm[21].

- The National Climactic Data Center's Storm Events Database records 0 deaths, 0 injuries, and $0 in reported damages for the counties covered by the Kentucky River Area Development District (i.e., Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, and Wolfe county "zones"). This obviously is unrealistic and, at the very least, ignores indirect economic impacts from the January 26-29, 2009 event. The ice storm event resulted in a nearly statewide FEMA disaster declaration (DR-1818) that included Breathitt, Lee, Owsley, Perry, and Wolfe Counties in its declared counties listing. It is assumed that the $0 in direct impacts recorded for this event results because NCDC did not record the damages from the severe flooding that resulted from the ice melting.
- That said (and though unrelated), Breathitt, Leslie, and Perry county "zones" had recorded by NCDC's Storm Events Database $409,000 in damages resulting from a winter storm event on December 18, 2009.

[18] CBS/AP. (February 2, 2009). "Kentucky Hardest Hit by Deadly Ice Storm." CBS News: https://www.cbsnews.com/news/kentucky-hardest-hit-by-deadly-ice-storm/
[19] Dolce, Chris; Jon Erdman. (January 11, 2017). "The Nation's Worst Ice Storms." The Weather Channel: https://weather.com/storms/winter/news/top-10-worst-ice-storms-20131205
[20] *Ibid.*
[21] *Ibid.*

EFFECTS

Storm effects such as power outages; extreme cold, flooding, and snow accumulation can cause hazardous conditions and hidden problems for people in affected areas.

Power Outages Snow and ice accumulation on trees can cause branches and trunk to break and fall on to vulnerable power lines causing blackouts varying in size from one street to an entire city. In turn, a population may be even more vulnerable to other effects such as extreme cold.

Extreme Cold With the occurrence of extremely cold temperatures the risk of frozen water mains and pipes, potentially damaged car engines, and, in extreme cases, prolonged exposure to cold resulting in frostbite rises.

Flooding After precipitation has mounted and temperatures rise once again, snow and ice melts and, depending on the amount of total precipitation, flooding can occur. In turn, as more snow and ice accumulate the threat of flooding increases.

Snow and Ice Accumulation on Roadways This can cause severe transportation problems in the form of extremely hazardous roadway conditions that encourage loss of control of vehicles, collisions, and road and interstate closures.

II. PROFILE (KRADD DATA)

Kentucky's location makes it vulnerable to heavy snowfall. Its proximity to the Gulf of Mexico provides a necessary moisture source, yet it is far enough north to be influenced by polar air masses. Low-pressure systems that bring heavy snow to Kentucky usually track eastward across the southern United States before turning toward the northeast. Frequently, these systems move up the east coast and have little effect on Kentucky. Sometimes however, storms turn and move along the western margin of the Appalachian Mountains. With cold air in place over Kentucky, these storms bring moisture from the Gulf of Mexico and can dump heavy snow as they plow through the Commonwealth. (BRADD, KCC)

SIGNIFICANT WINTER STORM EVENTS IN KENTUCKY

DATE	LOCATION	EVENT TYPE	DAMAGES
3/12/1993	EAST/ SOUTHEAST	SNOW	Not Available
12/27/1993	NORTH/ EAST	SNOW/ ICE	$500,000
2/03/1998	EAST	HEAVY SNOW	$10 Million
01/27/2009	NORTH/WEST/EAST	ICE	$246 Million

- On March 3, 1993 one of the strongest Winter Storms ever, sometimes referred to as “the storm of the century” dumped from 6 to 30 inches of snow over eastern and southeastern Kentucky. The snow combined with winds to produce snowdrifts from 6 to 10 feet. Some of the heavier snow amounts accumulated in Perry County where 30 inches were recorded. (NOAA)

- On February 3-6, 1998 a major snowstorm affected four of the eight KRADD counties including Breathitt, Owsley, Lee and Wolfe. Snowfall totals for the storm ranged from around 4 inches in valley locations in Letcher County near the Virginia border to as much as

1/1/2 feet in areas of Lee, Owsley and Wolfe Counties. Because of the extremely wet nature of the snow, damage from this storm was extensive. Power outages were widespread as falling trees brought down power lines and poles. Power outages affected 100% of the electric customers in many counties. As many as 2,000 customers were still without power on February 9, and some areas were without power for 2 weeks. Trees blocked numerous roads, and bulldozers had to be used to reach people who were stranded. There were numerous buildings that collapsed under the weight of the snow, including trailer homes, houses, barns, and commercial buildings. Many people remained in unheated homes during the extended power outages. A man in Wolfe County died from hypothermia in his home (NOAA).

- See above regarding January 26-29, 2009 Ice Storm Event and a December 18, 2009 Winter Storm event whose inclusion is intended to illustrate the damages resulting from Winter Storms in 2009 despite $0 being recorded from one of the nation's worst ice storms in history (i.e., the January 26-29, 2009 event).

According to NOAA data 29 winter storms have affected the Kentucky River ADD region since 1959. These storms have caused $10 million+ worth of property damage injuring 2 and causing 2 deaths in the eight counties of the KY River ADD.

RECENT PRESIDENTIAL DISASTER DECLARATIONS

DECLARATION DATE	INCIDENT PERIOD	DECLARED KRADD	EVENT TYPE	DECLARATION
03/16/1994	02/09/1994 – 02/11/1994	Breathitt, Lee, Letcher, Owsley, Perry, Wolfe	SEVERE STORM; FREEZING RAIN; SLEET; SNOW	DR-1018
01/13/1996	01/05/1996 – 01/12/1996	Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, Wolfe	BLIZZARD	DR-1089
03/03/1998	02/04/1998 – 02/06/1998	Breathitt, Lee, Owsley, Wolfe	WINTER STORM	DR-1207
03/14/2003	02/15/2003 – 02/26/2003	Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, Wolfe	WINTER STORM	DR-1454
02/05/2009	01/26/2009 – 02/13/2009	Breathitt, Lee, Owsley, Perry, Wolfe	WINTER STORM; FLOODING	DR-1818
04/30/2015	02/15/2015 – 02/23/2015	Knott, Lee, Letcher, Perry, Wolfe	WINTER STORM; SNOWSTORM; FLOODING; LANDSLIDES; MUDSLIDES	DR-4216
05/12/2015	03/03/2015 – 03/09/2015	Breathitt, Lee, Leslie, Letcher, Owsley, Perry	WINTER STORM; SNOWSTORM; FLOODING; LANDSLIDES; MUDSLIDES	DR-4218

Below list tables from the National Climactic Data Center (NCDC) Storm Events Database for each of Kentucky River ADD's counties that summarizes what NCDC designates as Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard events from January 1, 2011 to March 31, 2018.

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Breathitt County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	01/08/2011	00:00	EST-5	Heavy Snow	3.5” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.5” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.5” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.5” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	03/04/2012	23:30	EST-5	Heavy Snow	4.4” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	03/04/2012	23:30	EST-5	Heavy Snow	4.4” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	01/21/2014	05:00	EST-5	Heavy Snow	4.5” – 6.4” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	03/02/2014	22:15	EST-5	Winter Storm	6.0” – 8.0” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/16/2015	05:30	EST-5	Winter Storm	8.0” – 14.0” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/18/2015	09:00	EST-5	Winter Storm	3.0” – 4.0” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/21/2015	00:30	EST-5	Winter Storm	0.25” – 0.3” Ice	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	03/05/2015	00:00	EST-5	Winter Storm	4.0” – 7.0” Snow; 0.25” Sleet	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	01/22/2016	05:00	EST-5	Heavy Snow	11.0” – 20.0” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	02/14/2016	17:00	EST-5	Heavy Snow	3.0” – 5.0” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	01/16/2018	06:00	EST-5	Heavy Snow	4.6” Snow	0	0	0.00K	0.00K
BREATHITT (ZONE)	BREATHITT (ZONE)	KY	03/11/2018	23:00	EST-5	Heavy Snow	Up to 5.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Knott County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	5.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.0” Snow (Heavy; Wet)	0	0	5.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	11/26/2013	22:00	EST-5	Winter Storm	4.0” – 6.0” Snow	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/12/2014	18:00	EST-5	Heavy Snow	5.0” – 11.0” Snow	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	03/02/2014	22:30	EST-5	Winter Storm	3.0” – 5.0” Snow	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/16/2015	06:00	EST-5	Winter Storm	11.0” – 17.0” Snow	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/18/2015	09:00	EST-5	Winter Storm	4.0” Snow	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/21/2015	00:30	EST-5	Winter Storm	0.25” Ice	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	03/05/2015	01:00	EST-5	Winter Storm	5.5” Snow; 0.5” Sleet	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	01/22/2016	04:00	EST-5	Winter Storm	4.0” – 8.0” Snow; 0.125” Freeze Rain	0	0	0.00K	0.00K
KNOTT (ZONE)	KNOTT (ZONE)	KY	02/14/2016	17:00	EST-5	Heavy Snow	3.0” – 5.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	5.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Lee County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	3.5” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	03/04/2012	23:30	EST-5	Heavy Snow	3.5” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	01/21/2014	04:00	EST-5	Heavy Snow	Up to 5.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	01/25/2014	06:15	EST-5	Heavy Snow	4.7” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	03/02/2014	22:00	EST-5	Winter Storm	3.0” – 5.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	02/16/2015	05:00	EST-5	Winter Storm	8.0” – 15.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	02/18/2015	09:00	EST-5	Winter Storm	3.0” – 6.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	02/21/2015	01:30	EST-5	Winter Storm	0.25” Ice	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	03/04/2015	22:00	EST-5	Winter Storm	4.0” – 6.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	01/22/2016	05:00	EST-5	Heavy Snow	12.0” – 18.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	02/14/2016	16:30	EST-5	Heavy Snow	3.0” – 6.0” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	01/16/2018	05:00	EST-5	Heavy Snow	5.2” Snow	0	0	0.00K	0.00K
LEE (ZONE)	LEE (ZONE)	KY	03/11/2018	22:30	EST-5	Heavy Snow	4.0” – 7.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Leslie County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	30.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow	0	0	30.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	01/25/2013	06:30	EST-5	Ice Storm	Up to 0.25” Ice	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	03/24/2013	23:00	EST-5	Heavy Snow	1.0” – 5.0” Snow	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/12/2014	17:00	EST-5	Heavy Snow	5.0” – 7.5” Snow	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	03/03/2014	00:00	EST-5	Winter Storm	Up to 1.0” Sleet; 0.25” Ice	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/16/2015	07:30	EST-5	Winter Storm	7.0” Snow	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/20/2015	23:30	EST-5	Winter Storm	2.0” – 4.0” Snow; 0.25” Ice	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	03/05/2015	01:30	EST-5	Winter Storm	4.0” Snow; 0.25” – 0.5” Sleet	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	01/22/2016	02:00	EST-5	Winter Storm	6.0” – 11.0” Snow; 0.3” Freezing Rain	0	0	0.00K	0.00K
LESLIE (ZONE)	LESLIE (ZONE)	KY	02/14/2016	16:00	EST-5	Heavy Snow	5.0” – 7.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	30.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Letcher County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/07/2011	05:00	EST-5	Heavy Snow	7.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/07/2011	06:00	EST-5	Heavy Snow	7.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/07/2011	19:00	EST-5	Heavy Snow	7.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/26/2011	04:00	EST-5	Winter Storm	5.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	6.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	10/28/2012	19:00	EST-5	Heavy Snow	9.0” Snow (@ 2,100 ft.)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	10/28/2012	19:00	EST-5	Heavy Snow	9.0” Snow (@ 2,100 ft.)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	10/28/2012	19:00	EST-5	Heavy Snow	9.0” Snow (@ 2,100 ft.)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	10/29/2012	16:00	EST-5	Heavy Snow	5.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	10/29/2012	19:00	EST-5	Heavy Snow	5.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/17/2013	12:30	EST-5	Heavy Snow	1.0” – 5.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	03/24/2013	23:00	EST-5	Heavy Snow	1.0” – 3.0”; 5.0” – 10.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	11/26/2013	22:00	EST-5	Winter Storm	4.0” – 6.0” Snow (@ 2,400 ft.)	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/21/2014	05:00	EST-5	Heavy Snow	4.0” – 6.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/12/2014	16:00	EST-5	Heavy Snow	7.0” – 14.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	03/03/2014	00:00	EST-5	Winter Storm	1.0” – 3.0” Snow; 0.25” Ice	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/16/2015	08:00	EST-5	Winter Storm	8.0” – 13.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/21/2015	00:30	EST-5	Winter Storm	8.0” – 20.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	03/05/2015	01:30	EST-5	Winter Storm	5.0” Snow; 0.5” Sleet	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	01/22/2016	02:30	EST-5	Winter Storm	5.0” – 9.0” Snow	0	0	0.00K	0.00K
LETCHER (ZONE)	LETCHER (ZONE)	KY	02/14/2016	16:00	EST-5	Heavy Snow	3.0” – 5.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Owsley County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	4.0” Snow (Heavy; Wet)	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	01/25/2013	06:30	EST-5	Ice Storm	0.25” Ice	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	01/21/2014	05:00	EST-5	Heavy Snow	3.0” – 6.0” Snow	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	03/02/2014	22:00	EST-5	Winter Storm	4.0” – 6.0” Sleet & Snow	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	02/16/2015	05:30	EST-5	Winter Storm	7.0” – 11.0” Snow	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	02/21/2015	00:00	EST-5	Winter Storm	0.25” Ice	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	03/05/2015	00:30	EST-5	Winter Storm	Up to 5.0” Snow	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	01/22/2016	04:00	EST-5	Heavy Snow	~ 20.0” Snow	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	02/14/2016	16:30	EST-5	Heavy Snow	4.0” – 5.0” Snow	0	0	0.00K	0.00K
OWSLEY (ZONE)	OWSLEY (ZONE)	KY	01/16/2018	05:30	EST-5	Heavy Snow	5.1” Snow	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Perry County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.50” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.50” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/19/2012	11:30	EST-5	Heavy Snow	5.50” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	10/30/2012	00:00	EST-5	Heavy Snow	6.0” Snow (@ 1,500 ft. elevation)	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	10/30/2012	00:00	EST-5	Heavy Snow	6.0” Snow (@ 1,500 ft. elevation)	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	01/25/2013	07:00	EST-5	Ice Storm	0.10” – 0.50” Ice	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	01/21/2014	05:00	EST-5	Heavy Snow	4.0” – 6.0” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/12/2014	17:30	EST-5	Heavy Snow	3.0” – 8.0” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	03/02/2014	23:00	EST-5	Winter Storm	3.0” – 4.0” Snow & Sleet	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/16/2015	07:30	EST-5	Winter Storm	10.0” – 17.0” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/21/2015	00:00	EST-5	Winter Storm	2.0” – 8.0” Snow; 0.25” Ice	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	03/05/2015	01:30	EST-5	Winter Storm	4.0” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	01/22/2016	03:00	EST-5	Winter Storm	5.0” – 15.0” Snow; 0.2” Freezing Rain	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	02/14/2016	17:00	EST-5	Heavy Snow	3.0” – 5.0” Snow	0	0	0.00K	0.00K
PERRY (ZONE)	PERRY (ZONE)	KY	01/05/2017	09:00	EST-5	Heavy Snow	4.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

NCDC Record of Winter Storm, Heavy Snow, Ice Storm, Sleet, and Blizzard Events: Wolfe County, January 1, 2011 – March 31, 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	03/04/2012	23:30	EST-5	Heavy Snow	5.4” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	12/21/2012	05:00	EST-5	Heavy Snow	4.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	01/21/2014	04:00	EST-5	Heavy Snow	5.4” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	02/04/2014	18:15	EST-5	Ice Storm	0.25” Ice	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	03/02/2014	21:30	EST-5	Winter Storm	8.0” Snow & Ice	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	02/16/2015	03:30	EST-5	Winter Storm	10.0” – 15.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	02/21/2015	00:30	EST-5	Winter Storm	0.25” Freezing Rain	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	03/04/2015	22:00	EST-5	Winter Storm	4.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	01/22/2016	06:00	EST-5	Heavy Snow	18.0” – 20.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	02/14/2016	17:00	EST-5	Heavy Snow	3.0” – 5.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	03/03/2016	12:00	EST-5	Heavy Snow	2.0” – 5.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	01/16/2018	05:00	EST-5	Heavy Snow	5.4” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	03/11/2018	22:00	EST-5	Heavy Snow	4.0” Snow	0	0	0.00K	0.00K
WOLFE (ZONE)	WOLFE (ZONE)	KY	03/24/2018	07:00	EST-5	Heavy Snow	4.0” Snow	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Summary:

The location and extent of severe winter storms are not limited by geographic boundaries and impact all eight counties and thirteen cities within the district. The overall probability of future events has ranged from a high of 3.1 per year over the past ten years to an overall 1.65 per year over the study period of 20 years. Each county can anticipate at least one winter storm per year. Winter storm impacts have historically caused damage to power-lines and loss of electrical power, as well as loss of accessibility due to impassable roadways. The loss of power and inability of residents to travel the rural county routes lead to exposure of persons to potential dangers of death by exposure, or by carbon monoxide due to secondary heating sources from combustion fuels (i.e. kerosene, wood, or propane/natural gas). The direct costs of loss from power-line damage and repair have been unavailable from the local power companies; but, would be very useful in future updates. In future updates additional information needs to be collected as to more detailed damage in terms of local loss as well as in terms of loss of transportation ability and access to services. Population vulnerability is also a major factor in winter snow and ice storms. The aged population and handicapped population are overall much more vulnerable than the general population due to their inability to physically cope with the loss of heat sources and lack of transportation during severe winter storms. It is also relevant that much of the Kentucky River ADD counties sit at high elevations, which exacerbate snowfall accumulation and make even minimal ice and sleet accumulation exponentially treacherous.

Summary: Frequency; Probability for Snow and Ice for the Kentucky River ADD Region[22]

County	*# Years in Record*	*# Events in Record*	*# Events in Past 10 Years*	*# Events in Past 20 Years*	*# Events in Past 50 Years*	*Record Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*	*Frequency Per Year (20-Year)*	*Frequency Per Year (50-Year)*
REGION	20	245	201	232	245	0.08	100.00%	20.1	11.6	N/A
Breathitt	55	30	14	28	30	1.83	54.55%	1.4	1.4	0.60
Knott	25	24	16	22	24	1.04	96.00%	1.6	1.1	N/A
Lee	55	26	22	25	26	2.12	47.27%	2.2	1.25	0.52
Leslie	55	26	20	23	26	2.12	47.27%	2.0	1.15	0.52
Letcher	55	54	51	54	54	1.02	98.18%	5.1	2.7	1.08
Owsley	55	30	28	30	30	1.83	54.55%	2.8	1.5	0.60
Perry	55	25	23	25	25	2.20	45.45%	2.3	1.25	0.50
Wolfe	55	30	27	29	30	1.83	54.55%	2.7	1.45	0.60

[22] Note that this table's summary is distinguishable from the citation of NCDC Storm Events Database summary of events above for each of the Kentucky River ADD counties: This summary table does not truncate the historic record at 2011 and it does not include duplicative events. Ultimately, the source for this summary table's data is the same, though: NOAA statistics were used for the historic record and the number of events in the record.

TORNADOS

DESCRIPTION

Tornado: a highly unpredictable, violently rotating column of air in contact with the ground and extending from the base of a thunderstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm (or sometimes as a result of a hurricane) and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly (National Weather Service).

The most destructive and deadly tornadoes occur from **super cells** -- which are rotating thunderstorms with a well-defined radar circulation called a *mesocyclone*. (Super cells can also produce damaging hail, severe non-tornadic winds, unusually frequent lightning, and flash floods.) Tornado season is generally March through August, although tornadoes can occur at any time of year. They tend to occur in the afternoons and evenings: over 80 percent of all tornadoes strike between noon and midnight.

The damage from a tornado is a result of the high wind velocity (up to 250 mph) and wind-blown debris with paths that can be in excess of one mile wide and fifty miles long. Tornadoes gain their destructive power by increasing wind speed and picking up all debris in its path. They have been known to blow off roofs of houses, move cars and tractor-trailers, and demolish homes. According to the Fujita-Pearson Tornado Measurement Scale, the magnitude of a tornado is categorized by its damage pattern and wind velocity. This scale was the only widely used rating method until 2007. The Fujita-Pearson Tornado Measurement Scale, or F-Scale, always came with a disclaimer not to interpret wind speeds-cum-damages literally. Precise wind speed numbers were always caveated as scientifically unverified guesses. Since 2007, the Enhanced Fujita Scale has been used as the primary source to communicate the extent of tornadic activity. While the F-Scale communicated extent through both the “fastest quarter-mile” and using “three-second gust,” the Enhanced Fujita Scale relies solely upon the “three-second gust.” Specifically, the Enhanced Fujita Scale uses three-second gusts estimated at the point of damage based on a judgment of eight (8) levels to 28 labeled damage indicators. “Three-second gusts” is not synonymous with standard surface observation wind[23].

This document lists both the F-Scale and the Enhanced Fujita Scale for reference for extent due to the low number of tornadoes within a long historical record for the Kentucky River ADD region. In other words, out in western Kentucky, for example, there would be sufficient tornadic activity to warrant an illustration of historic events from 2007 onward, i.e., relying solely upon the Enhanced Fujita Scale for extent. Southeastern Kentucky (i.e., the Kentucky River ADD counties and cities) have had comparatively few tornadoes throughout history. Thus, for illustration of previous occurrences, it is relevant to reach deep into the historical record. This requires referencing extent in terms both of the F-Scale and Enhanced Fujita Scale.

[23] The above paragraph derives from the following source: http://www.spc.noaa.gov/faq/tornado/ef-scale.html.

THE FUJITA-PEARSON SCALE

Fujita Scale	Estimated Wind Speed (mph) (Fastest ¼-Mile)	3-Second Gust (mph)	Typical Damage
F0	< 73	45-78	*Light Damage:* Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; signboards damaged.
F1	73 - 112	79-117	*Moderate Damage:* Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113 - 157	118-161	*Considerable Damage:* Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
F3	158 - 207	162-209	*Severe Damage:* Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	208 - 260	210-261	*Devastating Damage:* Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261 - 318	262-317	*Incredible Damage:* Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

ENHANCED FUJITA SCALE

EF Number	3-Second Gust (mph)	Typical Damage
EF0	65-85	*Minor damage:* Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	*Moderate damage:* Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	*Considerable damage:* Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	*Severe damage:* Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.
EF4	166-200	*Devastating damage:* Well-constructed and whole frame houses completely leveled; cars and other large objects thrown and small missiles generated.
EF5	> 200	*Incredible damage:* Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km)

FACTS

- A tornado can move as fast as125 mph with internal winds speeds exceeding 300 mph.
- Tornadoes are not limited to geographic boundaries and have the potential to impact any jurisdiction within the eight-county region.
- Over the past 25 years, more than 100 federal disaster declarations included damage associated with tornadoes.
- 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 way from their foundations.

EFFECTS

Effects of tornadoes can encompass everything from crop and property damage and destruction to power outages and environmental degradation to death and injury.

- Property Damage: Tornadoes have been known to cause every type of physical property damage from breaking windows to turning over cars to tearing off roofs to completely demolishing houses.
- Power Outages: High tornado winds have also been known to uproot trees and push them into power lines causing extended blackouts.

PROFILE

The Kentucky River ADD eight county region is located in the 2nd most severe wind zone (ZONE III 200mph) and on the fringe of the most severe zone (ZONE IV 250mph) in the country.

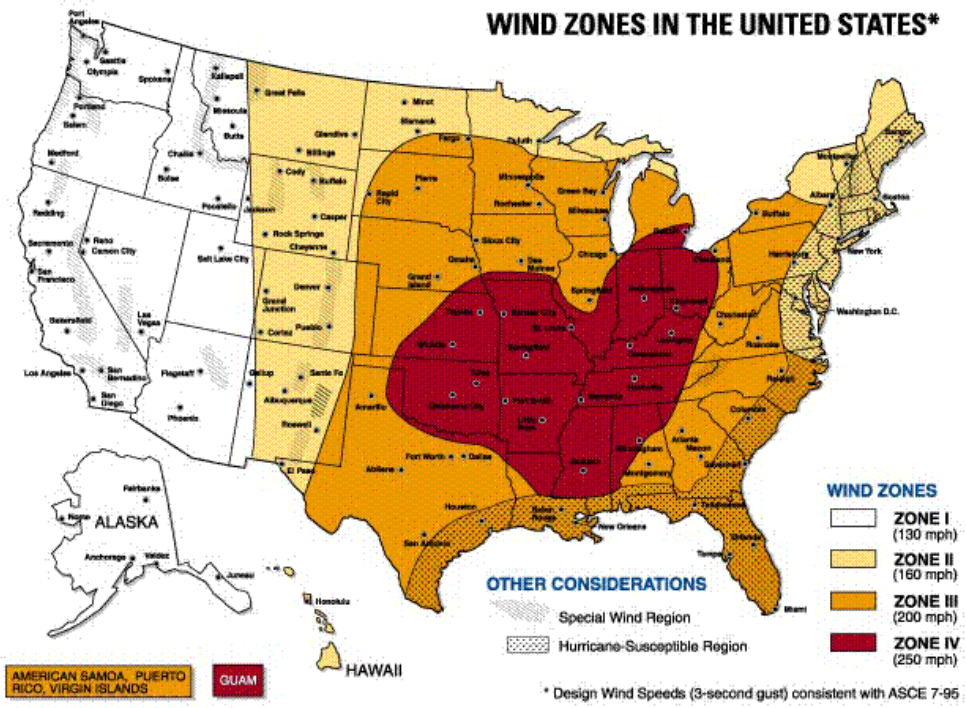


Figure I.2 Wind zones in the United States

Tornadoes are somewhat common throughout the region and have occurred in almost every month of the year. 10 tornadoes have been reported in the Kentucky River Region since 1950, an average of about 2 every 10 years, according to NOAA). In the same instance, the occurrence of a tornado is highly unpredictable in that it is impossible to forecast the exact time and location that it will touch down and the path that it will take.

The map below illustrates the predictability of tornadic activity according to NOAA.

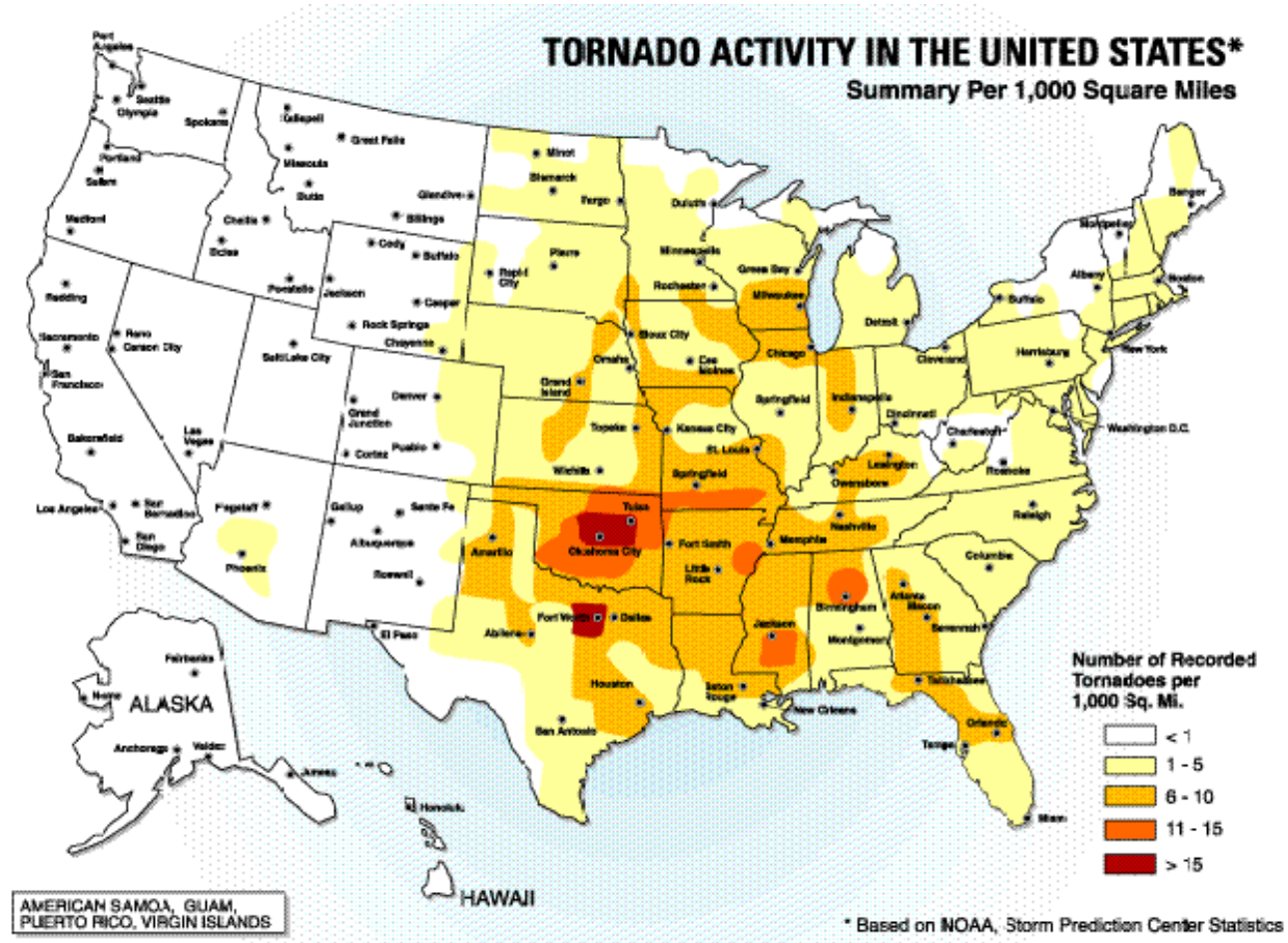


Figure I.1 The number of tornadoes recorded per 1,000 square miles

COUNTY BREAKDOWN OF TORNADOES AND THEIR EFFECTS 1950-2018

COUNTY	TORNADOES	DAMAGES	DEAD	INJURED	EXTENT
BREATHITT	05/18/1995	$0K	0	0	Not Specified
	03/29/2002	$1K	0	0	F0
	02/22/2003	$300K	2	7	F1
	05/31/2004	$0K	0	0	F0
KNOTT	----------	$0K	0	0	N/A
LEE	06/09/1961	$2.5M	1	25	F3
	08/27/1987	$25K	0	0	F1
LESLIE	06/22/1990	$25K	0	0	F0
	05/11/2008	$25K	0	0	EF1
	07/27/2014	$0K	0	0	EF1
LETCHER	05/12/1978	$250K	0	0	F1
	06/03/1983	$2.5M	0	0	F1
OWSLEY	10/01/1977	$250K	0	0	F2
	05/31/2004	$0	0	0	F0
PERRY	03/27/1983	$2.5K	0	0	F1
WOLFE	05/19/2005	$20K	0	0	F0
	02/28/2011	$75K	0	0	EF1
	04/09/2011	$30K	0	0	EF0
	03/02/2012	$0K	0	0	EF1
TOTALS	18	$6,003,500	3	32	

According to the NOAA (NCDC Storm Events Database) 18 tornadoes have touched down in the region since 1950 (and queried to 2018). These tornadoes have caused $6,003,500 dollars' worth of property damage. No crop damage was reported. These tornados have killed 3 people while injuring 32. Of these 18 tornadoes only one was categorized in the F3 class, one in the F2 class, nine in the F1 and six in the F0 class putting the predominance in the F1 category.

Still, it should be noted that the National Climactic Data Center (NCDC) Storm Events Database underreports tornadoes for the region: It is important to note that for the FEMA presidential disaster declarations that included tornadoes from 2011, the following Kentucky River ADD counties comprised part of the declaration:

FEMA Disaster Declarations Comprised of Kentucky River ADD Counties that Included Tornadoes in the Declaration, 2011 - 2018

FEMA Disaster	Declaration Date	Incident Period	Kentucky River ADD Counties in Declaration	Individual Assistance (IA) and/or Public Assistance (PA)
DR-4008: Severe Storms, Tornadoes, Flooding	July 25, 2011	June 19, 2011 – June 23, 2011	Breathitt	PA
			Knott	PA
			Lee	PA
			Perry	IA and PA
DR-4057: Severe Storms, Tornadoes, Straight-Line Winds, Flooding	March 6, 2012	February 29, 2012 – March 3, 2012	Wolfe	IA and PA
DR-4217: Severe Storms, Tornadoes, Flooding, Landslides, Mudslides	May 1, 2015	April 2, 2015 – April 17, 2015	Breathitt	PA
			Lee	PA
			Owsley	PA
			Wolfe	PA
DR-4239: Severe Storms, Tornadoes, Straight-Line Winds, Flooding, Landslides, Mudslides	August 12, 2015	July 11, 2015 – July 20, 2015	Breathitt	IA and PA
			Knott	PA
			Lee	PA
			Leslie	IA and PA
			Letcher	PA
			Owsley	PA
			Perry	IA and PA
			Wolfe	PA

The purpose of providing the Individual Assistance (IA) and Public Assistance (PA) designations for the counties comprising the abovementioned FEMA disaster declarations is to deduce that for those counties with Individual Assistance (IA) designations, tornadic activity was a primary or significant factor in the county's inclusion in the disaster declaration. The deduction is necessary because monetary damages or hazard type are not parsed out by county in FEMA's recording of the disaster declaration for public consumption. The point is, from the NCDC Storm Events Database, it is obvious and general that the Kentucky River ADD region (i.e., southeastern Kentucky) does not suffer tornadoes frequently. This is, again, generally expected given the hilly, mountainous, and elevated geography of the region. However, since 2011, at least four (4) additional disaster events (unrecorded by NCDC) that included tornadic activity have affected the counties within the Kentucky River ADD with impacts severe enough to prompt presidential disaster declarations and authorize Individual Assistance and Public Assistance.

An Historical Event

Eastern Kentucky February 22, 2003
Two people were killed in Eastern Kentucky when strong winds blew through the mobile home park where they lived, destroying their homes. Ten others were injured in the devastation at the Athol community on the Breathitt/Lee county line. Six mobile homes were destroyed, as well as 12 cars at a used car lot. One of them was carried several hundred feet and landed in a front yard. It was partially buried in mud.

Summary:

The region overall faces about four tornados every ten years. All jurisdictions are susceptible to tornado damage. Tornados are not limited to any specific geographical boundary. However, the counties and jurisdictions to the north and west including Lee and the City of Beattyville, Owsley and the City of Booneville, Breathitt and the City of Jackson, Wolfe and the City of Campton, and Leslie and the City of Hyden seem to be somewhat more susceptible to the stronger tornadoes and historically have sustained more damage than the other counties and cities. An exception is Letcher County in the east, which has had 2 historical events. This may be due to the topography of those jurisdictions. Certain sections of each have more rolling, open land with wider river valleys and lower maximum elevations. The main limitation of the available data has been the few historical events, coupled with the generally localized damage, many times affecting the very rural areas of counties. In future updates of this profile, it is planned to include more detailed information of potential impacts for each individual jurisdiction.

Summary: Frequency; Probability for Tornadoes for the Kentucky River ADD Region[24]

County	*# Years in Record[25]*	*# Events in Record*	*# Events in Past 10 Years*	*# Events in Past 20 Years*	*# Events in Past 50 Years*	*Record Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*	*Frequency Per Year (20-Year)*	*Frequency Per Year (50-Year)*
REGION	56	18	5	10	17	3.11	32.14%	0.5	0.5	0.34
Breathitt	22	4	0	3	N/A	5.50	18.18%	0.0	0.15	N/A
Knott	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lee	56	2	0	0	1	28.00	3.57%	0	0	0.02
Leslie	27	3	0	2	N/A	9.00	11.11%	0	0.10	N/A
Letcher	39	2	0	0	2	19.50	5.13%	0	0	N/A
Owsley	40	2	0	1	2	20.00	5.00%	0	0.05	N/A
Perry	34	1	0	0	1	34.00	2.94%	0	0	N/A
Wolfe	12	4	3	4	N/A	3.00	33.33%	0.3	N/A	N/A

[24] This summary table does not cover the events implied by illustrating the FEMA presidential disaster declarations that included tornadic activity from 2011 to 2015: Because it is not certain from the data available whether, say, Perry County in June 2011 suffered an event severe enough for a disaster declaration that resulted from tornadoes or from flooding (or from severe storms), it is simply assumed that there was no event for June 2011 for, in this example, Perry County.

[25] Number of Years in Record ends at 2017.

SEVERE THUNDERSTORM WIND/HAIL

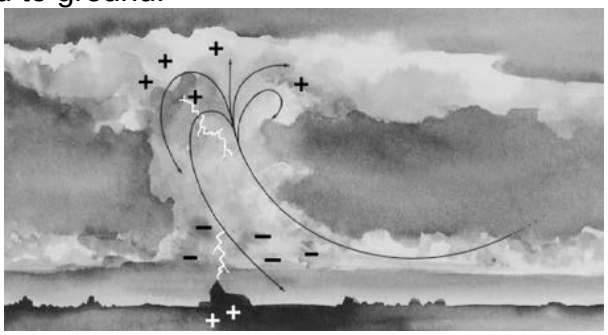
Definition

Lightning is a visible electric discharge caused by electric-charge separation of precipitation particles within a cumulonimbus.
Cumulonimbus is a cloud of a class indicative of thunderstorm conditions, characterized by large, dense, and very tall towers.
Thunderstorms: Transient storm of thunder & lightning, usually with rain and gusty winds.
Thunder: A shock wave that results in a sound wave of thunder, which is caused by the rapid heating and cooling of the air near lightning channels.
Hail: Precipitation in the form of spherical or irregular pellets of ice larger than 5 millimeters (0.2 inches) in diameter.
The American Heritage® Dictionary of the English Language, Fourth Edition

Lightning Formation

Lightning comes from a parent cumulonimbus cloud. These thunderstorm clouds are formed wherever there is enough upward motion, instability, and moisture to produce a deep cloud that reaches up to levels somewhat colder than freezing. Lightning has been known to strike more than 10 miles from the storm in an area of clear sky above.

Lightning originates around 15,000 to 25,000 feet above sea level when raindrops are carried upward until some of them convert to ice. For reasons that are not widely agreed upon, a cloud-to-ground lightning flash originates in this mixed water and ice region. The charge then moves downward in 50-yard sections called step leaders. It keeps moving toward the ground in these steps and produces a channel along which charge is deposited. Eventually, it encounters something on the ground that is a good connection. The circuit is complete at that time, and the charge is lowered from cloud to ground.



The return stroke is a flow of charge (current) which produces luminosity much brighter than the part that came down. This entire event usually takes less than half a second[26].

[26] Source: https://www.nssl.noaa.gov/education/svrwx101/lightning/

Lightning Types

Flashes that do not strike the surface are called cloud flashes. They may be inside a cloud, travel from one part of a cloud to another, or from cloud to air. Overall, there are four different types of lightning:

a) cloud to sky (sprites)
b) cloud to ground
c) intra-cloud
d) inter-cloud

Lightning flashes can have more than one ground point. Roughly, there are five to ten times as many cloud flashes than there are clouds to ground flashes.

Thunderstorm Types

All thunderstorms require instability and lift. Fronts, low pressure troughs or an air rising upslope produce lifts, which release the instability. Instability occurs when cooler air rises to a warmer environment. Cooler air tends to sink. The upward moving air is the updraft and the downdraft winds produce one of the fours storms below; single cell, multi-cell cluster, multi-cell line, or super cell.

Single Cell (aka pulse storms)
Typically last 20-30 minutes. Pulse storms can produce severe weather elements such as downbursts, hail, some heavy rainfall and occasionally weak tornadoes. This storm is light to moderately dangerous to the public and moderately to highly dangerous to aviation.

Multi-cell Cluster
These storms consist of a cluster of storms in varying stages of development. Multi-cell storms can produce moderate size hail, flash floods and weak tornadoes. This storm is moderately dangerous to the public and moderately to highly dangerous to aviation.

Multi-cell Line
Multi-cell line storms consist of a line of storms with a continuous, well developed gust front at the leading edge of the line. Also known as squall lines, these storms can produce small to moderate size hail, occasional flash floods and weak tornadoes. This storm is moderately dangerous to the public and moderately to highly dangerous to aviation.

Super cell
Even though it is the rarest of storm types, the super cell is the most dangerous because of the extreme weather generated. Defined as a thunderstorm with a rotating updraft, these storms can produce strong downbursts, large hail, occasional flash floods and weak to violent tornadoes. This storm is extremely dangerous to the public and aviation.

Please see this website http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/svr/type/home.rxml

Visible Warning Signs of Thunderstorms

- ✓ Dark, towering, threatening clouds
- ✓ Distant lightning and thunder

General Facts

- ✓ National Weather Service estimates more than 100,000 thunderstorms worldwide each year
- ✓ Thunderstorms and high winds are not limited to geographic boundaries and have impacted all jurisdictions within the eight-county region
- ✓ 1,800 to 2,000 thunderstorms occur worldwide in a given second
- ✓ In the last 25 years, severe storms have been involved in over 300 federal disasters

Dangers Associated with Thunderstorms

- ✓ Lightning
- ✓ Flash floods
- ✓ Hail
- ✓ Outflow
- ✓ Winds
  - o Downburst-a strong down draft which can cause an outburst of potentially damaging winds at or near the ground
  - o Micro or macro-bursts-a microburst is a down draft of wind with a diameter less than 2.5 miles, while a macro burst has a diameter greater than 2. 5 miles. High winds are observed when the down draft makes contact with the ground
- ✓ Tornadoes

Means of Transfer of Lightning to People and Objects

Cloud to ground lightning can injure or kill people and objects by direct or indirect means. Objects can either absorb or transmit energy. The absorbed energy can cause the object to explode, burn, or totally destruct. The various forms of transfer are;

a. Tall object transferred to person
b. Tall object to ground to person
c. Object (telephone line, plumbing pipes) to a person in contact with the appliance

General Lightning Facts[27]:

- ✓ It is the second most frequent killer in the United States with nearly 100 deaths and 500 injuries each year.
- ✓ Lightning strikes are not limited to geographic boundaries and have historically impacted all areas of every jurisdiction within the region
- ✓ Lightning is a component of all thunderstorms
- ✓ In the continental United States there are more than 40 million cloud to ground lightning flashes each year.
- ✓ The longest bolt seen to date was 118 miles long in the Dallas-Ft. Worth, TX area
- ✓ The peak temperature of lightning is around 60,000 degree Fahrenheit, or about 5 times hotter than the surface of the Sun
- ✓ Lightning most commonly occurs in thunderstorms, but it can also occur in snowstorms, sandstorms, and in the ejected material over volcanoes

[27] Source: https://www.nssl.noaa.gov/research/lightning/

Who and What's Vulnerable?

In October 1997, the National Oceanic and Atmospheric Administration published findings of some 35 years of USA lightning statistics. Fatalities, injuries, and damage were compiled for the years 1959-1994.

1. Location of Incident:

    40% Unreported.
    27% Open fields & recreation areas (not golf).
    14% under trees (not golf).
    8% Water-related (boating, fishing, swimming…).
    5% Golf/golf under trees.
    3% Heavy equipment and machinery-related.
    2.4% Telephone-related.
    0.7% Radio, transmitter & antenna-related.

2. Gender of victims = 84% male; 16% female.
3. Months of most incidents = June 21%, July 30%, Aug 22%.
4. Days of week of most incidents = Sun./Wed./Sat.
5. Time of day of most incidents = 2 PM to 6 PM.
6. Number of victims = One (91%), two or more (9%).

In conclusion, here is a list of damages and after effects brought about from lightning strikes:

1. Fires
    a. Structures
        - ✓ storage and processing units
        - ✓ aircraft
        - ✓ electrical infrastructure and components
    b. Forests
        - ✓ Approximately 10% of the forest fires in the region over the past 34 years are attributable to lightning strikes.
        - ✓ These fires resulted in a loss of value of the timber of approximately $192,500 and an overall cost of suppression of around $2,250,000
2. Injury and Death to People
        - ✓ 85% of lightning victims are children and young men ages 10-35, often engaged in recreation or work.
        - ✓ 25% of victims die and 70% of survivors suffer long term effects

Lightning Strike Victims, Denoted Effects[28]

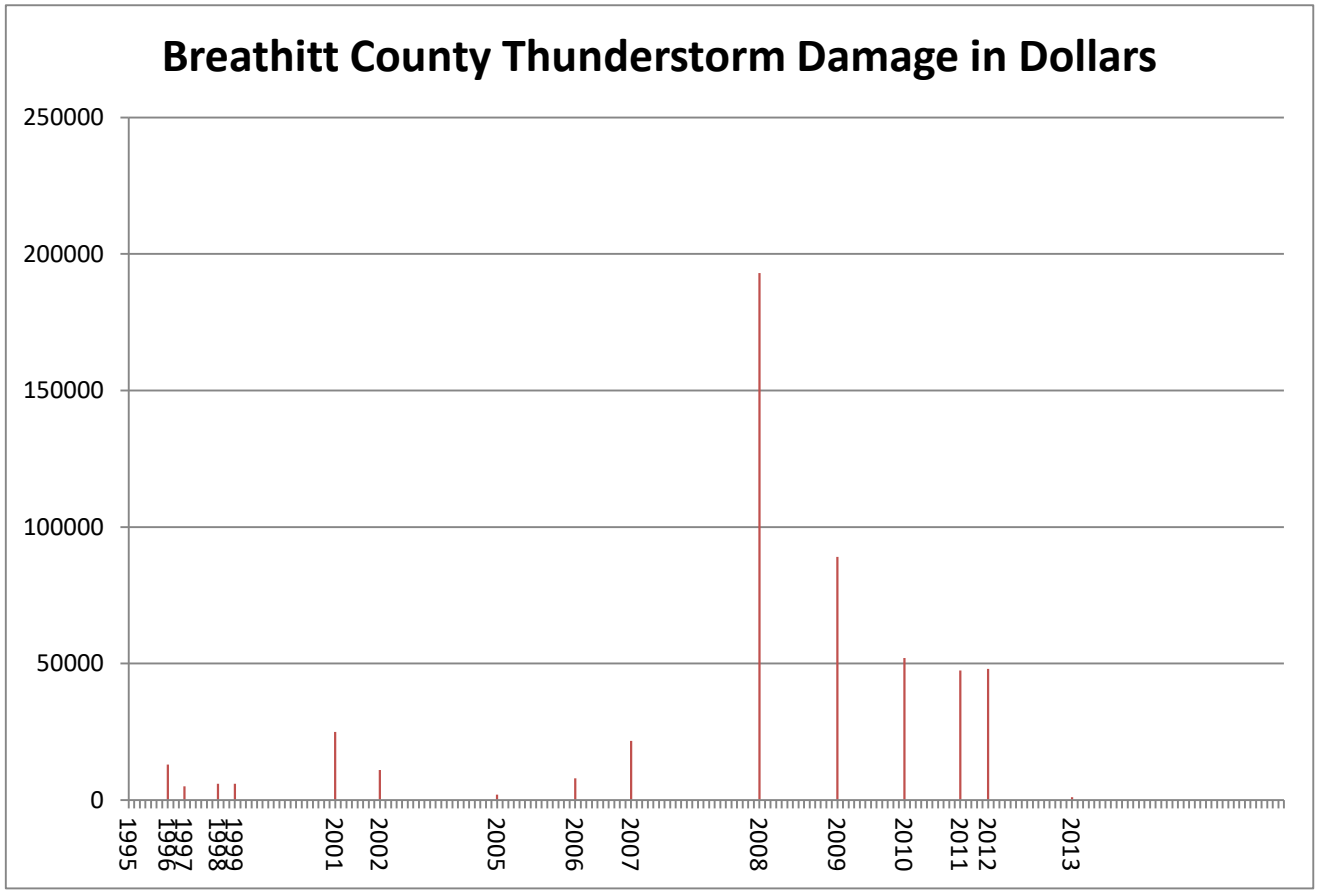
Table 1. Frequency 25% or greater.

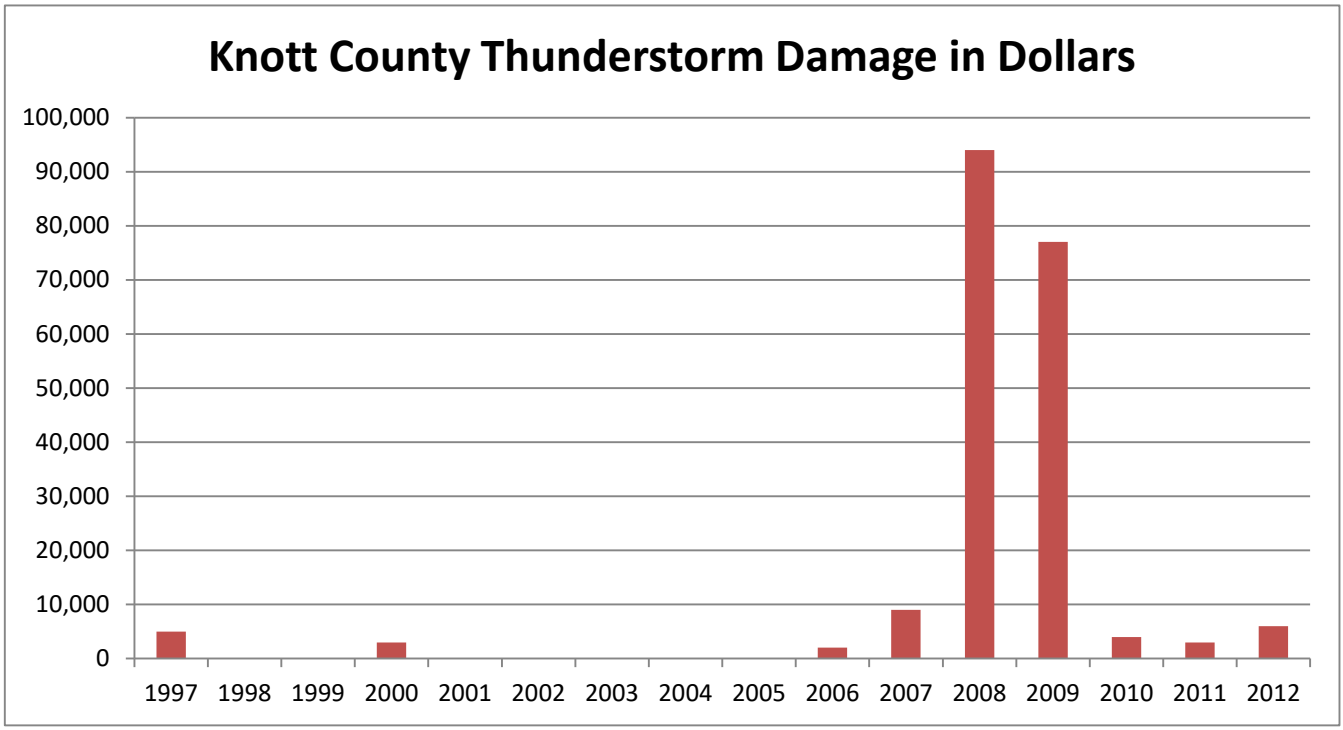
Memory Deficits & Loss	52% **	Depression	32% *
Attention Deficits	41% **	Inability to Sit Long	32%
Sleep Disturbance	44% *	External Burns	32%
Numbness/Parathesias	36% **	Severe Headaches	32% **
Dizziness	38% *	Fear of Crowds	29% *
Easily Fatigued	37% *	Storm Phobia	29% *
Stiffness in Joints	35%	Inability to Cope	29% *
Irritability/Temper Loss	34% *	General Weakness	29% **
Photophobia	34%	Unable to Work	29% **
Loss of Strength/Weakness	34% **	Reduced Libido	26% *
Muscle Spasms	34%	Confusion	25% **
Chronic Fatigue	32% *	Coordination Problems	28% **
Hearing Loss	25%		

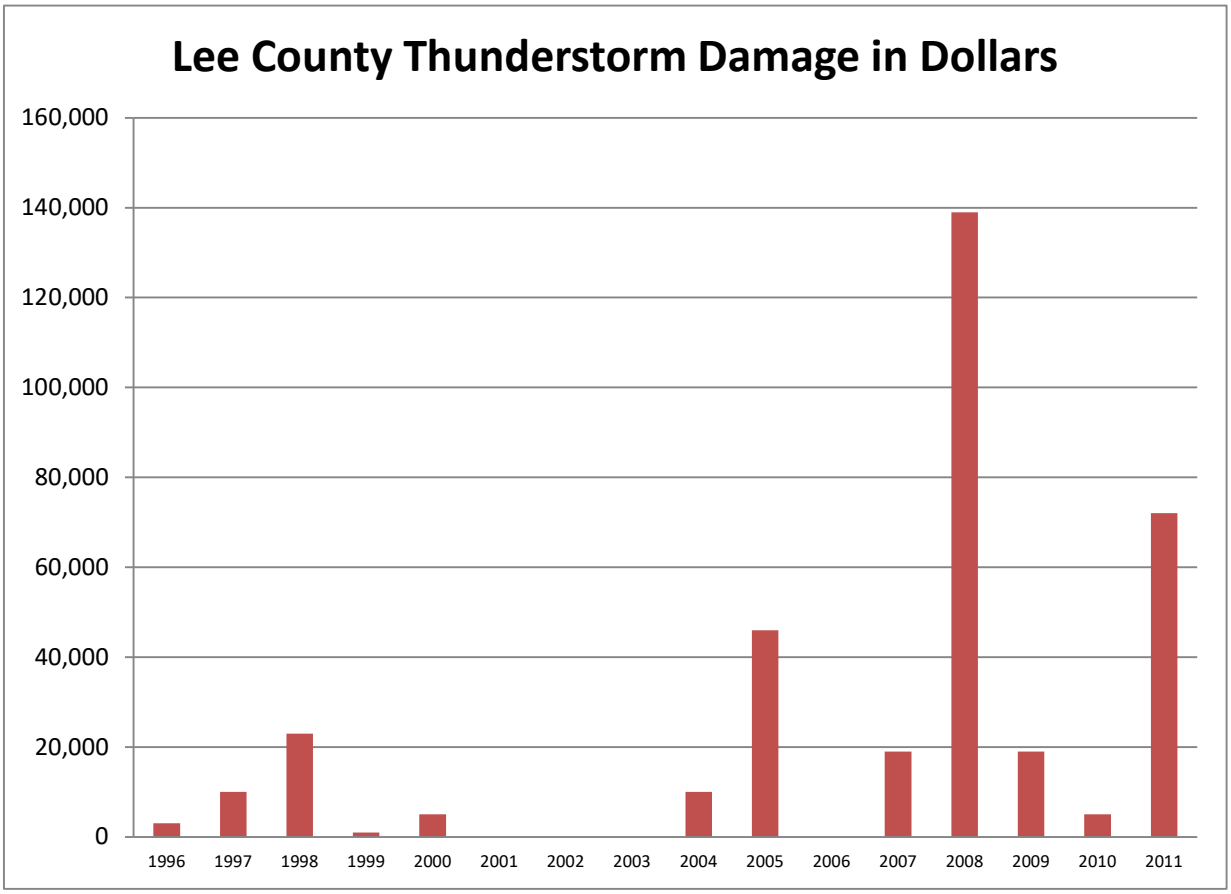
- *Denotes Psychological ** Denotes Psychological or Organic
- No Asterisk Denotes Organic

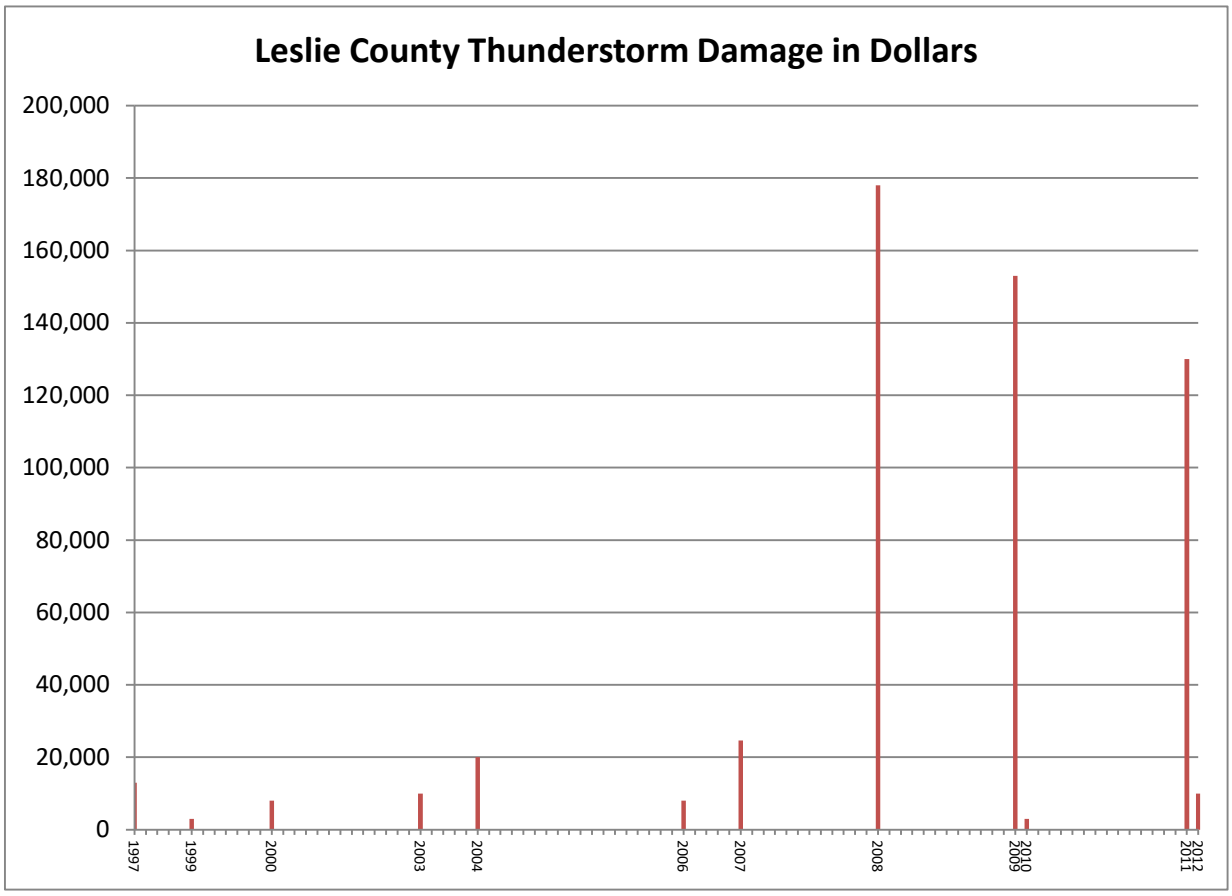
[28] Source: http://www.lightningsafety.com/nlsi_lls/sec.html

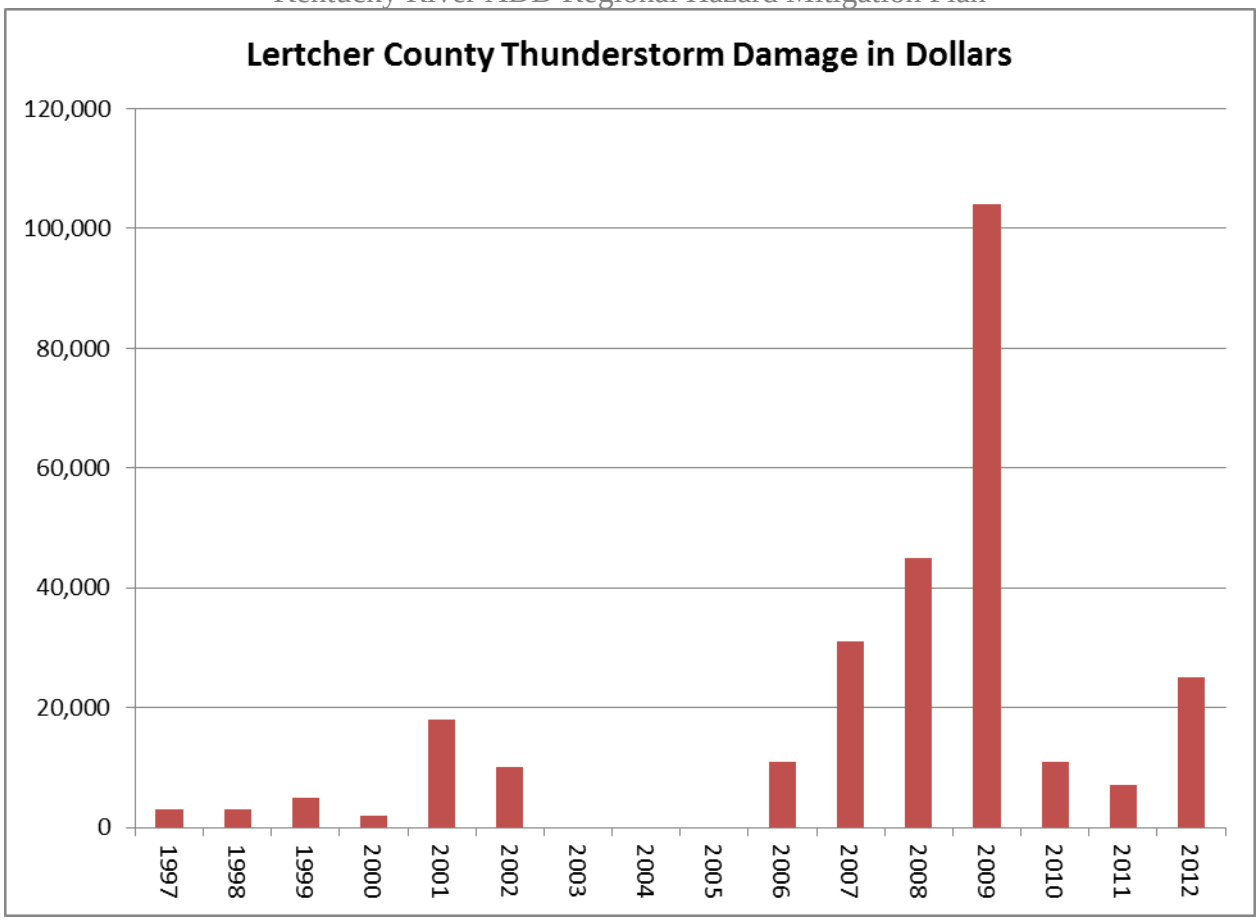
The following graphs were compiled from the NCDC table information. The graphs as presented below depict the severity of Thunderstorms by damages in dollars.

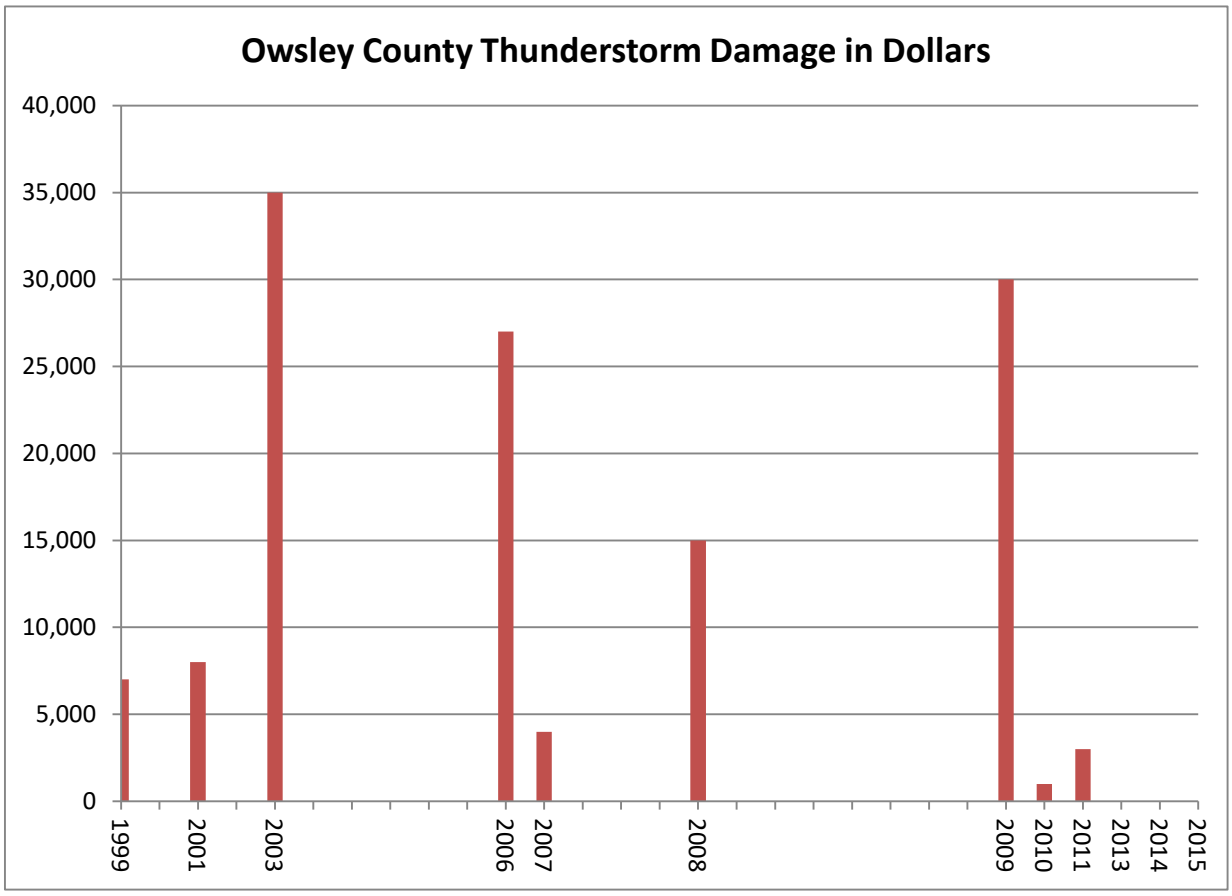


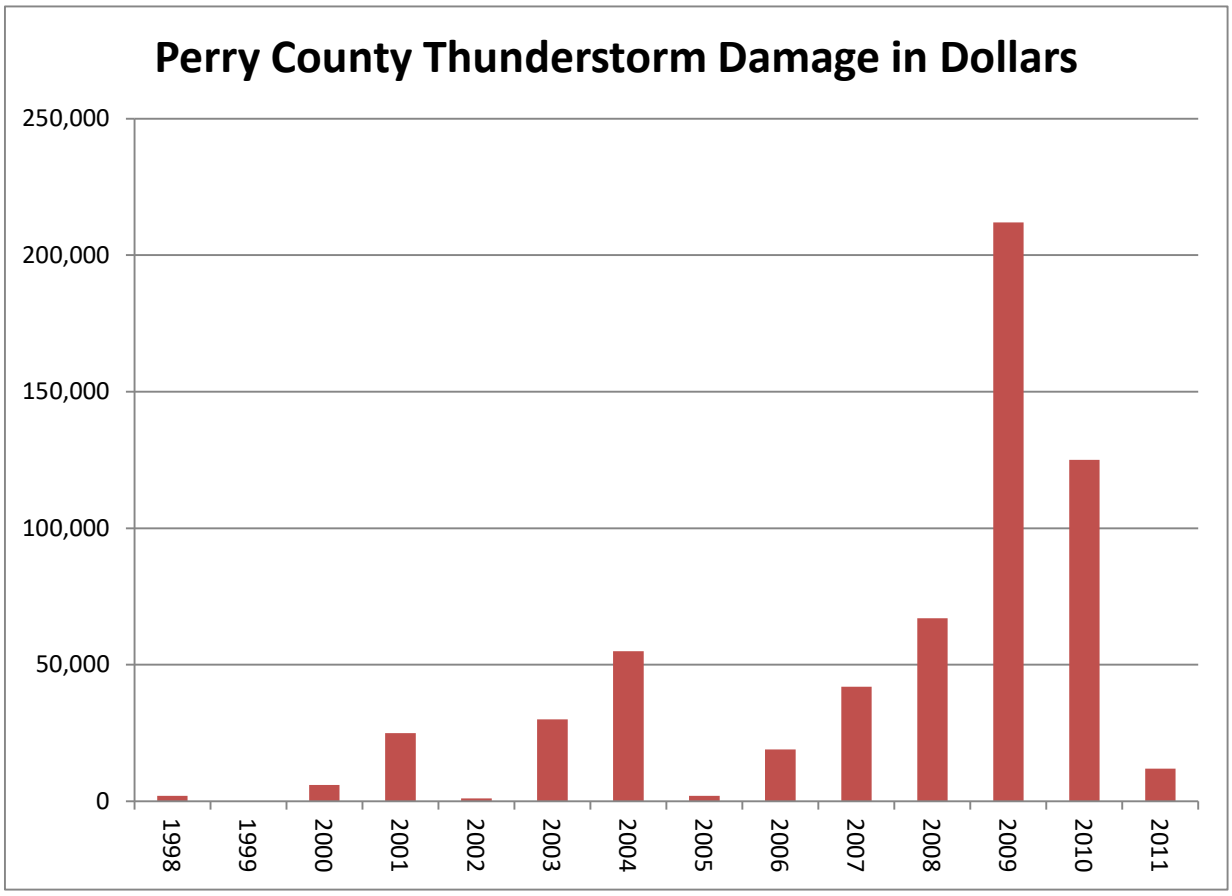

Knott County Thunderstorm Damage in Dollars
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

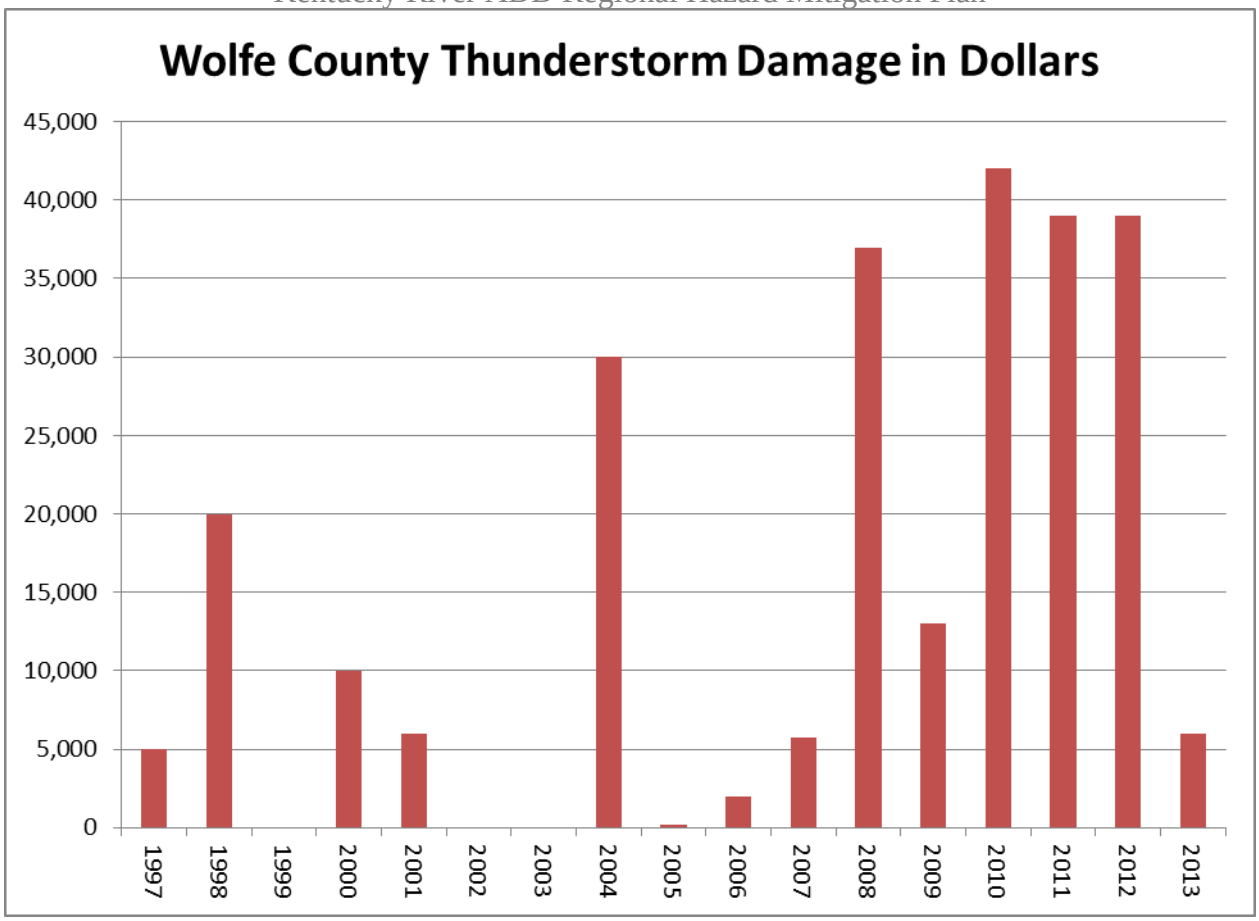

Lee County Thunderstorm Damage in Dollars
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011


Leslie County Thunderstorm Damage in Dollars
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1997
1999
2000
2003
2004
2006
2007
2008
2009
2010
2011
2012


Lertcher County Thunderstorm Damage in Dollars
120,000
100,000
80,000
60,000
40,000
20,000
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012


Owsley County Thunderstorm Damage in Dollars
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1999
2001
2003
2006
2007
2008
2009
2010
2011
2013
2014
2015


Perry County Thunderstorm Damage in Dollars
250,000
200,000
150,000
100,000
50,000
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


Wolfe County Thunderstorm Damage in Dollars
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013

HAIL

Hail is a somewhat frequent occurrence associated with severe thunderstorms. Hailstones grow as ice pellets and are lifted by updrafts, and collect super-cooled water droplets. As they grow, hailstones become heavier and begin to fall. Sometimes, they are caught by successively stronger updrafts and are re-circulated through the cloud growing larger each time the cycle is repeated. Eventually, the updrafts can no longer support the weight of the hailstones. As hailstones fall to the ground, they produce a hail streak (i.e. area where hail falls) that may be more than a mile wide and a few miles long.

Hail is a unique and fairly common hazard capable of producing extensive damage from the impact of these falling objects. Hailstorms occur more frequently during the late spring and early summer months. Most thunderstorms do not produce hail, and ones that do normally produce only small hailstones not more than one-half inch in diameter. However, hailstones can grow larger than the size of a golf ball before falling to the ground.

HAIL CONVERSION CHART

Diameter of Hailstones (inches)	Description
0.50	Marble
0.70	Dime
0.75	Penny
0.88	Nickel
1.00	Quarter
1.25	Half Dollar
1.50	Walnut
1.75	Golf Ball
2.00	Hen Egg
2.50	Tennis Ball
2.75	Baseball
3.00	Tea Cup
4.00	Grapefruit
4.50	Softball

FACTS

- Hailstones can fall at speeds of up to 120mph.
- Hail is not limited to geographic boundaries and has impacted all jurisdictions within the region
- Hail is responsible for nearly one billion dollars in damage to crops and property each year in the United States.
- The largest hailstone ever recorded fell in Coffeyville, Kansas in 1970. It measured over 5.6in in diameter and weighed almost two pounds.

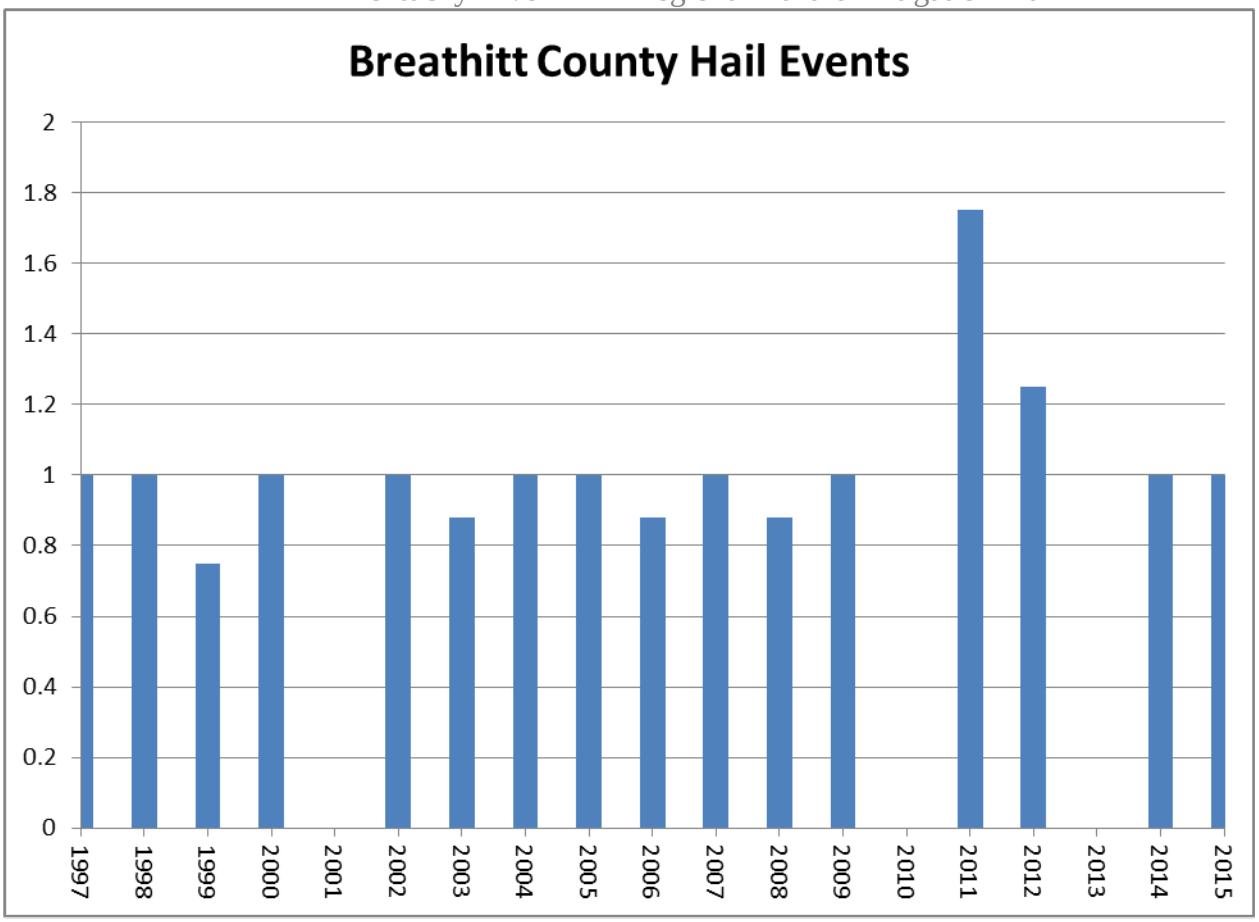
EFFECTS

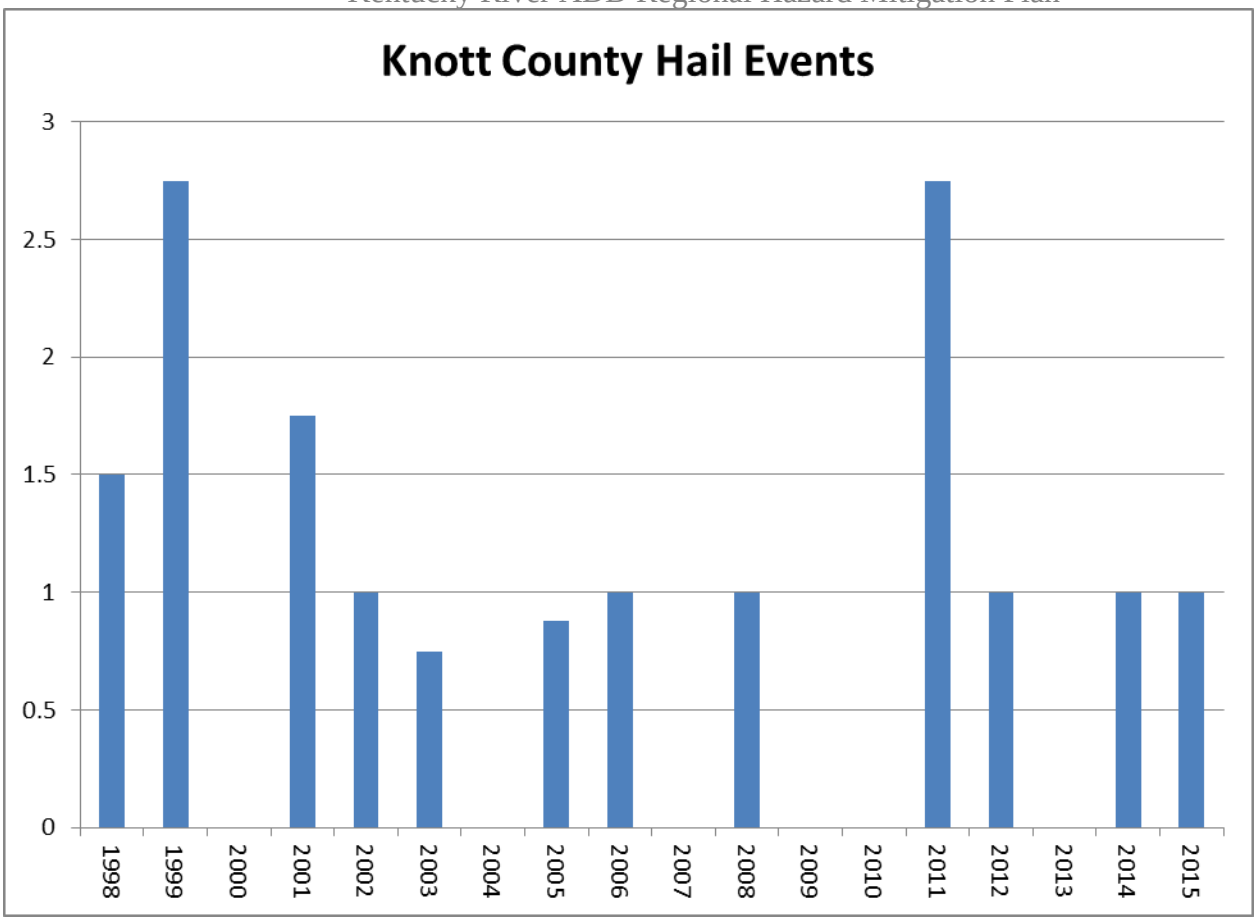
- **Property and crop damage** is the main effect of hailstorms. Hail is capable of destroying homes, cars, crops and the environment.

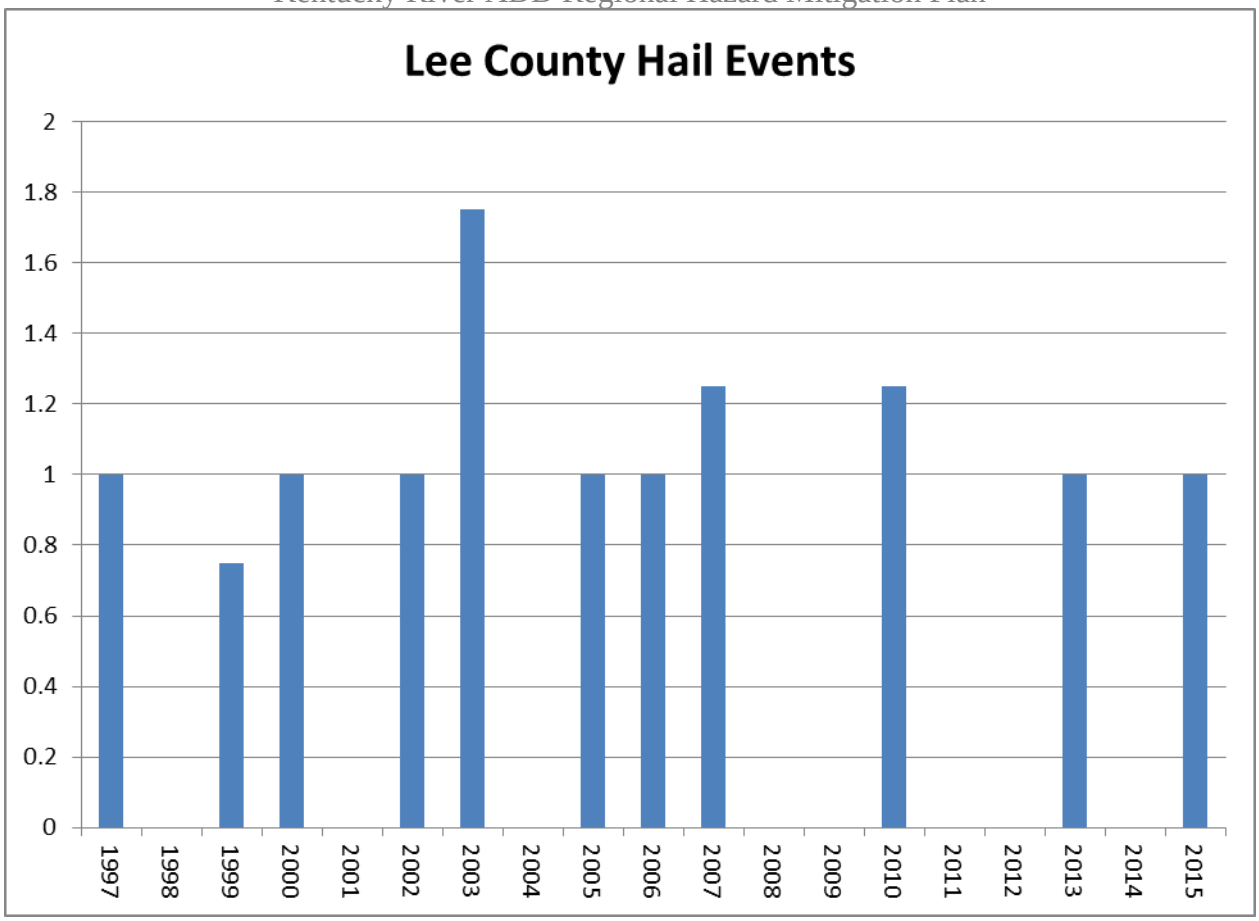
Profile

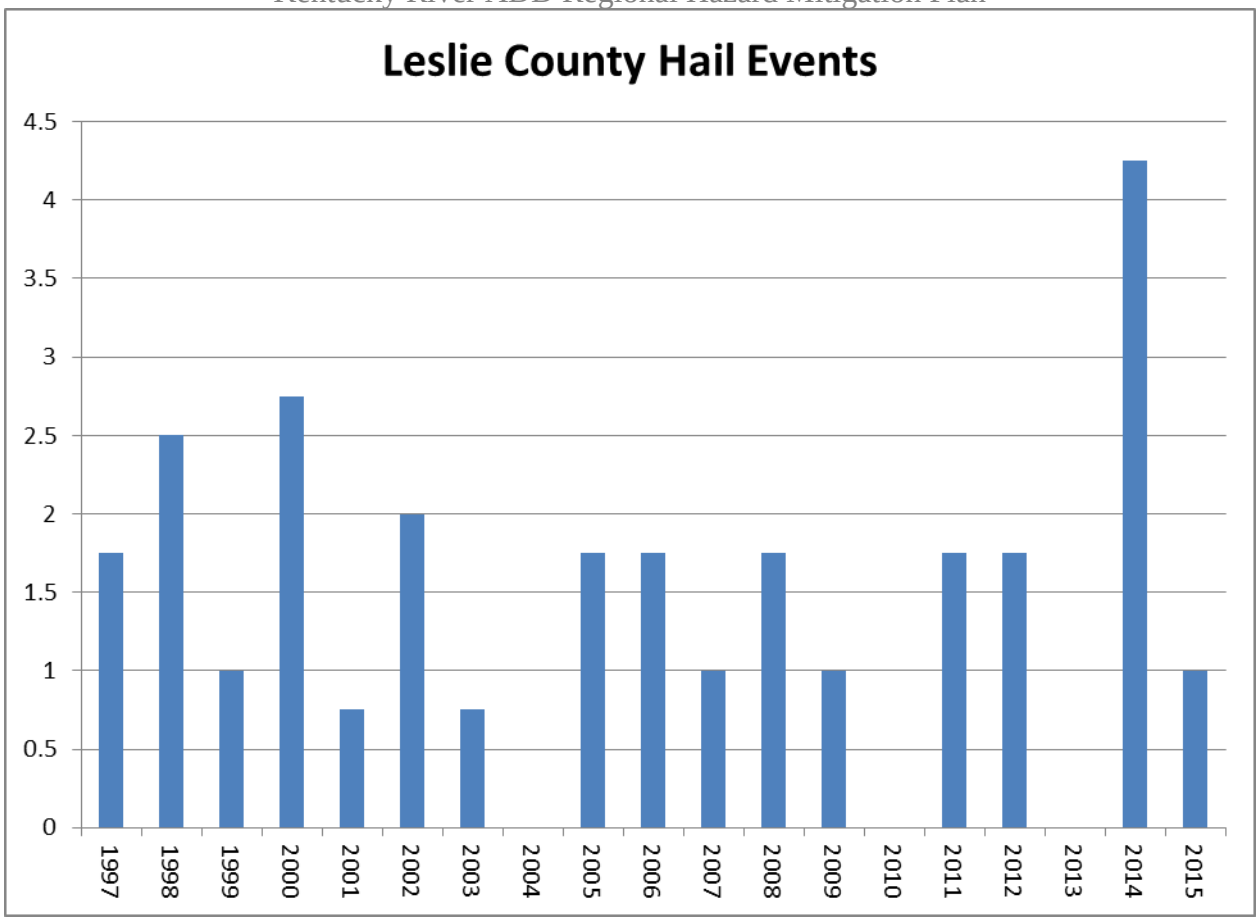
Historical Incidences in the Kentucky River Area Development District

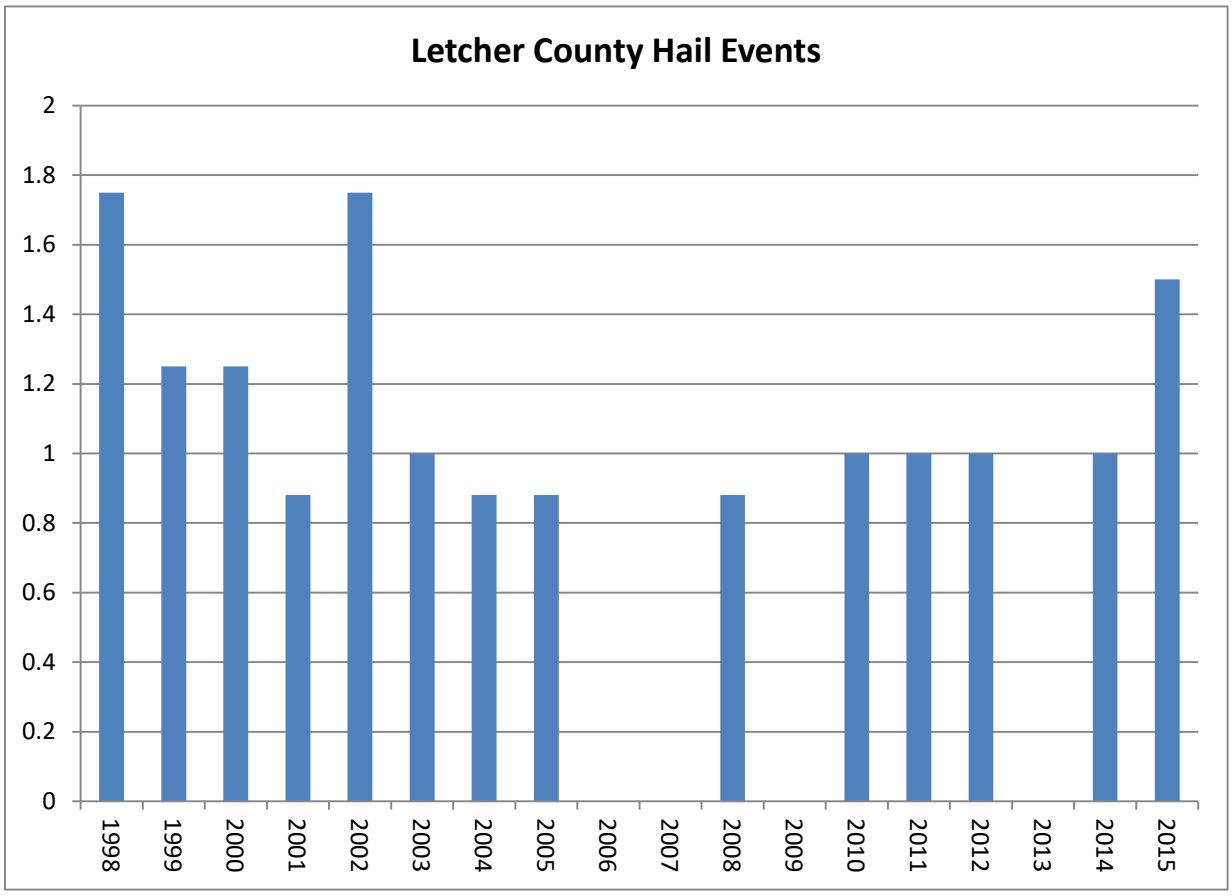
The following graphs were compiled from the NCDC table information. These graphs reflect the severity of events in terms of hail size expressed in maximum hail diameter per event.

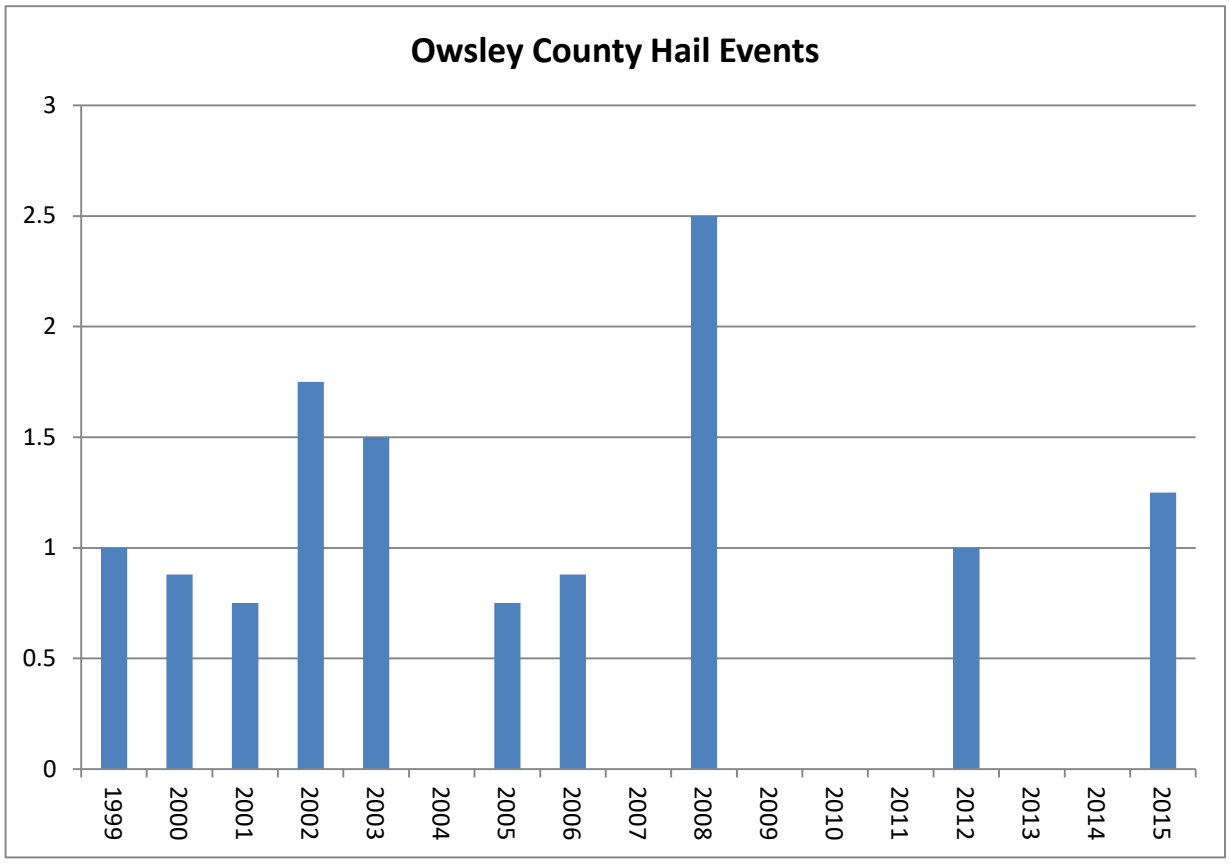

Breathitt County Hail Events
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

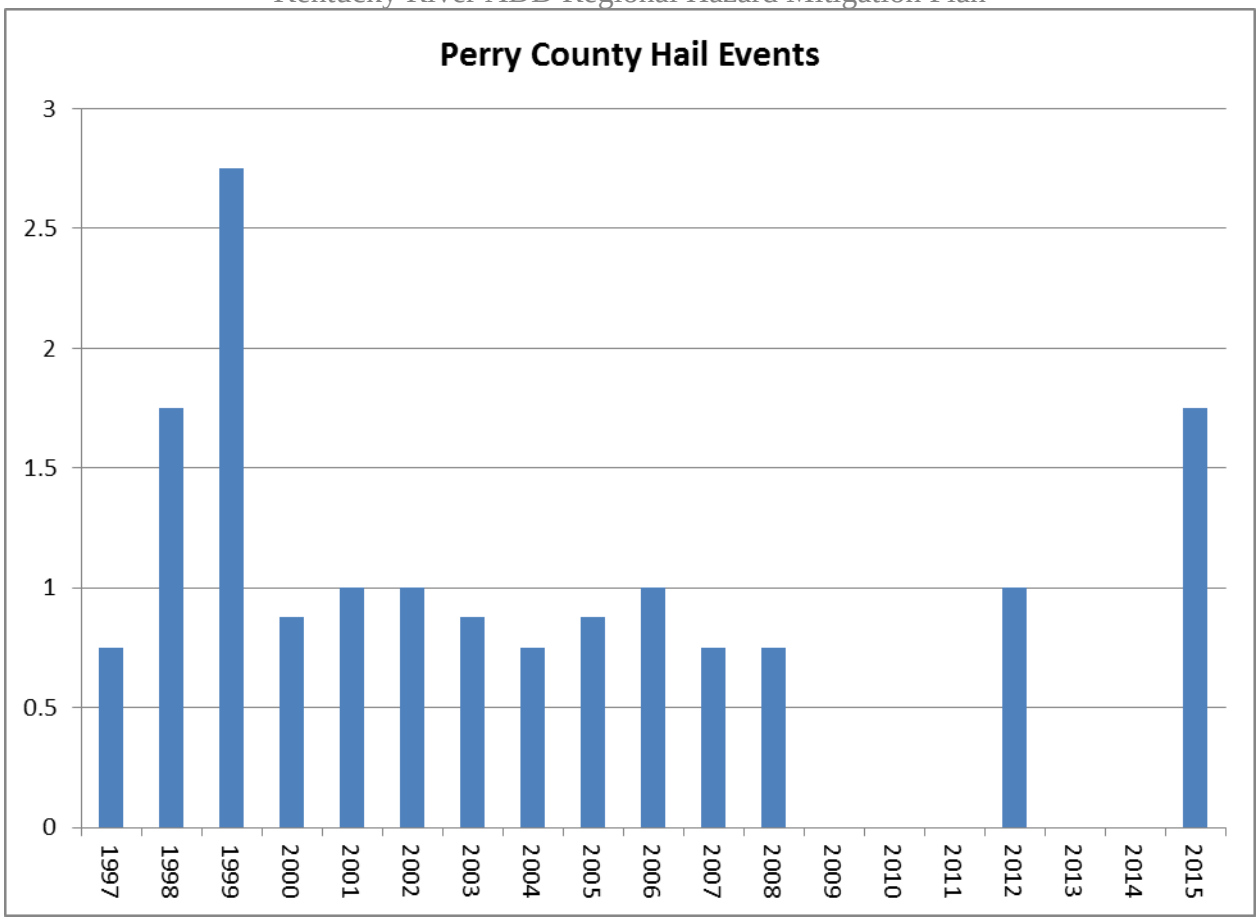

Knott County Hail Events
3
2.5
2
1.5
1
0.5
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

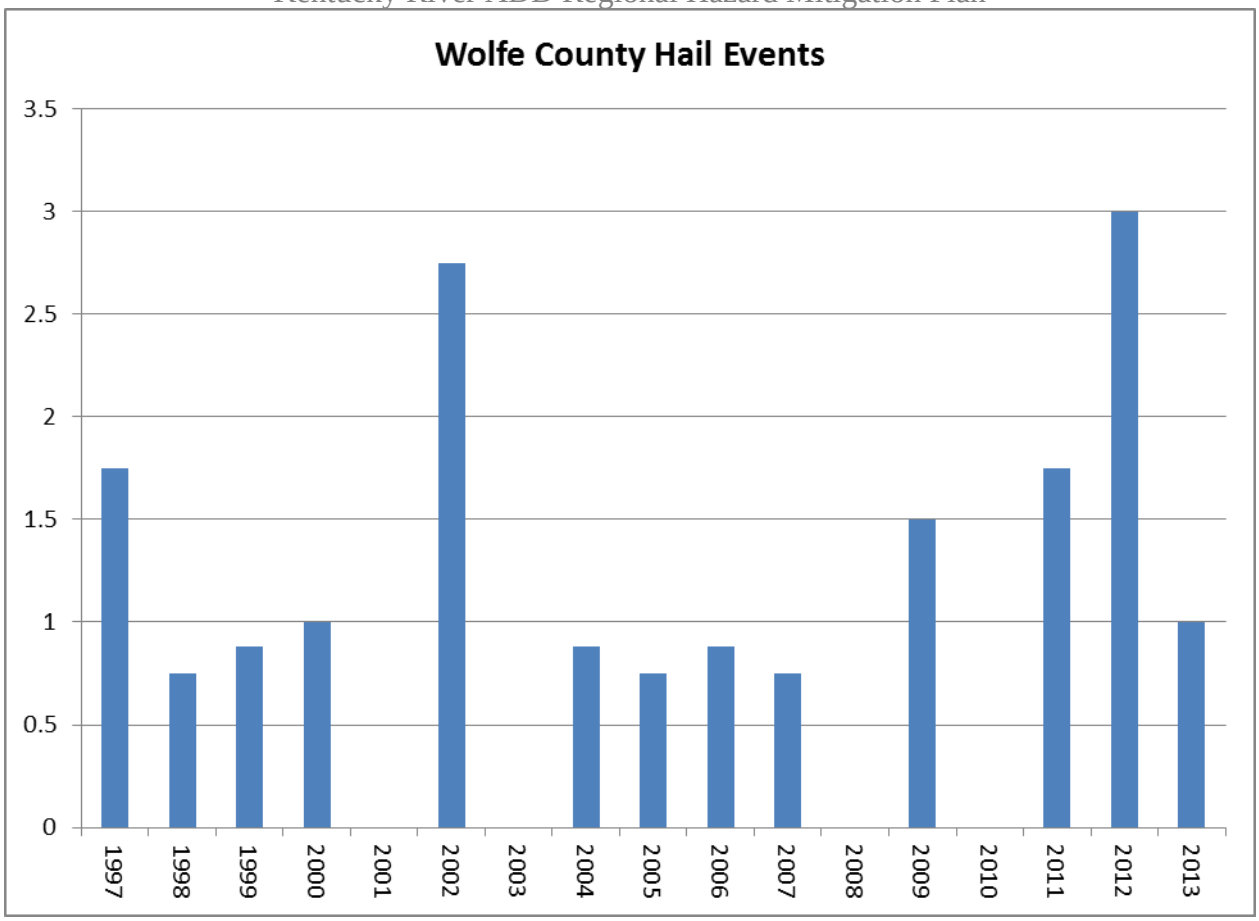

Lee County Hail Events
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Leslie County Hail Events
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Letcher County Hail Events
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Owsley County Hail Events
3
2.5
2
1.5
1
0.5
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Perry County Hail Events
3
2.5
2
1.5
1
0.5
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Wolfe County Hail Events
3.5
3
2.5
2
1.5
1
0.5
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013

Presidential Declarations

For context, between the years of 1995 to 2016, there have been 28 presidential declarations that had severe storms and other storm-related events as a factor in the declaration for the Commonwealth of Kentucky.

Year	Disaster Declaration	Declaration Date
1995	DR-1055	June 12, 1995
1996	DR-1117	May 31, 1996
1997	DR-1163	March 3, 1997
1998	DR-1216	April 28, 1998
2000	DR-1310; DR-1320	January 9, 2000; February 27, 2000
2001	DR-1388	August 14, 2001
2002	DR-1407; DR-1414	April 3, 2002; May 6, 2002
2003	DR-1471; DR-1475	June 2, 2003; July 1, 2002
2004	DR-1523; DR-1537	June 9, 2004; August 5, 2004
2005	DR-1617	November 30, 2005
2007	DR-1703	May 24, 2007
2008	DR-1746; DR-1757	February 20, 2008; May 18, 2008
2009	DR-1841; DR-1855	May 28, 2009; August 13, 2009
2010	DR-1912; DR-1925	May 10, 2010; July 22, 2010
2011	DR-1976; DR-4008	May 3, 2011; July 24, 2011
2012	DR-4057	March 5, 2012
2014	DR-4196	September 29, 2014
2015	DR-4217; DR-4239	May 1, 2015; August 12, 2015
2016	DR-4278	August 26, 2016

SIGNIFICANT HAIL EVENTS IN THE REGION

DATE	LOCATION (COUNTY)	MAGNITUDE	PROPERTY DAMAGE	CROP DAMAGE
05/18/95	Breathitt	1.75”	<$1,000	<$1,000
07/30/99	Knott	2.75”	<$1,000	<$1,000
04/24/58	Lee	2.00”	<$1,000	<$1,000
08/17/00	Leslie	2.75”	<$1,000	<$1,000
05/18/95	Letcher	2.75”	<$1,000	<$1,000
6/16/08	Owsley	2.5”	<$1,000	<$1,000
4/25/15	Perry	1.75”	<$1,000	<$1,000
4/28/02	Wolfe	2.75”	<$1,000	<$1,000

The above chart reflects the hail events in severity scale in terms of both property and crop damage expressed in dollars lost. The effects of large hailstorms can include minimal to severe property and crop damage and destruction as well as loss of human life.

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	49.00K	0.00K
JACKSON	BREATHITT CO.	KY	01/17/2012	14:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
JACKSON	BREATHITT CO.	KY	01/17/2012	14:51	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
CAMP LEWIS	BREATHITT CO.	KY	01/17/2012	15:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	20.00K	0.00K
JACKSON	BREATHITT CO.	KY	02/29/2012	14:42	EST-5	Thunderstorm Wind	55 kts. EG	0	0	10.00K	0.00K
YEADON	BREATHITT CO.	KY	06/29/2012	18:43	EST-5	Thunderstorm Wind	52 kts. EG	0	0	15.00K	0.00K
PAXTON	BREATHITT CO.	KY	01/30/2013	07:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TALBERT	BREATHITT CO.	KY	01/30/2013	07:51	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GUAGE	BREATHITT CO.	KY	01/30/2013	08:06	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	05/21/2013	17:08	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
CAMP LEWIS	BREATHITT CO.	KY	05/21/2013	17:28	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TURKEY	BREATHITT CO.	KY	06/13/2013	11:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ELKATAWA	BREATHITT CO.	KY	06/13/2013	11:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SIMPSON	BREATHITT CO.	KY	07/01/2013	16:47	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CURT	BREATHITT CO.	KY	07/02/2013	13:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JETTS CREEK	BREATHITT CO.	KY	07/04/2013	20:23	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HOUSTON	BREATHITT CO.	KY	07/04/2013	20:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMP LEWIS	BREATHITT CO.	KY	09/12/2013	15:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
COPEBRANCH	BREATHITT CO.	KY	11/01/2013	01:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HADDIX	BREATHITT CO.	KY	11/01/2013	02:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	12/22/2013	01:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TURKEY	BREATHITT CO.	KY	05/21/2014	21:14	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TURKEY	BREATHITT CO.	KY	05/21/2014	21:16	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	06/10/2014	17:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	06/10/2014	17:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WILHURST	BREATHITT CO.	KY	06/10/2014	17:59	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	06/10/2014	18:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FROZEN CREEK	BREATHITT CO.	KY	06/10/2014	18:03	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	06/10/2014	18:13	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GUAGE	BREATHITT CO.	KY	06/10/2014	18:13	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GUAGE	BREATHITT CO.	KY	06/10/2014	18:16	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CHENOWEE	BREATHITT CO.	KY	07/27/2014	12:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WOLVERINE	BREATHITT CO.	KY	07/27/2014	12:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WOLF COAL	BREATHITT CO.	KY	07/27/2014	12:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WOLF COAL	BREATHITT CO.	KY	07/27/2014	12:35	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYHOLE	BREATHITT CO.	KY	08/21/2014	15:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	09/02/2014	17:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LAWSON	BREATHITT CO.	KY	09/06/2014	13:34	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
GAMBILL	BREATHITT CO.	KY	10/06/2014	22:30	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CAMP LEWIS	BREATHITT CO.	KY	10/07/2014	21:39	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
KECK	BREATHITT CO.	KY	06/18/2015	12:36	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WILHURST	BREATHITT CO.	KY	06/29/2015	18:45	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
WOLF COAL	BREATHITT CO.	KY	07/09/2015	14:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CHENOWEE	BREATHITT CO.	KY	07/09/2015	14:08	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
ROUSSEAU	BREATHITT CO.	KY	07/09/2015	14:27	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
VANCLEVE	BREATHITT CO.	KY	07/13/2015	15:15	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
VANCLEVE	BREATHITT CO.	KY	07/13/2015	15:16	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
NOCTOR	BREATHITT CO.	KY	07/13/2015	15:20	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
ELKATAWA	BREATHITT CO.	KY	07/13/2015	15:20	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	07/13/2015	15:23	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CROCKETTSVILLE	BREATHITT CO.	KY	07/13/2015	15:25	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
QUICKSAND	BREATHITT CO.	KY	07/13/2015	15:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ROUSSEAU	BREATHITT CO.	KY	07/14/2015	18:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WILHURST	BREATHITT CO.	KY	07/14/2015	18:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LOST CREEK	BREATHITT CO.	KY	07/14/2015	18:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CURT	BREATHITT CO.	KY	07/14/2015	18:35	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MORRIS FORK	BREATHITT CO.	KY	07/14/2015	18:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYHOLE	BREATHITT CO.	KY	07/14/2015	18:53	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
YEADON	BREATHITT CO.	KY	08/19/2015	12:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GUAGE	BREATHITT CO.	KY	06/04/2016	14:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
NOCTOR	BREATHITT CO.	KY	06/23/2016	18:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LAWSON	BREATHITT CO.	KY	06/23/2016	18:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	07/04/2016	16:54	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LAWSON	BREATHITT CO.	KY	03/01/2017	09:02	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
QUICKSAND	BREATHITT CO.	KY	03/01/2017	09:10	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
QUICKSAND	BREATHITT CO.	KY	03/01/2017	09:10	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	03/01/2017	09:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
(JKL)CARROLL ARPT JA	BREATHITT CO.	KY	03/01/2017	09:10	EST-5	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	03/01/2017	09:10	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
BAYS	BREATHITT CO.	KY	03/01/2017	09:14	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
SEWELL	BREATHITT CO.	KY	03/01/2017	09:15	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
CANOE	BREATHITT CO.	KY	03/01/2017	09:15	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
COPEBRANCH	BREATHITT CO.	KY	03/01/2017	09:15	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
ROUSSEAU	BREATHITT CO.	KY	03/01/2017	09:15	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
GUAGE	BREATHITT CO.	KY	03/01/2017	09:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FROZEN CREEK	BREATHITT CO.	KY	05/19/2017	20:42	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
STEVENSON	BREATHITT CO.	KY	05/19/2017	21:39	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
JACKSON	BREATHITT CO.	KY	05/27/2017	16:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WILSTACY	BREATHITT CO.	KY	05/31/2017	15:08	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
NOCTOR	BREATHITT CO.	KY	06/23/2017	20:18	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	49.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
JETTS CREEK	BREATHITT CO.	KY	03/15/2012	13:15	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
GUERRANT	BREATHITT CO.	KY	03/15/2012	13:45	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
LOST CREEK	BREATHITT CO.	KY	04/26/2012	16:01	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
TALBERT	BREATHITT CO.	KY	06/04/2014	19:15	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
WAR CREEK	BREATHITT CO.	KY	06/25/2015	18:25	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
NED	BREATHITT CO.	KY	05/02/2016	13:50	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
CLAYHOLE	BREATHITT CO.	KY	05/10/2016	19:42	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
QUICKSAND	BREATHITT CO.	KY	05/27/2017	16:27	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	6.00K	0.00K
MOUSIE	KNOTT CO.	KY	07/01/2012	20:26	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
EMMALENA	KNOTT CO.	KY	07/05/2012	14:06	EST-5	Thunderstorm Wind	78 kts. EG	0	0	5.00K	0.00K
PINE TOP	KNOTT CO.	KY	07/05/2012	14:20	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
YELLOW MTN	KNOTT CO.	KY	07/05/2012	14:40	EST-5	Thunderstorm Wind	56 kts. MG	0	0	0.00K	0.00K
HINDMAN	KNOTT CO.	KY	07/18/2012	11:25	EST-5	Thunderstorm Wind	48 kts. EG	0	0	1.00K	0.00K
YELLOW MTN	KNOTT CO.	KY	01/30/2013	08:30	EST-5	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
PIPPA PASSES	KNOTT CO.	KY	01/30/2013	08:33	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HINDMAN	KNOTT CO.	KY	06/13/2013	11:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HINDMAN	KNOTT CO.	KY	06/13/2013	11:58	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MOUSIE	KNOTT CO.	KY	11/01/2013	02:35	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TOPMOST	KNOTT CO.	KY	11/01/2013	02:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DECOY	KNOTT CO.	KY	02/21/2014	01:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
EMMALENA	KNOTT CO.	KY	02/21/2014	01:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
YELLOW MTN	KNOTT CO.	KY	02/21/2014	01:20	EST-5	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
HINDMAN	KNOTT CO.	KY	02/21/2014	01:22	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HINDMAN	KNOTT CO.	KY	02/21/2014	01:22	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PINE TOP	KNOTT CO.	KY	02/21/2014	01:32	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CODY	KNOTT CO.	KY	06/10/2014	18:28	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
TOPMOST	KNOTT CO.	KY	09/02/2014	17:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LITTCARR	KNOTT CO.	KY	10/07/2014	16:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CARRIE	KNOTT CO.	KY	06/16/2015	15:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HINDMAN	KNOTT CO.	KY	07/13/2015	15:52	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PIPPA PASSES	KNOTT CO.	KY	07/14/2015	18:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
RITCHIE	KNOTT CO.	KY	07/14/2015	18:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BRINKLEY	KNOTT CO.	KY	07/14/2015	19:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CORDIA	KNOTT CO.	KY	07/14/2015	19:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LITTCARR	KNOTT CO.	KY	07/14/2015	19:08	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
VEST	KNOTT CO.	KY	06/23/2016	18:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SOFT SHELL	KNOTT CO.	KY	06/23/2016	18:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MOUSIE	KNOTT CO.	KY	06/23/2016	18:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEARVILLE	KNOTT CO.	KY	07/04/2016	17:13	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
PIPPA PASSES	KNOTT CO.	KY	07/08/2016	14:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
YELLOW MTN	KNOTT CO.	KY	03/01/2017	09:40	EST-5	Thunderstorm Wind	59 kts. MG	0	0	0.00K	0.00K
Totals:								0	0	6.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TOPMOST	KNOTT CO.	KY	03/15/2012	13:11	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
PIPPA PASSES	KNOTT CO.	KY	03/15/2012	13:42	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
LITTCARR	KNOTT CO.	KY	08/01/2012	14:50	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
LITTCARR	KNOTT CO.	KY	04/29/2014	20:25	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
LITTCARR	KNOTT CO.	KY	04/25/2015	21:15	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
MOUSIE	KNOTT CO.	KY	05/02/2016	14:14	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
DECOY	KNOTT CO.	KY	05/10/2016	19:37	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
DECOY	KNOTT CO.	KY	05/20/2017	19:35	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	1.00K	0.00K
BEATTYVILLE	LEE CO.	KY	01/17/2012	14:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
VADA	LEE CO.	KY	07/05/2012	13:22	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MT OLIVE	LEE CO.	KY	07/05/2012	13:40	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
YELLOW ROCK	LEE CO.	KY	07/05/2012	13:45	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MT OLIVE	LEE CO.	KY	07/05/2012	13:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MONICA	LEE CO.	KY	07/19/2012	14:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	01/30/2013	07:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	06/09/2013	14:50	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
PROCTOR	LEE CO.	KY	07/01/2013	16:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BELLE PT	LEE CO.	KY	07/13/2013	15:31	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
PROCTOR	LEE CO.	KY	11/01/2013	01:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CONGLETON	LEE CO.	KY	11/01/2013	01:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	12/22/2013	00:52	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HEIDELBERG	LEE CO.	KY	02/21/2014	00:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PROCTOR	LEE CO.	KY	02/21/2014	00:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TALLEGA	LEE CO.	KY	02/21/2014	00:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
OLD LNDG	LEE CO.	KY	06/10/2014	17:38	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
IDA MAY	LEE CO.	KY	06/10/2014	17:39	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BELLE PT	LEE CO.	KY	06/10/2014	17:39	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
CONGLETON	LEE CO.	KY	06/10/2014	17:39	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
OLD LNDG	LEE CO.	KY	06/10/2014	17:40	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
YELLOW ROCK	LEE CO.	KY	07/27/2014	12:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PROCTOR	LEE CO.	KY	07/27/2014	12:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MT OLIVE	LEE CO.	KY	07/27/2014	12:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CONGLETON	LEE CO.	KY	07/27/2014	12:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MONICA	LEE CO.	KY	07/27/2014	12:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CANYON FALLS	LEE CO.	KY	07/27/2014	12:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PRIMROSE	LEE CO.	KY	08/21/2014	15:14	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LOWER BUFFALO	LEE CO.	KY	09/02/2014	14:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LOWER BUFFALO	LEE CO.	KY	09/02/2014	14:56	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
EARNESTVILLE	LEE CO.	KY	09/02/2014	16:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PRIMROSE	LEE CO.	KY	09/02/2014	16:45	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
ATHOL	LEE CO.	KY	09/02/2014	16:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ST HELENS	LEE CO.	KY	09/02/2014	17:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ST HELENS	LEE CO.	KY	09/02/2014	17:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
OLD LNDG	LEE CO.	KY	04/07/2015	19:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PRIMROSE	LEE CO.	KY	04/07/2015	19:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LOWER BUFFALO	LEE CO.	KY	05/11/2015	13:56	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ST HELENS	LEE CO.	KY	05/11/2015	14:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	07/09/2015	14:00	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
TALLEGA	LEE CO.	KY	07/09/2015	14:05	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	07/14/2015	18:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
IDA MAY	LEE CO.	KY	07/14/2015	18:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	05/10/2016	17:53	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ST HELENS	LEE CO.	KY	05/10/2016	18:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CRESSMONT	LEE CO.	KY	05/10/2016	19:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	03/01/2017	08:46	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
MT OLIVE	LEE CO.	KY	03/01/2017	08:49	EST-5	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
YELLOW ROCK	LEE CO.	KY	03/01/2017	08:54	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	03/01/2017	09:01	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
HEIDELBERG	LEE CO.	KY	03/27/2017	19:28	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
PROCTOR	LEE CO.	KY	05/18/2017	15:43	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ATHOL	LEE CO.	KY	05/31/2017	14:46	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	1.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
PRIMROSE	LEE CO.	KY	06/09/2013	14:50	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	07/13/2013	15:34	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	04/25/2015	19:35	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BEATTYVILLE	LEE CO.	KY	05/10/2016	17:53	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	10.00K	0.00K
WENDOVER	LESLIE CO.	KY	07/05/2012	14:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
THOUSANDSTICKS	LESLIE CO.	KY	01/30/2013	08:00	EST-5	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
WOOTON	LESLIE CO.	KY	01/30/2013	08:03	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SIZEROCK	LESLIE CO.	KY	06/13/2013	11:54	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
STINNETT	LESLIE CO.	KY	06/13/2013	12:16	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HOSKINSTON	LESLIE CO.	KY	06/13/2013	12:16	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SMILAX	LESLIE CO.	KY	06/13/2013	12:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BEAR BRANCH	LESLIE CO.	KY	11/01/2013	01:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SHOAL	LESLIE CO.	KY	02/21/2014	00:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
THOUSANDSTICKS	LESLIE CO.	KY	02/21/2014	01:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CONFLUENCE	LESLIE CO.	KY	02/21/2014	01:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CUTSHIN	LESLIE CO.	KY	02/21/2014	01:14	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ASHER	LESLIE CO.	KY	05/13/2014	17:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ROCKHOUSE	LESLIE CO.	KY	05/21/2014	21:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WENDOVER	LESLIE CO.	KY	05/21/2014	21:40	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
WOOTON	LESLIE CO.	KY	06/10/2014	18:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CUTSHIN	LESLIE CO.	KY	06/10/2014	18:15	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
WOOTON	LESLIE CO.	KY	06/10/2014	18:18	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
THOUSANDSTICKS	LESLIE CO.	KY	07/27/2014	14:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MOZELLE	LESLIE CO.	KY	07/27/2014	15:18	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
SIZEROCK	LESLIE CO.	KY	10/07/2014	16:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
STINNETT	LESLIE CO.	KY	05/11/2015	16:02	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	06/21/2015	15:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MOZELLE	LESLIE CO.	KY	06/21/2015	15:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	07/13/2015	15:57	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MOZELLE	LESLIE CO.	KY	07/13/2015	16:02	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CONFLUENCE	LESLIE CO.	KY	07/14/2015	06:06	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	07/14/2015	06:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	07/14/2015	19:38	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ROARK	LESLIE CO.	KY	07/14/2015	19:38	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ASHER	LESLIE CO.	KY	03/01/2016	16:08	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
DRYHILL	LESLIE CO.	KY	06/23/2016	19:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WENDOVER	LESLIE CO.	KY	06/23/2016	19:37	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CUTSHIN	LESLIE CO.	KY	03/01/2017	09:57	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	06/13/2017	16:40	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
ASHER	LESLIE CO.	KY	07/06/2017	17:42	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	10.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	5.00K	0.00K
KALIOPI	LESLIE CO.	KY	03/15/2012	15:04	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
KALIOPI	LESLIE CO.	KY	03/15/2012	15:07	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
DRYHILL	LESLIE CO.	KY	03/15/2012	15:12	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
SMILAX	LESLIE CO.	KY	03/15/2012	15:15	EST-5	Hail	1.75 in.	0	0	5.00K	0.00K
SMILAX	LESLIE CO.	KY	03/15/2012	15:30	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
WARBRANCH	LESLIE CO.	KY	03/15/2012	15:53	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	04/26/2012	17:00	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BIG ROCK	LESLIE CO.	KY	04/26/2012	17:15	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	07/27/2014	14:50	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BEAR BRANCH	LESLIE CO.	KY	07/27/2014	14:55	EST-5	Hail	4.25 in.	0	0	0.00K	0.00K
BEAR BRANCH	LESLIE CO.	KY	07/27/2014	15:05	EST-5	Hail	2.75 in.	0	0	0.00K	0.00K
ESSIE	LESLIE CO.	KY	07/27/2014	15:10	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ESSIE	LESLIE CO.	KY	07/27/2014	15:15	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	04/25/2015	18:45	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	06/25/2015	18:00	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HYDEN	LESLIE CO.	KY	06/13/2017	16:37	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
Totals:								0	0	5.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	25.00K	0.00K
CROWN	LETCHER CO.	KY	04/03/2012	14:57	EST-5	Thunderstorm Wind	60 kts. EG	0	0	25.00K	0.00K
MILLSTONE	LETCHER CO.	KY	07/24/2012	14:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HEMPHILL	LETCHER CO.	KY	07/31/2012	15:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FARRADAY	LETCHER CO.	KY	07/31/2012	15:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SERGENT	LETCHER CO.	KY	07/31/2012	16:11	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
WHITCO	LETCHER CO.	KY	08/03/2012	12:49	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LETCHER	LETCHER CO.	KY	04/17/2013	12:37	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BLACKEY	LETCHER CO.	KY	06/13/2013	12:20	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DONGOLA	LETCHER CO.	KY	06/13/2013	12:37	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
WHITCO	LETCHER CO.	KY	05/21/2014	22:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MILLSTONE	LETCHER CO.	KY	05/27/2014	16:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SACKETT	LETCHER CO.	KY	06/10/2014	06:28	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
ULVAH	LETCHER CO.	KY	06/10/2014	18:20	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
JEREMIAH	LETCHER CO.	KY	06/10/2014	18:28	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
SACKETT	LETCHER CO.	KY	06/10/2014	18:28	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
DUNHAM	LETCHER CO.	KY	07/23/2014	14:27	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DONGOLA	LETCHER CO.	KY	07/23/2014	14:52	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
WHITESBURG ARPT	LETCHER CO.	KY	07/27/2014	13:25	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BLACKEY	LETCHER CO.	KY	07/27/2014	13:25	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
COLSON	LETCHER CO.	KY	10/07/2014	17:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WHITCO	LETCHER CO.	KY	06/21/2015	15:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SACKETT	LETCHER CO.	KY	07/13/2015	16:04	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ULVAH	LETCHER CO.	KY	07/13/2015	16:10	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
NEON	LETCHER CO.	KY	07/13/2015	16:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DONGOLA	LETCHER CO.	KY	07/13/2015	16:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SACKETT	LETCHER CO.	KY	07/14/2015	19:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CARCASSONNE	LETCHER CO.	KY	07/14/2015	19:12	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LETCHER	LETCHER CO.	KY	07/14/2015	19:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ERMINE	LETCHER CO.	KY	07/14/2015	19:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CROWN	LETCHER CO.	KY	07/14/2015	19:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FARRADAY	LETCHER CO.	KY	06/22/2016	12:24	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
JEREMIAH	LETCHER CO.	KY	03/01/2017	10:01	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
CAUDELL	LETCHER CO.	KY	05/27/2017	17:27	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAUDELL	LETCHER CO.	KY	05/27/2017	17:27	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WHITESBURG	LETCHER CO.	KY	05/27/2017	17:35	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	25.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
NEON	LETCHER CO.	KY	07/31/2012	15:34	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ULVAH	LETCHER CO.	KY	08/01/2012	16:55	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BLACKEY	LETCHER CO.	KY	04/29/2014	20:15	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
MILLSTONE	LETCHER CO.	KY	04/29/2014	20:52	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
WHITCO	LETCHER CO.	KY	04/25/2015	20:30	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
DONGOLA	LETCHER CO.	KY	04/25/2015	20:55	EST-5	Hail	1.50 in.	0	0	0.00K	0.00K
WHITCO	LETCHER CO.	KY	04/25/2015	21:24	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
WHITESBURG	LETCHER CO.	KY	05/02/2016	13:36	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	01/30/2013	07:24	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	05/21/2013	16:24	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	05/21/2013	16:26	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEROSE	OWSLEY CO.	KY	05/21/2013	16:38	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ARNETT	OWSLEY CO.	KY	05/21/2013	16:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TRAVELLERS REST	OWSLEY CO.	KY	05/21/2013	16:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	06/13/2013	11:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SCOVILLE	OWSLEY CO.	KY	11/01/2013	01:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BLAKE	OWSLEY CO.	KY	11/01/2013	01:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	11/01/2013	01:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEROSE	OWSLEY CO.	KY	11/01/2013	01:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TRAVELLERS REST	OWSLEY CO.	KY	12/22/2013	01:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	12/22/2013	01:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MAJOR	OWSLEY CO.	KY	02/21/2014	00:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEVI	OWSLEY CO.	KY	05/21/2014	20:57	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	05/21/2014	21:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	05/21/2014	21:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEVI	OWSLEY CO.	KY	05/21/2014	21:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEROSE	OWSLEY CO.	KY	05/21/2014	21:04	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEROSE	OWSLEY CO.	KY	05/21/2014	21:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
STURGEON	OWSLEY CO.	KY	06/10/2014	17:29	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BLAKE	OWSLEY CO.	KY	06/10/2014	17:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
RICETOWN	OWSLEY CO.	KY	06/10/2014	17:35	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
ENDEE	OWSLEY CO.	KY	06/10/2014	17:39	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
PEBWORTH	OWSLEY CO.	KY	06/10/2014	17:39	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEROSE	OWSLEY CO.	KY	06/10/2014	17:39	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
TURIN	OWSLEY CO.	KY	07/27/2014	12:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOONEVILLE	OWSLEY CO.	KY	08/20/2014	17:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PEBWORTH	OWSLEY CO.	KY	09/02/2014	14:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TRAVELLERS REST	OWSLEY CO.	KY	07/09/2015	13:44	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	07/13/2015	15:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	07/14/2015	19:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PEBWORTH	OWSLEY CO.	KY	03/01/2017	09:00	EST-5	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	03/28/2012	18:20	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	04/26/2012	15:49	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	04/25/2015	20:00	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	04/25/2015	20:05	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
SEBASTIAN	OWSLEY CO.	KY	04/25/2015	20:10	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
BLAKE	OWSLEY CO.	KY	06/25/2015	17:17	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
SEBASTIAN	OWSLEY CO.	KY	05/02/2016	13:30	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	02/25/2017	00:41	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
ISLAND CITY	OWSLEY CO.	KY	02/25/2017	00:41	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
VINCENT	OWSLEY CO.	KY	03/27/2017	19:30	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.10K
HAZARD ARPT	PERRY CO.	KY	07/05/2012	14:09	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TYPO	PERRY CO.	KY	07/05/2012	14:13	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
CHAVIES	PERRY CO.	KY	07/05/2012	14:13	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HARVEYTON	PERRY CO.	KY	07/19/2012	15:23	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	07/19/2012	15:28	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BUTTERFLY	PERRY CO.	KY	07/19/2012	15:28	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DICE	PERRY CO.	KY	05/21/2013	17:15	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	05/21/2013	17:15	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
ARY	PERRY CO.	KY	05/21/2013	17:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CORNETTSVILLE	PERRY CO.	KY	05/21/2013	17:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
YERKES	PERRY CO.	KY	02/21/2014	01:04	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ARY	PERRY CO.	KY	02/21/2014	01:12	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	02/21/2014	01:12	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FARLER	PERRY CO.	KY	02/21/2014	01:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD ARPT	PERRY CO.	KY	05/13/2014	17:28	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
STACY	PERRY CO.	KY	05/13/2014	17:37	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	05/21/2014	21:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GRIGSBY	PERRY CO.	KY	06/04/2014	19:55	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
CHAVIES	PERRY CO.	KY	07/14/2014	14:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GLOMAWR	PERRY CO.	KY	07/14/2014	14:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARVEYTON	PERRY CO.	KY	07/14/2014	14:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DARFORK	PERRY CO.	KY	07/14/2014	14:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DICE	PERRY CO.	KY	07/27/2014	12:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DICE	PERRY CO.	KY	07/27/2014	13:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ARY	PERRY CO.	KY	07/27/2014	13:08	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
TUB	PERRY CO.	KY	07/27/2014	16:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SLEMP	PERRY CO.	KY	07/27/2014	16:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GAYS CREEK	PERRY CO.	KY	08/20/2014	16:57	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
VIPER	PERRY CO.	KY	08/20/2014	17:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BUTTERFLY	PERRY CO.	KY	08/20/2014	17:42	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	10/07/2014	16:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	10/07/2014	16:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DWARF	PERRY CO.	KY	06/25/2015	19:22	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DWARF	PERRY CO.	KY	07/13/2015	15:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
AVAWAM	PERRY CO.	KY	07/13/2015	15:45	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
COMBS	PERRY CO.	KY	07/13/2015	15:49	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	07/13/2015	15:54	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
STACY	PERRY CO.	KY	07/14/2015	18:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BULAN	PERRY CO.	KY	07/14/2015	18:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	07/14/2015	19:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TYPO	PERRY CO.	KY	06/22/2016	11:47	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ENGLE	PERRY CO.	KY	07/04/2016	16:59	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TUB	PERRY CO.	KY	07/04/2016	17:13	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ARY	PERRY CO.	KY	07/04/2016	17:15	EST-5	Thunderstorm Wind	54 kts. EG	0	0	0.00K	0.00K
BULAN	PERRY CO.	KY	03/01/2017	09:45	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
TYPO	PERRY CO.	KY	05/05/2017	00:35	EST-5	Thunderstorm Wind	45 kts. EG	0	0	0.00K	0.10K
TUB	PERRY CO.	KY	07/06/2017	17:45	EST-5	Thunderstorm Wind	51 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.10K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
LAMONT	PERRY CO.	KY	03/15/2012	14:25	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HAZARD	PERRY CO.	KY	08/01/2012	17:06	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BUCKHORN	PERRY CO.	KY	04/25/2015	20:25	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
KRYPTON	PERRY CO.	KY	04/25/2015	20:37	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BUSY	PERRY CO.	KY	04/25/2015	20:45	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
VIPER	PERRY CO.	KY	04/25/2015	21:47	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
CHAVIES	PERRY CO.	KY	06/21/2015	16:40	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ROWDY	PERRY CO.	KY	05/02/2016	13:55	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HAYSLEN	PERRY CO.	KY	05/27/2017	16:48	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	70.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	02/29/2012	14:19	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
PINE RIDGE	WOLFE CO.	KY	06/29/2012	18:17	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
TOLIVER	WOLFE CO.	KY	06/29/2012	18:18	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
STILLWATER	WOLFE CO.	KY	06/29/2012	18:19	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	07/01/2012	19:45	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
DAYSBORO	WOLFE CO.	KY	07/01/2012	19:47	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	07/01/2012	19:50	EST-5	Thunderstorm Wind	65 kts. EG	0	0	25.00K	0.00K
GILLMORE	WOLFE CO.	KY	07/01/2012	20:05	EST-5	Thunderstorm Wind	55 kts. EG	0	0	10.00K	0.00K
TOLIVER	WOLFE CO.	KY	07/08/2012	16:35	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HELECHAWA	WOLFE CO.	KY	07/19/2012	14:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TRENT	WOLFE CO.	KY	09/02/2012	15:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	01/30/2013	07:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HELECHAWA	WOLFE CO.	KY	06/09/2013	15:15	EST-5	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
TOLIVER	WOLFE CO.	KY	07/04/2013	20:48	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DAYSBORO	WOLFE CO.	KY	07/04/2013	20:53	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	08/21/2013	14:40	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
ROGERS	WOLFE CO.	KY	11/01/2013	00:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	11/01/2013	01:16	EST-5	Thunderstorm Wind	55 kts. MG	0	0	0.00K	0.00K
GILLMORE	WOLFE CO.	KY	11/01/2013	01:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HELECHAWA	WOLFE CO.	KY	11/01/2013	01:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
FLAT	WOLFE CO.	KY	12/22/2013	01:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BETHANY	WOLFE CO.	KY	02/21/2014	00:34	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	04/03/2014	15:20	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	04/03/2014	15:25	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BETHANY	WOLFE CO.	KY	04/03/2014	15:29	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	06/10/2014	17:52	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	06/10/2014	17:52	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
ROSEFORK	WOLFE CO.	KY	06/10/2014	18:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
VALERIA	WOLFE CO.	KY	07/27/2014	13:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	08/21/2014	14:25	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
ROGERS	WOLFE CO.	KY	08/21/2014	14:33	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
PINE RIDGE	WOLFE CO.	KY	08/21/2014	14:35	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BETHANY	WOLFE CO.	KY	09/06/2014	13:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PINE RIDGE	WOLFE CO.	KY	10/06/2014	21:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	10/06/2014	21:50	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
TRENT	WOLFE CO.	KY	10/07/2014	20:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PINE RIDGE	WOLFE CO.	KY	06/18/2015	14:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BETHANY	WOLFE CO.	KY	06/29/2015	18:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
VORTEX	WOLFE CO.	KY	06/29/2015	18:13	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
CAMPTON	WOLFE CO.	KY	07/09/2015	14:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	07/09/2015	14:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEE CITY	WOLFE CO.	KY	07/14/2015	02:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	05/10/2016	18:24	EST-5	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
PINE RIDGE	WOLFE CO.	KY	06/23/2016	17:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PINE RIDGE	WOLFE CO.	KY	06/23/2016	17:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
GILLMORE	WOLFE CO.	KY	06/23/2016	17:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FLAT	WOLFE CO.	KY	06/23/2016	17:37	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TRENT	WOLFE CO.	KY	06/23/2016	17:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZEL GREEN	WOLFE CO.	KY	06/23/2016	17:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	03/01/2017	08:55	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	03/01/2017	09:02	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
HOLLONVILLE	WOLFE CO.	KY	05/18/2017	15:54	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
TOLIVER	WOLFE CO.	KY	06/14/2017	14:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	06/23/2017	19:55	EST-5	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
Totals:								0	0	70.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	2.000M	0.00K
CAMPTON	WOLFE CO.	KY	03/02/2012	18:35	EST-5	Hail	3.00 in.	0	0	2.000M	0.00K
TRENT	WOLFE CO.	KY	06/09/2013	15:05	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
CAMPTON	WOLFE CO.	KY	05/10/2016	18:30	EST-5	Hail	2.50 in.	0	0	0.00K	0.00K
TOLIVER	WOLFE CO.	KY	05/10/2016	18:42	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
ROGERS	WOLFE CO.	KY	05/19/2017	20:40	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
Totals:								0	0	2.000M	0.00K

Summary Severe Thunderstorm/Hail/Lightning/High Winds:

The above charts based upon the National Climatic Data Center (NCDC) tables show that all jurisdictions within the region are susceptible to severe thunderstorm winds and hail. Severe storms are not limited by geographical boundaries. The regional impacts have been determined using the information underlying these charts and are expressed in terms of both dollars of damage and wind speed in knots for each jurisdiction. The overall frequency of any combination of these events is around 2.5 per month in the past 10 years (see hazard frequency charts). The major limiting factors of the underlying data sets are that they do not address any individual city within the district. In future updates of the severe thunderstorm/lightening/hail the data will be included if funds and resources are available to collect the individual jurisdictional data sets.

Summary: Frequency; Probability for Thunderstorm Wind for the Kentucky River ADD Region

County	*# Years in Record*	*# Events in Record*	*# Events in Past 10 Years*	*# Events in Past 20 Years*	*# Events in Past 50 Years*	*Record Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*	*Frequency Per Year (20-Year)*	*Frequency Per Year (50-Year)*
REGION	50	664	517	569	650	0.08	100.00%	51.7	28.45	13
Breathitt	55	145	117	125	145	0.38	100.00%	11.7	6.25	2.9
Knott	55	38	22	26	35	1.45	69.09%	2.2	1.3	0.7
Lee	55	75	37	48	75	0.73	100.00%	3.7	2.4	1.5
Leslie	55	96	78	89	96	0.57	100.00%	7.8	4.45	1.92
Letcher	55	67	52	58	62	0.82	100.00%	5.2	2.9	1.24
Owsley	55	59	50	53	57	0.93	100.00%	5.0	2.65	1.14
Perry	55	107	93	97	105	0.51	100.00%	9.3	4.85	2.1
Wolfe	55	77	68	73	75	0.71	100.00%	6.8	3.65	1.5

Summary: Frequency; Probability for Hail for the Kentucky River ADD Region

County	*# Years in Record*[29]	*# Events in Record*	*# Events in Past 10 Years*	*# Events in Past 20 Years*	*# Events in Past 50 Years*	*Record Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*	*Frequency Per Year (20-Year)*	*Frequency Per Year (50-Year)*
REGION	50	290	228	257	287	0.17	100.00%	22.8	12.85	5.74
Breathitt	55	60	41	48	60	0.92	100.00%	4.1	2.4	1.2
Knott	55	23	12	18	23	2.39	41.82%	1.2	0.9	0.46
Lee	55	27	20	22	27	2.04	49.09%	2.0	1.1	0.54
Leslie	55	61	53	58	61	0.90	100.00%	5.3	2.9	1.22
Letcher	55	28	24	26	26	1.96	50.91%	2.4	1.3	0.52
Owsley	55	24	21	24	24	2.29	43.64%	2.1	1.2	0.48
Perry	55	38	32	35	37	1.45	69.09%	3.2	1.75	0.74
Wolfe	55	29	25	26	29	1.90	52.73%	2.5	1.3	0.58

[29] Number of Years in Record ends at 2017.

WILDFIRES

I. Identify

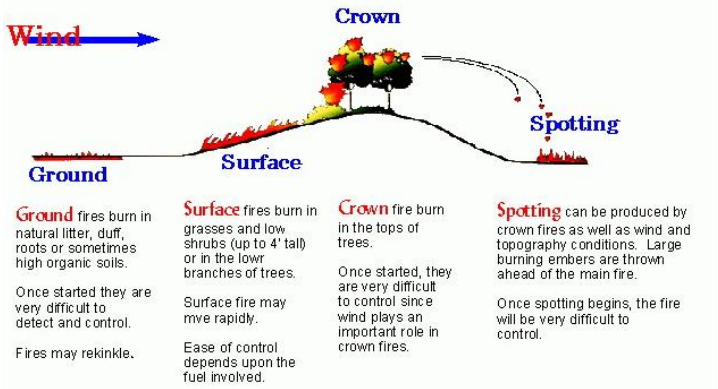
A. Definitions

Wildfire, n-A composition of inflammable materials, which, when kindled is very hard to quench; Greek fire.
Webster's Revised Unabridged Dictionary, © 1996, 1998 MICRA, Inc.

B. Description/Formation/Cause

A wildfire is an unplanned fire, a term, which includes grass fires, forest fires, and scrub fires either man caused or natural in origin. There are three different classes of wild land fires.

- A surface fire is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees.
- A ground fire is usually started by lightning and burns on or below the forest floor.
- Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. This type of fire rarely or never occurs within the eight county region.



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 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 loss 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

Fuel Types

- **Grass:** found in many reclaimed strip mine areas. 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.

- **Timber litter:** This type of fuel is most dominant in mountainous topography, especially in the Northwest.

- **Logging slash:** Found throughout the eight county region, this is the debris left after logging, pruning, thinning, or shrub-cutting operations. It may include logs, chunks, bark, branches, stumps, and broken under story trees or shrubs.

Fuels Characteristics

Fuel moisture is the amount of water (moisture) in a fuel. This measurement is expressed as a percentage. 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.

Fuel loading is the quantity of fuels in a given area. The loading of the fuels in any given area does not necessarily mean the fire will burn with great intensity.

Types of Fuels

- **Uniform fuels** include all of the fuels distributed continuously over an area. Areas containing a network of fuels that connect with each other to provide a continuous path for a fire to spread are included in this category.

- **Patchy fuels** include all fuels distributed unevenly over an area, or as areas of fuel with definite breaks or barriers present, such as patches of rock outcroppings, bare ground, swamps, or areas where the dominant type of fuel is much less combustible.

- **Ground fuels** are all of the combustible materials lying beneath the surface, including deep duff, tree roots, rotten buried logs, and other organic material.
- **Surface fuels** are all of the combustible materials lying on or immediately above the ground, including needles or leaves, duff, grass, small deadwood, downed logs, stumps, large limbs, and low shrubs.
- **Aerial fuels** are all of the green and dead materials located in the upper canopy, including tree branches and crowns, snags, hanging moss, and tall shrubs.

Facts

- The Endangered Species Act permits federal officials to take actions that might impact endangered species or their habitat during times of emergency, including wildfire emergencies. Water can be taken from a river without permission from wildlife agencies during emergencies.

- While it was U.S. policy for most of the 20th century to suppress wildfires, fires actually benefit the ecosystem: The effects of fire can retard or accelerate the natural development of plant communities, alter species diversity and change nutrient flows.

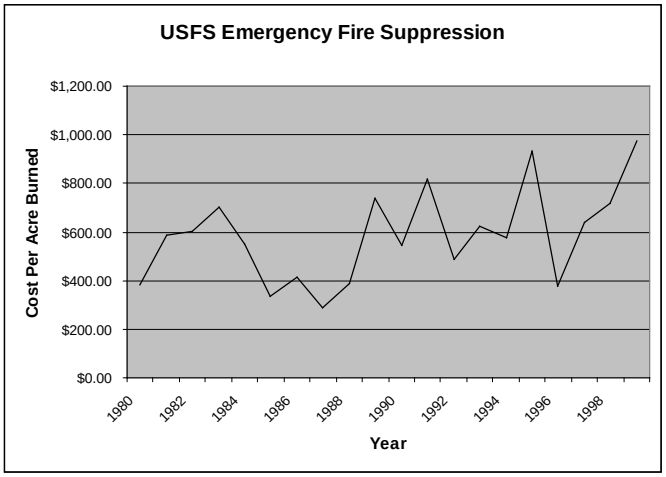
- Government scientists have also concluded that "fire severity has generally increased and fire frequency has generally decreased over the last 200 years. The primary causative factors behind fire regime changes are effective fire prevention and suppression strategies, selection and regeneration cutting, domestic livestock grazing, and the introduction of exotic plants."

- Fire ecologists and most forest scientists agree that long-term ecological restoration with careful fire reintroduction -- not increased resource extraction or aggressive fire suppression -- holds the best hope of preventing future large-scale severe wildfires in fire-dependent ecosystems of the interior west.

- Many species depend on fires to improve habitat, recycle nutrients and maintain diverse habitats.

Causes

Humans, either through negligence, accident, or intentional arson, have caused approximately 90% of all wildfires in the last decade. Accidental and negligent acts include unattended campfires, sparks, burning debris, and irresponsibly discarded cigarettes. Lightning mostly causes the remaining 10% of fires.



Costs (KRADD REGION)
Dollar figures are scaled to 1999 dollars for comparison's sake)

III. Profile

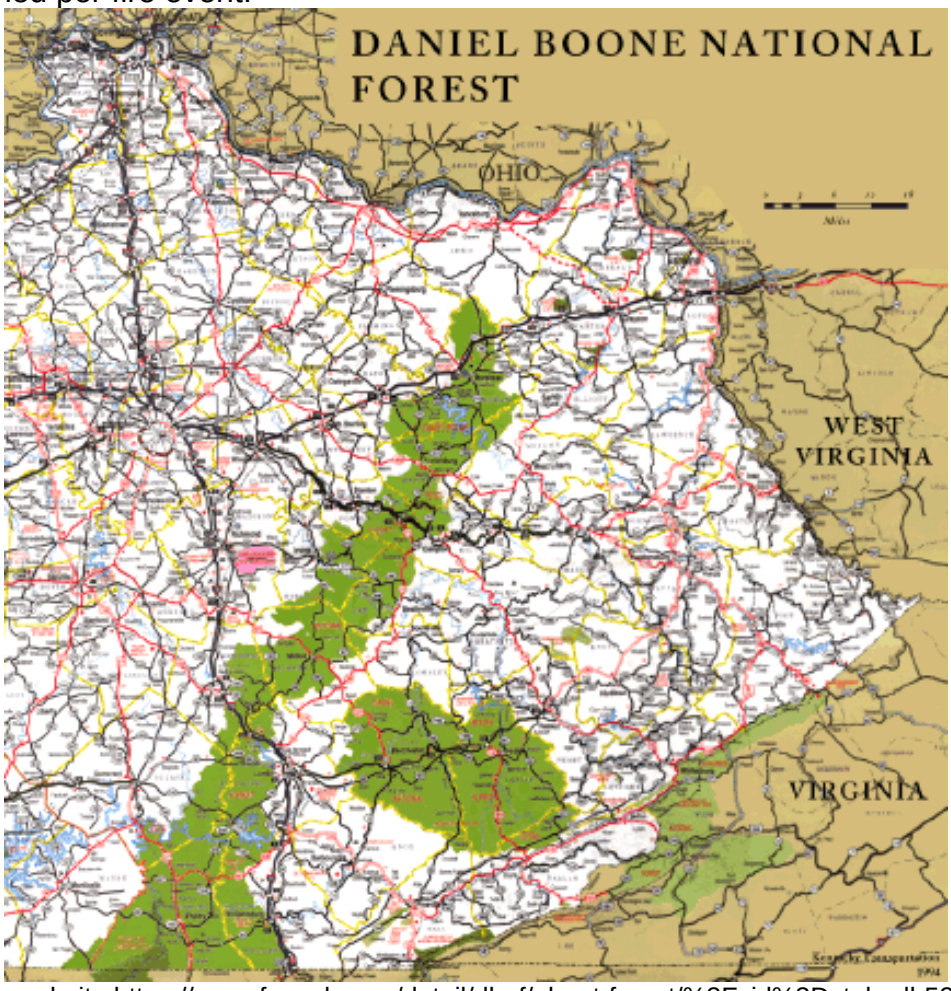
Of the Kentucky River Area Development District's Land area of 2,563.4 square miles, over 81% is forested; approximately 1,329,000 acres. Less than 10% of the land is cropland while less than 2% is pastureland. Through the abandonment of marginal forestland, contrary to most belief, the eight County Region has continued to gain forestland.

KRADD Forest Facts

- Hardwoods account for 90% of the region's forest.
- The KRADD region has more forested acres today than it did in 1950.
- Valuable hardwood trees in the eight counties include red oak, white oak, yellow popular, ash, cherry and walnut.

Since 1994 in the Eight County Kentucky River Region, there have been 2,998 wildfires, which burned 190,478 acres that resulted in a cost of suppression of $1.185 million dollars. Approximately 91 percent of these fires were human caused, with around 63 percent caused by arson; 21 percent by open burning, and careless smoking habits accounting for 1 percent. The damage to the Region's timber resource is valued at $85.58 per acre. This is an average yearly loss of approximately $1,630,110 to our timber resource. This figure does not account for the loss of wildlife habitat, increased soil erosion, and degraded water quality. All eight of the Region's counties have reported fires of some magnitude the last several years; the greatest fire threat is in Breathitt, Knott and Perry Counties. These three counties have more fires burning more acres than the other five counties. This is due to the extensively forested areas in these counties and the poor accessibility of many areas, as well as the lack of or very limited amount of National Forest or other managed forestlands, making fire suppression more difficult.

For the purposes of this plan the magnitude of fires shall be expressed in terms of total acreage burned per fire event.



Please see this website https://www.fs.usda.gov/detail/dbnf/about-forest/%3Fcid%3Dstelprdb5296122
Please see this website http://forestry.ky.gov/Pages/default.aspx

Terms

- **DBH (diameter at breast height):** the stem diameter of a tree measured at breast height, 1.3 meters above the ground.
- **POLES or POLETIMBER** - trees from 5 to 7 inches in diameter at breast height.
- **Sapling:** a loose term for a young tree no longer a seedling but not yet a pole, about 1 - 2 m high and 2 - 4 cm DBH, typically growing vigorously and without dead bark or more than an occasional dead branch. Also, a young tree having a DBH greater than 1 cm but less than the smallest merchantable diameter.
- **SAWTIMBER** - a log or tree that is large enough (usually 10 to 12 inches in diameter) to be sawed into lumber. Minimum log length is typically 8 feet.
- **Seedling:** a young tree, grown from seed, from the time of germination to the sapling stage, having a DBH equal or less than 1 cm.

KRADD HISTORICAL WILDFIRES:

KENTUCKY RIVER DISTRICT

Kentucky Division of Forestry
P.O. Box 702
Hazard, Kentucky 41702
Phone (606) 435-6073
Fax (606) 435-6075
District Forester - herman.slone@ky.gov
Counties served:
Breathitt, Lee, Perry, Estill, **Letcher**, Powell, **Knott, Owsley and Wolfe**

SOUTHEASTERN DISTRICT

Kentucky Division of Forestry
P O Box 130
Pineville, KY 40977
Phone (606) 337-3011
Fax (606)337-1630
District Forester-- jared.calvert@ky.gov
Counties served:
Bell, Clay, Harlan, Jackson, Laurel, **Leslie**, McCreary, Rockcastle and Whitley

The Kentucky Division of Forestry provided the following data set and graph information.

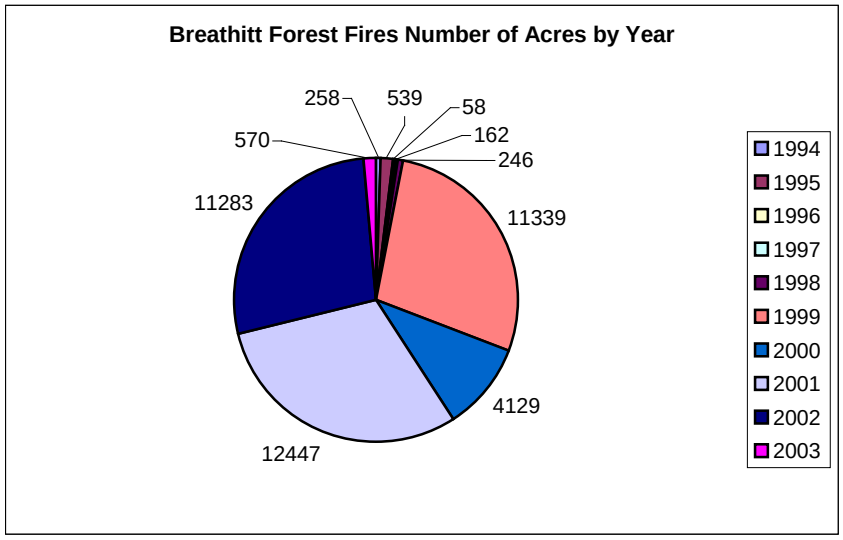
Number of Fires and Acres Burned for Kentucky River ADD Counties, 1994-2009

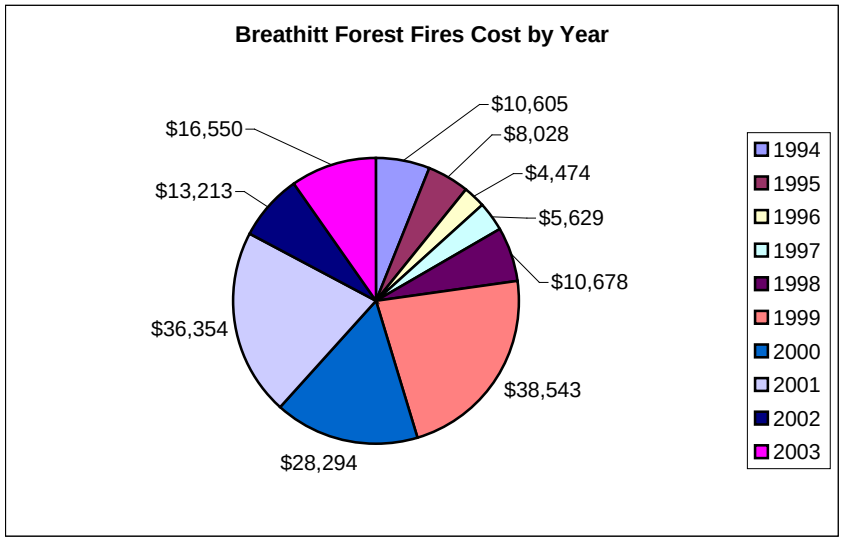
Year	Number of Fires	Acres Burned
1994	417	8,818
1995	385	14,057
1996	171	2,937
1997	214	3,460
1998	249	4,745
1999	453	42,892
2000	267	28,940
2001	410	58,689
2002	221	18,450
2003	221	7,661
2004	224	8,740
2005	243	11,031
2006	177	2,949
2007	247	10,212
2008	218	5,427
2009	111	1,866
TOTALS	4,228	230,703

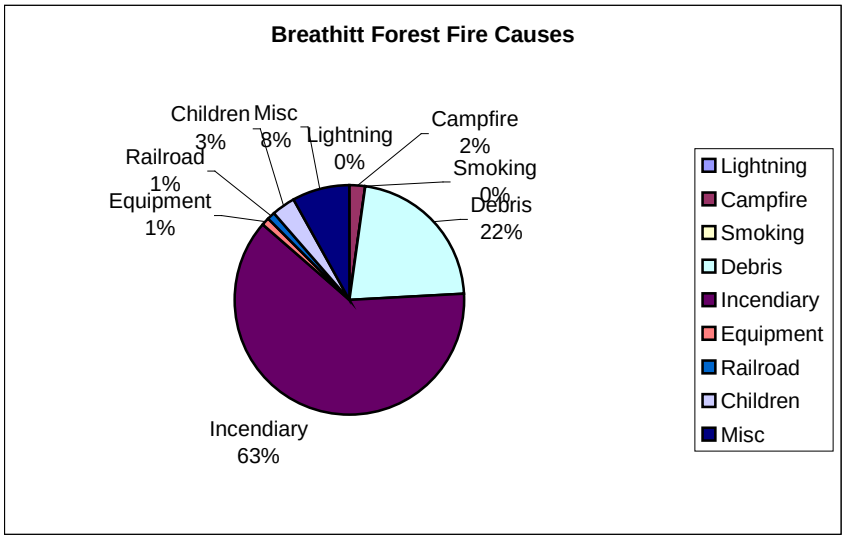
Causes of Wildfire, 1994-2009

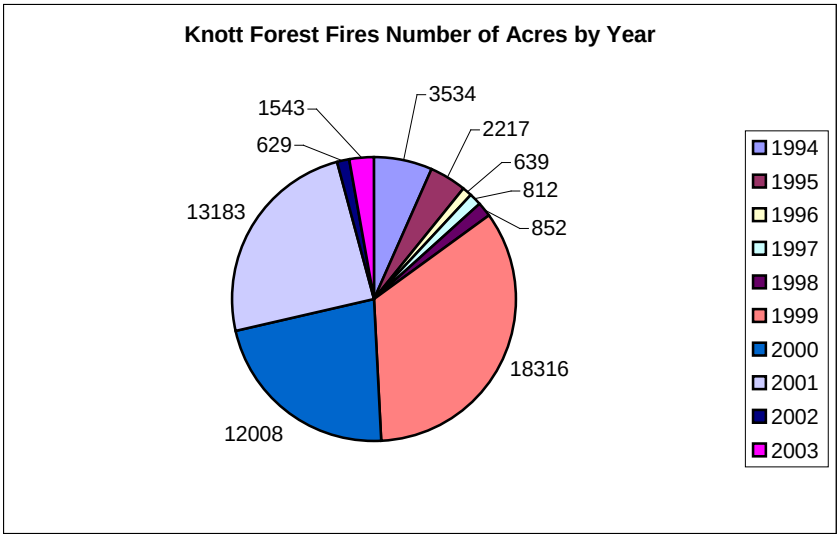
Cause	Number	Percent
Lightning	7	<1%
Campfire	73	2%
Smoking	42	1%
Debris Burning	910	21%
Arson	2,672	63%
Equipment Use (e.g., Farm Equipment)	48	1%
Railroad	12	<1%
Children	82	2%
Miscellaneous	382	8%
TOTALS	4,228	100%

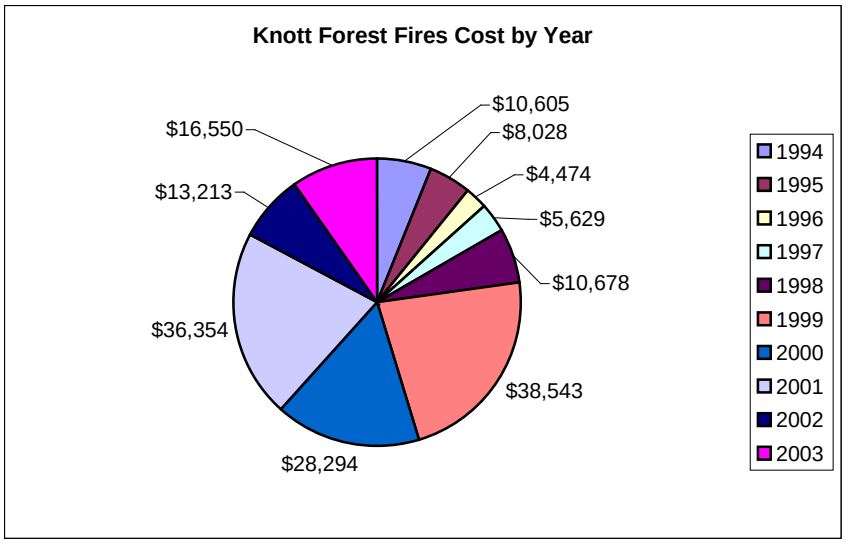
The Division of Forestry promotes fire prevention through activities such as enforcement of the forest fire laws, school fire prevention programs, community events, Smokey Bear appearances and distribution of fire prevention information. Radio and television interviews as well as newspaper and magazine articles are also used to educate citizens about fire prevention. The following pie charts reflect the severity of wildfires in terms of acres burned and cost per year. The pie charts are dated; but, they are still illustrative of the extent and impact from the wildfire (specifically, forest fire) hazard for the eight-county Kentucky River ADD region.

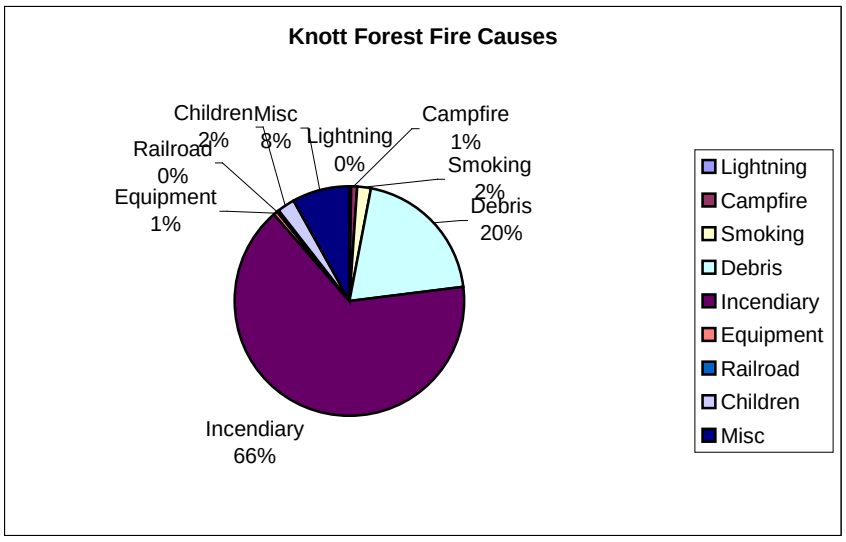

Breathitt Forest Fires Number of Acres by Year
258
539
58
162
246
570
11283
11339
4129
12447
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

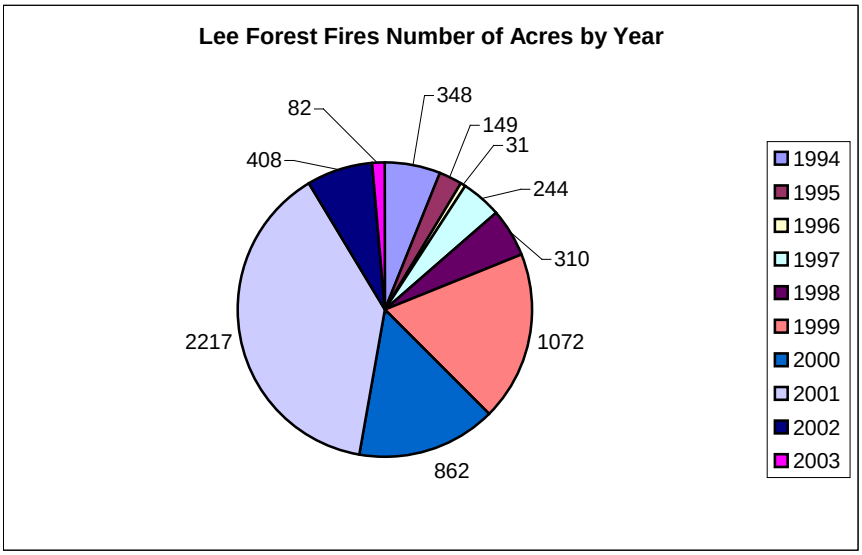

Breathitt Forest Fires Cost by Year
$10,605
$16,550
$8,028
$4,474
$13,213
$5,629
$10,678
$36,354
$38,543
$28,294
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

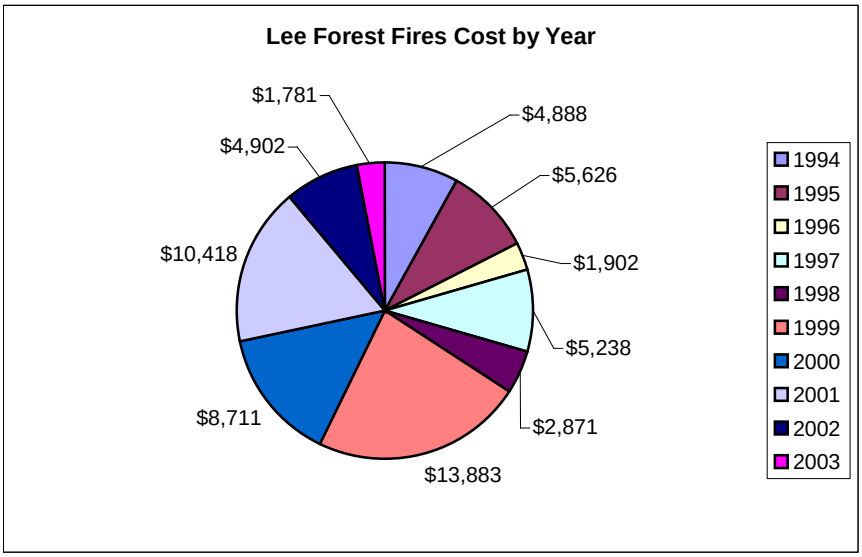

Breathitt Forest Fire Causes
Children 3%
Misc 8%
Lightning 0%
Campfire 2%
Railroad 1%
Smoking 0%
Equipment 1%
Debris 22%
Incendiary 63%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

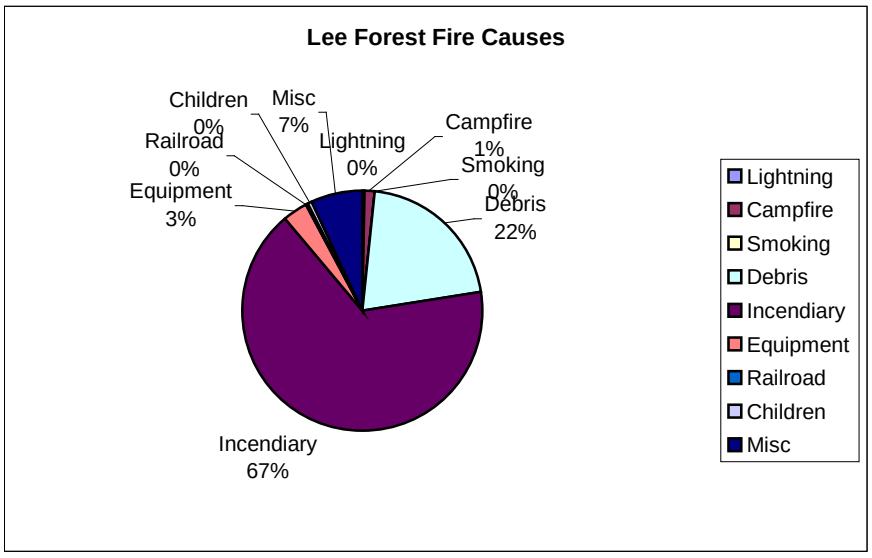

Knott Forest Fires Number of Acres by Year
1543
3534
2217
629
639
812
13183
852
18316
12008
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

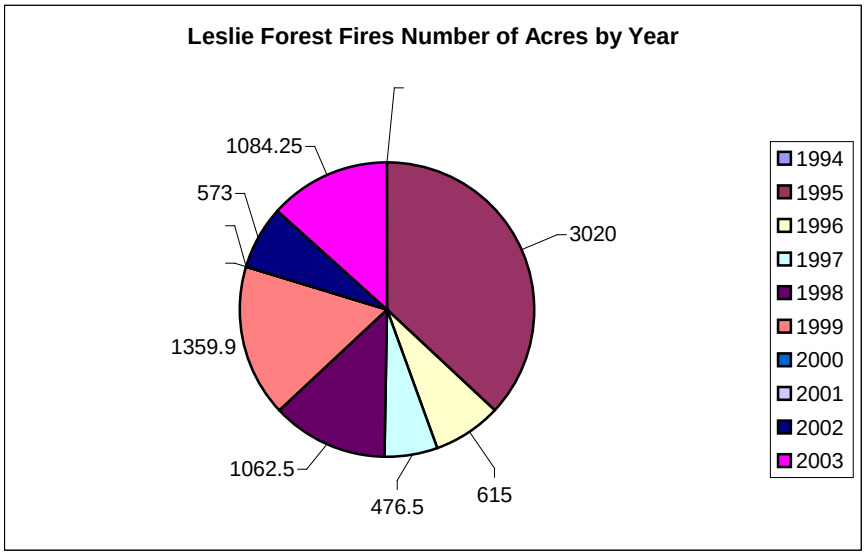

Knott Forest Fires Cost by Year
$16,550
$10,605
$8,028
$13,213
$4,474
$5,629
$10,678
$36,354
$38,543
$28,294
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

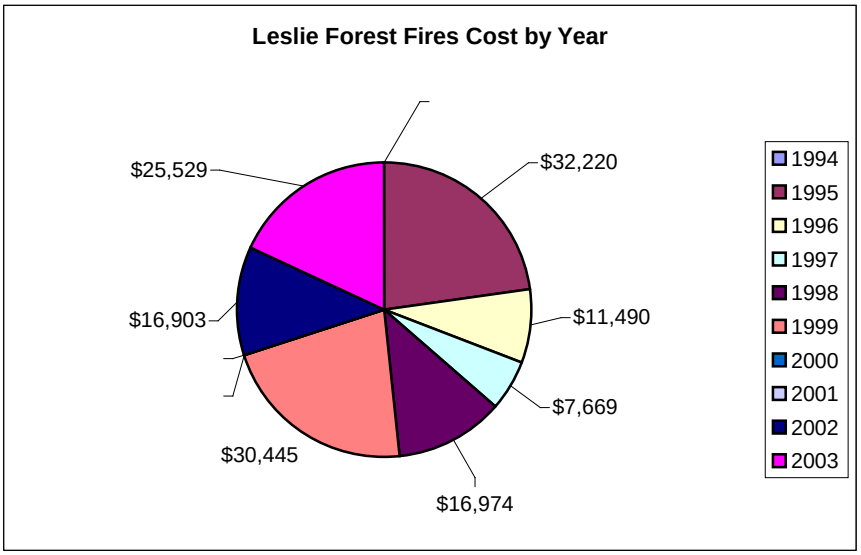

Knott Forest Fire Causes
Children
2%
Misc
8%
Lightning
0%
Campfire
1%
Railroad
0%
Smoking
2%
Equipment
1%
Debris
20%
Incendiary
66%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

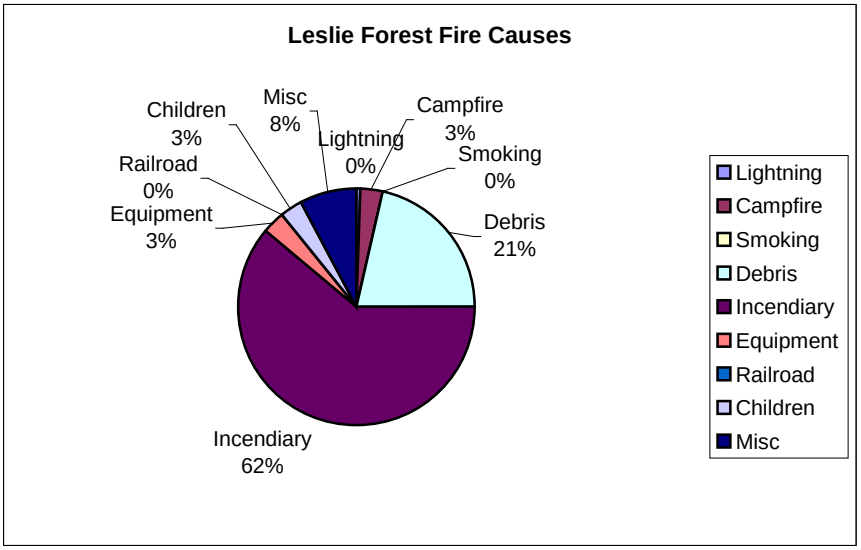

Lee Forest Fires Number of Acres by Year
82
348
149
31
408
244
310
2217
1072
862
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

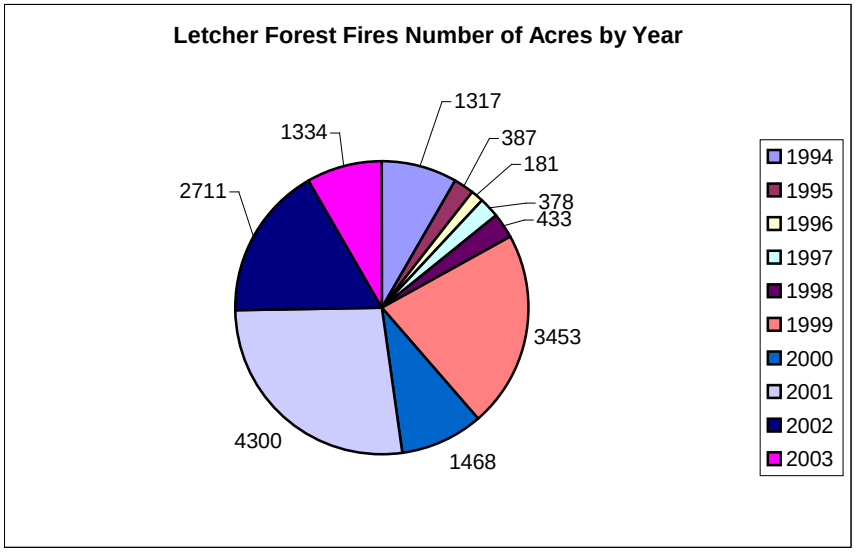

Lee Forest Fires Cost by Year
$1,781
$4,888
$4,902
$5,626
$10,418
$1,902
$5,238
$8,711
$2,871
$13,883
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

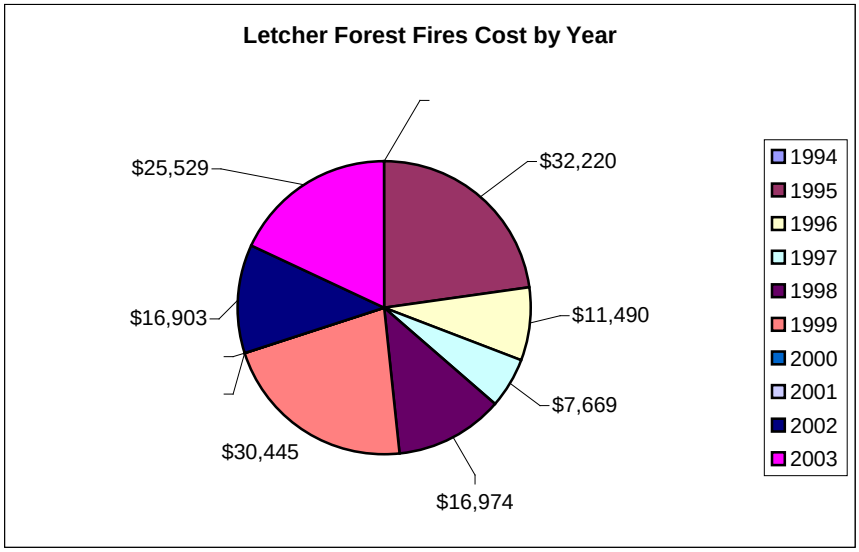

Lee Forest Fire Causes
Children 0%
Misc 7%
Lightning 0%
Campfire 1%
Railroad 0%
Smoking 0%
Equipment 3%
Debris 22%
Incendiary 67%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

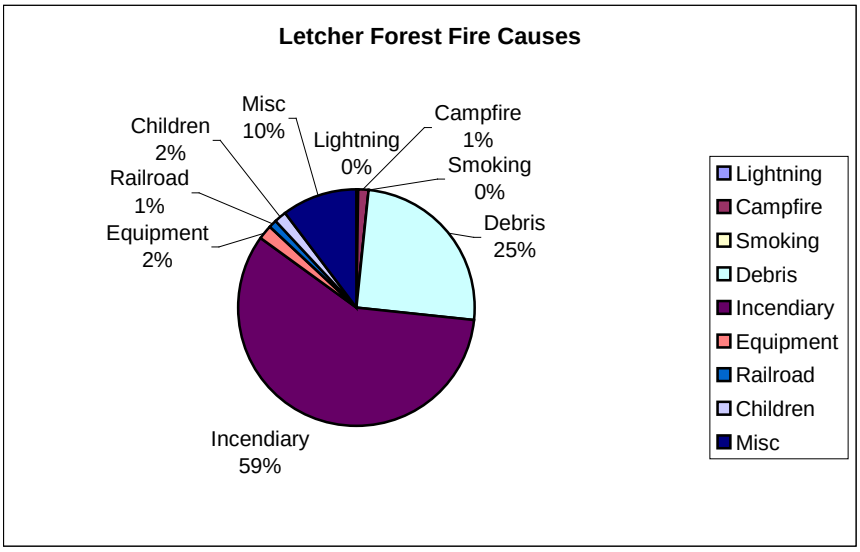

Leslie Forest Fires Number of Acres by Year
1084.25
573
3020
1359.9
1062.5
476.5
615
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

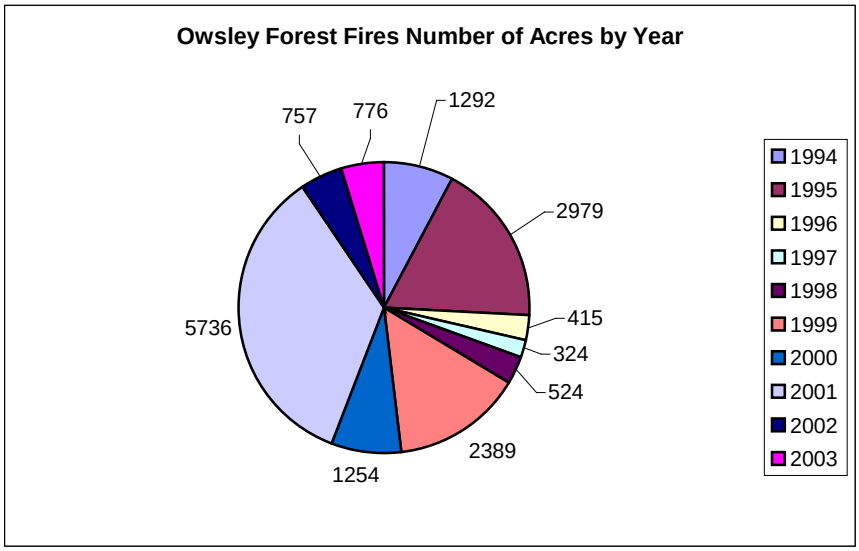

Leslie Forest Fires Cost by Year
$25,529
$32,220
$16,903
$11,490
$7,669
$30,445
$16,974
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

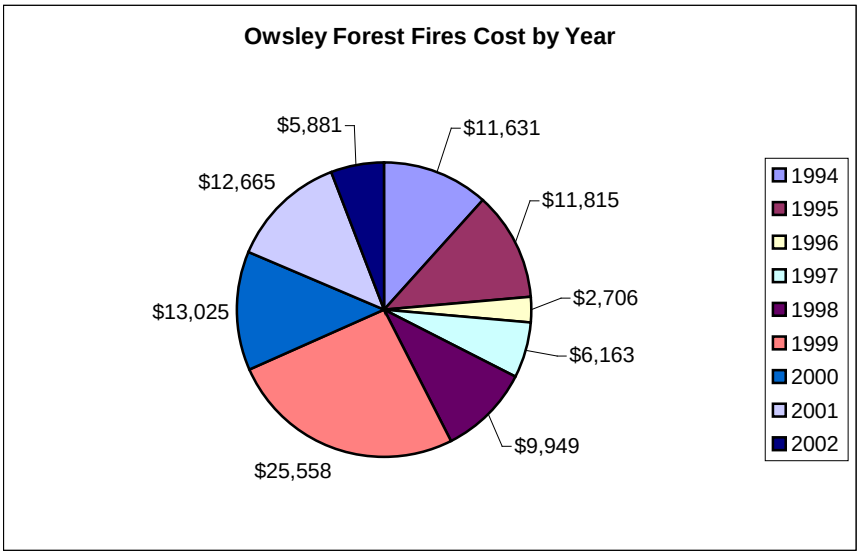

Leslie Forest Fire Causes
Children 3%
Misc 8%
Campfire 3%
Lightning 0%
Smoking 0%
Railroad 0%
Equipment 3%
Debris 21%
Incendiary 62%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

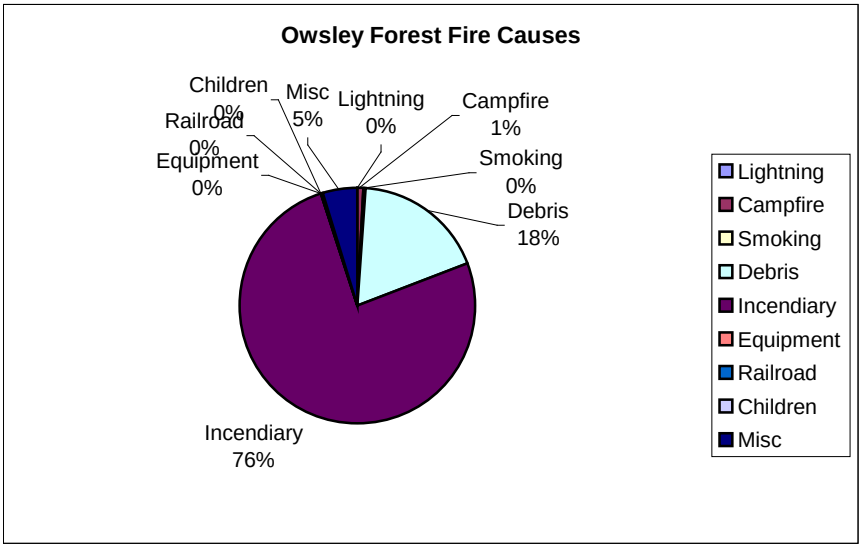

Letcher Forest Fires Number of Acres by Year
1317
387
181
378
433
3453
1468
4300
2711
1334
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

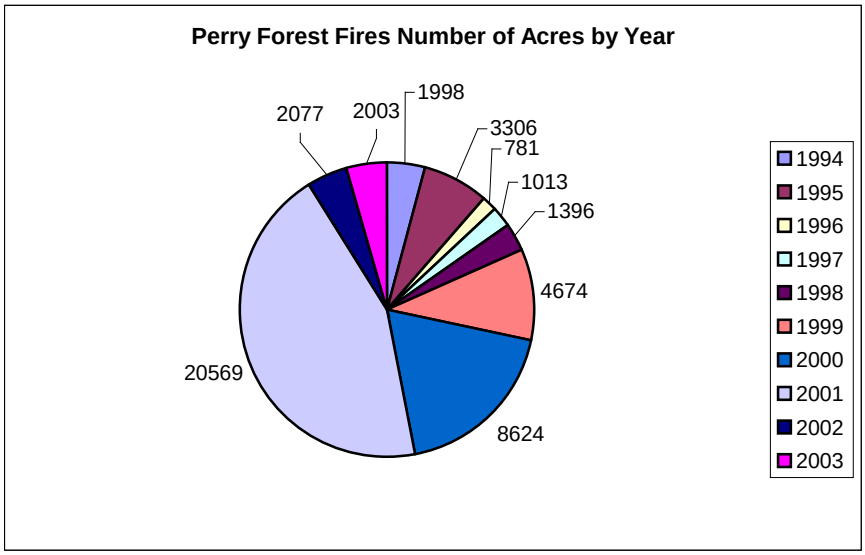

Letcher Forest Fires Cost by Year
$32,220
$11,490
$7,669
$16,974
$30,445
$16,903
$25,529
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

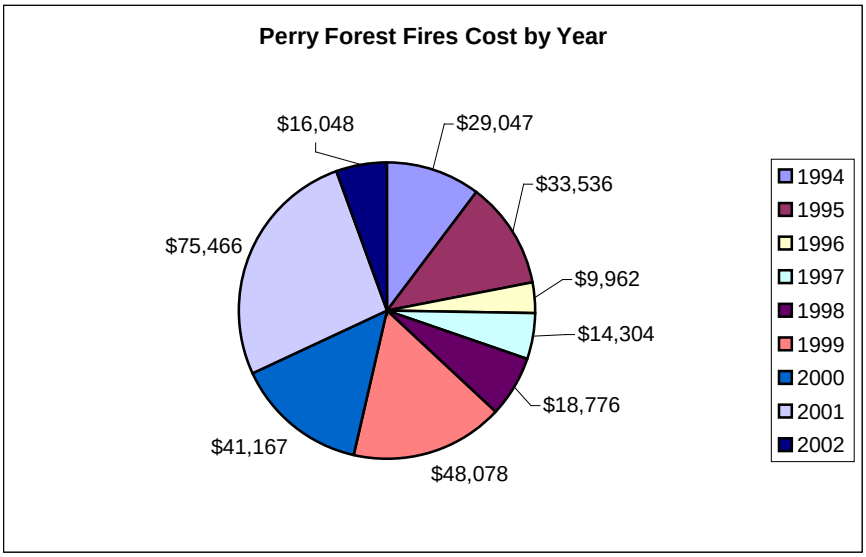

Letcher Forest Fire Causes
Misc
10%
Children
2%
Lightning
0%
Campfire
1%
Railroad
1%
Smoking
0%
Equipment
2%
Debris
25%
Incendiary
59%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

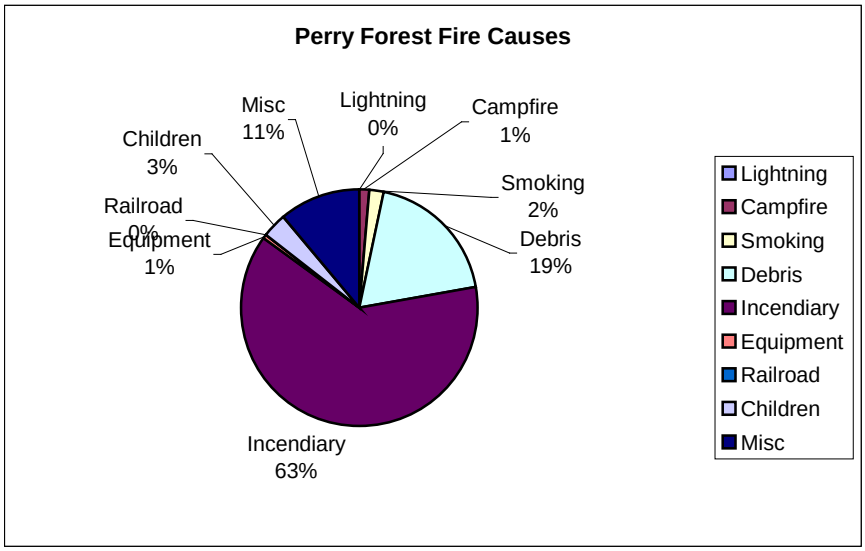

Owsley Forest Fires Number of Acres by Year
757
776
1292
2979
415
324
524
2389
1254
5736
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003

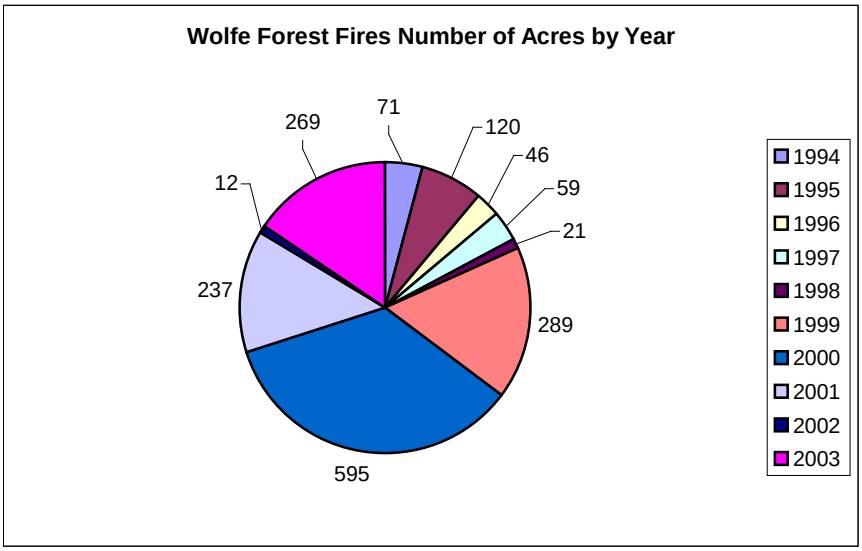

Owsley Forest Fires Cost by Year
$5,881
$11,631
$12,665
$11,815
$2,706
$13,025
$6,163
$9,949
$25,558
1994
1995
1996
1997
1998
1999
2000
2001
2002

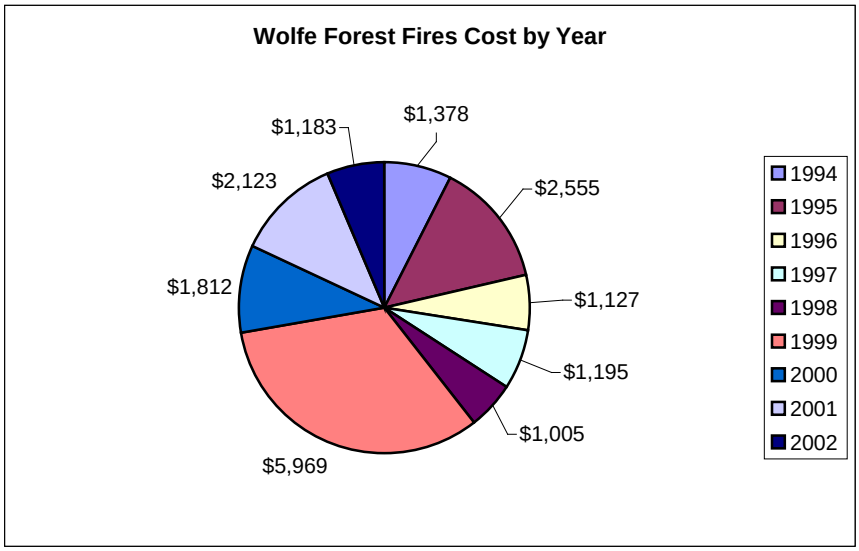

Owsley Forest Fire Causes
Children 0%
Misc 5%
Lightning 0%
Campfire 1%
Railroad 0%
Equipment 0%
Smoking 0%
Debris 18%
Incendiary 76%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

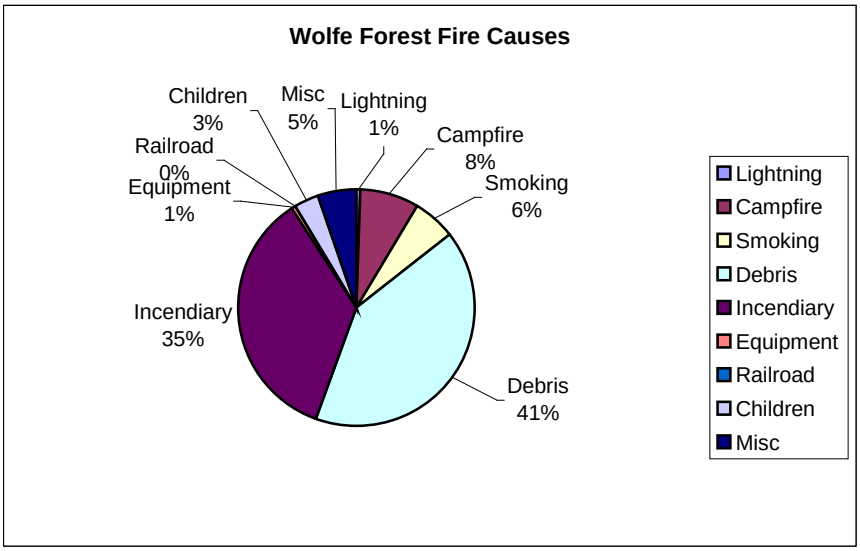

Perry Forest Fires Number of Acres by Year
1998
2077
2003
3306
781
1013
1396
4674
20569
8624
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003


Perry Forest Fires Cost by Year
$16,048
$29,047
$33,536
$75,466
$9,962
$14,304
$18,776
$41,167
$48,078
1994
1995
1996
1997
1998
1999
2000
2001
2002


Perry Forest Fire Causes
Misc
11%
Lightning
0%
Campfire
1%
Children
3%
Smoking
2%
Railroad
0%
Equipment
1%
Debris
19%
Incendiary
63%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc


Wolfe Forest Fires Number of Acres by Year
71
120
46
59
21
289
595
237
12
269
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003


Wolfe Forest Fires Cost by Year
$1,378
$2,555
$1,127
$1,195
$1,005
$5,969
$1,812
$2,123
$1,183
1994
1995
1996
1997
1998
1999
2000
2001
2002


Wolfe Forest Fire Causes
Children 3%
Misc 5%
Lightning 1%
Campfire 8%
Smoking 6%
Railroad 0%
Equipment 1%
Incendiary 35%
Debris 41%
Lightning
Campfire
Smoking
Debris
Incendiary
Equipment
Railroad
Children
Misc

Below are tables that update the wildfire frequency, extent, and fatality and injury impacts from the wildfire hazard between the years 2010-2017 for each of the counties comprising the Kentucky River ADD region. As with the above data and graphics, the figures have been provided by Kentucky's Division of Forestry.

Breathitt County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	60	3,020	50.33	0	0
2011	43	569	13.23	0	0
2012	42	1,013	24.12	1	0
2013	35	686	19.60	0	0
2014	50	1,827	36.54	0	0
2015	30	741	24.70	0	0
2016	49	8,706	177.67	0	0
2017	15	557	37.13	0	0
TOTAL	*324*	*17,119*	*52.84*	*1*	*0*

Knott County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	57	2,084	36.56	1	0
2011	66	1,895	28.71	2	0
2012	89	2,665	29.94	1	0
2013	65	1,410	21.69	0	0
2014	80	2,986	37.33	1	0
2015	35	861	24.60	0	0
2016	48	1,840	38.33	0	0
2017	30	600	20.00	0	0
TOTAL	*470*	*14,341*	*30.51*	*5*	*0*

Lee County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	24	312	13.00	0	0
2011	18	190	10.56	0	0
2012	27	305	11.30	0	0
2013	21	301	14.33	0	0
2014	30	381	12.70	0	0
2015	6	47	7.83	0	0
2016	33	580	17.58	0	0
2017	17	257	15.12	0	0
TOTAL	*176*	*2,373*	*13.48*	*0*	*0*

Leslie County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	26	942	36.23	0	0
2011	24	1,358	56.58	0	0
2012	21	1,154	54.95	0	0
2013	18	235	13.05	0	0
2014	34	1,515	44.56	0	0
2015	14	939	67.07	0	0
2016	29	1,539	53.07	0	0
2017	25	832	33.28	0	0
TOTAL	*191*	*8,514*	*44.58*	*0*	*0*

Letcher County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	42	2,007	47.79	0	0
2011	32	716	22.38	0	0
2012	68	2,487	36.57	1	0
2013	38	629	16.55	1	0
2014	43	1,653	38.44	0	0
2015	33	448	13.58	0	0
2016	48	6,357	132.44	0	0
2017	31	791	25.52	0	0
TOTAL	*335*	*15,088*	*45.04*	*2*	*0*

Owsley County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	27	1,209	44.78	0	0
2011	41	508	12.39	0	0
2012	27	267	9.89	0	0
2013	24	504	21.00	0	0
2014	27	397	14.70	0	0
2015	25	429	17.16	0	0
2016	25	448	17.92	0	0
2017	16	328	20.50	0	0
TOTAL	*212*	*4,090*	*19.29*	*0*	*0*

Perry County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	93	3,019	32.46	0	0
2011	76	1,731	22.78	0	0
2012	85	2,172	25.55	1	0
2013	63	2,278	36.16	0	0
2014	109	2,607	23.92	0	0
2015	50	1,119	22.38	0	0
2016	107	3,649	34.10	0	0
2017	63	2,904	46.10	0	0
TOTAL	*646*	*19,479*	*30.15*	*1*	*0*

Wolfe County Wildfire Events, Extent, and Impacts, 2010-2017

Year	Number of Wildfire Events	Total Acreage Burned	Average Acreage Burned (per Event)	Injuries	Fatalities
2010	21	138	6.57	0	0
2011	17	175	10.29	0	0
2012	9	47	5.22	0	1
2013	11	108	9.82	0	0
2014	14	149	10.64	1	0
2015	11	39	3.55	0	0
2016	8	23	2.88	0	0
2017	10	79	7.90	0	0
TOTAL	*101*	*758*	*7.50*	*1*	*1*

FEMA Fire Management Assistance Declarations in November 2016

One highly significant set of events that illustrates the risk to wildfire for the counties comprising the Kentucky River ADD are the statewide conflagrations that characterized October and November of 2016. From October 27 until November 11, 2016, there had been 210 wildfires that had burned around 33,000 acres of woodland statewide. However, the disproportionate majority of those 210 fires were concentrated in five counties in southeastern Kentucky, two of which are part of the Kentucky River Area Development District: Perry and Letcher counties. By November 3, Governor Matt Bevin had issued a State of Emergency resulting from the primarily southeastern wildfire spread. By November 15, 2016, 73[30] of Kentucky's 120 counties had issued burn bans that had made it illegal to burn outdoors within 150 feet of woodland areas between the hours of 6:00 PM and 6:00 AM. A formal request was made to FEMA to provide Fire Management Assistance (FMAG) because by November 11, 2016, the Commonwealth of Kentucky had maxed its capacity to address the southeastern Kentucky burning: 136 volunteer firefighters from 32 fire stations and 385 deployed personnel from the Kentucky Division of Forestry had by November 11th been managing 25 then-active wildfires. Of particular frustration, it was reported that of the 210 fires that

[30] Sayers, Justin. (November 15, 2016). "27 Wildfires Remain in Southeastern Kentucky." *Courier-Journal, The*: https://www.courier-journal.com/story/news/local/2016/11/15/27-wildfires-remain-southeastern-kentucky/93913974/

preoccupied primarily the southeastern region of the Commonwealth, 159 had been caused by arson[31].

Related, on November 2, 2016, one wildfire in particular – dubbed the Eagles Nest Fire – was so severe as to prompt FEMA's authorization of a second FMAG declaration: This wildfire was concentrated in one of Kentucky River ADD's counties, Breathitt County. By the time of the FMAG declaration on November 8, 2016, this particular set of wildfires had burned more than 2,000 acres of commonwealth and private land and had been threatening 1,100 homes in the City of Jackson (population 2,170)[32].

Summary:

The data sets used to build the above charts were compiled from the Kentucky Division of Forestry and do not have data to corresponding cities within the ADD district. They do have GIS data on these fires, which will show proximity to cities. Latitudes and longitudes for wildfire events from 2008-2017 are available upon request. To date there have been no significant impacts to the built environment with very little to no structure loss. The majority of historical damage has been to the loss of marketable timber. The frequency of reoccurrence of forest fires is outlined in the Hazards Frequency Tables. On average the eight counties have experienced 319 fires per year over the past 10 years. Magnitude is expressed in terms of acres burned and the associated value per acre as defined by the National Forest Service. The annualized timber loss has been $1.5 million or a total over the 10 years of over $15.1 million. It should be noted that for this particular update to the Kentucky River ADD hazard mitigation plan, the ten-year estimate of timber loss of $15.1 million dollars likely significantly underestimates impacts to Kentucky River ADD counties' timber values given that it does not include damages resulting from the anomalous wildfire conflagrations that broke out at the end of October and lasted until the middle of November in 2016. The severity of the wildfires prompted a FEMA Fire Management Assistance disaster declaration and, while the wildfires were statewide, the vast majority of the burning was concentrated in southeastern Kentucky. The eastern Kentucky region, as a whole, experiences a far greater economic impact due to wildfires than all the rest of the state combined.

Summary: Frequency; Probability for Wildfire for the Kentucky River ADD Region

County	*# Years in Record*	*# Events in Record*	*# Events in Past 10 Years*	*Record Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*
REGION	10	3,189	3,189	0.003	100.00%	318.9
Breathitt	10	419	419	0.024	100.00%	41.9
Knott	10	569	569	0.018	100.00%	56.9
Lee	10	242	242	0.041	100.00%	24.2
Leslie	10	251	251	0.040	100.00%	25.1
Letcher	10	407	407	0.025	100.00%	40.7
Owsley	10	318	318	0.031	100.00%	31.8
Perry	10	827	827	0.012	100.00%	82.7
Wolfe	10	156	156	0.064	100.00%	15.6

[31] With the exception of the Courier-Journal article cited above, all of the above context derived from the following primary source: "An Open Letter by Energy and Environment Cabinet Secretary Charles Snavely." This letter can be accessed from the following website: https://kydep.wordpress.com/2016/11/12/kentucky-needs-your-help-during-its-wildfire-emergency/.

[32] The above information derived from the following source: Kenny, Tom. (November 9, 2016). "FEMA Authorizes Money to Fight Wildfires in KY." WTVQ (ABC 36): https://www.wtvq.com/2016/11/09/fema-authorizes-money-fight-wildfires-ky/.

DROUGHT

I. DESCRIPTION

A **drought** is defined in terms of the cumulative deficit of precipitation relative to what is normal for a region over an extended period of time. A drought can be short, lasting just a few months, or persist for years before climatic conditions return to normal. Drought conditions can occur at any time throughout the year but are most apparent during the summer-early fall months.

Drought is measured in the Palmer Drought Severity Index according to the level of recorded precipitation against the average or normal amount of precipitation for a region.

PALMER DROUGHT SEVERITY INDEX

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

FACTS

- High temperatures, prolonged high winds, and low relative humidity can aggravate drought conditions further.
- Droughts are not limited to geographic boundaries and have been recorded in all jurisdictions
- Droughts can lead to economic losses such as unemployment, decreased land values, and Agricultural business losses.

Source: FEMA 1997

EFFECTS

Primary

- **Crop failure** is the most apparent effect of drought in that it has a direct impact on the economy and, in many cases, health (nutrition) of the population that is affected by it.
- **Water shortage** is a very serious effect of drought in that 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.

Secondary

- **Fire susceptibility** is increased if the absence of moisture associated with a drought persists.

Tertiary

- **Environmental degradation** in the forms of erosion and ecological damage can be seen in cases of drought. As moisture in topsoil decreases and the ground becomes dryer and dryer the susceptibility to windblown erosion increases. In prolonged drought situations forest root systems can be damaged and/or destroyed resulting in loss of habitat for certain species. Finally, prolonged drought conditions may result in loss of food sources for certain species.

II. PROFILE

Generally, the southeastern portion of Kentucky do not suffer drought events (as measured on the Palmers Drought Severity Index) regularly.

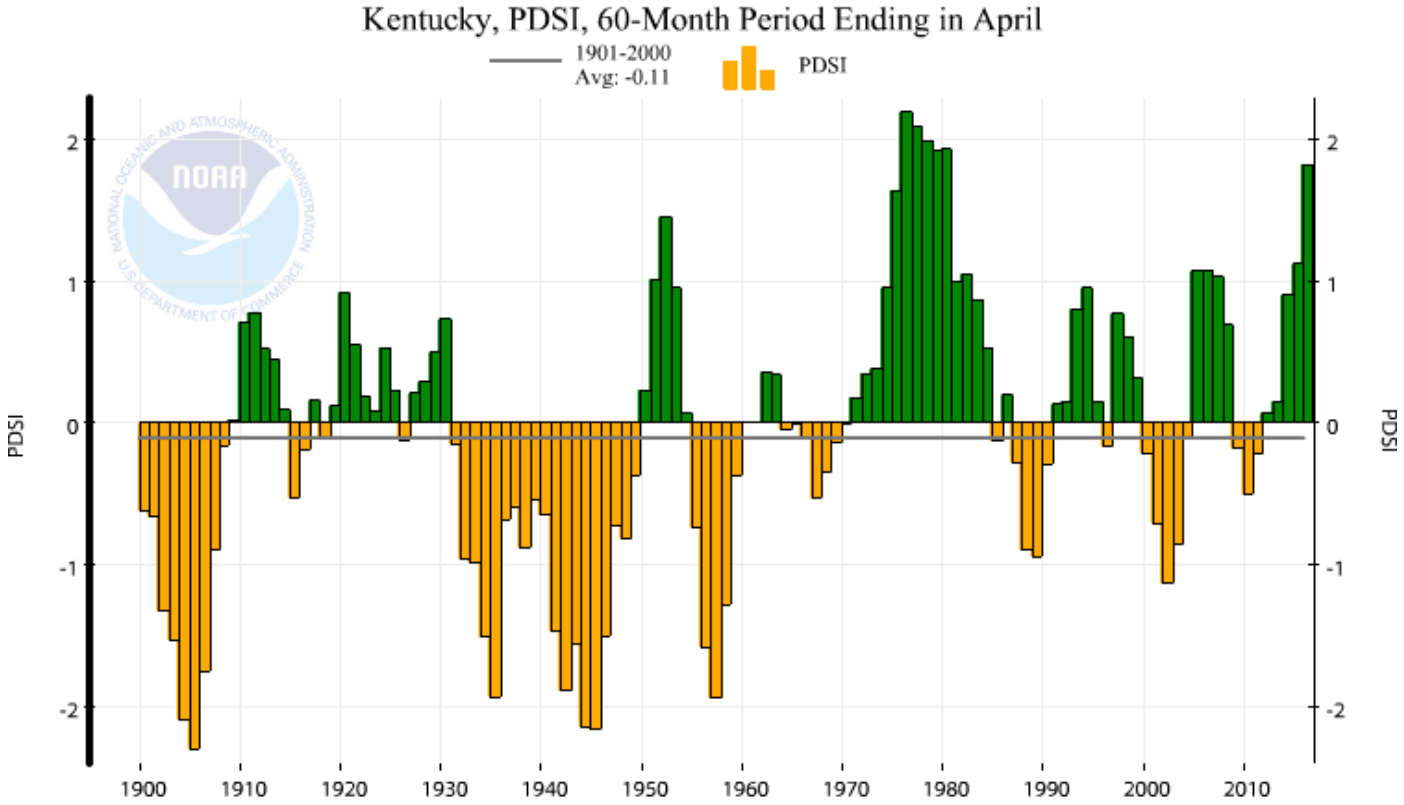
Consequently, below is a table of past drought events for the Kentucky River ADD region, as reported through Western Kentucky University's Kentucky Climate Center (www.wku.edu/kentuckyclimate) and from NOAA's NCDC Storm Events Database. These few events illustrate that Kentucky River ADD's counties can suffer from drought; but, that "severe" drought is extremely rare.

SIGNIFICANT DROUGHT EVENTS – EIGHT COUNTY REGION

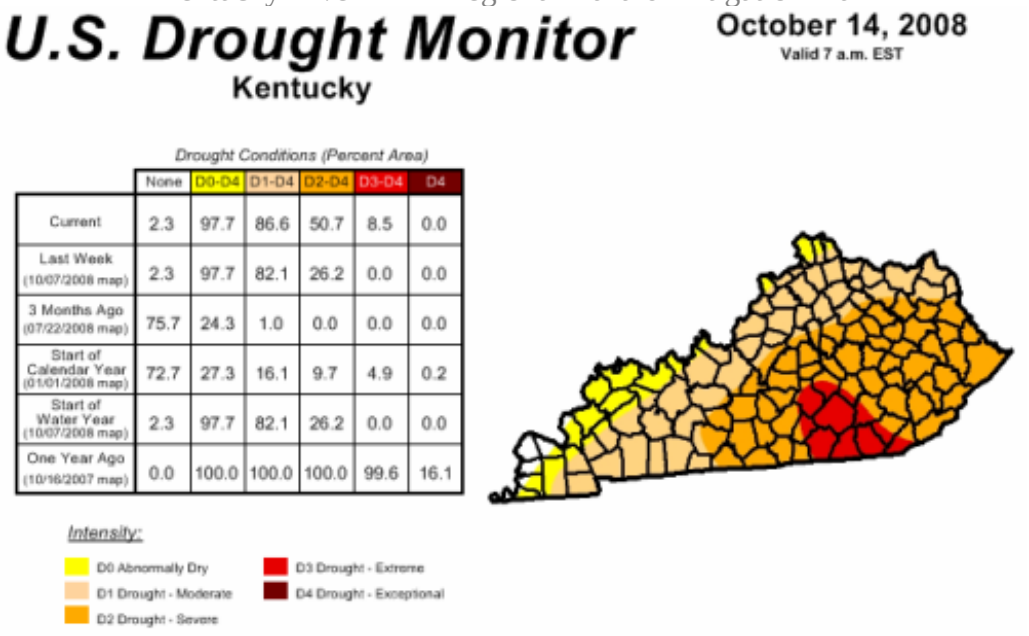
TIME PERIOD	LOCATION	PDSI RATING	CROP LOSSES
MAY, 1930 – DECEMBER, 1931	All Eight Counties	-4.73	$0.00
FALL 1939 – SPRING 1942	All Eight Counties	-3.97	$0.00
SUMMER 1999	All Eight Counties	-3.65	Anecdotal
Fall 2007 – Summer 2008	All Eight Counties	-4.68	$0.00
November 8, 2016	All Eight Counties	-1.24	$0.00
December 1, 2016	All Eight Counties	Unknown	$0.00

Of the events listed above, below gives context to the most "recent" (i.e., after World War II) events:

A 1999 drought affected all eight counties in the Kentucky River ADD District. Crop damage was limited to the counties of Owsley, Lee, and Wolfe counties where the majority of the agricultural activity occurs in the region. There were no injuries or deaths reported as a result of these droughts.



Another “severe” drought occurred during the fall of 2007 through summer of 2008. According to the Palmer Drought Index, this indicates long-term moisture deficiencies. During 2007 and 2008, the University of Nebraska-Lincoln’s Drought Monitor placed the majority of the Commonwealth of Kentucky in “extreme agricultural and hydrologic drought status.” Rather than use the Palmer Drought Severity Index’s range of severity or extent (that includes statuses of non-drought or of high moisture), UNL’s Drought Monitor sub-divides the drought range into the following categories: Abnormally Dry (D0), Moderate Drought (D1), Severe Drought (D2), Extreme Drought (D3), and Exceptional Drought (D4). Throughout 2007 and 2008, UNL’s Drought Monitor had declared the following ten (10) counties as suffering from UNL’s most severe drought sub-category, D4 Exceptional Drought: Leslie, Letcher, Perry, Bell, Clay, Knox, Laurel, Harlan, McCreary, and Whitley. The first three (3) counties in the aforementioned list (Leslie, Letcher, and Perry) are Kentucky River ADD counties. The only significant impact the 2007-2008 drought had for the area concerned water supply shortages. These shortages were in some areas severe in nature and triggered for the second time in recent history the water shortage response plans for several district water suppliers. Supplemental raw water supplies were the only alternatives identified to lessen the impact of prolonged drought conditions. Current plans are in place to interconnect the existing water systems within the district and several are already interconnected and have the ability to share water supply. The economic impact of the 2007-2008 drought on the Kentucky River ADD counties concentrated on timber values and the data available reflects subsequent insect damage due to the reduced ability of the forest to fight off these pests. Below show screenshots from the University of Nebraska-Lincoln’s Drought Monitor for southeastern Kentucky for the 2007-2008 drought.



- 0 to -0.99 = near normal
- -1.00 to -1.99 = mild drought
- -2.00 to -2.99 = moderate drought
- -3.00 to -3.99 = severe drought
- -4.00 and below = extreme drought

The November 8, 2016 and December 1, 2016 drought events recorded by NOAA's National Climatic Data Center refer to the droughts that helped trigger the anomalous wildfire conflagrations discussed in the above wildfire risk assessment profile. Before declaring a State of Emergency (on November 3, 2016) for the wildfires consuming the Commonwealth of Kentucky, Governor Matt Bevin had issued a statewide drought declaration[33]. The wildfires raging during this drought prompted two (2) FEMA FMAG declarations and were concentrated in six (6) southeastern Kentucky counties, three (3) of which are Kentucky River ADD's and one of which (Breathitt County) prompted its own FEMA FMAG declaration.

[33] "An Open Letter by Energy and Environment Cabinet Secretary Charles Snavely." This letter can be accessed from the following website: https://kydep.wordpress.com/2016/11/12/kentucky-needs-your-help-during-its-wildfire-emergency/.

Summary:

The data sets used to build the above charts were compiled from the Kentucky Climate Center at Western Kentucky University, the Kentucky Division of Water, USGS, and the Kentucky Geological Survey. The Regional Mitigation Planning Committee determined that because we have had two droughts within a ten-year period that this hazard needed to be moved from minimal impacting to full analysis. The major impacts to local jurisdictions have been to water supplies. Two of the smaller water suppliers experienced severe reductions in their normal raw water supplies. Both had to rely on either supplemental raw water sources or purchased finished water from other sources. They also experienced major economic impacts from the higher costs of purchasing water and the implementation of emergency response plans. One system even had to rely on the Kentucky Guard to temporarily treat water in order to meet the demands of their system. Because of the few numbers of extreme droughts in the historic period (only six over a hundred years), the analysis of future impacts has been very difficult. The RMPC has had to rely on partial data sets and estimates from engineers and others that have been directly involved in the two systems water shortage emergencies. One impacted supplier uses a surface water supply and the other has wells as the primary raw water supply. The long-term impact of continued drought conditions on underground supplies is very difficult to assess. Many of the aquifers in eastern Kentucky have very long-term recharge rates. These recharge rates can range anywhere form relatively a short period 5-10 years to as much as 500 years. This makes it virtually impossible to estimate when the impacts of severe to extreme drought conditions will be reflected in the underground pools/streams from which these wells draw their water. These two instances are the more extreme cases. Even so, all of our public water supplies are susceptible to the impacts of drought conditions to varying degrees.

It is also relevant to note that Kentucky River ADD's counties (and southeastern Kentucky, generally) has significant vulnerability to wildfire conflagrations. Though rare, instances of drought exacerbate that vulnerability. As stated above, the November-December, 2016 wildfires that consumed the Commonwealth of Kentucky and were concentrated in southeastern Kentucky coincided with a drought declaration.

Summary: Frequency; Probability for Drought for the Kentucky River ADD Region

County	*# Years in Record*	*# Events in Record*	*# Events in Past 10 Years*	*# Events in Past 20 Years*	*# Events in Past 50 Years*	*Record Recurrence Interval (years)*	*Historic Frequency % Chance Per Year*	*Frequency Per Year (10-Year)*	*Frequency Per Year (20-Year)*	*Frequency Per Year (50-Year)*
REGION	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Breathitt	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Knott	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Lee	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Leslie	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Letcher	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Owsley	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Perry	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08
Wolfe	100	6	3	4	4	16.67	6.00%	0.3	0.2	0.08

LANDSLIDES

I. Description

"Landslide" is a term, which encompasses many phenomena-involving lateral and down slope movement of earth materials such as, rock, soil, and/or artificial fill. The term covers a broad category of events, including mudflows, mudslides, debris flows, rock falls, rock slides, debris slides, earth flows, and soil creep. Landslides can occur as sudden, short-lived events, or as a slow moving slide mass or as soil creep. Landslides are common throughout the Appalachian region and New England. Landslides constitute a major geologic hazard because they are widespread, occurring in all 50 states, and cause $1-2 billion in damages and more than 25 fatalities on average each year. Landslides pose serious threats to highways and structures that support fisheries, tourism, timber harvesting, mining, and energy production as well as general transportation. Landslides commonly occur with other major natural disasters such as earthquakes and floods that exacerbate relief and reconstruction efforts and expanded development and other land use has increased the incidence of landslide disasters. Please see this website https://landslides.usgs.gov/ Landslides that occur following periods of heavy rain or rapid snow melt worsen the effects of flooding that accompanies the event.

There are four classifications of landslides:

- **Slides-** Slides of soil or rock involve downward displacement along one or more failure surfaces. The material from the slide may be broken into a number of pieces or remain a single, intact mass. Sliding can be rotational, where movement involves turning about a specific point. Sliding can be translational, where movement is down slope on a path roughly parallel to the failure surface. The most common example of a rotational slide is a slump, which has a strong, backward rotational component and a curved, upwardly-concave failure surface.

- **Flows-** Flows are characterized by shear strains distributed throughout the mass of material. Flows are distinguished from slides by high water content and distribution of velocities resembles that of viscous fluids. Debris flows are common occurrences in much of North America. These flows are a form of rapid movement in which loose soils, rocks, and organic matter, combined with air and water, form slurry that flows down slope. The term "debris avalanche" describes a variety of very rapid to extremely rapid

debris flows associated with volcanic hazards. The term "avalanche," is unmodified, normally refers to slope movements of snow and ice. Mudflows are flows of fine-grained materials, such as sand, silt, or clay, with high water content. Subcategories of debris flows, mudflows, contain less than 50 percent gravel.

- **Lateral Spreads-** Large elements of distributed, lateral displacement of materials characterize lateral spreads. They occur in rock, but the process is not well-documented and the movement rates apparently are very slow. Lateral spreads can occur in fine-grained, sensitive soils such as quick clays, particularly if remolded or disturbed by construction and grading. Loose, granular soils commonly produce lateral spread through liquefaction. Liquefaction can occur spontaneously, presumably because of changes in pore-water pressures, or in response to vibrations such as those produced by strong earthquakes.

- **Falls and Topples-** Falls occur when masses of rock or other material detach from a steep slope or cliff and descend by free fall, rolling, or bouncing. Movements are rapid to extremely rapid. Topples consist of forward rotation of rocks or other materials about a pivot point on a hill slope. Toppling may culminate in abrupt falling, sliding, or bouncing, but the movement is tilting without collapse. Data on rates of movement and control measures for topples is sparse.

II. Profile

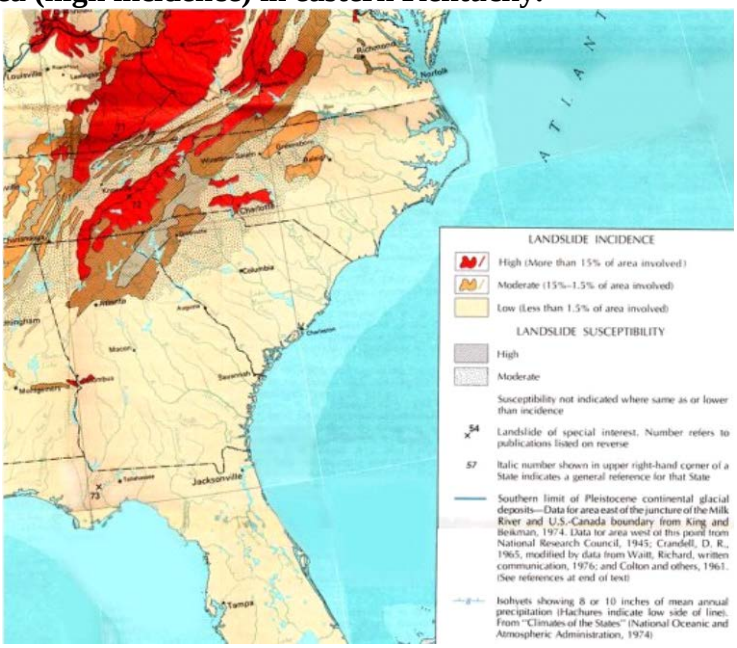
Many homes have been damaged or destroyed in eastern and southeastern Kentucky because they were constructed on unstable geologic formations, or because of a combination of unstable soil and rock and the subsidence of abandoned underground mines.

Factors Contributing to Landslides in Eastern Kentucky

- Steep slopes: Steep slopes should be avoided when choosing a building site.
- Water: Slope stability decreases as water moves into the soil. Springs, seeps, roof runoff, gutter down spouts, septic systems, and site grading that cause ponding or runoff are sources of water that often contribute to landslides.
- Changing the Natural Slope by creating a level area where none previously exists.
- Poor site selection for roads and driveways.
- Improper placement of fill material.
- Removal of Trees and other Vegetation: Plants, especially trees, help remove water and stabilize the soil with their extensive root systems.
- Old abandoned mine works that pose hidden subsurface cavities that may be prone to subsidence when the overburden collapses into the old mine shaft(s).
- Repetitive freezing and thawing over time results in widening of fissures in the natural rock structures as well as in material exposed during road construction with the introduction of large volumes of water in the spring and summer can result in sudden slope failures.
- The natural rock layer structures of eastern Kentucky contain various materials disbursed in intervals within the soils. The presence of shale and slate both of which are extremely brittle and prone to water retention as well as holding natural oily materials make for a higher risk of slippage when exposed to the elements.

- Coal Slurry impoundments and sediment ponds if not properly maintained and monitored pose a potential added factor to mudflows during flooding events, potentially adding to the volume of fluid material if structural failure were to occur.
- Steep stream/river bank failures are also very common impacting many state and local roadways that must be constructed on the slopes just above these waterways.

Counties Covered by plan are Breathitt, Lee, Leslie, Letcher, Owsley, Perry, and Wolfe, all of which are located in the red area (high incidence) in eastern Kentucky.



Landslides

The majority of historical landslides in the Kentucky River ADD region have occurred along highway construction, abandoned mine works, new home/structure construction, and reconstruction of roadways and slopes following heavy rain events. Abandoned underground mine subsidence has also greatly contributed to areas of reoccurring sliding within the region. The resulting road closures, mitigation measures, and relocation activities have resulted in a high cost to local economies as well as federal agencies and private individuals. Many of the costs go unaccounted for because of the lack of insurance coverage to private property owners, many of which must pay for the repairs themselves. These events are usually localized and unless very significant in nature do not qualify for a federal disaster declaration. In a few instances where the landslide event can be shown to be connected with failures caused by old mine works the national abandoned mine lands funds may be used to mitigate the costs associated with either stabilization or relocation of the impacted structures.

Varnes (1978) and Kehew (1995) classified landslides by type of movement and type of material. The types of movement are slides, flows, lateral spreads, falls and topples. The types of material involved in landslides include bedrock and soil (including artificial fill). Soils are described as material that is either predominantly coarse (debris) or predominantly fine (earth). A combination of two or more of the principal types of flows is referred to as a complex movement.

Public and private economic losses from landslides include not only the direct costs of replacing and repairing damaged facilities, but also the indirect cost associated with lost productivity, disruption of utility and transportation systems, reduced property values, and costs for any litigation. Some indirect costs are difficult to evaluate, thus estimates are usually conservative or simply ignored. If indirect costs were realistically determined, they likely would exceed direct costs.

Much of the economic loss is borne by Federal, State, and local agencies responsible for disaster assistance, flood insurance, and highway maintenance and repair. Private costs involve mainly damage to land and structures. A severe landslide can result in financial ruin for the property owners because landslide insurance (except for debris flow coverage) or other means of spreading the costs of damage are unavailable.

Historical Events within the Kentucky River ADD:
SIGNIFICANT SLIDE EVENTS – EIGHT COUNTY REGION

The following table was compiled from the NCDC table information and local input.

TIME PERIOD	LOCATION	SEVERITY	LOSS
02/22/03	KYZ117	N/A	<$1,000
04/10/03	KYZ088	N/A	<$1,000
01/1998—04/30/2004	Breathitt -- 4	N/A	>$50,000
01/1998—04/30/2004	Knott -- 8	N/A	>$100,000
01/1998—04/30/2004	Leslie – 3	N/A	Unknown
01/1998—04/30/2004	Letcher – 20	N/A	>$150,000
01/1998—04/30/2004	Perry – 3	N/A	Unknown

The Kentucky designated locations in the first two incidences are tied to general damage areas where no specific location was given but are scattered across the eight counties.

Below cites landslide events that have been recorded in the Kentucky Geological Survey's (KGS) Landslide Inventory. Generally speaking, landslide events are not recorded systematically and independently like flood events or atmospheric events. The record of events is highly dependent upon anecdotal reporting and subsequent site inspection. Consequently, KGS's Landslide Inventory does not contain information related to all cells for all landslide events. Where cells are blank, the information for that particular event was not made available for record in the Landslide Inventory. Excluded from the below snapshot of landslide events for the Kentucky River ADD region that potentially are recorded in KGS's Landslide Inventory are latitudes/longitudes of event sites, the geologic units comprising the landslide, the lithology and surficial geology comprising the event, the geomorphic position and slope of the event, the geologic unit of the event, whether there was water present in the event, whether there were fractures or faults, and other locational data.

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Breathitt County, 2008-2018

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Extent (Movement Speed)	Impact (Costs)	Impact (Damage Narrative)
Breathitt	Quicksand	KY 1098	6/4/2008		Landslide						
Breathitt	Quicksand	Smith Branch Rd	6/4/2008		Landslide						
Breathitt	Quicksand	Cabin Hill Rd	5/4/2009		Landslide			30 ft. x 10 ft.	Continuous; Rapid		Yes
Breathitt	Quicksand	KY 1812	3/25/2009		Landslide						Yes
Breathitt	Quicksand	KY 1812	3/25/2009		Landslide						
Breathitt	Quicksand	KY 2436	2/13/2009		Landslide						Yes
Breathitt	Jackson	Pond Branch Rd	10/29/2009	5/8/2009	Landslide				Continuous; Moderate	$4,500.00	Yes
Breathitt	Tallega	Bryants Creek Rd	10/29/2009		Landslide						
Breathitt	Tallega	KY 2469	3/16/2010		Landslide	50 ft.		0 ft. – 10 ft.			Yes
Breathitt	Tallega	KY 2469	3/16/2010		Landslide						Yes
Breathitt	Tallega	KY 2469	5/26/2010		Landslide						Yes
Breathitt	Tallega	KY 2469	5/26/2010		Landslide						
Breathitt	Tallega	KY 2469	5/26/2010		Landslide						Yes
Breathitt	Quicksand	KY 540			Landslide						
Breathitt	Quicksand	KY 2436			Landslide						Yes
Breathitt	Quiclsand	KY 2436			Landslide						Yes
Breathitt	Quicksand	KY 30			Mudslide						
Breathitt	Quicksand	KY 30			Landslide						Yes

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Extent (Movement Speed)	Impact (Costs)	Impact (Damage Narrative)
Breathitt	Quicksand	Hensley Cemetery Rd									
Breathitt	Quicksand	KY 1098									
Breathitt	Quicksand	KY 1098									
Breathitt	Quicksand	KY 1098									
Breathitt	Quicksand	KY 1098									
Breathitt	Quicksand	KY 1098									
Breathitt	Quicksand	KY 1812			Landslide						
Breathitt	Haddix	KY 15									
Breathitt	Noble	Clemons Fork Rd	8/9/2010		Landslide			1 acre	Intermittent		Yes
Breathitt	Buckhorn	Baker Dr		4/1/2011	Landslide						Yes
Breathitt	Quicksand	KY 30	7/13/2011		Landslide						Yes
Breathitt	Quicksand	Cabin Hill Rd			Landslide						
Breathitt	Quicksand	KY 30			Landslide						Yes
Breathitt	Jackson	KY 3193									
Breathitt	Jackson	KY 378									
Breathitt	Jackson	KY 541									
Breathitt	Jackson	KY 541									
Breathitt	Jackson	KY 30									
Breathitt	Jackson	Stray Branch Rd									
Breathitt	Jackson	Fire Trail Rd									
Breathitt	Jackson	KY 3193									
Breathitt	Jackson	KY 378									
Breathitt	Jackson	Buzzard Hollow Rd									
Breathitt	Jackson	KY 15									

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Extent (Movement Speed)	Impact (Costs)	Impact (Damage Narrative)
Breathitt	Jackson	KY 52									
Breathitt	Jackson	Shacks Branch Rd									
Breathitt	Jackson	KY 15							Slow, but Accelerates with Rise and Fall of River		Yes
Breathitt	Jackson	KY 15									
Breathitt	Haddix	KY 1110		7/6/2013	Landslide						Yes
Breathitt	Jackson										
Breathitt	Guage										
Breathitt	Jackson										
Breathitt	Canoe										
Breathitt	Guage										
Breathitt	Haddix										
Breathitt	Quicksand	KY 30		12/6/2013	Landslide						Yes
Breathitt	Jackson	KY 15			Rockfall						Yes
Breathitt	Jackson				Mudslide						
Breathitt	Lee City	KY 378		3/4/2015	Landslide						Break in Pavement
Breathitt	Tallega	KY 2469		3/4/2015	Landslide						
Breathitt	Cowcreek	KY 2469		3/4/2015	Landslide						
Breathitt	Buckhorn	Miller Branch Barwick Rd		3/9/2015	Landslide						Road Taken Out
Breathitt	Tallega	KY 2469		3/9/2015	Landslide						Road Closed
Breathitt	Canoe	KY 30		5/8/2015	Landslide						

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Extent (Movement Speed)	Impact (Costs)	Impact (Damage Narrative)
Breathitt	Noble	Clemons Fork		4/6/2015	Landslide						Buildings Threatened
Breathitt	Quicksand	KY 15		9/28/2015	Rockfall		40 ft.				Heavily Damaged Walmart
Breathitt	Jackson	Blue Jay Rd	8/13/2015		Landslide						Damage to Home and Property
Breathitt	Canoe			1/26/2016	Rockslide						Train Derailment
Breathitt	Jackson	KY 3193 (Wolverine Rd)			Landslide						Damaged Roadway
Breathitt	Haddix	KY 15									Road Failure
Breathitt	Canoe	KY 2469									
Breathitt	Canoe	KY 3237		2/16/2018	Rockfall						
Breathitt	Buckhorn	KY 1110		3/25/2018							Break in Pavement; Home Threatened
Breathitt	Lee City	KY 378									Break in Pavement; Road Closure
Breathitt	Haddix	KY 1110		3/27/2018							One Lane Blocked

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Knott County, 2009-2018

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Impact (Costs)	
Knott	Wayland	KY 550			Landslide					
Knott	Wayland	KY 550			Landslide					
Knott	Handshoe	White Oak Flats		5/8/2009	Landslide					
Knott	Handshoe	KY 80	4/13/2010		Landslide			1/2 acre		
Knott	Handshoe	Shiloh Dr	2/16/2010		Landslide					
Knott	Handshoe	Rt 1098								
Knott	Hindman	KY 582		7/12/2011	Landslide					
Knott	Kite	Puncheon Rd		5/11/2011	Landslide					
Knott	Carrie	KY 80							$300,000	
Knott	Hindman	KY 550								
Knott	Blackey	KY 15							$2,160,000	
Knott	Hindman	KY 550								
Knott	Hindman	KY 80								
Knott	Kite	KY 582								
Knott	Vicco	KY 15		7/5/2012	Mudslide					
Knott	Handshoe	Yellow Mountain Rd	7/24/2012		Landslide	85 ft.				
Knott	Handshoe									
Knott	Handshoe									
Knott	Handshoe									
Knott	Hindman									
Knott	Hindman									
Knott	Hindman									
Knott	Hindman									
Knott	Wayland	KY 7		1/30/2013	Mudslide					
Knott	Wayland	KY 550								
Knott	Kite	Puncheon Rd								
Knott	Carrie	KY 1088			Landslide					

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Impact (Costs)	
Knott	Hindman									
Knott	Kite									
Knott	Carrie									
Knott	Blackey									
Knott	Hindman									
Knott	Hindman									
Knott	Hindman									
Knott	Carrie									
Knott	Hindman									
Knott	Hindman									
Knott	Blackey									
Knott	Kite									
Knott	Carrie									
Knott	Carrie									
Knott	Hindman									
Knott	Hindman									
Knott	Carrie									
Knott	Carrie									
Knott	Carrie									
Knott	Carrie									
Knott	Hindman									
Knott	Blackey									
Knott	Kite									
Knott	Carrie									
Knott	Handshoe									
Knott	Hindman									
Knott	Kite									
Knott	Handshoe									
Knott	Hindman									
Knott	Blackey									
Knott	Carrie									
Knott	Carrie									
Knott	Kite									
Knott	Carrie									
Knott	Carrie									
Knott	Carrie									
Knott	Carrie									
Knott	Kite									
Knott	Kite									
Knott	Carrie									
Knott	Hindman									
Knott	Kite									
Knott	Carrie									

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Dimension)	Impact (Costs)	
Knott	Carrie									
Knott	Hindman									
Knott	Carrie									
Knott	Kite									
Knott	Kite									
Knott	Blackey									
Knott	Handshoe	KY 1087		12/23/2013	Landslide					
Knott	Kite	KY 899		3/5/2015	Landslide					
Knott	Hindman	KY 550			Landslide					
Knott	Kite	KY 582								
Knott	Carrie	KY 1102								
Knott	Carrie	KY 1088		4/1/2017						
Knott	Kite	KY 899		5/22/2017						
Knott	Kite					280 ft.	75 ft.			
Knott	Handshoe	KY 1087								
Knott	Carrie	KY 80			Rockfall					
Knott	Handshoe	Pinetree Hollow		2/10/2018						

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Lee County, 2010-2018

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Movement Speed)	Impact (Damage Narrative)
Lee	Beattyville	KY 52	5/26/2010		Landslide		
Lee	Beattyville	KY 52	7/28/2010		Landslide		No
Lee	Beattyville	Silver Creek Rd	2/1/2011	1/30/2011	Rockfall		Yes
Lee	Beattyville	KY 52					
Lee	Beattyville	KY 1144					
Lee	Tallega	KY 708					
Lee	Beattyville	KY 52					
Lee	Beattyville	KY 3150		5/6/2013	Rockfall		
Lee	Beattyville	KY 52		7/9/2013	Landslide		Yes
Lee	Heidelberg						
Lee	Beattyville						
Lee	Beattyville						
Lee	Beattyville	KY 1411	3/3/2014	3/3/2014	Landslide	Continuous; Rapid	Yes
Lee	Beattyville	Pleasant Flat Rd			Landslide		
Lee	Beattyville	KY 52		3/4/2015	Landslide		Break in Pavement
Lee	Tallega	KY 708			Landslide		Road Closure
Lee	Beattyville	KY 52					Break in Pavement; Road Closure
Lee	Beattyville	KY 1144					Break in Pavement

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Leslie County, 2009-2018

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Impact (Costs)	
Leslie	Hoskinston	KY 2009		10/17/2009	Rockfall				
Leslie	Hoskinston	John Morgan Memorial Rd			Landslide				
Leslie	Hoskinston	KY 2009		1/9/2011	Rockfall				
Leslie	Hoskinston	KY 406							
Leslie	Hyden East	KY 1807							
Leslie	Hyden East	US 421							
Leslie	Hyden West	KY 118							
Leslie	Hyden East	KY 1807							
Leslie	Hyden East	KY 80							
Leslie	Hyden West	KY 118				80 ft.		$375,000.00	
Leslie	Hyden East	KY 1807							
Leslie	Hyden East	KY 1807							
Leslie	Hyden East	KY 1807			Landslide	150 ft.			
Leslie	Hyden East	KY 80			Landslide	450 ft.			
Leslie	Helton								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Cutshin								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Helton								
Leslie	Hoskinston								
Leslie	Helton								
Leslie	Cutshin								
Leslie	Cutshin								
Leslie	Hyden West								
Leslie	Beverly								
Leslie	Hoskinston								
Leslie	Hazard South								
Leslie	Hyden West								
Leslie	Big Creek								
Leslie	Hoskinston								

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Impact (Costs)	
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Cutshin								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Big Creek								
Leslie	Hyden West								
Leslie	Big Creek								
Leslie	Big Creek								
Leslie	Hyden West								
Leslie	Helton								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Cutshin								
Leslie	Cutshin								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden West								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Hyden East								
Leslie	Hyden East	KY 1807		2/10/2014	Landslide				
Leslie	Hyden East	KY 699			Landslide		180 ft.		
Leslie	Hyden West	KY 3424			Landslide				
Leslie	Hyden East	US 421			Landslide				
Leslie	Hoskinston	KY 421			Landslide				
Leslie	Cutshin	KY 699		3/5/2015	Landslide				

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Impact (Costs)	
Leslie	Hoskinston	US 421		3/8/2015	Landslide				
Leslie	Hoskinston	US 421		12/1/2015	Landslide				
Leslie	Hoskinston	US 421							
Leslie	Hyden East	KY 257					100 ft.		
Leslie	Hyden East	KY 2057, Polls Creek Rd							
Leslie	Helton								
Leslie	Leatherwood	KY 699							
Leslie	Hoskinston	KY 1780		2/19/2018					

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Letcher County

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Slip Surface Depth)	Extent (Movement Speed)	Impact (Damage Narrative)
Letcher	Roxana	KY 588						
Letcher	Whitesburg	US 119						
Letcher	Mayking	U 9999	10/8/1975			22 ft. - 68 ft.	Very Slow: 1.3 ft. in total movement as of report date	Yes
Letcher	Roxana	KY 588						
Letcher	Roxana							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Roxana							
Letcher	Benham							
Letcher	Louellen							
Letcher	Louellen							
Letcher	Louellen							
Letcher	Louellen							
Letcher	Louellen							

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Slip Surface Depth)	Extent (Movement Speed)	Impact (Damage Narrative)
Letcher	Louellen							
Letcher	Blackey	Doty Creek Rd						
Letcher	Whitesburg							
Letcher	Mayking							
Letcher	Blackey							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Louellen							
Letcher	Mayking							
Letcher	Roxana							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Roxana							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Mayking							
Letcher	Whitesburg							
Letcher	Jenkins West							
Letcher	Jenkins East							
Letcher	Mayking							
Letcher	Blackey							
Letcher	Blackey							
Letcher	Blackey							
Letcher	Roxana							
Letcher	Whitesburg							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Jenkins							

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Slip Surface Depth)	Extent (Movement Speed)	Impact (Damage Narrative)
	West							
Letcher	Roxana							
Letcher	Mayking							
Letcher	Whitesburg							
Letcher	Roxana							
Letcher	Roxana							
Letcher	Whitesburg							
Letcher	Mayking							
Letcher	Jenkins West							
Letcher	Whitesburg							
Letcher	Whitesburg							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Mayking							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Mayking							
Letcher	Whitesburg							
Letcher	Mayking							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Jenkins West							
Letcher	Mayking	KY 931			Landslide			Road Closure
Letcher	Whitesburg	Solomon Rd		12/29/2016				Road Closure; Homes Threatened
Letcher	Mayking	KY 1148						Road Damage
Letcher	Whitesburg	US 119		2/10/2018				Material on Roadway
Letcher	Roxana	KY 588		2/17/2018				Road Failure; Home Threatened

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Owsley County to 2015

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Impact (Damage Narrative)
Owsley	Booneville	KY 846				
Owsley	Sturgeon	KY 847				
Owsley	Booneville	KY 30				
Owsley	Booneville	KY 11				
Owsley	Beattyville	KY 11				
Owsley	Booneville	KY 30				
Owsley	Tallega	KY 708		7/10/2013	Landslide	Yes
Owsley	Booneville					
Owsley	Booneville					
Owsley	Sturgeon	KY 847			Landslide	
Owsley	Booneville	KY 1938		3/31/2015	Landslide	Break in Pavement

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Perry County, 2007-2018

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Hazard South	Browns Fork Rd	9/25/2007		Landslide						
Perry	Hazard South	KY 1166	5/3/2007		Landslide						
Perry	Hazard South	KY 1096	12/18/2007		Landslide						
Perry	Hazard South	Browns Fork Rd	4/8/2007		Landslide						
Perry	Hazard South	KY 1096	5/29/2007		Landslide						
Perry	Hazard South	KY 1165	12/10/2007		Landslide						
Perry	Tilford	KY 699	10/15/2008	4/18/2006	Landslide						Yes
Perry	Buckhorn	KY 1833			Landslide						Yes
Perry	Buckhorn	Lakeview Dr		12/18/2009	Landslide						Yes
Perry	Hazard North	Grand Oak Ln	2/16/2010		Landslide						Yes
Perry	Hazard North	KY 80									
Perry	Krypton	KY 15									
Perry	Hazard North	Happy Valley Ln									
Perry	Hazard North	KY 80									
Perry	Krypton	Briar Fork Circle Rd		10/14/2010	Rockfall						
Perry	Krypton	Sam Campbell Branch Rd	3/3/2011		Landslide	120 ft.			1/2 acre	Intermittent	No
Perry	Hazard North	Jordan St		3/8/2011	Mudslide						Yes

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Krypton	William Baker Ln		4/16/2011	Mudslide						No
Perry	Krypton	KY 451		6/18/2011	Landslide						Yes
Perry	Krypton	Krypton Lick Branch Rd		4/15/2011	Landslide						
Perry	Hazard South	Anderson Fork Rd			Landslide						
Perry	Krypton	HR 9006									
Perry	Krypton	KY 28									
Perry	Buckhorn	KY 28									
Perry	Tilford	KY 699									
Perry	Krypton	KY 28									
Perry	Noble	KY 476									
Perry	Vicco	KY 7									
Perry	Hazard South	KY 451									
Perry	Hazard South	KY 1165									
Perry	Vicco	KY 1165									
Perry	Vicco	KY 1165									
Perry	Hazard North	KY 476									
Perry	Noble	KY 476									
Perry	Hazard North	KY 1088		4/5/2012							Yes
Perry	Krypton	Hall Rogers Pkwy			Landslide		240 ft.	15 ft.			
Perry	Buckhorn										
Perry	Buckhorn										
Perry	Buckhorn										
Perry	Buckhorn										

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Buckhorn										
Perry	Buckhorn										
Perry	Buckhorn										
Perry	Hazard South			10/19/2012	Landslide						Yes
Perry	Hazard South	KY 7									
Perry	Hazard South	KY 7									
Perry	Krypton	KY 451		1/30/2013							
Perry	Noble	KY 476									Yes
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Krypton										
Perry	Vicco										
Perry	Vicco										
Perry	Hazard North										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard South										
Perry	Hazard North										

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard North										
Perry	Vicco										
Perry	Krypton										
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard North										
Perry	Tilford										
Perry	Hazard North										
Perry	Vicco										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard South										
Perry	Hazard North										
Perry	Vest										
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard South										
Perry	Hazard North										

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard North										
Perry	Buckhorn										
Perry	Krypton										
Perry	Krypton										
Perry	Vicco										
Perry	Hazard North										
Perry	Hyden East										
Perry	Hazard North										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard North										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard South										

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hyden East										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard South										
Perry	Vicco										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard South										
Perry	Vicco										
Perry	Hazard North										
Perry	Hazard South										
Perry	Krypton										
Perry	Hazard North										
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Perry	Hazard South										
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Perry	Hazard North										
Perry	Hazard North										

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Krypton										
Perry	Hyden East										
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard North										
Perry	Vicco										
Perry	Krypton										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard North										
Perry	Krypton										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard North										
Perry	Hazard South										
Perry	Hazard North										
Perry	Carrie	KY 80		2/15/2013	Rockfall						Yes
Perry	Buckhorn	Cam Johnson Branch Rd		3/3/2014	Landslide						Yes
Perry	Buckhorn	KY 28			Landslide						
Perry	Buckhorn	KY 28		3/3/2015	Rockfall						Road Closure

County	Quadrangle (City)	Location	Date Observed	Date Failed	Type	Extent (Track Length)	Extent (Track Width)	Extent (Slip Surface Depth)	Extent (Dimension)	Extent (Movement Speed)	Impact (Damage Narrative)
Perry	Hazard North	Faulkner St		3/6/2015	Landslide						Damaged Home; Others Threatened
Perry	Hazard North	KY 550 (Combs Rd)		4/14/2015	Landslide					Fast	
Perry	Hazard North	KY 1146 (Hardburly Rd)		5/28/2016	Mudslide						Damaged Homes; Road
Perry	Hazard South	Hank St		3/1/2017							Road Blocked, Houses Threatened
Perry	Hazard North	KY 476		4/22/2017							Road Closure for Several Days
Perry	Hyden East	KY 80		2/17/2018							Slide Blocking all Lanes
Perry	Vicco	KY 7		2/17/2018							One Lane Blocked
Perry	Hyden West	Saul Mud Lick Branch		2/10/2018							Home Damaged; Road Threatened
Perry	Hazard North	KY 476		3/5/2018							Road Closure
Perry	Krypton	Hickory Gap Rd		3/25/2018							Home Threatened
Perry	Hazard North	KY 451		3/24/2018							
Perry	Hazard North	Sun Valley Terrace		2/11/2018							Home Damaged
Perry	Leatherwood	Clover Fork Rd									Home Threatened

Landslide Events as Recorded in Kentucky Geological Survey (KGS) Landslide Inventory: Wolfe County to 2015

County	Quadrangle (City)	Location	Date Failed	Type	Impact (Damage Narrative)
Wolfe	Pomeroyton	KY 9000			
Wolfe	Campton	KY 9009			
Wolfe	Campton	KY 9009			
Wolfe	Campton	KY 9000			
Wolfe	Campton	KY 651	7/10/2013	Landslide	Yes
Wolfe	Landsaw				
Wolfe	Campton				
Wolfe	Landsaw	KY 1261	3/4/2015	Landslide	
Wolfe	Pomeroyton	KY 746	4/14/2015	Landslide	Road Closure

Summary:

All jurisdictions of the region are located in a high susceptibility area except for small areas of Owsley, Lee, and Wolfe Counties. Two of the above events (KYZ117 & KYZ088) were listed in the NCDC tables for the eight county region and did not supply sufficient data in order to determine the exact location within the eight county region. Much landslide damage occurs during flood events and the data associated with the events are contained within the FEMA PW's pertaining to the individual disaster declarations. At this time, it is not feasible due to time constraints to extract these data sets for landslide events. The sub-committees, RMPC and KRADD Board of Directors would like to have this data available. Future updates to this plan may include the appropriate data if funds are made available for the time it would take to extract or if alternative information sources are identified that would be readily available and usable. The following web site contains the landslide susceptibility for our eight counties and thirteen cities and was utilized to develop hazard areas and potential vulnerability. Please visit the following website: http://www.uky.edu/KGS/gis/landslide/index.html.

Landslides occur fairly frequently in the region and are usually associated with flood events. The historical data gathered from the NCDC tables was supplemented with local input from the sub-committees and the RMPC. During the process of evaluating the data the committee members determined for purposes of this plan to utilize the same frequency as was determined for flood events and to utilize a ratio to develop loss estimates based upon the local input of damage areas. The reoccurring damage areas have been identified on the individual jurisdictional maps located at, Attachments B and C at the end of this document, by local officials and road foremen.

The following hazards frequency table takes into account both the historical data from the NCDC tables as well as data from local input. This table shows the frequency, impact, and probability of future events for each jurisdiction. Additional research needs to be undertaken in order to supplement the information in this plan. It is the intent of the planning committee to seek funds to further the available data in future updates to this plan.

All infrastructure resources within the eight counties and thirteen cities of the district are susceptible to landslide damage. Twelve water treatment plants, 1,005 miles of potable water lines, 71 water tanks, and 70 water pump stations are in the high incidence zone per the USGS map above. Thirteen sewer treatment plants, 146 miles of sewer collection lines, and 82 sewer lift/grinder pump stations are in the high incidence zone. The region currently has no electrical power plants, but does have approximately 20 sub-stations, and many miles of overhead power lines all in the high incidence zone. There are around 7,500 active gas and/or oil wells in the region all potentially impacted by landslides. Numerous miles of gas lines also exist; however, the figures are not currently available. These data sets may be included in future updates if resources for collection are made available and the data is release by the appropriate agencies.

Reference List

FEMA http://www.fema.gov

Water Science Glossary of Terms; https://water.usgs.gov/edu/dictionary.html

Weather Channel on line https://weather.com/maps/severealerts

Perry, Charles A. https://pubs.usgs.gov/fs/2000/0024/report.pdf

FEMA, Backgrounder: Floods and Flash Flood http://disaster.ifas.ufl.edu/PDFS/CHAP09/D09-03.PDF

FEMA, Hazards, Floods, What is a Flood? https://www.ready.gov/floods

Streamflow information— https://waterwatch.usgs.gov/

Flood Insurance— https://www.fema.gov/national-flood-insurance-program

Dam Safety— https://www.fema.gov/dam-safety-publications-resources

Hurricane Safety— http://www.nws.noaa.gov/om/hurricane/index.shtml

Flash-Flood Safety— http://www.floodsafety.noaa.gov/index.shtml

Regional Flood Safety— http://www.floodsafety.noaa.gov/index.shtml

River Forecast Centers— https://www.weather.gov/ohrfc/

1957 Flood--- http://www.hazardkentucky.com/flood.htm

U.S. Army Corps of Engineers
regional sites and districts— http://www.usace.army.mil/

USGS Stream flow Data
Historical— http://waterdata.usgs.gov/usa/nwis
Peak flow— https://nwis.waterdata.usgs.gov/usa/nwis/peak

USGS Homepage— http://www.usgs.gov/

National Severe Storms Laboratory https://www.nssl.noaa.gov/research/flood/

National Basin Delineation Project https://www.nssl.noaa.gov/projects/basins/

Flood Damage in the United States, 1926-2000 A Reanalysis of National
Weather Service Estimates http://www.flooddamagedata.org/

Association of State Floodplain Managers http://www.floods.org/

Natural Hazards Center https://hazards.colorado.edu/

Floodplain Management in Kentucky,
Department for Environmental Protection http://water.ky.gov/floodplain/Pages/default.aspx

Sanders, David and Conner, Glen. “Ohio River Floods”,

The Kentucky Climate Center- Fact Sheet. Jan. 2000. https://worldhistoryproject.org/1937/1/18/ohio-river-flood-of-1937

National Severe Storms Laboratory https://www.nssl.noaa.gov/

An Overview of Kentucky’s Waters.
Kentucky Division of Water, 2002. http://water.ky.gov/watershed/Documents/Kentucky%27s%20Water%20Health%20Guide%20-%20Online%20Version.pdf

National Weather Service, Office of Climate,
Water and Weather Services http://www.nws.noaa.gov/om/hazstats.shtml

FEMA; National Flood Insurance Program	https://www.fema.gov/national-flood-insurance-program

Reference List (cont.)

Kentucky Division of Forestry	http://forestry.ky.gov/Pages/default.aspx
Merriam Webster Online	https://www.merriam-webster.com/
City of Hazard Web Page	http://hazardky.gov/
E-Podunk.com Kentucky Counties	http://www.epodunk.com/counties/ky_county.html
USDA Natural Resources Conservation Services	https://www.nrcs.usda.gov/wps/portal/nrcs/site/ky/home/
National Pipeline Mapping System	https://www.npms.phmsa.dot.gov/

The KRADD Staff consisting of the Public Administration Specialist, Community Resources Planners, GIS Personnel, and Program Director, researched and provided data to the sub-committees, RMPC, and KRADD Board of Directors. Local officials, DEM personnel, regional FEMA personnel, federal representatives, and area citizens completed surveys during the hazard identification process. The survey data was incorporated into the hazards identification as well as the risk assessment of the plan. The GIS staff has been involved in this process through, existing map data layer searches from the KY State Data Center, the USGS web site, and information contained in the HAZUS MH module. Cartographic products have been produced identifying the hazards and were provided to the KRADD staff and committees for analysis and, where appropriate, have been included in the plan. The gathered information has been presented first to the sub-committees, then upon their review to the RMPC, and finally to the KRADD Board of Directors. The RMPC and KRADD Board of Directors have had the final decision on what is included in the plan.

The following is a partial list of resources used to identify hazards in the region

- Kentucky State Climatology Center – http://www.kyclimate.org/
- Kentucky Division of Water – Floods and floodplain mapping information - http://water.ky.gov/floodplain/Pages/default.aspx
- National Climatic Data Center database of storm events by location - https://www.ncdc.noaa.gov/stormevents/
- Kentucky Geological Survey data relating to earthquakes and landslides - http://www.uky.edu/KGS/geologichazards/risks.htm
- Kentucky Insurance Department information related to risk and insurance cost analysis - http://insurance.ky.gov/laws.aspx
- Kentucky Data Site GIS links related to Kentucky - https://technology.ky.gov/gis/Pages/default.aspx
- Kentucky State Data Center – Census and population data - http://www.ksdc.louisville.edu/data-downloads/
- Information found FEMA 386-2 *Understanding Your Risk* - https://www.fema.gov/media-library/assets/documents/4241
- GIS, KRADD plan development staff have used Hazards U. S. (HAZUS MH - https://www.fema.gov/hazus/) as a tool to complete this and other sections of the risk assessment)
- The Federal Emergency Management Agency's Flood Hazard Mapping Web Site - http://awra.org/~awra/proceedings/www99/w18/index.htm
- FEMA and other web based databases and information sources that identify hazards by geographic locations - https://www.fema.gov/disasters/
- Flood Insurance Rate Maps and Flood Insurance Studies - https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping

- United States Army Corps of Engineers (USACE) flood data - http://www.iwr.usace.army.mil/Missions/Flood-Risk-Management/Flood-Risk-Management-Program/
- Information from past hazard events and previous declared disasters including if available, FEMA reports - https://www.fema.gov/resource-document-library# such as disaster specific mitigation strategic - https://www.fema.gov/blog/2018-01-11/investing-mitigation-build-more-resilient-nation?utm_source=hp_promo&utm_medium=web&utm_campaign=blog and implementation plans - https://www.fema.gov/hazard-mitigation-planning
- Interviews of knowledgeable officials and residents in the planning area
- Historical local records to include archived newspapers - http://www.breathittcounty.com/FF0.html, TV – http://www.wymt.com/, and radio - http://www.wsgs.com/ information
- Local input survey forms

4.3: 44CFR §201.6(c)(2)(ii), §201.6(c)(2)(ii)(a) Assessing Vulnerability: Identifying Assets: Overall Summary

The eight county Kentucky River Region is most susceptible to flooding, both flash flooding due topography and to Riverine flooding due to the narrow river valleys and development within the 100-year floodplain. A high percentage of the built environment has been placed within the 100 year flood plain due to the lack of suitable available property elsewhere. Given the topography and location of the built environment it can be inferred that any development located in and along the streams and rivers in the region are susceptible to either flash flooding or riverine flooding. Census data, HAZUS MH, GIS databases and capabilities using GIS data, local input, and historical event data was used in formulating this section of the vulnerability analysis.

HAZUS MH was used in conjunction with Arc Map 10.5 in identifying assets and determining loss estimations. Where applicable, KRADD GIS staff have produced maps identifying and locating these assets and provided them to the KRADD staff and the mitigation plan committees as well as to the Regional Mitigation Planning Committee for analysis. The maps are included in the plan as attachments. A total of around 41,100 occupied homes are susceptible to flooding. In addition, 3 water treatment plants, 6 sewer treatment plants and numerous pump/lift stations are susceptible to flood damage. The total potential damage of these facilities is around $8 to $12 million dollars. Fifteen schools, six fire departments, and one police station are prone to flood damage, with around $1.34 million in potential damages (HAZUS plus local input). Approximately 271 major bridges and around 500 major road miles are prone to flooding, debris deposits, and erosion. The total potential annualized loss estimate from flood damage ranges from a high of well over $8.4 million to a low of $2.6 million. The total public damage alone from flooding in the 12-year sample period ending August of 2009 was $101,220,000 (www.fema.gov/disasters).

The following staff and committees were involved in the identification of assets: Public Administration Specialist; Community Resources Planners; Program Director; Executive Director; GIS Technician & Specialist; Secretarial; and RMPC and all sub-committees.

In addition to flooding the Kentucky River region is also susceptible to severe winter storms, severe thunderstorms with lightning, hail and high wind damage, tornados, wildfires, and landslides. Severe winter storms, severe thunderstorms/lightening/hail/high winds/, tornados are all not specifically limited to geographical boundaries. Wildfires are attributable to forested areas; however, the Kentucky River Region has 81% forested land, which makes the preponderance of the total acreage susceptible to wildfires. The total potential loss for wildfires is approximately, $113.9 million in lost timber value alone. This does not take into consideration the costs of suppression nor the loss of wildlife habitat, increased soil erosion, and degraded water quality. Landslides are attributable to geographic boundaries as well; again however the majority of the region is located within a high susceptibility area as defined by the Kentucky Geological Survey. Only very small sections in the northern and western portions of Lee and Wolfe counties are identified as being in the moderate susceptibility zone for landslide potential. Most of the damage of landslides occurs during flood events and the estimated damage is tied to a percentage of the overall losses attributable to flooding. Primarily these losses take into consideration damage to roads, and infrastructure facilities. The potential annualized loss for landslides is around $250,000 based on the 12-year study period ended August 2009. This is public loss only and does not take into consideration the potential loss to private property. The remaining overall hazards not attributable to a particular geographic boundary have the potential to damage every structure of the built environment. A rough estimate based on the 2010 census data would place a value of around $1.46 billion on this built environment. It is very unlikely that this level of damage would occur from any given hazard; however the overall vulnerability still remains.

Overall of the total damages from the 12-year period ended August 2009, these twelve disasters have resulted in a total of $101.2 million in damages or around $8,433,000 average per county per disaster. (Some counties were not included in every disaster.). Though unrecorded here, recent (post 2009) past disaster damage was taken into consideration by the RMPC during the review of potential loss estimates.

The 2010 census data and the American Community Survey (ACS) was also utilized during the identification of future development trends. Overall the region is estimated through self-reporting to have lost population from the 2010 census to the 2015 ACS five-year population estimate. This loss of population resulted in a somewhat reduced construction of new homes; however, it was not a linear relationship. The overall persons per household for the region declined during the same year period resulting in fewer persons living in each home. The problem of new construction occurring in the 100-year floodplain still exists to some extent in the region. An identified action item is for local jurisdictions to better implement their local floodplain management ordinances and develop methods to better enforce them.

The impact of each identified hazard is developed and explained under the individual hazard profile in the previous section of this plan. The greatest threat remains flooding. Tornadoes, landslides, severe thunderstorms/hail/lightening, wildfires, and severe winter storms follow close behind. The individual impacts to each participating jurisdiction may also be found throughout the individual hazard profile section.

The following were utilized in the development of the vulnerability analysis of assets:

- Identification of hazards
- Maps of the hazard areas available to the general public
- An inventory of the assets at risk
- Expected impacts from the hazard(s) and what they would do to community assets
- An estimate of potential losses

1. Determination of which hazards impact the largest portion of the community.

- Maps of where hazards are most likely to occur in any given area were used to determine which hazards impact the largest portion of the community.

2. Determination of which hazards have the greatest potential financial impact upon the community.

- Identification of the important and/or critical assets in the hazard areas was completed first using HAZUS MH then updating the information with local input through surveys and from local officials.

3. A determination of which hazards have had the greatest potential risk on the region were identified.

- Staff utilized existing inventories of known vulnerable structures from the HAZUS MH data base then added known structures as provided by local officials and area citizens. Other inventories were obtained from historical records, flood insurance rate maps, topo maps, digital ortho quadrangle images, KY Division of Water floodplain mapping. Staff compiled this information and supplied it to the sub-committees, and to the RMPC. The sub-committees and RMPC reviewed and recommend the inclusion of the data into the plan to the KRADD Board of Directors.

The GIS Staff have incorporated the available data structures, infrastructure and have added the data supplied by local officials and area residents and provided overlay maps to both the staff developing the mitigation plan as well as to all committees and local communities for review.

Committee members also reviewed potential future vulnerable structures from identified development areas and included critical facilities and infrastructure facilities in the review. The development of goals objectives and action items for each jurisdiction were all focused to enhance the jurisdictions' abilities to reduce or minimize the impacts of the identified hazards where economically feasible.

Identification of Assets

This section of the plan addresses what can be affected by each identified hazard event. The hazard information; charts, graphs, and statistical data found in the profile section were utilized as a basis for describing the vulnerability to these hazards with types and numbers of existing and potential future development of the built environment, including homes, critical facilities, transportation facilities, and other infrastructure within the region where data sets were available and accessible. Additional data sets need to be collected for specific areas including bridges and roadways, electrical power lines, and gas/oil distribution and transmission lines. The overall current values of power lines, gas and oil wells, gas and oil lines, bridges and roads were also not available to incorporate into this plan. It is hoped that these items may be included in future updates if funds available and the data sets can be accessed. Much of the data is now considered as being limited access to the local public due to homeland security guidelines.

Information was collected using a variety of sources, including HAZUS MH modeling, the National Climatic Data Center, US Census data sets, and local input. These information sets were collected, mapped where available & appropriate, summarized by KRADD staff, provided to the sub-committees, RMPC, KRADD Board of Directors, and included in the plan where appropriate.

Finally, Attachments D, E, F, and G appended to this document provide visual context of the vulnerability of the Kentucky River ADD region to its identified hazards.

Summary

The below tables were compiled from the Regional Water Council, Kentucky Infrastructure Authority (http://kia.ky.gov), and area officials for the water and sewer data; county road foremen, Kentucky Transportation Cabinet personnel, and the regional transportation planner for the road and bridge information. Electrical information availability was very limited and much of the information is now restricted due to enhanced homeland security measures. Any gas and oil information was compiled from the National Pipeline Mapping System (www.npms.phmsa.dot.gov) Any missing information below needs to be compiled and studied by the RMPC in order to be fully incorporated into this plan. The missing data is considered protected under national homeland security as high-risk facilities. The locations and other pertinent data sets are not accessible for any public document. It is unlikely that future plans will be able to include these data sets.

The hazards of Severe Winter Storms and Wildfires will not be addressed in terms of the built environment susceptibility. Winter storms have not historically caused any significant damage to structures in the region but have caused hardship in cleanup efforts and loss of utility services (especially electrical). Winter storms have posed detrimental impacts on vulnerable populations, especially the elderly and disabled who many times live in sub-standard houses with limited heat sources and inadequate weatherization. The wildfires have not historically impacted the built environment of the region either. The major impact has been to the timber resources of the region and will be expressed in terms of potential loss to timber resources and expressed in acres burned as well as timber value of $96.32 per acre lost. A total of around 1,329,000 acres are vulnerable in the region with an estimated value of about $128,000,000.

The following reflects the potential vulnerable acreage of timber within the region.

Jurisdiction	Total Acreage Within Jurisdiction	Percent of Acreage Vulnerable
Breathitt County	256,703	100%
Knott County	182,591	100%
Lee County	108,800	100%
Leslie County	209,471	100%
Letcher County	175,743	100%
Owsley County	102,720	100%
Perry County	177,343	100%
Wolfe county	115,520	100%
Regional Total	***1,328,891***	***100%***

The following reflects the potential vulnerable elderly population in the region. Information provided by representatives of the area aging council.

Jurisdiction	Total Identified Population Elderly 62 and over	% of total Population	% of Elderly Population estimated vulnerable
Breathitt County	1,789	12%	90%
City of Jackson	480	22%	90%
Knott County	2,297	14%	90%
City of Hindman	142	27%	90%
City of Pippa Passes	11	02%	90%
Lee County	1,055	13%	90%
City of Beattyville	322	25%	90%
Leslie County	1,694	15%	90%
City of Hyden	114	31%	90%
Letcher County	2,824	12%	90%
City of Fleming-Neon	187	24%	90%
City of Jenkins	423	19%	90%
City of Whitesburg	491	23%	90%
Owsley County	836	18%	90%
City of Booneville	24	30%	90%
Perry County	3,008	11%	90%
City of Buckhorn	19	12%	90%
City of Hazard	989	22%	90%
City of Vicco	53	16%	90%
Wolfe County	1,005	14%	90%
City of Campton	84	19%	90%
Totals	17,847	16%	90%

The following chart represents the non-institutionalized disabled persons in the region. All are considered vulnerable in varying degrees for the purpose of this plan.

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, non-sampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

	Breathitt County, Kentucky	Knott County, Kentucky	Lee County, Kentucky	Leslie County, Kentucky	Letcher County, Kentucky	Owsley County, Kentucky	Perry County, Kentucky	Wolfe County, Kentucky
Total disabilities tallied:	11,895	12,546	4,912	9,738	17,628	3,789	18,936	4,825
Total disabilities tallied for people 5 to 15 years:	402	367	138	173	522	89	447	152
Sensory disability	87	49	41	47	74	13	60	22
Physical disability	58	85	25	32	105	13	55	31
Mental disability	215	181	51	77	292	54	249	85
Self-care disability	42	52	21	17	51	9	83	14
Total disabilities tallied for people 16 to 64 years:	8,911	9,322	3,181	7,265	12,492	2,693	13,778	3,251
Sensory disability	762	882	209	563	1,137	263	1,237	306
Physical disability	2,274	2,398	792	1,845	3,255	740	3,529	810
Mental disability	1,449	1,589	487	1,154	2,045	493	2,135	570
Self-care disability	621	626	167	534	816	144	1,021	183
Go-outside-home disability	1,419	1,574	557	1,215	1,933	386	2,264	622
Employment disability	2,386	2,253	969	1,954	3,306	667	3,592	760
Total disabilities tallied for people 65 years and over:	2,582	2,857	1,593	2,300	4,614	1,007	4,711	1,422
Sensory disability	411	471	280	409	853	167	798	280
Physical disability	801	887	532	729	1,457	346	1,489	440
Mental disability	430	430	220	320	720	158	782	207
Self-care disability	332	372	209	274	588	108	584	190
Go-outside-home disability	608	697	352	568	996	228	1,058	305

U.S. Census Bureau
Census 2010

The following definitions of critical facilities are as defined by FEMA Publication 386-1, version 1.0, pages 3-9.

Transportation Facilities: Roads, Bridges, tunnels, overpasses; airports, heliports; rail track segments, tunnels, bridges, yards, depots; water transportation locks, dams, docks and piers

Utilities: Potable water systems, wastewater systems, oil, natural gas, electric and communication systems

Essential facilities: included are structures that are essential to the health, safety and welfare of the community; structural integrity, content value, and possible interruption of their functions are considered. Falling within this category are hospitals and other medical facilities, police and fire stations, emergency operations centers, evacuation shelters, schools and health and human services facilities as well as some governmental facilities

High Potential Loss Facilities: facilities that have a high loss associated with them including both physical and economical examples include dams, military installations

Hazardous Materials Facilities: those structures housing industrial/hazardous material, i.e. explosives, corrosive liquids/gases, flammables toxins and radio active materials

The maps appended to this document show the locations of critical facilities within the district using HAZUS MH with added known facilities.

4.4: 44CFR §201.6(c)(2)(ii)(B) Assessing Vulnerability: Estimating Potential Losses:

The following data on vulnerability lists an estimate for each identified hazard of the potential dollar losses to vulnerable structures identified in Section 3.3.3 and a description of the methodology used to prepare the estimates.

The cost estimate tools used include, but were not limited to, research on losses from past hazard events (including available repetitive flood loss data), public works cost records, and local input and HAZUS MH modeling, the use of loss estimating tables such as those found in the FEMA publication Understanding Your Risks and estimates derived from HAZUS and other GIS resources.

Estimated Potential Vulnerable Timber Assets:

Jurisdiction	Total Acreage Within Jurisdiction	Percent of Acreage Vulnerable	Potential Timber Resource Damage Forest Fires
Breathitt County	256,703	100%	$21,968,643
City of Jackson	N/A	N/A	N/A
Knott County	182,591	100%	$15,626,138
City of Hindman	N/A	N/A	N/A
City of Pippa Pa	N/A	N/A	N/A
Lee County	108,800	100%	$ 9,311,104
City of Beattyville	N/A	N/A	N/A
Leslie County	209,471	100%	$17,926,528
City of Hyden	N/A	N/A	N/A
Letcher County	175,743	100%	$15,040,086
City of Fleming-Neon	N/A	N/A	N/A
City of Jenkins	N/A	N/A	N/A
City of Whitesburg	N/A	N/A	N/A
Owsley County	102,720	100%	$ 8,790,778
City of Booneville	N/A	N/A	N/A
Perry County	177,343	100%	$15,177,014
City of Buckhorn	N/A	N/A	N/A
City of Hazard	N/A	N/A	N/A
City of Vicco	N/A	N/A	N/A
Wolfe county	115,520	100%	$ 9,886,202
City of Campton	N/A	N/A	N/A
Regional Total	1,329,161	100%	$113,726,493

Summary

The above chart infrastructure information and values were compiled from a variety of sources including the Kentucky Infrastructure Authority, regional water management council, water suppliers, local officials for the water data; State Transportation Cabinet; county road foremen, KRADD regional transportation planner for the road and bridge data electrical supply information from local officials; and the oil and gas information from the National Pipe system. The values and structures in the hazard areas reflect both known structures for water/sewer plants & pump stations; estimates on the numbers of road miles, and bridges based on past occurrences. The dollar values are based on current replacement costs for similar sized facilities as currently exist in each jurisdiction. The RMPC members recognize that the values stated in the hazard areas reflect total value and not actual potential losses, as no historical events have caused 100% damage to any of the above listed facilities. However, as can be seen if only 1% damage occurs to structures in the hazard area during any given event, a flood event could potential cause around $4 million in damage for the eight county region to the infrastructure alone. There are two small regional airports and several miles of rail facilities within the region. No major rail depots are currently found in the eight counties, the only structural facilities with the rail system are unit train load-outs providing loading of coal resources onto rail cars. These two types of data sets are currently unavailable given the time constrains of this plan and the unavailability of the data and values associated with each.

44CFR §201.6(c)(2)(ii)(C) Assessing Vulnerability:

4.5: Analyzing Development Trends:

Land uses and development trends have been identified by the following: the Kentucky Cabinet of Economic Development's Resources for Economic Development manuals for each county in the planning area; interviews with mayors/judge executives, developers in the area; representatives from the State Department of Transportation and State Governor's Department for Local Government; review of the approved water management plans for each jurisdiction, review of the overall Comprehensive Economic Development Strategy for the Region; and consultation with county and city units of local government representatives. In addition, GIS spatial block group data from 1990 and 2010 Census was compared to help define and analyze development trends.

The Kentucky River ADD lost population at a rate of around **-7%** between 2010 and 2015 estimates compared to the overall state growth 7.4%. Over the next 10 years, the Region is projected to continue the loss of population by another **-8%.**

The region is rural in nature. The minor residential development is mostly in or near the regions cities with other scattered development in the outlying county communities. The Census Data Demographics information projects that **7,174 fewer people** will be living in the Kentucky River Region after 2015, so it is projected that there will be little to no housing starts in general. One new major construction project located in Letcher County (a proposed new federal prison) is estimated to place a demand of around 600 houses within the next 7-10 years in order to accommodate the influx of construction workers and employees. Essential Facilities and Services are expected to remain about where they are today with some minor increases around the areas showing growth (Lee County, Breathitt County, Wolfe County). Infrastructure development will vary as to the type of infrastructure. The overall water and sewer plant numbers are expected to grow by no more than one or two in the next twenty years. Breathitt, Knott, Leslie, Letcher, Perry and Wolfe counties are expected to add miles of waterline over the next twenty years. Some line extension are planned in Owsley and Lee however better than 90% of the total households in each are currently served and both are reaching the maximum numbers of economically feasible customers. All are expected to add miles of sewer line. Gas wells and gas transmission lines are expected to continue to multiply overall in the next twenty years. However, because of Homeland security issues most of the information will be unavailable. Because of the overall decrease in population the miles of electrical line service are expected to remain almost constant during the same period[34].

Summary

Major development areas within the region have remained for the most part in close proximity to the area's cities. The area in and around the City of Jackson and along Kentucky Highway 15 in Breathitt County; sections of development are ongoing in and around the City of Beattyville in Lee County include the Crystal Creek sub-division and businesses along Kentucky Highway 11 and 52; sections of development around Kentucky 80 and US 421 in and adjacent to Hyden in Leslie County; development in Letcher County includes areas of Jenkins around US 23 and the downtown area, Whitesburg on Kentucky 15 and US 119, with little to no development in Fleming-Neon; Owsley County development continues to be in and around Booneville along Kentucky Highways 11 and 30; within Perry County the main development has been in and around the City of Hazard including the Morton Boulevard adjacent to the Appalachian Regional Healthcare facility, along Kentucky Highway 80 and 15, and the Hal Roger's Parkway; Wolfe County continues to grow around the City of Campton on Kentucky Highway 15, and the Mountain Parkway. Overall housing development continues to be light in the region and mainly occurs around the cities. Small

[34] Source for the Above Narrative: Comprehensive Economic Development Strategy and local input

areas of other housing development continue around the region in rural areas. Housing needs overall are expected to decline over the next few years as the KRADD area is expected to continue to lose population, exceptions being Lee County/Beattyville; Wolfe County/Campton, and Breathitt County/Jackson. The reduction in housing needs has not been in direct proportion to the population loss primarily due to fewer persons per household and more first-time homebuyers in the region. There are only two known significant infrastructure projects planned in the near future, a regional water treatment plant at Carr Fork Lake approximately a $20 million total project, and a new power generation plant in Knott County.

4.6: 44CFR §201.6(c)(2)(iii) Multi-Jurisdictional Risk Assessment:

The following tables summarize the estimates of assets and persons at risk within the entire Kentucky River Region. They are a summary of where the risks vary one to another for the entire planning area. The tables summarize the hazards and the jurisdictions they affect, the potential dollar losses from hazards for structures in each county, as well as the potential dollar losses from the hazards for critical facilities in each county.

The following charts summarize the hazard risk for each jurisdiction and the hazards that affect each jurisdiction.

Multi-Jurisdictional Hazard Risk Summary **Hazard by Jurisdiction**							
Jurisdiction	**Flood**	**Landslide**	**Tornados**	**Severe Thunderstorm**	**Severe Winter Storms**	**Wildfires**	**Drought**
BREATHITT COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Jackson	Yes	Yes	Yes	Yes	Yes	Yes	Yes
KNOTT COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Hindman	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Pippa Passes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LEE COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Beattyville	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LESLIE COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Hyden	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LETCHER COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Fleming-Neon	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of City of Jenkins	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of City of Whitesburg	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OWSLEY COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Booneville	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PERRY COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Buckhorn	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Hazard	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Vicco	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WOLFE COUNTY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Campton	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Note: Although the City of Pippa Passes in Knott County is not identified by FEMA as being in a flood impacted area, the City has sustained damage to some extent from flash flooding and storm drain overflow (Area 10 DEM officer, local input).

CHAPTER 5

44CFR §201.6(c)(3) Mitigation Strategy

Summary

The mitigation strategy of this plan was developed through a process utilizing public input, local knowledge, and local officials; through public hearings, plan participation input, Regional Mitigation Planning Committee input, and the Kentucky River ADD Board of Directors' input. The RMPC, general public, and the KRADD Board of Directors reviewed the Hazard profiles, and vulnerability assessments. These groups made a determination as to the relevance of each identified hazard. Those identified will be included in the strategy.

The plan includes a mitigation strategy that provides the planning area's blueprint for reducing the potential losses identified in the risk assessment. This strategy is based on existing authorities, policies, programs and resources and the ability of the planning area's jurisdictions to expand on and improve these existing tools. The RMPC, subcommittees and KRADD staff have identified which authorities, polices, programs, and resources are relevant to this section of the plan and how they impact the implementation of the mitigation strategy. **This section includes:**

5.1: 44CFR §201.6(c)(3) Capability Assessment

The capacity to carry out the intent and actions included in this plan resides within the region on several levels. The first line of authority is contained in the local jurisdictional governing bodies. There are eight county governments seven of which are Judge/Executive and magistrate forms and one commission from of government; there are thirteen cities, six of which are Mayor/ Council forms and seven Mayor/ Commission forms of government. The power to adopt ordinances and resolutions impacting this plan lies with these units of local government. The RMPC meets at least annually to assess the overall needs of the region as a whole and to make recommendations to the Kentucky River ADD Board of Directors, which consists of all the area Judges and Mayors as well as local citizen members. The local jurisdictions' governing bodies have the capacity to carry out the actions within this plan through the use of existing ordinances, resolutions, administrative codes, as well as policies and procedures. The majority of the work associated with the carrying out of this plan will lie with existing staff and officials at the local level of government. Each jurisdiction will make their own staff assignments and develop internal policies and procedures in order to provide the proper oversight and implementation of this plan.

The following two charts represent the jurisdictions' capabilities regarding their existing ordinances/codes (law); existing internal programs; and existing resources to carry out the intent of the laws and programs. The second chart reflects the departments of each jurisdiction that may have specific duties in the implementation, maintenance, monitoring of activities, evaluation of effectiveness, and ongoing public involvement.

KY River Jurisdictional Capability Assessment

	Existing Authorities									Programs		Resources	
JURISDICTION	FLOOD PLAIN ORDINANCE	CRS AND FMA PLANS	ZONING ORDINANCES	SUBDIVISION ORDINANCES	LAND DEVELOPMENT PLANS	FIRE PREVENTION CODE	COMPREHENSIVE EMERGENCY PLANS	CAPITAL IMPROVEMENT	STORMWATER MANAGEMENT	CERT	NWS STORM READY PROGRAM	LOCAL ECONOMIC DEVELOPMENT	REGIONAL DEVELOPMENT AGENCY
Breathitt County	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Jackson	YES	NO	NO	NO	NO	YES	YES	NO	NO	YES	NO	NO	YES
Knott County	YES	NO	N0	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Hindman	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES
City of Pippa Passes	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES
Lee County	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Beattyville	YES	NO	NO	NO	NO	YES	YES	NO	NO	YES	NO	NO	YES
Leslie County	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Hyden	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES
Letcher County	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Fleming-Neon	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES
City of Jenkins	YES	NO	NO	NO	NO	YES	YES	NO	NO	YES	NO	NO	YES
City of Whitesburg	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
Owsley County	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Booneville	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
Perry County	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Buckhorn	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES
City of Hazard	YES	NO	YES	NO	NO	YES	YES	NO	NO	YES	NO	YES	YES
City of Vicco	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES
Wolfe County	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
City of Campton	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES

KY River Jurisdictional Capability Assessment

Existing Professional Departments													
JURISDICTION	BOARDS OF EDUCATION	BUILDING INSPECTOR	COUNTY COURT CLERK	EMERGENCY MANAGEMENT	TREASURERS	ELECTRED JURISDICTIONAL HEAD - MAYOR JUDGE	HEALTH DEPARTMENT	ROAD DEAPRTMENT	SHERRIF'S OFFICE/POLICE DEPARTMENT	PROPERTY VALUE ASSESSMENT PVA	SOCIAL SERVCIES	UTILITY DEPARTMENT	SOLID WASTE COORDINATOR
Breathitt County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
City of Jackson	YES	YES		YES	YES	YES		YES	YES			YES	YES
Knott County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
City of Hindman	NO	NO		NO	YES	YES		YES	YES			YES	YES
City of Pippa Passes	NO	NO		NO	YES	YES		NO	YES			NO	YES
Lee County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES
City of Beattyville	NO	YES		YES	YES	YES		YES	YES			YES	YES
Leslie County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
City of Hyden	NO	NO		NO	YES	YES		YES	YES			YES	YES
Letcher County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
City of Fleming-Neon	NO	NO		NO	YES	YES		YES	YES			YES	YES
City of Jenkins	YES	YES		YES	YES	YES		YES	YES			YES	YES
City of Whitesburg	NO	NO		NO	YES	YES		YES	YES			YES	YES
Owsley County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES
City of Booneville	NO	NO		YES	YES	YES		NO	YES			YES	YES
Perry County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES
City of Buckhorn	NO	NO		NO	YES	YES		NO	YES			YES	YES
City of Hazard	YES	YES		YES	YES	YES		YES	YES			YES	YES
City of Vicco	NO	NO		NO	YES	YES		NO	YES			YES	YES
Wolfe County	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES
City of Campton	NO	NO		YES	YES	YES		NO	YES			YES	YES

The summary of duties and responsibilities associated with each of the above departments; authorities and programs are specifically spelled out in the administrative codes; personnel policies; KRS (KY Revised Statutes); and local policies and procedures as they pertain to the specific type of local jurisdiction. The overall utilization of this plan will depend in great part on the participation of the departments and personnel of the individual jurisdictions; regional agencies; and local officials. The following is a summary of the basic functions of each of the above listed entities:

- **Boards of Education:** Are responsible for the oversight and management of the individual school districts for which they are elected to represent. County resources in the forms of local taxes/ bond issues are utilized for most capital improvements, while the state is normally responsible for salaries, textbooks, and supplies.
- **Building Inspectors:** enforce the local ordinances, collect permit fees, and oversee the building codes compliance, National Flood Insurance compliance, and other local ordinances and code as they apply to the built environment.
- **PVA; County Clerks; and Sheriffs' Departments:** are all elected positions with very specific duties and responsibilities defined by KRS, and include property valuations by the PVA office; County Clerk is the custodian of Fiscal Court Records and county real and tangible property records and is funded through fees and state funds; Sheriff's Departments are primarily responsible for law enforcement and real property tax collection for the county government and various sub-divisions of county government that operate on local tax revenues.
- **Emergency Management:** is responsible for preparedness and response to natural and made cause disasters, as well as coordinating and providing assistance for mitigation of disasters. Each county emergency management office is mandated by KY Revised Statutes.
- **Treasurers:** are the fiscal officers responsible for the management and oversight of each jurisdiction's funds (revenues and expenses).
- **Elected Jurisdictional Heads:** are the County Judge Executives and City Mayors, who have the responsibilities of the day to day running of the local units of government and all aspects of that responsibility.
- **Health Departments:** are governed by local Boards and provide a wide variety of Health Services to the county residents and jurisdictions within each county.
- **Road Departments:** are responsible for the general maintenance and repairs as well as capital improvements projects to roadways within their jurisdictional boundaries.
- **City Police Departments:** are responsible for law enforcement within their specific jurisdictional boundaries.
- **Road Departments:** are responsible for the general maintenance and repairs as well as capital improvements projects to roadways within their jurisdictional boundaries.
- **Social Services offices:** consist of both the unemployment offices and the Kentucky Cabinet for Human Services offices and provide registration for unemployment benefits and job search assistance and wellness, and child protective services to families.
- **Local Utilities:** are responsible for providing potable drinking water; wastewater collection and treatment; gas distribution; to the general public within their service areas.
- **Solid Waste Coordinators:** are appointed positions within each local jurisdiction that provide oversight to solid waste collection and illegal dump monitoring and cleanup efforts.

The above listed departments will be utilized throughout the process of implementing the activities outlined in this plan in order to streamline the process of reducing costs of recovery from the identified hazards located herein. Each individual jurisdiction will assign duties to the appropriate department in order to facilitate and economically carry out the intent of this plan. Many of the local jurisdiction within the eight counties are very small and have only 3 to 5 staff, in these instances the small jurisdictions rely heavily on the County Governments to carry out many of the necessary functions, including emergency response and preparedness as well as partnering with their associated counties in order to carry out larger construction projects which they would not have the resources to complete on their own. All eight counties and thirteen cities are listed as distressed by the Appalachian Regional Commission (ARC), and do not have available local funds for any large construction projects.

Because of the overall lack of personnel at the local jurisdictions and because of the lack of available funds, the KY River ADD has become the primary technical assistance agency, providing planning; budget preparation assistance; code development; resolution and ordinance development; and policies/procedures development assistance to most of the smaller jurisdictions. The ADD also provides project funding development packages, grant writing services, grant administration services, as well as financial management assistance when asked.

SUMMARY: Integration into Other Planning Mechanisms

The resources outlined in this section will be utilized to the fullest in order to fully implement the intent and carry out the mitigation activities as identified in this plan. Because of the recognized limited financial as well as personnel resources for the participating jurisdictions, all items that can be implemented on a regional basis will be developed regionally where feasible and economical to do so. Eight of thirteen cities have populations of less than 1,000 persons each. These small jurisdictions also have on average 3 to 5 employees total counting in many instances the city police departments. This very much limits their abilities to carry out any added duties or responsibilities given the existing staff levels. Their individual budgets for the most part will not support the hiring of additional personnel.

All jurisdictions have participated in some manner throughout the planning process either by committee or through KRADD staff meeting directly with the local government personnel.

Relevant to the integration of this mitigation strategy into other planning mechanisms, Kentucky River Area Development District performs most planning activity for its counties. It supplies virtually all risk assessment and GIS mapping for any plans at the county and city level and writes and/or coordinates regional plans such as comprehensive plans and economic development plans. This centralization of plan development has the advantage that mitigation actions found here will be or have already been incorporated into other plans coordinated by or written by Kentucky River ADD. Conversely, other plans' actions inform this plan's mitigation strategy.

5.2: 44CFR §201.6(c)(3)(i): Local Hazard Mitigation Goals:

The RMPC and subcommittees, and KRADD staff have developed a list of potential goals and objectives. These goals are regional and local. In development of these goals and objectives the best available data was utilized. These goals and objectives were developed using samples from North Carolina, the KY State Plan, and from the Buffalo Trace ADD regional plan. Then the sub-committees and RMPC, and local representatives added their own inputs and revised the list accordingly.

Goal 1 **Maintain and enhance the Kentucky River Area's local jurisdiction's Emergency Management Team's capacity to continuously make the region less vulnerable to hazards.**

Objective 1.1 Institutionalize hazard mitigation.
Objective 1.2 Improve organizational efficiency.
Objective 1.3 Maximize utilization of best technology.

Goal 2 **Build and support local capacity and commitment to become continuously less vulnerable to hazards**.

Objective 2.1 Increase awareness and knowledge of hazard mitigation principles and practice among local public officials.
Objective 2.2 Provide direct technical assistance to local public officials and help communities obtain funding for mitigation planning and project activities.
Objective 2.3 Encourage each jurisdiction to implement their actions identified in the regional hazard mitigation plan.

Goal 3 **Improve coordination and communication with other relevant organizations.**

Objective 3.1 Establish and maintain lasting partnerships.
Objective 3.2 Streamline policies to eliminate conflicts and duplication of effort.
*Objective 3.*3 Incorporate hazard mitigation into activities of other organizations.

Goal 4 **Increase public understanding, support, and demand for hazard mitigation.**

Objective 4.1 Identify hazard-specific issues and needs.
Objective 4.2 Heighten public awareness of natural hazards.
Objective 4.3 Publicize and encourage the adoption of appropriate hazard mitigation actions.

Goal 5 **Reduce over time the high cost of recovery from hazards where economically feasible**

Objective 5.1 Develop a timeframe for implementation of identified mitigation action items
*Objective 5.*2 Develop estimates of costs for implementing identified action items
Objective 5.3 Pursue potential sources of funds to fund identified action items
Objective 5.4 Develop regional partnerships to enhance the local jurisdictions' abilities to implement the identified actions

Public meetings were held to solicit input for any changes, additions or deletions to the goals and objectives. The plan participants, RMPC, and KRADD Board of Directors meetings are all open public meetings. A time was allowed at each for public input and comment. All participating members and citizens agreed that these approved goals and objectives are still relevant and viable for the purposes being undertaken by the RMPC and KRADD regional leadership. These goals and objectives were reviewed by the RMPC and presented to the KRADD Board of Directors for re-approval.

Summary

Goals one through four, including their respective objectives, are regional in nature and will involve the coordination of the RMPC with units of local government over the next several years. These four goals are aimed at maximizing the local resources by implementation regionally where feasible, spreading the costs of each over the entire region to minimize impacts to all units of local government. All of these goals and objectives were designed with addressing the regionally impacting hazards utilizing local and regional resources as well as any available state and federal resources in order to accomplish results in as timely and efficient manner as possible.

Goal five addresses the individual jurisdiction's desires to have a direct impact upon reduction of the reoccurring high costs associated with each type of hazard recovery as well as to strengthen the units of local government's abilities to provide mechanisms to reduce and eliminate as much human suffering and loss as possible. The individual local government's action items as discussed in the following sections addresses the objectives of goal five. The overall cost benefit review utilizes past disaster data on reoccurring damage areas where feasible and incorporates local estimates of each mitigation activity in order to determine an estimate of the benefits of mitigating these problems. The actions items under this goal were developed by the units of local government officials to directly reduce the costs associated with disaster recovery. Identified funding sources for these action items may include but not be limited to FEMA; USDA Rural Development; Economic Development Administration (EDA), Appalachian Regional Commission (ARC); State Funds, and Local Funds.

5.3: 44CFR §201.6(c)(3)(ii) Identification and Analysis of Mitigation Measures:

Surrounding successful projects were reviewed (i.e. floodwall in Pineville, KY). As of 2002, the US Army Corps of Engineers Nashville District's flood control projects have prevented more than $1.75 billion in flood damages. During February 2003, projects in the Upper Cumberland Basin prevented more than $25 million in damages when more than 8 inches of rain fell); the Cy Bend cut through in Breathitt County (during the most recent flood event the high elevation for floodwaters in Jackson was reduced by approximately 3 feet in comparison to past events of similar magnitude). The reduced impacts of flooding from both of these among others were studied and incorporated where feasible. The US Army Corps of Engineers was utilized to present on the long-term impacts of the Carr Creek Reservoir and the Buckhorn Reservoir as flood abatement projects. No new mitigation measures in the surrounding region were identified during this update.

Mitigation measures will be categorized in the following six groups:

1. Prevention through the potential use of government regulatory actions such as zoning and planning for land use development.
2. Protect Life and Property—Make property more resistant to natural hazards, promote insurance coverage, and improve hazard assessment to discourage development in hazard prone areas, possibly through acquisition and relocation, structural retrofits, and shatter resistant glass.
3. Promote Public Awareness—risk education, information on mitigation tools and partnerships, outreach efforts to local citizens, hazard information centers etc.
4. Incorporate Mitigation into the Management of Natural Systems—Watershed plan, forest management, natural functions that serve mitigation purposes.
5. Emergency services such as early warning systems, emergency response services, and protection of critical facilities.
6. Structural projects--directly protect people and property, involve construction of man-made structures to control hazards—reservoirs, levees, floodwalls and seawalls, diversions, channel modifications, storm sewers bridge & culvert replacements, etc.

Specific regional mitigation actions include:

- Replacing inadequate culverts with larger ones or with bridges where size has been identified as leading to potential flood or road damage.
- Purchase of flood prone properties where feasible and economical
- The incorporation of standards leading to reduction of hazard damages into building codes, and focus and ensuring the enforcement of local flood-plain management regulations.
- Promoting Inter-governmental, Intra-governmental, Private Nonprofit (PNP), businesses, academic and private participation and cooperation in mitigation actions.
- Promoting commercial and industrial development outside of hazard areas to limit business interruption.
- Promoting private acquisition by conservation organizations or units of local government of flood prone areas for community parks and recreational areas/green space.
- Incorporating Mitigation Plan goals and action items into existing regulations, orders, policies and procedures.

5.4: 44CFR §201.6(c)(3)(iii) Implementation of Mitigation Measures:

Summary

The following information outlines the action plan to implement the actions identified in Section 3.4.2 how they are prioritized, and the plan to implement and administer them by the local jurisdictions and, when appropriate, throughout the planning area. The implementation timeline carries the actions items over the next five years at which time the evaluations shall be reviewed and the implementation strategy shall be updated accordingly. The funding sources (including non-FEMA funding sources such as funds from other federal, state and local agencies funds) and other identified resources that will be used to implement the strategy, when possible; and the agency or personnel responsible for carrying out these actions are included where feasible in the following information data sets.

The implementation process provides for effective local sponsorship of the identified project(s) including the use of local resources where feasible and economical. The long-term monitoring will be carried out within each local jurisdiction for identified implementation measures for the locale. The Counties and Cities will work together with local citizens' groups in order to shape the implementation process into the long-term community development schedules. At all phases of implementation opportunities will be provided for public input and involvement through open public meetings. Public input into the implementation process will be incorporated during the planning process as well as during the actual implementation. The implementation will include public service announcements as well as news coverage of a community's ongoing or completed project(s). Multi-partnerships will be developed during this process and include units of local government, area citizens, departments of state and federal government. These partnerships will carry forward throughout the process and it is believed that they will facilitate the reduction of losses due to the identified hazards.

A. Prioritization:

Each participating jurisdiction provided a list of action items that they would work toward implementing in order to reduce the long term economic and/or social losses, displacement, or disruption of services from the identified natural hazards. Items were prioritized using the overall relevance to the identified goals and objectives outlined in Section 5.2. These action items were first discussed in the county plan meetings, then the RMPC meetings, and finally submitted to the KRADD Board of Directors. Priorities were developed using the following: 1. level of need (severity of the problem); 2. benefit(s) from completion of the project (benefit(s) (savings) out-way the cost of the project over the life of the asset); 3. ease of implementation; 4. and availability of resources to complete the project.

It should be noted that the straightforward, stakeholder demand-focused prioritization mechanism above has not changed from Kentucky River ADD's 2011 multi-hazard mitigation plan: Communities are small and lacking in resources. The region necessarily has not been overly active in formal, federal mitigation action implementation. Consequently, action items (i.e., mitigation needs and demands) have not changed mightily from 2011 and the 2011's priorities remain priorities for this update.

B. Implementation Strategy:

Individual action items shall be implemented and placed into practice by appropriate personnel within the governing bodies of each local jurisdiction. According to the type of action item the following shall be utilized overall, with some differences according to local jurisdictional authority, personnel to carry out the items, and availability of resources to implement the action item. All action items identified, as being regulatory either by resolution, order, or ordinance, will be in-acted by appropriate local legislation duly voted on by the jurisdiction(s)' governing body. Proposed construction, prevention, protection, education, emergency response, and early warning systems will be carried out by the appropriate department(s) of local units of government as well as regional emergency personnel. Some examples of the administration and oversight of implementation are as follows: 1.) roadway mitigation construction projects would be overseen by county/city road management procedures and personnel responsible; 2.) ordinance enforcement would be the responsibility of county sheriff's departments and city police departments and corresponding legal departments; 3.) policies and procedures oversight would be delegated to various local jurisdictional personnel depending on the department's individual capacity to carry out the intent of the policy; 4.) emergency services will be the responsibility of the local emergency personnel in coordination with regional emergency personnel; 5.) Promotion of public awareness/education strategies will be carried out by partnerships between units of local government and the KY River ADD; 6.) buy-out and relocation of structures in the floodplain shall be carried out by the legal department(s) and governing bodies of each jurisdiction where appropriate and feasible.

Existing resources will be utilized where feasible and will be used to address, ordinances, resolutions, policies & procedures. Education and public awareness shall be conducted using local resources where available, federal and state when available and private funds if accessible.

The resolutions, ordinances and policies & procedures will be implemented during the first six to eighteen months after plan adoption. Construction projects and buy-outs/relocations shall be completed on as timely a basis as possible given the availability of the necessary funds to fully complete the identified project. The evaluations will be reviewed during the five-year update

process and action items not addressed during the initial five-year period will be re-examined for appropriate inclusion in the update plan.

C. Cost-benefit procedures

The following general cost benefit review criteria were utilized to determine the overall benefit of each action item. 1.) In general, the adoptions of ordinances, resolutions, and orders have a very low initial cost but for some smaller jurisdictions the practicality of implementation may in some cases be cost prohibitive. Each jurisdiction will weigh this cost internally and either provide mechanisms for the implementation through procedures and existing personnel or may piggyback on such actions of the county in which they are located. 2.) Public awareness and education will be addressed regional where feasible and practical to do so; partnerships will be developed between jurisdictions and the Kentucky River ADD. It is estimated that over time this action item has the potential to have one of the greatest cost benefit ratios of all potential action items. 3.) Emergency services activities will be reviewed on a case by case basis and a mutually derived analysis shall be developed between units of local government and the regional Disaster & Emergency personnel. 4.) Construction and buy-out relocation projects are being looked at on the overall costs of the mitigation action item to determine if within the useful life of the asset being address (assigned 20 years for the purpose of this plan) and the savings from the mitigation action out-weigh the costs of the sum of the annualized hazard recoveries.

5.5: 44CFR §201.6(c)(3)(iv) Multi-Jurisdictional Mitigation Strategy:

Summary

There are twenty-one jurisdictions in the planning area. Eight of those jurisdictions have populations of less than 1,000. Though they have all participated in the planning process, because of their size, some of the smaller jurisdictions may not have specific mitigation action items that vary from those of the region or county or other adjacent jurisdictions. When this situation is identified the action items for these jurisdictions are the same action items for the broader planning area.

Each plan meeting developed the action items for their respective jurisdictions requesting FEMA approval or credit for the plan. The overall regional action items were identified at the county plan level, then submitted to the RMPC for review and recommendation to the KRADD Board of Directors. The regional action items are those that are either identical across all jurisdictions or are broad in nature and may be applied to the region as a whole.

Each participating jurisdiction submitted their individual jurisdictional action items prioritized to the sub-committees first then to the Regional Mitigation Planning Committee for review and recommendation to the KRADD Board of Directors. In most instances the action items reflect reoccurring damage areas as identified below, but also includes items of areas that get damage on a more frequent basis than reflected in past disasters. Local officials having specific knowledge of their jurisdictional needs incorporated these items were appropriate.

The following tables represent the Mitigation action items as identified for the purpose and intent of this regional Mitigation Plan.

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events Overall for Eight County Region			
Action Items in priority ranking Highest to lowest	Timeline for Implementation/Status	Responsible Entities/Parties	Funding Potentials
1. Eliminate Severe Repetitive Loss Structures	Eliminate individually as funds are available	Breathitt County Fiscal Court/City of Jackson/RMPC	FEMA/HMPG/ PDM/CDBG
2. Formalizing Hazard Mitigation Planning Committee	Complete	KY River ADD and RMPC	Local
3. Promoting partnerships between government, private nonprofits, business, and educational entities	Quarterly each year	KY River ADD and all units of Local Government	Local
4. Promotion of development outside of identified hazard areas	Through Floodplain Ordinances	Units of Local Government	Local/FEMA/ PDM
5 Incorporate mitigation goals and objectives into existing regulations, orders and policies	Complete	Units of Local Government	Local
6. Replacing undersized culverts, and bridges where feasible	Addressed in sections as funds become available	Units of Local Government & Road Departments	FEMA Disaster Recovery/HMPG PDM
7. Purchase of flood-prone properties where feasible and economical	As funding is obtained	Units of Local Government	FEMA/HUD/ Local
8. Promoting private acquisitions by conservation groups of flood prone areas	Quarterly as priority areas are selected and addressed	Units of Local Government	Local
9. Development of floodplain management policies and procedures	As governments re-evaluate their administrative codes	Units of Local Government	Local

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Overall for Eight County Region			
Action Items in priority ranking Highest to lowest	Timeline for Implementation/Status	Responsible Entities/Parties	Funding Potentials
1. Formalizing Hazard Mitigation Planning Committee	Complete	KY River ADD and RMPC	Local
2. Promoting partnerships between government, private nonprofits, business, and educational entities	Quarterly each year	KY River ADD and all units of Local Government	Local
3. Promotion of development of structures designed to better withstand the identified hazards	As building codes are updated and adopted locally	Units of Local Government	Local
4. Incorporate mitigation goals and objectives into existing regulations, orders and policies	Monthly	Units of Local Government	Local/FEMA/ PDM
5. Incorporate better early warning systems were feasible	Not yet Addressed --Will be implemented as funds are available	Units of Local Government & Road Departments	Local
6. Develop better communications between agencies	In various training sessions throughout the year	Units of Local Government	FEMA Disaster Recovery/HMPG PDM
7. Promoting partnerships with neighboring communities	Monthly	Units of Local Government	FEMA/ Local
8. Development of coordination procedures between intra-governmental departments	Monthly	Units of Local Government	Local

Kentucky River Area Development District
Mitigation Action Items Prioritization
Flooding Events --- Breathitt County

Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Mitigate severe repetitive loss structures as identified by FEMA	When Funding becomes available	Breathitt County Fiscal Court/City of Jackson	FEMA/HMPG/ PDM/HUD-CDBG
1.a) Develop long term SRLP Action Plan	Within 12 months	Breathitt County Fiscal Court	FEMA/Local
2. Replace inadequate culverts and bridges at various locations in county	Construction in phases as funds become available	Breathitt County Fiscal Court/Road Department	FEMA/HMPG/ PDM
3. Continue to put into place policies and procedures to assist with floodplain ordinance enforcement	quarterly	Breathitt County Fiscal Sheriff's Department	Local
4. Address inadequate road elevations at Morris Fk Rd and at Freeman Fk	Thirty six to forty eight months after plan adoption	Breathitt County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road Funds
City of Jackson			
1. Mitigate severe repetitive loss structure as identified by FEMA	As soon as funds are available	Jackson City Council, Breathitt County Fiscal Court	HUD/FEMA HMPG/PDM
1.a) Develop long term SRLP Action Plan	Within 12 months	City of Jackson Council	FEMA/Local
2. Relocate 10—12 Mobile homes prone to repetitive flooding	As soon as funds are made available	Jackson City Council/City Attorney	FEMA/HUD/ Local
2. Replace inadequate culverts and bridges at Bridge Hollow/Road Elevations on Armory Drive	Complete	Jackson Mayor's Office & Road Department	FEMA/Road funds
3. Address Structures in the flood plain where feasible	Monthly/Quarterly as funds are available	Jackson Mayor's Office	FEMA/HMPG/ PDM/HUD-CDBG

Breathitt County has completed the slide repairs at South Copeland and Jesse's Branch. They have begun to address some of the inadequate culvert replacements but still have many that need to be addressed. The policies and procedures have been adopted but more work needs to be done in order to develop the internal mechanisms to be able to fully carry out the intent of the ordinance. The inadequate road elevations have not been addressed at this time.

The City of Jackson has completed the culvert/bridge replacements and developed polices to assist in the carrying out of the flood plain ordinance.

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Knott County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Repair slide areas - Puncheon rd, Horseshoe Bend, Eagles Nest, Lick Br, Clear fork	Complete	Knott County Fiscal Court/Road Department	FEMA/HMPG/ PDM/HUD-CDBG
2. Replace inadequate culverts and bridges across county	Construction in phases as funds become available	Knott County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Judge/Executive's Office	Local
4. Address inadequate channel width & Depth by dredging at Reynolds Fk/Pine Creek	Partially address need additional funds to complete	Knott County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road Funds
City of Hindman			
1. Assist homeowners in six locations with elevating homes and flood proofing measures	As soon as funds are available	Hindman City Council, Hindman Legal Department	HUD/FEMA HMPG/PDM
2. Replace inadequate culverts and bridges at various locations	Construction in phases as funds become available	Hindman Mayor's Office & Road Department	FEMA/HUD/ Local
3. Development of educational material for information on hazards of constructing in the floodplain	Complete	Hindman Mayor's Office	FEMA/Road funds
City of Pippa Passes			
1. Replace inadequate culverts and storm drains at various locations in the city	Construction in phases as funds become available	Pippa Passes Mayor's Office	FEMA/HMPG/ PDM/Road funds
2. Public Education	Complete	Pippa Passes Mayor's Office	Local
3. Address Sewer system flood water infiltration	As soon as funds are available	Knott County Water/Sewer District	USDA/KIA/Corps of Engineers

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Lee County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Address road elevations at Todds Rd, Big Sinking Ck, Willow Ck, Cave Rock, Blains Branch, Big Branch, & Fox Hollow	Construction in phases as funds become available	Lee County Fiscal Court/Road Department	FEMA/HMPG/ PDM/HUD-CDBG
2. Replace inadequate culverts and bridges Fox Hollow, Silver Creek, Gibson Fork, Branson Hollow, Nick Spencer Rd, Willow Creek, JR. Fox RD, Pickering etc	Completed phase I replaced 22 structures; need to address several wooden bridge and replace with concrete	Lee County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Judge/Executive's Office	Local
City of Beattyville			
1. Address structures in the Floodplain – replace with green space	As soon as funds are available	Beattyville City Council/City Attorney	FEMA/HMPG/ PDM/HUD-CDBG
1(a). Relocation of City Hall/City Park Structures away from flood prone area	Complete	Beattyville City Council	HUD/FEMA HMPG/PDM
2. Replace inadequate culverts and bridges at various locations	Construction in phases as funds become available	Beattyville Mayor's Office & Road Department	FEMA/ Local\Road Funds
3. Development of educational material for information on hazards of constructing in the floodplain	Complete	Beattyville Mayor's Office	Local/FEMA
4. Development of Policies and procedures for floodplain development ordinance	Complete	Beattyville Mayor's Office	Local

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Leslie County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Flood Control Project Junction of Copperhead RD & KY 257	Construct as soon as funds are available	Leslie County Fiscal Court/Road Department, Natural Resources Conservation District	FEMA/HMPG/ PDM/HUD-CDBG/EDA
2. Replace inadequate culverts and bridges at various locations in county	Completed projects at Big Fork many other areas as funds are available	Leslie County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Judge/Executive's Office	Local
4. Address flood impacted families (Buckhorn Lake back waters blocking KY 257 stranding residents)	As soon as funds are available	Judge/Executive's Office	FEMA/HMPG/ PDM/HUD-CDBG
5. Road Elevations on Lane Branch, Big Lewis Lane, and Cutshin Rd Smilax	When funds are available	Leslie County Fiscal Court/Road Department	FEMA/HMPG/ PDM/HUD-CDBG/Road Funds
City of Hyden			
1.Relocate Rockhouse creek to its original channel	As soon as funds are available	Hyden City Council	FEMA/ Local\Road Funds
1(a). Install baskets and stone on creek bank at City Park	Completed	Hyden City Council	FEMA/Dept. of Interior
2. Dredge Rockhouse Creek between Hwy 118 and Middlefork	Completed	Hyden Mayor's Office & Road Department	FEMA/HMPG/ PDM/HUD-CDBG/Road Funds
3. Repair Storm Drains on Main Street at Hyden Baptist Church	Under Construction at this time	Hyden Mayor's Office & Road Department	FEMA/ Local\Road Funds
4. Development of educational material for information on hazards of constructing in the floodplain	Monthly/Quarterly	Hyden Mayor's Office	Local
5. Development of Policies and procedures for floodplain development ordinance	Complete	Hyden Mayor's Office	Local

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Letcher County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Mitigate various road breaks/slides	Monthly/Quarterly as funds are available	Letcher County Fiscal Court/Road Department	FEMA/HMPG/ PDM/
2. Replace inadequate culverts and bridges at various locations in county	Phase I complete other phases as funds become available	Letcher County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Judge/Executive's Office	Local
City of Fleming- Neon			
1. Relocate City Hall out of Flood prone area	As soon as funds are available	Fleming-Neon City Council	FEMA/ EDA/Road funds/State
2. Replace inadequate culverts and bridges at various locations	Monthly/Quarterly as funds are available	Fleming-Neon Mayor & Road Department	FEMA/Road Funds
City of Jenkins			
1. Extend bridge width at Pine Lane in Dunham;	As soon as funds are available	Jenkins City Council	FEMA/ Local\Road Funds
2. Extend bridge widths at Freedom Lane & Woodland Trail	As soon as funds are available	Jenkins City Council	FEMA/ Local\Road Funds
3. Dredge Elkhorn Lake	As soon as funds are available	Mayor's Office	EDA/USDA/ State/Local
City of Whitesburg			
1. Dredge river at water intake	As soon as funds are available	Mayor's Office	EDA/USDA/ State/Local
2. Inadequate culvert at Caudill town road	As soon as funds are available	Mayor's Office, Road Dept	FEMA/Road Funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Mayor's Office	Local

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Owsley County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Replace 2 Low Water Bridges on Laurel fork with regular bridges	Construction as funds become available	Owsley County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road Funds
2. Repair Slide at Left Fork of Cow Creek	Construction as funds become available	Owsley County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	First Twelve Months	Judge/Executive's Office	Local
City of Booneville			
1. Development of educational material for information on hazards of constructing in the floodplain/ address roadway flooding	First Twelve Months	Booneville Mayor's Office	Local/FEMA
2. Development of Policies and procedures for floodplain development ordinance	First Twelve Months	Booneville Mayor's Office	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Perry County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Mitigate various road breaks/slides across county	Completing in phases as funds become available	Perry County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road Funds
2. Replace inadequate culverts and bridges at various locations in county	Construction in phases as funds become available	Perry County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	First Twelve Months	Judge/Executive's Office	Local
City of Buckhorn			
1. Replace inadequate culverts and storm drains	Construction in phases as funds become available	Buckhorn Mayor's Office	FEMA/HMPG/ PDM/Local/ Road Funds
2. Provide public education	Complete	Buckhorn Mayor's Office	Local

City of Hazard			
1. Relocate City parking area out of the flood prone area	Completing in phases as funding becomes available	Hazard City Council	FEMA/Road Funds
2. Replace inadequate culverts and storm drains at various locations in the City	Construction in phases as funds become available	Hazard City Manager & Road Department	FEMA/HMPG/ PDM/Local/ Road Funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Mayor's Office	Local
City of Vicco			
1. Relocate Sewer Treatment Facilities out of the flood plain	As soon as funds are available	Vicco City Council	EDA/USDA/ State/Local
2. Replace inadequate culverts and storm drains at various locations in the City	Construction in phases as funds become available	Vicco Mayor and City Personnel	FEMA/HMPG/ PDM/Local/ Road Funds
2. Develop Policies and procedures for floodplain development ordinance	Complete	Mayor's Office	Local

Kentucky River Area Development District Mitigation Action Items Prioritization Flooding Events --- Wolfe County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Replace inadequate bridges as per Attachment C	Construction in phases as funds become available	Wolfe County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road Funds
2.Raise Athe Br Road; & Gal Br. Road; Roadway flooding at Lee City	Construction in phases as funds become available	Wolfe County Fiscal Court/Road Department	FEMA/HMPG/ PDM/Road funds
3. Develop Policies and procedures for floodplain development ordinance	Complete	Judge/Executive's Office	Local
City of Campton			
1. Replace undersized storm drain near Shopwise and Clinic	Construction upon availability of funds	Office of the Mayor	FEMA/HMPG/ PDM/Road Funds
2. Replace various undersized culverts on plumbers street/Quillen Chappell Rd	Completing in phases as funding becomes available	Office of the Mayor	FEMA/HMPG/ PDM/Road Funds
3. Install storm drains in the downtown are of Campton	Completing in phases as funding becomes available	Office of the Mayor	FEMA/HMPG/ PDM/Road Funds
4. Early Warning Siren for Tornado/Severe Thunderstorm/Hail	Purchase upon availability of funds	Office of the Mayor	FEMA/HMPG/ PDM
5. Development of educational material for information on hazards of constructing in the floodplain	Complete	Campton Mayor's Office	Local
6. Development of Policies and procedures for floodplain development ordinance	Still working to adopt ordinance at this time	Campton Mayor's Office	Local

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Breathitt County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Early Warning sirens	Install as funds are available	Breathitt County Fiscal Court/Jackson Mayor	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Breathitt County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Breathitt County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Breathitt County Fiscal Court	Local/ FEMA
City of Jackson			
1. Communications development	Complete	City Council	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Council	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Council	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Council	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Knott County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Knott County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Knott County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Knott County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Knott County Fiscal Court	Local/ FEMA
City of Hindman & City of Pippa Passes			
1. Communications development	Complete	City Council/Commission	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Council/Commission	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Council/Commission	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Council/Commission	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Lee County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Lee County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Lee County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Lee County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Lee County Fiscal Court	Local/ FEMA
City of Beattyville			
1. Communications development	Complete	City Council	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Council	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Council	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Council	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Leslie County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Leslie County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Leslie County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Leslie County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Leslie County Fiscal Court	Local/ FEMA
City of Hyden			
1. Early Warning System	Install when funds are available	City Commission	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Commission	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Commission	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Commission	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Letcher County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Letcher County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Letcher County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Letcher County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Letcher County Fiscal Court	Local/ FEMA
City of Fleming-Neon, City of Jenkins, City of Whitesburg			
1. Communications development	Complete	City Council/Commission	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Council/Commission	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Council/Commission	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Council/Commission	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Owsley County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Owsley County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Owsley County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Owsley County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Owsley County Fiscal Court	Local/ FEMA
City of Booneville			
1. Communications development	Complete	City Commission	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Commission	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Commission	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Commission	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Perry County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Perry County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Perry County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Perry County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Perry County Fiscal Court	Local/ FEMA
City of Buckhorn, City of Hazard, City of Vicco			
1. Communications development	Complete	City Commission	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Commission	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Commission	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Commission	Local/FEMA

Kentucky River Area Development District Mitigation Action Items Prioritization Tornados, Severe Storms, Landslides, Winter Storms, & Wildfire Events Wolfe County			
Action Items in priority ranking Highest to lowest	Timeline for Implementation	Responsible Entities/Parties	Funding Potentials
1. Communications development	Complete	Wolfe County Fiscal Court	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	Wolfe County Fiscal Court	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	Wolfe County Fiscal Court	FEMA/Local
4. Public Awareness Campaign	Monthly/Quarterly	Wolfe County Fiscal Court	Local/ FEMA
City of Campton			
1. Communications development	Complete	City Commission	FEMA/HMPG/ PDM
2 Education of Citizens	Monthly/Quarterly	City Commission	FEMA/Local
3. Alternative Heating Methods training for elderly & disabled	Monthly/Quarterly as funds are available	City Commission	Local
4. Public Awareness Campaign	Monthly/Quarterly	City Commission	Local/FEMA

Overall the types and priorities of each jurisdiction are very similar for flooding with some variation for each entity's specific needs. The action items for those hazards that cannot readily be tied to a specific geographic location (i.e. tornado; winter storms; severe thunderstorm with lightening, hail & high winds; landslides, and wildfires) are all addressed with mitigation action items that can be worked on regionally as well as by the individual jurisdictions. Where practical and economically feasible these regional approaches will be used with the Kentucky River ADD acting as the coordinating agency where appropriate, economical and feasible.

CHAPTER 6

44CFR §201.6(c)(4) Plan Maintenance Procedures

Summary

The overall plan maintenance and upkeep is the responsibility of the RMPC and the authority residing with the local governing bodies of each participating jurisdiction. The maintenance consists of a.) monitoring; b.) implementation; c.) continued public involvement. Each of these areas of focus is described in the sections following.

6.1: 44CFR §201.6(c)(4) Monitoring, Evaluating and Updating the Plan

A. Monitoring

Monitoring, Evaluating, and Updating procedures were developed by plan stakeholders and formally approved by the RMPC and KRADD Board of Directors. Monitoring of the implementation of this plan shall be the responsibility of first local Emergency Management representative, then the Regional Mitigation Planning Committee. Coordination of the monitoring effort will be provided by the Kentucky River ADD staff on an as needed basis.The schedule for monitoring is as follows:

1. First follow-up of implementation process – 3 months after plan adoption
2. Development through existing departmental procedures – 12-48 months after adoption
3. Review of alternative mitigation action steps – 6-18 months after adoption
4. Review of evaluation activities – 24-48 months after plan adoption
5. Annual RMPC meeting to be held yearly beginning in fall of 2010
6. ADD staff will coordinate the annual RMPC meetings and provide data sets needed in order to carry out the necessary monitoring of progress of the plan implementation
7. Monitoring will continue through the beginning of the five-year update period schedule to start in 2014 and take approximately 12 to 16 months to complete

B. Evaluating

1. Evaluation of the plan shall be first the responsibility of the local County/City level Department of Emergency Management personnel, then the Kentucky Emergency Management Area 8 and 9 Emergency Management Centers, and finally the RMPC.
2. The process of evaluation will begin for each jurisdiction when at least 2/3 of the proposed activities have been implemented.
3. The evaluation criteria may include, but not necessarily be limited to, the following:
    a.) Successful implementation of appropriate alternative mitigation actions (i.e. ordinances, resolutions, policies and procedures)
    b) Development of internal mechanisms to utilize existing departments to implement alternative mitigation actions and to ascertain utilization of these actions
    c) Establishment, by the local jurisdiction, of a proposed timeline to implement the goals and objectives as well as the identified priority action items for each jurisdiction to be done in phases where necessary
    d) Identification of potential sources for funding proposed priority action items and active pursuit of these sources
    e) Successful priority project completion and utilization of available resources

C. Updating

1. Interim updates request will be submitted by the affected local jurisdiction(s) with all required information including but not limited to hazard data, damage data, location, and requested action items if applicable.
2. The interim update will be submitted to the RMPC by the local unit of government official with a request to amend the Regional Hazard Mitigation Plan.
3. The RMPC will make a recommendation to the KRADD Board of Directors, which will approval inclusion into the plan.
4. The adoption of the update will be the responsibility of the affected jurisdictions legal governing body by appropriate resolution.
5. The evaluations for the five-year update shall be gathered at the Kentucky River ADD office the first part of 2021 by the local Emergency Management officers and ADD staff.
6. Pending funding and resource availability, the process of updating the plan will begin in early 2021.
7. Information gathered during the monitoring and evaluation processes shall be utilized during the plan update.
8. Plan participants and the public will review the evaluations and monitoring information and take into account what worked and what didn’t in the development of the update.
9. A cursory review of all hazards shall be undertaken to determine if any hazard not processed through the risk assessment in the last update may need to be included in the update, if significantly impacting the region during the five-year analysis period.
10. Plan participants and the public will present the compiled findings to the RMPC for review and comment
11. Comments and suggestions will be returned to the RMPC for its consideration.
12. Upon consensus of the plan participants, the public, and RMPC, all update modifications will be incorporated into the plan which in turn will be submitted to the local jurisdictions for adoption

6.2: 44CFR §201.6(c)(4)(ii) Implementation Through Existing Programs:

Each jurisdiction within the Kentucky River ADD utilizes various mechanisms to incorporate new plans into their existing programs. Upon formal adoption of this plan as their legal Hazard Mitigation Plan, each unit of local government intends to incorporate the appropriate sections of this plan into their existing programs. The incorporation in most cases will be carried out through existing ordinances as well as administrative policies and procedures and through administrative codes where feasible. Existing personnel and departments will be used where feasible and appropriate to assist in the implementation of this plan. Each identified department where feasible will be assigned duties to carry out the intent of the plan.

The emergency contact person for each individual jurisdiction will be the first point of contact for implementation activities. This person will coordinate with the legal head of the unit of local government and coordinate with others in regional implementation where appropriate. Upon adoption each individual jurisdiction shall be responsible for the implementation of the strategies, goals, and objectives of this plan as they pertain to the individual jurisdiction utilizing existing programs as they determine to be the most appropriate for carrying out the intent of the plan. The timeline for implementation of non-construction projects will be within twelve to eighteen months of adoption by the local jurisdiction.

County-level plan stakeholder meetings, with the help of ADD Staff, identified appropriate planning mechanisms. They then made recommendations to the RMPC for inclusion of appropriate plan items into the other existing planning mechanisms. The RMPC reviewed the recommendations of the sub-committees, incorporate them into the regional plan, and when appropriate returned them to sub-committees for clarifications and corrections. The RMPC included the steps to incorporate the requirements of the mitigation plan into the identified existing planning mechanisms and included these in the recommendations to the KRADD Board of Directors for final approval.

6.3: 44CFR §201.6(c)(4)(iii) Continued Public Involvement:

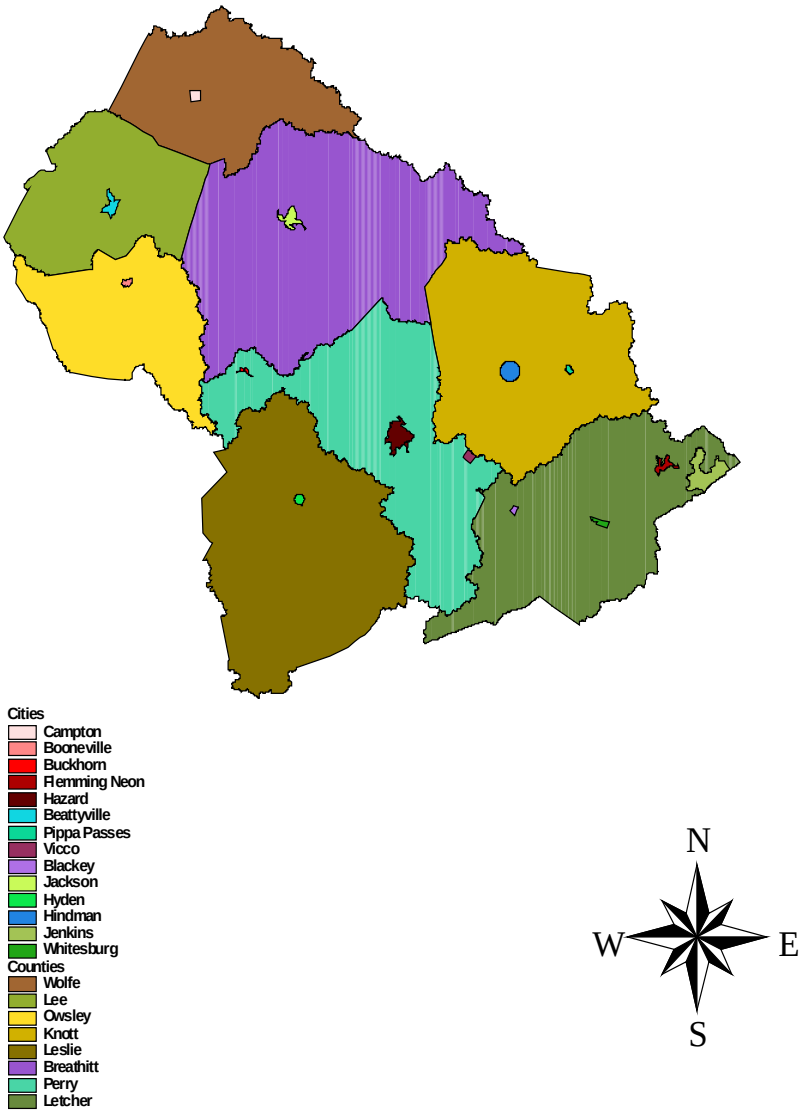
The Regional Mitigation Planning Committee with input from the subcommittees and as needed from KRADD staff developed the following methodology to maintain ongoing public participation in the planning process.

- Public comment will be reviewed by staff of the Kentucky River ADD.
- Summations and excerpts of the comments will be provided to the RMPC.
- The public and plan stakeholders will direct ADD staff to summarize the appropriate suggestions and recommend them first to the RMPC, then to the KRADD Board of Directors, if requested.
- The RMPC and KRADD Board will direct staff to include all pertinent public input into the Plan Document update
- Future anticipated updates, where economically feasible, will follow the same methodology as the original plan.
- At least one opportunity will be provided to the general public for review of an updated draft prior to final adoption by the local jurisdictions and by the KRADD Board of Directors.
- At least one public notice will be provided to area news agencies giving pertinent information on where drafts will be available and outlining where and how comments may be made.
- Public review will be made available at the offices of the units of local government, local public libraries, and at local health departments as well as being posted on the Kentucky River ADD Web page for review and comment.
- All available public comment will be reviewed by sub-committees and the RMPC, which will direct staff to incorporate, where appropriate and feasible, all data that is relevant to the plan update.

Attachments—

A. Kentucky River ADD Region Map
B. Plan Participants and Their Titles and Agencies
C. Vulnerable Areas for Potential Mitigation Actions Identified by Public and Plan Participants
D. Risk Assessment: Flood Maps with Identified Assets
E. Risk Assessment: Severe Storms and Hail Vulnerability Maps
F. Vulnerability: Critical Facilities Maps
G. Vulnerability: Identification of Asset Types and Their Values per Hazard
H. Vulnerability: Development Areas Maps
I. Vulnerability: Regional Zones of Gasline Flooding
J. Mitigation Strategy: Mitigation Actions Locations Maps
K. Mitigation Strategy: Locations of Completed Mitigation Actions
L. HAZUS Quick Assessment Reports
M. HAZUS Full Flood Event Report

ATTACHMENT A
Kentucky River ADD Region Map



ATTACHMENT B
Plan Participants and Their Titles and Agencies

August 26, 2015

Name	Title	Agency Representing
Jim Childers	Private Citizen	Knott County
Larry Parke	Private Citizen	Knott County
Jim Ward	Judge/Executive	Letcher County Fiscal Court
Charles Long	Mayor	City of Booneville
Jack Burkick	Private Citizen	Letcher County
Hiram Cornett	Private Citizen	Leslie County
Eugene Stewart	Private Citizen	Leslie County
Freddie Combs	Private Citizen	Perry County
Derrick Bowling	Private Citizen	Perry County
Tracy Neice	Mayor	City of Hindman
Larry King	Private Citizen	Knott County
Kimberly King	Private Citizen	Knott County
Meriwether Wash Hall	Private Citizen	Perry County
Pam Pilgrim	Private Citizen	Wolfe County
Phyllis McCord	Private Citizen	Lee County
Floyd John	Private Citizen	Lee County
Carol Joseph	Mayor	City of Hyden
Dale Bishop	Private Citizen	Owsley County
Scott Cornett	Mayor	City of Pippa Passes
Jim McDaniel	Private Citizen	Letcher County
Annette Napier	Program Director	KRADD

September 23, 2015

Name	Title	Agency Representing
John L. Smith	Judge/Executive	Breathitt County Fiscal Court
Zach Weinberg	Judge/Executive	Knott County Fiscal Court
Jimmy Sizemore	Judge/Executive	Leslie County Fiscal Court
James Childers	Private Citizen	Knott County
Michael Huffman	Private Citizen	Knott County
Carol Joseph	Mayor	City of Hyden
John Pray	Private Citizen	Perry County
Bob Perkins	Private Citizen	Perry County
Jesse Campbell	Private Citizen	Perry County
Larry Parke	Private Citizen	Knott County
Meriwether Wash Hall	Private Citizen	Perry County
Charles Long	Mayor	City of Booneville
Freddie Combs	Private Citizen	Perry County
Hiram Cornett	Private Citizen	Leslie County
Jack Burkick	Private Citizen	Letcher County
Dale Bishop	Private Citizen	Owsley County
Dennis Brooks	Judge/Executive	Wolfe County Fiscal Court
Todd DePriest	Mayor	City of Jenkins
Jim McDaniel	Private Citizen	Letcher County
Scott Cornett	Mayor	City of Pippa Passes

April 27, 2016

Name	Title	Agency Representing
Grady Varney	City Manager	City of Hazard
Tom Cravens	Private Citizen	Perry County
Meriwether Hall	Private Citizen	Perry County
Floyd Johns	Private Citizen	Lee County
Phyllis McCord	Private Citizen	Lee County
Pam Pilgrim	Private Citizen	Wolfe County
Chuck Caudill	Private Citizen	Lee County
Bobby Brown	Private Citizen	Perry County
Mike Mays	Private Citizen	Owsley County
Charles Long	Mayor	City of Booneville
Dennis Brooks	Judge/Executive	Wolfe County Fiscal Court
Zach Weinberg	Judge/Executive	Knott County Fiscal Court
Gary Campbell	Private Citizen	Breathitt County
Hiram Cornett	Private Citizen	Leslie County
Eugene Stewart	Private Citizen	Leslie County
Rose Wolfe	Mayor	City of Jackson
James Childers	Private Citizen	Knott County
Dale Bishop	Private Citizen	Owsley County
Paul Nesbitt	Private Citizen	Perry County
Ervine Allen	Private Citizen	Breathitt County
John Pray	Private Citizen	Perry County
Annette Napier	Program Director	KRADD
Michelle Allen	Finance Officer	KRADD
Karlena Campbell	Staff Accountant	KRADD
Joey Jeffers	Private Citizen	Leslie County
Teresa Humble	Private Citizen	Perry County
Pat Wooton	Mayor	City of Buckhorn
Rebecca Long	Emergency Director	Wolfe County EMA
Michael Oliver	Private Citizen	Wolfe County
Jennifer McIntosh	Community Resource Planner	KRADD
Garrett Denniston	Private Citizen	Wolfe County

May 11, 2016

Name	Title	Agency Representing
Sam Stacy	Fire Chief	Perry County Fire Department
Roger Friley	Fire Chief	Breathitt County Fire Department
Grady Varney	City Manager	City of Hazard
Quentin Smith	Planner	Kentucky Transportation Cabinet (KYTC)
Jason Blackburn	Planning Engineer	Kentucky Transportation Cabinet (KYTC)
Troy Hearn	Bike/Ped Coordinator	Kentucky Transportation Cabinet (KYTC)
Keith Damron	Senior Engineer	Kentucky Transportation Cabinet (KYTC)
Rob Blair	Source Water Protection Coordinator	Kentucky Division of Water (KDOW)
Laura Norris		Kentucky Division of Water (KDOW)
Scott Alexander	Judge/Executive	Perry County Fiscal Court
Ervine Allen	Private Citizen	Breathitt County
Freeman Robertson	Maintenance Supervisor	Perry County Fiscal Court
Rodney Campbell	Sales and Marketing	Mineral Labs, Inc.
Johannah Lemaster	Student	Big Sandy Community and Technical College
Sharlenda Matthews	Environmental Manager; Chemist; Biologist	
Shannon Chapman Thacker	Quality Manager; Chemist; Biologist	
Jennifer McIntosh	Community Resource Planner	KRADD
Eunice Holland	Transportation Planner	KRADD

May 25, 2016

Name	Title	Agency Representing
Pam Pilgrim	Private Citizen	Wolfe County
Scott Alexander	Judge/Executive	Perry County Fiscal Court
Kimberly King	Private Citizen	Knott County
Zach Weinberg	Judge/Executive	Knott County Fiscal Court
Jimmy Sizemore	Judge/Executive	Leslie County Fiscal Court
Hiram Cornett	Private Citizen	Leslie County
Eugene Stewart	Private Citizen	Leslie County
Dale Bishop	Private Citizen	Leslie County
Jack Burkick	Private Citizen	Letcher County
Phyllis McCord	Private Citizen	Lee County
Larry Parke	Private Citizen	Knott County
Gary Campbell	Private Citizen	Breathitt County
Everett Marshall	Magistrate	Lee County Fiscal Court
Carol Joseph	Mayor	City of Hyden
Jimmy Ray Lindon	Mayor	City of Hazard
Jim McDannel	Private Citizen	Letcher County
Todd DePriest	Mayor	City of Jenkins
Scott Cornett	Mayor	City of Pippa Passes

June 14, 2016

Name	Title	Agency Representing
Dennis Brooks	Judge/Executive	Wolfe County Fiscal Court
Brandon Rose	Magistrate	Wolfe County Fiscal Court
Stephen Oliver	Private Citizen	Wolfe County
Tracy Sparks	Private Citizen	Wolfe County
Joe Dean	Private Citizen	Wolfe County

June 20, 2016 (Meeting #1)

Name	Title	Agency Representing
Annette Napier	Program Director	KRADD
Calvin Waddles	Magistrate	Knott County Fiscal Court
Jeff Dobson	Magistrate	Knott County Fiscal Court
Zach Weinberg	Judge/Executive	Knott County Fiscal Court

June 20, 2016 (Meeting #2)

Name	Title	Agency Representing
Josh Collins	Private Citizen	Letcher County
Wayne Fleming	Magistrate	Letcher County Fiscal Court
Terry Adams	Magistrate	Letcher County Fiscal Court
Keith Adams	Magistrate	Letcher County Fiscal Court
Jim Ward	Judge/Executive	Letcher County Fiscal Court
Bobby Howard	Magistrate	Letcher County Fiscal Court
Woody Holbrook	Magistrate	Letcher County Fiscal Court
Angelia Hall	Community Resource Planner	KRADD

June 21, 2016

Name	Title	Agency Representing
Mike Miller	Executive Director	KRADD
Jerry Stacy	Emergency Management Director	Perry County EMA
Don Howard	911 Director	Perry County EMS
Scott Alexander	Judge/Executive	Perry County Fiscal Court
Keith Miller	Magistrate	Perry County Fiscal Court
Sharon Adams	Private Citizen	Perry County
Tonya McQueen	County Treasurer	Perry County Fiscal Court
Rocky Hudson	Private Citizen	Perry County
George Campbell	Private Citizen	Perry County
Gary King	Private Citizen	Perry County
Ernie Ellison	Environmental Scientist	Kentucky Division of Abandoned Mine Lands
Phil Bowling	Environmental Scientist	Kentucky Division of Abandoned Mine Lands
Kenny Cole	Magistrate	Perry County Fiscal Court
Ronald Combs	Magistrate	Perry County Fiscal Court
Benny Hamilton	Private Citizen	Perry County

June 22, 2016 (Meeting #1)

Name	Title	Agency Representing
Kenneth Best	Private Citizen	Leslie County
Carolyn Howard	Private Citizen	Leslie County
Kathy Shepherd	Private Citizen	Leslie County
James Lewis	Private Citizen	Leslie County
Jimmy Sizemore	Judge/Executive	Leslie County Fiscal Court

June 22, 2016 (Meeting #2)

Name	Title	Agency Representing
Larry Parke	Private Citizen	Knott County
Carolyn Howard	Private Citizen	Leslie County
Eunice Holland	Transportation Planner	KRADD
Larry Perkins	Private Citizen	Knott County
Dale Bishop	Private Citizen	Owsley County
Grady Varney	City Manager	City of Hazard
Jimmy Lindon	Mayor	City of Hazard
Bill McIntosh	Private Citizen	Perry County
Floyd Johns	Private Citizen	Lee County
Phyllis McCord	Private Citizen	Lee County
Rose Wolfe	Mayor	City of Jackson
Scott Alexander	Judge/Executive	Perry County Fiscal Court
Jim McDannel	Private Citizen	Letcher County
Todd DePriest	Mayor	City of Jenkins
Dennis Brooks	Judge/Executive	Wolfe County Fiscal Court
Larry King	Private Citizen	Knott County
Zach Weinberg	Judge/Executive	Knott County Fiscal Court
Kim King	Private Citizen	Knott County
Gary Campbell	Private Citizen	Breathitt County
Carol Joseph	Mayor	City of Hyden
Kimberly Coomer	Finance Officer	KRADD
Karlena Campbell	Human Resources Director	KRADD
Hiram Cornett	Private Citizen	Leslie County
Eugene Stewart	Private Citizen	Leslie County
Freddie Combs	Private Citizen	Perry County
Annette Napier	Program Director	KRADD
John Chester	GIS Specialist	KRADD

ATTACHMENT C
Vulnerable Areas for Potential Mitigation Actions Identified by Public and Plan Participants

The following is a partial list of reoccurring road/bridge/slide problem areas by type for flooding in the region (as compiled by the public, local officials, and county DES/county road department personnel).

Listing of Locations and Problems

BREATHITT COUNTY		
STATUS	LOCATION	PROBLEM
ROAD SURFACE	SMITH BRANCH RD-4217 DECLARATION	ROAD BROKEN UP/CRACKED
NEEDS STEEL	MORGUE FRK RD-4217 DECLARATION	ROAD SLIPPING OFF BASE
CULVERTS	BRIDGE HOLW RD -4215 & 4217 DECLARATION	ROAD OVERTOPPED/HEADWALLS DEGRADED
ROAD SURFACE	SEWELL ST-4217 DECLARATION	ROAD BROKEN UP/CRACKED
ROAD SURFACE	COMBS ST-4217 DECLARATION	ROAD BROKEN UP/CRACKED
ROAD SURFACE	ARMORY DR-4217 DECLARATION	ROAD BROKEN UP/CRACKED
RR BRIDGE	TOWN HL RD	ABUTMENT DEGRADED AND LEANING
ROAD SURFACE	LICK BR-ARMORY DR	ROAD BROKEN UP/CRACKED
BRIDGE	KY-476 AT NOBLES LANDING-4217 DECLARATION	BRIDGE OVERTOPS/SURFACE DEGRADED

KNOTT COUNTY		
STATUS	LOCATION	PROBLEM
ROAD SURFACE	MALLIE RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	SMITH BR	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	BIG SPRING BR	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	BIG SPRING BR	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
CULVERTS	PINETREE HOLW	CULVERT OVERTOPS FREQUENTLY
SLIP STABILIZE	LOTTS CR-KELLY FK	BANK ABOVE ROAD SLIPS FREQUENTLY
SLIP STABILIZE	EAGLES NEST RD	BANK ABOVE ROAD SLIPS FREQUENTLY
SLIP STABILIZE	KY 721 CTR-CCR	BANK ABOVE ROAD SLIPS FREQUENTLY
SLIP STABILIZE	LICK BRANCH RD	BANK ABOVE ROAD SLIPS FREQUENTLY
ROAD SURFACE	DEFEATED CRK	ROAD BROKEN UP/CRACKED
ROAD SURFACE	BIG SMITH BR	ROAD BROKEN UP/CRACKED
SLIP STABILIZE	BUCKHORN RD	BANK ABOVE ROAD SLIPS FREQUENTLY
SLIP STABILIZE	COMBS BRANCH RD	BANK ABOVE ROAD SLIPS FREQUENTLY
SLIP STABILIZE	MULLINS BRANCH RD	BANK ABOVE ROAD SLIPS FREQUENTLY
ROAD SURFACE	KY HWY 7	ROAD BROKEN UP/CRACKED
DREDGE	KY HWY 7	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
SUBSIDENCE	KY HWY 582	BASE UNDER ROAD BROKEN BY PAST MINING
SLIP STABILIZE	STARFIRE HAUL RD	BANK ABOVE ROAD SLIPS FREQUENTLY
CULVERT	VARIOUS AROUND HINDMAN	CULVERTS OVERTOPS FREQUENTLY
BRIDGE	VARIOUS AROUND HINDMAN	BRIDGES OVERTOP/RESTRICT FLOOD FLOW

LEE COUNTY		
STATUS	LOCATION	PROBLEM
ROAD SURFACE	WILLOW CREEK RD	ROAD BROKEN UP/CRACKED
CULVERTS	LITTLE CREEK RD	CULVERT OVERTOPS FREQUENTLY
CULVERTS	MILL BRANCH SCHOOL RD	CULVERT OVERTOPS FREQUENTLY
CULVERTS	LITTLE ROSS CRK	CULVERT OVERTOPS FREQUENTLY
CULVERTS	GREYS BEND RD	CULVERT OVERTOPS FREQUENTLY
BRIDGE	NICK SPENCER RD	BRIDGE OVERTOPS/RESTRICTS FLOOD FLOW
BRIDGE	PICKERING RD	BRIDGE OVERTOPS/RESTRICTS FLOOD FLOW

LESLIE COUNTY		
STATUS	LOCATION	PROBLEM
RAISE ROAD BED	KY 421-ROUND TREE LN	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
RAISE ROAD BED	MIDDLE FORK RD-SAMS BRANCH RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	KY 406-LOWER BOWEN CREEK RD	ROAD BROKEN UP/CRACKED
ROAD SURFACE	US 421-HONEYSUCKLE RD	ROAD BROKEN UP/CRACKED
ROAD SURFACE	US 421-WENDOVER RD	ROAD BROKEN UP/CRACKED
RAISE ROAD BED	KY 3427-COON CR	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
RAISE ROAD BED	KY 699-WOOTON	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	HYDEN CITY LIMITS	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	HYDEN CITY LIMITS	ROAD BROKEN UP/CRACKED
ROAD SURFACE	HYDEN CITY LIMITS	ROAD BROKEN UP/CRACKED
RAISE ROAD BED	US 421-GINGER CREEK LN	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	DRYHILL RD	ROAD BROKEN UP/CRACKED
DREDGE	DRYHILL RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
SLIP STABILIZE	BLAZE BRANCH RD	BANK ABOVE ROAD SLIPS FREQUENTLY
DREDGE	HWY 406	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
SLIP STABILIZE	STINNETT WENDOVER RD	BANK ABOVE ROAD SLIPS FREQUENTLY
DREDGE	HWY 421	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	HURRICANE CREEK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	POOLS CREEK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
RAISE ROAD BED	DOWN CUTSHIN CREEK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	LOWER MCINTOSH RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
CULVERTS	TOULOUSE RD	CULVERT OVERTOPS FREQUENTLY
SLIP STABILIZE	COPPERHEAD RD	BANK ABOVE ROAD SLIPS FREQUENTLY
SLIP STABILIZE	WILDER BRANCH RD	BANK ABOVE ROAD SLIPS FREQUENTLY
BRIDGE	KY 3427-COON CR	BRIDGE OVERTOPS/RESTRICTS FLOOD FLOW

OWSLEY COUNTY		
STATUS	LOCATION	PROBLEM
NEEDS STEEL	LEFT FRK COW CREEK	ROAD BASE BROKEN/SLIPPING OFF
NEEDS STEEL	TURNER BRANCH RD	ROAD BASE BROKEN/SLIPPING OFF
GABION BASKETS	CHARLIE ROBERTS BR RD	ROAD BASE SLIPPING/BANK ABOVE ROAD SLIPPING
NEEDS STEEL	BUCK HOLLOW RD	ROAD BASE BROKEN/SLIPPING OFF
NEEDS STEEL	GUM CREEK RD	ROAD BASE BROKEN/SLIPPING OFF
CULVERTS	CHADWELL SPUR RD	CULVERT OVERTOPS FREQUENTLY
CULVERTS	BROWN GABBARD RD	CULVERT OVERTOPS FREQUENTLY
ROAD SURFACE	SEBASTIAN RD	ROAD BROKEN UP/CRACKED

PERRY COUNTY		
STATUS	LOCATION	PROBLEM
DECLARED IN DISASTER	LEATHERWOOD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DECLARED IN DISASTER	LITTLE LEATHERWOOD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	BROWNS FORK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	BIG CREEK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	BIG CREEK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
CULVERTS	HARLEY HOLLOW RD	CULVERTS OVERTOP FREQUENTLY
CULVERTS	POLLY HOLW	CULVERTS OVERTOP FREQUENTLY
CULVERTS	WHITAKER FORK RD	CULVERTS OVERTOP FREQUENTLY
CULVERTS	WOLF BRANCH RD	CULVERTS OVERTOP FREQUENTLY
CULVERTS	JACKS BR	CULVERTS OVERTOP FREQUENTLY
CULVERTS	BUFFALO RUN	CULVERTS OVERTOP FREQUENTLY
ROAD SURFACE	COUCHTOWN RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	KY 451	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
CULVERTS	NAPIER BRANCH RD	CULVERTS OVERTOP FREQUENTLY
ROAD SURFACE	CHAVIES DUNRAVEN	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	KY 28-CHAVIES	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	COURTNEY RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
ROAD SURFACE	UPPER SECOND CREEK RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
SLIP STABILIZE	UPPER RIVER RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	RIVER RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
CULVERT	WILLIAMS BR RD	CULVERT OVERTOPS FREQUENTLY
BRIDGE	WILLIAMS BR RD	BRIDGE OVERTOPS/RESTRICTS FLOOD FLOW

PERRY COUNTY		
STATUS	LOCATION	PROBLEM
CULVERT	MELISSA BR RD	CULVERT OVERTOPS FREQUENTLY
CULVERT	GREGORY BR RD	CULVERT OVERTOPS FREQUENTLY
CULVERT	CAM JOHNSON BR AND MIDDLE FRK RIVER RD	CULVERT OVERTOPS FREQUENTLY
CULVERT	OTTER CREEK RD	CULVERT OVERTOPS FREQUENTLY
CULVERT	GEORGES BRANCH	CULVERT OVERTOPS FREQUENTLY
CULVERT	PUNCHEON CAMP RD	CULVERT OVERTOPS FREQUENTLY
CULVERT	RT FORK BEEHIVE RD	CULVERT OVERTOPS FREQUENTLY
BRIDGE	BIG CREEK AND KATHRINE LN	BRIDGE OVERTOPS/RESTRICTS FLOOD FLOW

WOLFE COUNTY		
STATUS	LOCATION	PROBLEM
RAISE ROAD BED	CAVE BRANCH RD	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	BETHANY BOTTOM	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
RAISE ROAD BED	KY 1812 & KY 2491	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
DREDGE	KY 1812 & KY 2491	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
RAISE ROAD BED	BEAR BR	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
RAISE ROAD BED	KY 1094-POOR BR TO KY 205	ROAD SURFACE AND CREEK AT SIMILAR ELEVATION
CULVERTS	PLUMBERS ST	CULVERTS OVERTOP FREQUENTLY
CULVERTS	QUILLEN CHAPPEL RD	CULVERTS OVERTOP FREQUENTLY
STORM DRAIN	CLINIC-SHOPWISE	INLET INADEQUATE FOR FLOW
STORM DRAIN	DOWNTOWN	INLET INADEQUATE FOR FLOW
BRIDGE	CAVE BRANCH RD	BRIDGE OVERTOPS/RESTRICTS FLOOD FLOW

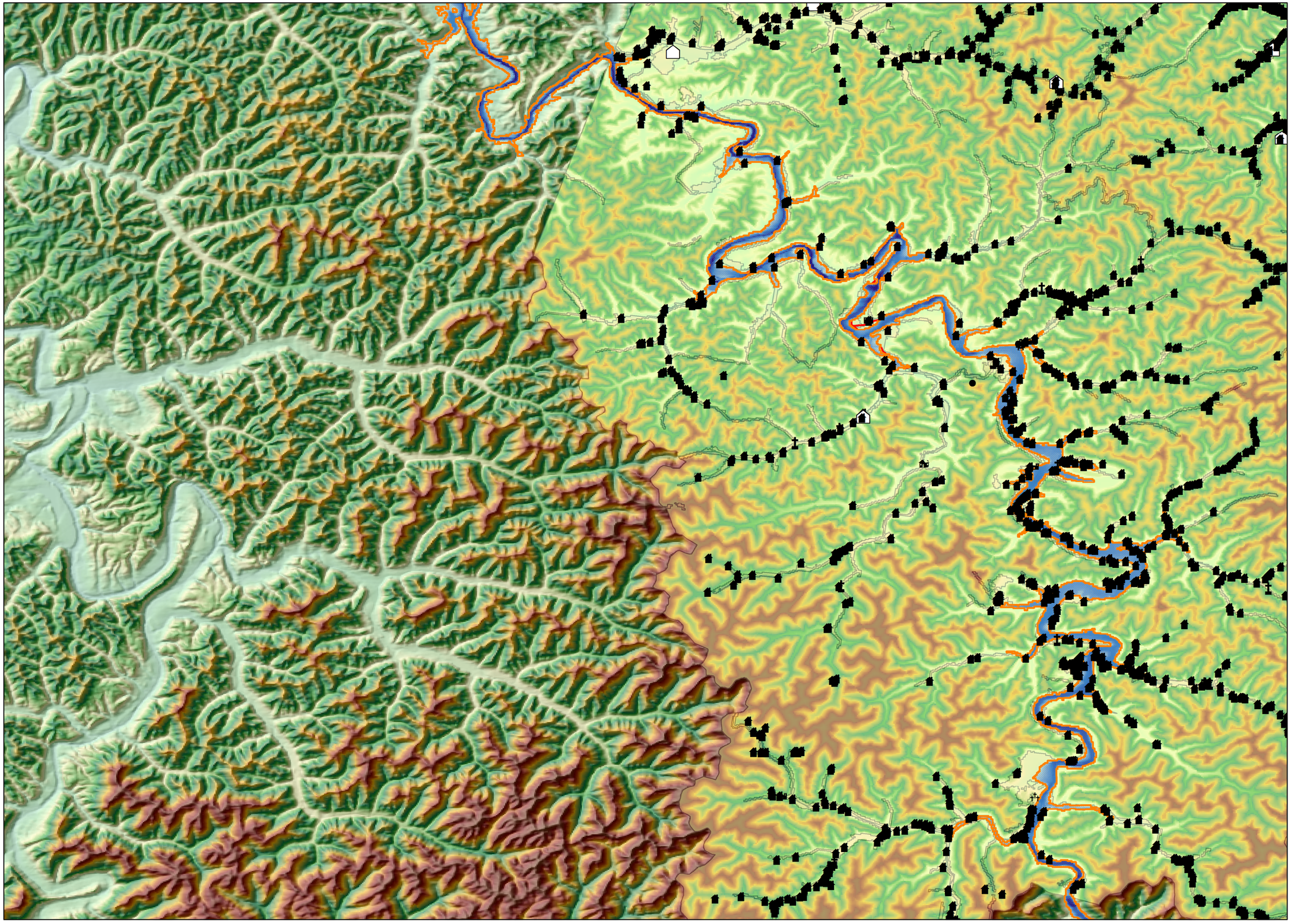
*Note: Above data supplied by the individual sub-committee members/Public input.

ATTACHMENT D

Risk Assessment: Flood Maps with Identified Assets

Study Region: BreathittCo Description: Breathitt County Hazard Mitigation Flood Analysis

Scenario: BreathittCoMidFrkKyRiver



Legend

TYPE

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

BoundaryPolygon

rpd100_r

High : 52.1492

Low : 0.000437012

ChosenReaches

ChosenReaches

Reaches

Reaches

RegionDEM

High : 2918.06

Low : 622.471

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

Study Region Boundary

Study Region Boundary

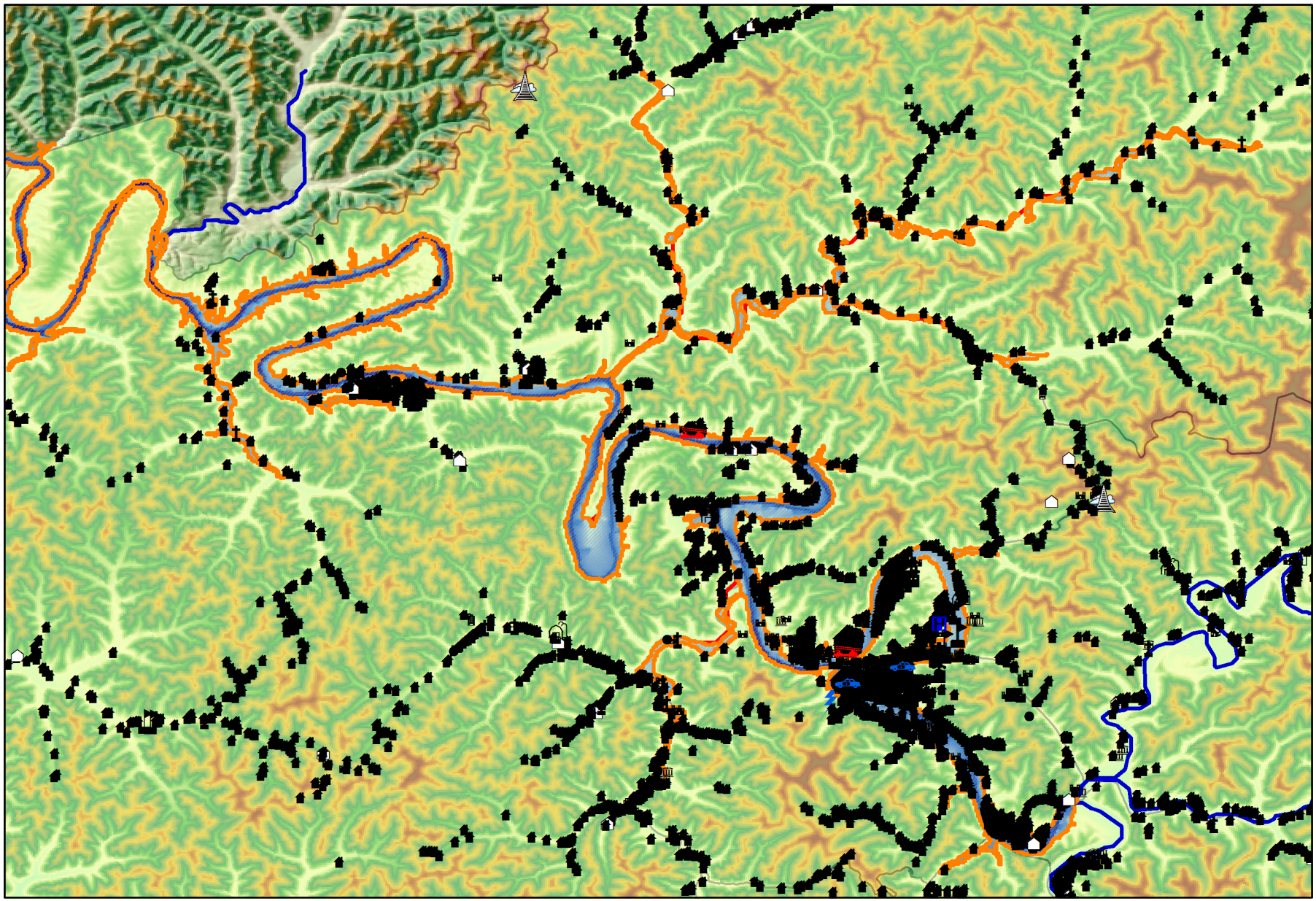
1 0.5 0 1 Miles

N

W E

S

Study Region: BreathittCo Description: Breathitt County Hazard Mitigation Flood Analysis
Scenario: BreathittCoNoFrkKyRiverDS



Legend

- Police Station
- Fire Station
- Hospital

TYPE

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon
BoundaryPolygon

rpd100_r
High : 91.3022
Low : 0.0011084

ChosenReaches
ChosenReaches

Reaches
Reaches

RegionDEM
High : 2918.06
Low : 622.471

Census Blocks
Census Blocks

Census Tracts
Census Tracts

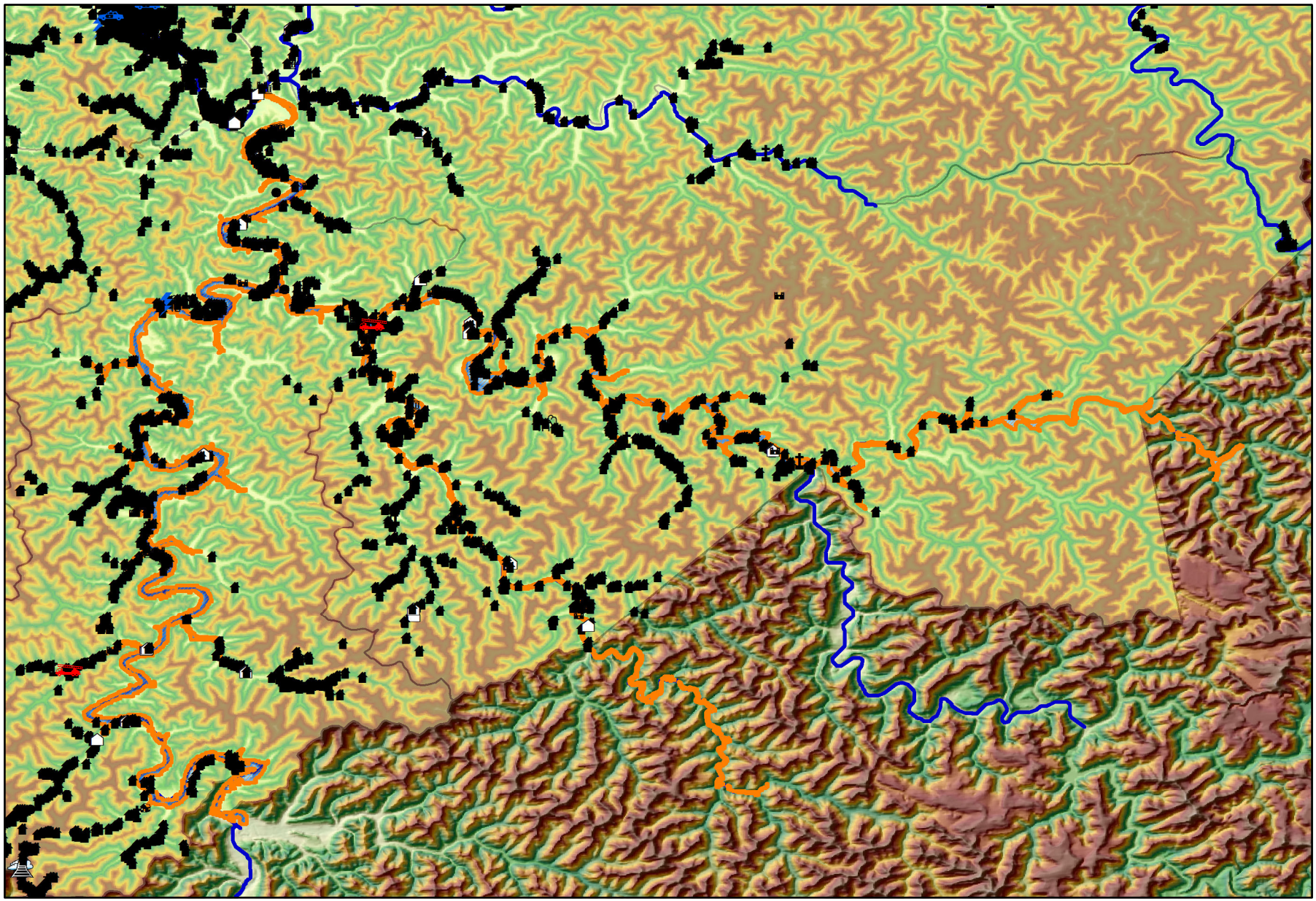
Hillshade
High : 254
Low : 0

Study Region Boundary
Study Region Boundary

1 0.5 0 1 Miles

N
W E
S

Study Region: BreathittCo Description: Breathitt County Hazard Mitigation Flood Analysis
Scenario: BreathittCoNoFrkKyRiverUS



Legend

- Police Station
- Fire Station
- Hospital

TYPE

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION
- BoundaryPolygon

rpd100_r

Value

High : 76.9312

Low : 0.00335693

Reaches

Reaches

RegionDEM

High : 2918.06

Low : 622.471

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

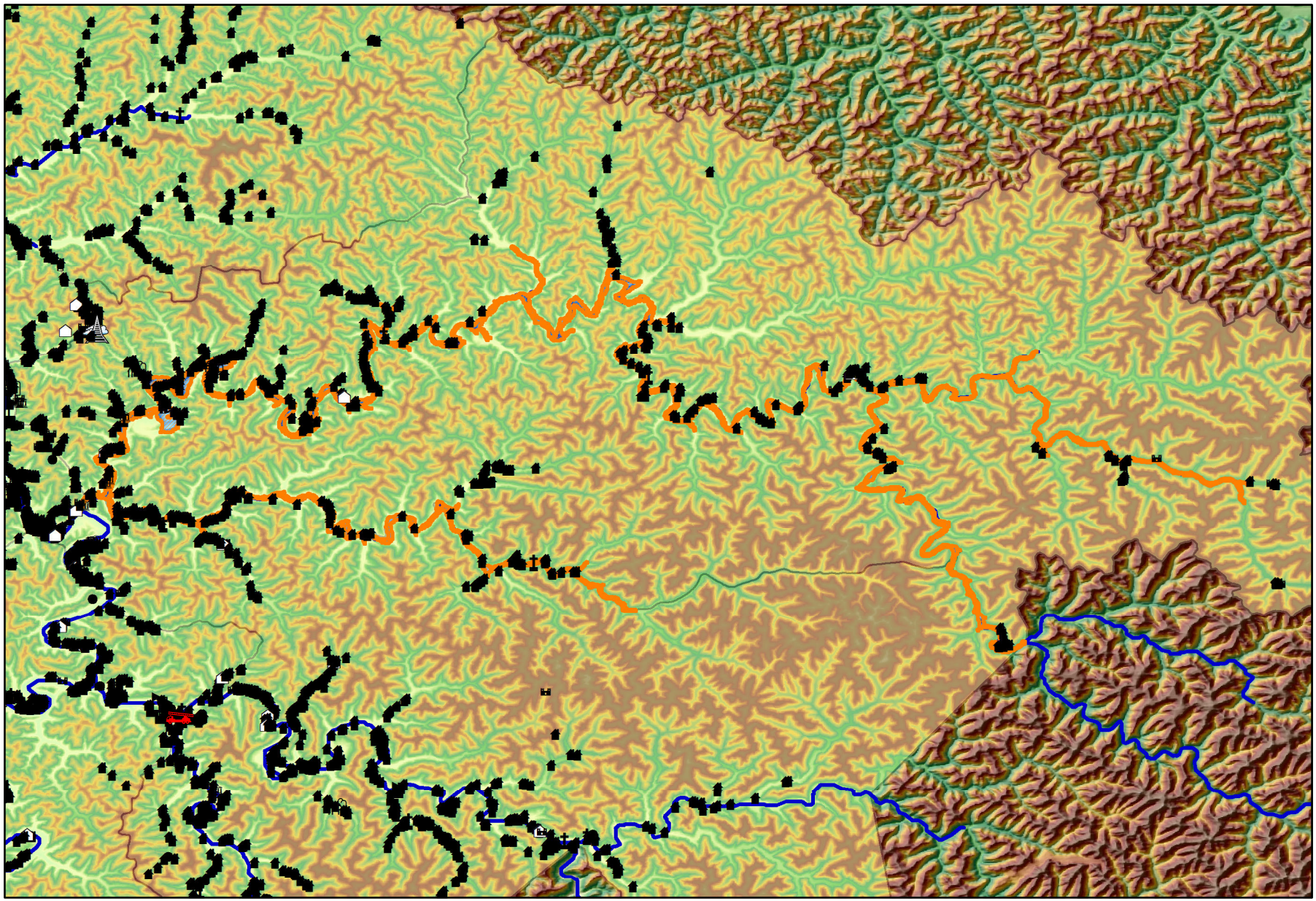
Study Region Boundary

Study Region Boundary

1.5 0.75 0 1.5 Miles

N W E S

Study Region: BreathittCo Description: Breathitt County Hazard Mitigation Flood Analysis
Scenario: BreathittCoQuicksandCrk



Legend

- Police Station
- Fire Station
- Hospital

TYPE

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION
- BoundaryPolygon

rpd100_r

Value

High : 51.69

Low : 9.76

Reaches

Reaches

RegionDEM

High : 2918.06

Low : 622.471

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

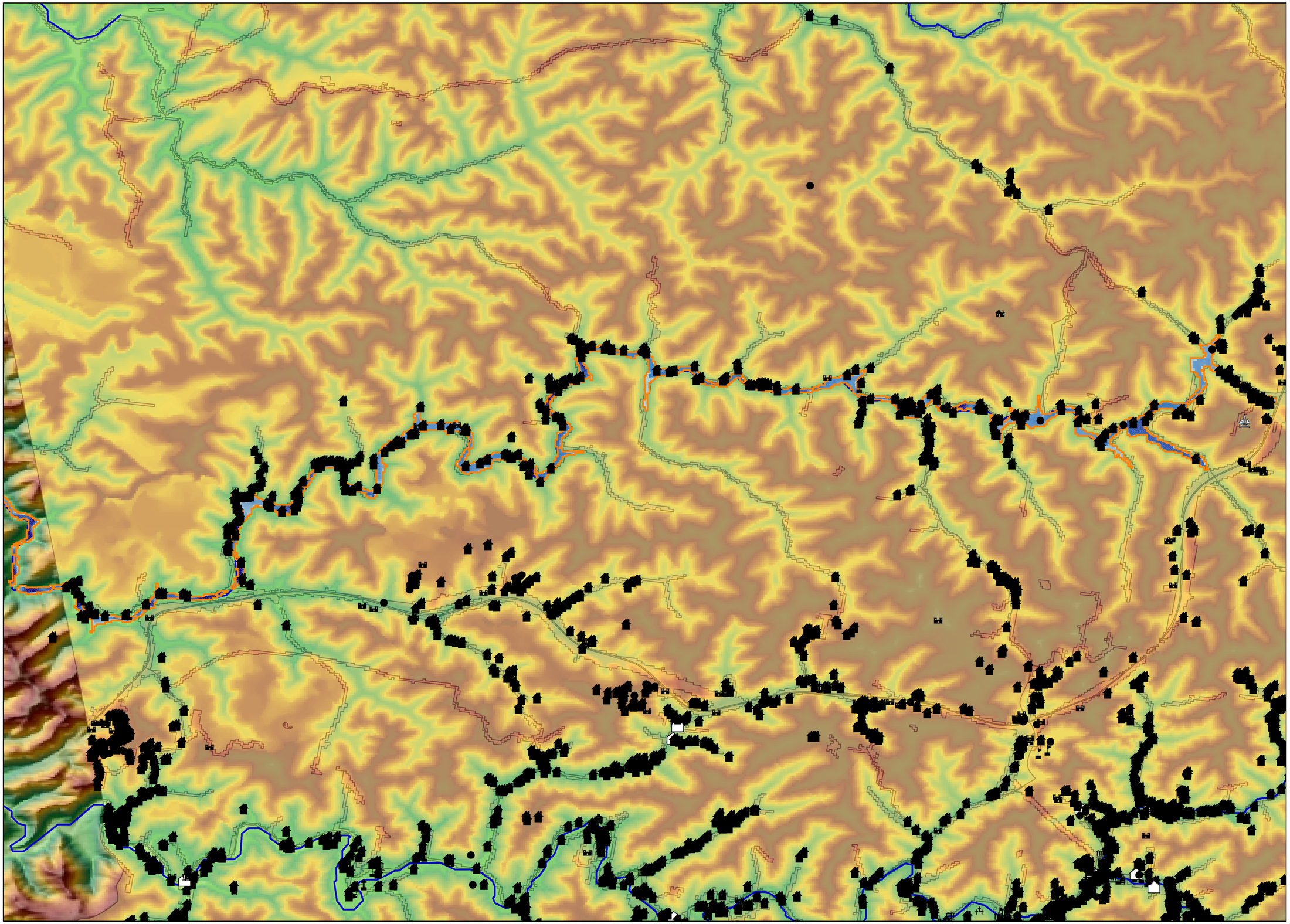
Study Region Boundary

Study Region Boundary

N W E S

2 1 0 2 Miles

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottBallsFrk



Legend

Addresses
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon
- BoundaryPolygon

rpd100_r
- High : 43.5013
- Low : 0.000854492

Reaches
- Reaches

RegionDEM
- High : 2918.06
- Low : 569.913

Census Blocks
- Census Blocks

Census Tracts
- Census Tracts

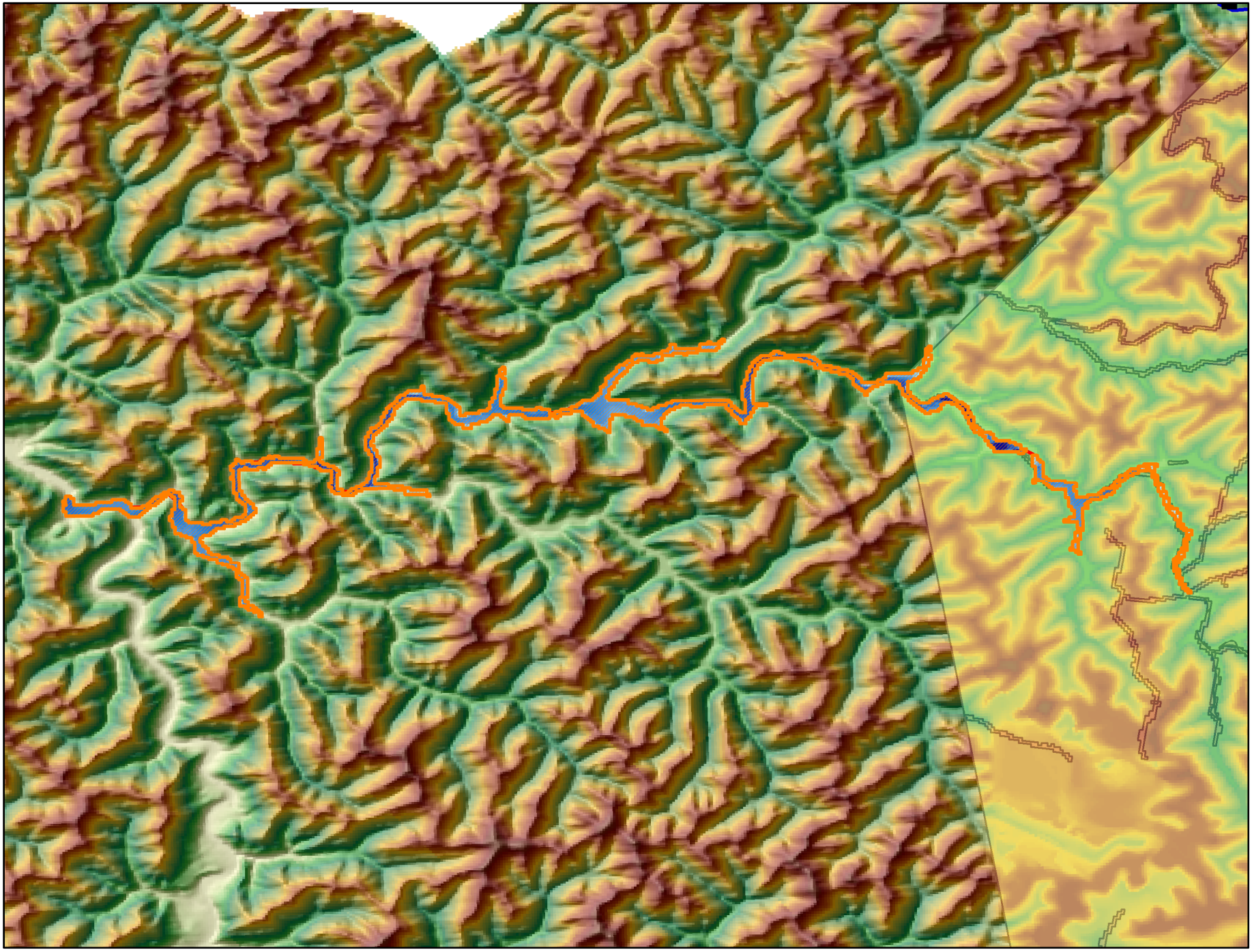
Hillshade
- High : 254
- Low : 0

Study Region Boundary
- Study Region Boundary

1 0.5 0 1 Miles

N
W E
S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottBuckhornCrk



Legend

Addresses
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon
- BoundaryPolygon

rpd100_r
- High : 41.694
- Low : 0.00220703

ChosenReaches
- ChosenReaches

Reaches
- Reaches

RegionDEM
- High : 2918.06
- Low : 569.913

Census Blocks
- Census Blocks

Census Tracts
- Census Tracts

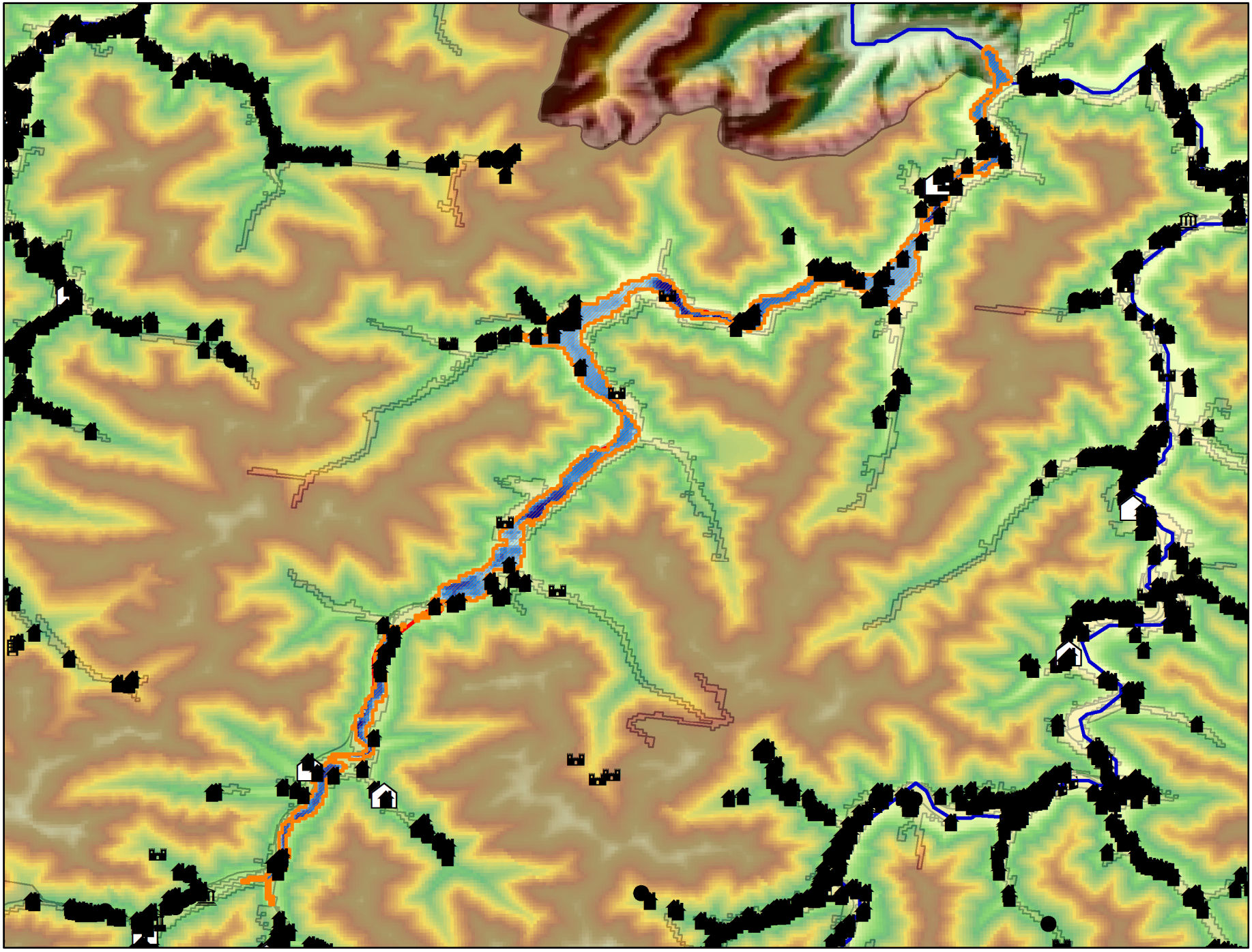
Hillshade
- High : 254
- Low : 0

Study Region Boundary
- Study Region Boundary

2.5 1.25 0 2.5 Kilometers

N W E S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottBuckhornCrk

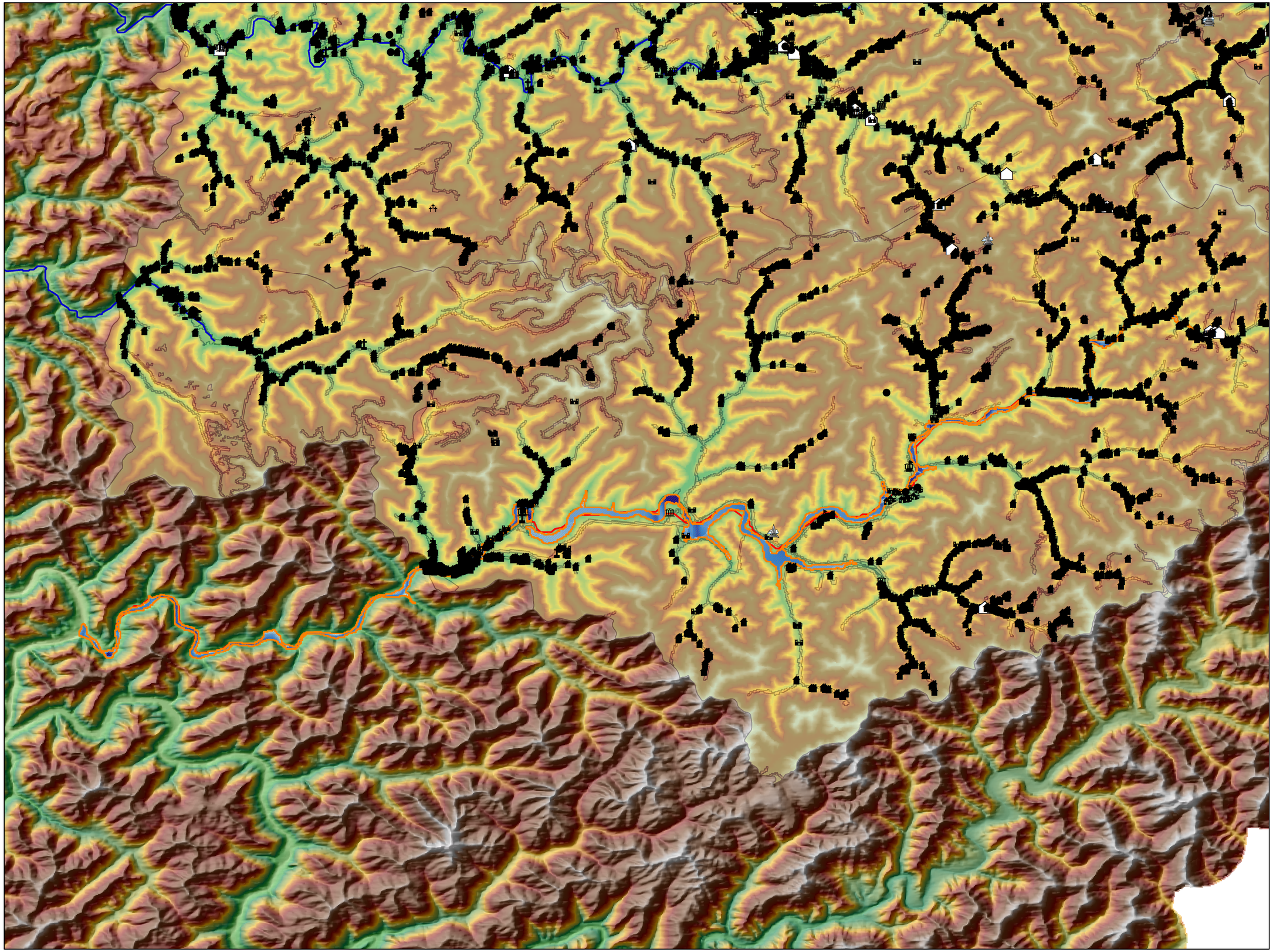


Addresses
OTHER
APARTMENT
CELL TOWER
CEMETERY
CHURCH
COMMERCIAL
FARM STRUCTURE
GARAGE
GOVERNMENT
INDUSTRIAL
PUBLIC
RESIDENCE
SCHOOL
SUBSTATION
BoundaryPolygon
rpd100_r
Value
High : 29.9231
Low : 0.0164795
ChosenReaches
Reaches
Reaches
RegionDEM
High : 2918.06
Low : 569.913
Census Blocks
Census Blocks
Census Tracts
Census Tracts
Hillshade
High : 254
Low : 0
Study Region Boundary
Study Region Boundary

1.5 0.75 0 1.5 Kilometers

N
W E
S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottCarrCrk



Legend

Addresses
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

rpd100_r

Value

High : 45.60

Low : 0.001

ChosenReaches

Reaches

Reaches

RegionDEM

High : 2918.06

Low : 569.913

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

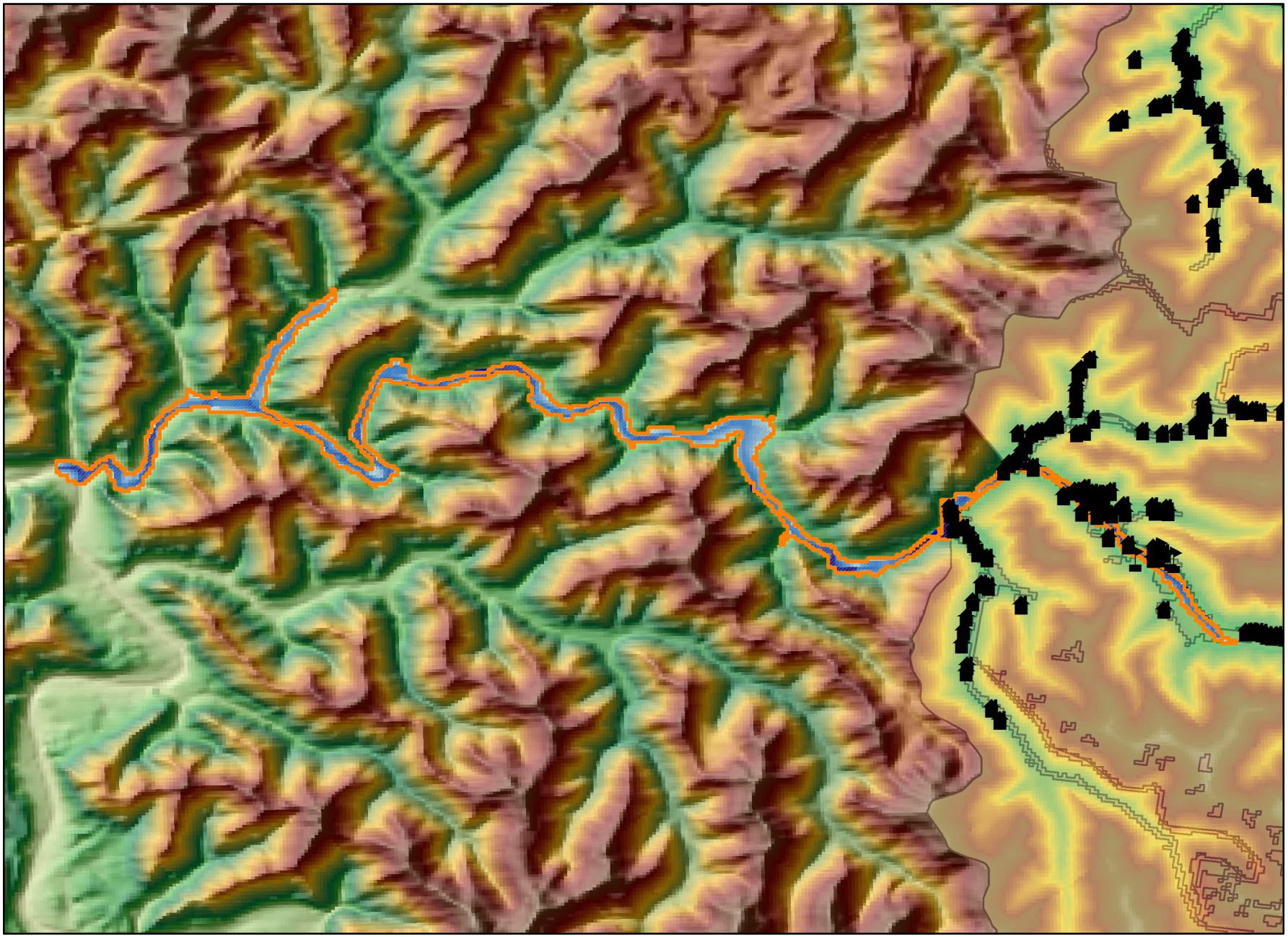
Study Region Boundary

Study Region Boundary

2 1 0 2 Miles

N W E S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottLottsCrk



Legend

Addresses
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

rpd100_r
Value
High : 54.16
Low : 0.002

Reaches
Reaches

RegionDEM
High : 2918.06
Low : 569.913

Census Blocks
Census Blocks

Census Tracts
Census Tracts

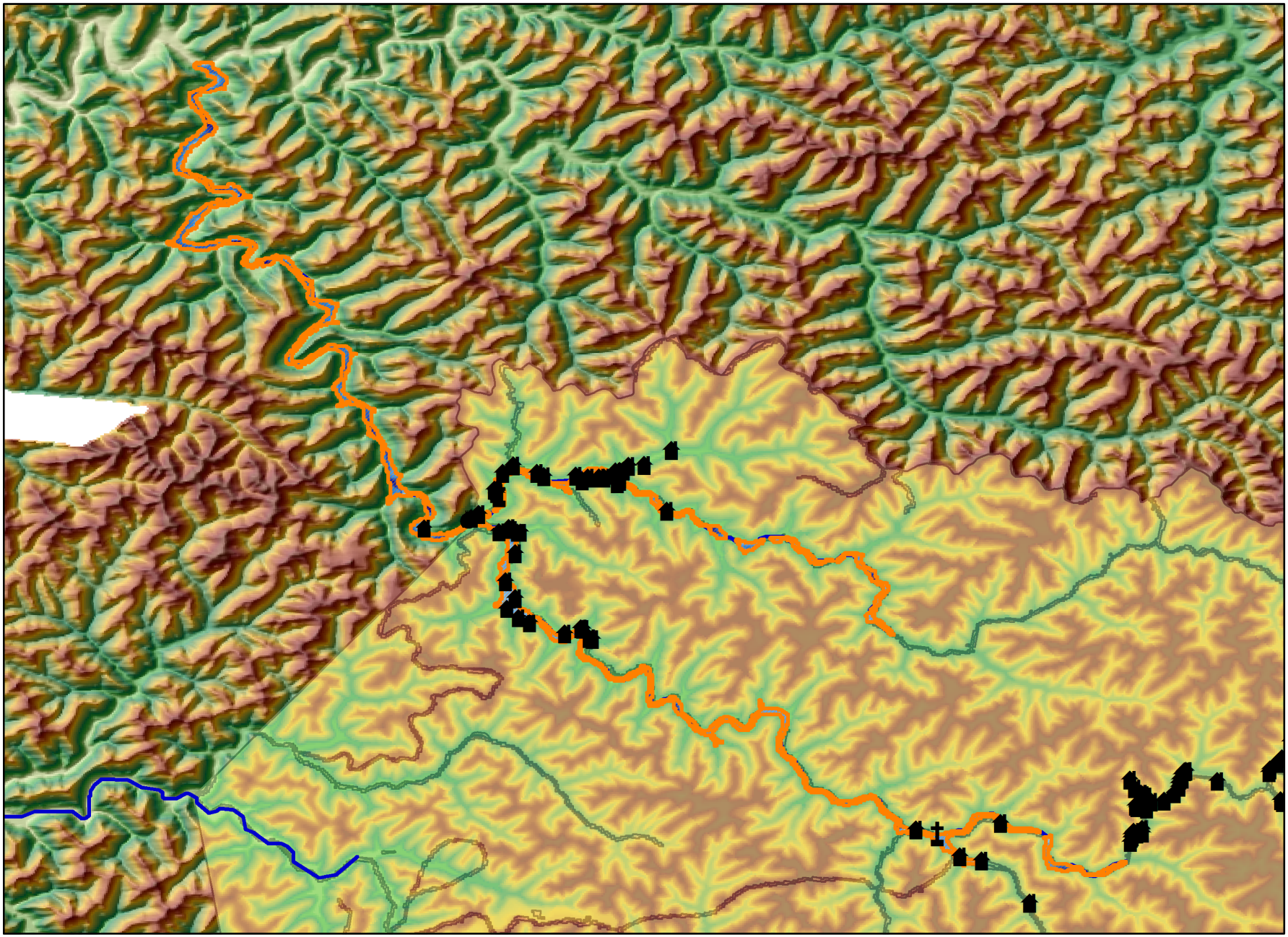
Hillshade
High : 254
Low : 0

Study Region Boundary
Study Region Boundary

0.5 0.25 0 0.5 Miles

N W E S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottQuicksandCrk



Legend

Addresses
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION
- BoundaryPolygon

rpd100_r
Value
- High : 57.744
- Low : 0.0122778

Reaches
- Reaches

RegionDEM
- High : 2918.06
- Low : 569.913

Census Blocks
- Census Blocks

Census Tracts
- Census Tracts

Hillshade
- High : 254
- Low : 0

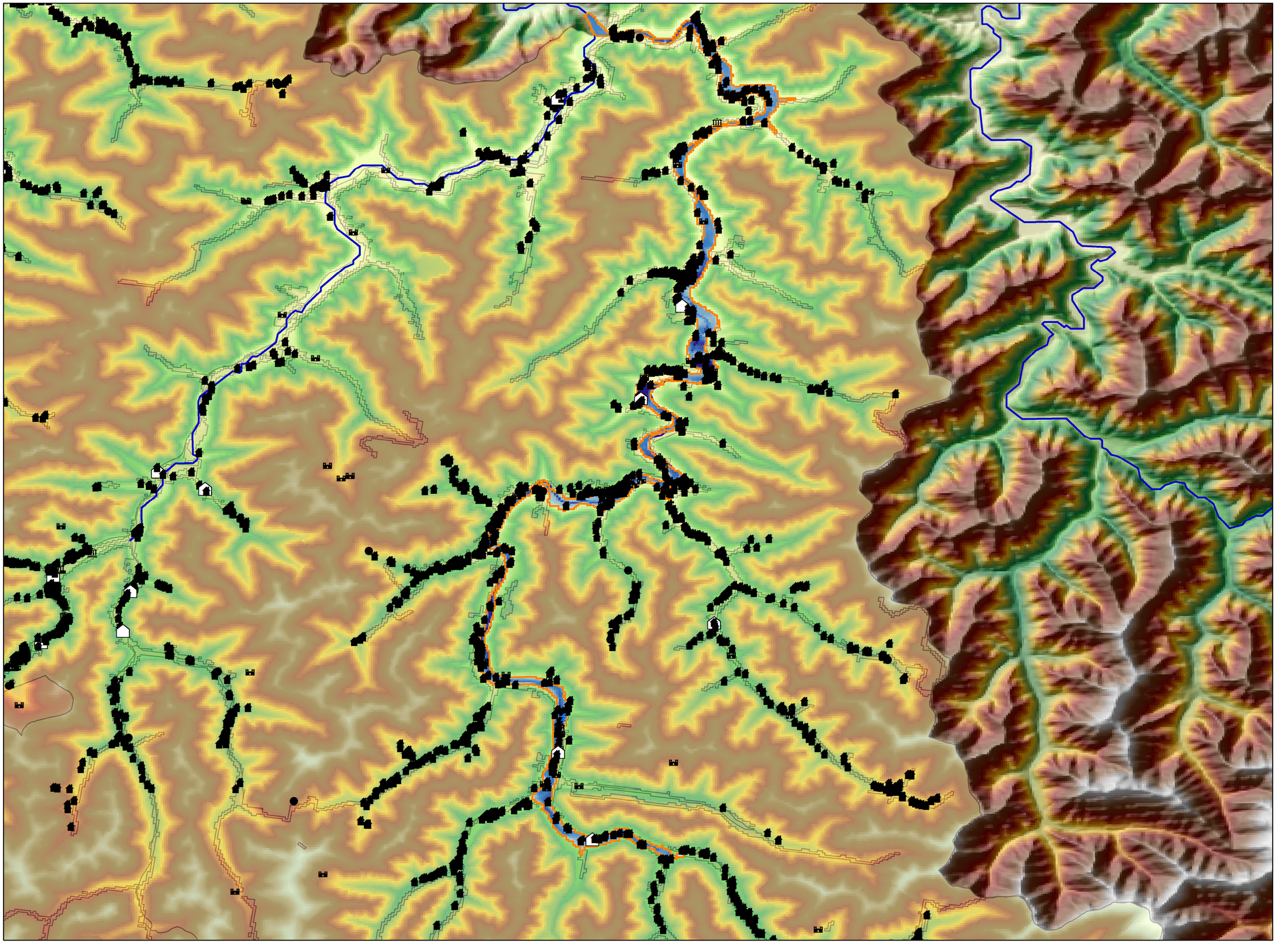
Study Region Boundary
- Study Region Boundary

240

1 0.5 0 1 Miles

N
W E
S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottRtFrkBeaverCrk



Legend

Addresses
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

rpd100_r
Value
High : 51.05
Low : 0.002

Reaches
Reaches

RegionDEM
High : 2918.06
Low : 569.913

Census Blocks
Census Blocks

Census Tracts
Census Tracts

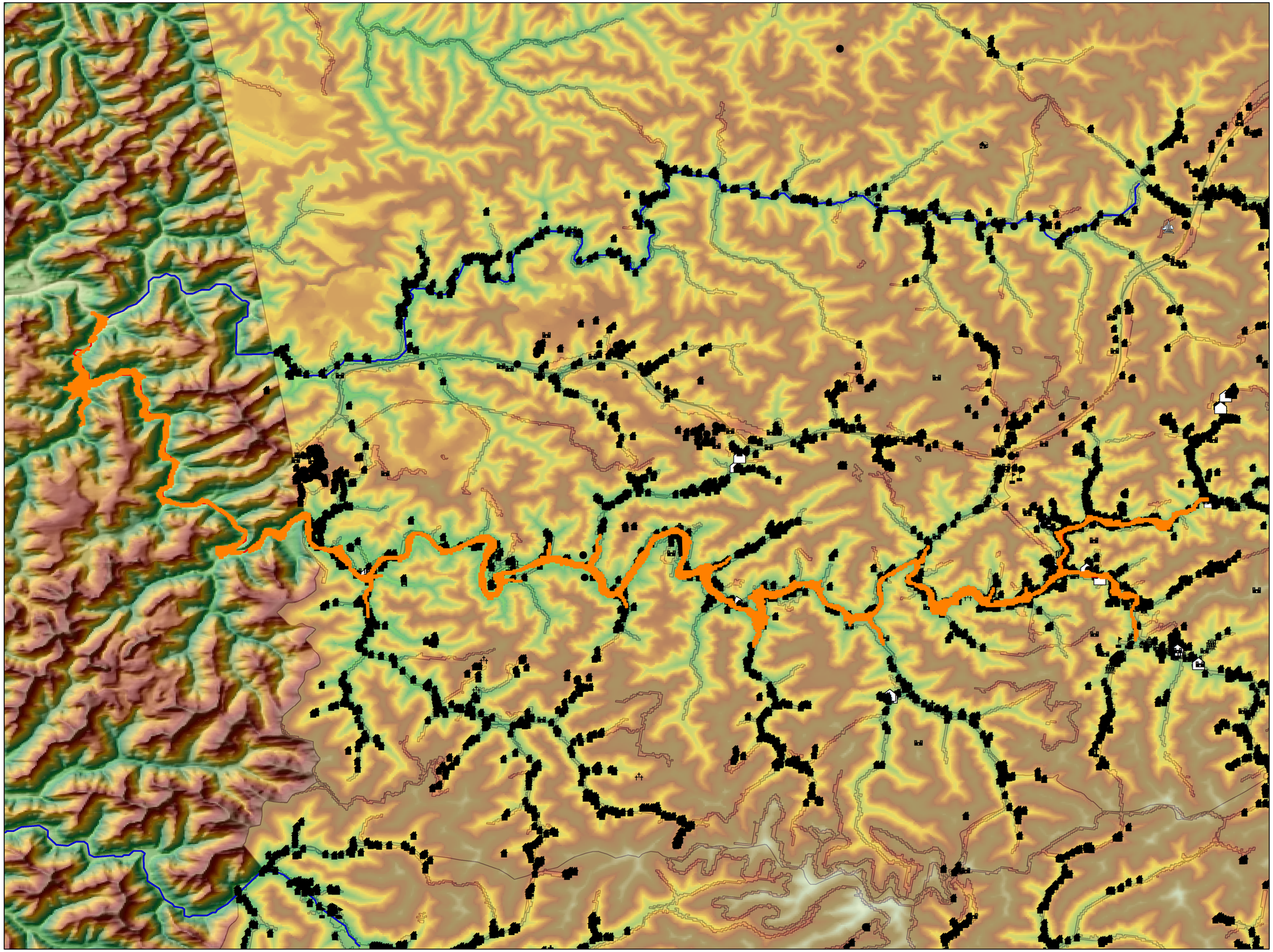
Hillshade
High : 254
Low : 0

Study Region Boundary
Study Region Boundary

1 0.5 0 1 Miles

N
W E
S

Study Region: Knott2 Description: Knott County Hazard Mitigation Flood Analysis
Scenario: KnottTrooublesome Crk



Legend

BoundaryPolygon

rpd100_r

Value

High : 43.6627

Low : 0.0158789

ChosenReaches

Addresses

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

Reaches

Reaches

RegionDEM

High : 2918.06

Low : 569.913

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

Study Region Boundary

Study Region Boundary

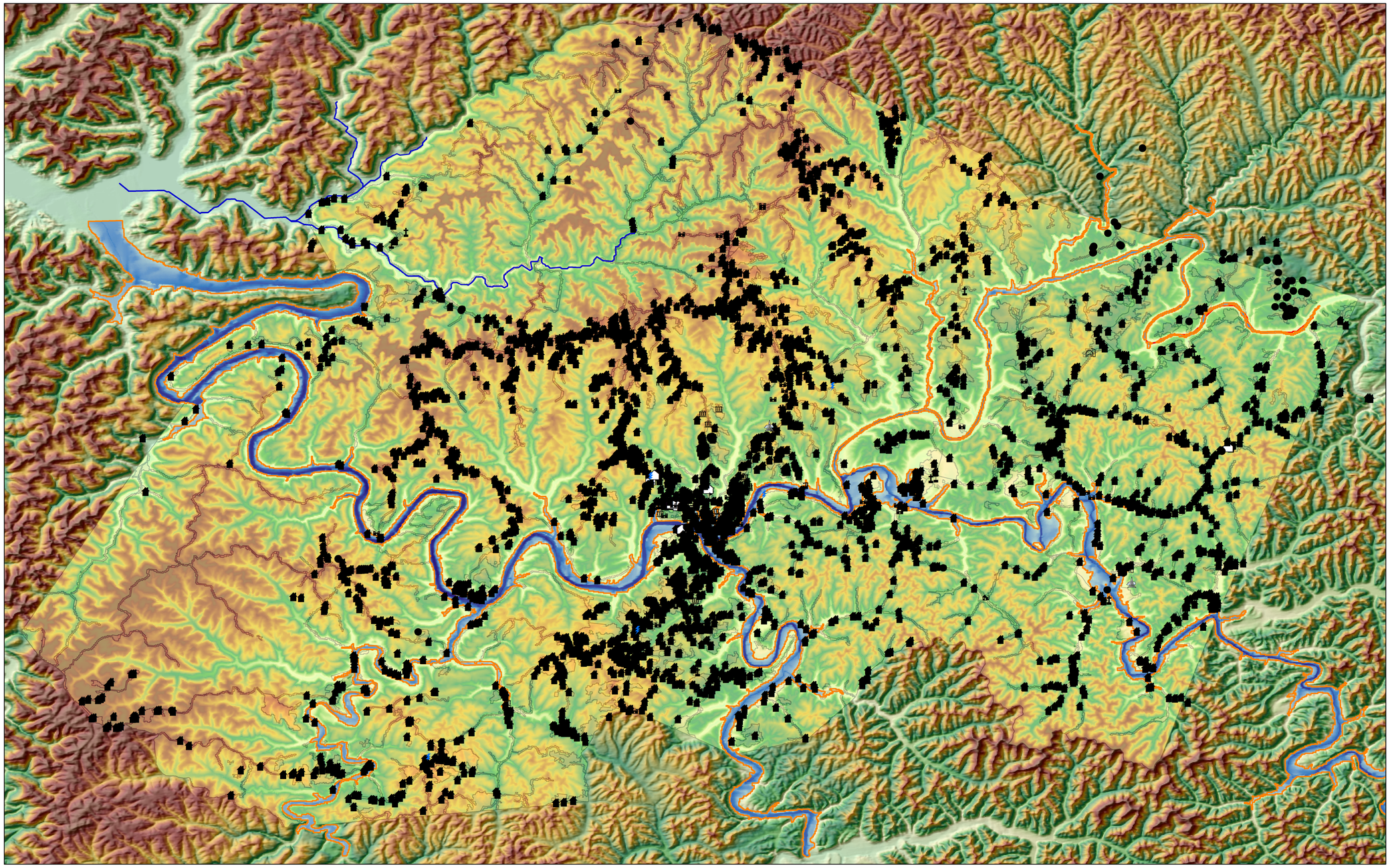
2 1 0 2 Miles

242

N W E S

Study Region: LeeCo2 Description: Lee County Hazard Mitigation Flood Analysis

Scenario: LeeCoKentuckyRiv



3 1.5 0 3 Miles

N
W E
S

243

Legend

TYPE

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon
BoundaryPolygon

rpd100_r
High : 69.12
Low : 0.001

ChosenReaches
ChosenReaches

Reaches
Reaches

RegionDEM
High : 2442.88
Low : 564.994

Census Blocks
Census Blocks

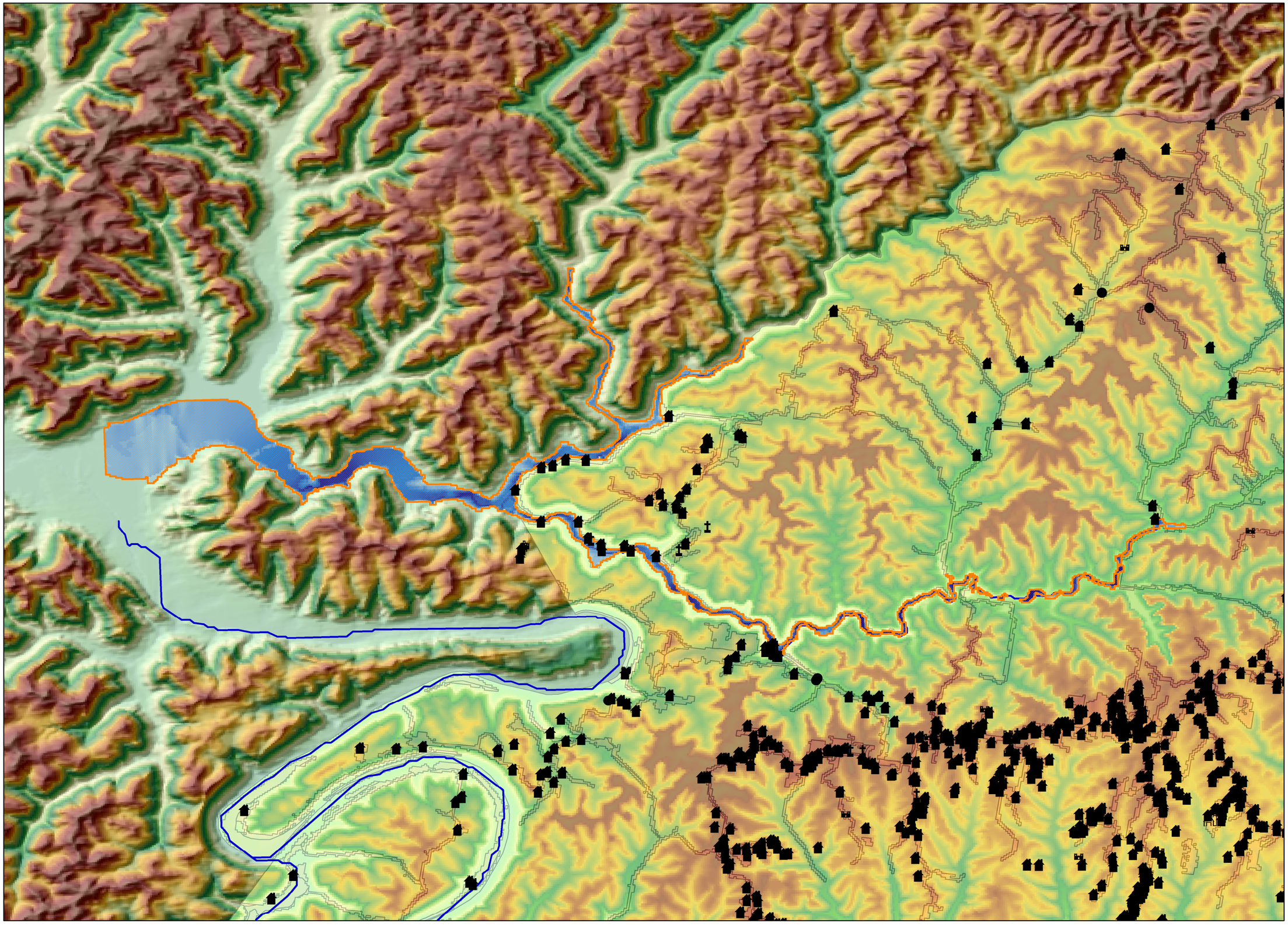
Census Tracts
Census Tracts

Hillshade
High : 254
Low : 0

Study Region Boundary
Study Region Boundary

Study Region: LeeCo2 Description: Lee County Hazard Mitigation Flood Analysis

Scenario: LeeCoMillersCrk



Legend

TYPE

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION
- BoundaryPolygon

rpd100_r

Value

High : 39.60

Low : 0.001

Reaches

Reaches

RegionDEM

High : 2442.88

Low : 564.994

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

Study Region Boundary

Study Region Boundary

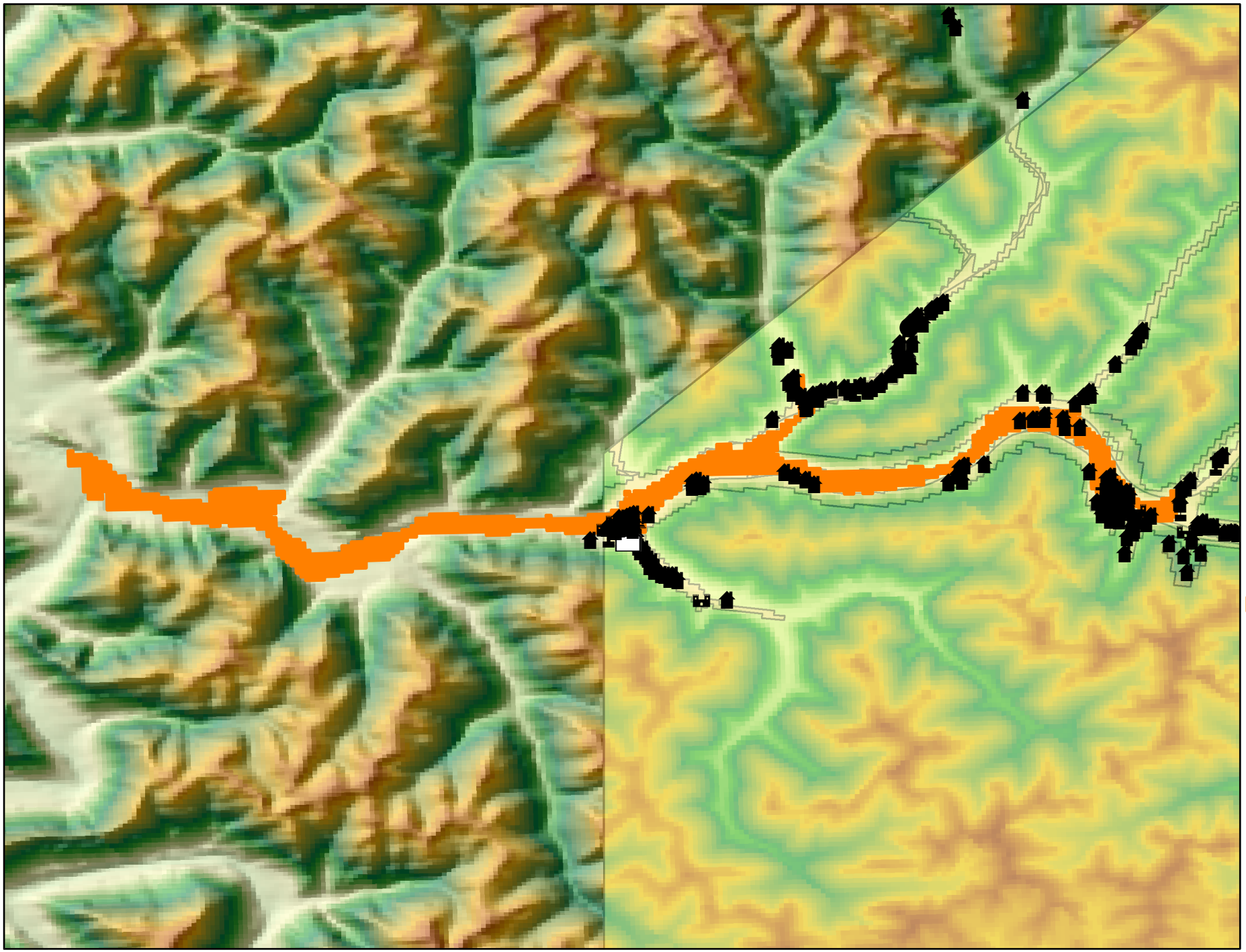
1 0.5 0 1 Miles

N

W E

S

Study Region: LeslieCo Description: Leslie County Hazard Mitigation Flood Analysis
Scenario: LeslieCoMidFrkKyRiver



Legend

TYPE
- OTHER
- APARTMENT
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- BoundaryPolygon

rpd100_r

Value
High : 35.4428
Low : 0.0188086

RegionDEM
High : 3418.99
Low : 622.984

Census Blocks
Census Blocks

Census Tracts
Census Tracts

Study Region Boundary
Study Region Boundary

Hillshade
High : 254
Low : 0

245

0.5 0.25 0 0.5 Miles

N W E S

Study Region: LeslieCo Description: Leslie County Hazard Mitigation Flood Analysis

Scenario: LeslieCoMidFrkKyRiver

Legend

TYPE

- OTHER
- APARTMENT
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL

BoundaryPolygon

BoundaryPolygon

rpd100_r

High : 95.09

Low : 0.001

RegionDEM

High : 3418.99

Low : 622.984

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Study Region Boundary

Study Region Boundary

Hillshade

High : 254

Low : 0

3 1.5 0 3 Miles

246

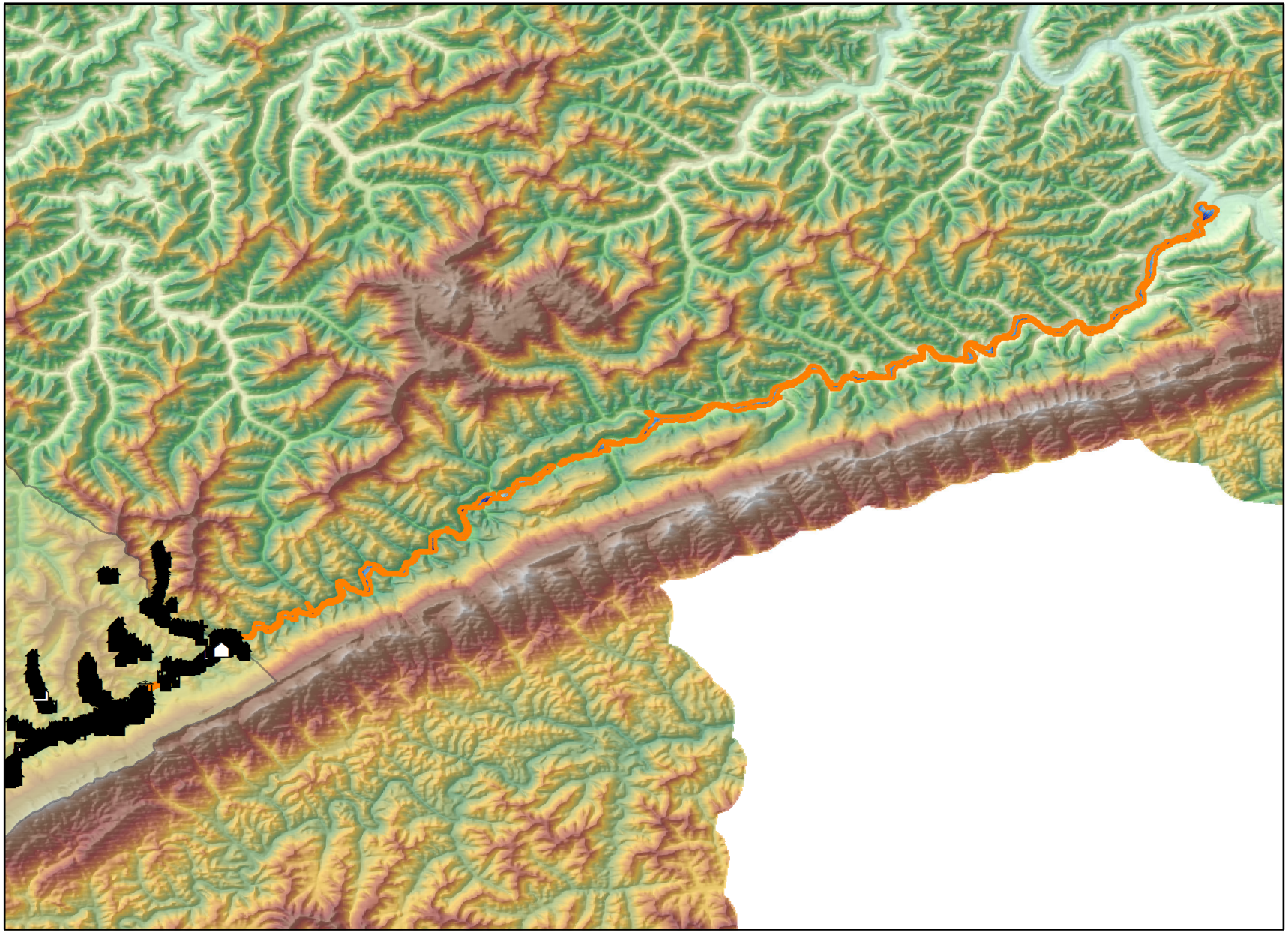
N

W E

S

Study Region: LetcherCo Description: Letcher County Hazard Mitigation Flood Analysis

Scenario: LetcherCoElkhornCrk



Legend

Merged_Structure_sps

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

rpd100_r

Value

High : 44.8319

Low : 0.00293945

BoundaryPolygon

BoundaryPolygon

rpd100_r

High : 66.5096

Low : 0.00452637

Census Tracts

Census Tracts

clipdem

High : 4687.23

Low : 655.236

hillshade

High : 254

Low : 0

Study Region Boundary

Study Region Boundary

2 1 0 2 Miles

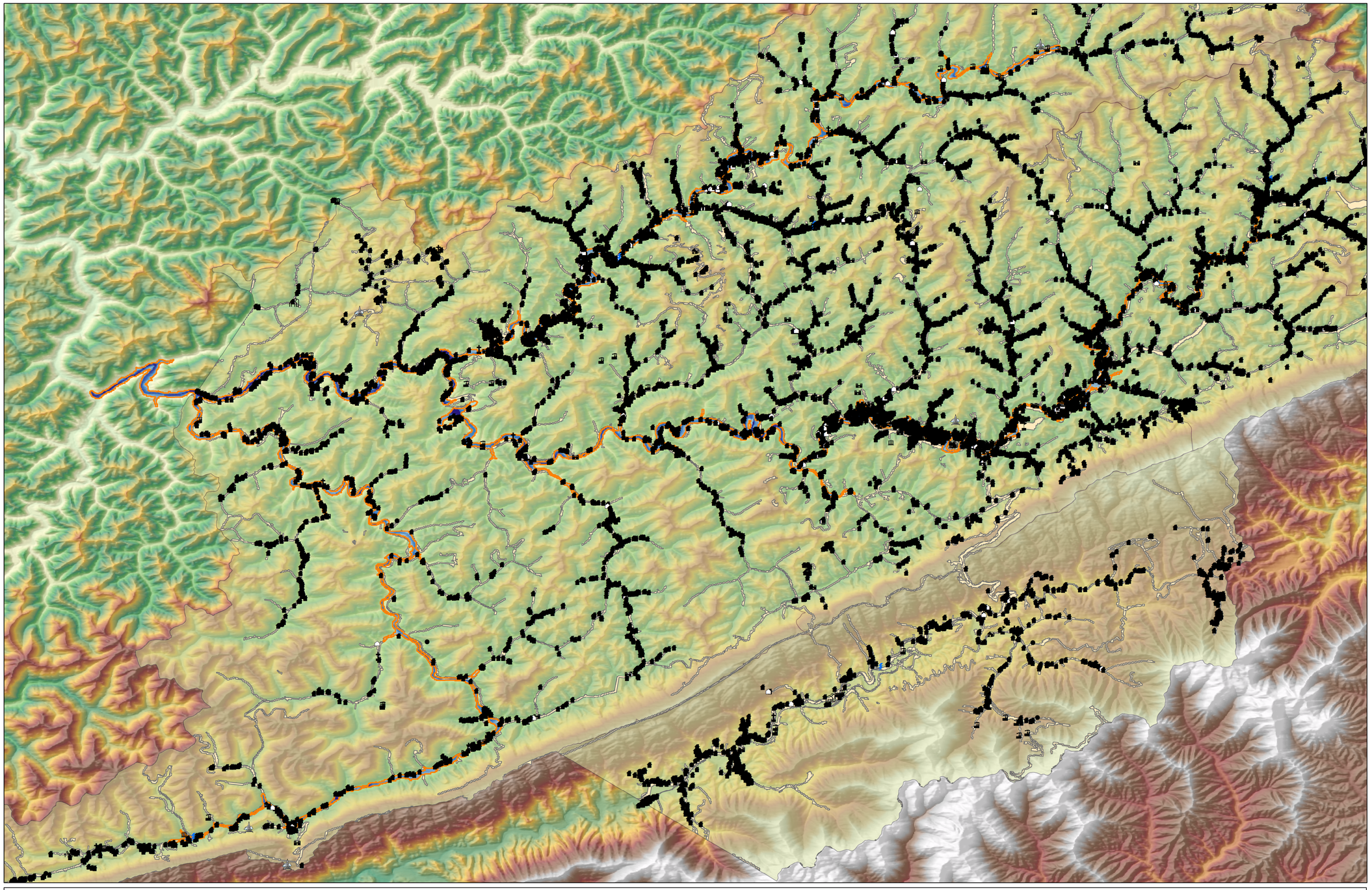
247

N

W E

S

Study Region: LetcherCo Description: Letcher County Hazard Mitigation Flood Analysis
Scenario: LetcherCoNoFrkKentuckyRiv



Legend

Merged_Structure_sps
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon
- BoundaryPolygon

rpd100_r
- High : 66.5096
- Low : 0.00452637

Census Blocks
- Census Blocks

Census Tracts
- Census Tracts

clipdem
- High : 4687.23
- Low : 655.236

hillshade
- High : 254
- Low : 0

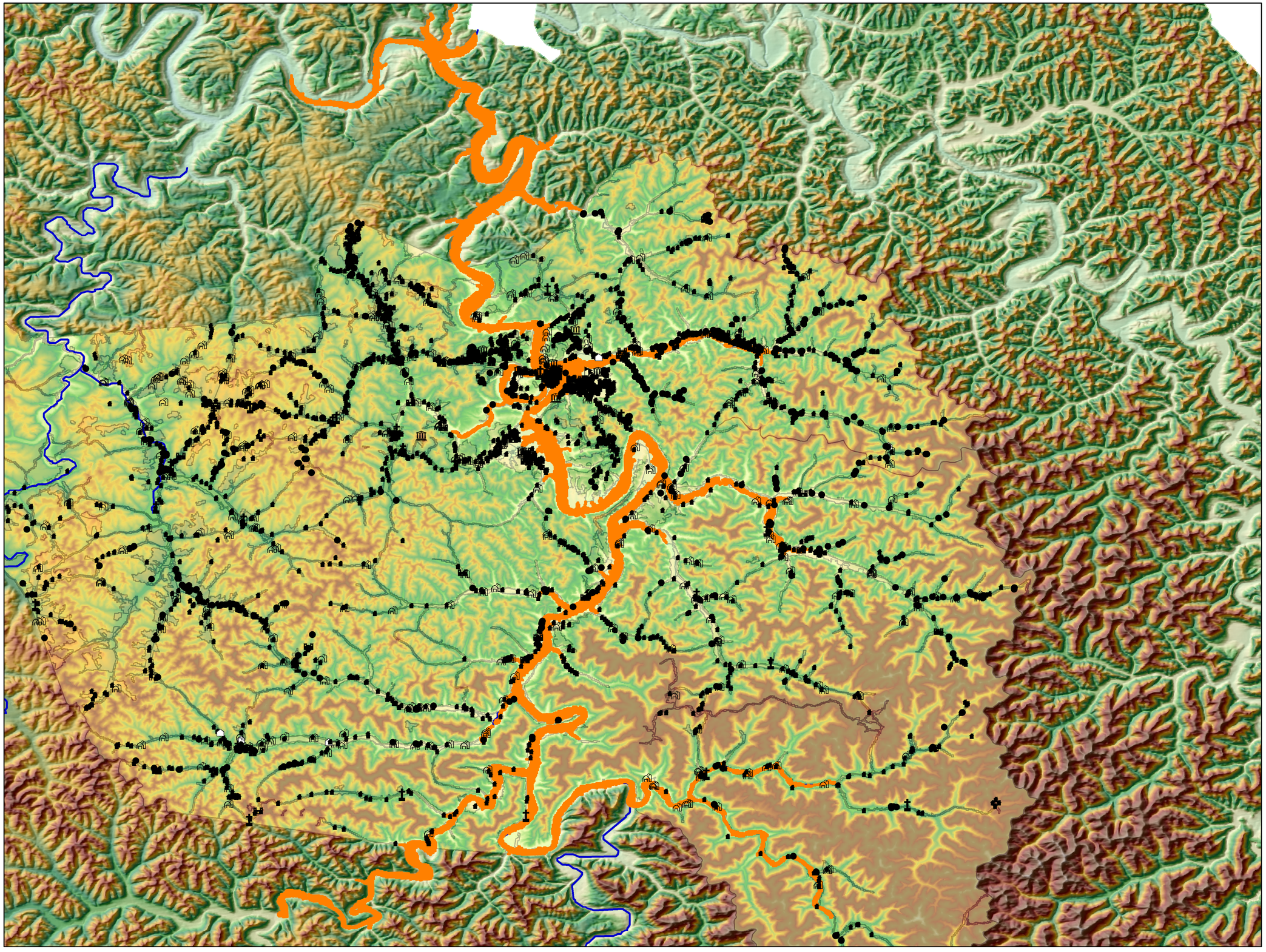
Study Region Boundary
- Study Region Boundary

2 1 0 2 Miles

N W E S

Study Region: OwsleyCo Description: Owsley County Hazard Mitigation Flood Analysis

Scenario: OwsleyCoSoFrkKyRiver



Legend

OwsleyPnts

- OTHER
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

BoundaryPolygon

rpd100_r

High : 67.61

Low : 0.001

Reaches

Reaches

RegionDEM

High : 2442.88

Low : 585.98

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

Study Region Boundary

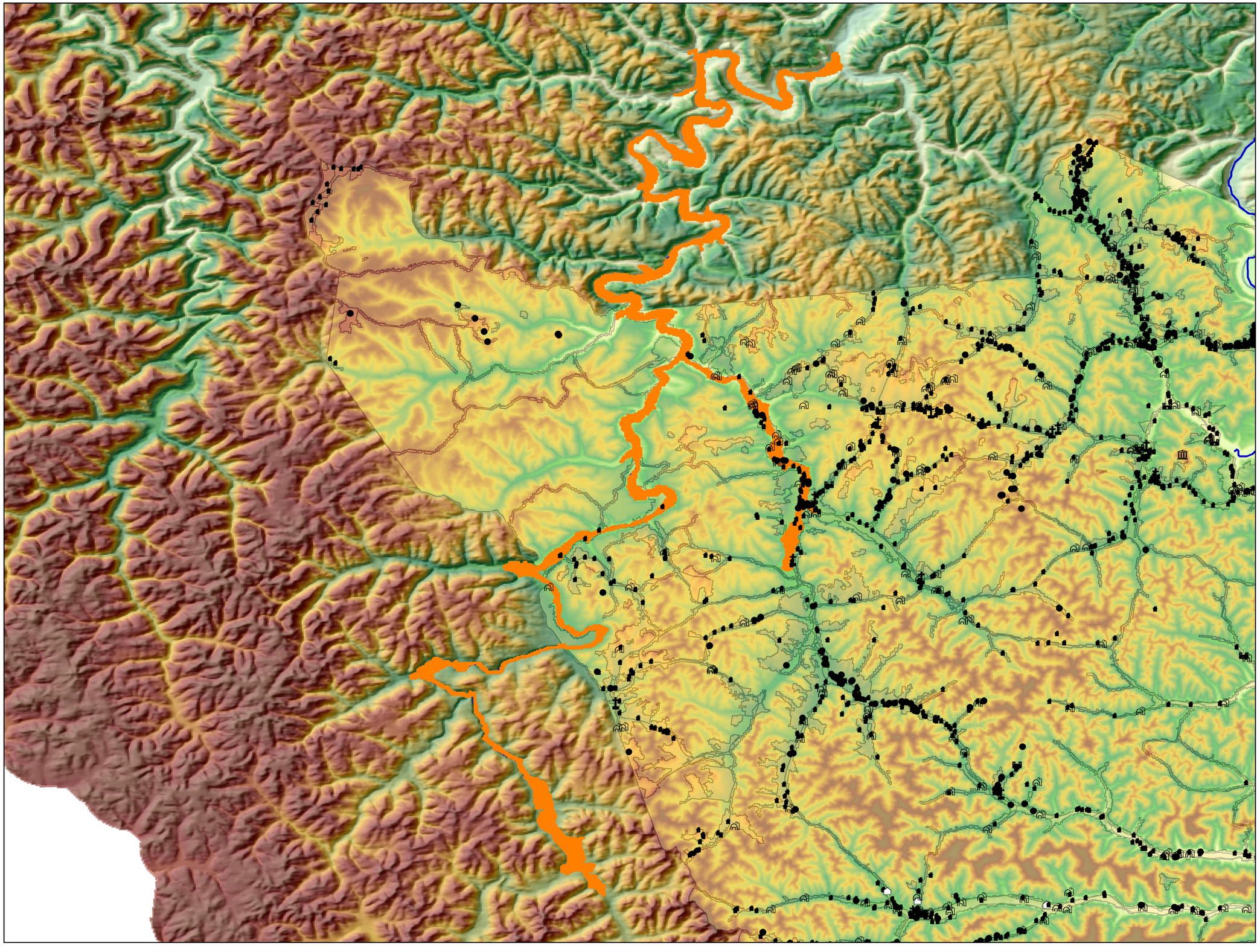
Study Region Boundary

3 1.5 0 3 Miles

N W E S

Study Region: OwsleyCo Description: Owsley County Hazard Mitigation Flood Analysis

Scenario: OwsleyCoSturgeonCrk



Legend

OwsleyPnts

- OTHER
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- PUBLIC
- RESIDENCE
- SCHOOL
- SUBSTATION

BoundaryPolygon

rpd100_r

Value

High : 46.9438

Low : 0.00116943

Reaches

Reaches

RegionDEM

High : 2442.88

Low : 585.98

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

Study Region Boundary

Study Region Boundary

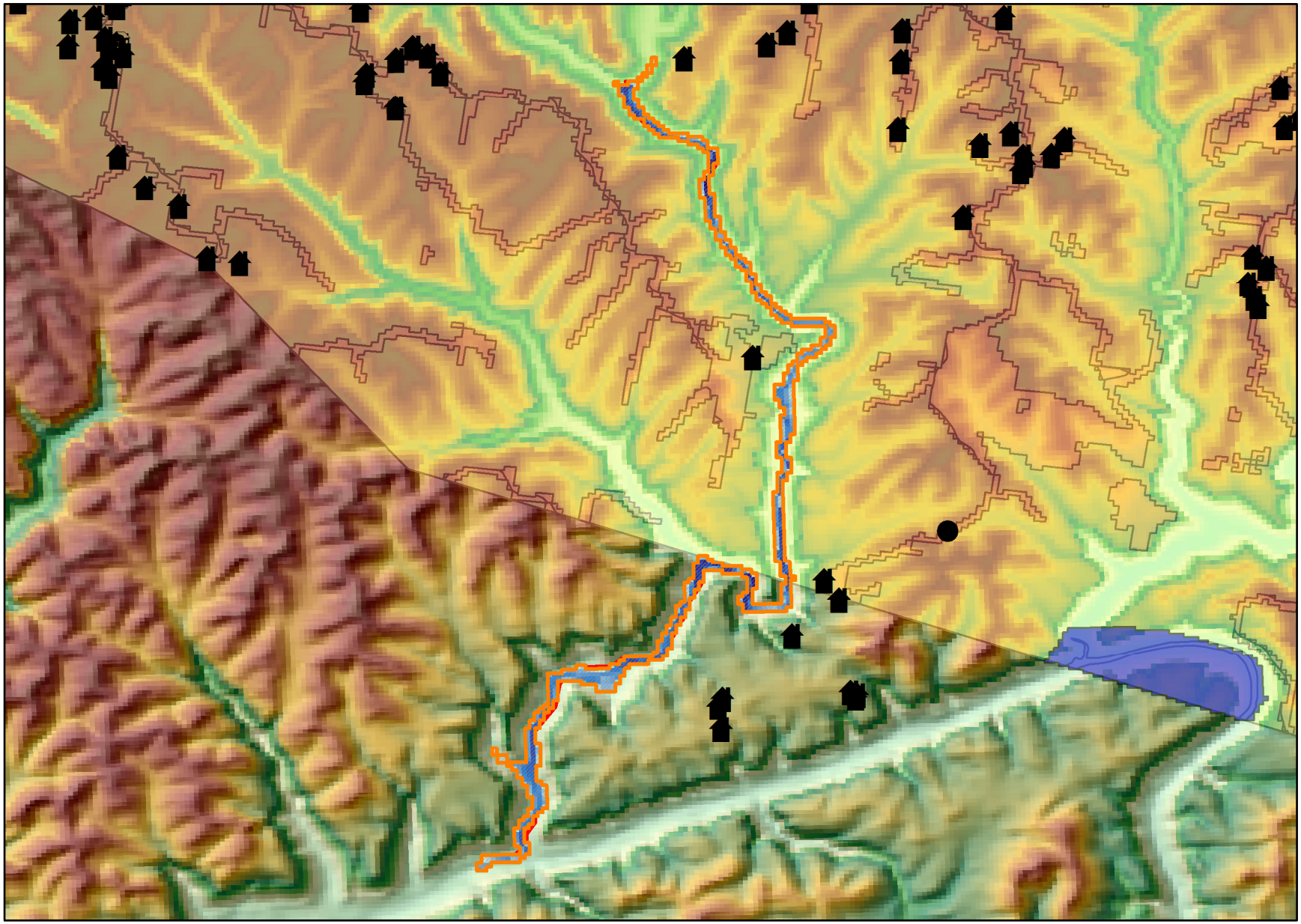
2 1 0 2 Miles

250

N W E S

Study Region: WolfeCo Description: Wolfe County Hazard Mitigation Flood Analysis

Scenario: WolfeCoLoDevilCrk



Legend

structure
- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL

structure
- structure

BoundaryPolygon
- BoundaryPolygon

rpd100_r
- High : 31.077
- Low : 0.074646

ChosenReaches
- ChosenReaches

BoundaryPolygon
- BoundaryPolygon

rpd100_r
- High : 86.7392
- Low : 9.76563e-006

UserData
- Depth Grid

RegionDEM
- High : 1612.76
- Low : 564.994

Census Blocks
- Census Blocks

Census Tracts
- Census Tracts

Hillshade
- High : 254
- Low : 0

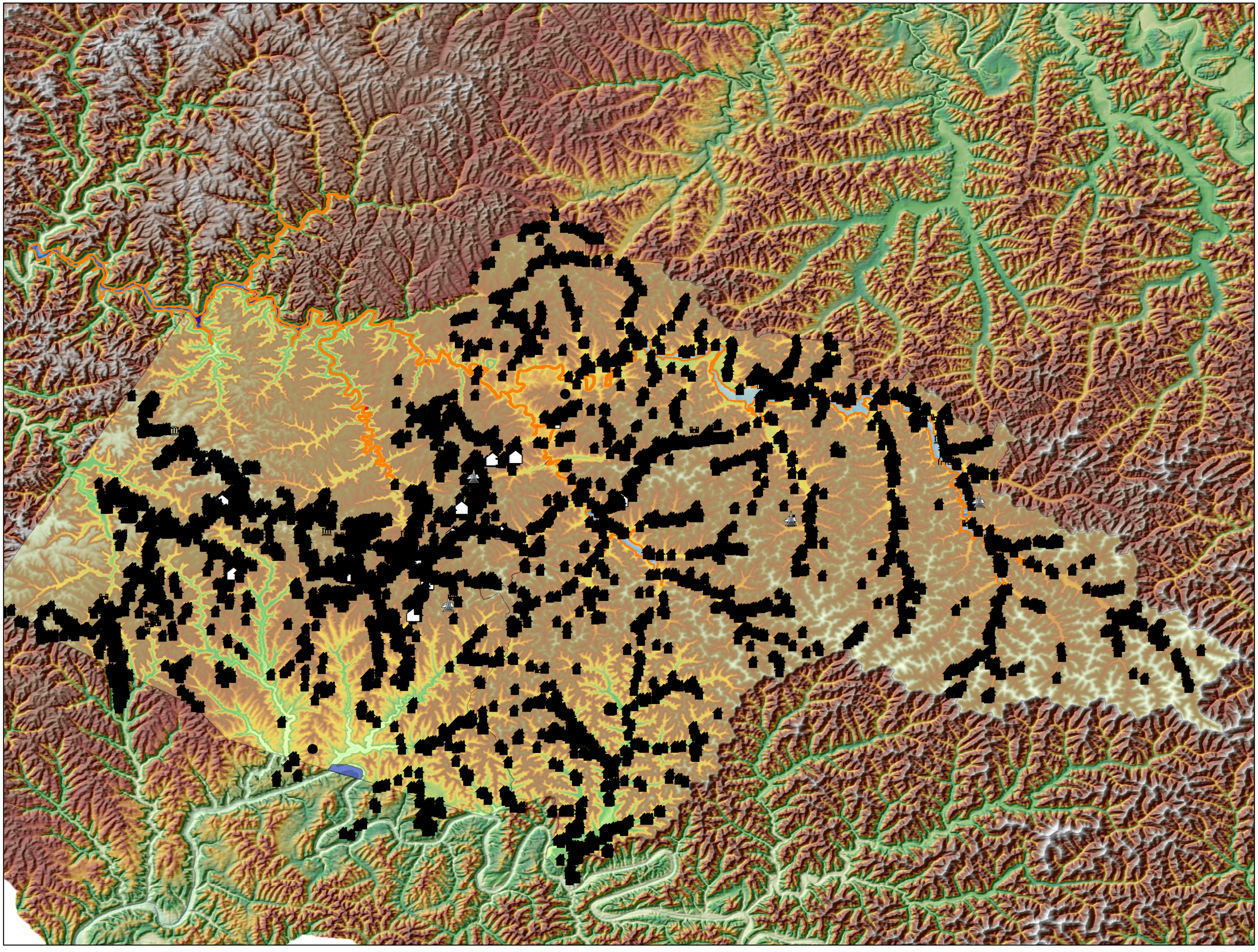
Study Region Boundary
- Study Region Boundary

1 0.5 0 1 Miles

N W E S

Study Region: WolfeCo Description: Wolfe County Hazard Mitigation Flood Analysis

Scenario: WolfeCoRedRiver



Legend

structure

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL

BoundaryPolygon

- BoundaryPolygon

rpd100_r

- High : 86.7392
- Low : 9.76563e-006

ChosenReaches

- ChosenReaches

UserData

- Depth Grid

RegionDEM

- High : 1612.76
- Low : 564.994

Census Tracts

- Census Tracts

Hillshade

- High : 254
- Low : 0

Study Region Boundary

- Study Region Boundary

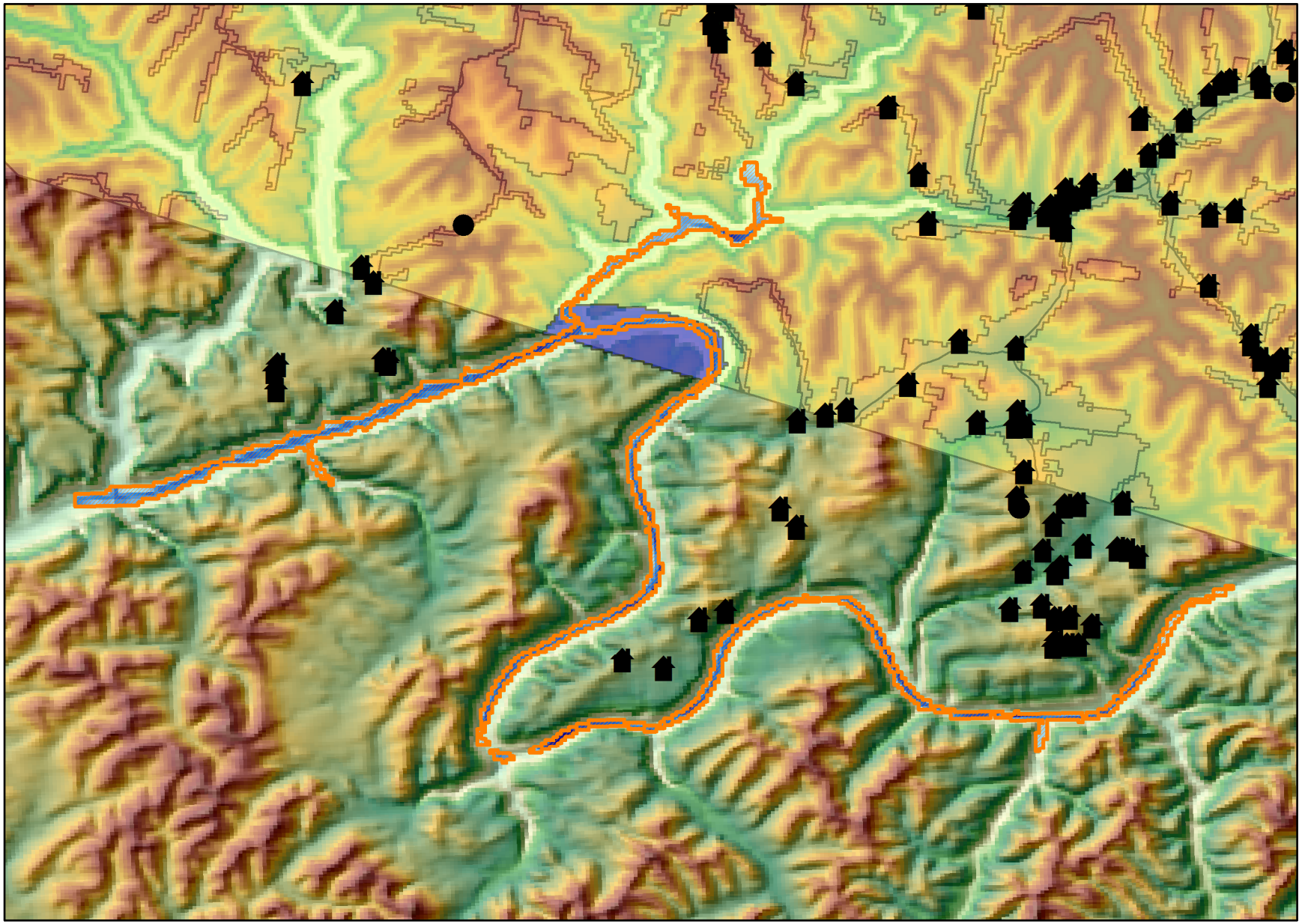
3.5 1.75 0 3.5 Miles

N W E S

252

Study Region: WolfeCo Description: Wolfe County Hazard Mitigation Flood Analysis

Scenario: WolfeCoUpDevilCrk



Legend

structure

- OTHER
- APARTMENT
- CELL TOWER
- CEMETERY
- CHURCH
- COMMERCIAL
- FARM STRUCTURE
- GARAGE
- GOVERNMENT
- INDUSTRIAL
- PUBLIC
- RESIDENCE
- SCHOOL

BoundaryPolygon

rpd100_r

Value

High : 42.0516

Low : 0.0011084

UserData

Depth Grid

RegionDEM

High : 1612.76

Low : 564.994

Census Blocks

Census Blocks

Census Tracts

Census Tracts

Hillshade

High : 254

Low : 0

Study Region Boundary

Study Region Boundary

1 0.5 253 0 1 Miles

N

W E

S

ATTACHMENT E
Risk Assessment: Severe Storms and Hail Vulnerability Maps

City of Beattyville
Storm Events

065 KY-11

065 KY-1144

0.75

MAG=55
$0

MAG=55
$0

MAG=52
$0

0.88

MAG=55
$0

MAG=55
$10000

MAG=0
$3000

MAG=53
$0

MAG=52
$0

MAG=55
$0

MAG=53
$0

065 KY-52

1.00

MAG=57
$30000

MAG=52
$4000

MAG=52
$4000

1.00

MAG=52
$1000

MAG=0
$3000

1.25

MAG=55
$0

MAG=50
$0

065 KY-3150

065 KY-1411

Crystal Cr.

Bridge Fork

Kentucky River North Fork

Red Bird River/S. Fk. Kentucky R.

Miles Cr.

0 0.1 0.2 0.4 0.6 Miles

Legend

- Hail Events by Size
- Lightning by Damage
- Thunderstorm by Windspeed and Damage
- State Routes
- Streams
- City of Beattyville
- Lee County

City of Blackey
Storm Events

MAG=60
$0

¿

067 KY-3408

067 KY-2036

067 KY-568

$3000

BLACKEY

067 KY-7

Rockhouse Creek

Rockhouse Creek

Kentucky River North Fork

0 0.05 0.1 0.2 0.3 Miles

Legend

- Æ Hail Events by Size
- ¿ Thunderstorm by Windspeed and Damage
- Tornado by Damage
- State Routes
- Streams
- Flashflood by Damage
- City Boundaries
- Letcher County

City of Booneville
Storm Events

Æ 0.75
Æ 0.75
MAG=80
$25000
¿
Æ 0.75
Æ 0.75
MAG=0
$2000
¿
Æ 1.50
Æ 0.75
Æ 0.75
Æ 0.88
MAG=55
$0
¿
MAG=65
$10000
¿
MAG=65
$10000
¿
Æ 0.88
MAG=55
$7000
¿

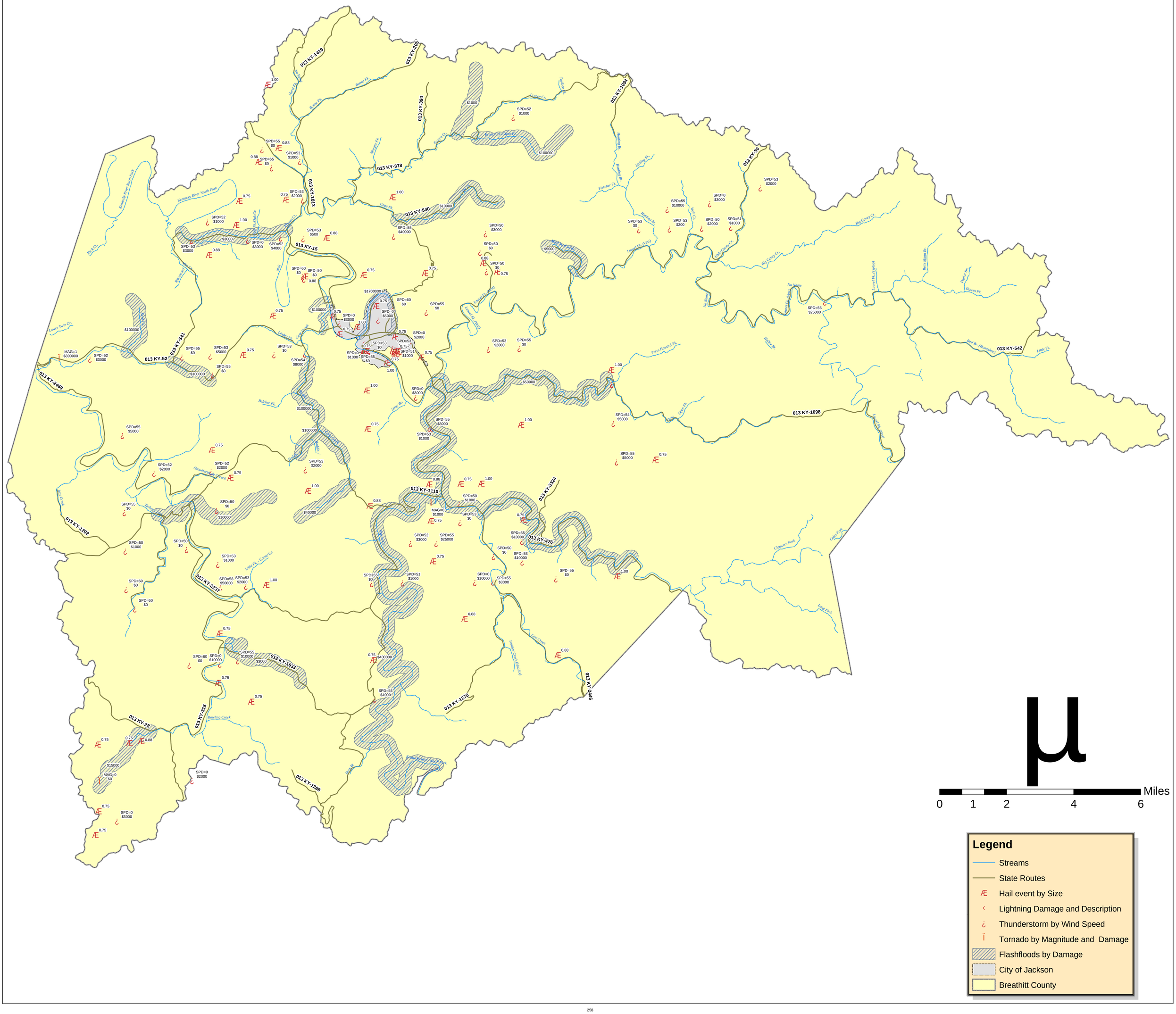
095 KY-1411
095 KY-30
095 KY-3504
095 KY-11
095 KY-3346
095 KY-3347
095 KY-28

0 0.1 0.2 0.4 0.6 Miles

Legend

- Æ Hail Events by Size
- ¿ Thunderstorm by Windspeed and Damage
- Í Tornado by Damage
- Flashflood by Damage
- State Routes
- Owsley_stream
- City of Booneville
- Letcher County

Breathitt County
Storm Events



Legend

- Streams
- State Routes
- Æ Hail event by Size
- ‹ Lightning Damage and Description
- ¿ Thunderstorm by Wind Speed
- Ï Tornado by Magnitude and Damage
- Flashfloods by Damage
- City of Jackson
- Breathitt County

City of Buckhorn
Storm Events

MAG=53
$6000

0.75

0.75

0.88

0.88

MAG=0
$2000

097 KY-28

097 KY-1387

097 KY-2022

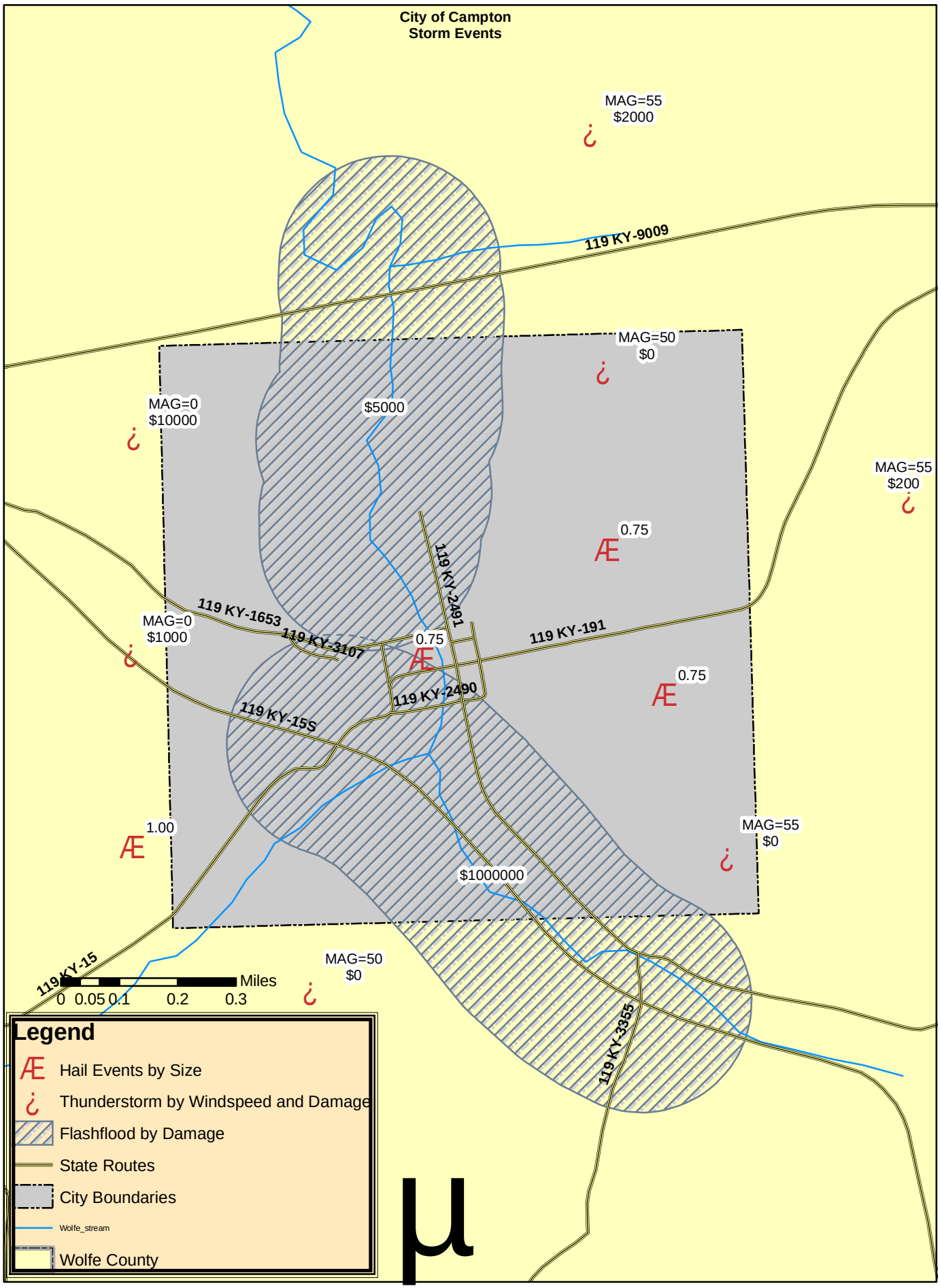
$0

MAG=55
$0

0 0.05 0.2 0.3 Miles

Legend

- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Flashflood by Damage
- State Routes
- City Boundaries
- Streams
- Perry County


City of Campton
Storm Events
MAG=55
$2000
119 KY-9009
MAG=50
$0
MAG=0
$10000
$5000
MAG=55
$200
0.75
119 KY-2491
119 KY-1653
119 KY-3107
MAG=0
$1000
0.75
119 KY-191
0.75
119 KY-2490
119 KY-15S
1.00
MAG=55
$0
$1000000
MAG=50
$0
119 KY-15
119 KY-3355
0 0.05 0.1 0.2 0.3
Miles
Legend
Hail Events by Size
Thunderstorm by Windspeed and Damage
Flashflood by Damage
State Routes
City Boundaries
Wolfe_stream
Wolfe County

City of Fleming-Neon
Storm Events

Miles
0 0.05 0.1 0.2 0.3

Legend
- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Tornado by Damage
- State Routes
- Streams
- Flashflood by Damage
- City Boundaries
- Letcher County

$0

067 KY-343

FLEMING-NEON

$200000

067 KY-317

Boone Fork

Æ 1.00

067 KY-805

Ï $250000

Æ 1.25

Æ 1.00

Æ 0.75

City of Hazard
Storm Events

N

Miles
0 0.125 0.25 0.5 0.75 1

Legend

- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- State Routes
- Streams
- HAZARD_CITY_2008
- Flashflood by Damage
- City Boundaries
- Perry County

097 KY-15
097 KY-267
097 KY-80
097
$0
KY-1088
MAG=0 $2000
1.00
MAG=50 $0
097 DB-9006
0.88
097 KY-550
097 KY-1440
097 KY-2021
MAG=52 $20000
MAG=53 $8000
MAG=0 $15000
MAG=53 $3000
097 KY-2445
MAG=52 $7000
MAG=52 $3000
MAG=52 $1000
MAG=55 $35000
MAG=55 $0
1.00
0.75
0.88
MAG=70 $10000
097 KY-451
MAG=50 $0
0.75
0.75
097 KY-2451
097 KY-15X
1.00
097 KY-1762
MAG=50 $5000
MAG=52 $1000
1.00
0.75
097 KY-2449
097 KY-2448
MAG=55 $30000
MAG=55 $50000
1.00
MAG=50 $0
MAG=0 $3000
MAG=50 $2000
MAG=54 $7000
0.88
0.88
MAG=52 $5000
097 KY-1096

City of Hindman
Storm Events

060 KY-80
060 KY-2759
060 KY-160
060 KY-550
060 KY-3391
Troublesome Creek

Æ 2.75
Æ 0.75
Æ 0.75
Æ 0.75
Æ 1.50
¿ MAG=53 $0
¿ MAG=0 $5000
¿ MAG=50 $0
¿ MAG=55 $25000
¿ MAG=55 $30000

0 0.125 0.25 0.5 Miles

Legend

- Æ Hail Events by Size
- ¿ Thunderstorm by Windspeed and Damage
- State Routes
- Streams
- City of Hindman
- Knott County

City of Hyden
Storm Events

0.88

0.75

MAG=60
$0

0.88

066 KY-257

MAG=0
$3000

0.88

MAG=55
$3000

MAG=53
$4000

1.00

066 KY-118

2.50

066 US-421

066 KY-80

MAG=50
$0

Rockhouse Creek

Hurts Creek

$0

Middle Fork Kentucky River

0 0.05 0.2 0.3 Miles

Legend

- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Tornado by Damage
- Flashflood by Damage
- State Routes
- Streams
- City of Hyden
- Leslie County

City of Jackson
Storm Events

Kentucky River North Fork

013 KY-3193

Pan Bowl Br.

$1700000

Kentucky River North Fork

Pan Bowl Lake Runoff

Coxe Creek

013 KY-3231

013 KY-3232

013 KY-1812

013 KY-3068

013 KY-2462

013 KY-2472

013 KY-15

013 KY-30

Laurel Fk. (West)

South Fk. Quicksand Cr.

Stray Br.

$100000

$50000

SPD=60
$0

SPD=55
$0

SPD=0
$5000

SPD=0
$3000

SPD=0
$2000

SPD=0
$1000

SPD=0
$10000

SPD=50
$0

SPD=52
$1000

SPD=53
$0

SPD=53
$1000

SPD=53
$5000

SPD=53
$10000

SPD=51
$1000

SPD=53
$2000

SPD=54
$10000

0.75

1.00

Legend

- Streams
- State Routes
- Hail event by Size
- Lightning Damage and Description
- Thunderstorm by Wind Speed
- Tornado by Magnitude and Damage
- Flashfloods by Damage
- City of Jackson
- Breathitt County

0 0.1 0.4 0.6 Miles

City of Jenkins
Storm Events

MAG=53
$1000

067 KY-343

$0

1.75

$200000

FLEMING-NEON

067 KY-3409

067 US-23-2 067 US-23

Elkhorn Creek

1.25

1.00

1.00

MAG=52
$3000

067 US-23-221

$0

067 KY-805

JENKINS

MAG=53
$0

MAG=53
$5000

MAG=54
$6000

067 KY-3086

067 KY-2550

067 US-119-1

067 US-23-141

067 US-119

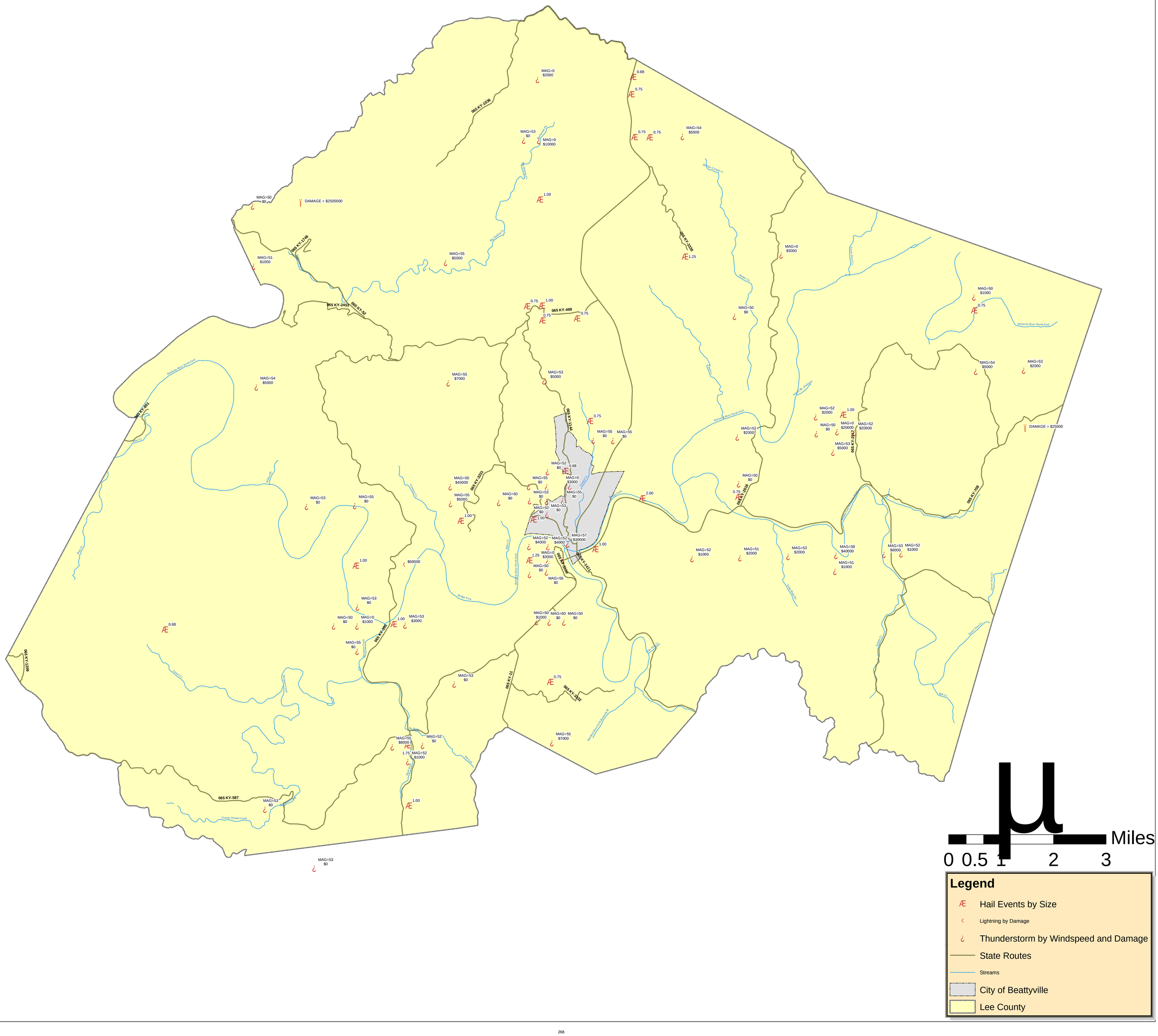
067 KY-3400

Miles
0 0.1 0.2 0.4 0.6

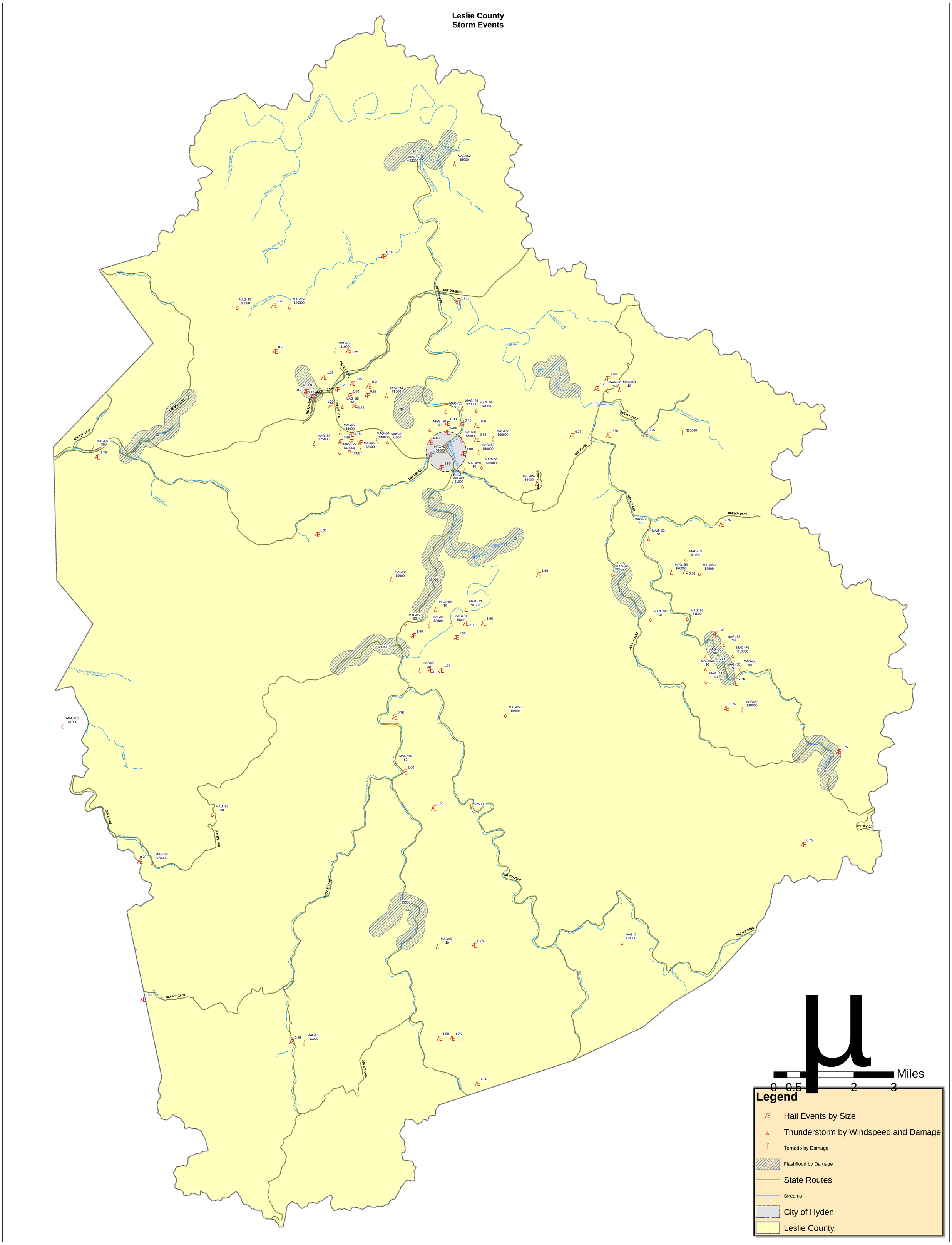
Legend
- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Tornado by Damage
- State Routes
- Streams
- Flashflood by Damage
- City Boundaries
- Letcher County

Knott County
Storm Events

Lee County
Storm Events



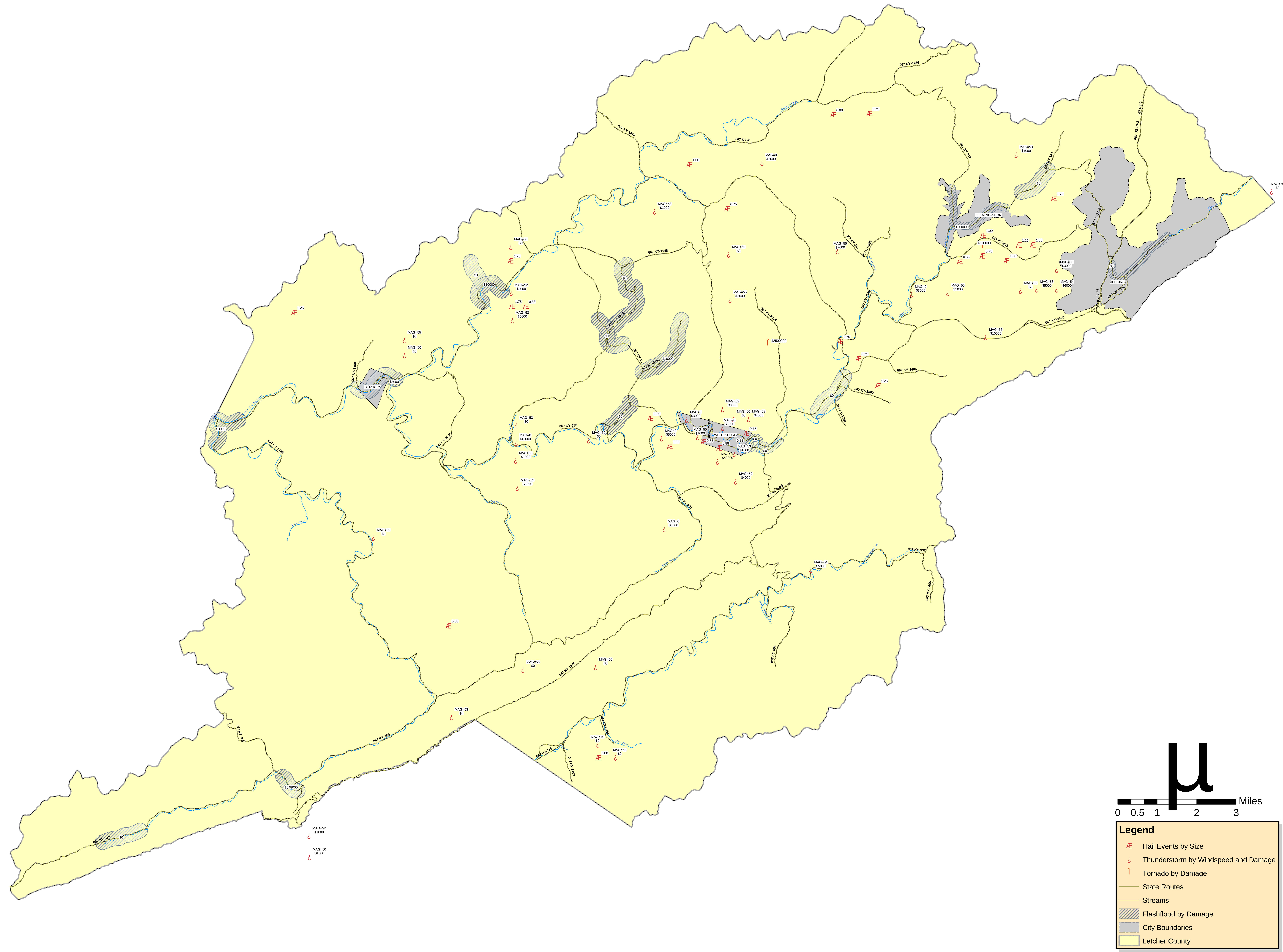
Leslie County
Storm Events



Legend

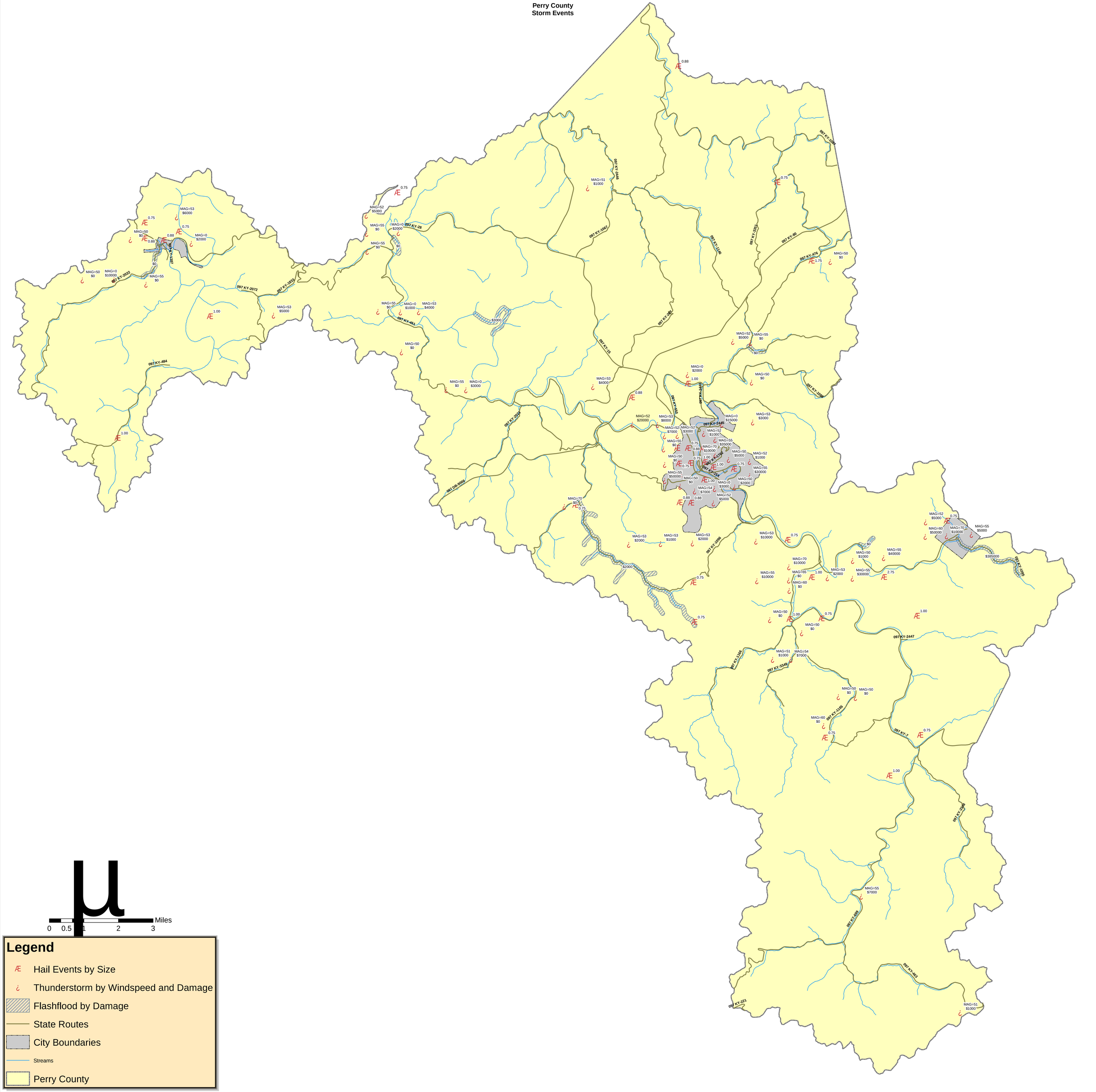
- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Tornado by Damage
- Flashflood by Damage
- State Routes
- Streams
- City of Hyden
- Leslie County

Letcher County
Storm Events



Owsley County
Storm Events

Perry County
Storm Events



0 0.5 1 2 3 Miles

Legend

- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Flashflood by Damage
- State Routes
- City Boundaries
- Streams
- Perry County

City of Pippa Passes
Storm Events

060 KY-1697

060 KY-899

Æ 0.88

Miles
0 0.05 0.1 0.2

Legend

- Æ Hail Events by Size
- ¿ Thunderstorm by Windspeed and Damage
- State Routes
- Streams
- City of Hindman
- Knott County

City of Vicco
Storm Events

N

Miles
0 0.05 0.2 0.3

Legend

- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Flashflood by Damage
- State Routes
- City Boundaries
- Streams
- Perry County

0.75

MAG=70
$10000

MAG=55
$5000

097 KY-15

097 KY-1095

$385000

097 KY-3197

City of Whitesburg
Storm Events

MAG=52
$3000

MAG=0
$3000

MAG=60
$0

MAG=53
$7000

MAG=0
$3000

MAG=55
$1000

MAG=53
$1000

MAG=55
$50000

0.75

0.88

0.75

0.88

$0

$0

WHITESBURG

067 KY-931

067 KY-15X

067 KY-15

067 KY-15X-1

067 KY-6289

067 KY-15C

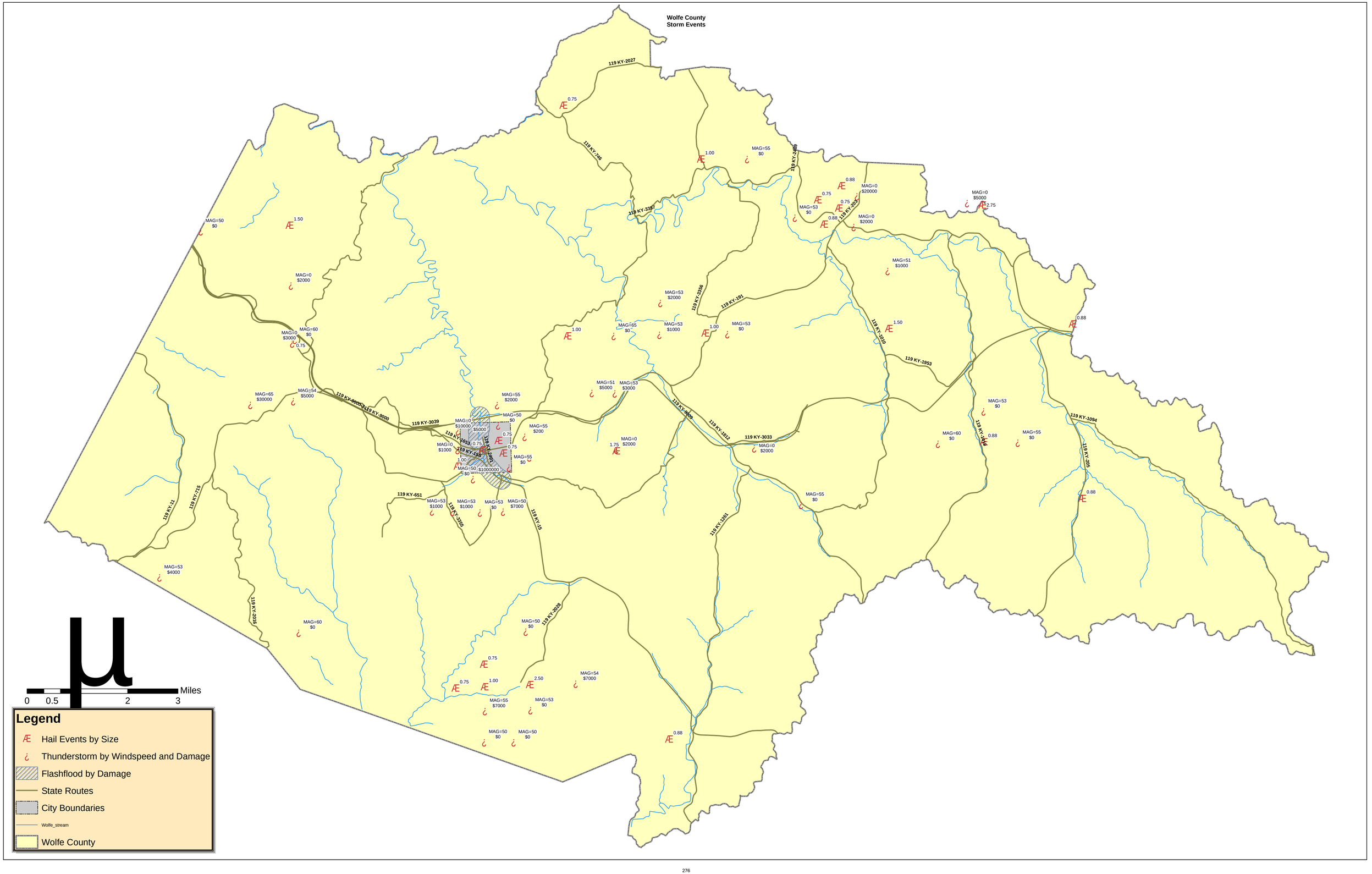
Kentucky River-North Fork

0 0.05 0.1 0.2 0.3 Miles

Legend

- Hail Events by Size
- Thunderstorm by Windspeed and Damage
- Tornado by Damage
- State Routes
- Streams
- Flashflood by Damage
- City Boundaries
- Letcher County

Wolfe County
Storm Events



ATTACHMENT F
Vulnerability: Critical Facilities Maps

Breathitt County
Flood Hazard Assessment

Legend

- CareFlty
- FireStation
- PoliceStation
- School
- CommunicationFlty
- PotableWaterFlty
- WasteWaterFlty
- Runway
- AirportFlty
- HighwayBridge

Roads

Owner

- State Highways
- County Routes
- City Streets
- 21
- 26
- RailFlty
- RailwayBridge
- RailwaySegment
- Rivers
- Dams
- Pan Bowl Lake
- City of Jackson
- Study Region Boundary

Historically Problematic Areas by Type

- Bridge
- Culvert
- Culvert & Road Brk
- Riverine Flooding
- Road Breaks
- Slide
- Slide & Road Breaks

0 0.5 1 2 3 Miles

N W E S

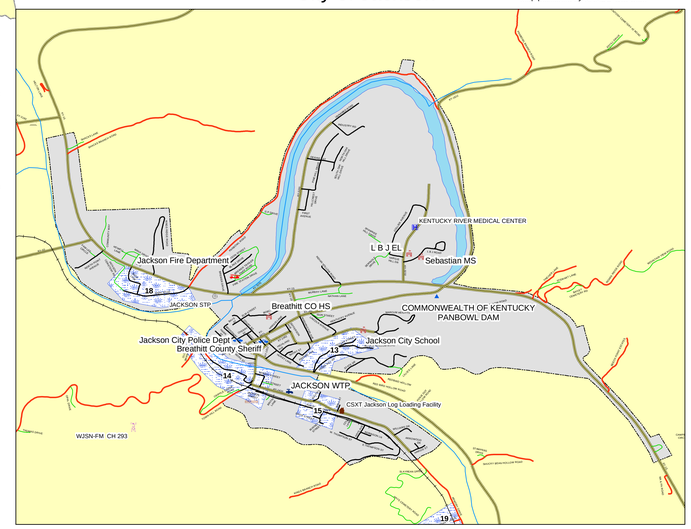
Kentucky River Area Development District
KRADD

Map published by KRADD GIS Staff

List of Problems and Locations

Loc. No.	Location	Problem
1	KY 542 at Calhoun Br Rd	KY 542 at Calhoun Br Rd – Rousseau Elem Sch floods
2	KY 30 from Griffith Br Rd to KY 30 and KY 52 Int	Flooding crosses and blocks road
3	KY 30 at Robinson Fk	Flooding crosses and blocks road
4	KY 30 at Belcher Fk	Flooding crosses and blocks road
5	KY 52 at Colts Fk	Flooding crosses and blocks road
6	KY 1278 at Leatherwood Rd	Flooding crosses and blocks road
7	Upper and Lower Caney Creek Rd	Flooding crosses and blocks road
8	KY 476 at Nix Br	Flooding crosses and blocks road
9	KY 1098 at Press Howard Fk	Flooding crosses and blocks road
10	KY 1098 at Smith Branch Rd	Flooding crosses and blocks road
11	KY 1812 from KY 15 Int to KY 378 Int	Flooding crosses and blocks road
12	KY 378 at Morgue Fork Rd	Flooding crosses and blocks road
13	KY 1812 at Bridge Holw	Flooding crosses and blocks road
14	Armory Dr at Combs St and Sewell St	Flooding crosses and blocks road
15	Armory Dr near Potable Water Treatment Plant	Flooding crosses and blocks road
16	KY 1110 at North & South Copeland Rd	Flooding crosses and blocks road
17	Miller Br	Flooding crosses and blocks road, frequent slides
18	KY 15 at Park Rd	Flooding crosses and blocks road
19	Armory Dr at Lick Br	Flooding crosses and blocks road
20	KY 28 at Morris Fk Rd	Flooding crosses and blocks road
21	KY 315 at Freeman Fk	Flooding crosses and blocks road
22	KY 315 at Jesses Br	Frequent slides block road

City of Jackson



Knott County
Flood Hazard Assessment

N
W E
S

0 0.5 1 2 3 Miles

Kentucky River Area Development District
KRADD

Map published by KRADD GIS Staff

Legend

- Fire Station
- Police Station
- School
- Communication Facility
- ElectricPowerFlty
- PotableWaterFlty
- WasteWaterFlty
- HighwayBridge

Roads

Owner

- State Highways
- County Routes
- City Streets
- 11
- 26
- RailwaySegment
- Rivers
- Dams
- Carr Creek Lake

City

NAME

- HINDMAN
- PIPPA PASSES
- VICCO
- Study Region Boundary

Historically Problematic Areas by Type

- Bridge
- Culvert
- Culvert & Road Brk
- Dredge
- Riverine Flooding
- Road Breaks
- Slide
- Slide & Road Breaks

List of Locations and Problems

Loc. No.	Location	Problem
1	HWY 899 from Reynolds Frk to Short Fork Rd	Historic flooding, needs Dredged
4	Dry Creek Rd	Historic flooding
5	Hall Branch Rd	Historic flooding
6	Mullins Branch Rd	Historic flooding
7	Bill Dee Br	Historic flooding
8	HWY 7 dowsstream of Puncheon Rd	Road breaks off
9	Mallie Rd	Historic flooding
10	Hales Branch Rd	Historic flooding
11	Horseshoe Bend Rd	Slide in road
12	Big Spring Br	Historic flooding
13	Pinetree Holw	Historic flooding
14	Lotts Crk thru Kelly Frk Rd	Road breaks off
15	Eagles Nest Rd	Slide in road
16	HWY 721 Clear Crk from Cockrell Tr Br to Dix Frk	Historic flooding
17	Lick Branch Rd	Slide in road

Lee County
Floood Hazard Assessment

Map published by KRADD GIS Staff

N
W E
S

0 0.5 1 2 Miles

List of Locations and Problems

Loc. No.	Location	Problem
1	KY 399 at Todds Rd	Flooding crosses and blocks road
2	KY 52 at Big Sinking Creek	Flooding crosses and blocks road
3	Ross Creek Rd	Flooding crosses and blocks road
4	KY 399 at Willow Creek Rd	Flooding crosses and blocks road
5	Fixer-Leeco Rd	Flooding crosses and blocks road
6	KY 11 at Fixer Rd, Cave Rock Rd and Bald Rock Rd	Flooding crosses and blocks road
7	KY 52 at Blaines Br	Flooding crosses and blocks road
8	KY 1411 at Big Branch Rd	Flooding crosses and blocks road
9	KY 1411 at Fox Hollow Rd	Flooding crosses and blocks road

Legend

- FireStation
- PoliceStation
- School
- CommunicationFlty
- PotableWaterFlty
- WasteWaterFlty
- RailwaySegment
- HighwayBridge

Roads

Owner

- State Highways
- County Routes
- City Streets
- 26
- Rivers
- Dams
- City of Beattyville
- Study Region Boundary

Historically Problematic Areas by Type

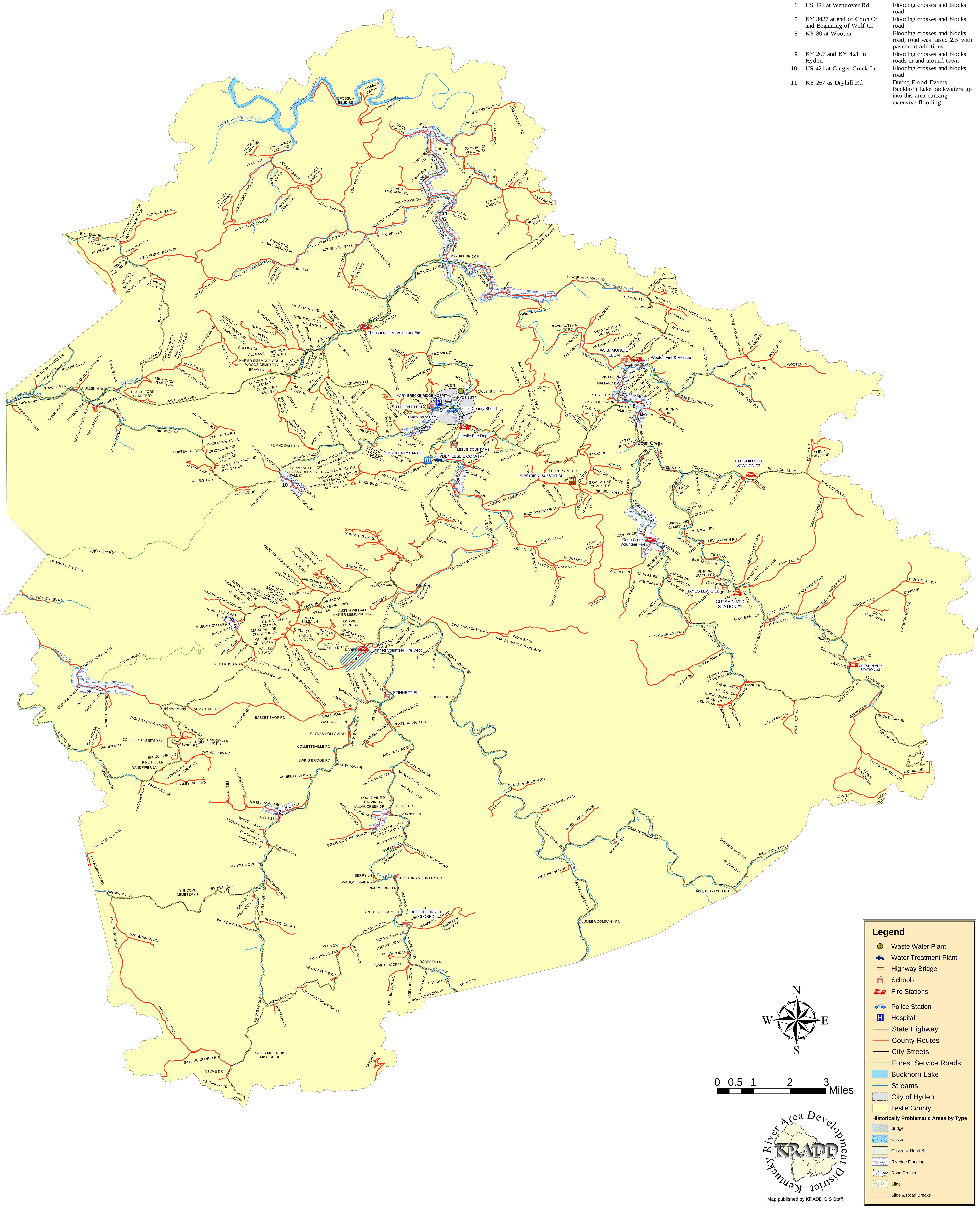
- Bridge
- Culvert
- Culvert & Road Brk
- Riverine Flooding
- Road Breaks
- Slide
- Slide & Road Breaks

BIG SINKING CREEK
Beartrack VFD
FIXER
TRI-COMMUNITY FIRE DEPARTMENT
BIG SINKING CREEK
WILLOW CREEK
ROSE CREEK
VFW - OLD PLEASANT PLAT SCHOOL
WLJC CH 271
WOCS CH 202
WLJC-TV CH 65
LEE COUNTY MID
LEE COUNTY HS
Lee County Sheriff Dispatcher
Primerose VFD
ST. HELENS SCHOOL
BEATTYVILLE COMM
BEATTYVILLE COMMUNITY CTR
Beattyville & Lee County Fire
Beattyville Police Dept
BLANES BRANCH
BEATTYVILLE WTP
ROCK QUARRY SHELTER
BEATTYVILLE COMMUNITY CTR
SOUTHSIDE ELEM
FOX HOLLOW
MIDDLE KY RIVER HEADSTART
SOUTH SIDE EL
BIG BRANCH
STURGEON CREEK

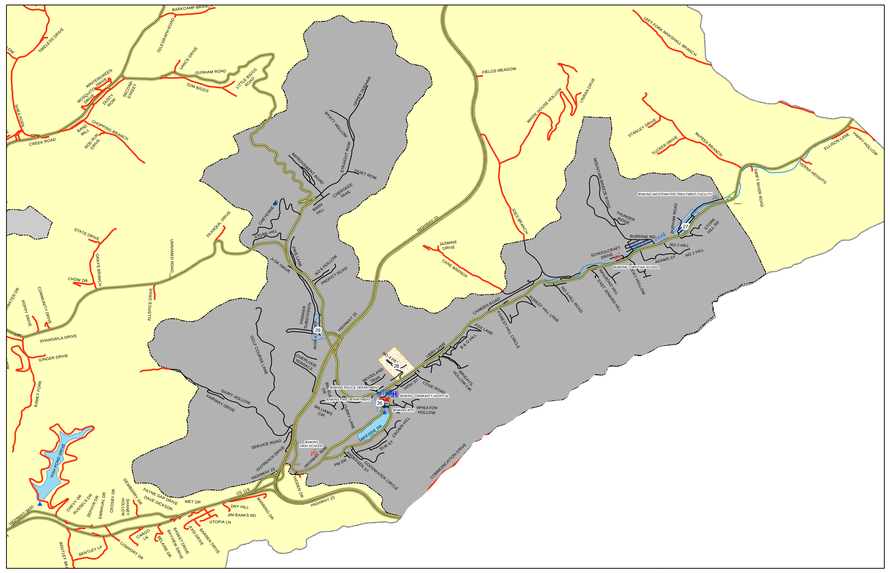
Leslie County
Flood Hazard Assessment

List of Locations and Problems

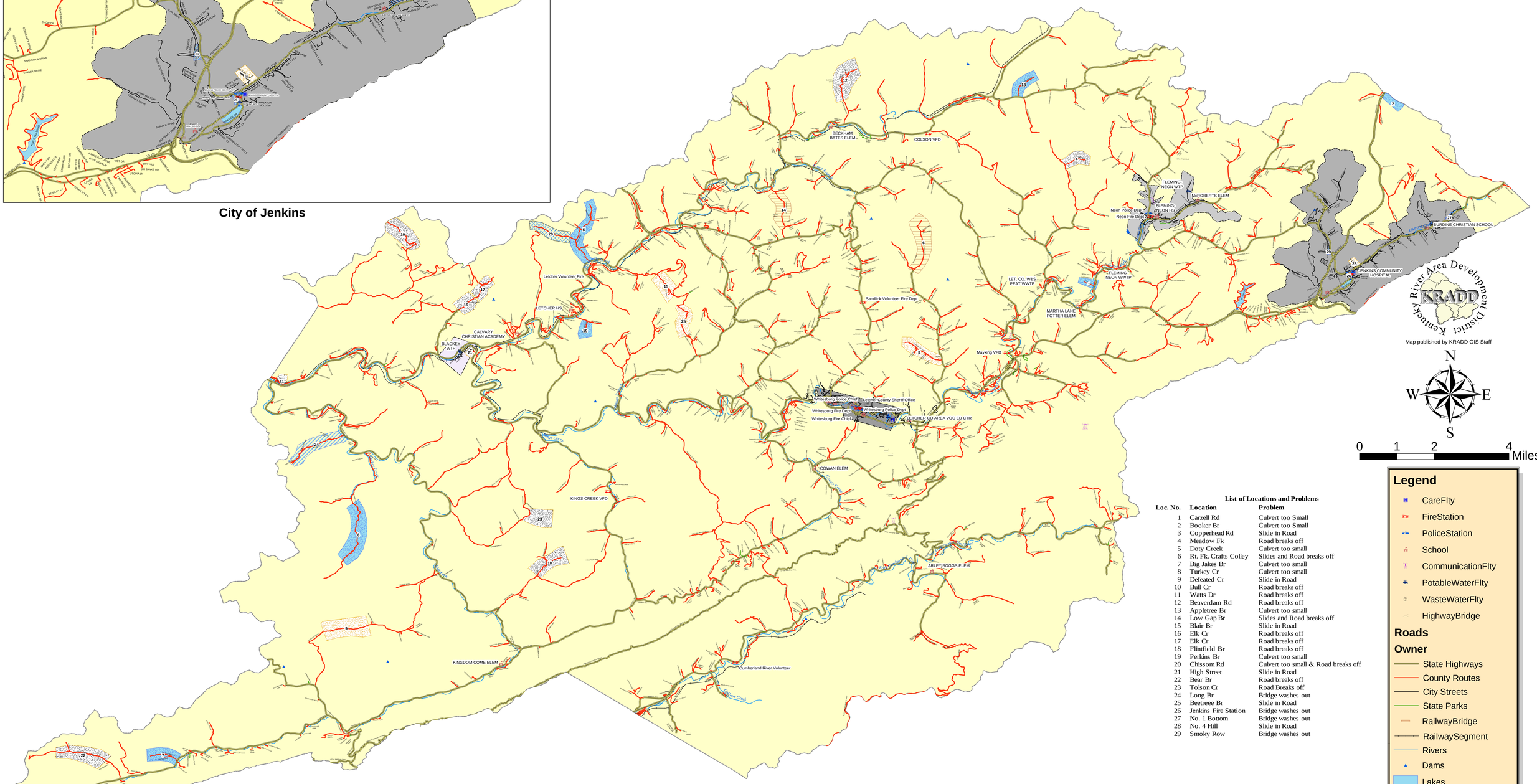
Loc. No.	Location	Problem
1	US 421 at Round Tree Ln	Flooding crosses and blocks road
2	Middle Fk Rd at Sams Branch Rd	Flooding crosses and blocks road
3	KY 406 at Lower Bowen Creek Rd	Flooding crosses and blocks road
4	US 421 at Honeysuckle Rd	Low Water Bridge floods frequently
5	KY 406 at Gobblers Knob Rd	Flooding crosses and blocks road
6	US 421 at Wendover Rd	Flooding crosses and blocks road
7	KY 3427 at end of Coon Cr and Beginning of Wolf Cr	Flooding crosses and blocks road
8	KY 80 at Wooten	Flooding crosses and blocks road; road was raised 2.5' with pavement additions
9	KY 267 and KY 421 in Hyden	Flooding crosses and blocks roads in and around town
10	US 421 at Ginger Creek Ln	Flooding crosses and blocks road
11	KY 267 as Dryhill Rd	During Flood Events Buckhorn Lake backwaters up into this area causing extensive flooding



LETCHER COUNTY
FLOOD HAZARD ASSESSMENT



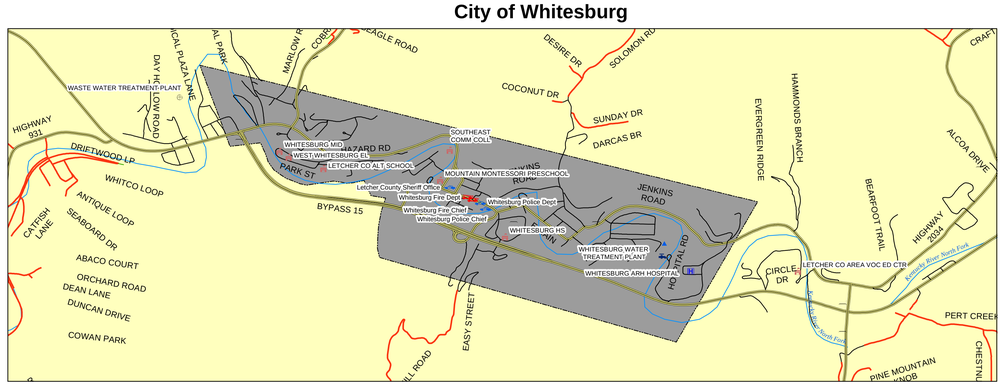
City of Jenkins



List of Locations and Problems

Loc. No.	Location	Problem
1	Carzell Rd	Culvert too Small
2	Booker Br	Culvert too Small
3	Copperhead Rd	Slide in Road
4	Meadow Fk	Road breaks off
5	Doty Creek	Culvert too small
6	Rt. Fk. Crafts Colley	Slides and Road breaks off
7	Big Jakes Br	Culvert too small
8	Turkey Cr	Culvert too small
9	Defeated Cr	Slide in Road
10	Bull Cr	Road breaks off
11	Watts Dr	Road breaks off
12	Beaverdam Rd	Road breaks off
13	Appletree Br	Culvert too small
14	Low Gap Br	Slides and Road breaks off
15	Blair Br	Slide in Road
16	Elk Cr	Road breaks off
17	Elk Cr	Road breaks off
18	Flintfield Br	Road breaks off
19	Perkins Br	Culvert too small
20	Chissom Rd	Culvert too small & Road breaks off
21	High Street	Slide in Road
22	Bear Br	Road breaks off
23	Tolson Cr	Road Breaks off
24	Long Br	Bridge washes out
25	Beetreee Br	Slide in Road
26	Jenkins Fire Station	Bridge washes out
27	No. 1 Bottom	Bridge washes out
28	No. 4 Hill	Slide in Road
29	Smoky Row	Bridge washes out

City of Whitesburg



Legend

- CareFlty
- FireStation
- PoliceStation
- School
- CommunicationFlty
- PotableWaterFlty
- WasteWaterFlty
- HighwayBridge

Roads

Owner

- State Highways
- County Routes
- City Streets
- State Parks
- RailwayBridge
- RailwaySegment
- Rivers
- Dams
- Lakes

City Boundaries

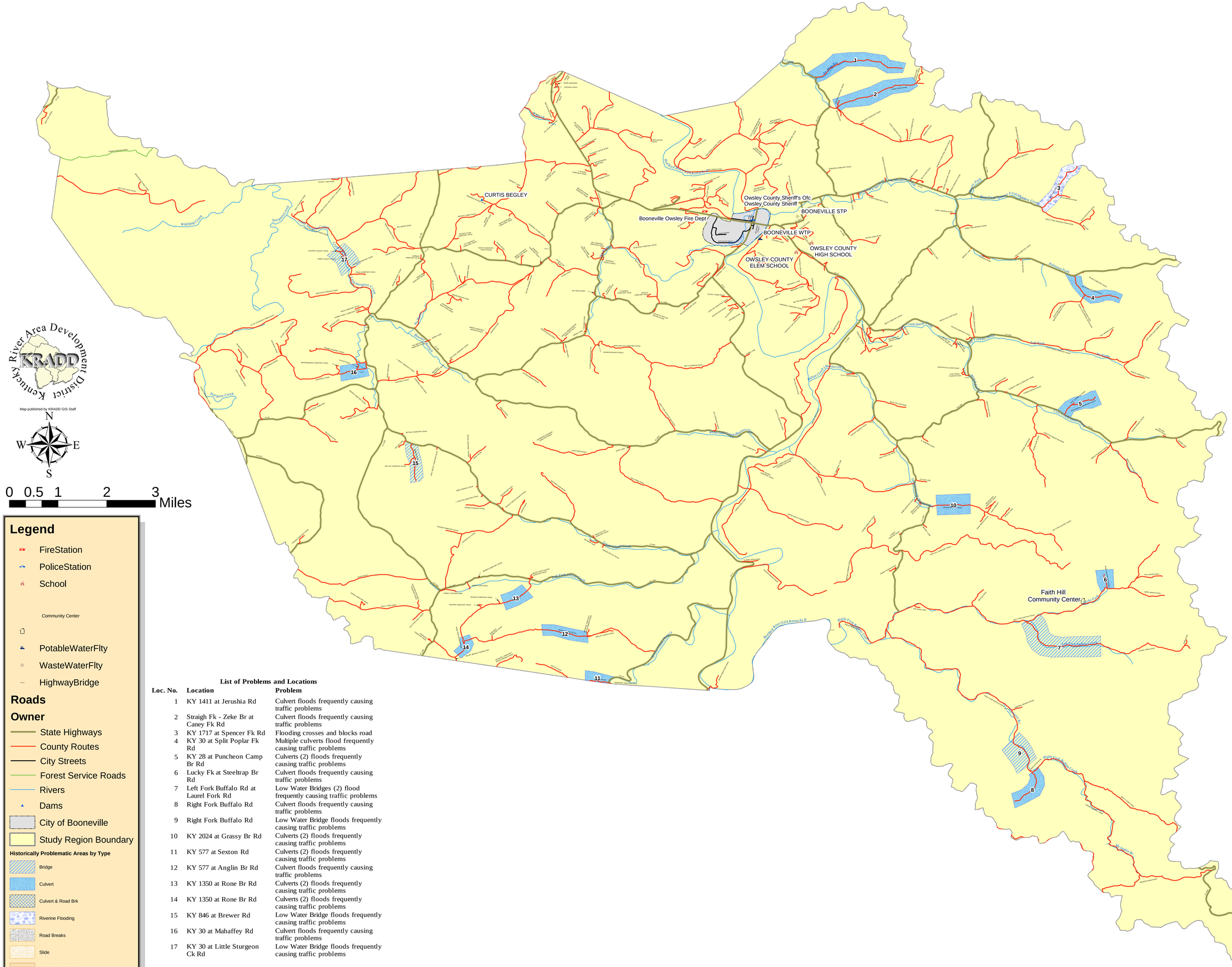
NAME

- BLACKEY
- FLEMING-NEON
- JENKINS
- WHITESBURG
- Study Region Boundary

Historically Problematic Areas by Type

- Bridge
- Culvert
- Culvert & Road Brk
- Road Breaks
- Slide
- Slide & Road Breaks

OWSLEY COUNTY
FLOOD HAZARD ANALYSIS



Kentucky River Area Development District
KRADD

Map published by KRADD GIS Staff

N
W E
S

0 0.5 1 2 3 Miles

Legend

- FireStation
- PoliceStation
- School
- Community Center
- PotableWaterFlty
- WasteWaterFlty
- HighwayBridge

Roads

Owner

- State Highways
- County Routes
- City Streets
- Forest Service Roads
- Rivers
- Dams
- City of Booneville
- Study Region Boundary

Historically Problematic Areas by Type

- Bridge
- Culvert
- Culvert & Road Brk
- Riverine Flooding
- Road Breaks
- Slide
- Slide & Road Breaks

List of Problems and Locations

Loc. No.	Location	Problem
1	KY 1411 at Jerushia Rd	Culvert floods frequently causing traffic problems
2	Straigh Fk - Zeke Br at Caney Fk Rd	Culvert floods frequently causing traffic problems
3	KY 1717 at Spencer Fk Rd	Flooding crosses and blocks road
4	KY 30 at Split Poplar Fk Rd	Multiple culverts flood frequently causing traffic problems
5	KY 28 at Puncheon Camp Br Rd	Culverts (2) floods frequently causing traffic problems
6	Lucky Fk at Steeltrap Br Rd	Culvert floods frequently causing traffic problems
7	Left Fork Buffalo Rd at Laurel Fork Rd	Low Water Bridges (2) flood frequently causing traffic problems
8	Right Fork Buffalo Rd	Culvert floods frequently causing traffic problems
9	Right Fork Buffalo Rd	Low Water Bridge floods frequently causing traffic problems
10	KY 2024 at Grassy Br Rd	Culverts (2) floods frequently causing traffic problems
11	KY 577 at Sexton Rd	Culverts (2) floods frequently causing traffic problems
12	KY 577 at Anglin Br Rd	Culvert floods frequently causing traffic problems
13	KY 1350 at Rone Br Rd	Culverts (2) floods frequently causing traffic problems
14	KY 1350 at Rone Br Rd	Culverts (2) floods frequently causing traffic problems
15	KY 846 at Brewer Rd	Low Water Bridge floods frequently causing traffic problems
16	KY 30 at Mahaffey Rd	Culvert floods frequently causing traffic problems
17	KY 30 at Little Sturgeon Ck Rd	Low Water Bridge floods frequently causing traffic problems

PERRY COUNTY
FLOOD HAZARD ANALYSIS

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0 1 2 4 6 Miles

Kentucky River Area Development District
KRADD

Map published by KRADD GIS Staff

Legend

- Hazardous Materials
- Communication Facility
- Electric Power Facility
- Natural Gas Facility
- Waste Water Plant
- Water Treatment Plant
- Airport
- Railway
- Highway Bridge
- Water Impoundments
- Schools
- Fire Stations
- Police Stations
- Hospital
- Streams
- State Highway
- County Routes
- City Streets
- Forest Service
- Private Drives
- Perry County
- City Boundaries
- Buckhorn Lake
- <all other values>

Type

- Bridge
- Culvert
- Culvert & Road Brk
- Dredge
- Riverine Flooding
- Road Breaks
- Slide
- Slide & Road Breaks

City of Hazard

WOLFE COUNTY
FLOOD HAZARD ANALYSIS

List of Locations and Problems

Loc. No.	Location	Problem
1	KY 1094 from Poor Br to KY 205 Intersection	Flooding crosses and blocks road
2	Athe Br	Flooding crosses and blocks road
3	Gal Branch Rd	Flooding crosses and blocks road
4	Red River - Lee City	Flooding crosses and blocks road
5	KY 15 to KY 651 intersection	Flooding crosses and blocks road

Kentucky River Area Development District KRADD

Map published by KRADD GIS Staff

N W E S

0 0.5 1 2 3 Miles

Legend

- FireStation
- PoliceStation
- School
- <all other values>

Added Points

- Potable Water Facility
- School
- HighwayBridge

Roads

Owner

- State Highways
- County Routes
- City Streets
- Private Drives
- Froest Service Roads
- Rivers
- Dams
- City of Campton
- Study Region Boundary

Historically Problematic Areas by Type

- Bridge
- Culvert
- Culvert & Road Brk
- Riverine Flooding
- Road Breaks
- Slide
- Slide & Road Breaks

ATTACHMENT G
Vulnerability: Identification of Asset Types and Their Values per Hazard

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	8 County Region		
	Numbers of Structures		
	Structures in Region	Structures in Hazard Area	% in Hazard Area
Water Plants	13	3	23%
Water Lines-Miles	1,852	325	18%
Water Tanks	113	0	0%
Water Pumps	135	12	9%
Sewer Plants	12	6	50%
Sewer Line-Miles	221	35	16%
Sewer Pumps	127	40	31%
Miles of Road	2511	500	20%
Bridges	813	271	33%
Electrical Plants	0	0	0%
Electrical Sub-stations	22	2	9%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	7,699	750	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	8 County Region		
	Numbers of Structures		
	Structures in Region	Structures in Hazard Area	% in Hazard Area
Water Plants	13	12	92%
Water Lines-Miles	1,852	1005	54%
Water Tanks	113	71	63%
Water Pumps	135	70	52%
Sewer Plants	12	13	108%
Sewer Line-Miles	221	146	66%
Sewer Pumps	127	82	65%
Miles of Road	2,511	2511	100%
Bridges	813	813	100%
Electrical Plants	0	0	0%
Electrical Sub-stations	22	20	91%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	7,699	7565	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Breathitt County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Jackson	1	1	100%
Water Lines-Miles Jck.	68	16	23%
Water Lines-Miles Dist	160	16	10%
Water Tanks Jackson	6	0	0%
Water Tanks District	8	0	0%
Water Pumps Jackson	3	0	0%
Water Pumps District	5	0	0%
Sewer Plants Jackson	1	0	0%
Sewer Line-Miles Jck.	27	8	30%
Sewer Pumps Jackson	25	5	20%
Miles of Road-Cnty	286	34	12%
City of Jackson	*11*	*2*	*18%*
Bridges -- County	57	45	*79%*
Bridges -- State	64	12	19%
Electrical Plants	0	0	0%
Electrical Sub-stations	3	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	654	64	10%

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Types and numbers of Infra-Structure Facilities In the Hazard Area Breathitt County			
Type of Structure	Breathitt County		
	Numbers of		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Jackson	1	1	100%
Water Lines-Miles Jck.	68	55	81%
Water Lines-Miles Dst	160	160	100%
Water Tanks Jackson	6	5	83%
Water Tanks District	8		
Water Pumps Jackson	3	2	67%
Water Pumps District	5		
Sewer Plants Jackson	1	1	100%
Sewer Line-Miles Jck.	27	22	81%
Sewer Pumps Jackson	25	15	60%
Miles of Road-Cnty	286	286	100%
City of Jackson	*11*	*11*	*100%*
Bridges -- County	57	57	*100%*
Bridges -- State	64	64	100%
Electrical Plants	0	0	0%
Electrical Sub-stations	3	3	100%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	654	639	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Knott County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants	2	0	0%
Hindman Plant	*1*	*0*	0%
Water Lines-Miles	140	2	1%
Hindman Lines	*46*	*4*	9%
Water Tanks	5	0	0%
Hindman Tanks	*6*	*0*	0%
Water Pumps	8	0	0%
Hindman Pumps	*6*	*0*	*0%*
Sewer Plants	1	0	0%
Hindman Plant	*1*	*1*	*100%*
Sewer Line-Miles	4	0	0%
Hindman Lines	*11*	*2*	*18%*
Sewer Pumps	0	0	0%
Hindman Pumps	*13*	*3*	*23%*
Miles of Road-Cnty	250	28	11%
City of Hindman	*6*	*2*	*33%*
City of Pippa Passes	*2*	*0*	*0%*
Bridges -- County	52	44	*85%*
Bridges -- State	59	12	*20%*
Electrical Plants	0	0	0%
Electrical Sub-stations	3	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	1,669	160	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Knott County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants	2	1	50%
Hindman Plant	*1*	*1*	100%
Water Lines-Miles	140	7	5%
Hindman Lines	*46*	*43*	94%
Water Tanks	5	2	40%
Hindman Tanks	*6*	*3*	50%
Water Pumps	8	2	25%
Hindman Pumps	*6*	*3*	*50%*
Sewer Plants	1	1	100%
Hindman Plant	*1*	*1*	*100%*
Sewer Line-Miles	4	2	45%
Hindman Lines	*11*	*7*	*62%*
Sewer Pumps	0	5	0%
Hindman Pumps	*13*	*9*	*69%*
Miles of Road-Cnty	250	250	100%
City of Hindman	*6*	*6*	*100%*
City of Pippa Passes	*2*	*2*	*100%*
Bridges -- County	52	52	*100%*
Bridges -- State	59	59	*100%*
Electrical Plants	0	0	0%
Electrical Sub-stations	3	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	1,669	1,630	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Lee County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Beattyville	1	0	0%
Water Lines-Miles Bty.	231	3	1%
Lines Southside	*23*	*0*	0%
Water Tanks Beattyville	9	0	0%
Tanks Southside	*2*	*0*	0%
Water Pumps Beattyville	8	0	0%
Pumps Southside	*1*	*0*	0%
Sewer Plants Beattyville	1	0	0%
Sewer Line-Miles Bty.	26	1	4%
Sewer Pumps Beattyville	15	3	20%
Miles of Road-Cnty	292	14	5%
City of Beattyville	*14*	*1*	*7%*
Bridges -- County	21	12	*57%*
Bridges -- State	23	3	*13%*
Electrical Plants	0	0	0%
Electrical Sub-stations	2	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	2,437	240	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Lee County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Beattyville	1	1	100%
Water Lines-Miles Bty.	231	182	79%
Lines Southside	*23*	*21*	92%
Water Tanks Beattyville	9	7	78%
Tanks Southside	*2*	*1*	50%
Water Pumps Beattyville	8	6	75%
Pumps Southside	*1*	*1*	100%
Sewer Plants Beattyville	1	1	100%
Sewer Line-Miles Bty.	26	13	49%
Sewer Pumps Beattyville	15	6	40%
Miles of Road-Cnty	292	292	100%
City of Beattyville	*14*	*14*	*100%*
Bridges -- County	21	21	*100%*
Bridges -- State	23	23	*100%*
Electrical Plants	0	0	0%
Electrical Sub-stations	2	2	100%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	2,495	2,437	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Leslie County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants	1	0	0%
Water Lines	233	7	3%
Water Tanks	9	0	0%
Water Pumps	22	0	0%
Sewer Plants - Hyden	1	0	0%
Sewer Line-Miles Hyden	11	1	9%
Sewer Pumps - Hyden	6	3	50%
Miles of Road-Cnty	325	48	15%
City of Hyden	*3*	*1*	*33%*
Bridges -- County	38	24	63%
Bridges -- State	57	6	11%
Electrical Plants	N/A	N/A	N/A
Electrical Sub-stations	4	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	727	70	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Leslie County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants	1	1	100%
Water Lines	233	150	64%
Water Tanks	9	8	89%
Water Pumps	22	22	100%
Sewer Plants - Hyden	1	1	100%
Sewer Line-Miles Hyden	11	4	36%
Sewer Pumps - Hyden	6	5	83%
Miles of Road-Cnty	325	325	100%
City of Hyden	*3*	*3*	*100%*
Bridges -- County	38	38	100%
Bridges -- State	57	54	95%
Electrical Plants	N/A	0	#VALUE!
Electrical Sub-stations	4	3	75%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	727	710	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Letcher County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants Blackey	1	1	100%
Flemming Neon Plant	*1*	*0*	*0%*
Jenkins Plant	*1*	*0*	*0%*
Whitesburg Plant	*1*	*1*	*100%*
Water Lines-Miles Blcky.	106	0	0%
Flemming Neon Lines	*36*	*6*	*17%*
Jenkins Lines	*30*	*4*	*13%*
Whitesburg Lines	*31*	*3*	*10%*
Water Tanks Blcky.	5	0	0%
Flemming Neon Tanks	*6*	*0*	*0%*
Jenkins Tanks	*3*	*0*	*0%*
Whitesburg Tanks	*7*	*0*	*0%*
Water Pumps Blcky.	2	0	0%
Flemming Neon Pumps	*4*	*0*	*0%*
Jenkins Pumps	*3*	*0*	*0%*
Whitesburg Pumps	*6*	*0*	*0%*
Sewer Plants	0	0	0%
Flemming Neon Plant	*1*	*1*	*100%*
Jenkins Plant	*1*	*1*	*100%*
Whitesburg Plant	*1*	*1*	*100%*
Sewer Line-Miles	0	0	0%
Flemming Neon Lines	*17*	*4*	*23%*
Jenkins Lines	*14*	*3*	*21%*
Whitesburg Lines	*17*	*3*	*18%*
Sewer Pumps	0	0	0%
Flemming Neon Pumps	*5*	*1*	*20%*
Jenkins Pumps	*1*	*1*	*100%*
Whitesburg Pumps	*17*	*4*	*24%*
Miles of Road-Cnty	366	47	13%
Blackey Streets	*1*	*1*	*100%*
Flemming Neon Streets	*8*	*5*	*63%*
Jenkins Streets	*13*	*3*	*23%*
Whitesburg Streets	*18*	*2*	*11%*
Bridges	58	44	*76%*
Bridges	101	8	*8%*
Electrical Plants	0	0	0%
Electrical Sub-stations	4	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	693	66	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Letcher County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants Blackey	1	1	100%
Flemming Neon Plant	*1*	*1*	*100%*
Jenkins Plant	*1*	*1*	*100%*
Whitesburg Plant	*1*	*1*	*100%*
Water Lines-Miles Blcky.	106	15	14%
Flemming Neon Lines	*36*	*26*	*72%*
Jenkins Lines	*30*	*22*	*74%*
Whitesburg Lines	*31*	*27*	*86%*
Water Tanks Blcky.	5	1	20%
Flemming Neon Tanks	*6*	*4*	*67%*
Jenkins Tanks	*3*	*3*	*100%*
Whitesburg Tanks	*7*	*7*	*100%*
Water Pumps Blcky.	2	1	50%
Flemming Neon Pumps	*4*	*4*	*100%*
Jenkins Pumps	*3*	*3*	*100%*
Whitesburg Pumps	*6*	*6*	*100%*
Sewer Plants	0	0	0%
Flemming Neon Plant	*1*	*1*	*100%*
Jenkins Plant	*1*	*1*	*100%*
Whitesburg Plant	*1*	*1*	*100%*
Sewer Line-Miles	0	0	0%
Flemming Neon Lines	*17*	*14*	*81%*
Jenkins Lines	*14*	*12*	*86%*
Whitesburg Lines	*17*	*10*	*60%*
Sewer Pumps	0	0	0%
Flemming Neon Pumps	*5*	*1*	*20%*
Jenkins Pumps	*1*	*1*	*100%*
Whitesburg Pumps	*17*	*14*	*82%*
Miles of Road-Cnty	366	366	100%
Blackey Streets	*1*	*1*	*100%*
Flemming Neon Streets	*8*	*8*	*100%*
Jenkins Streets	*13*	*13*	*100%*
Whitesburg Streets	*18*	*18*	*100%*
Bridges	58	58	*100%*
Bridges	101	101	*100%*
Electrical Plants	0	0	0%
Electrical Sub-stations	4	4	100%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	693	665	96%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Owsley County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Booneville	1	0	0%
Water Lines-Miles Boon	229	18	8%
Water Tanks Booneville	11	0	0%
Water Pumps Booneville	12	0	0%
Sewer Plants Booneville	1	0	0%
Sewer Line-Miles Boon.	26	2	8%
Sewer Pumps Booneville	11	2	18%
Miles of Road-Cnty	227	33	15%
City of Booneville streets	*2*	*1*	*50%*
Bridges	19	14	*74%*
Bridges	34	6	*18%*
Electrical Plants	0	0	0%
Electrical Sub-stations	2	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	55	5	9%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Owsley County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Booneville	1	1	100%
Water Lines-Miles Boon	229	134	59%
Water Tanks Booneville	11	6	55%
Water Pumps Booneville	12	10	83%
Sewer Plants Booneville	1	1	100%
Sewer Line-Miles Boon.	26	8	30%
Sewer Pumps Booneville	11	5	45%
Miles of Road-Cnty	227	227	100%
City of Booneville streets	*2*	*2*	*100%*
Bridges	19	19	*100%*
Bridges	34	34	*100%*
Electrical Plants	0	0	0%
Electrical Sub-stations	2	2	100%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	55	54	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Perry County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants Hazard	1	1	100%
Water Lines-Miles Hzd	*294*	*42*	14%
Vicco	*31*	*4*	*13%*
Buckhorn	*29*	*9*	*31%*
Water Tanks Hazard	22	0	0%
Vicco	*3*	*0*	0%
Buckhorn	1	0	0%
Water Pumps Hazard	39	0	0%
Vicco	*7*	*0*	*0%*
Buckhorn	*2*	*0*	*0%*
Sewer Plants Hazard	1	0	0%
Vicco	*1*	*1*	*100%*
Sewer Line-Miles- Haz.	43	7	16%
Vicco	*3*	*1*	*34%*
Sanitation District 1	*9*	*3*	*33%*
Sewer Pumps Hazard	23	8	35%
Vicco	*7*	*3*	*43%*
Sanitation District 1	*11*	*8*	*73%*
Miles of Road-Cnty	447	48	11%
Buckhorn	*3*	*0*	*0%*
Hazard	*42*	*4*	*10%*
Vicco	*2*	*1*	*50%*
Bridges	50	38	*76%*
Bridges	109	7	*6%*
Electrical Plants	0	0	0%
Electrical Sub-stations	4	1	25%
Electrical lines-Miles			0%
Gas/Oil Wells	898	87	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Perry County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants Hazard	1	1	100%
Water Lines-Miles Hzd	*294*	*176*	60%
Vicco	*31*	*23*	*75%*
Buckhorn	*29*	*18*	*62%*
Water Tanks Hazard	22	18	82%
Vicco	*3*	*2*	67%
Buckhorn	*1*	*1*	100%
Water Pumps Hazard	39	18	46%
Vicco	*7*	*2*	*29%*
Buckhorn	*2*	*1*	*50%*
Sewer Plants Hazard	1	1	100%
Vicco	*1*	*1*	*100%*
Sewer Line-Miles- Haz.	43	43	100%
Vicco	*3*	*3*	*102%*
Sewer Pumps Hazard	9	22	239%
Vicco	*23*	*4*	*17%*
Sanitation District 1	*11*	*8*	*73%*
Miles of Road-Cnty	7	447	6386%
Buckhorn	*447*	*3*	*1%*
Hazard	*3*	*42*	*1400%*
Vicco	*42*	*2*	*5%*
Bridges	2	50	*2500%*
Bridges	50	109	*218%*
Electrical Plants	109	0	0%
Electrical Sub-stations	0	4	0%
Electrical lines-Miles	4	N/A	N/A
Gas/Oil Wells	0	877	0%
Gas Lines-Miles	898	N/A	N/A

Flood Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Wolfe County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Campton	1	0	0%
Water Lines-Miles Cmp.	166	12	7%
Water Tanks Campton	10	0	0%
Water Pumps Campton	7	0	0%
Sewer Plants Campton	1	0	0%
Sewer Line-Miles Cmp.	11	4	36%
Sewer Pumps Campton	4	2	50%
Miles of Road-Cnty	190	10	5%
City of Campton Streets	*3*	*1*	*33%*
Bridges	12	3	*25%*
Bridges	59	0	*0%*
Electrical Plants	0	0	0%
Electrical Sub-stations	0	0	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	566	55	10%
Gas Lines-Miles	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Types and numbers of Infra-Structure Facilities In the Hazard Area			
Type of Structure	Wolfe County		
	Numbers of Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Water Plants-Campton	1	1	100%
Water Lines-Miles Cmp.	166	124	75%
Water Tanks Campton	10	5	50%
Water Pumps Campton	7	5	71%
Sewer Plants Campton	1	1	100%
Sewer Line-Miles Cmp.	11	6	54%
Sewer Pumps Campton	4	3	75%
Miles of Road-Cnty	190	190	100%
City of Campton Streets	*3*	*3*	*100%*
Bridges	12	12	*100%*
Bridges	59	59	*100%*
Electrical Plants	0	0	0%
Electrical Sub-stations	0	2	0%
Electrical lines-Miles	N/A	N/A	N/A
Gas/Oil Wells	566	553	98%
Gas Lines-Miles	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region 8 County Region						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in Region	Structures in Hazard	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	13	3	23%	$44,624,048	$7,500,000	17%
Water Lines	1,852	325	18%	$193,296,088	$52,690,176	27%
Water Tanks	113	0	0%	$46,057,125	$0	0%
Water Pumps	135	12	9%	$6,628,061	$975,375	15%
Sewer Plants	12	6	50%	$16,252,535	$10,000,000	62%
Sewer Lines	221	35	16%	$39,868,744	$8,667,648	22%
Sewer Pumps	127	40	32%	$2,943,304	$1,600,000	54%
Road Miles	2,511	500	20%	$1,255,500,000	$251,000,000	20%
Bridges	813	271	33%	$195,354,705	$66,000,000	34%
Electrical Plants	0		0%	$0		0%
					$0	
Sub-Stations	22	2	9%	N/A	N/A	N/A
Electrical Lines	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	7,699	750	10%	N/A	N/A	N/A
Gas Lines	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region 8 County Region						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in Region	Structures in Hazard	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	13	12	92%	$29,976,000	$29,976,000	100%
Water Lines	1,852	1,005	54%	$164,656,800	$164,656,800	100%
Water Tanks	113	71	63%	$36,600,000	$36,600,000	100%
Water Pumps	135	70	52%	$5,737,500	$5,737,500	100%
Sewer Plants	12	13	108%	$22,851,325	$22,851,325	100%
Sewer Lines	221	146	66%	$36,115,200	$36,115,200	100%
Sewer Pumps	127	82	65%	$3,240,000	$3,240,000	100%
Road Miles	2,511	2,511	100%	$1,255,500,000	$1,255,500,000	100%
Bridges	813	813	100%	$199,939,400	$199,939,400	100%
Electrical Plants	0	0	0%	$0	$0	0%
Sub-Stations	22	20	91%	N/A	N/A	N/A
Electrical Lines	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	7,699	750	10%	N/A	N/A	N/A
Gas Lines	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Breathitt County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Jackson	1	1	100%	$6,747,000	$6,747,000	100%
Water Lines-Miles Jck.	68	16	23%	$11,429,418	$2,743,060	24%
Water Lines-Miles Dist	160	16	10%	$3,186,750	$0	0%
Water Tanks Jackson	6	0	0%	$168,075	$0	0%
Water Tanks District	8	0	0%	$4,849,800	$0	0%
Water Pumps Jackson	3	0	0%	$6,204,541	$1,923,408	31%
Water Pumps District	5	0	0%	$759,038	$212,531	28%
Sewer Plants Jackson	1	0	0%	$14,000,000	$0	0%
Sewer Line-Miles Jck.	27	8	30%	$6,184,750	$912,251	15%
Sewer Pumps Jackson	25	5	20%	$1,230,653	$827,171	67%
Miles of Road-Cnty	286	34	12%	$2,792,358	$403,496	14%
City of Jackson	*11*	*2*	*18%*	$0	$0	0%
Bridges -- County	57	45	*79%*	N/A	N/A	N/A
Bridges -- State	64	12	19%	N/A	N/A	N/A
Electrical Plants	0	0	0%	N/A	N/A	N/A
Electrical Sub-stations	3	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	654	64	10%	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region

Breathitt County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	1	1	100%	$6,747,000	$6,747,000	100%
Water Lines	68	55	81%	$11,429,418	$11,429,418	100%
Water Lines District	160			$3,186,750	$3,186,750	
Water Tanks	6	5	83%	$168,075	$168,075	100%
Water Tanks District	8			$4,849,800	$4,849,800	
Water Pumps	3	2	67%	$6,204,541	$6,204,541	100%
Water Pumps District	5			$759,038	$759,038	
Sewer Plants	1	1	100%	$14,000,000	$14,000,000	100%
Sewer Lines	27	22	81%	$6,184,750	$6,184,750	100%
Sewer Pumps	25	15	60%	$1,230,653	$1,230,653	100%
Road Miles	286	286	100%	$2,792,358	$2,792,358	100%
City of Jackson	11	11	100%	$0	$0	0%
Bridges -- County	57	57	*100%*	$1,094,400	$1,094,400	100%
Bridges -- State	64	64	100%	$2,483,200	$2,483,200	100%
Electrical Plants	0	0	0%	$0	$0	0%
Sub-Stations	3	3	100%	N/A	N/A	N/A
Electrical Lines	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	654	639	98%	N/A	N/A	N/A
Gas Lines	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Knott County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	2	0	0%	$11,252,000	$0	0%
Hindman Plant	*1*	*0*	0%	$971,568	$0	0%
Water Lines-Miles	140	2	1%	$1,454,653	$378,210	26%
Hindman Lines	*46*	*4*	9%	$8,935,727	$714,858	8%
Water Tanks	5	0	0%	$674,700	$0	0%
Hindman Tanks	*6*	*0*	0%	$1,147,050	$0	0%
Water Pumps	8	0	0%	$172,058	$0	0%
Hindman Pumps	*6*	*0*	*0%*	$227,711	$0	0%
Sewer Plants	1	0	0%	$309,238	$0	0%
Hindman Plant	*1*	*1*	*100%*	$622,073	$553,645	89%
Sewer Line-Miles	4	0	0%	$564,049	$0	0%
Hindman Lines	*11*	*2*	*18%*	$1,970,573	$571,466	29%
Sewer Pumps	0	0	0%	$0	$0	0%
Hindman Pumps	*13*	*3*	*23%*	$455,423	$132,073	29%
Miles of Road-Cnty	250	28	11%	$142,812,500	$14,281,250	10%
City of Hindman	*6*	*2*	*33%*	$3,373,500	$1,012,050	30%
City of Pippa Passes	*2*	*0*	*0%*	$1,124,500	$0	0%
Bridges -- County	52	44	*85%*	$1,124,500	$854,620	76%
Bridges -- State	59	12	*20%*	$39,072,750	$15,238,373	39%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	3	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	1,669	160	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Knott County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	2	1	50%	$11,252,000	$11,252,000	100%
Hindman Plant	*1*	*1*	100%	$971,568	$971,568	100%
Water Lines-Miles	140	7	5%	$1,454,653	$1,454,653	100%
Hindman Lines	*46*	*43*	94%	$8,935,727	$8,935,727	100%
Water Tanks	5	2	40%	$674,700	$674,700	100%
Hindman Tanks	*6*	*3*	50%	$1,147,050	$1,147,050	100%
Water Pumps	8	2	25%	$172,058	$172,058	100%
Hindman Pumps	*6*	*3*	*50%*	$227,711	$227,711	100%
Sewer Plants	1	1	100%	$309,238	$309,238	100%
Hindman Plant	*1*	*1*	*100%*	$622,073	$622,073	100%
Sewer Line-Miles	4	2	45%	$564,049	$564,049	100%
Hindman Lines	*11*	*7*	*62%*	$1,970,573	$1,970,573	100%
Sewer Pumps	0	5	0%	$0	$0	0%
Hindman Pumps	*13*	*9*	*69%*	$455,423	$455,423	100%
Miles of Road-Cnty	250	250	100%	$142,812,500	$142,812,500	100%
City of Hindman	*6*	*6*	*100%*	$3,373,500	$3,373,500	100%
City of Pippa Passes	*2*	*2*	*100%*	$1,124,500	$1,124,500	100%
Bridges -- County	52	52	*100%*	$1,124,500	$1,124,500	100%
Bridges -- State	59	59	*100%*	$39,072,750	$39,072,750	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	3	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	1,669	1,630	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region--Lee County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Beattyville	1	0	0%	$2,698,800	$0	0%
Water Lines-Miles Bty.	231	3	1%	$41,184,343	$1,035,580	3%
Lines Southside	*23*	*0*	0%	$4,558,232	$0	0%
Water Tanks Beattyville	9	0	0%	$26,070,450	$0	0%
Tanks Southside	*2*	*0*	0%	$337,350	$0	0%
Water Pumps Beattyville	8	0	0%	$455,423	$0	0%
Pumps Southside	*1*	*0*	0%	$75,904	$0	0%
Sewer Plants Beattyville	1	0	0%	$1,555,184	$0	0%
Sewer Line-Miles Bty.	26	1	4%	$3,666,320	$183,316	5%
Sewer Pumps Beattyville	15	3	20%	$303,615	$127,518	42%
Miles of Road-Cnty	292	14	5%	$164,607,700	$5,637,814	3%
City of Beattyville	*14*	*1*	*7%*	$7,857,150	$392,858	5%
Bridges -- County	21	12	*57%*	$452,500	$217,200	48%
Bridges -- State	23	3	*13%*	$13,513,650	$1,418,933	11%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	2,437	240	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Lee County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Beattyville	1	1	100%	$2,698,800	$2,698,800	100%
Water Lines-Miles Bty.	231	182	79%	$41,184,343	$41,184,343	100%
Lines Southside	*23*	*21*	92%	$4,558,232	$4,558,232	100%
Water Tanks Beattyville	9	7	78%	$26,070,450	$26,070,450	100%
Tanks Southside	*2*	*1*	50%	$337,350	$337,350	100%
Water Pumps Beattyville	8	6	75%	$455,423	$455,423	100%
Pumps Southside	*1*	*1*	100%	$75,904	$75,904	100%
Sewer Plants Beattyville	1	1	100%	$1,555,184	$1,555,184	100%
Sewer Line-Miles Bty.	26	13	49%	$3,666,320	$3,666,320	100%
Sewer Pumps Beattyville	15	6	40%	$303,615	$303,615	100%
Miles of Road-Cnty	292	292	100%	$164,607,700	$164,607,700	100%
City of Beattyville	*14*	*14*	*100%*	$7,857,150	$7,857,150	100%
Bridges -- County	21	21	*100%*	$452,500	$452,500	100%
Bridges -- State	23	23	*100%*	$13,513,650	$13,513,650	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	2	100%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	2,437	2,437	100%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Leslie County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	1	0	0%	$2,156,700	$0	0%
Water Lines	233	7	3%	$31,171,140	$857,206	3%
Water Tanks	9	0	0%	$2,914,800	$0	0%
Water Pumps	22	0	0%	$1,669,883	$0	0%
Sewer Plants - Hyden	1	0	0%	$933,335	$0	0%
Sewer Line-Miles Hyden	11	1	9%	$1,128,098	$236,901	21%
Sewer Pumps - Hyden	6	3	50%	$253,013	$129,036	51%
Miles of Road-Cnty	325	48	15%	$218,578,750	$70,928,804	32%
City of Hyden	*3*	*1*	*33%*	$1,971,750	$473,220	24%
Bridges -- County	38	24	63%	$835,850	$446,344	53%
Bridges -- State	57	6	11%	$32,418,750	$2,674,547	8%
Electrical Plants	N/A	0	0%	$0	$0	0%
Electrical Sub-stations	4	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	727	70	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Leslie County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	1	1	100%	$2,156,700	$2,156,700	100%
Water Lines	233	150	64%	$31,171,140	$31,171,140	100%
Water Tanks	9	8	89%	$2,914,800	$2,914,800	100%
Water Pumps	22	22	100%	$1,669,883	$1,669,883	100%
Sewer Plants - Hyden	1	1	100%	$933,335	$933,335	100%
Sewer Line-Miles Hyden	11	4	36%	$1,128,098	$1,128,098	100%
Sewer Pumps - Hyden	6	5	83%	$253,013	$253,013	100%
Miles of Road-Cnty	325	325	100%	$218,578,750	$218,578,750	100%
City of Hyden	*3*	*3*	*100%*	$1,971,750	$1,971,750	100%
Bridges -- County	38	38	100%	$835,850	$835,850	100%
Bridges -- State	57	54	95%	$32,418,750	$32,418,750	100%
Electrical Plants	N/A	0	#VALUE!	$0	$0	0%
Electrical Sub-stations	4	3	75%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	727	710	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region--Letcher County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Blackey	1	1	100%	$961,800	$807,912	84%
Flemming Neon Plant	*1*	*0*	*0%*	$971,568	$0	0%
Jenkins Plant	*1*	*0*	*0%*	$2,698,800	$0	0%
Whitesburg Plant	*1*	*1*	*100%*	$2,320,968	$1,903,194	82%
Water Lines-Miles Blcky.	106	0	0%	$5,889,114	$0	0%
Flemming Neon Lines	*36*	*6*	*17%*	$5,402,998	$972,540	18%
Jenkins Lines	*30*	*4*	*13%*	$4,571,767	$640,047	14%
Whitesburg Lines	*31*	*3*	*10%*	$5,650,473	$452,038	8%
Water Tanks Blcky.	5	0	0%	$442,500	$0	0%
Flemming Neon Tanks	*6*	*0*	*0%*	$1,349,400	$0	0%
Jenkins Tanks	*3*	*0*	*0%*	$1,012,050	$0	0%
Whitesburg Tanks	*7*	*0*	*0%*	$2,361,450	$0	0%
Water Pumps Blcky.	2	0	0%	$75,904	$0	0%
Flemming Neon Pumps	*4*	*0*	*0%*	$303,615	$0	0%
Jenkins Pumps	*3*	*0*	*0%*	$227,711	$0	0%
Whitesburg Pumps	*6*	*0*	*0%*	$455,423	$0	0%
Sewer Plants	0	0	0%	$0	$0	0%
Flemming Neon Plant	*1*	*1*	*100%*	$1,236,950	$1,051,408	85%
Jenkins Plant	*1*	*1*	*100%*	$2,811,250	$2,389,563	85%
Whitesburg Plant	*1*	*1*	*100%*	$1,855,425	$1,577,111	85%
Sewer Line-Miles	0	0	0%	$0	$0	0%
Flemming Neon Lines	*17*	*4*	*23%*	$3,948,344	$3,277,126	83%
Jenkins Lines	*14*	*3*	*21%*	$3,384,295	$2,741,279	81%
Whitesburg Lines	*17*	*3*	*18%*	$2,820,246	$676,859	24%
Sewer Pumps	0	0	0%	$0	$0	0%
Flemming Neon Pumps	*5*	*1*	*20%*	$50,603	$43,518	86%
Jenkins Pumps	*1*	*1*	*100%*	$50,603	$43,012	85%
Whitesburg Pumps	*17*	*4*	*24%*	$834,435	$175,231	21%
Miles of Road-Cnty	366	47	13%	$224,083,500	$20,167,515	9%
Blackey Streets	*1*	*1*	*100%*	$562,250	$489,158	87%
Flemming Neon Streets	*8*	*5*	*63%*	$4,498,000	$3,553,420	79%
Jenkins Streets	*13*	*3*	*23%*	$7,309,250	$2,119,683	29%
Whitesburg Streets	*18*	*2*	*11%*	$11,205,000	$784,350	7%
Bridges -- County	58	44	*76%*	$1,346,950	$821,640	61%
Bridges -- State	101	8	*8%*	$61,817,100	$2,472,684	4%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	693	66	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Letcher County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Blackey	1	1	100%	$961,800	$961,800	100%
Flemming Neon Plant	*1*	*1*	*100%*	$971,568	$971,568	100%
Jenkins Plant	*1*	*1*	*100%*	$2,698,800	$2,698,800	100%
Whitesburg Plant	*1*	*1*	*100%*	$2,320,968	$2,320,968	100%
Water Lines-Miles Blcky.	106	15	14%	$5,889,114	$5,889,114	100%
Flemming Neon Lines	*36*	*26*	*72%*	$5,402,998	$5,402,998	100%
Jenkins Lines	*30*	*22*	*74%*	$4,571,767	$4,571,767	100%
Whitesburg Lines	*31*	*27*	*86%*	$5,650,473	$5,650,473	100%
Water Tanks Blcky.	5	1	20%	$442,500	$442,500	100%
Flemming Neon Tanks	*6*	*4*	*67%*	$1,349,400	$1,349,400	100%
Jenkins Tanks	*3*	*3*	*100%*	$1,012,050	$1,012,050	100%
Whitesburg Tanks	*7*	*7*	*100%*	$2,361,450	$2,361,450	100%
Water Pumps Blcky.	2	1	50%	$75,904	$75,904	100%
Flemming Neon Pumps	*4*	*4*	*100%*	$303,615	$303,615	100%
Jenkins Pumps	*3*	*3*	*100%*	$227,711	$227,711	100%
Whitesburg Pumps	*6*	*6*	*100%*	$455,423	$455,423	100%
Sewer Plants	0	0	0%	$0	$0	0%
Flemming Neon Plant	*1*	*1*	*100%*	$1,236,950	$1,236,950	100%
Jenkins Plant	*1*	*1*	*100%*	$2,811,250	$2,811,250	100%
Whitesburg Plant	*1*	*1*	*100%*	$1,855,425	$1,855,425	100%
Sewer Line-Miles	0	0	0%	$0	$0	0%
Flemming Neon Lines	*17*	*14*	*81%*	$3,948,344	$3,948,344	100%
Jenkins Lines	*14*	*12*	*86%*	$3,384,295	$3,384,295	100%
Whitesburg Lines	*17*	*10*	*60%*	$2,820,246	$2,820,246	100%
Sewer Pumps	0	0	0%	$0	$0	0%
Flemming Neon Pumps	*5*	*1*	*20%*	$50,603	$50,603	100%
Jenkins Pumps	*1*	*1*	*100%*	$50,603	$50,603	100%
Whitesburg Pumps	*17*	*14*	*82%*	$834,435	$834,435	100%
Miles of Road-Cnty	366	366	100%	$224,083,500	$224,083,500	100%
Blackey Streets	*1*	*1*	*100%*	$562,250	$562,250	100%
Flemming Neon Streets	*8*	*8*	*100%*	$4,498,000	$4,498,000	100%
Jenkins Streets	*13*	*13*	*100%*	$7,309,250	$7,309,250	100%
Whitesburg Streets	*18*	*18*	*100%*	$11,205,000	$11,205,000	100%
Bridges -- County	58	58	*100%*	$1,346,950	$1,346,950	100%
Bridges -- State	101	101	*100%*	$61,817,100	$61,817,100	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	4	100%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	693	665	96%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Owsley County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Booneville	1	0	0%	$1,943,136	$0	0%
Water Lines-Miles Boon	229	18	8%	$27,846,218	$2,227,697	8%
Water Tanks Booneville	11	0	0%	$2,029,500	$0	0%
Water Pumps Booneville	12	0	0%	$759,038	$0	0%
Sewer Plants Booneville	1	0	0%	$787,150	$0	0%
Sewer Line-Miles Boon.	26	2	8%	$2,272,148	$408,987	18%
Sewer Pumps Booneville	11	2	18%	$253,013	$80,964	32%
Miles of Road-Cnty	227	33	15%	$127,845,300	$12,784,530	10%
City of Booneville streets	*2*	*1*	*50%*	$1,212,000	$472,680	39%
Bridges	19	14	*74%*	$448,950	$157,133	35%
Bridges	34	6	*18%*	$20,760,400	$2,595,050	13%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	55	5	9%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Owsley County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Booneville	1	1	100%	$1,943,136	$1,943,136	100%
Water Lines-Miles Boon	229	134	59%	$27,846,218	$27,846,218	100%
Water Tanks Booneville	11	6	55%	$2,029,500	$2,029,500	100%
Water Pumps Booneville	12	10	83%	$759,038	$759,038	100%
Sewer Plants Booneville	1	1	100%	$787,150	$787,150	100%
Sewer Line-Miles Boon.	26	8	30%	$2,272,148	$2,272,148	100%
Sewer Pumps Booneville	11	5	45%	$253,013	$253,013	100%
Miles of Road-Cnty	227	227	100%	$127,845,300	$127,845,300	100%
City of Booneville streets	*2*	*2*	*100%*	$1,212,000	$1,212,000	100%
Bridges	19	19	*100%*	$448,950	$448,950	100%
Bridges	34	34	*100%*	$20,760,400	$20,760,400	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	2	100%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	55	54	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Perry County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Hazard	1	1	100%	$10,795,200	$9,600,000	89%
Water Lines-Miles Hzd	*294*	*42*	14%	$36,539,987	$7,805,952	21%
Vicco	*31*	*4*	13%	$3,852,856	$462,343	12%
Buckhorn	*29*	*4*	*14%*	$5,292,173	$722,568	14%
Water Tanks Hazard	22	0	0%	$6,558,300	$0	0%
Vicco	*3*	*0*	0%	$674,700	$0	0%
Buckhorn	1	0	0%	$540,000	$0	0%
Water Pumps Hazard	39	0	0%	$1,475,618	$0	0%
Vicco	*7*	*0*	*0%*	$151,808	$0	0%
Buckhorn	2	0	0%	$145,000		
Sewer Plants Hazard	1	0	0%	$9,839,375	$0	0%
Vicco	*1*	*1*	*100%*	$253,013	$225,000	89%
Sewer Line-Miles- Haz.	43	7	16%	$12,127,058	$1,725,504	14%
Vicco	*3*	*1*	*34%*	$91,450	$248,292	272%
Sanitatiion District 1	9	3	33%	$275,350	$89,020	32%
Sewer Pumps Hazard	23	8	35%	$1,113,255	$356,400	32%
Vicco	*7*	*3*	*43%*	$202,410	$135,000	67%
Sanitatiion District 1	*11*	*8*	*73%*	$202,410	$135,000	67%
Miles of Road-County	447	48	11%	$272,048,000	$25,000,000	9%
Buckhorn	*3*	*0*	*0%*	$1,686,750	$0	0%
Hazard	*42*	*4*	*10%*	$23,614,500	$2,000,000	8%
Vicco	*2*	*1*	*50%*	$1,124,500	$500,000	44%
Bridges	50	38	*76%*	$1,212,450	$760,000	63%
Bridges	109	7	*6%*	$62,972,000	$3,270,000	5%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	1	25%	N/A	N/A	N/A
Electrical lines-Miles	0	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	898	87	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Perry County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Hazard	1	1	100%	$10,795,200	$10,795,200	100%
Water Lines-Miles Hzd	*294*	*176*	60%	$36,539,987	$36,539,987	100%
Vicco	*31*	*23*	*75%*	$3,852,856	$3,852,856	100%
Buckhorn	*29*	*18*	*62%*	$5,292,173	$5,292,173	
Water Tanks Hazard	22	18	82%	$6,558,300	$6,558,300	100%
Vicco	*3*	*2*	67%	$674,700	$674,700	100%
Buckhorn	*1*	*1*	100%	$540,000	$540,000	
Water Pumps Hazard	39	18	46%	$1,475,618	$1,475,618	100%
Vicco	*7*	*2*	*29%*	$151,808	$151,808	100%
Buckhorn	*2*	*1*	*50%*	$145,000	$145,000	
Sewer Plants Hazard	1	1	100%	$9,839,375	$9,839,375	100%
Vicco	*1*	*1*	*100%*	$253,013	$253,013	100%
Sewer Line-Miles- Haz.	43	43	100%	$12,127,058	$12,127,058	100%
Vicco	*3*	*3*	*102%*	$91,450	$91,450	100%
Sanitation District 1	*11*	*8*	*73%*	$275,350	$275,350	100%
Sewer Pumps Hazard	23	22	96%	$1,113,255	$1,113,255	100%
Vicco	*7*	*4*	*57%*	$202,410	$202,410	100%
Sanitation District 1	11	8	73%	$202,410	$202,410	
Miles of Road-Cnty	11	447	4064%	$272,048,000	$272,048,000	100%
Buckhorn	*3*	*3*	*100%*	$1,686,750	$1,686,750	100%
Hazard	*42*	*42*	*100%*	$23,614,500	$23,614,500	100%
Vicco	*2*	*2*	*100%*	$1,124,500	$1,124,500	100%
Bridges	50	50	*100%*	$1,212,450	$1,212,450	100%
Bridges	109	109	*100%*	$62,972,000	$62,972,000	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	4	100%	N/A	N/A	N/A
Electrical lines-Miles	0	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	898	877	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Wolfe County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Campton	1	0	0%	$1,106,508	$0	0%
Water Lines-Miles Cmp.	166	12	7%	$27,806,449	$2,155,000	8%
Water Tanks Campton	10	0	0%	$1,818,675	$0	0%
Water Pumps Campton	7	0	0%	$409,894	$0	0%
Sewer Plants Campton	1	0	0%	$995,323	$0	0%
Sewer Line-Miles Cmp.	11	1	9%	$1,691,621	$255,773	15%
Sewer Pumps Campton	4	1	25%	$163,636	$30,458,173	18613%
Miles of Road-County	190	10	5%	$115,153,775	$4,750,093	4%
City of Campton Streets	*3*	*1*	*33%*	$1,688,100	$495,457	29%
Bridges	12	3	*25%*	$302,803	$60,939	20%
Bridges	59	0	*0%*	$36,363,600	$0	0%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	0	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	566	55	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Wolfe County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Campton	1	1	100%	$1,106,508	$1,106,508	100%
Water Lines-Miles Cmp.	166	124	75%	$27,806,449	$27,806,449	100%
Water Tanks Campton	10	5	50%	$1,818,675	$1,818,675	100%
Water Pumps Campton	7	5	71%	$409,894	$409,894	100%
Sewer Plants Campton	1	1	100%	$995,323	$995,323	100%
Sewer Line-Miles Cmp.	11	6	54%	$1,691,621	$1,691,621	100%
Sewer Pumps Campton	4	3	75%	$163,636	$163,636	100%
Miles of Road-County	190	190	100%	$115,153,775	$115,153,775	100%
City of Campton Streets	*3*	*3*	*100%*	$1,688,100	$1,688,100	100%
Bridges	12	12	*100%*	$302,803	$302,803	100%
Bridges	59	59	*100%*	$36,363,600	$36,363,600	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	0	2	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	566	553	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Assets of the
Kentucky River Region
8 County Region

Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	46,099	41,135	89%	$4,404,638,000	$3,968,474,398	90%	114,762	93,808	82%
Commercial	2,167	266	12%	$618,236,000	$75,857,557	12%	18,121	2,224	12%
Industrial	34	9	26%	$67,870,000	$17,965,189	26%	3,051	808	26%
Agricultural	66	0	0%	$5,299,000	$0	0%	344	0	0%
Religious	471	31	7%	$90,289,999	$5,941,082	7%	446	29	7%
Government	201	23	11%	$50,630,200	$5,792,095	11%	6,830	782	11%
Education	283	3	1%	$70,485,000	$747,141	1%	7,327	78	1%
Totals	49,321	41,467	84%	$5,307,448,199	$4,074,777,462	77%			0%

Flood Hazard Area
Vulnerable Assets of the
Kentucky River Region
Breathitt County

Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	5,494	5,722	104%	$530,131,000	$552,131,340	104%	13,878	12,817	92%
Commercial	1,166	40	3%	$77,093,000	$2,643,850	3%	2,492	85	3%
Industrial	2	0	0%	$10,347,000	$0	0%	508	0	0%
Agricultural	2	0	0%	$138,000	$0	0%	27	0	0%
Religious	248	5	2%	$11,369,000	$229,214	2%	45	1	2%
Government	105	2	2%	$6,815,000	$129,810	2%	260	5	2%
Education	218	1	0%	$13,754,000	$63,092	0%	1,536	7	0%
Totals	7,235	5,770	80%	$649,647,000	$555,197,305	85%			

Flood Hazard Area
Vulnerable Assets of the
Kentucky River Region
Knott County

Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	6,414	6,385	100%	$640,473,000	$637,577,191	100%	16,346	14,302	87%
Commercial	107	23	22%	$55,376,000	$11,903,252	22%	2,210	475	21%
Industrial	3	0	0%	$14,264,000	$0	0%	273	0	0%
Agricultural	12	0	0%	$986,000	$0	0%	0	0	0%
Religious	17	1	6%	$6,946,999	$408,647	6%	32	2	6%
Government	9	5	56%	$5,047,200	$2,804,000	56%	1,296	720	56%
Education	11	0	0%	$9,790,000	$0	0%	1,333	0	0%
Totals	6,573	6,414	98%	$732,883,199	$652,693,091	89%			

Flood Hazard Area
Vulnerable Assets of the
Kentucky River Region
Lee County

Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	2,910	2,384	82%	$292,439,000	$239,578,892	82%	7,887	5,507	70%
Commercial	62	10	16%	$27,796,000	$4,483,226	16%	884	143	16%
Industrial	1	0	0%	$2,576,000	$0	0%	358	0	0%
Agricultural	0	0	0%	$0	$0	0%	114	0	0%
Religious	29	3	10%	$3,961,000	$409,759	10%	54	6	10%
Government	8	1	13%	$343,000	$42,875	13%	562	70	13%
Education	4	0	0%	$640,000	$0	0%	295	0	0%
Totals	3,014	2,398	80%	$327,755,000	$244,514,752	75%			

Flood Hazard Area
Vulnerable Assets of the
Kentucky River Region
Leslie County

Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	4,555	4,663	102%	$441,839,000	$452,315,095	102%	11,310	10,352	92%
Commercial	80	18	23%	$55,408,000	$12,466,800	23%	1,614	363	23%
Industrial	3	1	33%	$9,762,000	$3,254,000	33%	270	90	33%
Agricultural	11	0	0%	$839,000	$0	0%	0	0	0%
Religious	29	3	10%	$9,195,000	$951,207	10%	50	5	10%
Government	8	3	38%	$3,557,000	$1,333,875	38%	857	321	38%
Education	8	1	13%	$8,315,000	$1,039,375	13%	687	86	13%
Totals	4,694	4,689	100%	$528,915,000	$471,360,352	89%			

Flood Hazard Area
Vulnerable Assets of the
Kentucky River Region
Letcher County

Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	10,014	9,604	96%	$962,645,000	$923,231,734	96%	24,519	21,897	89%
Commercial	206	62	30%	$127,514,000	$38,378,000	30%	4,361	1,313	30%
Industrial	10	2	20%	$2,750,000	$550,000	20%	394	79	20%
Agricultural	10	0	0%	$837,000	$0	0%	76	0	0%
Religious	43	10	23%	$24,037,000	$5,590,000	23%	80	19	23%
Government	25	6	24%	$24,600,000	$5,904,000	24%	1,375	330	24%
Education	16	0	0%	$11,804,000	$0	0%	1,472	0	0%
Totals	10,324	9,684	94%	$1,154,187,000	$973,653,734	84%			

Flood Hazard Area Vulnerable Assets of the Kentucky River Region Owlsey County									
Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	2,328	1,578	68%	$186,085,000	$126,134,936	68%	4,755	3,803	80%
Commercial	29	7	24%	$16,914,000	$4,082,690	24%	565	136	24%
Industrial	3	0	0%	$1,144,000	$0	0%	72	0	0%
Agricultural	12	0	0%	$830,000	$0	0%	19	0	0%
Religious	19	2	11%	$6,697,000	$704,947	11%	32	3	11%
Government	6	0	0%	$945,000	$0	0%	477	0	0%
Education	3	0	0%	$1,513,000	$0	0%	208	0	0%
Totals	2,400	1,587	66%	$214,128,000	$130,922,573	61%			

Flood Hazard Area Vulnerable Assets of the Kentucky River Region Perry County									
Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	11,319	10,393	92%	$1,092,674,000	$1,003,283,053	92%	28,712	24,216	84%
Commercial	465	105	23%	$232,655,000	$52,535,000	23%	4,922	1,111	23%
Industrial	9	6	67%	$24,403,000	$16,268,667	67%	715	477	67%
Agricultural	11	0	0%	$906,000	$0	0%	80	0	0%
Religious	76	7	9%	$24,023,000	$2,212,645	9%	133	12	9%
Government	32	6	19%	$6,723,000	$1,260,563	19%	1,512	284	19%
Education	18	1	6%	$21,579,000	$1,198,833	6%	1,604	89	6%
Totals	11,930	10,518	88%	$1,402,963,000	$1,076,758,761	77%			

Flood Hazard Area Vulnerable Assets of the Kentucky River Region Wolfe County									
Type of Structure	Numbers of Structures			Value of Structures			Persons Impacted		
	Structures in County	Structures in Hazard Area	% in Hazard Area	Total Value	Value in Hazard Area	% in Hazard Area	Total Persons	Persons in Hazard Area	% in Hazard Area
Residential	3,065	406	13%	$258,352,000	$34,222,157	13%	7,355	914	12%
Commercial	52	1	2%	$25,480,000	$490,000	2%	1,073	21	2%
Industrial	3	0	0%	$2,624,000	$0	0%	461	0	0%
Agricultural	8	0	0%	$763,000	$0	0%	28	0	0%
Religious	10	0	0%	$4,061,000	$0	0%	20	0	0%
Government	8	0	0%	$2,600,000	$0	0%	491	0	0%
Education	5	0	0%	$3,090,000	$0	0%	192	0	0%
Totals	3,151	407	13%	$296,970,000	$34,712,157	12%			

Above table information from the following: Strucuture and person counts -- US Census; Residential Value -- HAZUS MH;
Industrial Value -- KY Economic Development Cabinet; Other Structures Value -- HAZUS MH Stock exposure by occupancy type

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region 8 County Region						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in Region	Structures in Hazard	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	13	3	23%	$44,624,048	$7,500,000	17%
Water Lines	1,852	325	18%	$193,296,088	$52,690,176	27%
Water Tanks	113	0	0%	$46,057,125	$0	0%
Water Pumps	135	12	9%	$6,628,061	$975,375	15%
Sewer Plants	12	6	50%	$16,252,535	$10,000,000	62%
Sewer Lines	221	35	16%	$39,868,744	$8,667,648	22%
Sewer Pumps	127	40	32%	$2,943,304	$1,600,000	54%
Road Miles	2,511	500	20%	$1,255,500,000	$251,000,000	20%
Bridges	813	271	33%	$195,354,705	$66,000,000	34%
Electrical Plants	0		0%	$0		0%
					$0	
Sub-Stations	22	2	9%	N/A	N/A	N/A
Electrical Lines	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	7,699	750	10%	N/A	N/A	N/A
Gas Lines	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region 8 County Region						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in Region	Structures in Hazard	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	13	12	92%	$29,976,000	$29,976,000	100%
Water Lines	1,852	1,005	54%	$164,656,800	$164,656,800	100%
Water Tanks	113	71	63%	$36,600,000	$36,600,000	100%
Water Pumps	135	70	52%	$5,737,500	$5,737,500	100%
Sewer Plants	12	13	108%	$22,851,325	$22,851,325	100%
Sewer Lines	221	146	66%	$36,115,200	$36,115,200	100%
Sewer Pumps	127	82	65%	$3,240,000	$3,240,000	100%
Road Miles	2,511	2,511	100%	$1,255,500,000	$1,255,500,000	100%
Bridges	813	813	100%	$199,939,400	$199,939,400	100%
Electrical Plants	0	0	0%	$0	$0	0%
Sub-Stations	22	20	91%	N/A	N/A	N/A
Electrical Lines	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	7,699	750	10%	N/A	N/A	N/A
Gas Lines	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Breathitt County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Jackson	1	1	100%	$6,747,000	$6,747,000	100%
Water Lines-Miles Jck.	68	16	23%	$11,429,418	$2,743,060	24%
Water Lines-Miles Dist	160	16	10%	$3,186,750	$0	0%
Water Tanks Jackson	6	0	0%	$168,075	$0	0%
Water Tanks District	8	0	0%	$4,849,800	$0	0%
Water Pumps Jackson	3	0	0%	$6,204,541	$1,923,408	31%
Water Pumps District	5	0	0%	$759,038	$212,531	28%
Sewer Plants Jackson	1	0	0%	$14,000,000	$0	0%
Sewer Line-Miles Jck.	27	8	30%	$6,184,750	$912,251	15%
Sewer Pumps Jackson	25	5	20%	$1,230,653	$827,171	67%
Miles of Road-Cnty	286	34	12%	$2,792,358	$403,496	14%
City of Jackson	*11*	*2*	*18%*	$0	$0	0%
Bridges -- County	57	45	*79%*	N/A	N/A	N/A
Bridges -- State	64	12	19%	N/A	N/A	N/A
Electrical Plants	0	0	0%	N/A	N/A	N/A
Electrical Sub-stations	3	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	654	64	10%	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region

Breathitt County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	1	1	100%	$6,747,000	$6,747,000	100%
Water Lines	68	55	81%	$11,429,418	$11,429,418	100%
Water Lines District	160			$3,186,750	$3,186,750	
Water Tanks	6	5	83%	$168,075	$168,075	100%
Water Tanks District	8			$4,849,800	$4,849,800	
Water Pumps	3	2	67%	$6,204,541	$6,204,541	100%
Water Pumps District	5			$759,038	$759,038	
Sewer Plants	1	1	100%	$14,000,000	$14,000,000	100%
Sewer Lines	27	22	81%	$6,184,750	$6,184,750	100%
Sewer Pumps	25	15	60%	$1,230,653	$1,230,653	100%
Road Miles	286	286	100%	$2,792,358	$2,792,358	100%
City of Jackson	11	11	100%	$0	$0	0%
Bridges -- County	57	57	*100%*	$1,094,400	$1,094,400	100%
Bridges -- State	64	64	100%	$2,483,200	$2,483,200	100%
Electrical Plants	0	0	0%	$0	$0	0%
Sub-Stations	3	3	100%	N/A	N/A	N/A
Electrical Lines	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	654	639	98%	N/A	N/A	N/A
Gas Lines	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Knott County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	2	0	0%	$11,252,000	$0	0%
Hindman Plant	*1*	*0*	0%	$971,568	$0	0%
Water Lines-Miles	140	2	1%	$1,454,653	$378,210	26%
Hindman Lines	*46*	*4*	9%	$8,935,727	$714,858	8%
Water Tanks	5	0	0%	$674,700	$0	0%
Hindman Tanks	*6*	*0*	0%	$1,147,050	$0	0%
Water Pumps	8	0	0%	$172,058	$0	0%
Hindman Pumps	*6*	*0*	*0%*	$227,711	$0	0%
Sewer Plants	1	0	0%	$309,238	$0	0%
Hindman Plant	*1*	*1*	*100%*	$622,073	$553,645	89%
Sewer Line-Miles	4	0	0%	$564,049	$0	0%
Hindman Lines	*11*	*2*	*18%*	$1,970,573	$571,466	29%
Sewer Pumps	0	0	0%	$0	$0	0%
Hindman Pumps	*13*	*3*	*23%*	$455,423	$132,073	29%
Miles of Road-Cnty	250	28	11%	$142,812,500	$14,281,250	10%
City of Hindman	*6*	*2*	*33%*	$3,373,500	$1,012,050	30%
City of Pippa Passes	*2*	*0*	*0%*	$1,124,500	$0	0%
Bridges -- County	52	44	*85%*	$1,124,500	$854,620	76%
Bridges -- State	59	12	*20%*	$39,072,750	$15,238,373	39%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	3	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	1,669	160	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Knott County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	2	1	50%	$11,252,000	$11,252,000	100%
Hindman Plant	*1*	*1*	100%	$971,568	$971,568	100%
Water Lines-Miles	140	7	5%	$1,454,653	$1,454,653	100%
Hindman Lines	*46*	*43*	94%	$8,935,727	$8,935,727	100%
Water Tanks	5	2	40%	$674,700	$674,700	100%
Hindman Tanks	*6*	*3*	50%	$1,147,050	$1,147,050	100%
Water Pumps	8	2	25%	$172,058	$172,058	100%
Hindman Pumps	*6*	*3*	*50%*	$227,711	$227,711	100%
Sewer Plants	1	1	100%	$309,238	$309,238	100%
Hindman Plant	*1*	*1*	*100%*	$622,073	$622,073	100%
Sewer Line-Miles	4	2	45%	$564,049	$564,049	100%
Hindman Lines	*11*	*7*	*62%*	$1,970,573	$1,970,573	100%
Sewer Pumps	0	5	0%	$0	$0	0%
Hindman Pumps	*13*	*9*	*69%*	$455,423	$455,423	100%
Miles of Road-Cnty	250	250	100%	$142,812,500	$142,812,500	100%
City of Hindman	*6*	*6*	*100%*	$3,373,500	$3,373,500	100%
City of Pippa Passes	*2*	*2*	*100%*	$1,124,500	$1,124,500	100%
Bridges -- County	52	52	*100%*	$1,124,500	$1,124,500	100%
Bridges -- State	59	59	*100%*	$39,072,750	$39,072,750	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	3	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	1,669	1,630	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area
Vulnerable Infastructure of the
Kentucky River Region--Lee County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Beattyville	1	0	0%	$2,698,800	$0	0%
Water Lines-Miles Bty.	231	3	1%	$41,184,343	$1,035,580	3%
Lines Southside	*23*	*0*	0%	$4,558,232	$0	0%
Water Tanks Beattyville	9	0	0%	$26,070,450	$0	0%
Tanks Southside	*2*	*0*	0%	$337,350	$0	0%
Water Pumps Beattyville	8	0	0%	$455,423	$0	0%
Pumps Southside	*1*	*0*	0%	$75,904	$0	0%
Sewer Plants Beattyville	1	0	0%	$1,555,184	$0	0%
Sewer Line-Miles Bty.	26	1	4%	$3,666,320	$183,316	5%
Sewer Pumps Beattyville	15	3	20%	$303,615	$127,518	42%
Miles of Road-Cnty	292	14	5%	$164,607,700	$5,637,814	3%
City of Beattyville	*14*	*1*	*7%*	$7,857,150	$392,858	5%
Bridges -- County	21	12	*57%*	$452,500	$217,200	48%
Bridges -- State	23	3	*13%*	$13,513,650	$1,418,933	11%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	2,437	240	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Lee County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Beattyville	1	1	100%	$2,698,800	$2,698,800	100%
Water Lines-Miles Bty.	231	182	79%	$41,184,343	$41,184,343	100%
Lines Southside	*23*	*21*	92%	$4,558,232	$4,558,232	100%
Water Tanks Beattyville	9	7	78%	$26,070,450	$26,070,450	100%
Tanks Southside	*2*	*1*	50%	$337,350	$337,350	100%
Water Pumps Beattyville	8	6	75%	$455,423	$455,423	100%
Pumps Southside	*1*	*1*	100%	$75,904	$75,904	100%
Sewer Plants Beattyville	1	1	100%	$1,555,184	$1,555,184	100%
Sewer Line-Miles Bty.	26	13	49%	$3,666,320	$3,666,320	100%
Sewer Pumps Beattyville	15	6	40%	$303,615	$303,615	100%
Miles of Road-Cnty	292	292	100%	$164,607,700	$164,607,700	100%
City of Beattyville	*14*	*14*	*100%*	$7,857,150	$7,857,150	100%
Bridges -- County	21	21	*100%*	$452,500	$452,500	100%
Bridges -- State	23	23	*100%*	$13,513,650	$13,513,650	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	2	100%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	2,437	2,437	100%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Leslie County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	1	0	0%	$2,156,700	$0	0%
Water Lines	233	7	3%	$31,171,140	$857,206	3%
Water Tanks	9	0	0%	$2,914,800	$0	0%
Water Pumps	22	0	0%	$1,669,883	$0	0%
Sewer Plants - Hyden	1	0	0%	$933,335	$0	0%
Sewer Line-Miles Hyden	11	1	9%	$1,128,098	$236,901	21%
Sewer Pumps - Hyden	6	3	50%	$253,013	$129,036	51%
Miles of Road-Cnty	325	48	15%	$218,578,750	$70,928,804	32%
City of Hyden	*3*	*1*	*33%*	$1,971,750	$473,220	24%
Bridges -- County	38	24	63%	$835,850	$446,344	53%
Bridges -- State	57	6	11%	$32,418,750	$2,674,547	8%
Electrical Plants	N/A	0	0%	$0	$0	0%
Electrical Sub-stations	4	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	727	70	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Leslie County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants	1	1	100%	$2,156,700	$2,156,700	100%
Water Lines	233	150	64%	$31,171,140	$31,171,140	100%
Water Tanks	9	8	89%	$2,914,800	$2,914,800	100%
Water Pumps	22	22	100%	$1,669,883	$1,669,883	100%
Sewer Plants - Hyden	1	1	100%	$933,335	$933,335	100%
Sewer Line-Miles Hyden	11	4	36%	$1,128,098	$1,128,098	100%
Sewer Pumps - Hyden	6	5	83%	$253,013	$253,013	100%
Miles of Road-Cnty	325	325	100%	$218,578,750	$218,578,750	100%
City of Hyden	*3*	*3*	*100%*	$1,971,750	$1,971,750	100%
Bridges -- County	38	38	100%	$835,850	$835,850	100%
Bridges -- State	57	54	95%	$32,418,750	$32,418,750	100%
Electrical Plants	N/A	0	#VALUE!	$0	$0	0%
Electrical Sub-stations	4	3	75%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	727	710	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Letcher County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Blackey	1	1	100%	$961,800	$807,912	84%
Flemming Neon Plant	*1*	*0*	*0%*	$971,568	$0	0%
Jenkins Plant	*1*	*0*	*0%*	$2,698,800	$0	0%
Whitesburg Plant	*1*	*1*	*100%*	$2,320,968	$1,903,194	82%
Water Lines-Miles Blcky.	106	0	0%	$5,889,114	$0	0%
Flemming Neon Lines	*36*	*6*	*17%*	$5,402,998	$972,540	18%
Jenkins Lines	*30*	*4*	*13%*	$4,571,767	$640,047	14%
Whitesburg Lines	*31*	*3*	*10%*	$5,650,473	$452,038	8%
Water Tanks Blcky.	5	0	0%	$442,500	$0	0%
Flemming Neon Tanks	*6*	*0*	*0%*	$1,349,400	$0	0%
Jenkins Tanks	*3*	*0*	*0%*	$1,012,050	$0	0%
Whitesburg Tanks	*7*	*0*	*0%*	$2,361,450	$0	0%
Water Pumps Blcky.	2	0	0%	$75,904	$0	0%
Flemming Neon Pumps	*4*	*0*	*0%*	$303,615	$0	0%
Jenkins Pumps	*3*	*0*	*0%*	$227,711	$0	0%
Whitesburg Pumps	*6*	*0*	*0%*	$455,423	$0	0%
Sewer Plants	0	0	0%	$0	$0	0%
Flemming Neon Plant	*1*	*1*	*100%*	$1,236,950	$1,051,408	85%
Jenkins Plant	*1*	*1*	*100%*	$2,811,250	$2,389,563	85%
Whitesburg Plant	*1*	*1*	*100%*	$1,855,425	$1,577,111	85%
Sewer Line-Miles	0	0	0%	$0	$0	0%
Flemming Neon Lines	*17*	*4*	*23%*	$3,948,344	$3,277,126	83%
Jenkins Lines	*14*	*3*	*21%*	$3,384,295	$2,741,279	81%
Whitesburg Lines	*17*	*3*	*18%*	$2,820,246	$676,859	24%
Sewer Pumps	0	0	0%	$0	$0	0%
Flemming Neon Pumps	*5*	*1*	*20%*	$50,603	$43,518	86%
Jenkins Pumps	*1*	*1*	*100%*	$50,603	$43,012	85%
Whitesburg Pumps	*17*	*4*	*24%*	$834,435	$175,231	21%
Miles of Road-Cnty	366	47	13%	$224,083,500	$20,167,515	9%
Blackey Streets	*1*	*1*	*100%*	$562,250	$489,158	87%
Flemming Neon Streets	*8*	*5*	*63%*	$4,498,000	$3,553,420	79%
Jenkins Streets	*13*	*3*	*23%*	$7,309,250	$2,119,683	29%
Whitesburg Streets	*18*	*2*	*11%*	$11,205,000	$784,350	7%
Bridges -- County	58	44	*76%*	$1,346,950	$821,640	61%
Bridges -- State	101	8	*8%*	$61,817,100	$2,472,684	4%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	693	66	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Letcher County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Blackey	1	1	100%	$961,800	$961,800	100%
Flemming Neon Plant	*1*	*1*	*100%*	$971,568	$971,568	100%
Jenkins Plant	*1*	*1*	*100%*	$2,698,800	$2,698,800	100%
Whitesburg Plant	*1*	*1*	*100%*	$2,320,968	$2,320,968	100%
Water Lines-Miles Blcky.	106	15	14%	$5,889,114	$5,889,114	100%
Flemming Neon Lines	*36*	*26*	*72%*	$5,402,998	$5,402,998	100%
Jenkins Lines	*30*	*22*	*74%*	$4,571,767	$4,571,767	100%
Whitesburg Lines	*31*	*27*	*86%*	$5,650,473	$5,650,473	100%
Water Tanks Blcky.	5	1	20%	$442,500	$442,500	100%
Flemming Neon Tanks	*6*	*4*	*67%*	$1,349,400	$1,349,400	100%
Jenkins Tanks	*3*	*3*	*100%*	$1,012,050	$1,012,050	100%
Whitesburg Tanks	*7*	*7*	*100%*	$2,361,450	$2,361,450	100%
Water Pumps Blcky.	2	1	50%	$75,904	$75,904	100%
Flemming Neon Pumps	*4*	*4*	*100%*	$303,615	$303,615	100%
Jenkins Pumps	*3*	*3*	*100%*	$227,711	$227,711	100%
Whitesburg Pumps	*6*	*6*	*100%*	$455,423	$455,423	100%
Sewer Plants	0	0	0%	$0	$0	0%
Flemming Neon Plant	*1*	*1*	*100%*	$1,236,950	$1,236,950	100%
Jenkins Plant	*1*	*1*	*100%*	$2,811,250	$2,811,250	100%
Whitesburg Plant	*1*	*1*	*100%*	$1,855,425	$1,855,425	100%
Sewer Line-Miles	0	0	0%	$0	$0	0%
Flemming Neon Lines	*17*	*14*	*81%*	$3,948,344	$3,948,344	100%
Jenkins Lines	*14*	*12*	*86%*	$3,384,295	$3,384,295	100%
Whitesburg Lines	*17*	*10*	*60%*	$2,820,246	$2,820,246	100%
Sewer Pumps	0	0	0%	$0	$0	0%
Flemming Neon Pumps	*5*	*1*	*20%*	$50,603	$50,603	100%
Jenkins Pumps	*1*	*1*	*100%*	$50,603	$50,603	100%
Whitesburg Pumps	*17*	*14*	*82%*	$834,435	$834,435	100%
Miles of Road-Cnty	366	366	100%	$224,083,500	$224,083,500	100%
Blackey Streets	*1*	*1*	*100%*	$562,250	$562,250	100%
Flemming Neon Streets	*8*	*8*	*100%*	$4,498,000	$4,498,000	100%
Jenkins Streets	*13*	*13*	*100%*	$7,309,250	$7,309,250	100%
Whitesburg Streets	*18*	*18*	*100%*	$11,205,000	$11,205,000	100%
Bridges -- County	58	58	*100%*	$1,346,950	$1,346,950	100%
Bridges -- State	101	101	*100%*	$61,817,100	$61,817,100	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	4	100%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	693	665	96%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Owsley County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Booneville	1	0	0%	$1,943,136	$0	0%
Water Lines-Miles Boon	229	18	8%	$27,846,218	$2,227,697	8%
Water Tanks Booneville	11	0	0%	$2,029,500	$0	0%
Water Pumps Booneville	12	0	0%	$759,038	$0	0%
Sewer Plants Booneville	1	0	0%	$787,150	$0	0%
Sewer Line-Miles Boon.	26	2	8%	$2,272,148	$408,987	18%
Sewer Pumps Booneville	11	2	18%	$253,013	$80,964	32%
Miles of Road-Cnty	227	33	15%	$127,845,300	$12,784,530	10%
City of Booneville streets	*2*	*1*	*50%*	$1,212,000	$472,680	39%
Bridges	19	14	*74%*	$448,950	$157,133	35%
Bridges	34	6	*18%*	$20,760,400	$2,595,050	13%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	55	5	9%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Owsley County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Booneville	1	1	100%	$1,943,136	$1,943,136	100%
Water Lines-Miles Boon	229	134	59%	$27,846,218	$27,846,218	100%
Water Tanks Booneville	11	6	55%	$2,029,500	$2,029,500	100%
Water Pumps Booneville	12	10	83%	$759,038	$759,038	100%
Sewer Plants Booneville	1	1	100%	$787,150	$787,150	100%
Sewer Line-Miles Boon.	26	8	30%	$2,272,148	$2,272,148	100%
Sewer Pumps Booneville	11	5	45%	$253,013	$253,013	100%
Miles of Road-Cnty	227	227	100%	$127,845,300	$127,845,300	100%
City of Booneville streets	*2*	*2*	*100%*	$1,212,000	$1,212,000	100%
Bridges	19	19	*100%*	$448,950	$448,950	100%
Bridges	34	34	*100%*	$20,760,400	$20,760,400	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	2	2	100%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	55	54	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Perry County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Hazard	1	1	100%	$10,795,200	$9,600,000	89%
Water Lines-Miles Hzd	*294*	*42*	14%	$36,539,987	$7,805,952	21%
Vicco	*31*	*4*	13%	$3,852,856	$462,343	12%
Buckhorn	*29*	*4*	*14%*	$5,292,173	$722,568	14%
Water Tanks Hazard	22	0	0%	$6,558,300	$0	0%
Vicco	*3*	*0*	0%	$674,700	$0	0%
Buckhorn	1	0	0%	$540,000	$0	0%
Water Pumps Hazard	39	0	0%	$1,475,618	$0	0%
Vicco	*7*	*0*	*0%*	$151,808	$0	0%
Buckhorn	2	0	0%	$145,000		
Sewer Plants Hazard	1	0	0%	$9,839,375	$0	0%
Vicco	*1*	*1*	*100%*	$253,013	$225,000	89%
Sewer Line-Miles- Haz.	43	7	16%	$12,127,058	$1,725,504	14%
Vicco	*3*	*1*	*34%*	$91,450	$248,292	272%
Sanitatiion District 1	9	3	33%	$275,350	$89,020	32%
Sewer Pumps Hazard	23	8	35%	$1,113,255	$356,400	32%
Vicco	*7*	*3*	*43%*	$202,410	$135,000	67%
Sanitatiion District 1	*11*	*8*	*73%*	$202,410	$135,000	67%
Miles of Road-County	447	48	11%	$272,048,000	$25,000,000	9%
Buckhorn	*3*	*0*	*0%*	$1,686,750	$0	0%
Hazard	*42*	*4*	*10%*	$23,614,500	$2,000,000	8%
Vicco	*2*	*1*	*50%*	$1,124,500	$500,000	44%
Bridges	50	38	*76%*	$1,212,450	$760,000	63%
Bridges	109	7	*6%*	$62,972,000	$3,270,000	5%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	1	25%	N/A	N/A	N/A
Electrical lines-Miles	0	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	898	87	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area
Vulnerable Infastructure of the
Kentucky River Region
Perry County

Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants Hazard	1	1	100%	$10,795,200	$10,795,200	100%
Water Lines-Miles Hzd	*294*	*176*	60%	$36,539,987	$36,539,987	100%
Vicco	*31*	*23*	*75%*	$3,852,856	$3,852,856	100%
Buckhorn	*29*	*18*	*62%*	$5,292,173	$5,292,173	
Water Tanks Hazard	22	18	82%	$6,558,300	$6,558,300	100%
Vicco	*3*	*2*	67%	$674,700	$674,700	100%
Buckhorn	*1*	*1*	100%	$540,000	$540,000	
Water Pumps Hazard	39	18	46%	$1,475,618	$1,475,618	100%
Vicco	*7*	*2*	*29%*	$151,808	$151,808	100%
Buckhorn	*2*	*1*	*50%*	$145,000	$145,000	
Sewer Plants Hazard	1	1	100%	$9,839,375	$9,839,375	100%
Vicco	*1*	*1*	*100%*	$253,013	$253,013	100%
Sewer Line-Miles- Haz.	43	43	100%	$12,127,058	$12,127,058	100%
Vicco	*3*	*3*	*102%*	$91,450	$91,450	100%
Sanitation District 1	*11*	*8*	*73%*	$275,350	$275,350	100%
Sewer Pumps Hazard	23	22	96%	$1,113,255	$1,113,255	100%
Vicco	*7*	*4*	*57%*	$202,410	$202,410	100%
Sanitation District 1	11	8	73%	$202,410	$202,410	
Miles of Road-Cnty	11	447	4064%	$272,048,000	$272,048,000	100%
Buckhorn	*3*	*3*	*100%*	$1,686,750	$1,686,750	100%
Hazard	*42*	*42*	*100%*	$23,614,500	$23,614,500	100%
Vicco	*2*	*2*	*100%*	$1,124,500	$1,124,500	100%
Bridges	50	50	*100%*	$1,212,450	$1,212,450	100%
Bridges	109	109	*100%*	$62,972,000	$62,972,000	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	4	4	100%	N/A	N/A	N/A
Electrical lines-Miles	0	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	898	877	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Flood Hazard Area Vulnerable Infastructure of the Kentucky River Region--Wolfe County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Campton	1	0	0%	$1,106,508	$0	0%
Water Lines-Miles Cmp.	166	12	7%	$27,806,449	$2,155,000	8%
Water Tanks Campton	10	0	0%	$1,818,675	$0	0%
Water Pumps Campton	7	0	0%	$409,894	$0	0%
Sewer Plants Campton	1	0	0%	$995,323	$0	0%
Sewer Line-Miles Cmp.	11	1	9%	$1,691,621	$255,773	15%
Sewer Pumps Campton	4	1	25%	$163,636	$30,458,173	18613%
Miles of Road-County	190	10	5%	$115,153,775	$4,750,093	4%
City of Campton Streets	*3*	*1*	*33%*	$1,688,100	$495,457	29%
Bridges	12	3	*25%*	$302,803	$60,939	20%
Bridges	59	0	*0%*	$36,363,600	$0	0%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	0	0	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	566	55	10%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

Sever Thunder/Wind/Hail/Lightening, Tornado, Landslide Hazard Area Vulnerable Infastructure of the Kentucky River Region Wolfe County						
Type of Structure	Numbers of Structures			Value of Infastructures		
	Structures in County	Structures in Hazard Area	% in Hazard	Total Value	Value in Hazard Area	% in Hazard
Water Plants-Campton	1	1	100%	$1,106,508	$1,106,508	100%
Water Lines-Miles Cmp.	166	124	75%	$27,806,449	$27,806,449	100%
Water Tanks Campton	10	5	50%	$1,818,675	$1,818,675	100%
Water Pumps Campton	7	5	71%	$409,894	$409,894	100%
Sewer Plants Campton	1	1	100%	$995,323	$995,323	100%
Sewer Line-Miles Cmp.	11	6	54%	$1,691,621	$1,691,621	100%
Sewer Pumps Campton	4	3	75%	$163,636	$163,636	100%
Miles of Road-County	190	190	100%	$115,153,775	$115,153,775	100%
City of Campton Streets	*3*	*3*	*100%*	$1,688,100	$1,688,100	100%
Bridges	12	12	*100%*	$302,803	$302,803	100%
Bridges	59	59	*100%*	$36,363,600	$36,363,600	100%
Electrical Plants	0	0	0%	$0	$0	0%
Electrical Sub-stations	0	2	0%	N/A	N/A	N/A
Electrical lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A
Gas/Oil Wells	566	553	98%	N/A	N/A	N/A
Gas Lines-Miles	N/A	N/A	N/A	N/A	N/A	N/A

ATTACHMENT H
Vulnerability: Development Areas Maps

Regional Development Areas

WOLFE

LEE

BREATHITT

OWSLEY

PERRY

KNOTT

LESLIE

LETCHER

Industrial
Pine Ridge
Regional Business Park

Industrial
Appalachian
Land & Lumber

Commercial
11 North Development
(Beattyville)

Housing
Crystal Creek
Subdivision

Industrial
Lee County
Industrial Park

Housing
Oakwood

Housing
Kings Ridge

Housing
Brewers

Industrial
Breathitt County
Industrial Park

Industrial
Lone Oak
Industrial Park

Housing
Southfork Housing

Industrial
Coalfields Regional
Business Park

Housing
Adams
Subdivision

Commercial
Daniel Boone
Center

Housing
Ridgeview Subdivision

Housing
Happy Valley

Housing
Grand Oak Subdivision & Rock Ridge

Commercial
Coal Harbor Development

Housing
Cliff View

Housing
Osborne Housing
Development

Commercial
421 Strip Mall

Housing
LeeCo

Housing
Phoenix
Properties

Housing
Hunter's Forest

Housing
Charles Town
Heights

Knott County Sportsplex
Commercial Area

Housing
Brushy Fork

Industrial
Gateway Regional
Industrial Park

Industrial
Whitesburg
Industrial Park

Legend

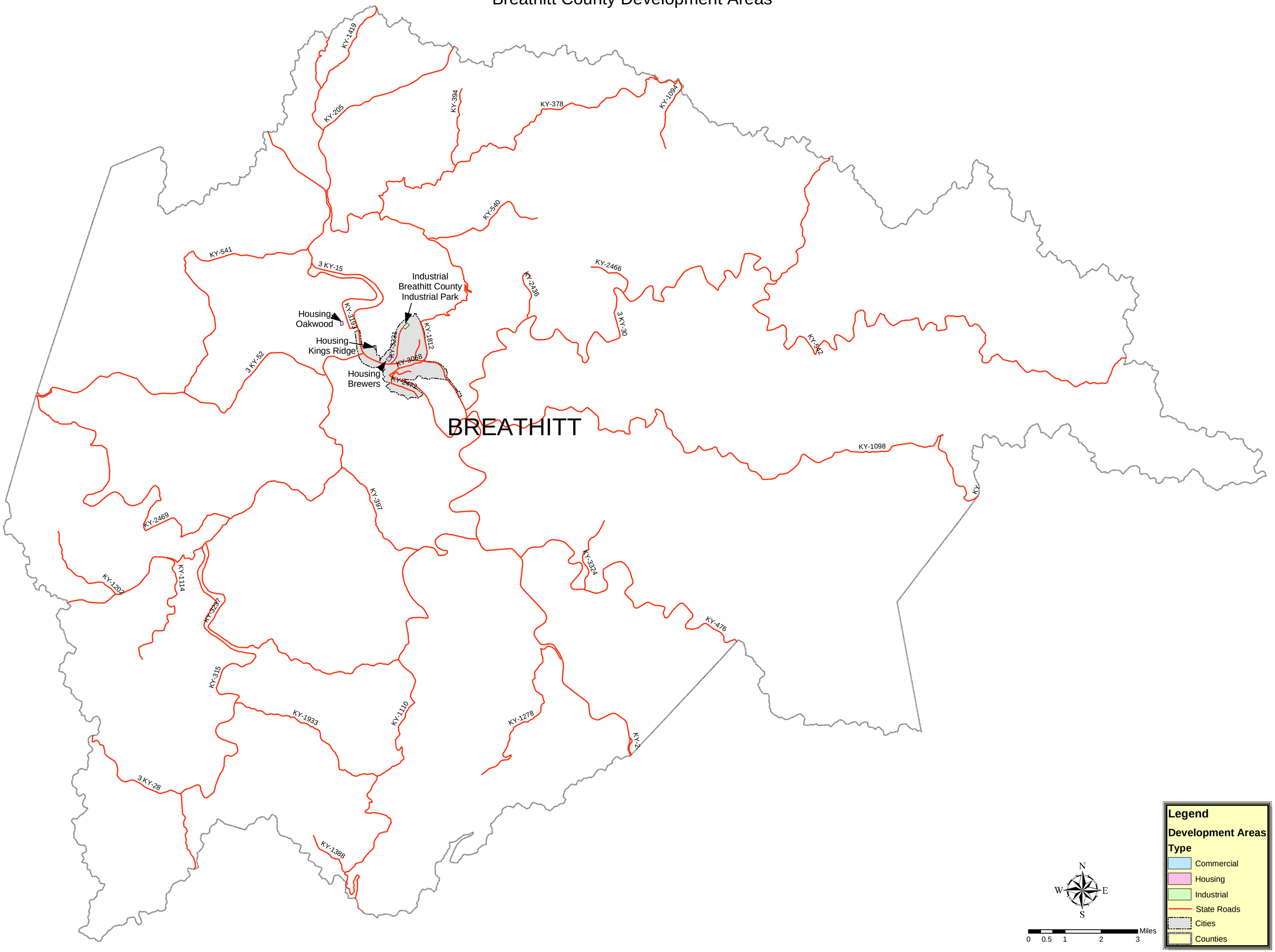
Development Areas

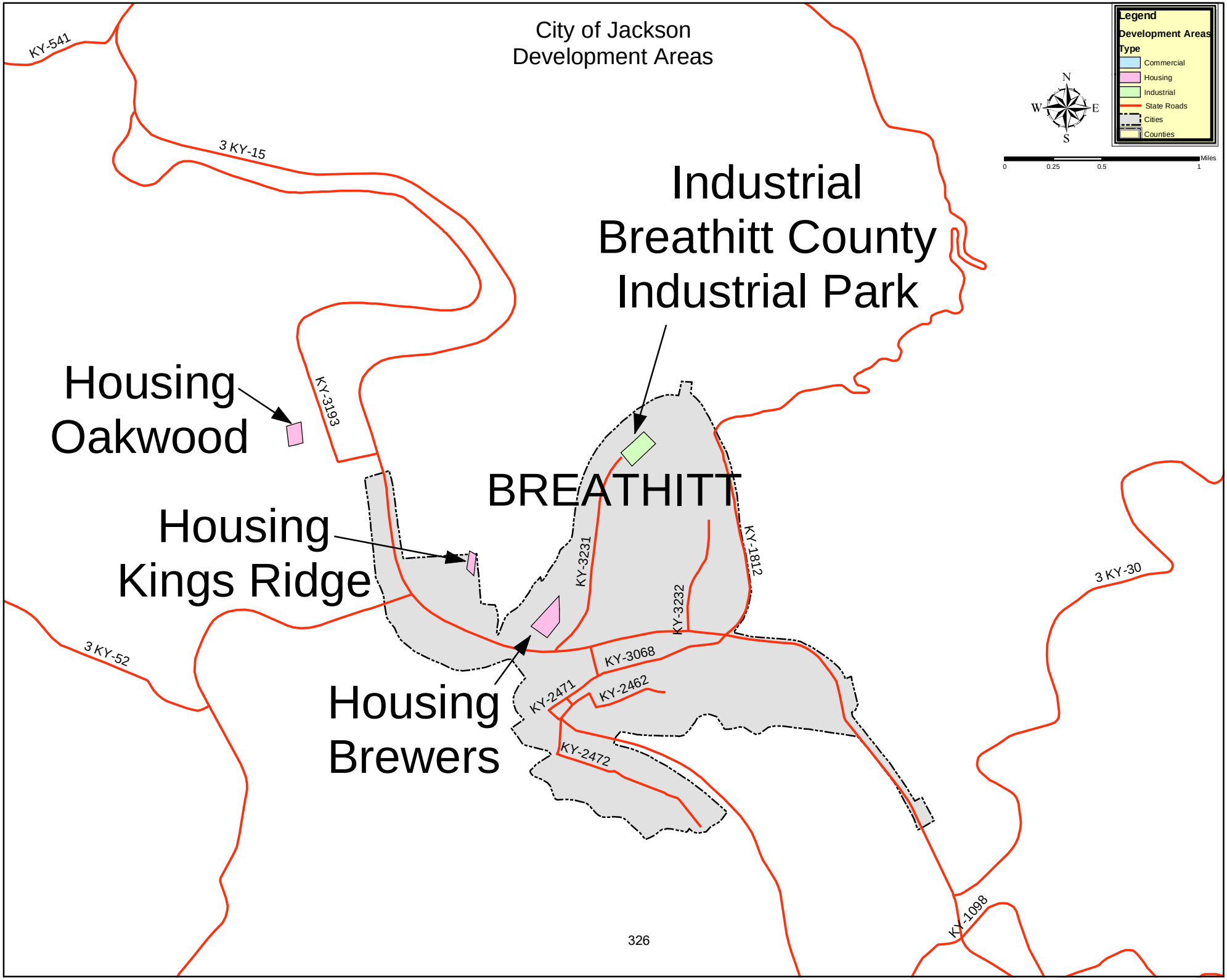
Type

- Commercial
- Housing
- Industrial
- State Roads
- Cities
- Counties

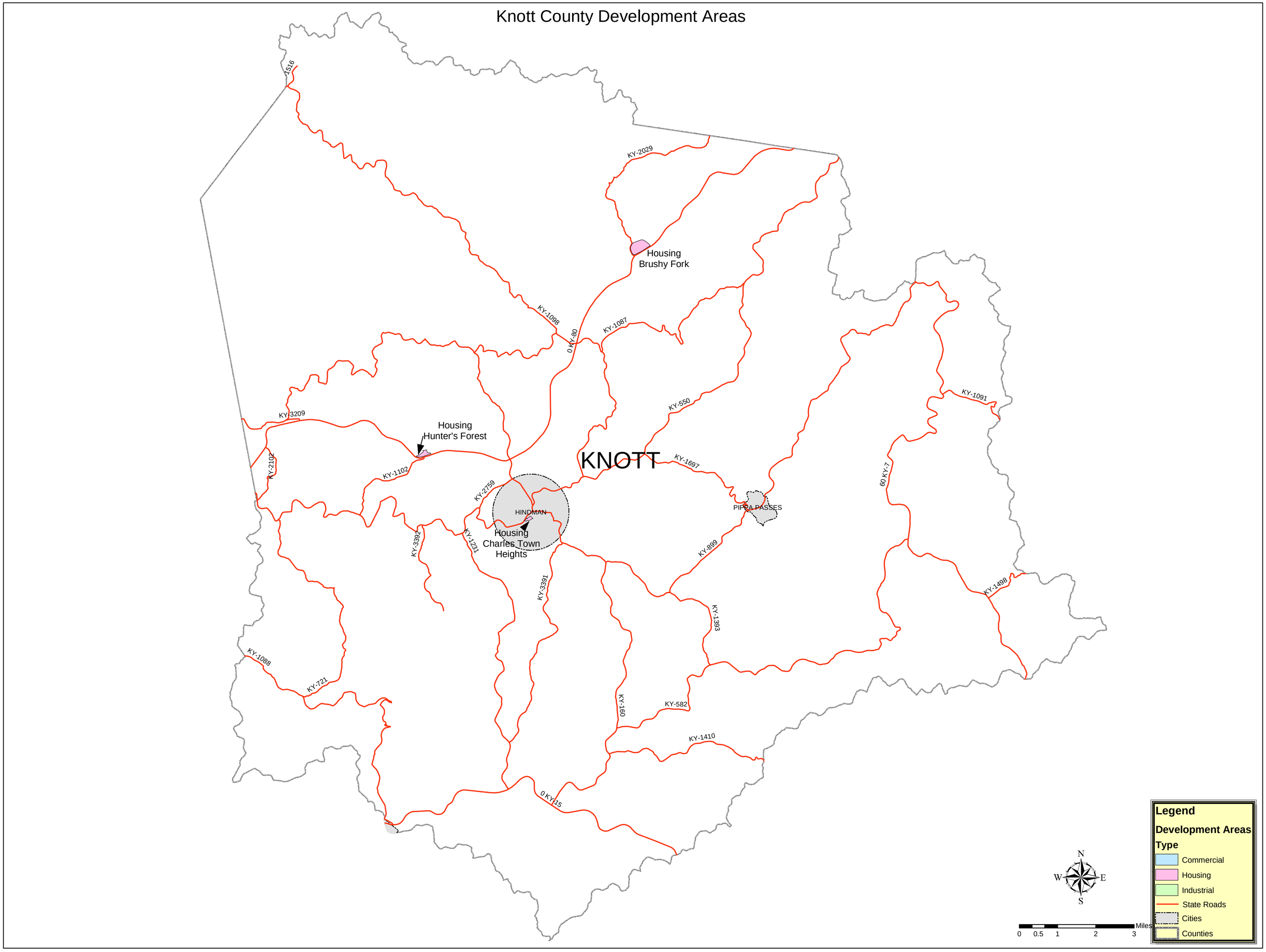
0 1.25 2.5 5 7.5 10 Miles

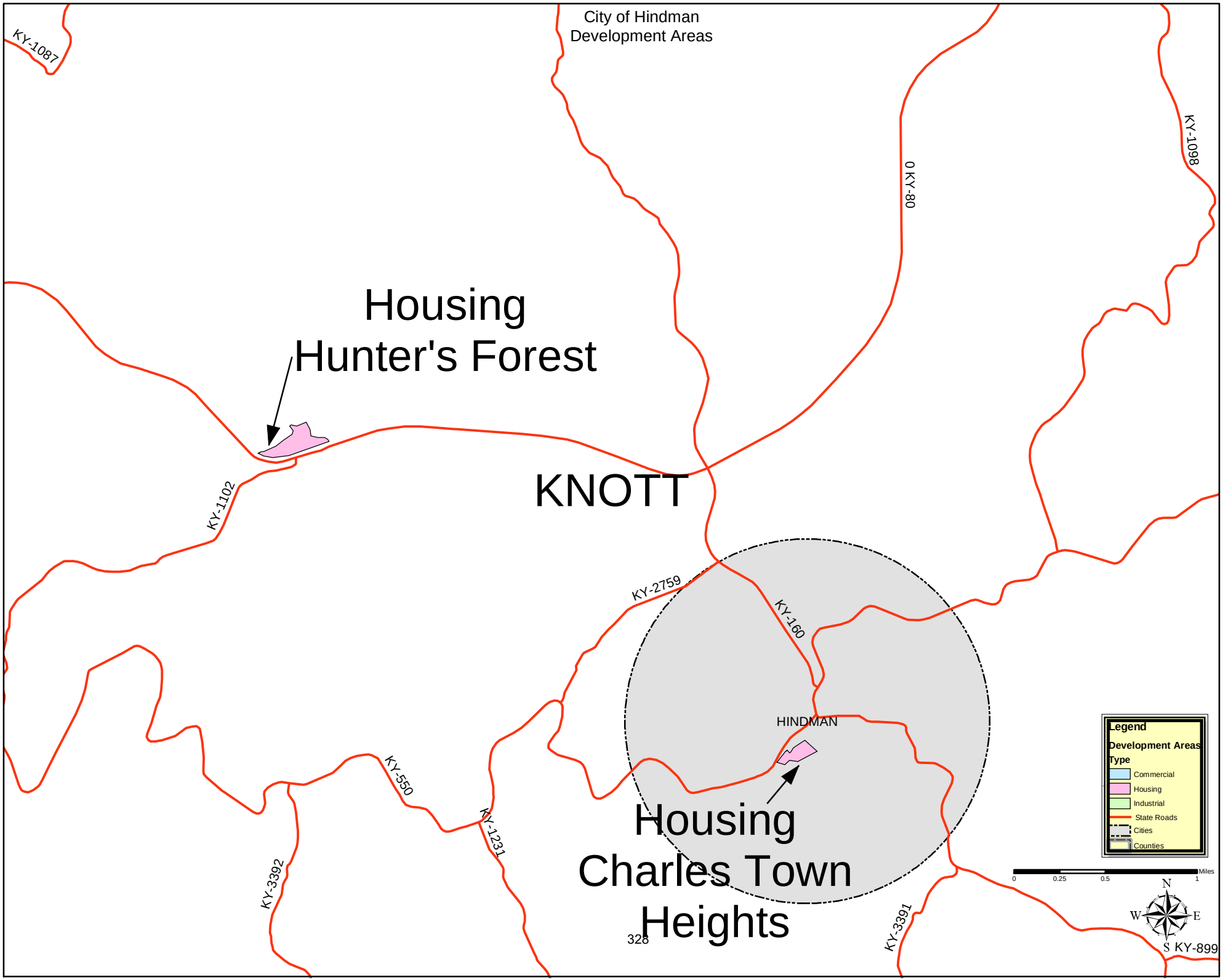
Breathitt County Development Areas

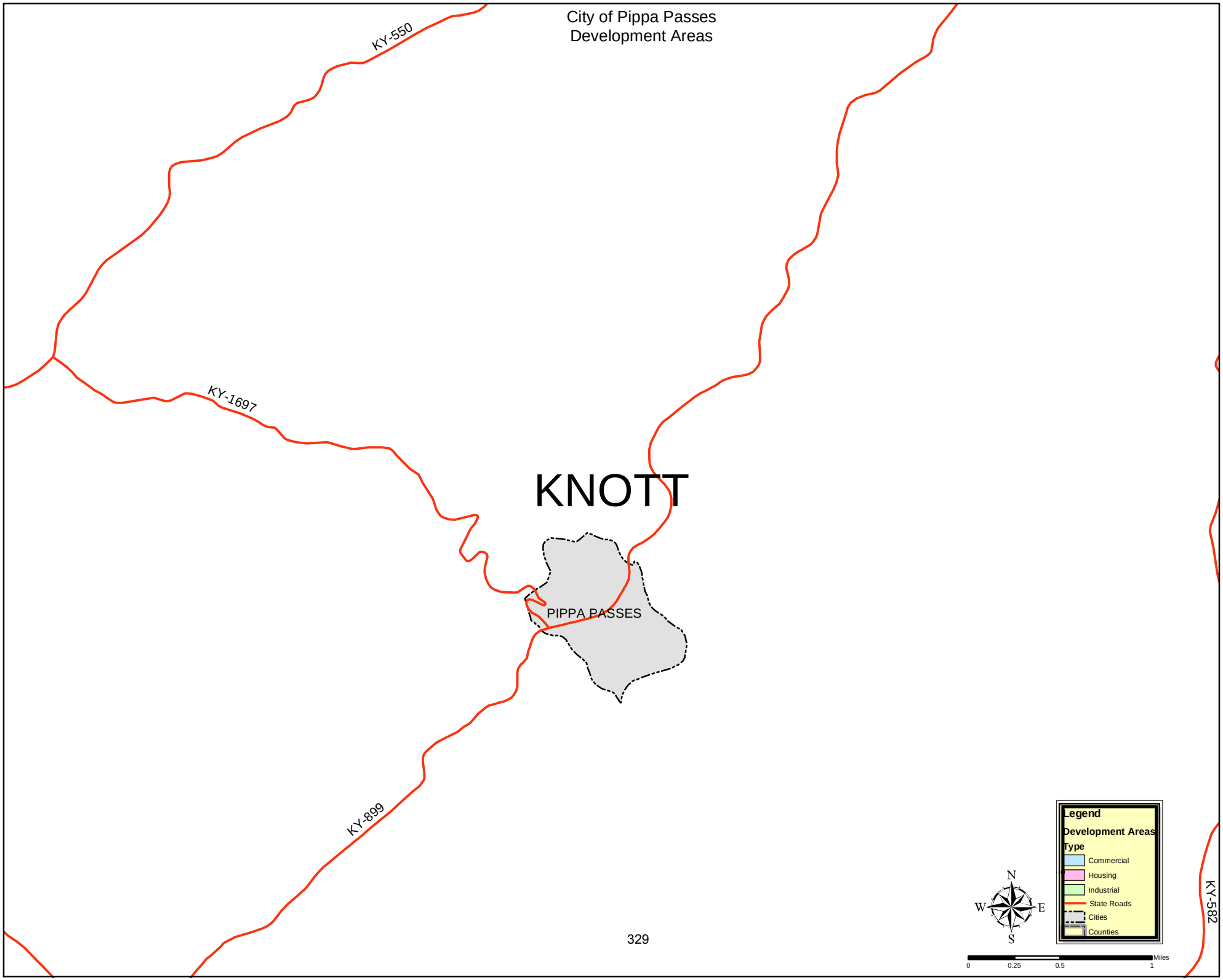



City of Jackson
Development Areas
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties
N
W
E
S
0
0.25
0.5
1
Miles
Industrial
Breathitt County
Industrial Park
Housing
Oakwood
Housing
Kings Ridge
Housing
Brewers
BREATHITT
KY-541
3 KY-15
KY-3193
KY-3231
KY-3232
KY-1812
KY-3068
KY-2471
KY-2462
KY-2472
3 KY-52
3 KY-30
KY-1098

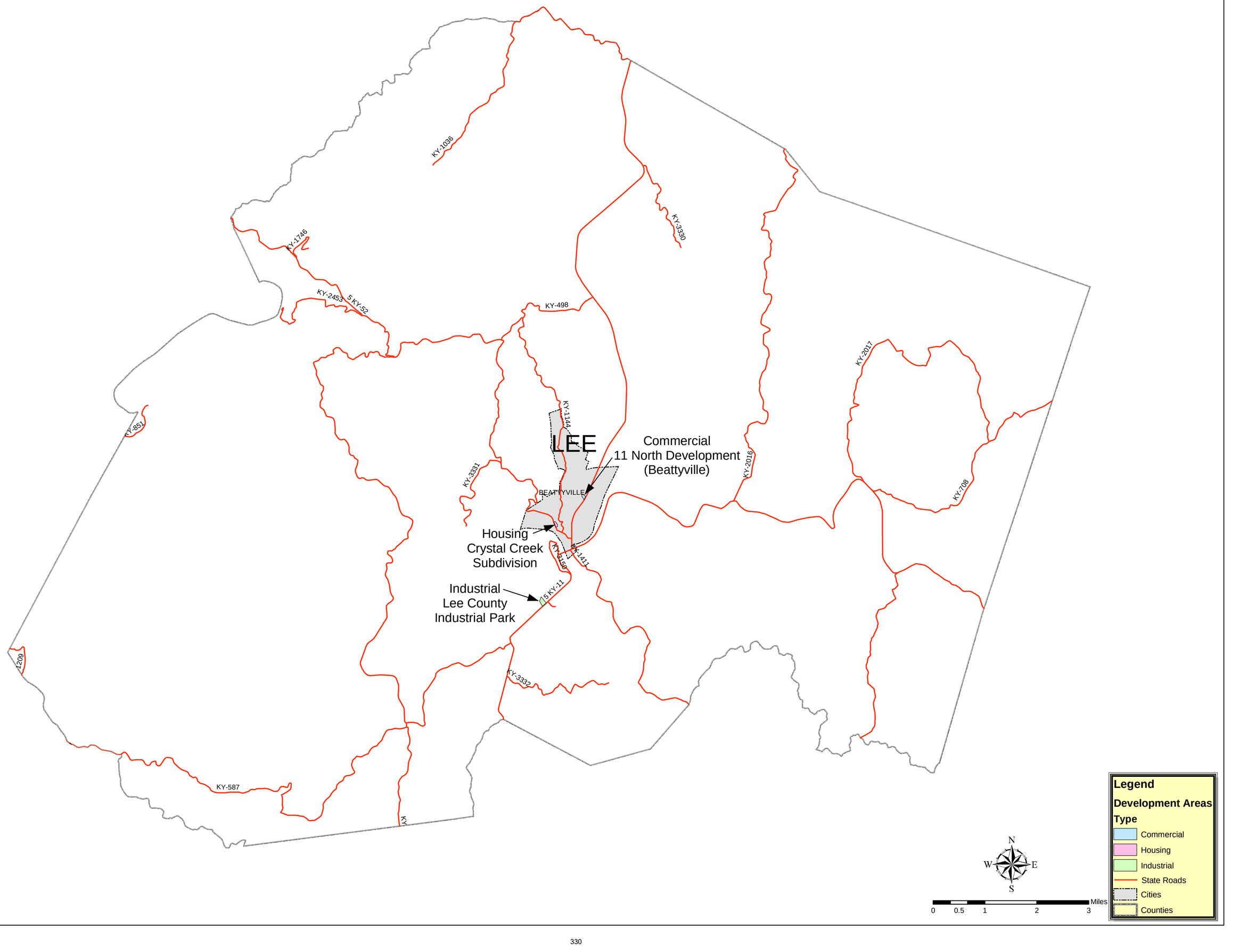
Knott County Development Areas

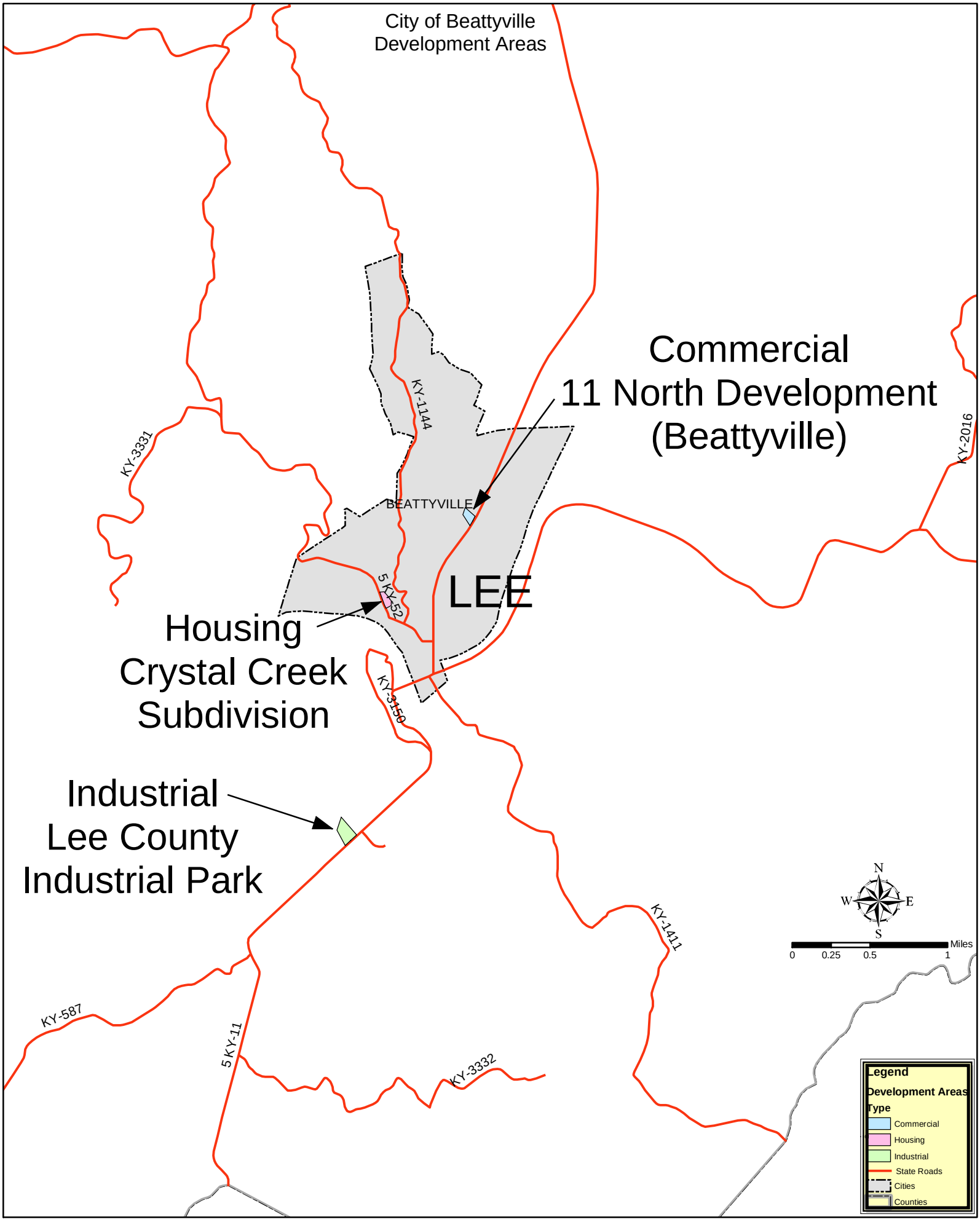



City of Hindman
Development Areas
KY-1087
KY-1098
KY-80
Housing
Hunter's Forest
KNOTT
KY-1102
KY-2759
KY-160
HINDMAN
Housing
Charles Town
Heights
KY-550
KY-1231
KY-3392
KY-3391
328
S KY-899
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties
0
0.25
0.5
1
Miles
N
W
E


City of Pippa Passes
Development Areas
KY-550
KY-1697
KNOTT
PIPPA PASSES
KY-899
KY-582
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties
N
W
E
S
0
0.25
0.5
1
Miles

Lee County Development Areas




City of Beattyville
Development Areas
Commercial
11 North Development
(Beattyville)
LEE
Housing
Crystal Creek
Subdivision
Industrial
Lee County
Industrial Park
BEATTYVILLE
KY-1144
KY-3331
KY-2016
5 KY-52
KY-3150
KY-1411
KY-587
5 KY-11
KY-3332
N
W
E
S
Miles
0
0.25
0.5
1
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties

Leslie County Development Areas

KY-1482
KY-3428
KY-6272
KY-6216
KY-257
DB-9006
KY-3424
KY-118
HYDEN
Housing
Osborne Housing
Development
Commercial
421 Strip Mall
6 KY-80
KY-1807
KY-3427
KY-2057
Housing
LeeCo
LESLIE
KY-699
KY-22
KY-406
KY-1780
KY-2009
KY-2008
KY-1850
KY-2058
US-421

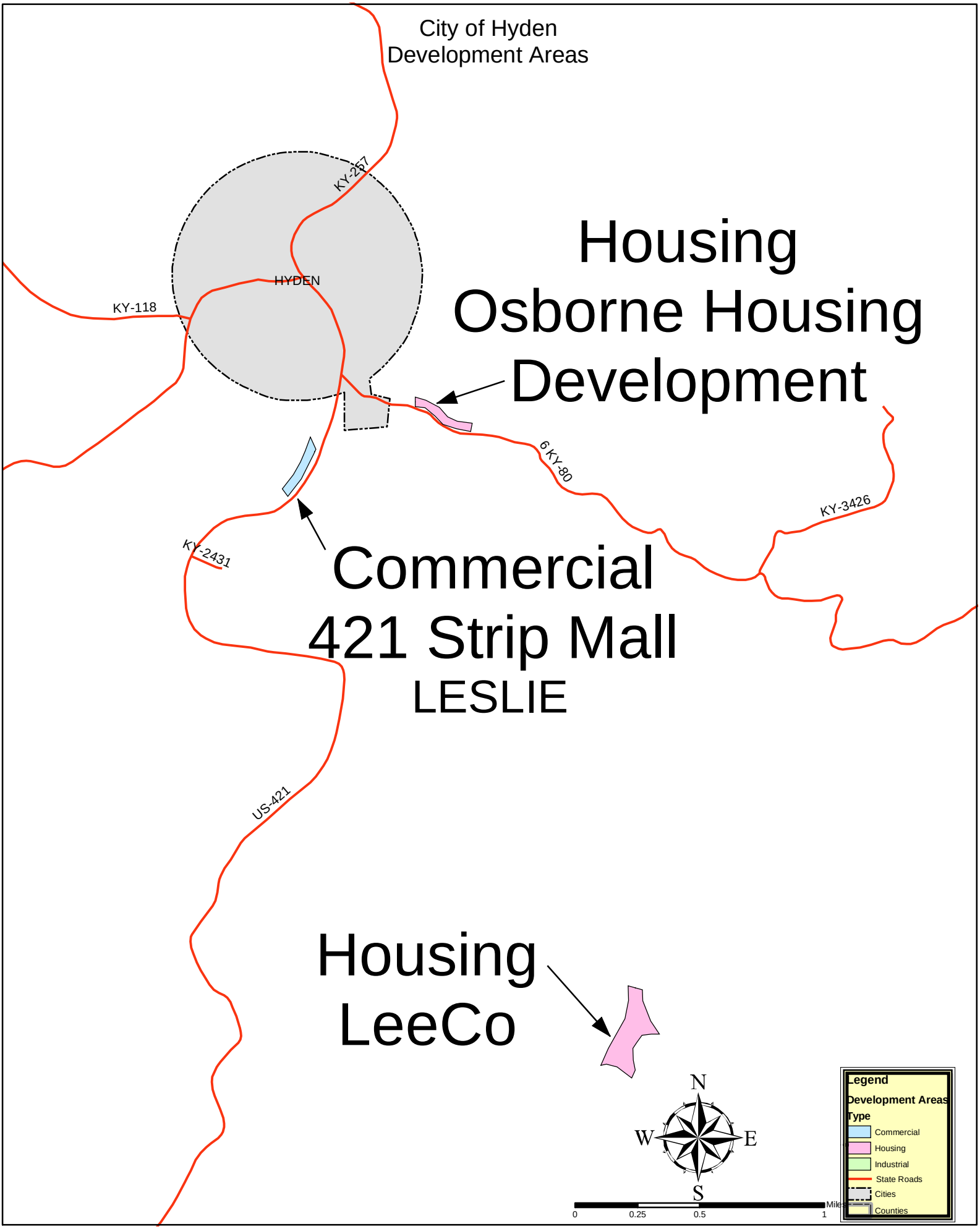
N
W
E
S
0 0.5 1 2 3 Miles

Legend

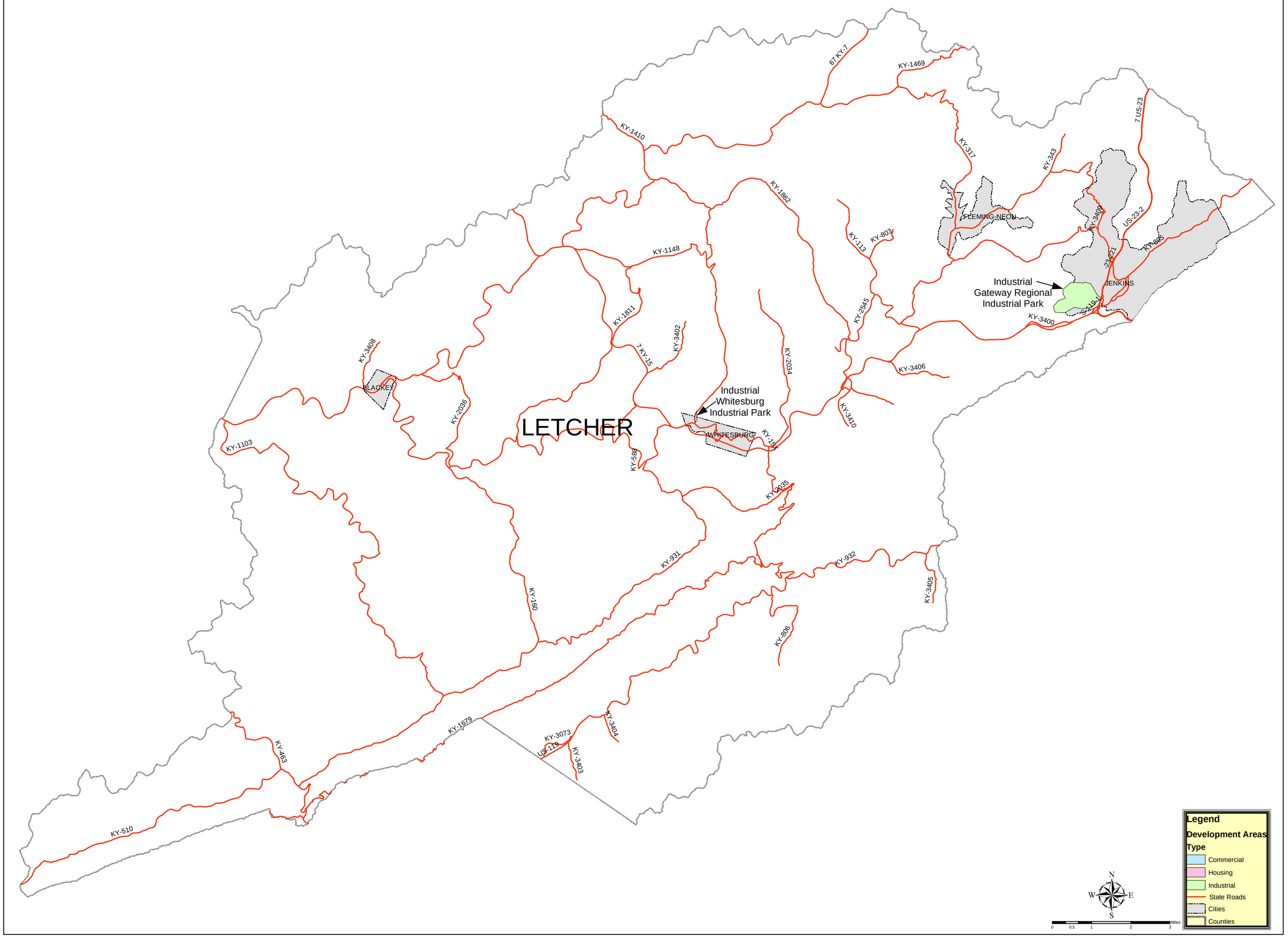
Development Areas

Type

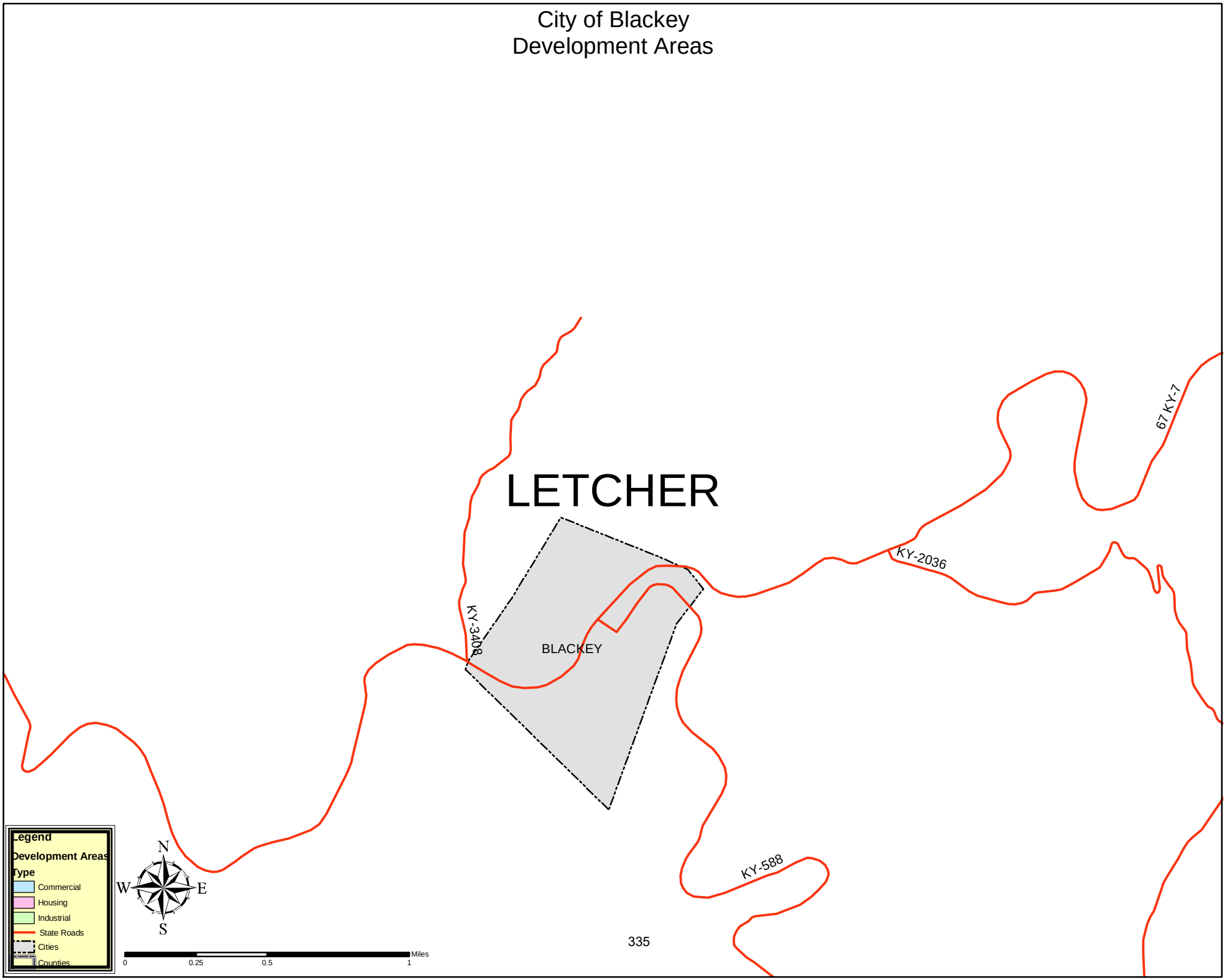
- Commercial
- Housing
- Industrial
- State Roads
- Cities
- Counties

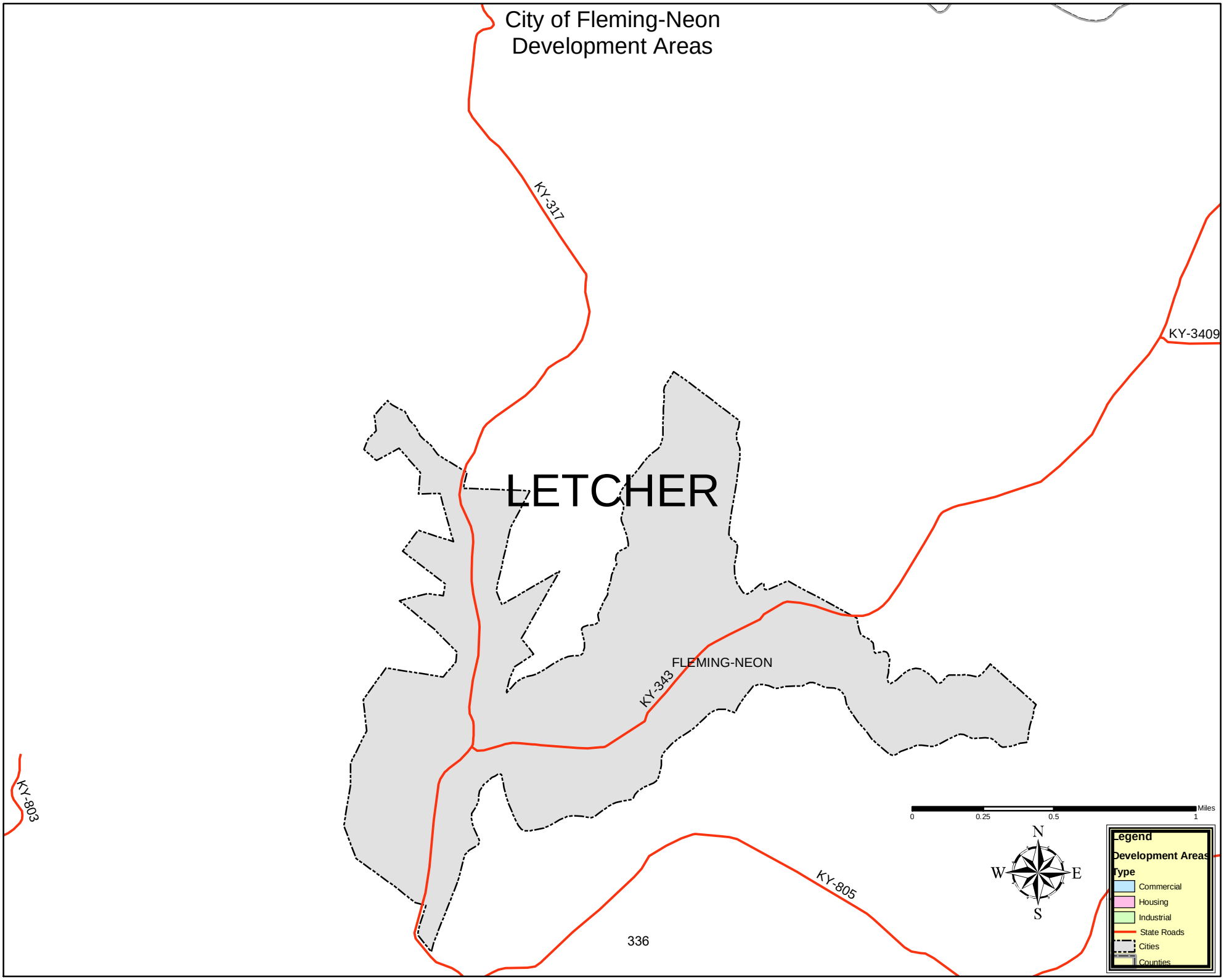

City of Hyden
Development Areas
KY-257
HYDEN
KY-118
Housing
Osborne Housing
Development
6 KY-80
KY-3426
KY-2431
Commercial
421 Strip Mall
LESLIE
US-421
Housing
LeeCo
N
W
E
S
0
0.25
0.5
1
Miles
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties

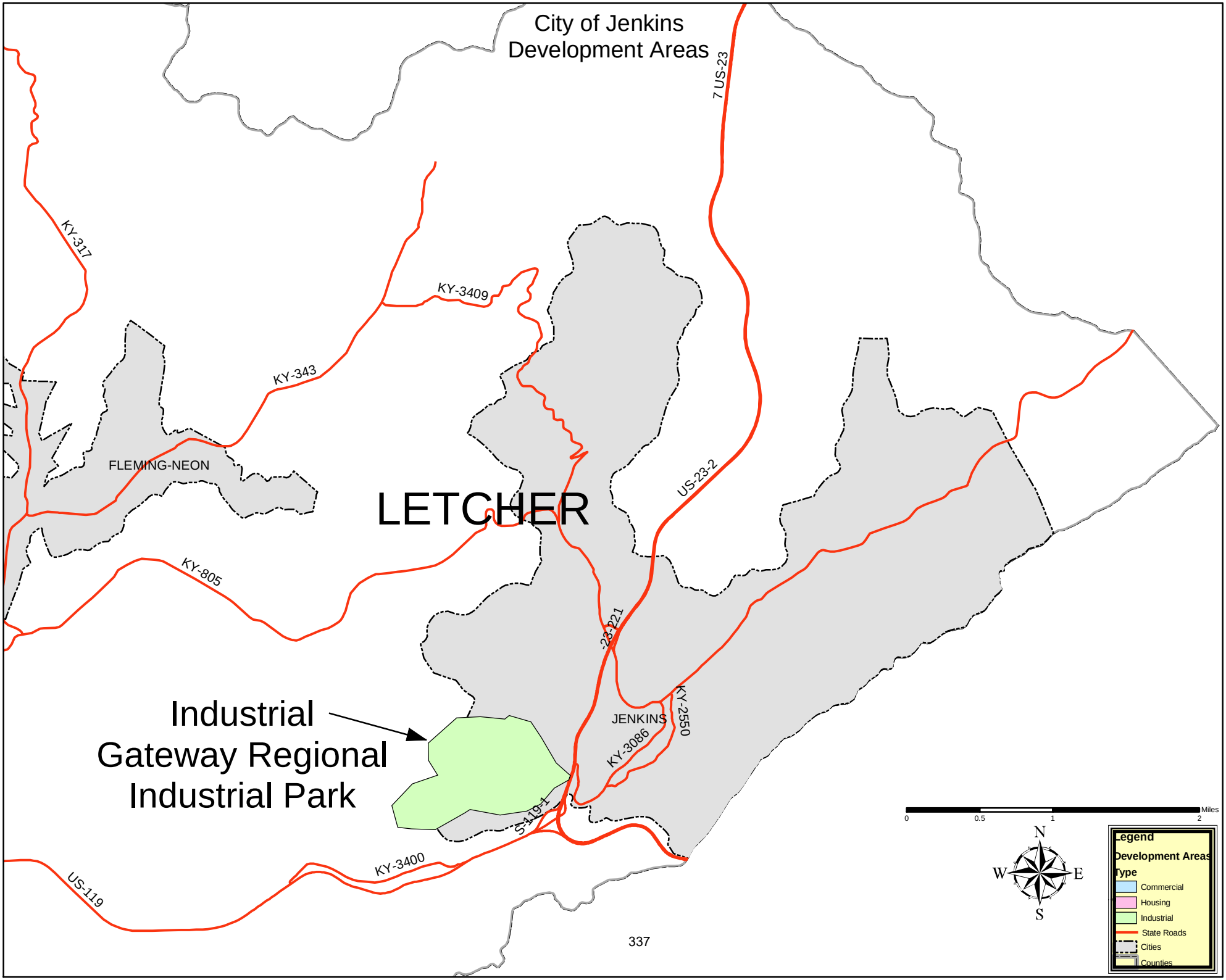
Letcher County Development Areas

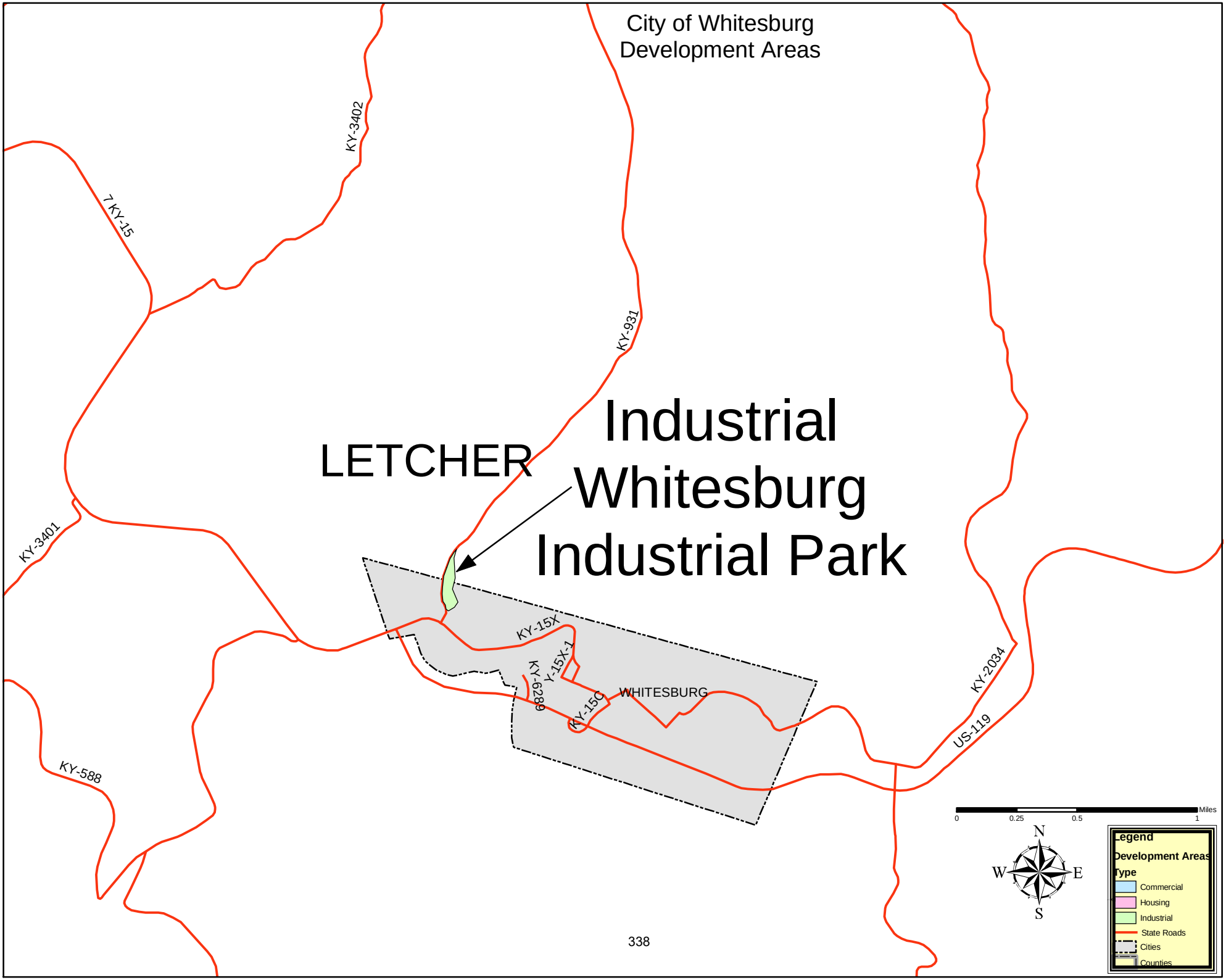


City of Blackey
Development Areas

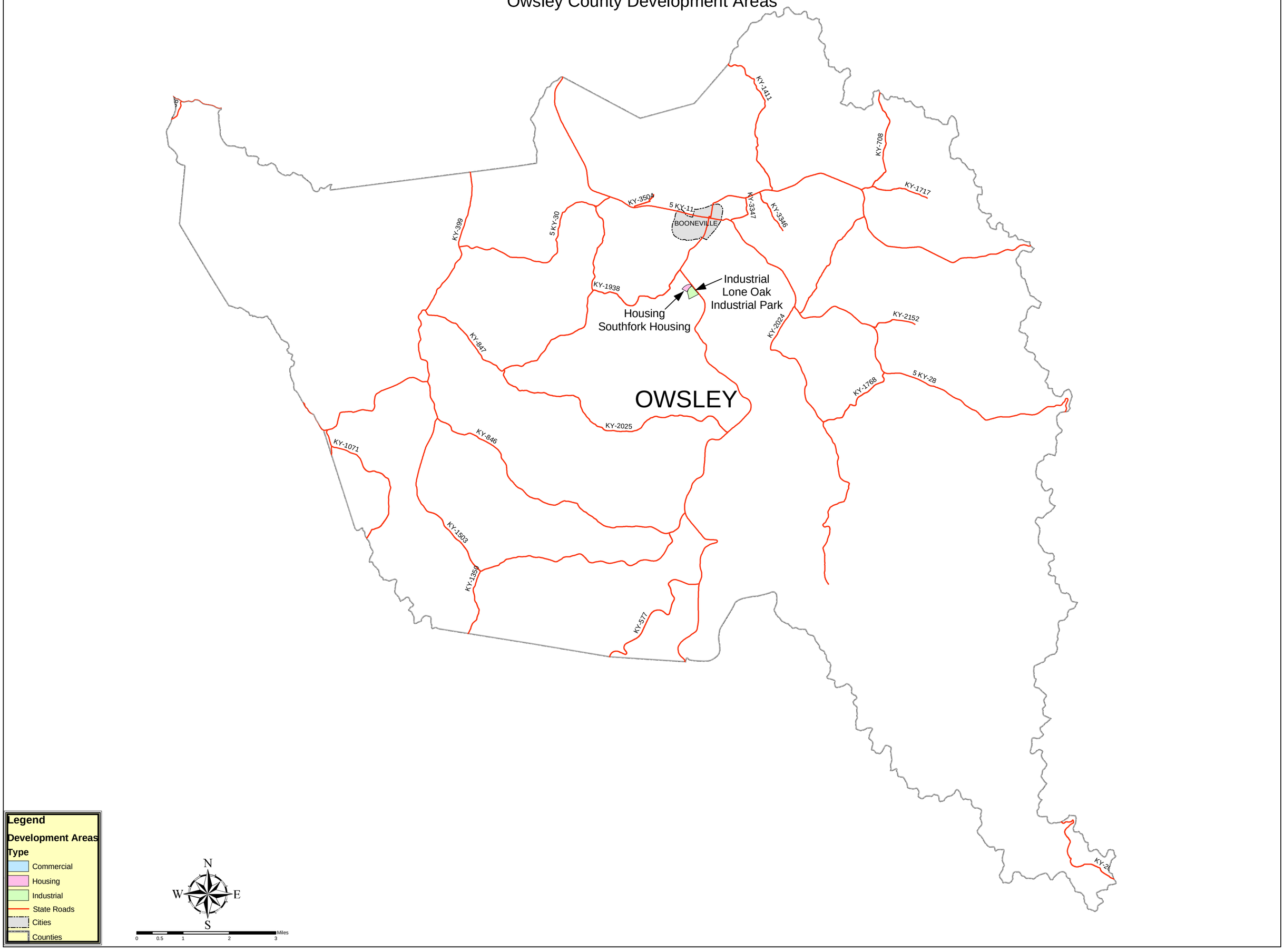


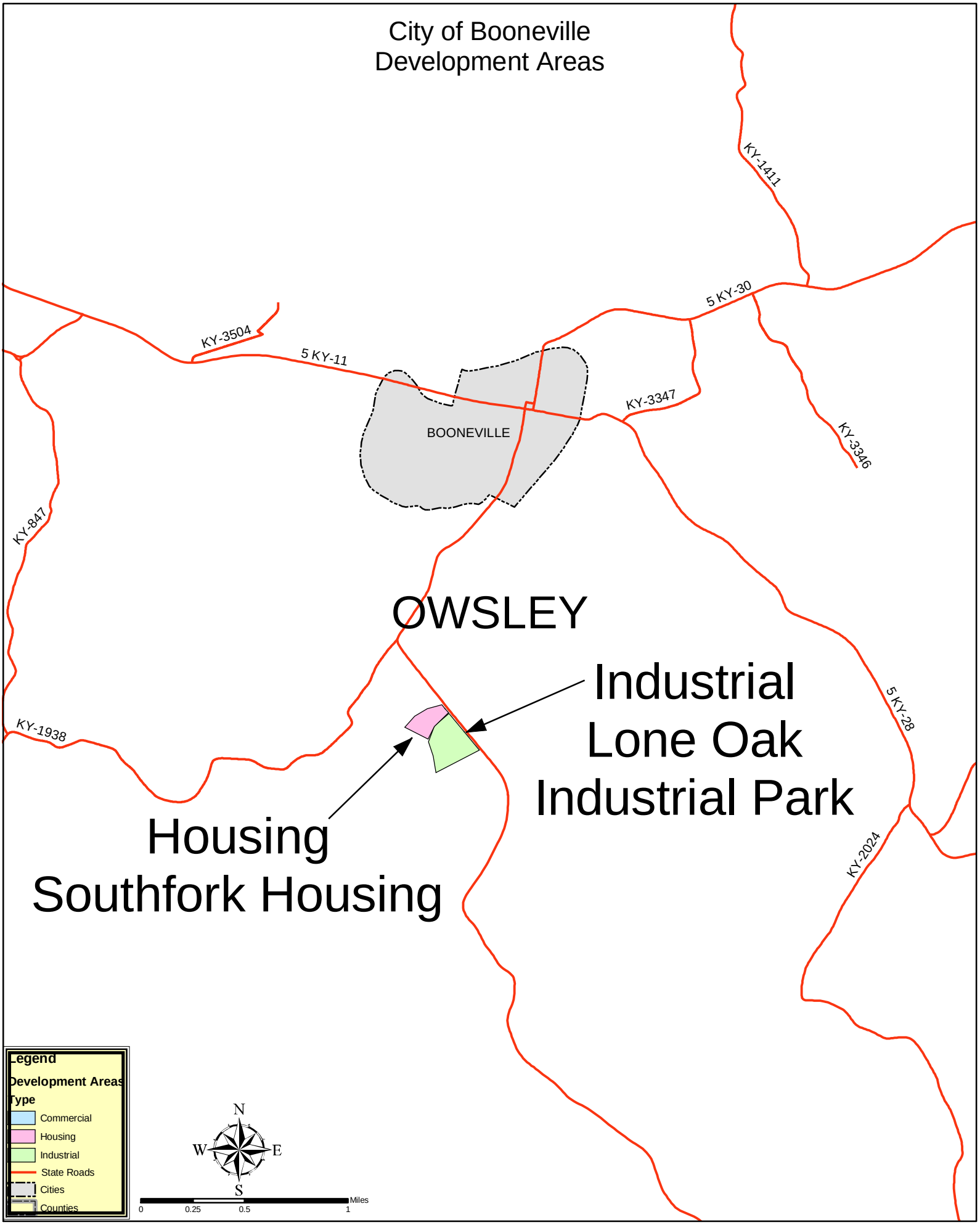

City of Fleming-Neon
Development Areas
KY-317
KY-3409
LETCHER
FLEMING-NEON
KY-343
KY-803
KY-805
336
0
0.25
0.5
Miles
1
N
W
E
S
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties


City of Jenkins
Development Areas
7 US-23
KY-317
KY-3409
KY-343
FLEMING-NEON
LETCHER
US-23-2
KY-805
23-221
KY-2550
JENKINS
KY-3086
Industrial
Gateway Regional
Industrial Park
S-419-1
KY-3400
US-119
337
0
0.5
1
Miles
2
N
W
E
S
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties

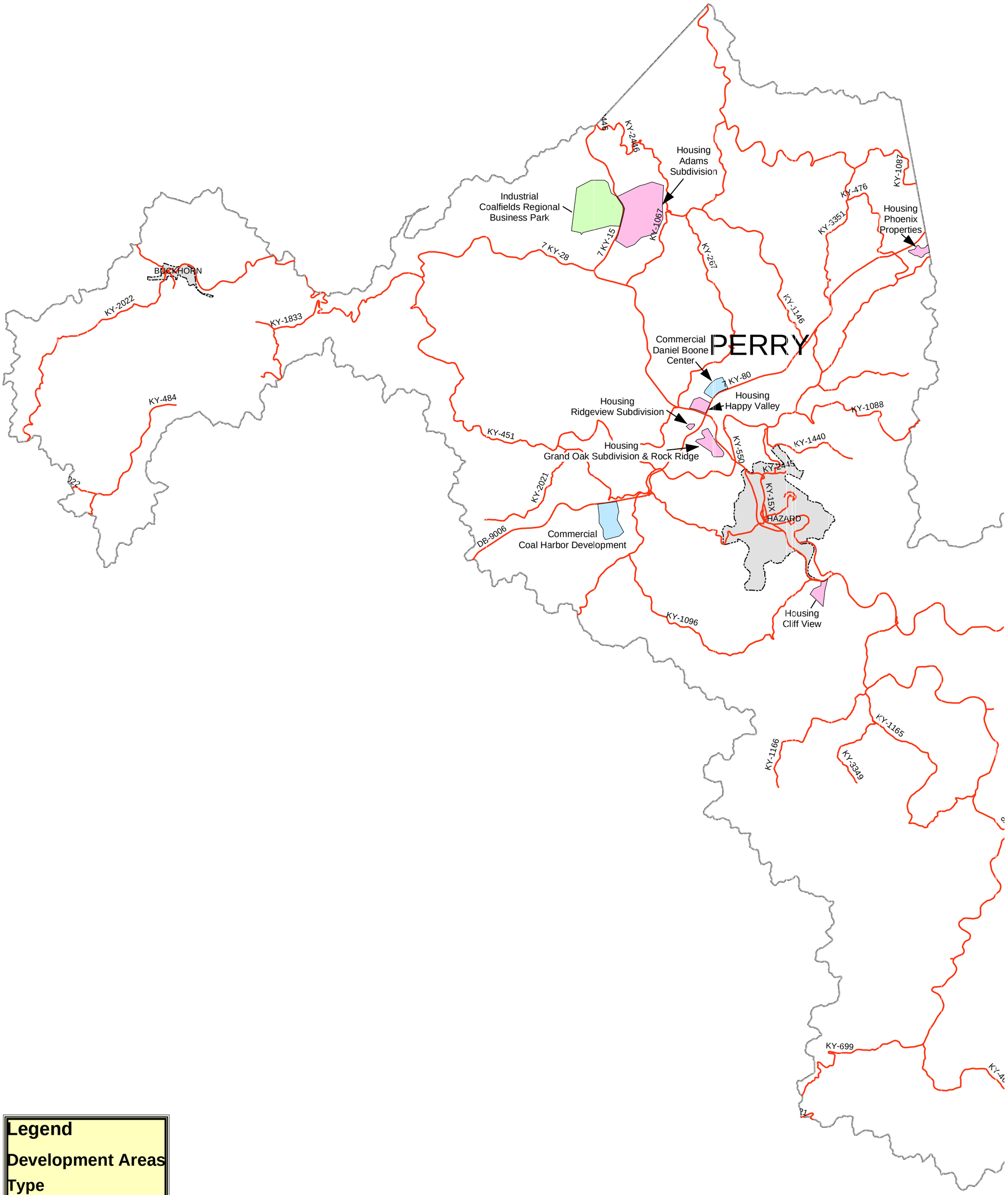

City of Whitesburg
Development Areas
KY-3402
7 KY-15
KY-931
LETCHER
Industrial
Whitesburg
Industrial Park
KY-3401
KY-15X
KY-15X-1
KY-6289
KY-15C
WHITESBURG
KY-2034
US-119
KY-588
0
0.25
0.5
Miles
1
N
W
E
S
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties

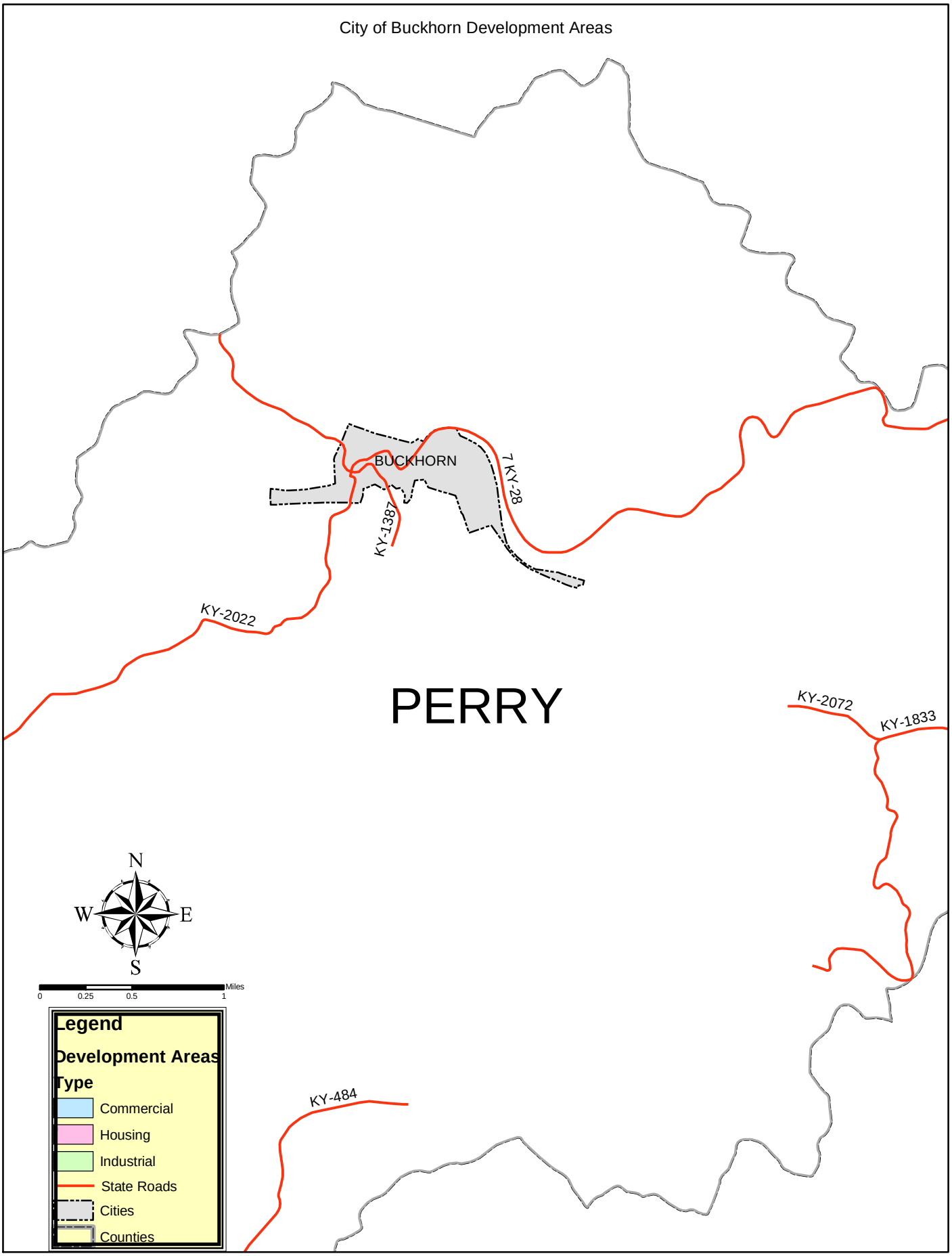
Owsley County Development Areas

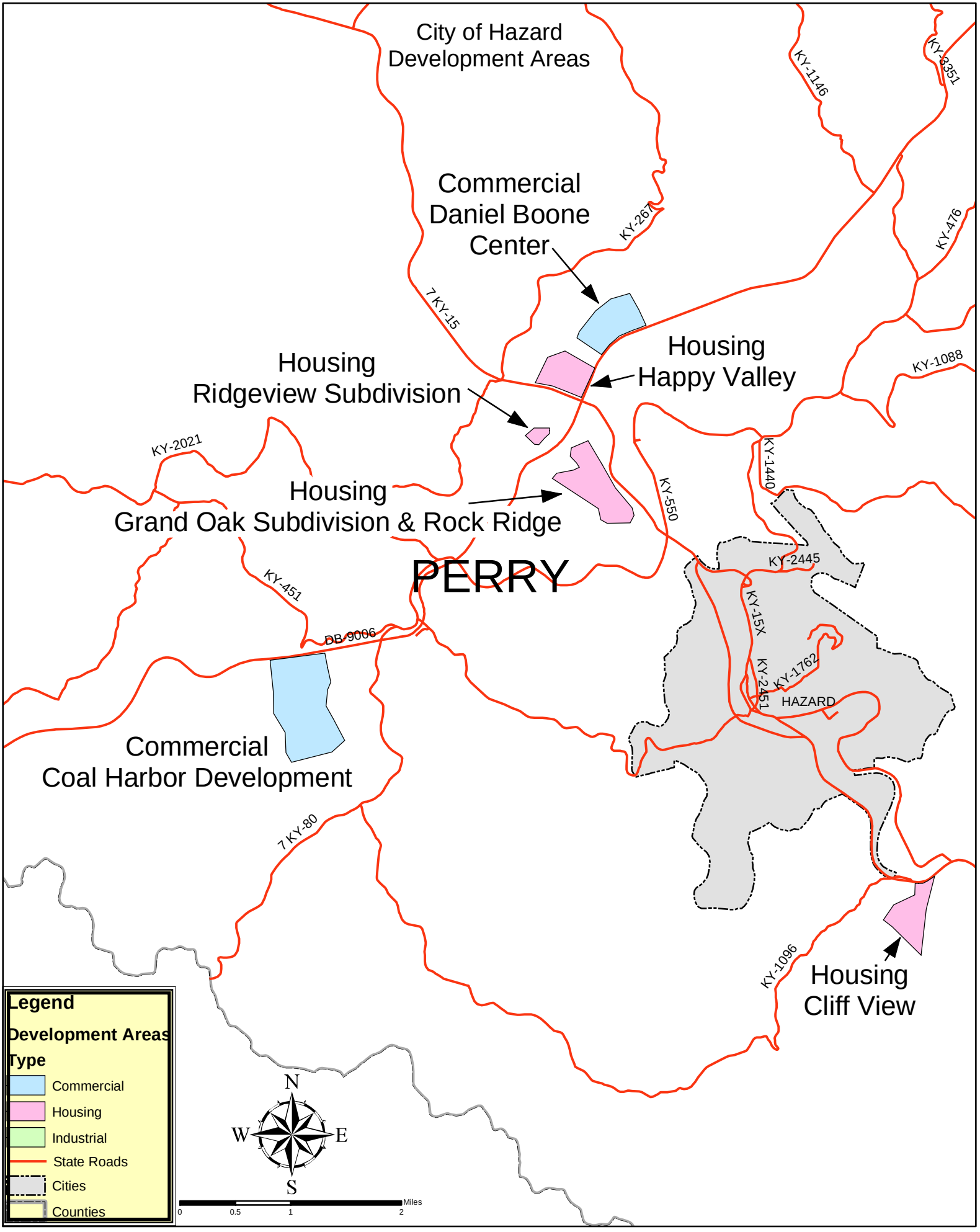



City of Booneville
Development Areas
KY-1411
5 KY-30
KY-3504
5 KY-11
KY-3347
KY-3346
BOONEVILLE
KY-847
OWSLEY
Industrial
Lone Oak
Industrial Park
5 KY-28
KY-1938
Housing
Southfork Housing
KY-2024
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties
N
W
E
S
0
0.25
0.5
1
Miles

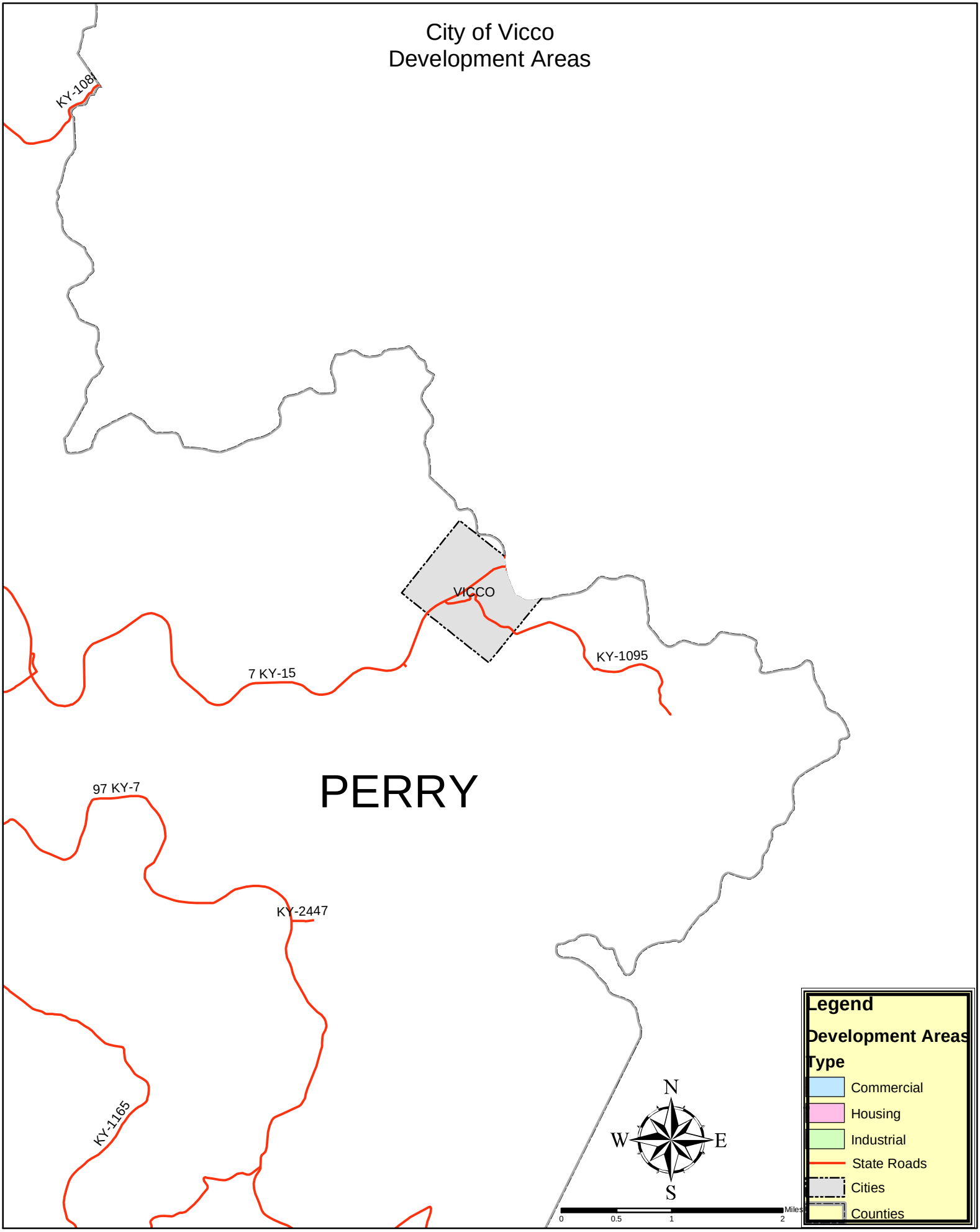
Perry County Development Areas



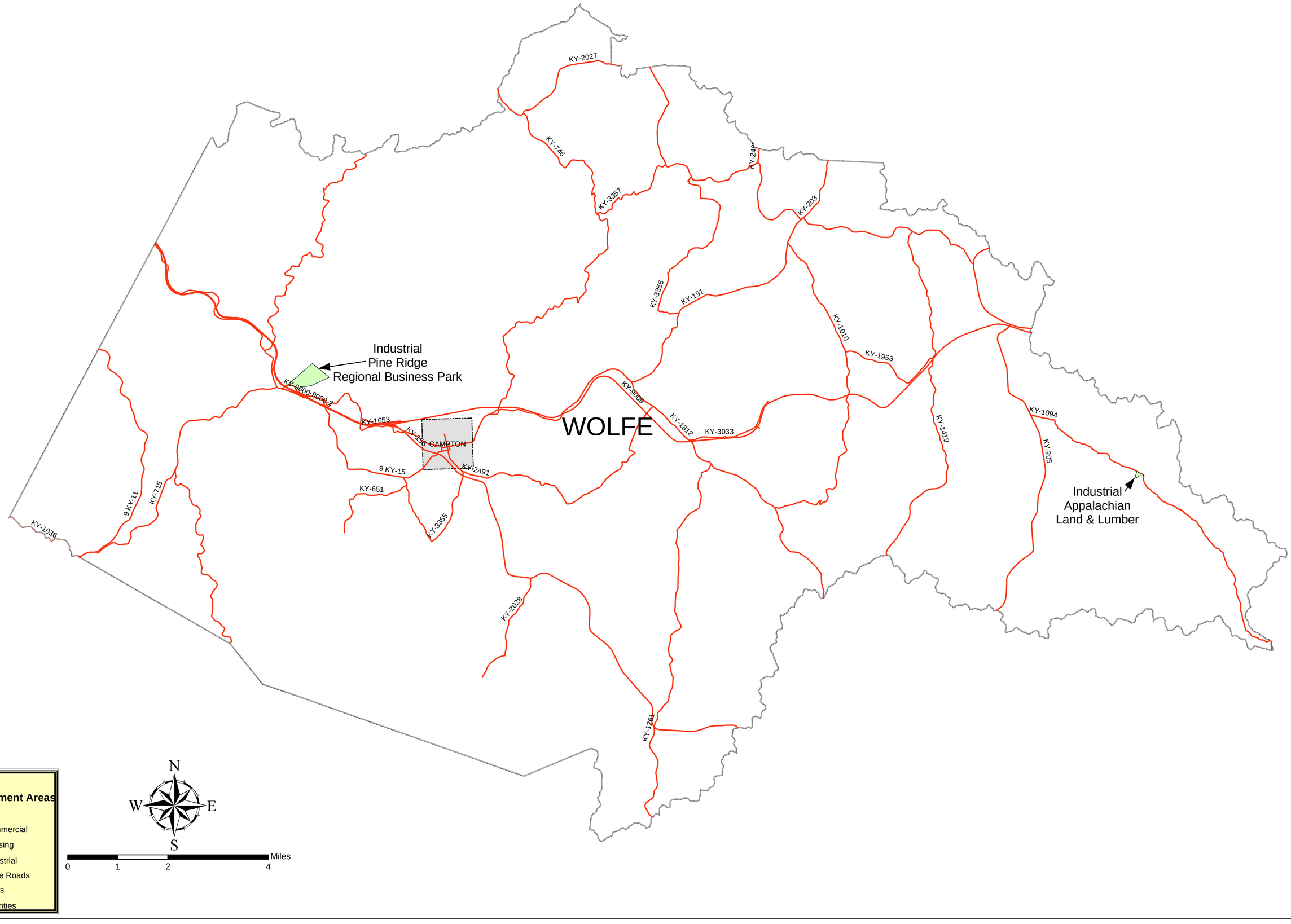

City of Buckhorn Development Areas
BUCKHORN
KY-28
KY-1387
KY-2022
PERRY
KY-2072
KY-1833
KY-484
N
W
E
S
0
0.25
0.5
1
Miles
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties

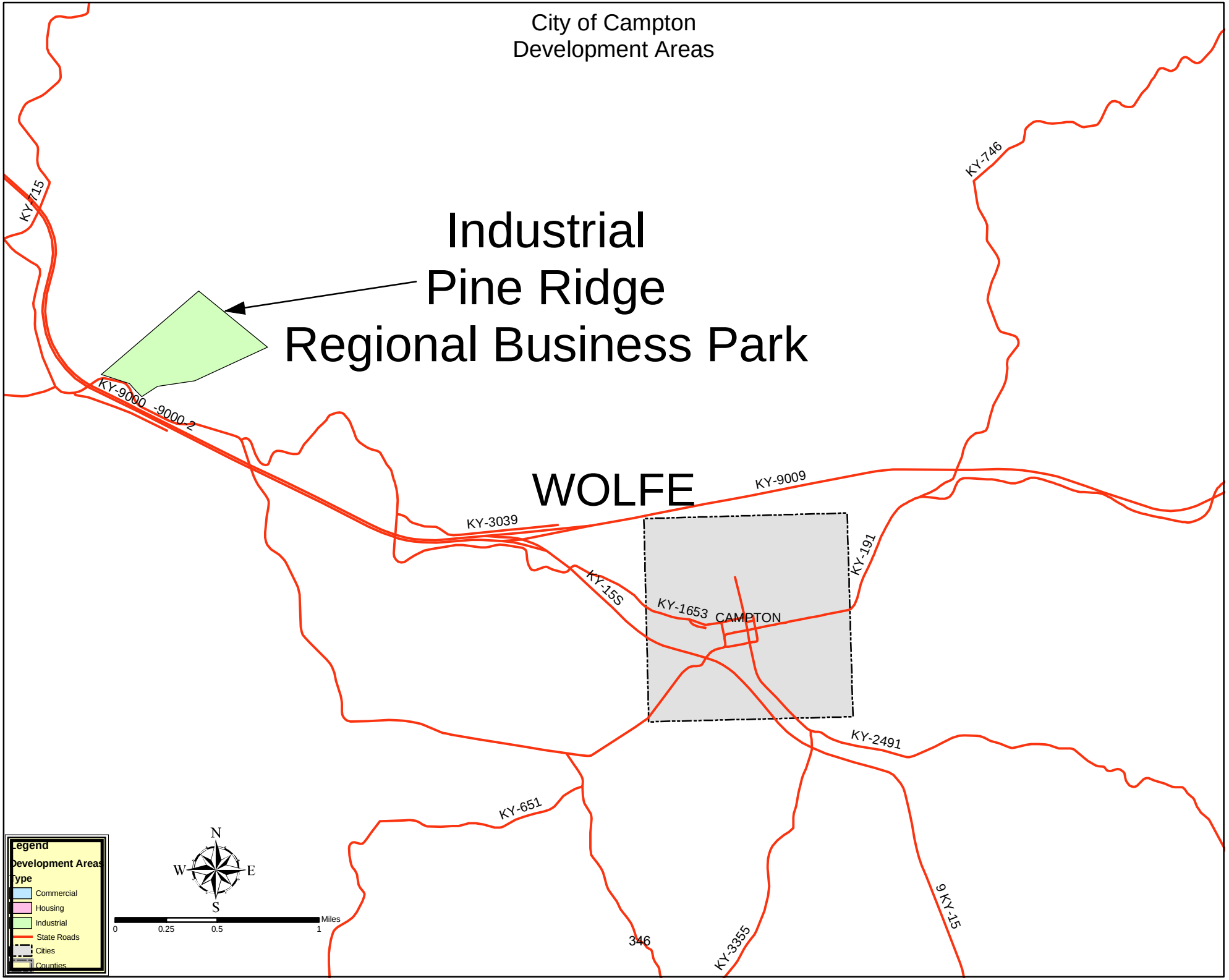

City of Hazard
Development Areas
Commercial
Daniel Boone
Center
Housing
Ridgeview Subdivision
Housing
Happy Valley
Housing
Grand Oak Subdivision & Rock Ridge
PERRY
Commercial
Coal Harbor Development
Housing
Cliff View
HAZARD
KY-1146
KY-3351
KY-267
KY-476
7 KY-15
KY-1088
KY-2021
KY-1440
KY-550
KY-2445
KY-15X
KY-1762
KY-2451
KY-451
DB-9006
7 KY-80
KY-1096
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties
N
W
E
S
0
0.5
1
2
Miles

City of Vicco
Development Areas



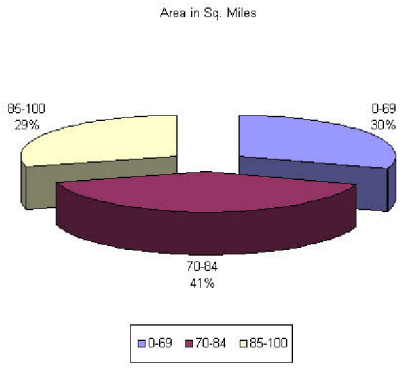
Wolfe County Development Areas




City of Campton
Development Areas
Industrial
Pine Ridge
Regional Business Park
WOLFE
CAMPTON
KY-715
KY-746
KY-9000
-9000-2
KY-9009
KY-3039
KY-15S
KY-1653
KY-191
KY-2491
KY-651
346
KY-3355
9 KY-15
Legend
Development Areas
Type
Commercial
Housing
Industrial
State Roads
Cities
Counties
N
W
E
S
0
0.25
0.5
1
Miles

ATTACHMENT I
Vulnerability: Regional Zones of Gas Line Flooding Risk

Regional Zones of Gasline Flooding Risk



WOLFE

LEE

BREATHITT

OWSLEY

KNOTT

PERRY

LETCHER

LESLIE

Legend

County Boundaries

Zones of Gasline Flooding Risk

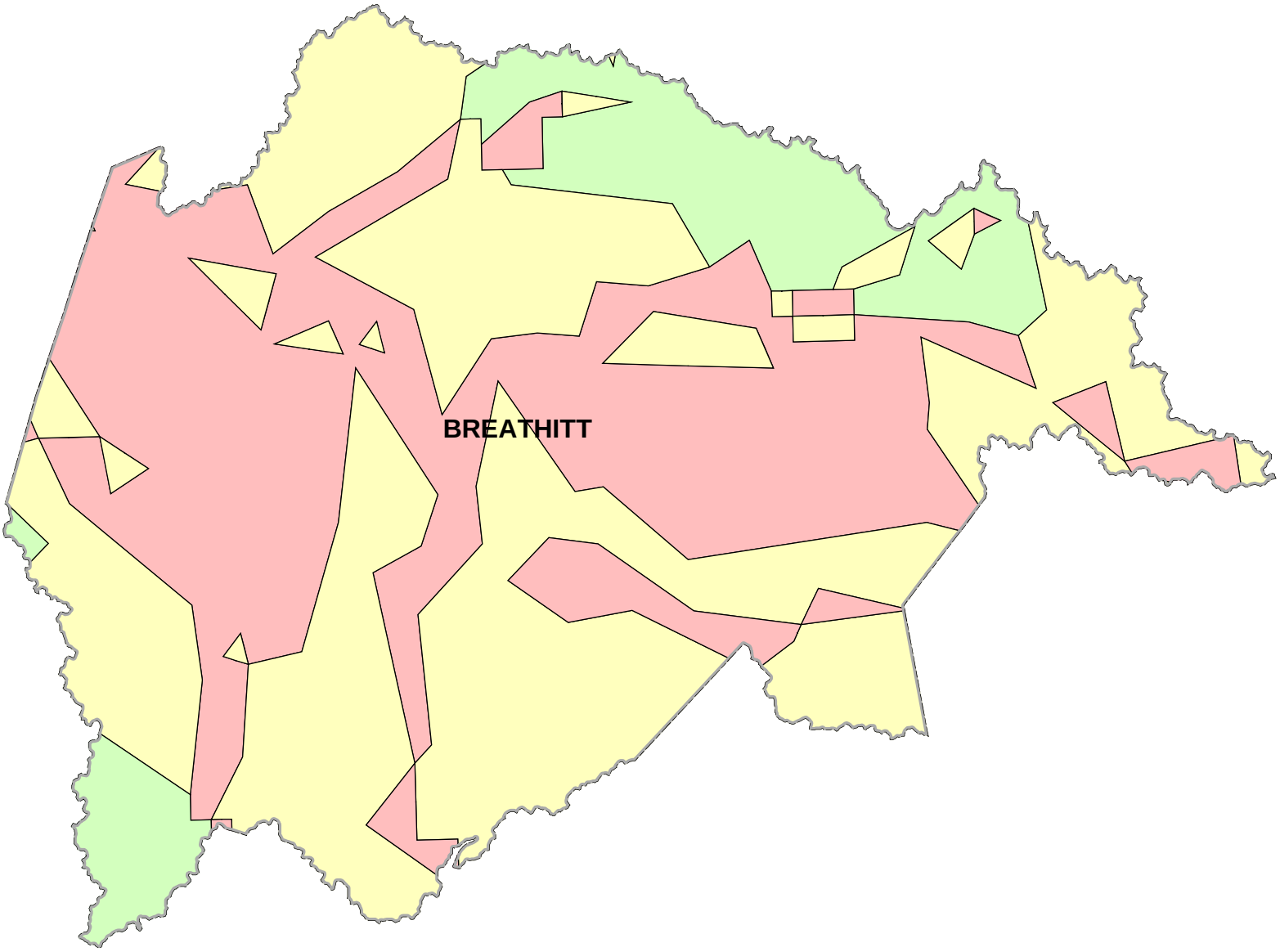
Risk Rank

- 0-69
- 70-84
- 85-100

®

0 4 8 16 24 32 Miles

Breathitt County Zones of Gasline Flooding Risk



Legend

County Boundaries

Zones of Gasline Flooding Risk

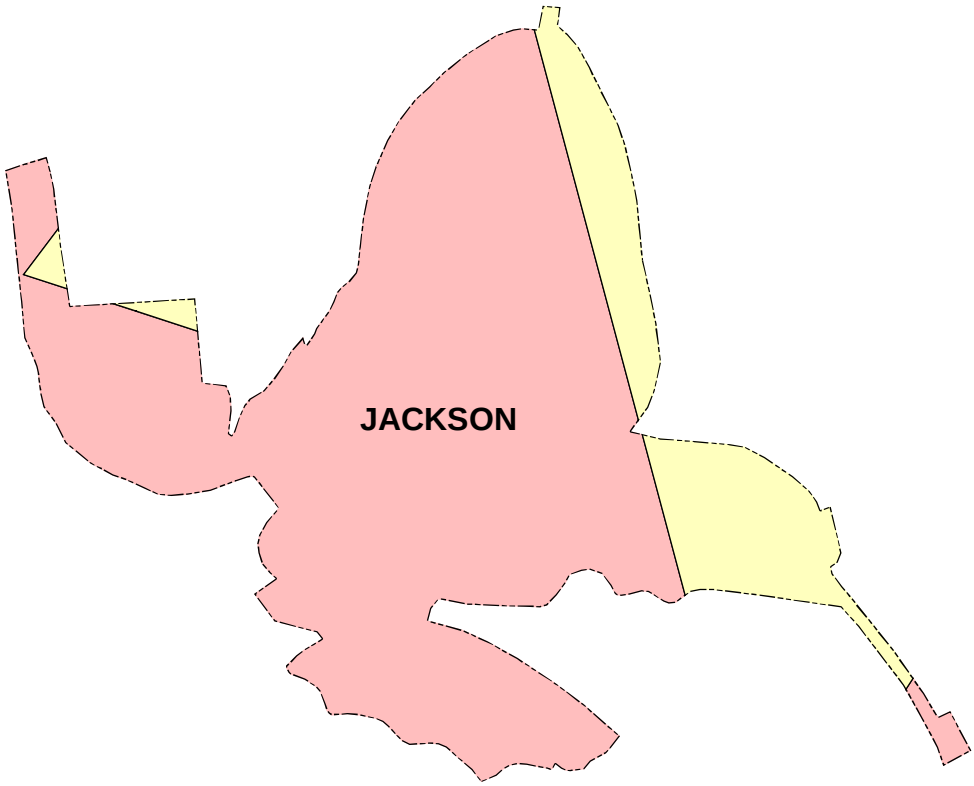
Risk Rank

- 0-69
- 70-84
- 85-100

N
W
E
S

0 1.5 3 6 9 12 Miles

City of Jackson Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

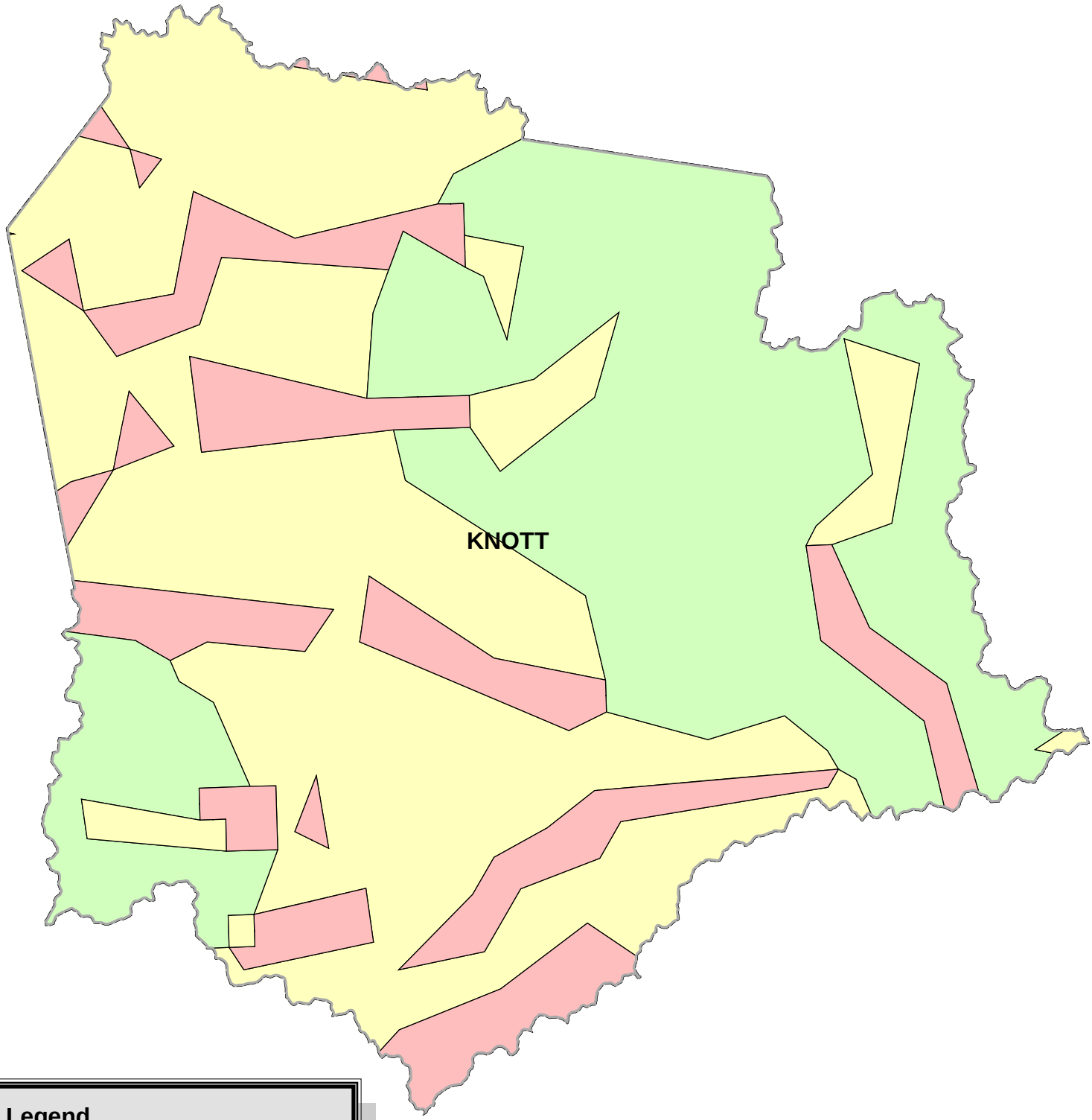
W E

S

Miles

0 0.2 0.4 0.8 1.2 1.6

Knott County Zones of Gasline Flooding Risk



Legend

County Boundaries

Zones of Gasline Flooding Risk

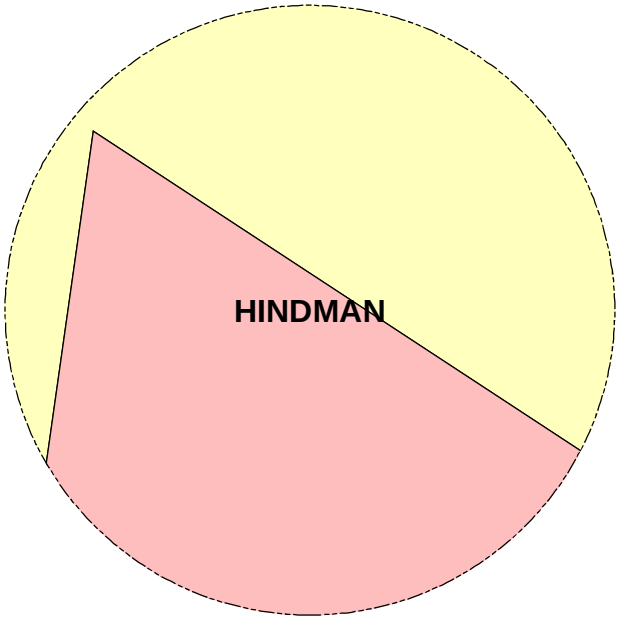
Risk Rank

- 0-69
- 70-84
- 85-100

N
W
E
S

0 1 2 4 6 8 Miles

City of Hindman Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

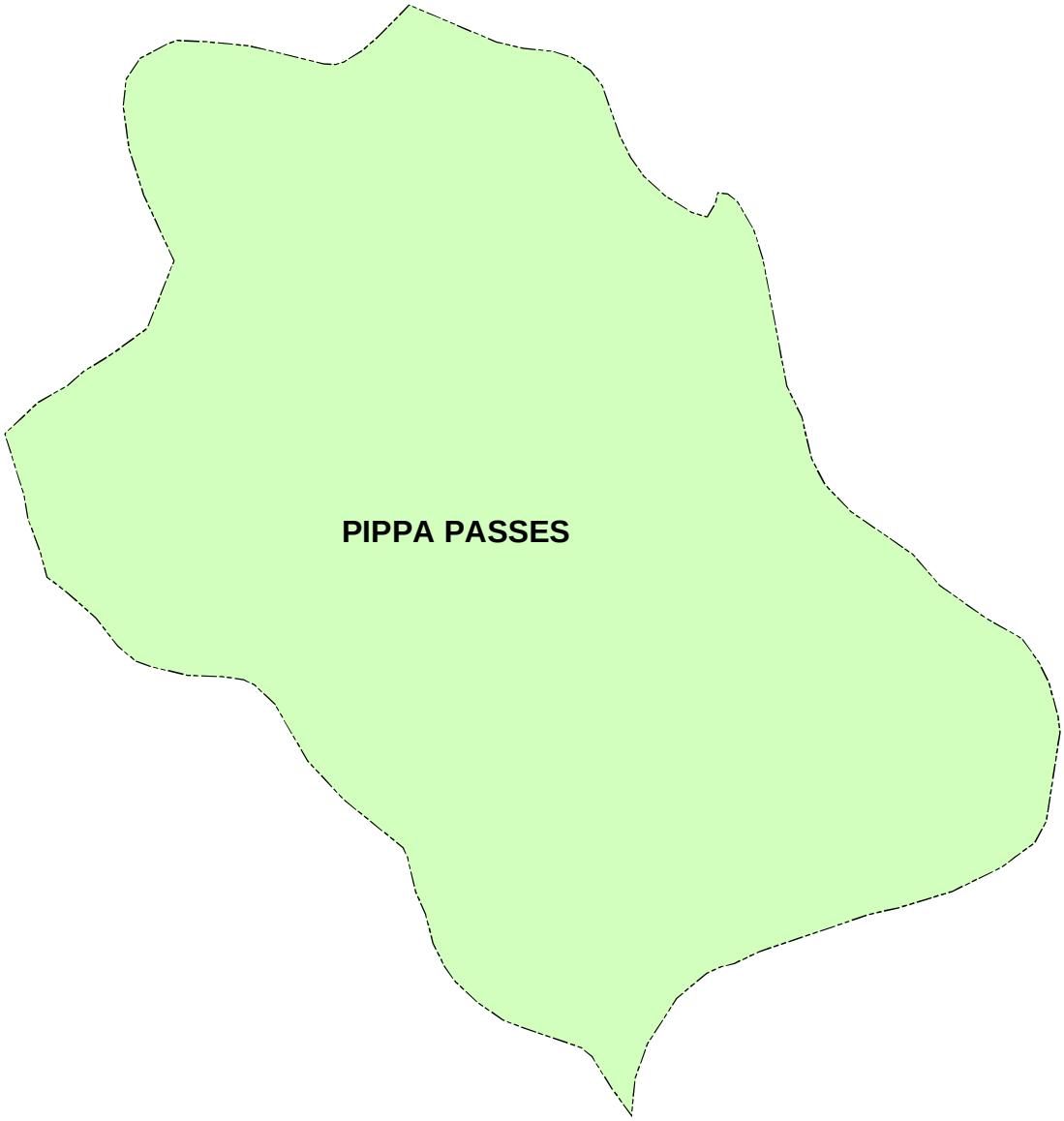
W E

S

Miles

0 0.2 0.4 0.8 1.2 1.6

City of Pippa Passes Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

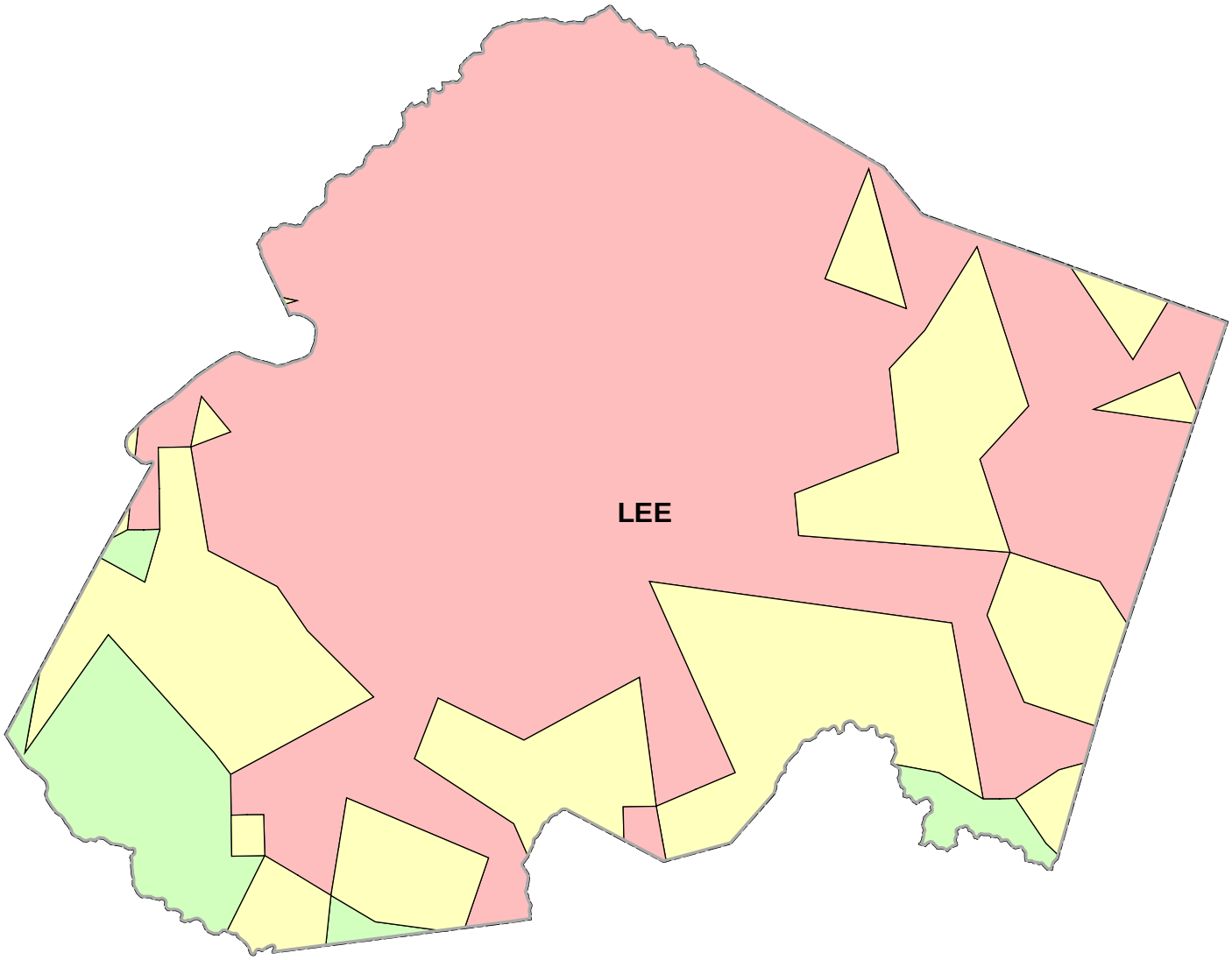
W E

S

Miles

0 0.05 0.1 0.2 0.3 0.4

Lee County Zones of Gasline Flooding Risk



Legend

County Boundaries

Zones of Gasline Flooding Risk

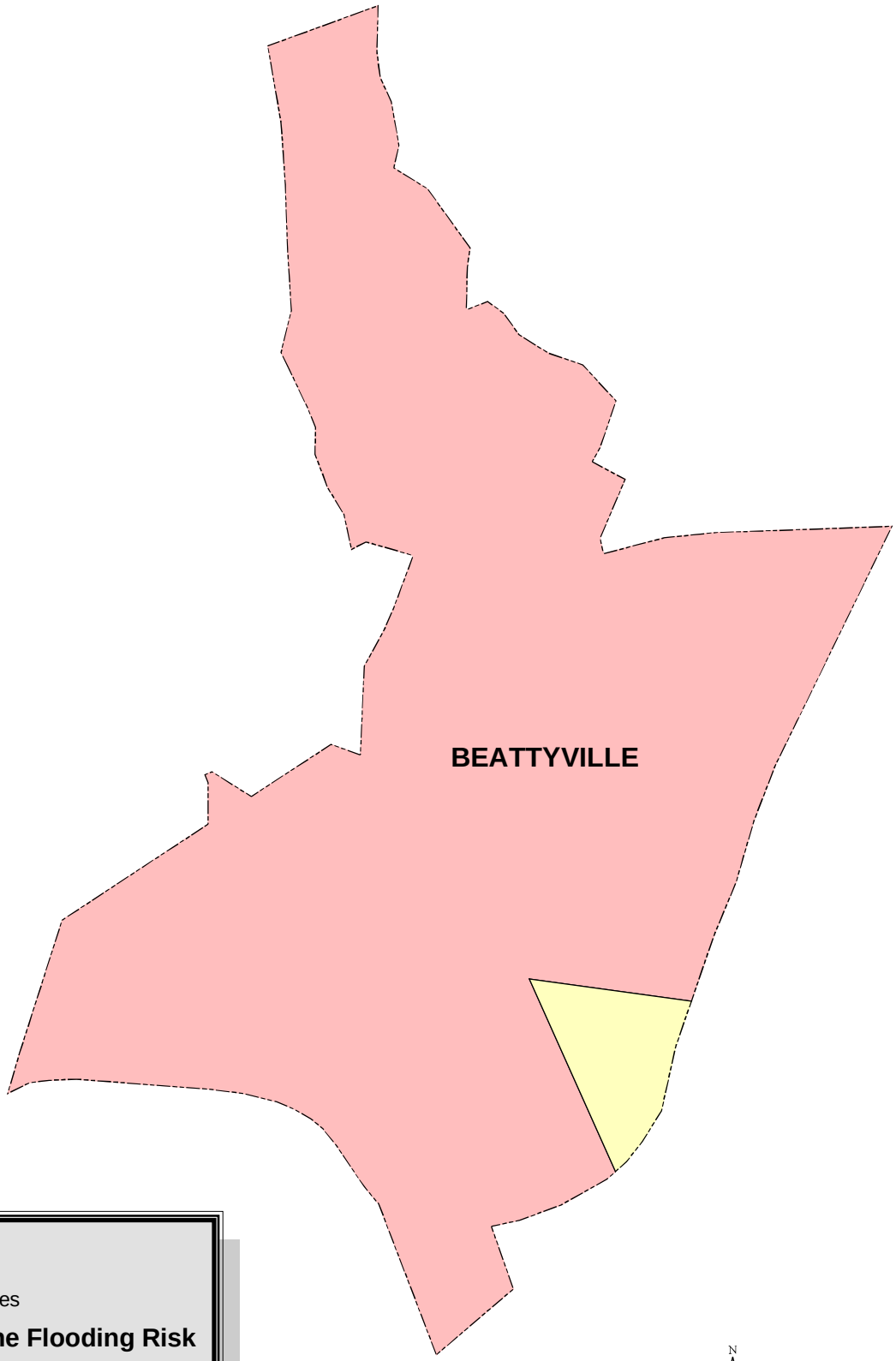
Risk Rank

- 0-69
- 70-84
- 85-100

N
W
E
S

0 1 2 4 6 8 Miles

City of Beattyville Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

W

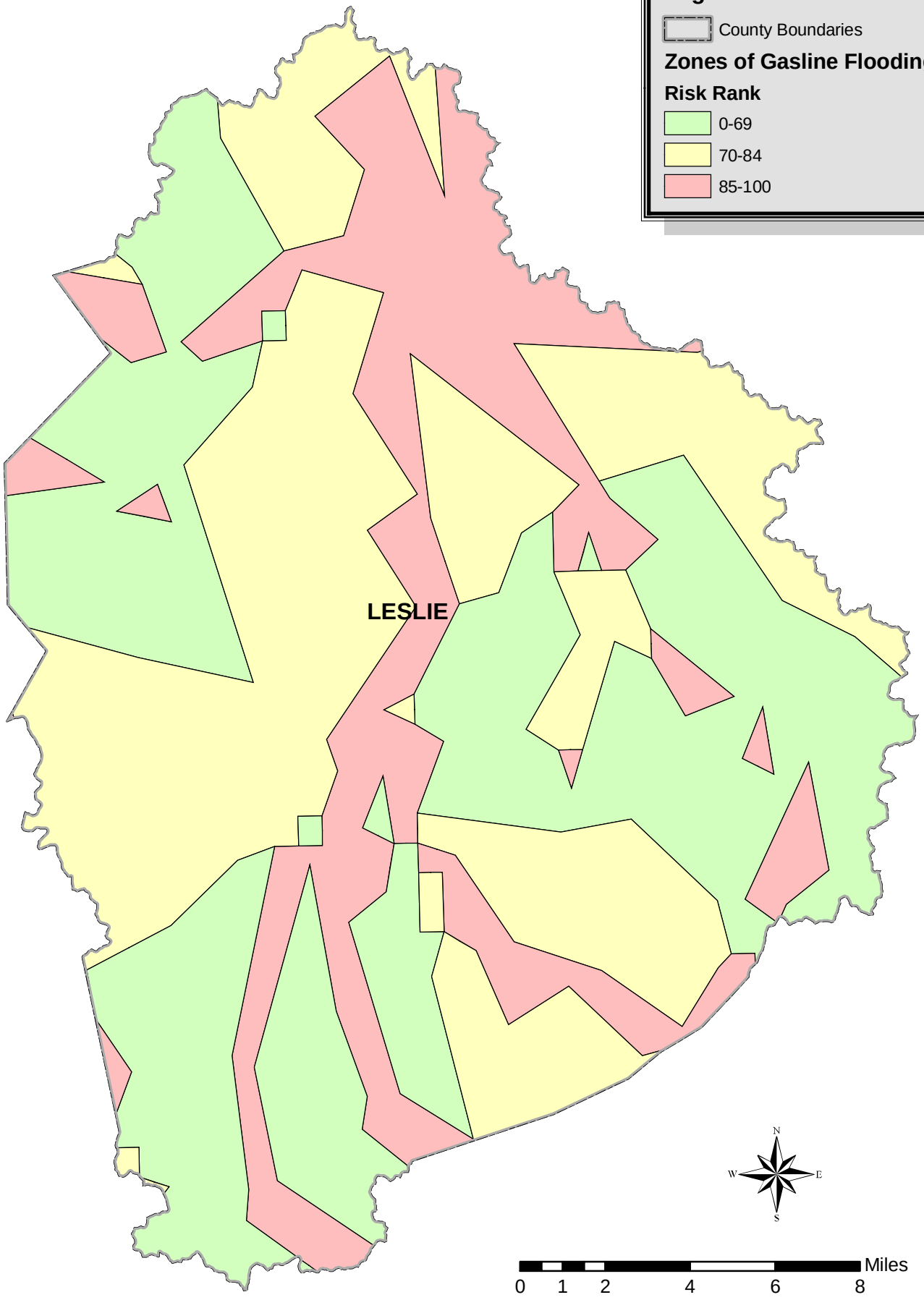
E

S

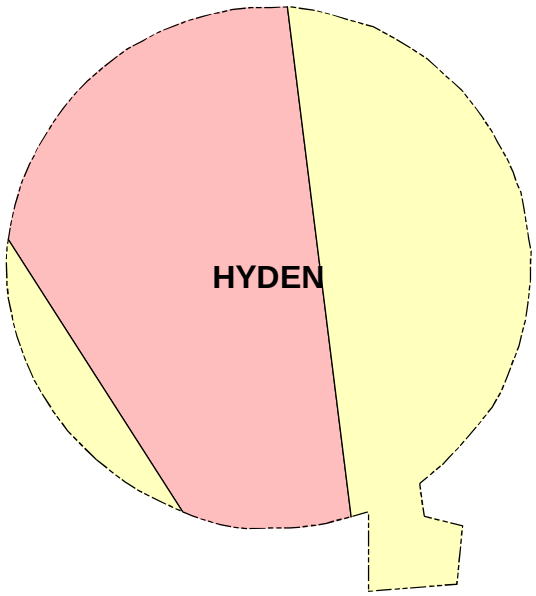
Miles

0 0.125 0.25 0.5 0.75 1

Leslie County Zones of Gasline Flooding Risk



City of Hyden Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

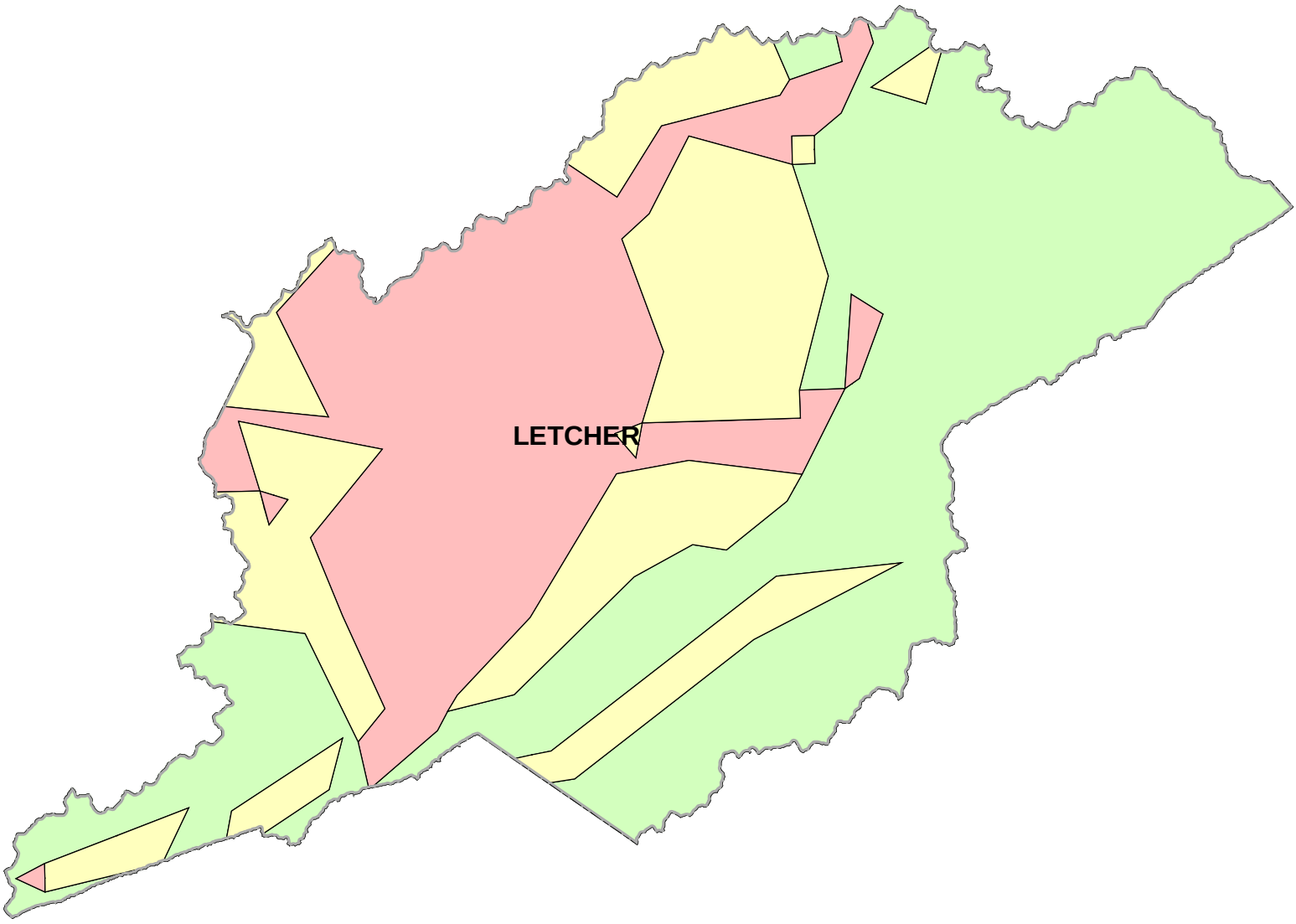
W E

S

Miles

0 0.125 0.25 0.5 0.75 1

Letcher County Zones of Gasline Flooding Risk



Legend

County Boundaries

Zones of Gasline Flooding Risk

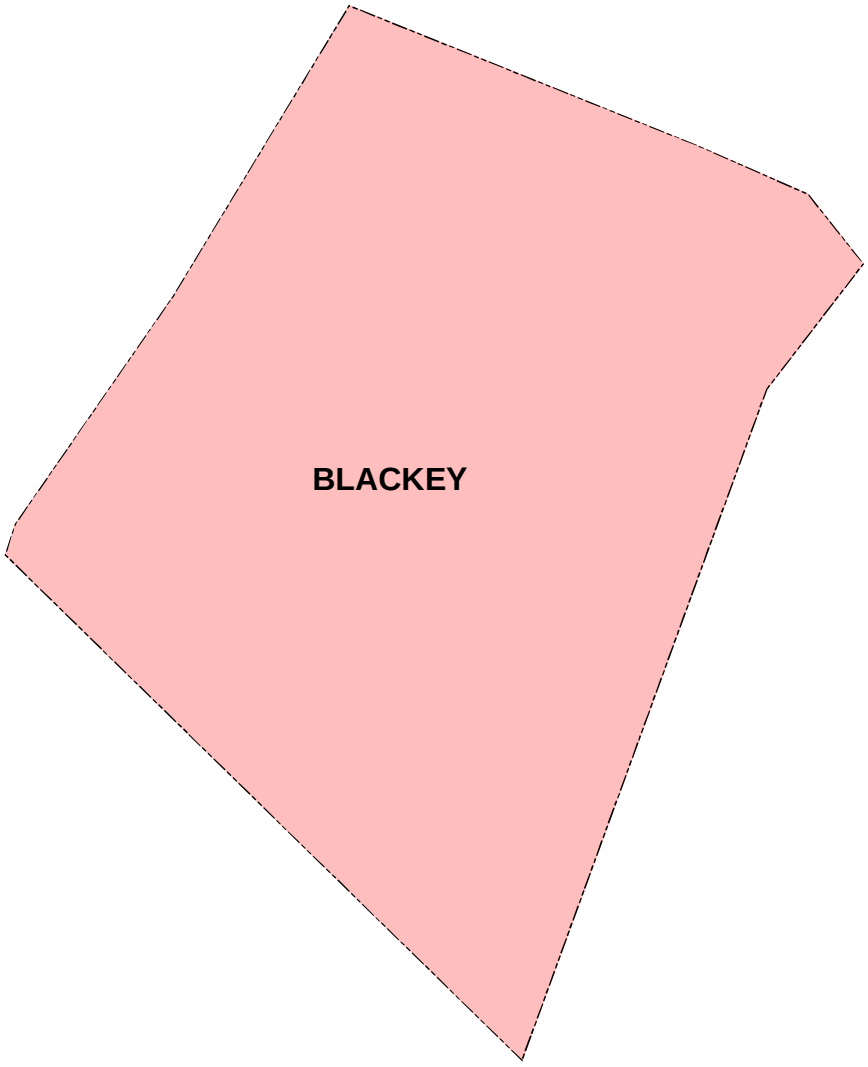
Risk Rank

- 0-69
- 70-84
- 85-100

N
W
E
S

0 1.5 3 6 9 12 Miles

City of Blackey Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

W

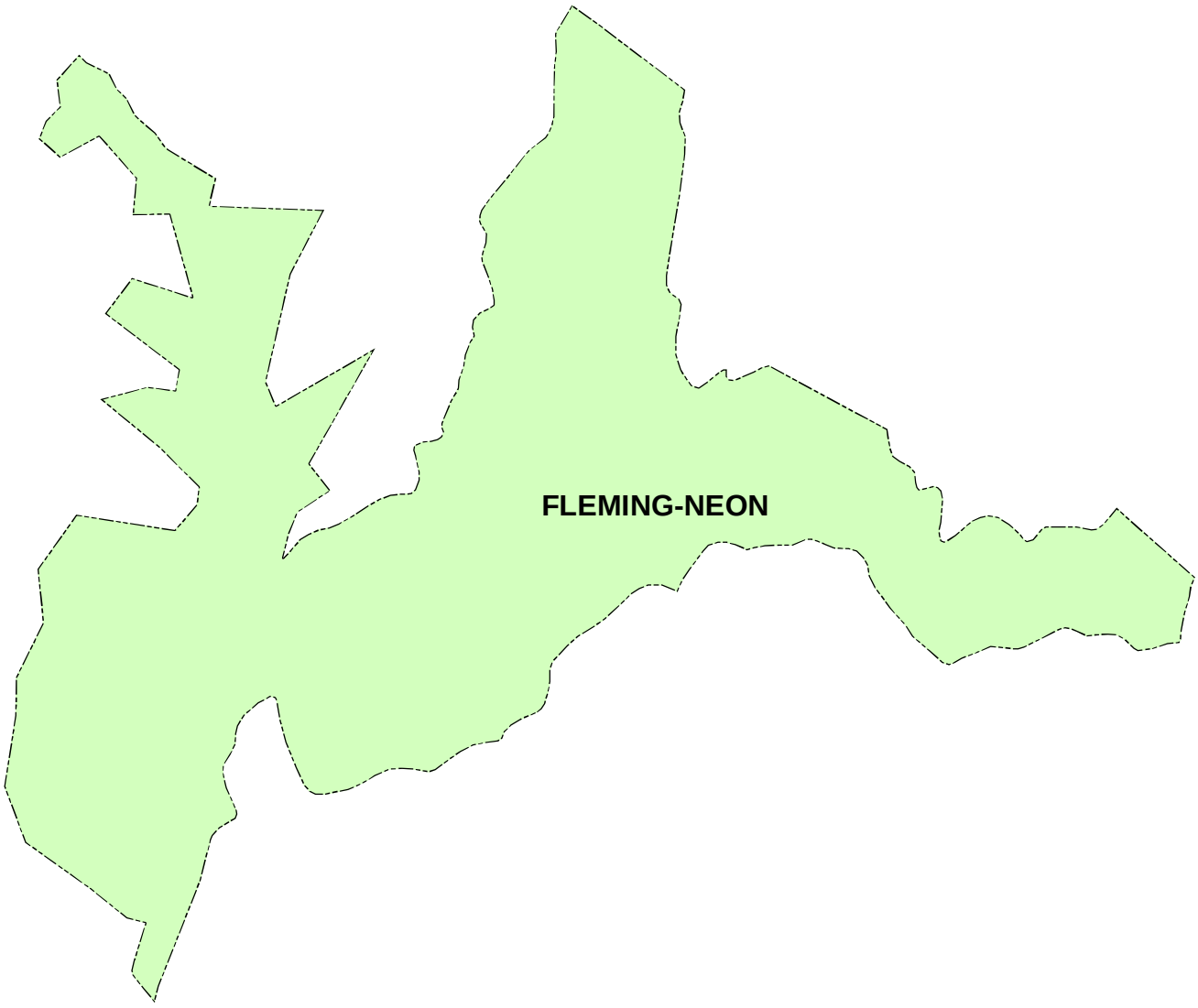
E

S

Miles

0 0.05 0.1 0.2 0.3 0.4

City of Fleming-Neon Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

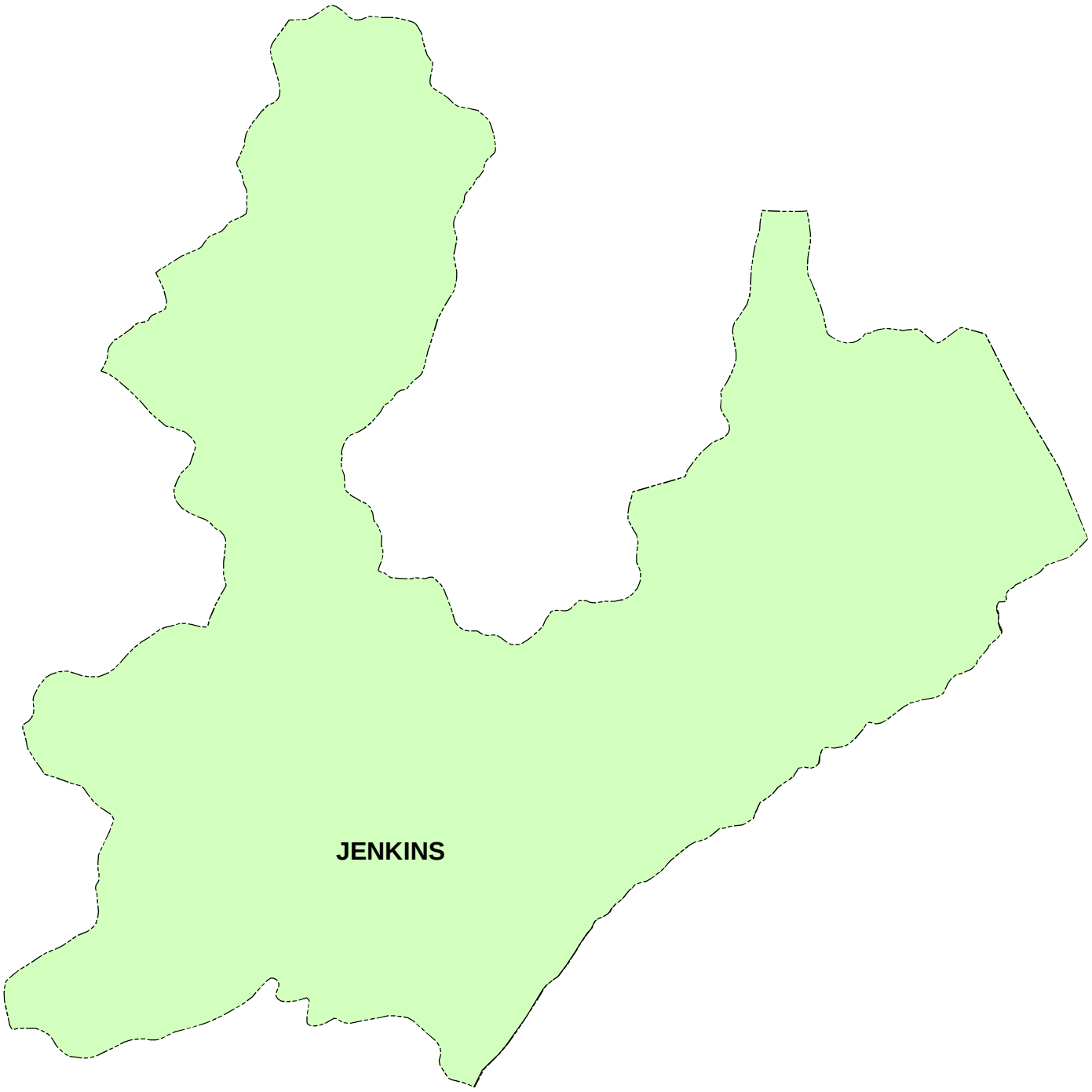
N

W E

S

0 0.125 0.25 0.5 0.75 1 Miles

City of Jenkins Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

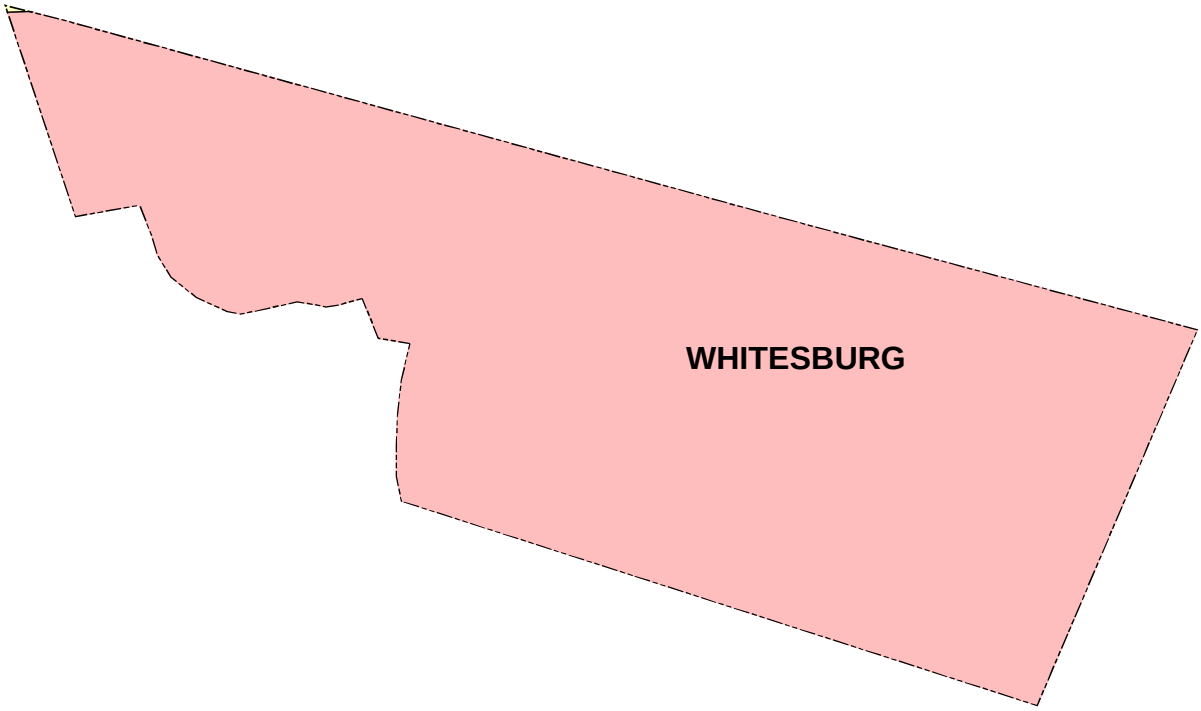
W E

S

Miles

0 0.2 0.4 0.8 1.2 1.6

City of Whitesburg Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

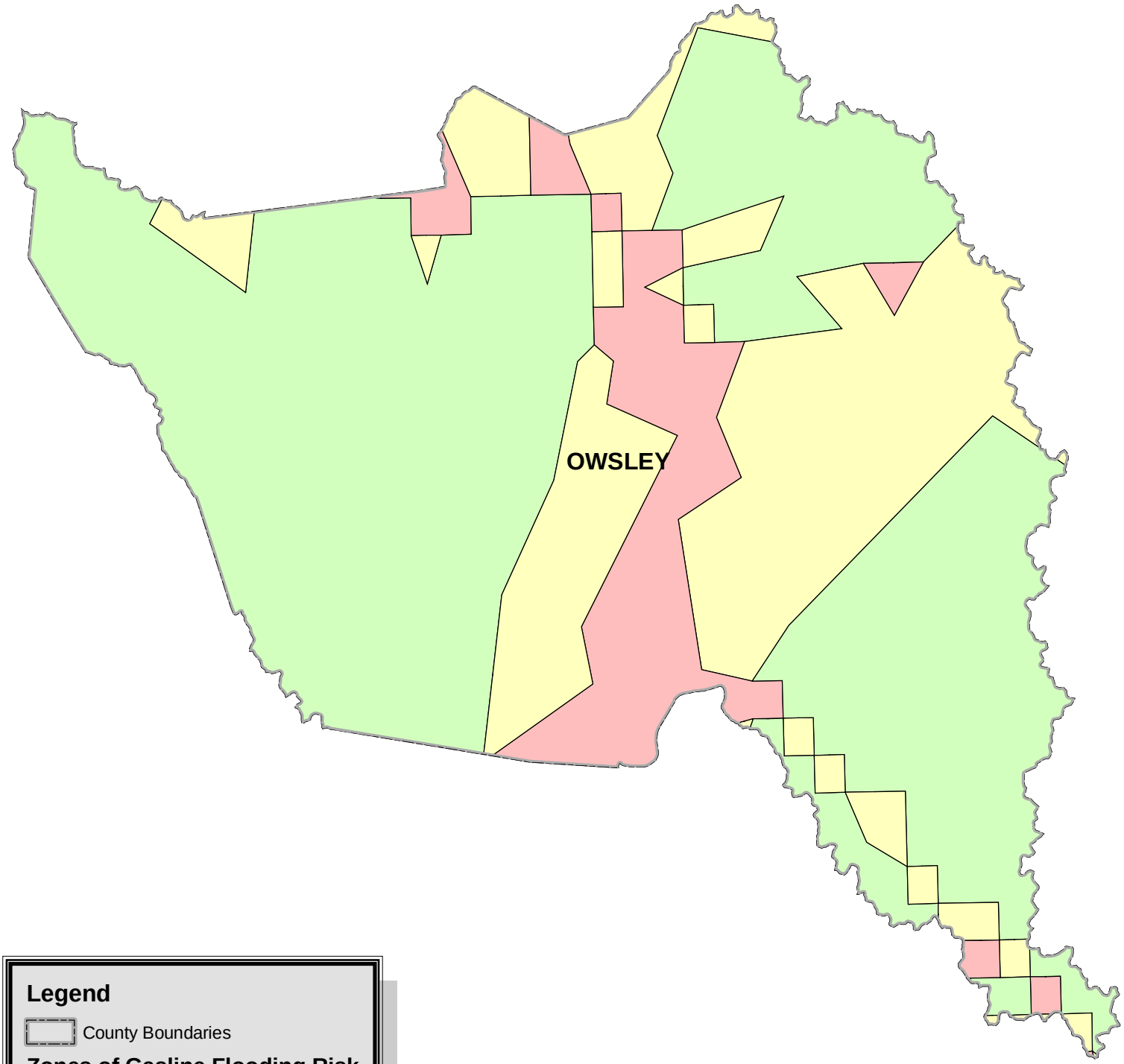
W E

S

Miles

0 0.1 0.2 0.4 0.6 0.8

Owsley County Zones of Gasline Flooding Risk



Legend

County Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

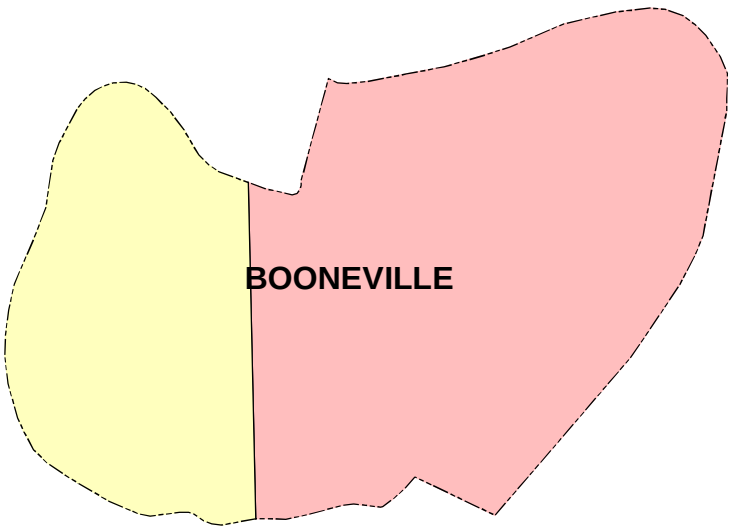
W

E

S

0 1 2 4 6 8 Miles

City of Booneville Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

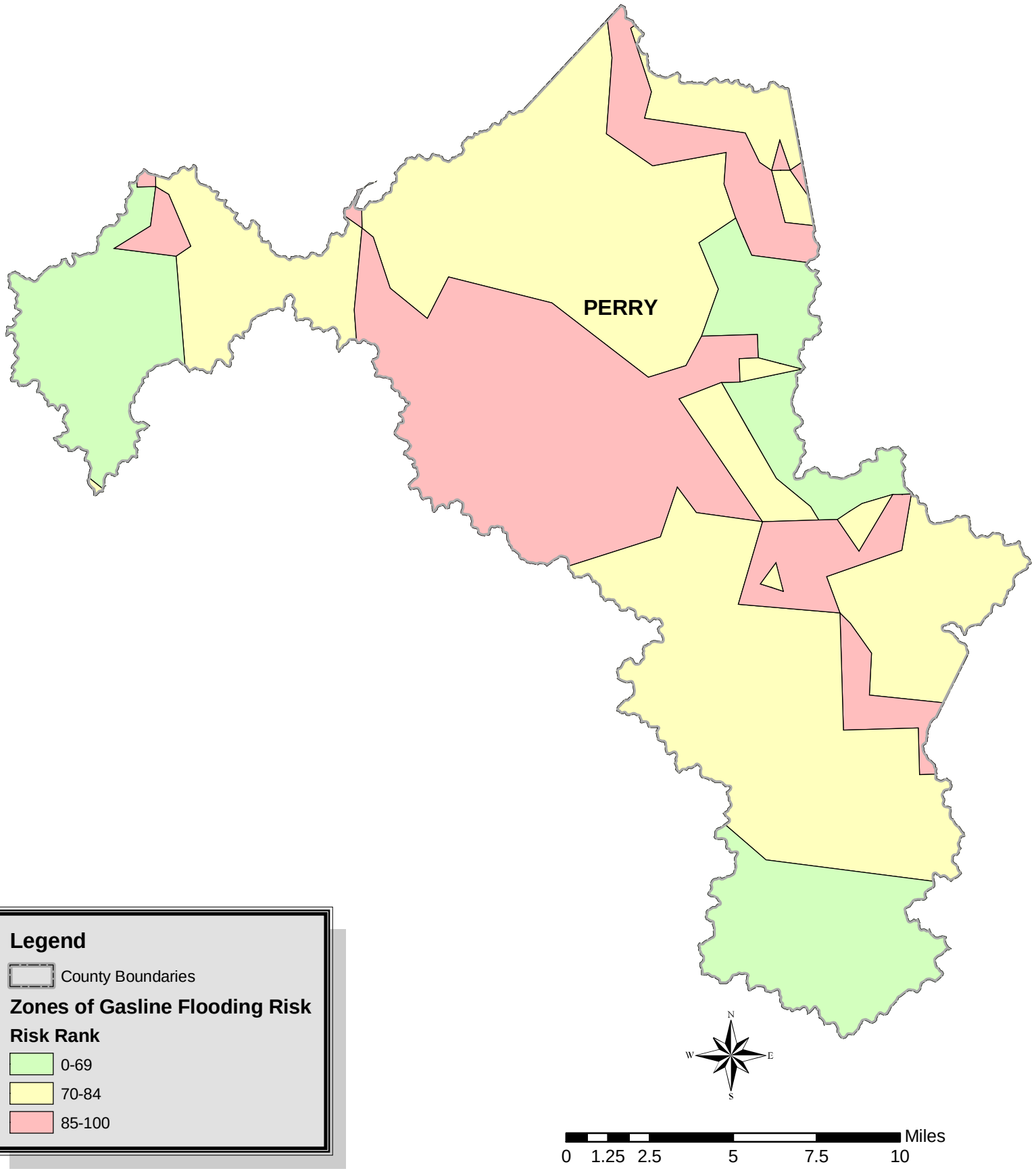
W E

S

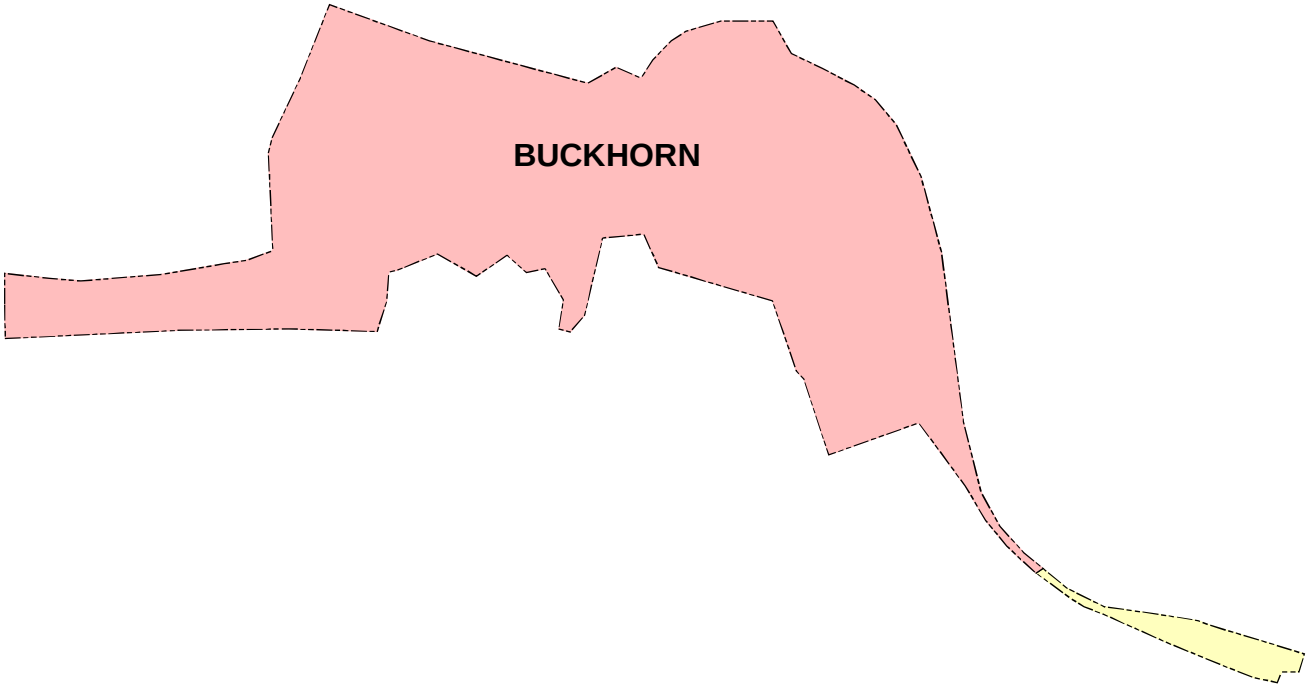
Miles

0 0.1 0.2 0.4 0.6 0.8

Perry County Zones of Gasline Flooding Risk



City of Buckhorn Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

W E

S

Miles

0 0.05 0.1 0.2 0.3 0.4

City of Hazard Zones of Gasline Flooding Risk

Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

W

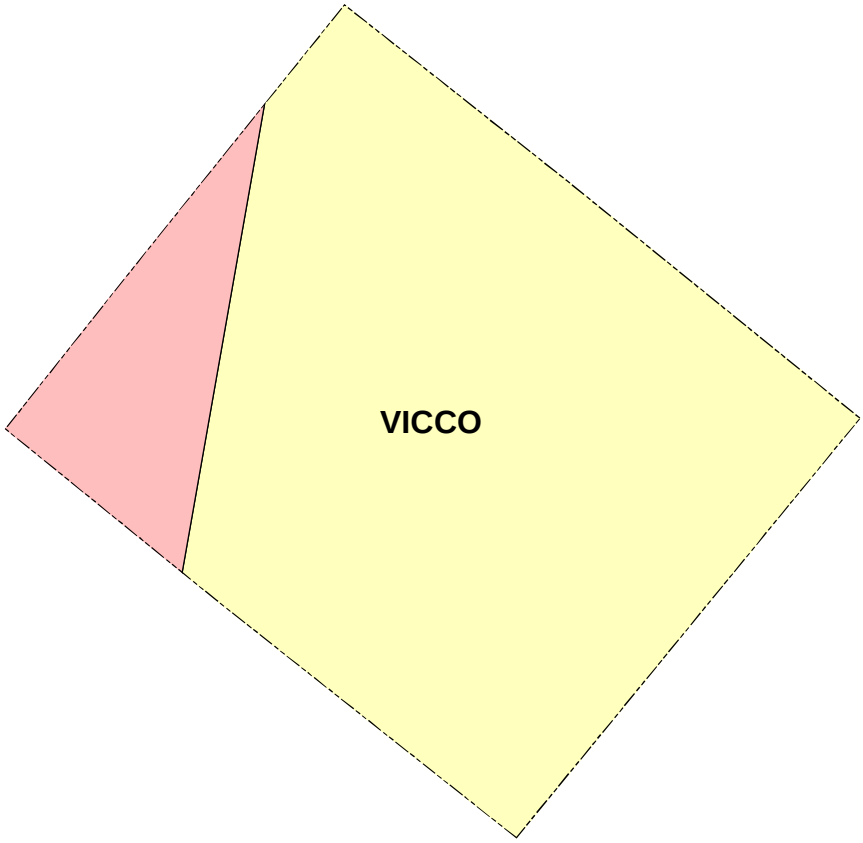
E

S

Miles

0 0.2 0.4 0.8 1.2 1.6

City of Vicco Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

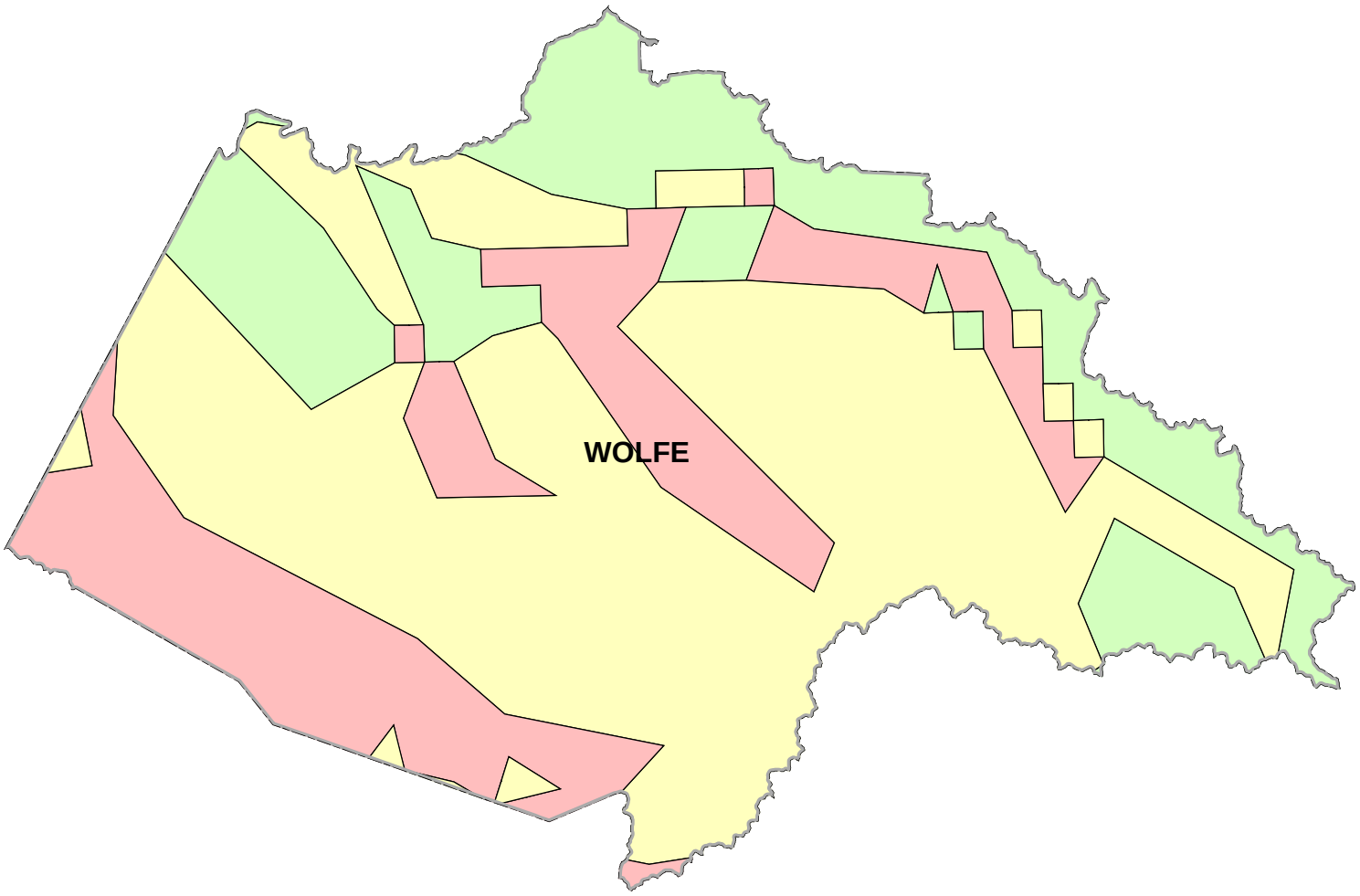
N

W E

S

0 0.1 0.2 0.4 0.6 0.8 Miles

Wolfe County Zones of Gasline Flooding Risk



Legend

County Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

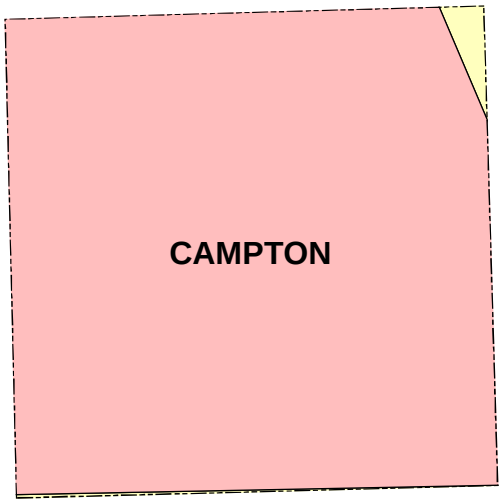
N

W E

S

0 1.25 2.5 5 7.5 10 Miles

City of Campton Zones of Gasline Flooding Risk



Legend

City Boundaries

Zones of Gasline Flooding Risk

Risk Rank

0-69

70-84

85-100

N

W E

S

Miles

0 0.15 0.3 0.6 0.9 1.2

ATTACHMENT J
Mitigation Strategy: Mitigation Actions Location Maps

BREATHITT COUNTY
ACTION ITEMS MAP

N
W E
S

0 0.5 1 2 Miles

Legend

INCOMPLETED ACTION ITEMS POINTS

TYPE

- CULVERT
- BRIDGE

INCOMPLETED ACTION ITEMS LINES

STATUS

- RR BRIDGE
- DREDGE
- SLIP STABILIZE
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

Breathitt Roads

OWNER

- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- TRAIL ACCESS
- PRIVATE
- FOREST SERVICE
- City of Jackson
- Breathitt County

BRIDGE HOLW RD-4217 DECLARATION

COMBS ST-4217 DECLARATION

SEWELL ST-4217 DECLARATION

TOWN HL RD-4217 DECLARATION

LICK BR-4217 DECLARATION

LOWER LICK BR-4217 DECLARATION

MORGUS FRK RD-4217 DECLARATION

SMITH BR-4217 DECLARATION

KY-476 AT NOBLES LANDING-4217 DECLARATION

CITY OF JACKSON AT ARMORY DR

BRIDGE HOLW RD-4217 DECLARATION

COMBS ST-4217 DECLARATION

SEWELL ST-4217 DECLARATION

TOWN HL RD-4217 DECLARATION

ARMORY DR-4217 DECLARATION

LICK BR-ARMORY DR

KNOTT COUNTY
ACTION ITEMS

N
W E
S

0 0.5 1 2 Miles

Legend

ACTION ITEMS POINTS

TYPE

- CULVERT
- BRIDGE

ACTION ITEMS AREAS

STATUS

- SUBSIDENCE
- DREDGE
- SLIP STABILIZE
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

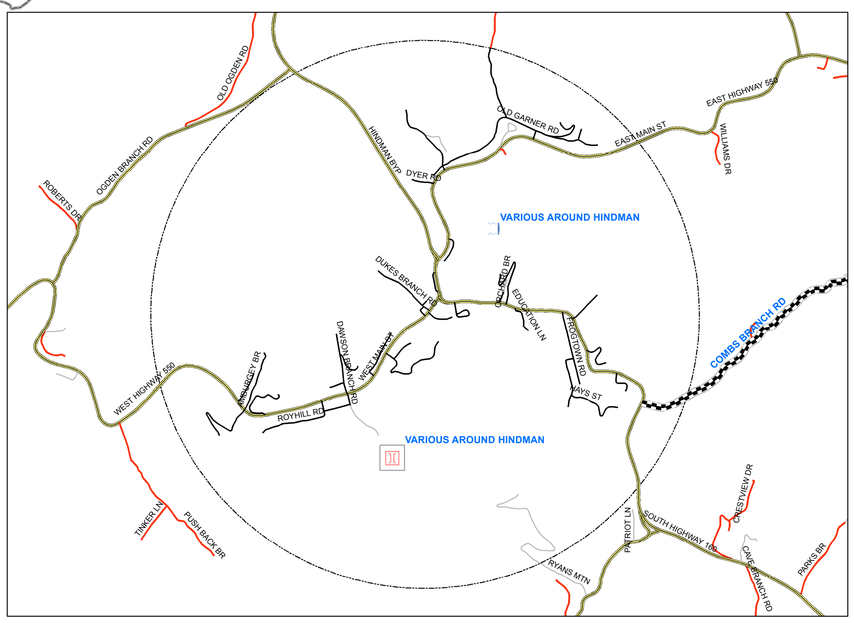
Knott Roads

OWNER

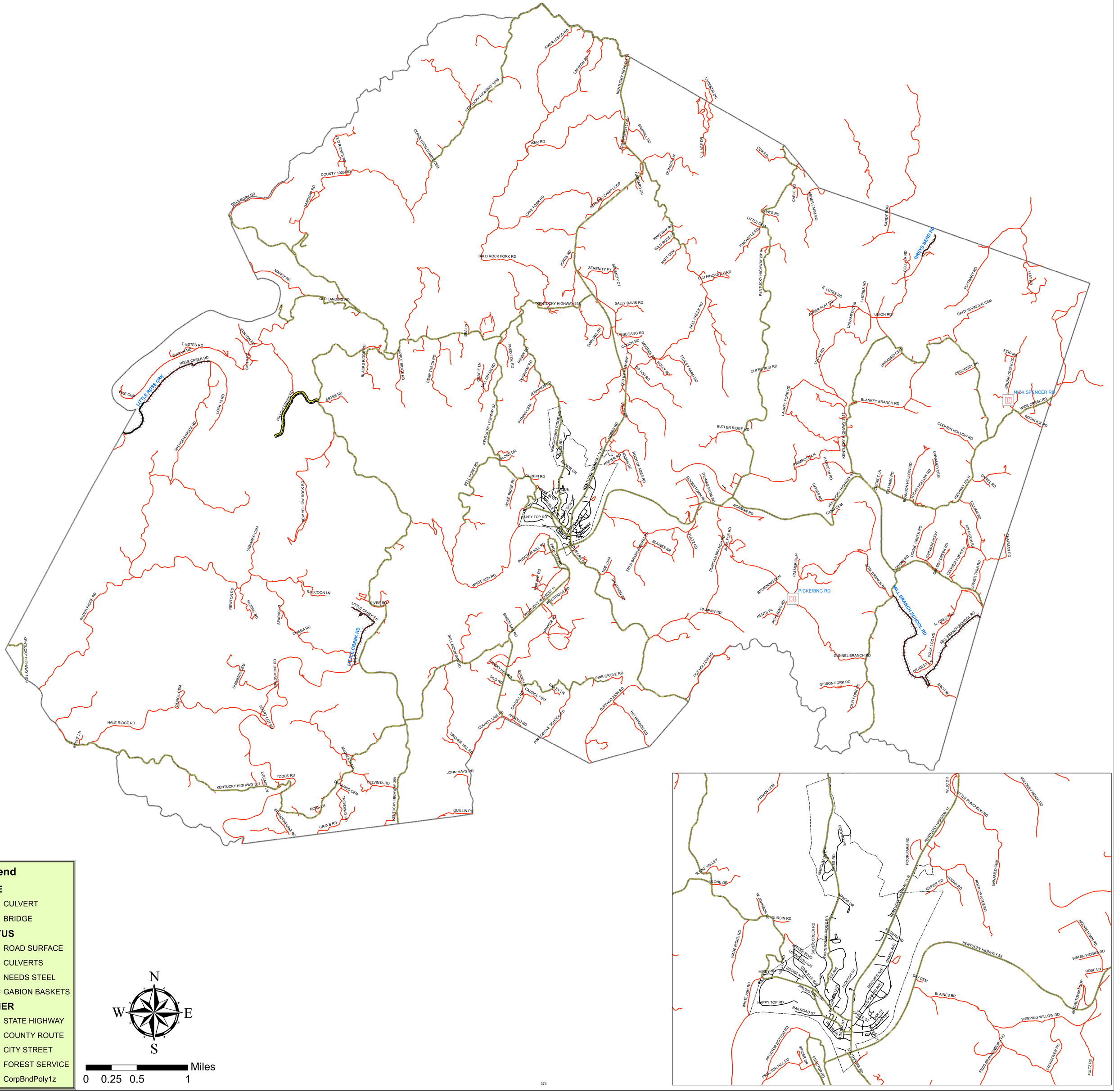
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE DRIVES
- FOREST SERVICE
- KNOTT COUNTY

INDIAN GRAVE RD
HIGHWAY 2023
W F COWLEY BR
CHERRY LN
PLUM BRANCH RD
NORMAN BR
AUREL FORK RD
ROCK FORK RD
BRUSHY FORK RD
TOBIE DR
DRY FORK RD
BIG SPRING BR
BIG SPRINGS BR
FOURMILE BR
ELMROCK DECOY RD
BUCKHORN RD
ELK VIEW DR
BUCKHORN RD
YELLOW MOUNTAIN RD
EAST HIGHWAY 80 NC
MINE BRANCH RD
EVA LN
FORD LN
EAST HIGHWAY 1097
EMBER LN
BEAR FORK RD
LITTLE DOTY BR
SALISBURY BRANCH RD
SLY BR
FREEDOM RD
BASKET CK
YERRY BR
GIBSON BR
CUTTOFF BR
GALE BR
POND BR
SALLIE BR
OGDEN VEST RD
TRAMPER BRANCH RD
TRAIL DR
WILEY FORK RD
HICKS BRANCH RD
POSSUM TROT RD
DISMAL BRANCH RD
EAST HIGHWAY 550
PINETREE HOLLW
PINETREE HOLLOW
SLATE FORK RD
TREASURE LN
SLONE BR
OLD HOUSE BRANCH RD
ROCKLICK BR
STARFIRE HAUL RD
WEST TALCUM RD
WEST HIGHWAY 80 NC
BIG BRANCH BALL RD
BEARVILLE RD
BEECH RD
TRACE BRANCH RD
FISTY BR
DRIFTWOOD LN
WEST HIGHWAY 80
D K FARRIS RD
CECIL LN
A BIRD LN
A C MTN
DIAMOND RD
FOX RUN RDG
CHARITY LN
CHIMNEY ROCK RD
OWENS BRANCH RD
KENTUCKY HINDMAN
EAST MAIN ST
CHRIS LN
WILL PARK DR
PRATT DR
PALMA DR
DIXON DR
N SLOPE RD
SPRUCE PINE RD
C HALL RD
ALUM CAVE BR
WHITS FORK RD
TOWER RD
ONION BLADE BR
COLONY BR
LIGE HOLLOW
STONE MASON RD
VIEMP PATCH BR
HALL BRANCH RD
RED BIRD LN
KY HWY 7
KY HWY 7
SOUTH HIGHWAY 7
RAILROAD LN
POTATO BR
GALLEY RD
ELKLICK BR
LEFT DRY CRK
DRY CREEK RD
PERK LN
DELL LN
MULLINS BRANCH RD
IRVIN DR
BATES BRANCH RD
NORTH HIGHWAY 1498
MUDLICK BR
ARNOLD FORK RD
WEST FORK RD
WILLOW LN
SCIP BRANCH RD
JASPER HALL LN
MEADOW LARK RD
ROPEWORKS BR
SPRING BR
WILLARD BR
PINETOP LN
MALLET FORK RD
DAISY LN
NEALY CREEK RD
HOLDER HOLLOW
HANNAHS CREEK RD
MALLIE RD
MALLIE RD
SMITH BR
HIGHWAY 582
STEER FORK RD
ELMS BENTLEY RD
GRAILS LN
SAMS BR
PINE DR
SHADOW LN
HIGHWAY 699
SHORT FORK RD
TRACE CANEY RD
WILSON BR
HOLLYBUSH RD
HAWK RD
HOLLY HILLS VILLA RD
JONES RD
PERMAN BR
CRIMSON RD
ARCHER LN
CAVE BRANCH RD
PARKS BR
RYANS MTN
ASHLEY BR
PUSH BACK BR
OWENS BRANCH RD
VARIOUS AROUND HINDMAN
COMBS BRANCH RD
VARIOUS AROUND HINDMAN
LICK BRANCH RD
LESLIE BR
SUMMERS BR
OGDEN BRANCH RD
OLD OGDEN RD
MONTGOMERY CREEK RD
MAYOR CK
EAGLES NEST RD
EAGLES NEST RD
HIGHWAY 711
FLY JOE DR
WEST HIGHWAY 550
LONG HORN BR
TORI LN
COCKRELLS TRACE RD
GEARHEART FRK
KY 724 CTR-CCR
HONEYCAMP RD
PENNY LN
HICKORY WITHE BR
CHESTNUT LOG BR
CLEAR CREEK RD
GRANDPA DR
CAMP BR
CALE HOLLOW
CORNETT RD
PONTIAC RD
WHITE OAK DR
LOWERY DR
HERLIN HALCOMB RD
IRISHMAN CREEK RD
CASTLE ROCK RD
DENNIS MADDEN BR
BANNER FORK RD
ROOSTER LN
CRAIG CT
SEALS HOLLOW
DEADMAN BR
STILLHOUSE BR
SHELTER RD
BIG BRANCH RD
FULK PATCH RD
CLEAR FORK RD
SHEKINAH LN
ASHBEE TREE RD
LOYDS CR KELLY FK
ELK FORK RD
YOUNGS FORK RD
BUCK BRANCH RD
KELLY FORK RD
YELLOW CREEK RD
BLUE BIRD RD
SASSAFRAS CREEK RD
ROWDY HOLLOW
CONCORD CT
RED OAK BR
SMITHBORO RD
IC-9080
BIG SMITH BR
LITTLE SMITH BR
BIG SMITH BR
VALLEY HOLLOW
SOUTH HIGHWAY 160
LAUREL FORK DR
DEFEATED CRK
DEFEATED CREEK RD
GRACELAND DR
TALES BRANCH RD
BREEDING CREEK RD
KELFREY LN
RED FORK RD
DEAD MANS BR
WOLFFEN CREEK RD
AMELIA RD
BURGEYS CREEK RD
WOLF RD
BIG DOUBLES BR

CITY OF HINDMAN



LEE COUNTY
HAZARD MITIGATION
ACTION ITEMS MAP



Legend

TYPE
- CULVERT
- BRIDGE

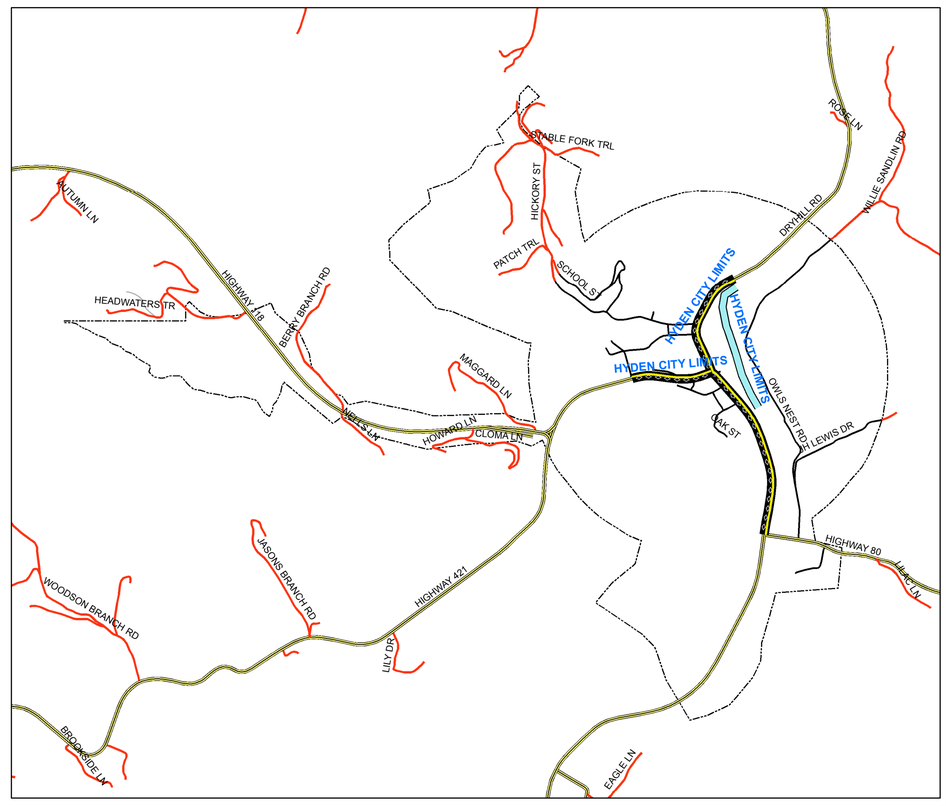
STATUS
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

OWNER
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- FOREST SERVICE
- CorpBndPoly1z

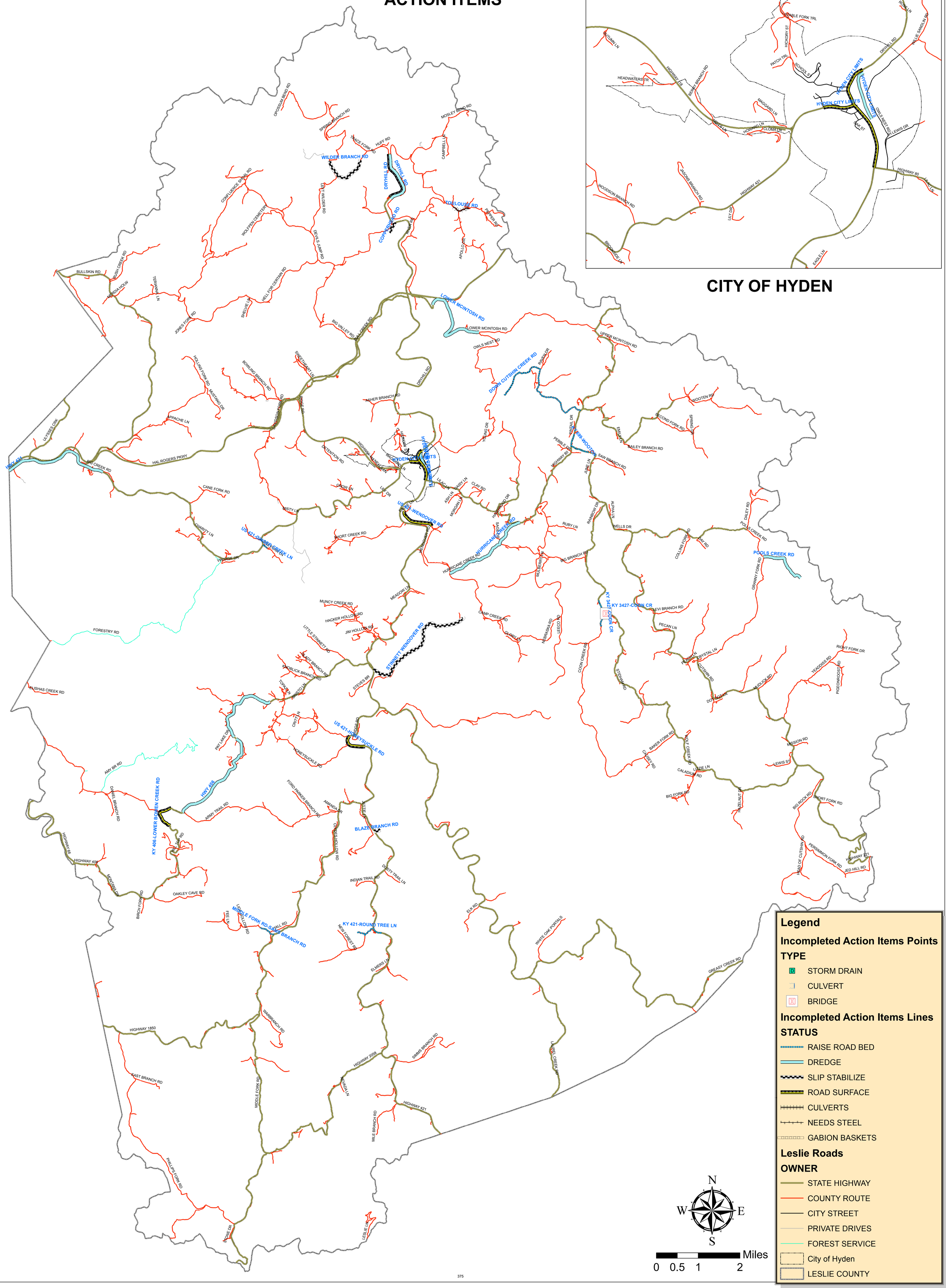
N W E S

0 0.25 0.5 1 Miles

LESLIE COUNTY ACTION ITEMS



CITY OF HYDEN



Legend

Incompleted Action Items Points

TYPE

- STORM DRAIN
- CULVERT
- BRIDGE

Incompleted Action Items Lines

STATUS

- RAISE ROAD BED
- DREDGE
- SLIP STABILIZE
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

Leslie Roads

OWNER

- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE DRIVES
- FOREST SERVICE
- City of Hyden
- LESLIE COUNTY

N W E S

0 0.5 1 2 Miles

LETCHER COUNTY
ACTION ITEMS MAP

CITY OF FLEMING-NEON

CITY OF JENKINS

CITY OF WHITESBURG

N
W E
S

0 1 2 4 Miles

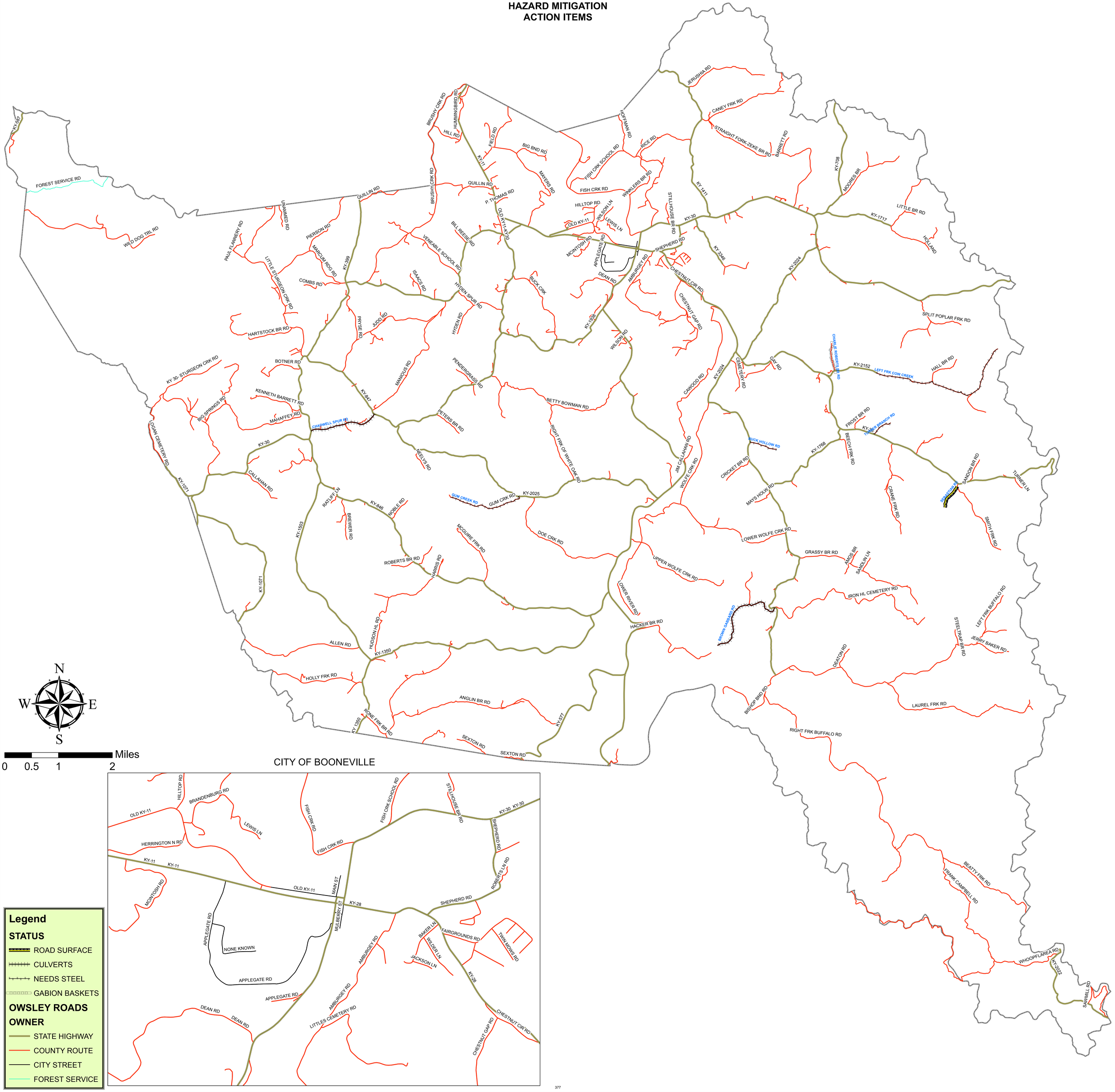
Legend

INCOMPLETED_ACTION_ITEMS_POINTS
TYPE
- CULVERT
- BRIDGE

INCOMPLETED_ACTION_ITEMS
STATUS
- ROAD BROKEN OFF
- DREDGE
- SLIP STABILIZE
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

Letcher Roads
OWNER
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE
- FOREST SERVICE
- City Boundaries
- Letcher County

OWSLEY COUNTY
HAZARD MITIGATION
ACTION ITEMS



CITY OF BOONEVILLE

Legend

STATUS

- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

OWSLEY ROADS

OWNER

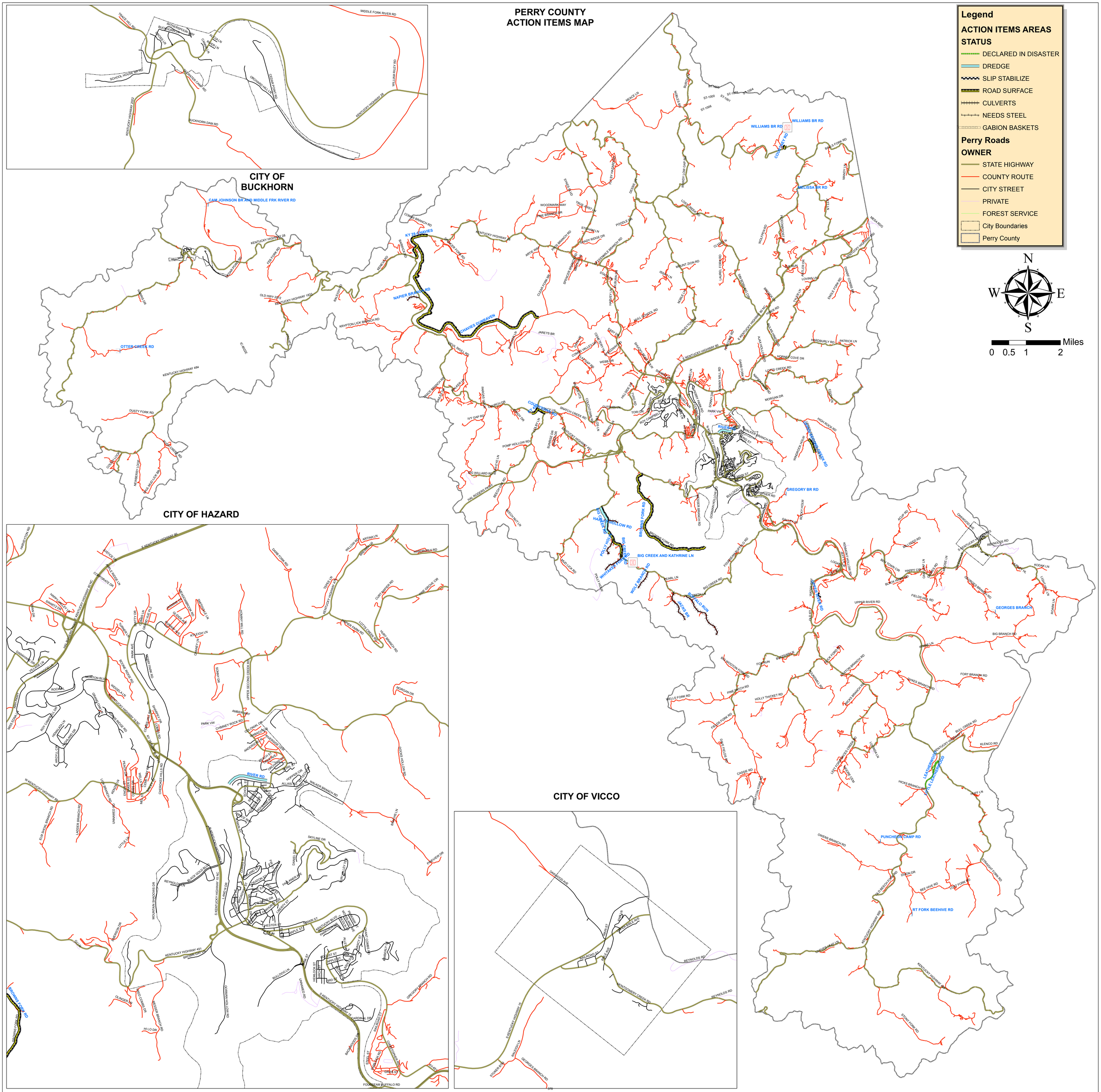
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- FOREST SERVICE

PERRY COUNTY ACTION ITEMS MAP

CITY OF BUCKHORN

CITY OF HAZARD

CITY OF VICCO



WOLFE COUNTY ACTION ITEMS

N
W E
S

0 0.5 1 2 Miles

Legend

Incompleted Action Items Points

TYPE
- STORM DRAIN
- CULVERT
- BRIDGE

Incompleted Action Items Lines

STATUS
- RAISE ROAD BED
- DREDGE
- SLIP STABILIZE
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

Wolfe Roads

OWNER
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE DRIVES
- FOREST SERVICE
- CorpBndPoly1z
- WOLFE COUNTY

CITY OF CAMPTON

ATTACHMENT K
Mitigation Strategy: Locations of Completed Mitigation Actions

BREATHITT COUNTY
COMPLETED ACTION ITEMS MAP

KNOTT COUNTY
COMPLETED ACTION ITEMS

N
W E
S

0 0.5 1 2 Miles

Legend

Completed Action Items Lines

TYPE

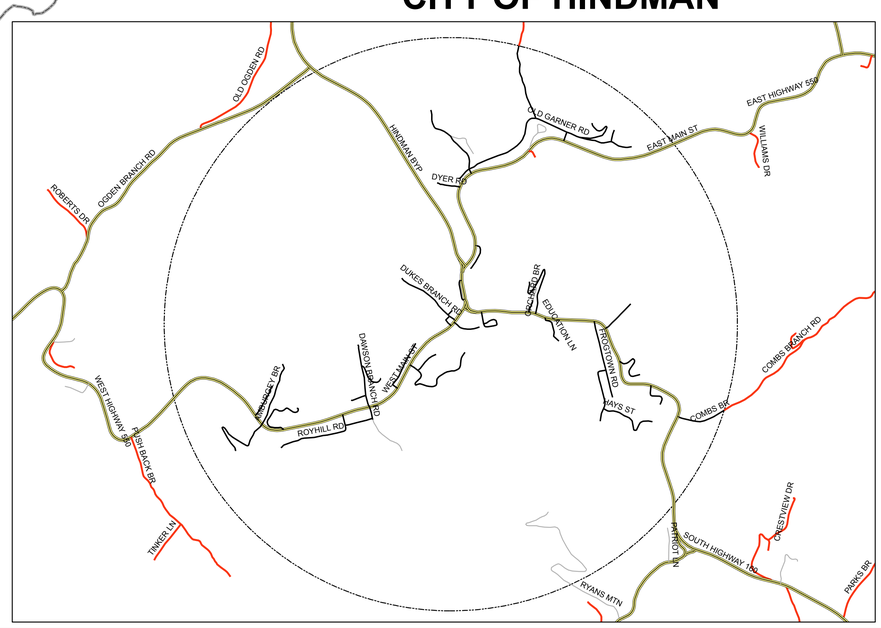
- AWAITING FEMA APP
- BASKET+STEEL
- BRIDGE+CULVERT REPAIR
- CLARIFY
- CULVERT REPAIR
- PARTIALLY COMPLETED
- ROAD WASHOUT REPAIR
- SHOTROCK_GROUT
- SLIP STABILIZE

Knott Roads

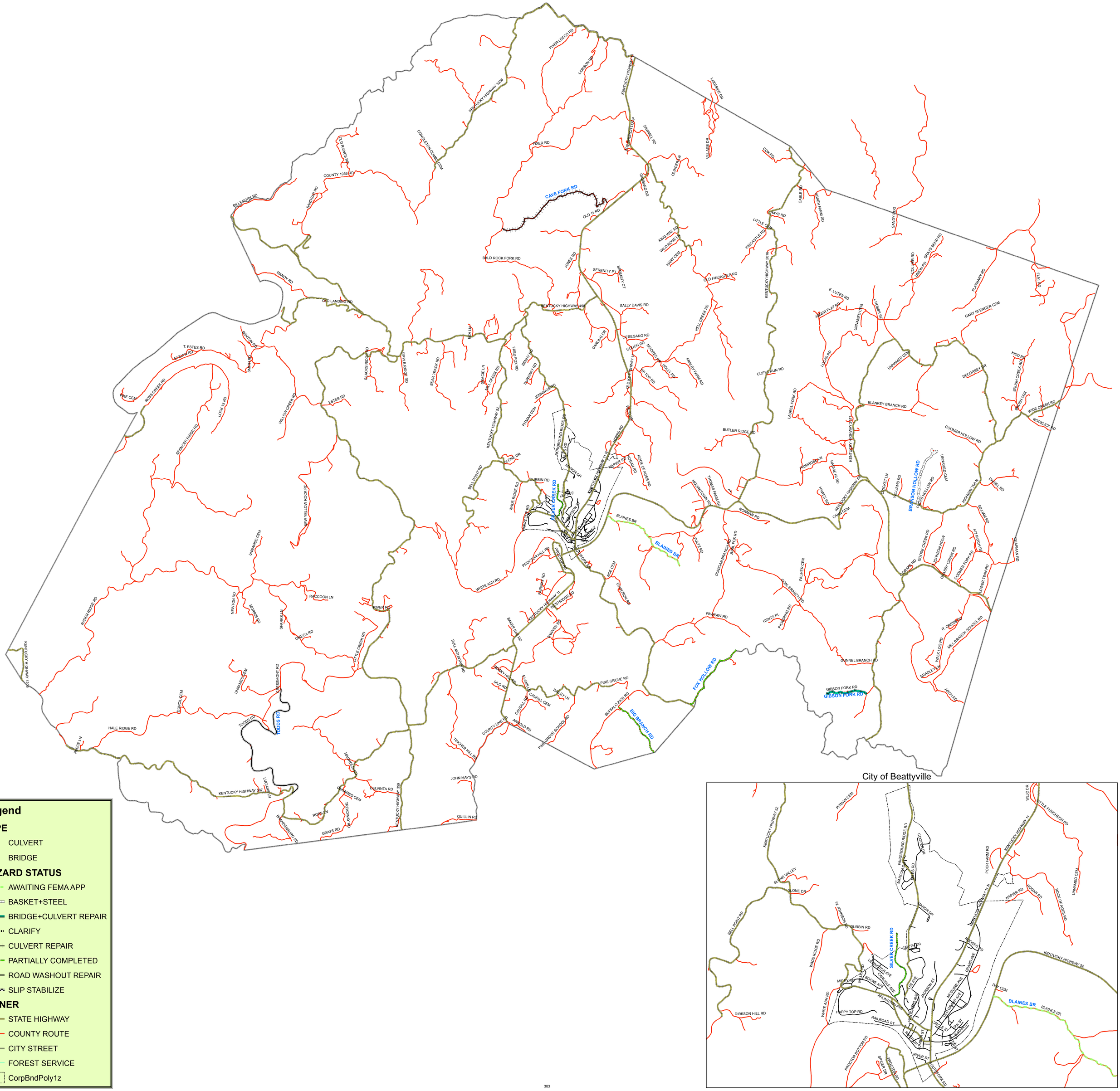
OWNER

- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE DRIVES
- FOREST SERVICE
- City Boundaries
- Knott County

CITY OF HINDMAN



LEE COUNTY
HAZARD MITIGATION
COMPLETED PROJECTS MAP



City of Beattyville

Legend

TYPE

- CULVERT
- BRIDGE

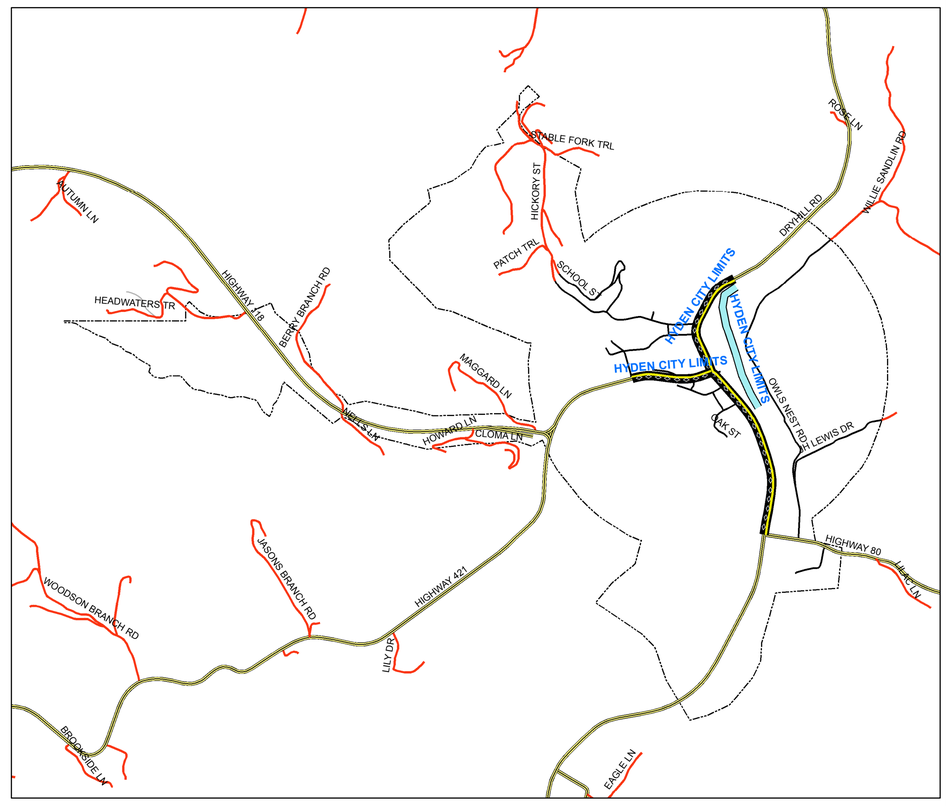
HAZARD STATUS

- AWAITING FEMA APP
- BASKET+STEEL
- BRIDGE+CULVERT REPAIR
- CLARIFY
- CULVERT REPAIR
- PARTIALLY COMPLETED
- ROAD WASHOUT REPAIR
- SLIP STABILIZE

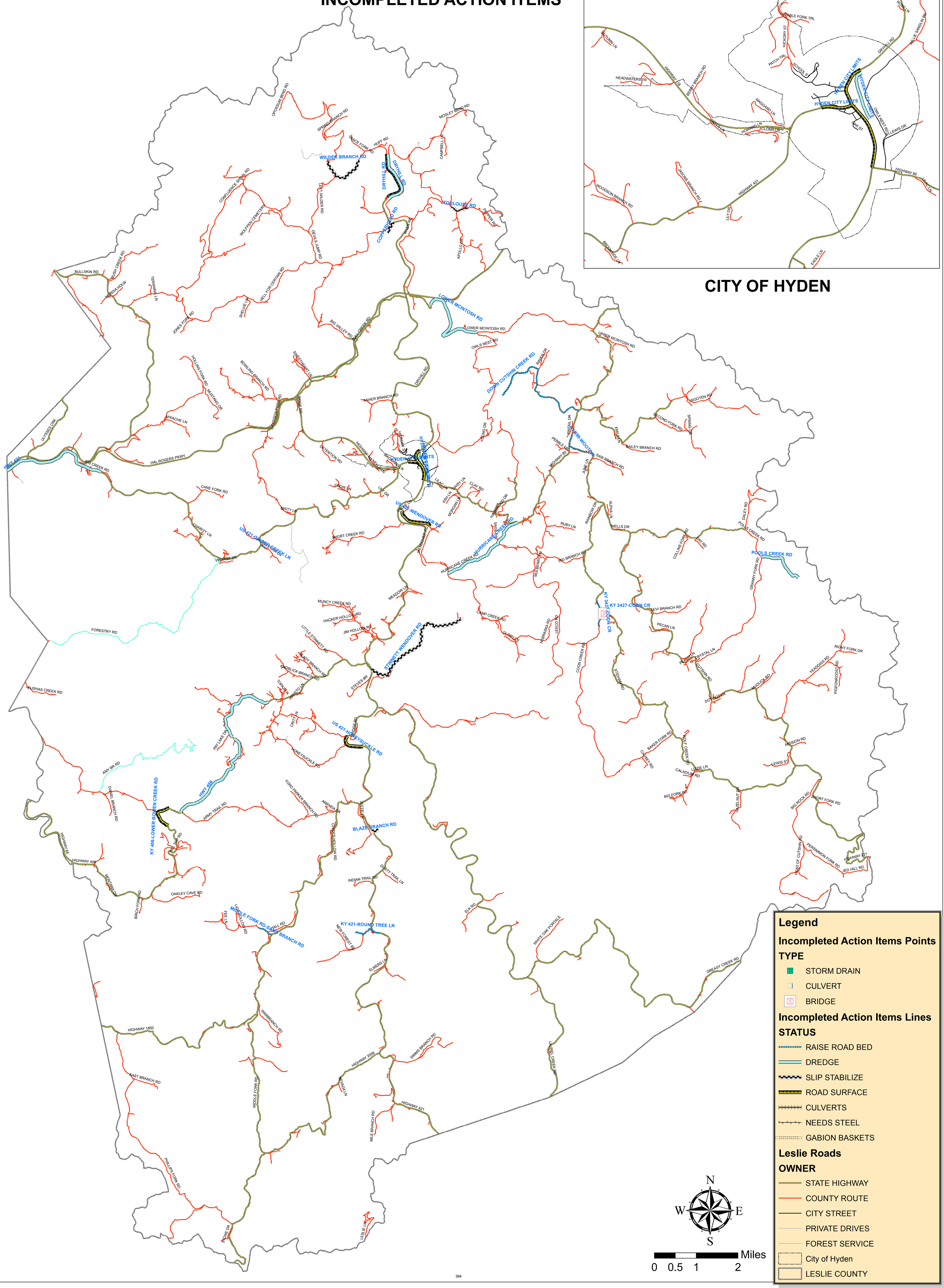
OWNER

- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- FOREST SERVICE
- CorpBndPoly1z

LESLIE COUNTY
INCOMPLETED ACTION ITEMS



CITY OF HYDEN



Legend

Incompleted Action Items Points

TYPE

- STORM DRAIN
- CULVERT
- BRIDGE

Incompleted Action Items Lines

STATUS

- RAISE ROAD BED
- DREDGE
- SLIP STABILIZE
- ROAD SURFACE
- CULVERTS
- NEEDS STEEL
- GABION BASKETS

Leslie Roads

OWNER

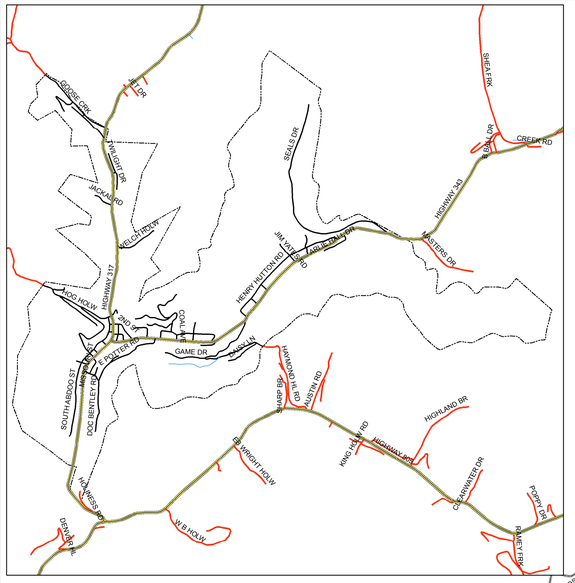
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE DRIVES
- FOREST SERVICE
- City of Hyden
- LESLIE COUNTY

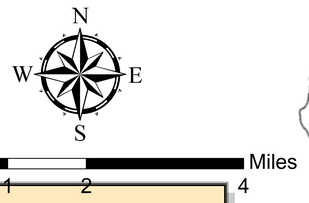
N W E S

0 0.5 1 2 Miles

LETCHER COUNTY
COMPLETED ACTION ITEMS MAP

CITY OF FLEMING-NEON





Miles
0 1 2 4

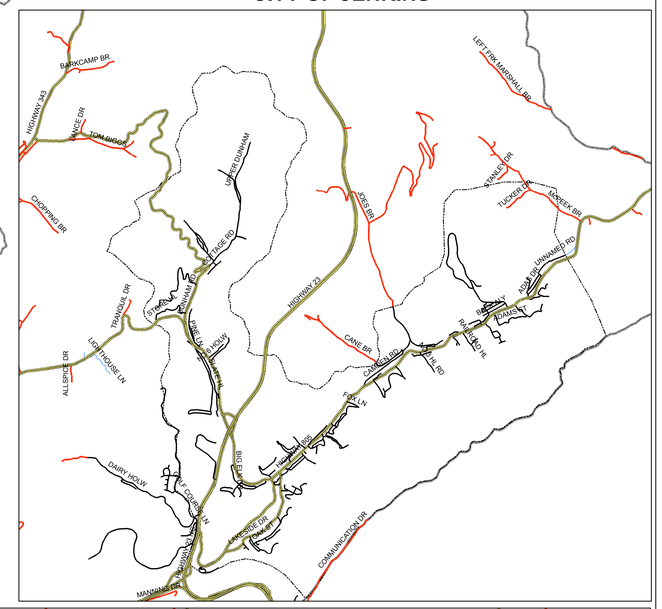
Legend

COMPLETED ACTION ITEMS POINTS
TYPE
- CULVERT
- BRIDGE

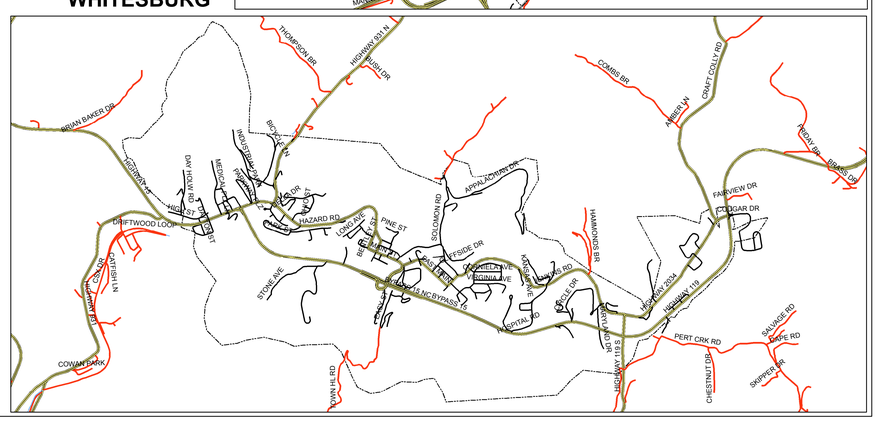
COMPLETED ACTION ITEMS LINES
HAZARD STATUS
- CULVERTS
- DITCH DREDGE
- ROAD RESURFACED
- SLIP STABILIZE

Letcher Roads
OWNER
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE
- FOREST SERVICE
- City Boundaries
- Letcher County

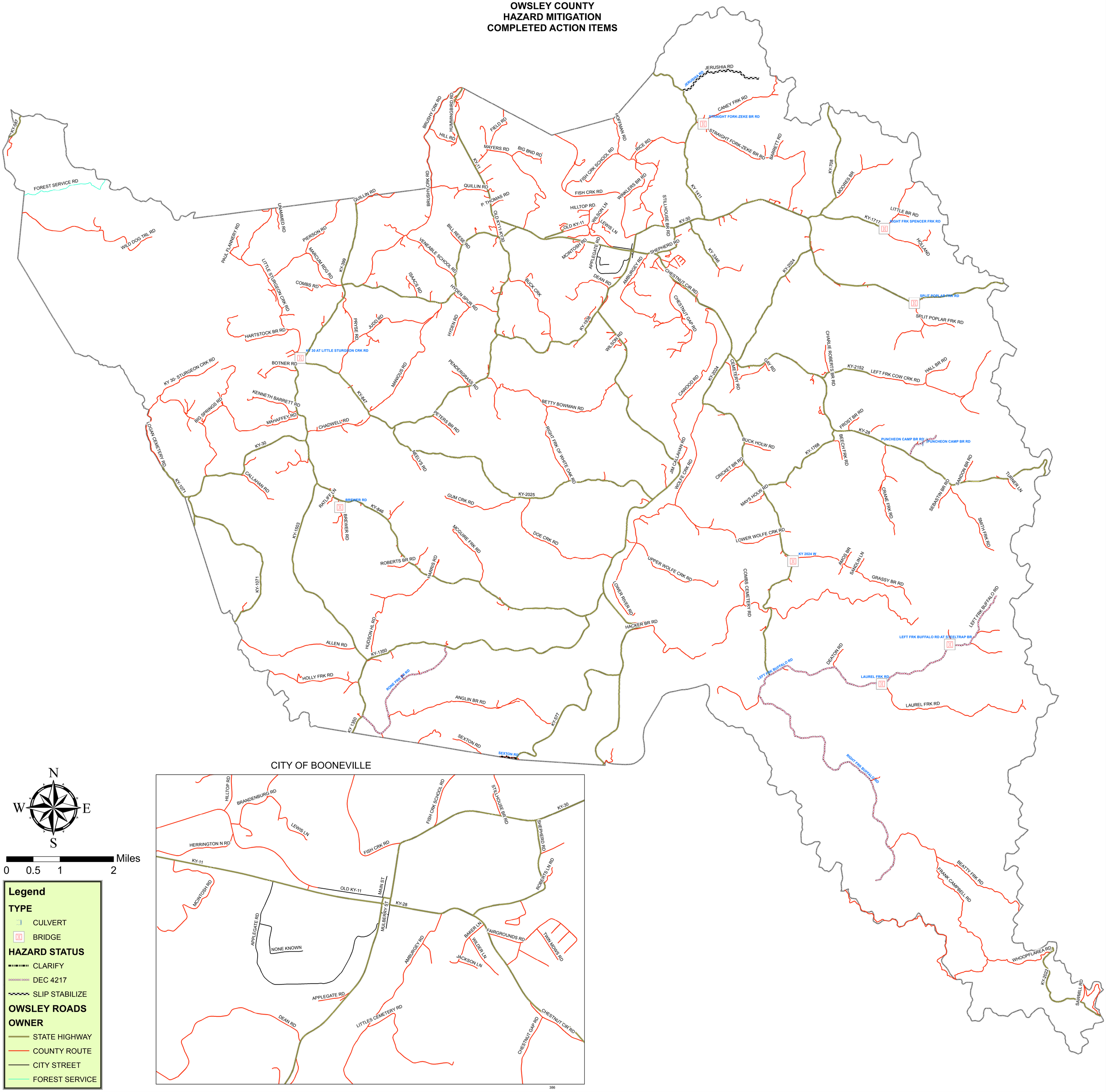
CITY OF JENKINS



CITY OF WHITESBURG



OWSLEY COUNTY
HAZARD MITIGATION
COMPLETED ACTION ITEMS



CITY OF BOONEVILLE

Legend

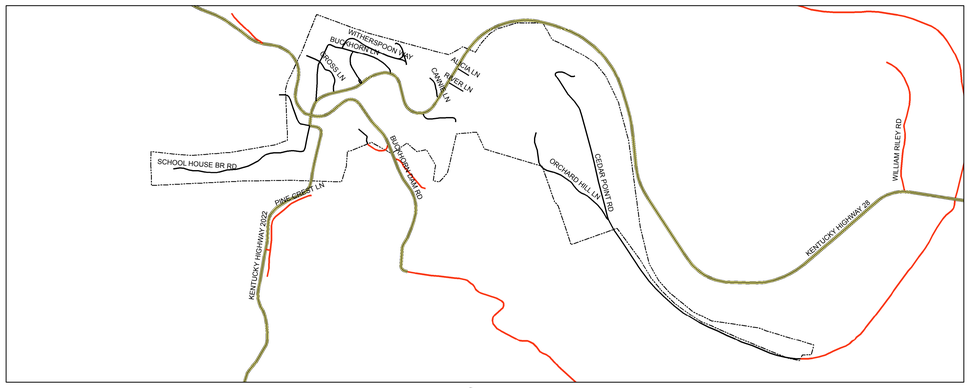
TYPE
- CULVERT
- BRIDGE

HAZARD STATUS
- CLARIFY
- DEC 4217
- SLIP STABILIZE

OWSLEY ROADS

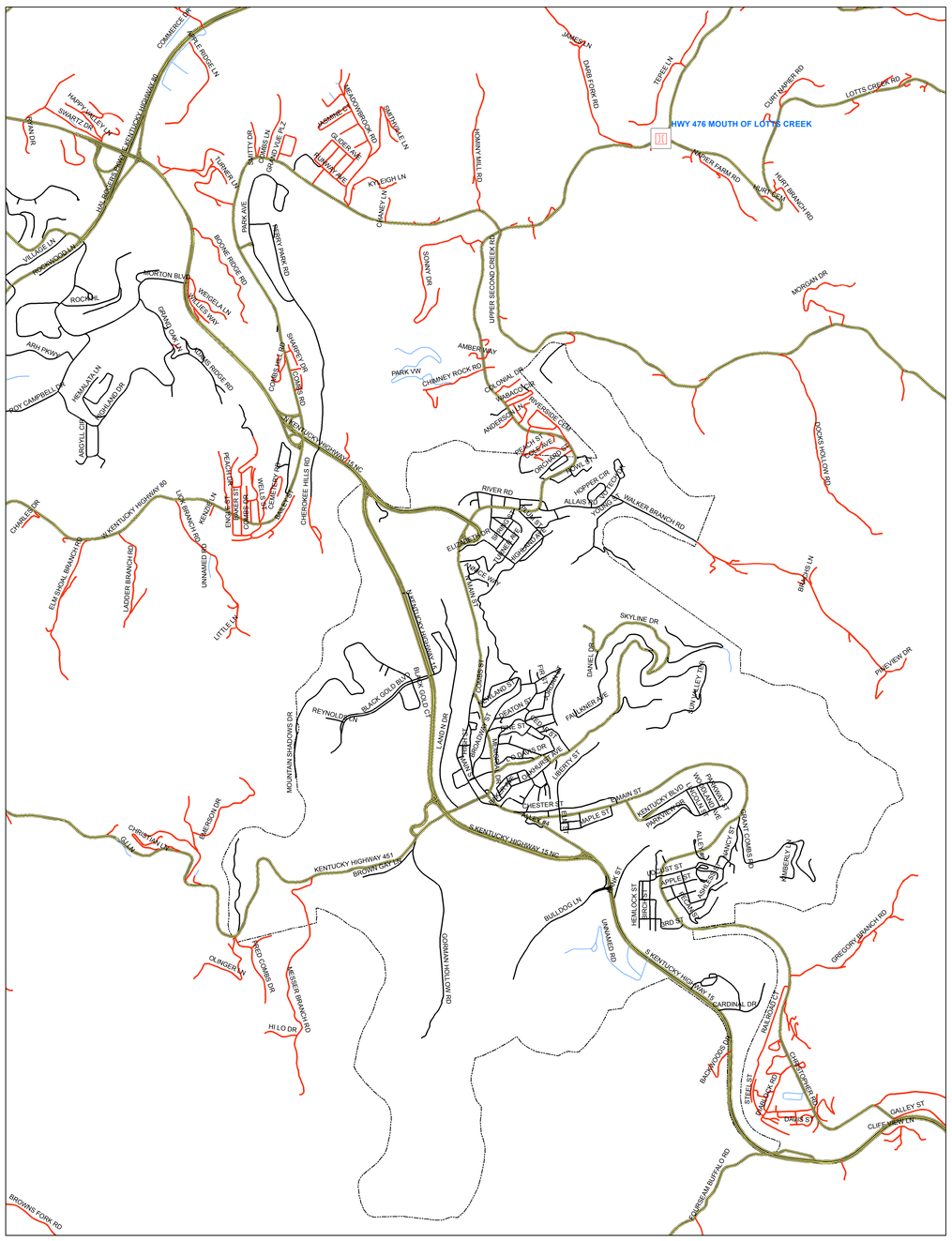
OWNER
- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- FOREST SERVICE

PERRY COUNTY
COMPLETED ACTION ITEMS MAP

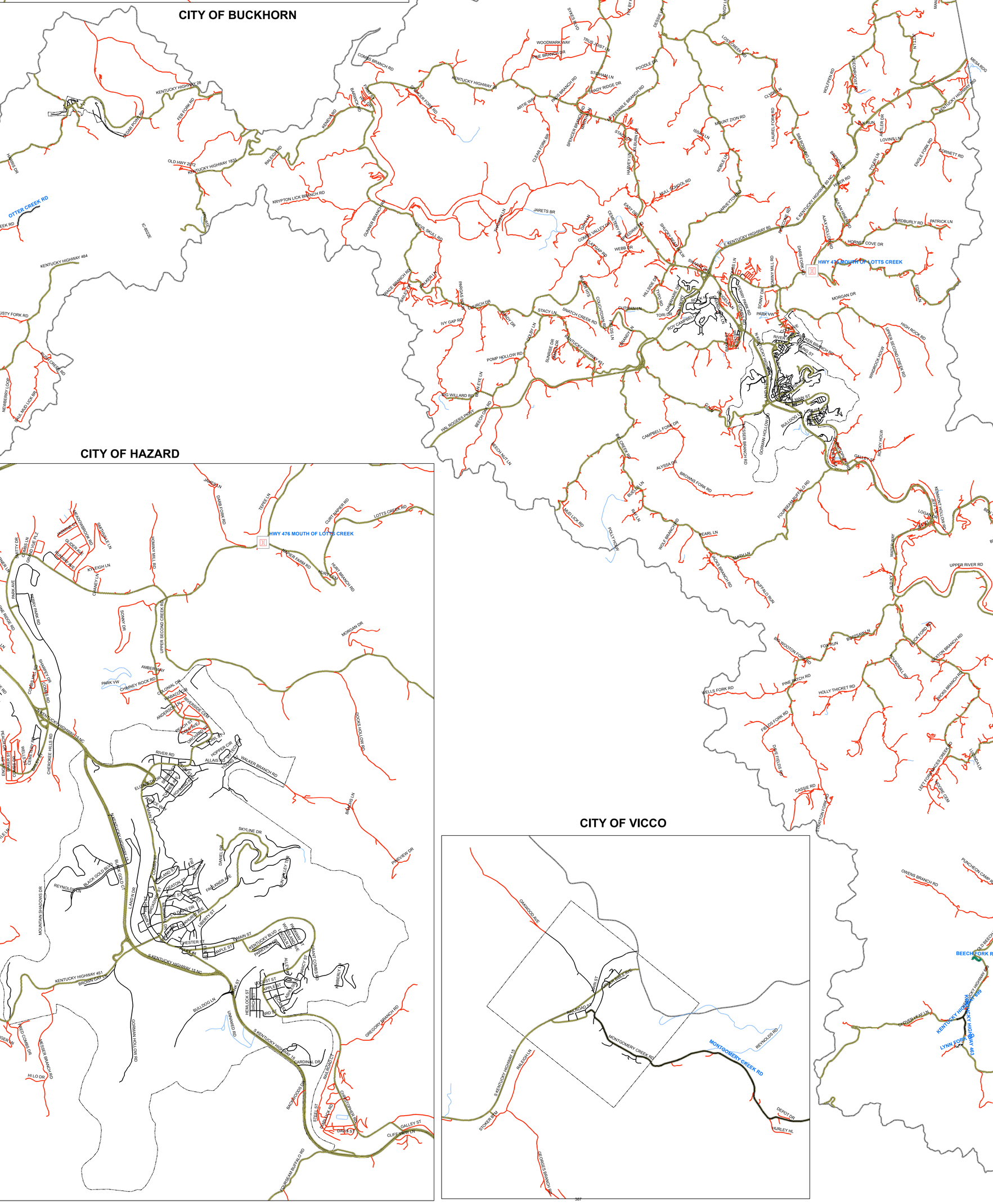


CITY OF BUCKHORN

CITY OF HAZARD



CITY OF VICCO



Legend

COMPLETED ACTION ITEMS POINTS TYPE

- CULVERT
- BRIDGE

COMPLETED ACTION ITEMS LINES HAZARD STATUS

- AWAITING FEMA APP
- BASKET+STEEL
- BRIDGE+CULVERT REPAIR
- CLARIFY
- CULVERT REPAIR
- PARTIALLY COMPLETED
- ROAD WASHOUT REPAIR
- SLIP STABILIZE

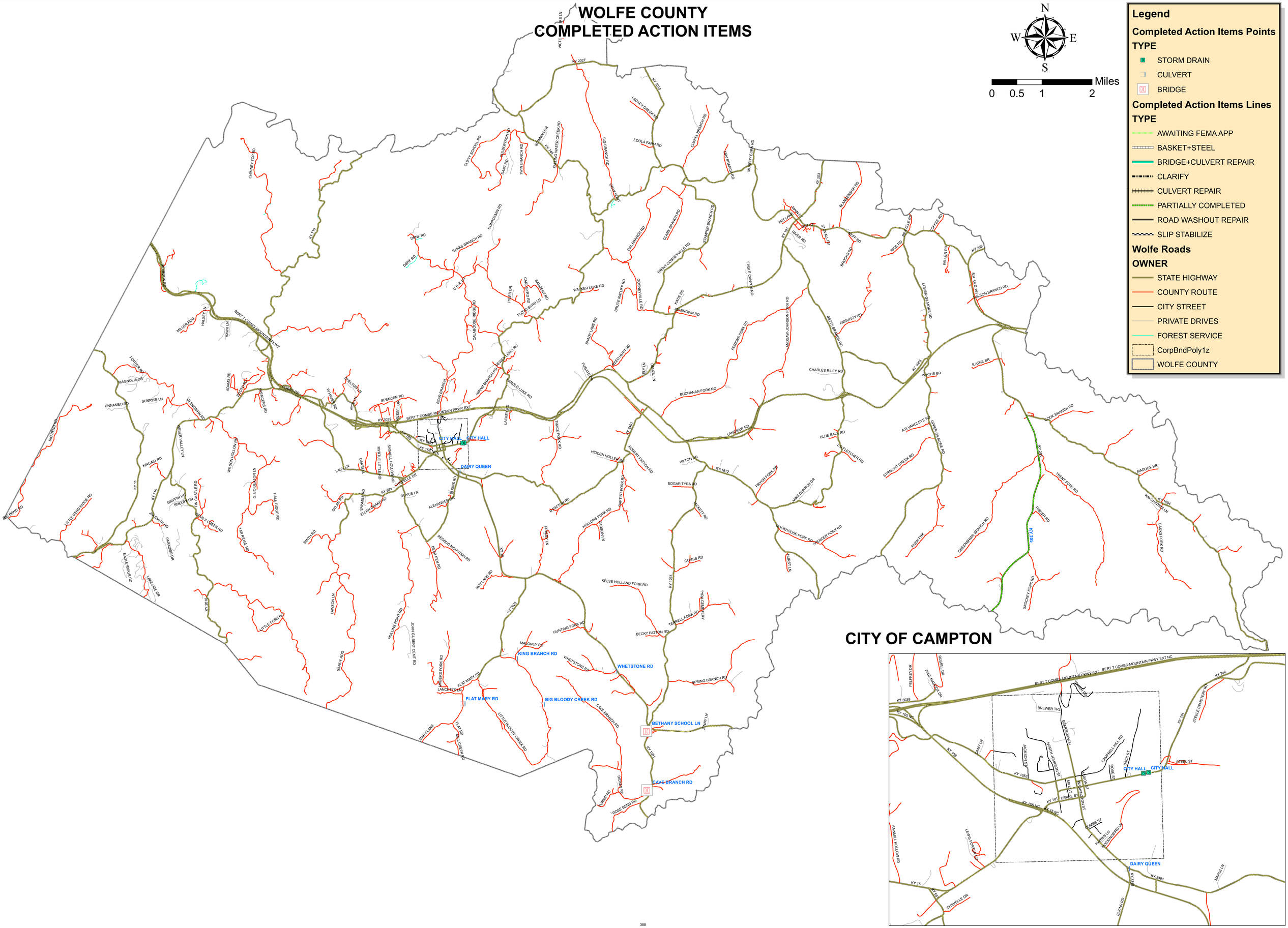
Perry Roads OWNER

- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE
- FOREST SERVICE
- City Boundaries
- Perry County

N W E S

0 1 2 4 Miles

WOLFE COUNTY
COMPLETED ACTION ITEMS



Legend

Completed Action Items Points

TYPE

- STORM DRAIN
- CULVERT
- BRIDGE

Completed Action Items Lines

TYPE

- AWAITING FEMA APP
- BASKET+STEEL
- BRIDGE+CULVERT REPAIR
- CLARIFY
- CULVERT REPAIR
- PARTIALLY COMPLETED
- ROAD WASHOUT REPAIR
- SLIP STABILIZE

Wolfe Roads

OWNER

- STATE HIGHWAY
- COUNTY ROUTE
- CITY STREET
- PRIVATE DRIVES
- FOREST SERVICE
- CorpBndPoly1z
- WOLFE COUNTY

CITY OF CAMPTON

ATTACHMENT L
HAZUS Quick Assessment Reports

Quick Assessment Report

July 20, 2016

Study Region : BreathittCo
Scenario : BreathittCoMidFrkKyRiver
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	495
Number of Census Blocks	858
Number of Buildings	
Residential	6,010
Total	6,351
Number of People in the Region (x 1000)	14
Building Exposure ($ Millions)	
Residential	681
Total	911

Scenario Results

Shelter Requirements

Displaced Population (# Households)	132
Short Term Shelter (# People)	271

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	18
Total Property (Capital Stock) Losses ($ Millions)	19
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 21, 2016

Study Region : BreathittCo
Scenario : BreathittCoNoFrkKyRiverUS
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	495
Number of Census Blocks	858
Number of Buildings	
Residential	6,010
Total	6,351
Number of People in the Region (x 1000)	14
Building Exposure ($ Millions)	
Residential	681
Total	911

Scenario Results

Shelter Requirements

Displaced Population (# Households)	291
Short Term Shelter (# People)	590

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	34
Total Property (Capital Stock) Losses ($ Millions)	41
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 20, 2016

Study Region : BreathittCo
Scenario : BreathittCoNoFrkKyRiverDS
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	495
Number of Census Blocks	858
Number of Buildings	
Residential	6,010
Total	6,351
Number of People in the Region (x 1000)	14
Building Exposure ($ Millions)	
Residential	681
Total	911

Scenario Results

Shelter Requirements

Displaced Population (# Households)	592
Short Term Shelter (# People)	1,332

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	89
Total Property (Capital Stock) Losses ($ Millions)	160
Business Interruptions (Income) Losses ($ Millions)	1

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 21, 2016

Study Region : BreathittCo
Scenario : BreathittCoQuicksandCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	495
Number of Census Blocks	858
Number of Buildings	
Residential	6,010
Total	6,351
Number of People in the Region (x 1000)	14
Building Exposure ($ Millions)	
Residential	681
Total	911

Scenario Results

Shelter Requirements

Displaced Population (# Households)	82
Short Term Shelter (# People)	109

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	9
Total Property (Capital Stock) Losses ($ Millions)	13
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 25, 2016

Study Region : Knott2
Scenario : KnottBallsFrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	56
Short Term Shelter (# People)	53

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	9
Total Property (Capital Stock) Losses ($ Millions)	10
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 26, 2016

Study Region : Knott2
Scenario : KnottBuckhornCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	5
Short Term Shelter (# People)	4

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	1
Total Property (Capital Stock) Losses ($ Millions)	1
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 21, 2016

Study Region : Knott2
Scenario : KnottCoCaneyFrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	35
Short Term Shelter (# People)	29

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	4
Total Property (Capital Stock) Losses ($ Millions)	6
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 25, 2016

Study Region : Knott2
Scenario : KnottCoCarrCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	80
Short Term Shelter (# People)	122

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	8
Total Property (Capital Stock) Losses ($ Millions)	11
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Quick Assessment Report

July 26, 2016

Study Region : Knott2
Scenario : KnottQuicksandCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	4
Short Term Shelter (# People)	1

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	0
Total Property (Capital Stock) Losses ($ Millions)	0
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 21, 2016

Study Region : Knott2
Scenario : KnottRtFrkBeaverCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	116
Short Term Shelter (# People)	127

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	15
Total Property (Capital Stock) Losses ($ Millions)	18
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 25, 2016

Study Region : Knott2
Scenario : KnottCoTroublesomeCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	353
Number of Census Blocks	673
Number of Buildings	
Residential	7,306
Total	7,705
Number of People in the Region (x 1000)	16
Building Exposure ($ Millions)	
Residential	963
Total	1,170

Scenario Results

Shelter Requirements

Displaced Population (# Households)	148
Short Term Shelter (# People)	238

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	21
Total Property (Capital Stock) Losses ($ Millions)	33
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 26, 2016

Study Region : LeeCo2
Scenario : LeeCoKentuckyRiv
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	211
Number of Census Blocks	604
Number of Buildings	
Residential	3,229
Total	3,450
Number of People in the Region (x 1000)	8
Building Exposure ($ Millions)	
Residential	403
Total	517

Scenario Results

Shelter Requirements

Displaced Population (# Households)	161
Short Term Shelter (# People)	256

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	32
Total Property (Capital Stock) Losses ($ Millions)	58
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 26, 2016

Study Region : LeeCo2
Scenario : LeeCoMillersCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	211
Number of Census Blocks	604
Number of Buildings	
Residential	3,229
Total	3,450
Number of People in the Region (x 1000)	8
Building Exposure ($ Millions)	
Residential	403
Total	517

Scenario Results

Shelter Requirements

Displaced Population (# Households)	7
Short Term Shelter (# People)	1

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	1
Total Property (Capital Stock) Losses ($ Millions)	2
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 21, 2016

Study Region : LeslieCo
Scenario : LeslieCoBigCreek
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	404
Number of Census Blocks	1,058
Number of Buildings	
Residential	5,169
Total	5,492
Number of People in the Region (x 1000)	11
Building Exposure ($ Millions)	
Residential	648
Total	830

Scenario Results

Shelter Requirements

Displaced Population (# Households)	14
Short Term Shelter (# People)	3

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	2
Total Property (Capital Stock) Losses ($ Millions)	2
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Quick Assessment Report

July 21, 2016

Study Region :	LeslieCo
Scenario :	LeslieCoMidFrkKyRiver
Return Period:	100
Analysis Option:	0

Regional Statistics

Area (Square Miles)	404
Number of Census Blocks	1,058
Number of Buildings	
Residential	5,169
Total	5,492
Number of People in the Region (x 1000)	11
Building Exposure ($ Millions)	
Residential	648
Total	830

Scenario Results

Shelter Requirements

Displaced Population (# Households)	451
Short Term Shelter (# People)	531

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	84
Total Property (Capital Stock) Losses ($ Millions)	145
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 21, 2016

Study Region : LetcherCo
Scenario : LetcherCoElkhornCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	339
Number of Census Blocks	1,430
Number of Buildings	
Residential	11,174
Total	11,978
Number of People in the Region (x 1000)	25
Building Exposure ($ Millions)	
Residential	1,533
Total	1,981

Scenario Results

Shelter Requirements

Displaced Population (# Households)	65
Short Term Shelter (# People)	96

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	6
Total Property (Capital Stock) Losses ($ Millions)	9
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 21, 2016

Study Region : LetcherCo
Scenario : LetcherCo
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	339
Number of Census Blocks	1,430
Number of Buildings	
Residential	11,174
Total	11,978
Number of People in the Region (x 1000)	25
Building Exposure ($ Millions)	
Residential	1,533
Total	1,981

Scenario Results

Shelter Requirements

Displaced Population (# Households)	761
Short Term Shelter (# People)	1,002

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	113
Total Property (Capital Stock) Losses ($ Millions)	212
Business Interruptions (Income) Losses ($ Millions)	1

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Quick Assessment Report

July 21, 2016

Study Region : OwsleyCo
Scenario : OwsleyCoSoFrkKyRiver
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	198
Number of Census Blocks	448
Number of Buildings	
Residential	2,262
Total	2,324
Number of People in the Region (x 1000)	5
Building Exposure ($ Millions)	
Residential	246
Total	295

Scenario Results

Shelter Requirements

Displaced Population (# Households)	97
Short Term Shelter (# People)	101

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	12
Total Property (Capital Stock) Losses ($ Millions)	14
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 21, 2016

Study Region : OwsleyCo
Scenario : OwsleyCoSturgeonCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	198
Number of Census Blocks	448
Number of Buildings	
Residential	2,262
Total	2,324
Number of People in the Region (x 1000)	5
Building Exposure ($ Millions)	
Residential	246
Total	295

Scenario Results

Shelter Requirements

Displaced Population (# Households)	11
Short Term Shelter (# People)	2

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	1
Total Property (Capital Stock) Losses ($ Millions)	1
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 20, 2016

Study Region :	PerryCo
Scenario :	PerryCoLostCrk
Return Period:	100
Analysis Option:	0

Regional Statistics

Area (Square Miles)	343
Number of Census Blocks	1,685
Number of Buildings	
Residential	11,997
Total	13,041
Number of People in the Region (x 1000)	29
Building Exposure ($ Millions)	
Residential	1,618
Total	2,317

Scenario Results

Shelter Requirements

Displaced Population (# Households)	42
Short Term Shelter (# People)	52

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	0
Total Property (Capital Stock) Losses ($ Millions)	0
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 19, 2016

Study Region : PerryCo
Scenario : PerryCoMidFrkKyRiv
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	343
Number of Census Blocks	1,685
Number of Buildings	
Residential	11,997
Total	13,041
Number of People in the Region (x 1000)	29
Building Exposure ($ Millions)	
Residential	1,618
Total	2,317

Scenario Results

Shelter Requirements

Displaced Population (# Households)	76
Short Term Shelter (# People)	114

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	8
Total Property (Capital Stock) Losses ($ Millions)	13
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 20, 2016

Study Region : PerryCo
Scenario : PerryCoNoFrkKyRiver
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	343
Number of Census Blocks	1,685
Number of Buildings	
Residential	11,997
Total	13,041
Number of People in the Region (x 1000)	29
Building Exposure ($ Millions)	
Residential	1,618
Total	2,317

Scenario Results

Shelter Requirements

Displaced Population (# Households)	1,296
Short Term Shelter (# People)	2,183

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	195
Total Property (Capital Stock) Losses ($ Millions)	410
Business Interruptions (Income) Losses ($ Millions)	2

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Quick Assessment Report

July 20, 2016

Study Region :	PerryCo
Scenario :	PerryCoTroublesomeCrk
Return Period:	100
Analysis Option:	0

Regional Statistics

Area (Square Miles)	343
Number of Census Blocks	1,685
Number of Buildings	
Residential	11,997
Total	13,041
Number of People in the Region (x 1000)	29
Building Exposure ($ Millions)	
Residential	1,618
Total	2,317

Scenario Results

Shelter Requirements

Displaced Population (# Households)	139
Short Term Shelter (# People)	180

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	22
Total Property (Capital Stock) Losses ($ Millions)	32
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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Quick Assessment Report

July 21, 2016

Study Region : WolfeCo
Scenario : WolfeCoLoDevilCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	223
Number of Census Blocks	536
Number of Buildings	
Residential	3,480
Total	3,668
Number of People in the Region (x 1000)	7
Building Exposure ($ Millions)	
Residential	377
Total	477

Scenario Results

Shelter Requirements

Displaced Population (# Households)	
Short Term Shelter (# People)	

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	0
Total Property (Capital Stock) Losses ($ Millions)	0
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 21, 2016

Study Region : WolfeCo
Scenario : WolfeCoUpDevilCrk
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	223
Number of Census Blocks	536
Number of Buildings	
Residential	3,480
Total	3,668
Number of People in the Region (x 1000)	7
Building Exposure ($ Millions)	
Residential	377
Total	477

Scenario Results

Shelter Requirements

Displaced Population (# Households)	0
Short Term Shelter (# People)	0

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	0
Total Property (Capital Stock) Losses ($ Millions)	0
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Quick Assessment Report

July 21, 2016

Study Region : WolfeCo
Scenario : WolfeCo
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	223
Number of Census Blocks	536
Number of Buildings	
Residential	3,480
Total	3,668
Number of People in the Region (x 1000)	7
Building Exposure ($ Millions)	
Residential	377
Total	477

Scenario Results

Shelter Requirements

Displaced Population (# Households)	62
Short Term Shelter (# People)	32

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	5
Total Property (Capital Stock) Losses ($ Millions)	5
Business Interruptions (Income) Losses ($ Millions)	0

Disclaimer:

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ATTACHMENT M
HAZUS Full Flood Event Report

Hazus-MH: Flood Event Report

Region Name: BreathittCo

Flood Scenario: BreathittCoMidFrkKyRiver

Print Date: Wednesday, July 20, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 495 square miles and contains 858 census blocks. The region contains over 5 thousand households and has a total population of 13,878 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 6,351 buildings in the region with a total building replacement value (excluding contents) of 911 million dollars (2010 dollars). Approximately 94.63% of the buildings (and 74.80% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 6,351 buildings in the region which have an aggregate total replacement value of 911 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	681,248	74.8%
Commercial	144,347	15.8%
Industrial	12,338	1.4%
Agricultural	744	0.1%
Religion	29,544	3.2%
Government	12,844	1.4%
Education	29,745	3.3%
Total	**910,810**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	102,711	93.8%
Commercial	4,268	3.9%
Industrial	227	0.2%
Agricultural	276	0.3%
Religion	1,977	1.8%
Government	0	0.0%
Education	0	0.0%
Total	**109,459**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 53 beds.
There are 12 schools, 5 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	BreathittCo
Scenario Name:	BreathittCoMidFrkKyRiver
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 56 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 52 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	1	1.79	3	5.36	52	92.86
Total	**0**		**0**		**0**		**1**		**3**		**52**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	28	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	1	3.57	3	10.71	24	85.71

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 53 hospital beds available for use. On the day of the scenario flood event, the model estimates that 53 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	12	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 4,052 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 162 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 132 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 271 people (out of a total population of 13,878) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 19.19 million dollars, which represents 17.53 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 19.18 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 93.84% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	12.25	0.25	0.00	0.12	12.62
	Content	5.75	0.50	0.00	0.30	6.55
	Inventory	0.00	0.02	0.00	0.00	0.02
	Subtotal	**18.00**	**0.77**	**0.00**	**0.41**	**19.18**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.01	0.00	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**
ALL	**Total**	**18.01**	**0.77**	**0.00**	**0.41**	**19.19**

Appendix A: County Listing for the Region

Kentucky

- Breathitt

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Breathitt	13,878	681,248	229,562	910,810
Total	**13,878**	**681,248**	**229,562**	**910,810**
Total Study Region	**13,878**	**681,248**	**229,562**	**910,810**

Hazus-MH: Flood Event Report

Region Name: BreathittCo

Flood Scenario: BreathittCoNoFrkKyRiverUS

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 495 square miles and contains 858 census blocks. The region contains over 5 thousand households and has a total population of 13,878 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 6,351 buildings in the region with a total building replacement value (excluding contents) of 911 million dollars (2010 dollars). Approximately 94.63% of the buildings (and 74.80% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 6,351 buildings in the region which have an aggregate total replacement value of 911 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	681,248	74.8%
Commercial	144,347	15.8%
Industrial	12,338	1.4%
Agricultural	744	0.1%
Religion	29,544	3.2%
Government	12,844	1.4%
Education	29,745	3.3%
Total	**910,810**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	151,100	85.1%
Commercial	13,899	7.8%
Industrial	699	0.4%
Agricultural	92	0.1%
Religion	7,988	4.5%
Government	332	0.2%
Education	3,426	1.9%
Total	**177,536**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 53 beds. There are 12 schools, 5 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	BreathittCo
Scenario Name:	BreathittCoNoFrkKyRiverUS
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 109 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the scenario. There are an estimated 99 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	2	1.83	1	0.92	3	2.75	4	3.67	99	90.83
Total	**0**		**2**		**1**		**3**		**4**		**99**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	41	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	2	3.03	1	1.52	3	4.55	4	6.06	56	84.85

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 53 hospital beds available for use. On the day of the scenario flood event, the model estimates that 53 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	1	0	1
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	12	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 7,475 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 39% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 299 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 291 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 590 people (out of a total population of 13,878) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 40.55 million dollars, which represents 22.84 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 40.51 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 82.87% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	22.88	1.84	0.06	0.67	25.45
	Content	10.71	2.84	0.12	1.33	14.99
	Inventory	0.00	0.06	0.01	0.00	0.06
	Subtotal	**33.59**	**4.74**	**0.18**	**2.00**	**40.51**
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.01
	Relocation	0.02	0.00	0.00	0.00	0.02
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.01	0.02
	Subtotal	**0.02**	**0.02**	**0.00**	**0.01**	**0.05**
ALL	**Total**	**33.61**	**4.76**	**0.18**	**2.01**	**40.55**

Appendix A: County Listing for the Region

Kentucky

- Breathitt

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Breathitt	13,878	681,248	229,562	910,810
Total	**13,878**	**681,248**	**229,562**	**910,810**
Total Study Region	**13,878**	**681,248**	**229,562**	**910,810**

Hazus-MH: Flood Event Report

Region Name: BreathittCo

Flood Scenario: BreathittCoNoFrkKyRiverDS

Print Date: Wednesday, July 20, 2016

Disclaimer:
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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
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There are an estimated 6,351 buildings in the region with a total building replacement value (excluding contents) of 911 million dollars (2010 dollars). Approximately 94.63% of the buildings (and 74.80% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 6,351 buildings in the region which have an aggregate total replacement value of 911 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	681,248	74.8%
Commercial	144,347	15.8%
Industrial	12,338	1.4%
Agricultural	744	0.1%
Religion	29,544	3.2%
Government	12,844	1.4%
Education	29,745	3.3%
Total	**910,810**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	357,057	68.6%
Commercial	110,252	21.2%
Industrial	7,302	1.4%
Agricultural	376	0.1%
Religion	17,643	3.4%
Government	8,857	1.7%
Education	18,732	3.6%
Total	**520,219**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 53 beds. There are 12 schools, 5 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	BreathittCo
Scenario Name:	BreathittCoNoFrkKyRiverDS
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 330 buildings will be at least moderately damaged. This is over 5% of the total number of buildings in the scenario. There are an estimated 289 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	3	0.90	7	2.10	8	2.40	10	3.00	16	4.80	289	86.79
Total	**3**		**7**		**8**		**10**		**16**		**289**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	121	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	1	8.33	11	91.67
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	3	1.50	7	3.50	8	4.00	10	5.00	15	7.50	157	78.50

Before the flood analyzed in this scenario, the region had 53 hospital beds available for use. On the day of the scenario flood event, the model estimates that 53 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	2	0	2
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	12	0	2	2

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 23,671 tons of debris will be generated. Of the total amount, Finishes comprises 19% of the total, Structure comprises 42% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 947 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 592 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,332 people (out of a total population of 13,878) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 160.72 million dollars, which represents 30.89 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 160.06 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 55.50% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	58.56	15.23	1.25	4.74	79.78
	Content	30.53	33.38	2.16	12.97	79.02
	Inventory	0.00	0.85	0.40	0.00	1.26
	Subtotal	**89.09**	**49.46**	**3.81**	**17.71**	**160.06**
Business Interruption						
	Income	0.01	0.09	0.00	0.02	0.12
	Relocation	0.06	0.02	0.00	0.01	0.09
	Rental Income	0.01	0.01	0.00	0.00	0.02
	Wage	0.02	0.16	0.00	0.25	0.43
	Subtotal	**0.11**	**0.27**	**0.00**	**0.28**	**0.66**
ALL	**Total**	**89.20**	**49.73**	**3.81**	**17.99**	**160.72**

Appendix A: County Listing for the Region

Kentucky
- Breathitt

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Breathitt	13,878	681,248	229,562	910,810
Total	**13,878**	**681,248**	**229,562**	**910,810**
Total Study Region	**13,878**	**681,248**	**229,562**	**910,810**

Hazus-MH: Flood Event Report

Region Name: BreathittCo

Flood Scenario: BreathittCoQuicksandCrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 495 square miles and contains 858 census blocks. The region contains over 5 thousand households and has a total population of 13,878 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 6,351 buildings in the region with a total building replacement value (excluding contents) of 911 million dollars (2010 dollars). Approximately 94.63% of the buildings (and 74.80% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 6,351 buildings in the region which have an aggregate total replacement value of 911 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	681,248	74.8%
Commercial	144,347	15.8%
Industrial	12,338	1.4%
Agricultural	744	0.1%
Religion	29,544	3.2%
Government	12,844	1.4%
Education	29,745	3.3%
Total	**910,810**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	95,382	75.8%
Commercial	21,799	17.3%
Industrial	3,709	2.9%
Agricultural	92	0.1%
Religion	3,133	2.5%
Government	890	0.7%
Education	756	0.6%
Total	**125,761**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 53 beds. There are 12 schools, 5 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	BreathittCo
Scenario Name:	BreathittCoQuicksandCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 9 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 9 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	9	100.00
Total	**0**		**0**		**0**		**0**		**0**		**9**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	100.00

Before the flood analyzed in this scenario, the region had 53 hospital beds available for use. On the day of the scenario flood event, the model estimates that 53 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	12	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,800 tons of debris will be generated. Of the total amount, Finishes comprises 19% of the total, Structure comprises 41% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 112 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 82 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 109 people (out of a total population of 13,878) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 13.49 million dollars, which represents 10.72 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 13.47 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 64.47% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5.92	1.00	0.63	0.08	7.63
	Content	2.78	1.56	1.21	0.18	5.73
	Inventory	0.00	0.01	0.10	0.00	0.11
	Subtotal	**8.69**	**2.57**	**1.95**	**0.26**	**13.47**
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.01
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.01	0.01
	Subtotal	**0.00**	**0.02**	**0.00**	**0.01**	**0.02**
ALL	**Total**	**8.70**	**2.58**	**1.95**	**0.26**	**13.49**

Appendix A: County Listing for the Region

Kentucky

- Breathitt

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Breathitt	13,878	681,248	229,562	910,810
Total	**13,878**	**681,248**	**229,562**	**910,810**
Total Study Region	**13,878**	**681,248**	**229,562**	**910,810**

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottBallsFrk

Print Date: Monday, July 25, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	57,573	80.2%
Commercial	7,209	10.0%
Industrial	387	0.5%
Agricultural	0	0.0%
Religion	3,170	4.4%
Government	1,211	1.7%
Education	2,194	3.1%
Total	**71,744**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottBallsFrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 9 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 9 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	9	100.00
Total	**0**		**0**		**0**		**0**		**0**		**9**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	100.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damages

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,447 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 39% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 58 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impacts

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 56 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 53 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 9.76 million dollars, which represents 13.60 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 9.75 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 87.87% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5.81	0.18	0.02	0.11	6.13
	Content	2.76	0.46	0.03	0.37	3.61
	Inventory	0.00	0.01	0.00	0.00	0.01
	Subtotal	**8.57**	**0.65**	**0.05**	**0.48**	**9.75**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.01	0.01
	Subtotal	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**
ALL	**Total**	**8.57**	**0.65**	**0.05**	**0.49**	**9.76**

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottBuckhornCrk

Print Date: Tuesday, July 26, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	12,722	65.9%
Commercial	2,538	13.1%
Industrial	112	0.6%
Agricultural	0	0.0%
Religion	1,175	6.1%
Government	1,211	6.3%
Education	1,555	8.1%
Total	**19,313**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottBuckhornCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

	# Facilities			
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 5 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 4 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 0.81 million dollars, which represents 4.20 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 0.81 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 72.66% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	0.40	0.02	0.00	0.05	0.47
	Content	0.19	0.04	0.00	0.11	0.34
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.59**	**0.06**	**0.00**	**0.16**	**0.81**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**0.59**	**0.06**	**0.00**	**0.16**	**0.81**

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottCoCaneyFrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	74,495	77.9%
Commercial	10,448	10.9%
Industrial	4,035	4.2%
Agricultural	0	0.0%
Religion	1,145	1.2%
Government	451	0.5%
Education	5,099	5.3%
Total	**95,673**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottCoCaneyFrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 1 building will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**1**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 458 tons of debris will be generated. Of the total amount, Finishes comprises 33% of the total, Structure comprises 31% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 18 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 35 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 29 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 5.63 million dollars, which represents 5.89 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 5.63 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 66.09% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	2.48	0.37	0.06	0.05	2.97
	Content	1.24	0.95	0.13	0.30	2.63
	Inventory	0.00	0.02	0.01	0.00	0.03
	Subtotal	**3.72**	**1.34**	**0.21**	**0.35**	**5.63**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**
ALL	**Total**	**3.72**	**1.35**	**0.21**	**0.35**	**5.63**

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottCoCarrCrk

Print Date: Monday, July 25, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	149,874	82.5%
Commercial	15,151	8.3%
Industrial	4,577	2.5%
Agricultural	424	0.2%
Religion	6,273	3.5%
Government	3,630	2.0%
Education	1,772	1.0%
Total	**181,701**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottCoCarrCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 11 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 10 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	1	9.09	10	90.91
Total	**0**		**0**		**0**		**0**		**1**		**10**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	1	11.11	8	88.89

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

	# Facilities			
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,458 tons of debris will be generated. Of the total amount, Finishes comprises 23% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 58 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 80 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 122 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 11.25 million dollars, which represents 6.19 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 11.24 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 75.20% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5.69	0.47	0.04	0.37	6.57
	Content	2.76	0.75	0.06	1.06	4.63
	Inventory	0.00	0.03	0.00	0.00	0.03
	Subtotal	**8.46**	**1.25**	**0.10**	**1.43**	**11.24**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.01	0.01
	Subtotal	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**
ALL	**Total**	**8.46**	**1.25**	**0.10**	**1.44**	**11.25**

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Project Number Report for: 10-1101.00

Perry **County**

Project #	10-1101.00	**Route 1**	097-KY-1166 -000	**Comments:**	
Official Order #		**Route 2**		Replace bridge over Right Fork Maces Creek at intersection with Hunter Ridge Ln, MP 2.137-2.177	
County #	97	**Route 3**			
District	10 **Initials** AGB	**Route 4**			
Date	7/20/2016 **OTT:** 6/30/2016	**Route 5**			

Old Route	BMP	EMP	Length	New Route	BMP	EMP	Length	Redesignated Rt.	BMP	EMP	Length
097-KY-1166 -000	0	2.145	2.145	097-KY-1166 -000	0	2.145	2.145				
no change											
097-KY-1166 -000	2.145	2.194	.049	097-KY-1166 -000	2.145	2.194	.049				
new bridge and approach											
097-KY-1166 -000	2.194	4.3	2.106	097-KY-1166 -000	2.194	4.3	2.106				
existing pvmnt											

505

Project Number Report for: 10-1101.00

Routes 097-KY-1166 -000

Charlie Nowlin

OP	☑	no change
PV	☑	pvmnt upgrade from 2.145 to 2.194
RW	☑	no change
SL	☑	no change
AL	☐	N/A
CA	☑	no change
LN	☑	pvmnt upgrade from 2.145 to 2.194
MD	☑	no change
PASS	☑	no change
RL	☑	updated
SH	☑	review

Gretchen Sanford

EV	☐	no change
FS	☐	no change

Charlie Spalding

PIF	☑	no change

Ron Wilhoit

CH	☐	N/A
FH	☐	N/A
EW	☐	N/A
SS	☐	no change
TR	☐	N/A

Josh Wentz

CF	☐	N/A
CR	☑	no change
CREV	☐	N/A
RA	☐	N/A

Keith Buckhout and Jake Rice

AH	☐	N/A

Shane McKenzie

AP	☐	N/A

Glenna Bottoms

FX	☐	N/A

Bill Bell

DS	☐	N/A

Greg Garner

TW	☑	no change

A. Collins and Chad Shive

PIRI	☑	pvmnt upgrade from 2.145 to 2.194
PM	☑	pvmnt upgrade from 2.145 to 2.194

Jackie Jones

SB	☐	N/A

Eric Gordon

CU	☑	pvmnt upgrade from 2.145 to 2.194
GR	☑	pvmnt upgrade from 2.145 to 2.194

Lynn Soporowski

FB	☐	N/A
BI	☐	N/A
BKPD	☐	N/A
KHFN	☐	N/A
NHFN	☐	N/A
RBRT	☐	N/A

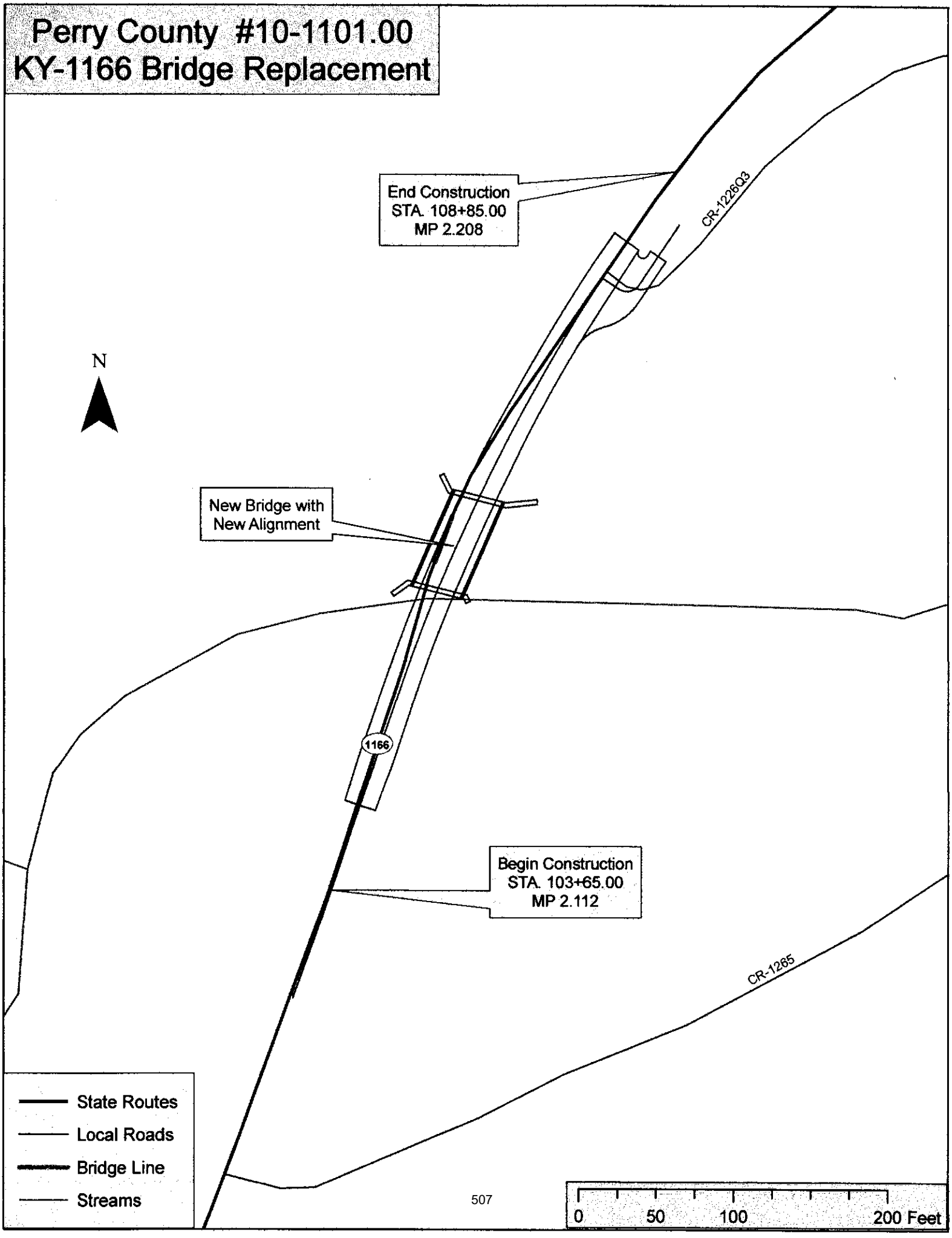
Melissa Brown

TF	☑	no change
TS	☑	no change

Susanne Winter

BRID	☑	bridge replaced 097B00101N
BRML	☑	bridge replaced 097B00101N

506


Perry County #10-1101.00
KY-1166 Bridge Replacement
End Construction
STA. 108+85.00
MP 2.208
CR-1226Q3
N
New Bridge with
New Alignment
1166
Begin Construction
STA. 103+65.00
MP 2.112
CR-1265
State Routes
Local Roads
Bridge Line
Streams
0
50
100
200 Feet

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottQuicksandCrk

Print Date: Tuesday, July 26, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	8,425	59.6%
Commercial	3,141	22.2%
Industrial	408	2.9%
Agricultural	103	0.7%
Religion	848	6.0%
Government	1,211	8.6%
Education	0	0.0%
Total	**14,136**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottQuicksandCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Analysis has not been performed for this Scenario.

Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damages

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 157 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 6 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

Analysis has not been performed for this Scenario.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

Analysis has not been performed for this Scenario.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Analysis has not been performed for this Scenario.						

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottRtFrkBeaverCrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	95,660	87.2%
Commercial	7,946	7.2%
Industrial	3,865	3.5%
Agricultural	307	0.3%
Religion	252	0.2%
Government	245	0.2%
Education	1,373	1.3%
Total	**109,648**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottRtFrkBeaverCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 18 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 18 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	18	100.00
Total	**0**		**0**		**0**		**0**		**0**		**18**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	11	100.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 3,357 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 38% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 134 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 116 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 127 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 18.00 million dollars, which represents 16.41 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 17.99 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 85.24% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	10.40	0.25	0.53	0.04	11.22
	Content	4.94	0.57	1.01	0.16	6.68
	Inventory	0.00	0.01	0.08	0.00	0.09
	Subtotal	**15.34**	**0.83**	**1.62**	**0.20**	**17.99**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**15.34**	**0.84**	**1.62**	**0.20**	**18.00**

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Hazus-MH: Flood Event Report

Region Name: Knott2

Flood Scenario: KnottCoTroublesomeCrk

Print Date: Monday, July 25, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 353 square miles and contains 673 census blocks. The region contains over 6 thousand households and has a total population of 16,346 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 7,705 buildings in the region with a total building replacement value (excluding contents) of 1,170 million dollars (2010 dollars). Approximately 94.82% of the buildings (and 82.26% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 7,705 buildings in the region which have an aggregate total replacement value of 1,170 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	962,775	82.3%
Commercial	116,685	10.0%
Industrial	27,639	2.4%
Agricultural	2,528	0.2%
Religion	19,621	1.7%
Government	10,523	0.9%
Education	30,605	2.6%
Total	**1,170,376**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	194,565	76.7%
Commercial	40,883	16.1%
Industrial	5,950	2.3%
Agricultural	897	0.4%
Religion	4,102	1.6%
Government	3,041	1.2%
Education	4,134	1.6%
Total	**253,572**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Knott2
Scenario Name:	KnottCoTroublesomeCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 35 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the scenario. There are an estimated 33 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	1	2.86	1	2.86	0	0.00	33	94.29
Total	**0**		**0**		**1**		**1**		**0**		**33**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	14	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	1	5.00	1	5.00	0	0.00	18	90.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 4,680 tons of debris will be generated. Of the total amount, Finishes comprises 18% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 187 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 148 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 238 people (out of a total population of 16,346) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 32.93 million dollars, which represents 12.99 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 32.80 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 63.06% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	13.71	2.82	0.25	0.46	17.23
	Content	7.05	6.39	0.45	1.35	15.24
	Inventory	0.00	0.24	0.07	0.02	0.33
	Subtotal	**20.76**	**9.45**	**0.77**	**1.83**	**32.80**
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.01
	Relocation	0.01	0.00	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.10	0.11
	Subtotal	**0.01**	**0.02**	**0.00**	**0.10**	**0.13**
ALL	**Total**	**20.77**	**9.47**	**0.77**	**1.93**	**32.93**

Appendix A: County Listing for the Region

Kentucky
- Knott

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Knott	16,346	962,775	207,601	1,170,376
Total	**16,346**	**962,775**	**207,601**	**1,170,376**
Total Study Region	**16,346**	**962,775**	**207,601**	**1,170,376**

Hazus-MH: Flood Event Report

Region Name: LeeCo2

Flood Scenario: LeeCoKentuckyRiv

Print Date: Tuesday, July 26, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 211 square miles and contains 604 census blocks. The region contains over 3 thousand households and has a total population of 7,887 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 3,450 buildings in the region with a total building replacement value (excluding contents) of 517 million dollars (2010 dollars). Approximately 93.59% of the buildings (and 77.98% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 3,450 buildings in the region which have an aggregate total replacement value of 517 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	402,952	78.0%
Commercial	65,998	12.8%
Industrial	12,586	2.4%
Agricultural	1,613	0.3%
Religion	19,891	3.8%
Government	2,674	0.5%
Education	11,033	2.1%
Total	**516,747**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	210,005	78.2%
Commercial	42,247	15.7%
Industrial	5,490	2.0%
Agricultural	937	0.3%
Religion	7,016	2.6%
Government	1,537	0.6%
Education	1,458	0.5%
Total	**268,690**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 4 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	LeeCo2
Scenario Name:	LeeCoKentuckyRiv
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 58 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 54 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	2	3.45	2	3.45	54	93.10
Total	**0**		**0**		**0**		**2**		**2**		**54**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	13	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	2	4.55	2	4.55	40	90.91

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	4	0	0	0
Hospitals	0	0	0	0
Police Stations	2	0	0	0
Schools	5	0	1	1

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 5,705 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 228 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 161 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 256 people (out of a total population of 7,887) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 58.20 million dollars, which represents 21.66 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 57.94 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 54.64% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	19.98	7.08	1.21	0.50	28.77
	Content	11.71	13.61	2.41	0.99	28.72
	Inventory	0.00	0.24	0.19	0.02	0.45
	Subtotal	**31.69**	**20.93**	**3.80**	**1.51**	**57.94**
Business Interruption						
	Income	0.03	0.05	0.00	0.00	0.07
	Relocation	0.01	0.01	0.00	0.00	0.02
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.06	0.08	0.00	0.02	0.16
	Subtotal	**0.11**	**0.13**	**0.00**	**0.02**	**0.26**
ALL	**Total**	**31.80**	**21.07**	**3.80**	**1.53**	**58.20**

Appendix A: County Listing for the Region

Kentucky
- Lee

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Lee	7,887	402,952	113,795	516,747
Total	**7,887**	**402,952**	**113,795**	**516,747**
Total Study Region	**7,887**	**402,952**	**113,795**	**516,747**

Hazus-MH: Flood Event Report

Region Name: LeeCo2

Flood Scenario: LeeCoMillersCrk

Print Date: Tuesday, July 26, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 211 square miles and contains 604 census blocks. The region contains over 3 thousand households and has a total population of 7,887 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 3,450 buildings in the region with a total building replacement value (excluding contents) of 517 million dollars (2010 dollars). Approximately 93.59% of the buildings (and 77.98% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 3,450 buildings in the region which have an aggregate total replacement value of 517 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	402,952	78.0%
Commercial	65,998	12.8%
Industrial	12,586	2.4%
Agricultural	1,613	0.3%
Religion	19,891	3.8%
Government	2,674	0.5%
Education	11,033	2.1%
Total	**516,747**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	16,260	77.8%
Commercial	2,285	10.9%
Industrial	1,564	7.5%
Agricultural	0	0.0%
Religion	769	3.7%
Government	35	0.2%
Education	0	0.0%
Total	**20,913**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 4 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	LeeCo2
Scenario Name:	LeeCoMillersCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	4	0	0	0
Hospitals	0	0	0	0
Police Stations	2	0	0	0
Schools	5	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 251 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 42% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 10 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 7 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1 people (out of a total population of 7,887) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 1.74 million dollars, which represents 8.32 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 1.74 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 66.32% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	0.78	0.16	0.01	0.00	0.95
	Content	0.37	0.38	0.01	0.01	0.77
	Inventory	0.00	0.02	0.00	0.00	0.02
	Subtotal	**1.15**	**0.56**	**0.02**	**0.01**	**1.74**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**1.15**	**0.56**	**0.02**	**0.01**	**1.74**

Appendix A: County Listing for the Region

Kentucky
- Lee

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Lee	7,887	402,952	113,795	516,747
Total	**7,887**	**402,952**	**113,795**	**516,747**
Total Study Region	**7,887**	**402,952**	**113,795**	**516,747**

Hazus-MH: Flood Event Report

Region Name: LeslieCo

Flood Scenario: LeslieCoBigCreek

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 404 square miles and contains 1,058 census blocks. The region contains over 5 thousand households and has a total population of 11,310 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 5,492 buildings in the region with a total building replacement value (excluding contents) of 830 million dollars (2010 dollars). Approximately 94.12% of the buildings (and 78.12% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 5,492 buildings in the region which have an aggregate total replacement value of 830 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	648,180	78.1%
Commercial	119,648	14.4%
Industrial	17,530	2.1%
Agricultural	3,352	0.4%
Religion	17,262	2.1%
Government	8,284	1.0%
Education	15,517	1.9%
Total	**829,773**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	22,849	84.2%
Commercial	1,879	6.9%
Industrial	0	0.0%
Agricultural	0	0.0%
Religion	1,031	3.8%
Government	98	0.4%
Education	1,293	4.8%
Total	**27,150**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 40 beds.
There are 7 schools, 6 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	LeslieCo
Scenario Name:	LeslieCoBigCreek
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 40 hospital beds available for use. On the day of the scenario flood event, the model estimates that 40 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	6	0	0	0
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	7	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 14 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3 people (out of a total population of 11,310) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 2.28 million dollars, which represents 8.41 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2.28 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 93.52% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1.45	0.02	0.00	0.01	1.48
	Content	0.69	0.05	0.00	0.06	0.81
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**2.14**	**0.07**	**0.00**	**0.08**	**2.28**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**2.14**	**0.07**	**0.00**	**0.08**	**2.28**

Appendix A: County Listing for the Region

Kentucky
- Leslie

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Leslie	11,310	648,180	181,593	829,773
Total	**11,310**	**648,180**	**181,593**	**829,773**
Total Study Region	**11,310**	**648,180**	**181,593**	**829,773**

Hazus-MH: Flood Event Report

Region Name: LeslieCo

Flood Scenario: LeslieCoMidFrkKyRiver

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 404 square miles and contains 1,058 census blocks. The region contains over 5 thousand households and has a total population of 11,310 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 5,492 buildings in the region with a total building replacement value (excluding contents) of 830 million dollars (2010 dollars). Approximately 94.12% of the buildings (and 78.12% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 5,492 buildings in the region which have an aggregate total replacement value of 830 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	648,180	78.1%
Commercial	119,648	14.4%
Industrial	17,530	2.1%
Agricultural	3,352	0.4%
Religion	17,262	2.1%
Government	8,284	1.0%
Education	15,517	1.9%
Total	**829,773**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	445,790	77.3%
Commercial	87,540	15.2%
Industrial	11,023	1.9%
Agricultural	2,709	0.5%
Religion	10,634	1.8%
Government	5,047	0.9%
Education	14,069	2.4%
Total	**576,812**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 40 beds.
There are 7 schools, 6 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	LeslieCo
Scenario Name:	LeslieCoMidFrkKyRiver
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 143 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 142 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	100.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	1	0.74	134	99.26
Total	**0**		**0**		**0**		**0**		**1**		**142**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	32	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	100.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	1	0.99	100	99.01

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 40 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	6	1	1	2
Hospitals	1	0	1	1
Police Stations	2	0	2	2
Schools	7	1	4	5

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 20,029 tons of debris will be generated. Of the total amount, Finishes comprises 16% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 801 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 451 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 531 people (out of a total population of 11,310) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 145.90 million dollars, which represents 25.29 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 145.48 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 57.33% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	56.00	15.90	1.10	7.58	80.57
	Content	27.62	23.29	1.99	11.01	63.91
	Inventory	0.00	0.65	0.24	0.10	0.99
	Subtotal	**83.61**	**39.84**	**3.33**	**18.69**	**145.48**
Business Interruption						
	Income	0.00	0.06	0.00	0.02	0.08
	Relocation	0.01	0.01	0.00	0.01	0.03
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.07	0.00	0.23	0.30
	Subtotal	**0.02**	**0.14**	**0.00**	**0.26**	**0.42**
ALL	**Total**	**83.64**	**39.98**	**3.33**	**18.95**	**145.90**

Appendix A: County Listing for the Region

Kentucky
- Leslie

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Leslie	11,310	648,180	181,593	829,773
Total	**11,310**	**648,180**	**181,593**	**829,773**
Total Study Region	**11,310**	**648,180**	**181,593**	**829,773**

Hazus-MH: Flood Event Report

Region Name: LetcherCo

Flood Scenario: LetcherCoElkhornCrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 339 square miles and contains 1,430 census blocks. The region contains over 10 thousand households and has a total population of 24,519 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 11,978 buildings in the region with a total building replacement value (excluding contents) of 1,981 million dollars (2010 dollars). Approximately 93.29% of the buildings (and 77.37% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 11,978 buildings in the region which have an aggregate total replacement value of 1,981 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,532,883	77.4%
Commercial	276,339	13.9%
Industrial	60,916	3.1%
Agricultural	4,264	0.2%
Religion	53,988	2.7%
Government	18,313	0.9%
Education	34,611	1.7%
Total	**1,981,314**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	77,538	77.7%
Commercial	7,575	7.6%
Industrial	4,712	4.7%
Agricultural	0	0.0%
Religion	4,099	4.1%
Government	494	0.5%
Education	5,385	5.4%
Total	**99,803**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 127 beds. There are 12 schools, 7 fire stations, 4 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	LetcherCo
Scenario Name:	LetcherCoElkhornCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 13 buildings will be at least moderately damaged. This is over 8% of the total number of buildings in the scenario. There are an estimated 12 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	1	7.69	0	0.00	0	0.00	12	92.31
Total	**0**		**0**		**1**		**0**		**0**		**12**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	1	16.67	0	0.00	0	0.00	5	83.33

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 127 hospital beds available for use. On the day of the scenario flood event, the model estimates that 127 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	7	0	0	0
Hospitals	2	0	0	0
Police Stations	4	0	0	0
Schools	12	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,745 tons of debris will be generated. Of the total amount, Finishes comprises 24% of the total, Structure comprises 36% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 70 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 65 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 96 people (out of a total population of 24,519) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 9.29 million dollars, which represents 9.30 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 9.28 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 66.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	4.15	0.37	0.25	0.25	5.02
	Content	2.02	0.59	0.59	0.95	4.16
	Inventory	0.00	0.02	0.08	0.00	0.10
	Subtotal	**6.17**	**0.99**	**0.92**	**1.20**	**9.28**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**
ALL	**Total**	**6.17**	**0.99**	**0.92**	**1.20**	**9.29**

Appendix A: County Listing for the Region

Kentucky
- Letcher

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Letcher	24,519	1,532,883	448,431	1,981,314
Total	**24,519**	**1,532,883**	**448,431**	**1,981,314**
Total Study Region	**24,519**	**1,532,883**	**448,431**	**1,981,314**

Hazus-MH: Flood Event Report

Region Name: LetcherCo

Flood Scenario: LetcherCo

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 339 square miles and contains 1,430 census blocks. The region contains over 10 thousand households and has a total population of 24,519 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 11,978 buildings in the region with a total building replacement value (excluding contents) of 1,981 million dollars (2010 dollars). Approximately 93.29% of the buildings (and 77.37% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 11,978 buildings in the region which have an aggregate total replacement value of 1,981 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,532,883	77.4%
Commercial	276,339	13.9%
Industrial	60,916	3.1%
Agricultural	4,264	0.2%
Religion	53,988	2.7%
Government	18,313	0.9%
Education	34,611	1.7%
Total	**1,981,314**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	709,004	74.4%
Commercial	159,595	16.7%
Industrial	19,691	2.1%
Agricultural	1,202	0.1%
Religion	28,138	3.0%
Government	14,281	1.5%
Education	21,133	2.2%
Total	**953,044**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 127 beds. There are 12 schools, 7 fire stations, 4 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	LetcherCo
Scenario Name:	LetcherCo
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 242 buildings will be at least moderately damaged. This is over 14% of the total number of buildings in the scenario. There are an estimated 182 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	2	33.33	2	33.33	2	33.33	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	1	0.42	12	5.08	18	7.63	17	7.20	7	2.97	181	76.69
Total	**1**		**14**		**20**		**19**		**7**		**182**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	1	1.23	80	98.77
Masonry	0	0.00	1	33.33	1	33.33	1	33.33	0	0.00	0	0.00
Steel	0	0.00	1	33.33	0	0.00	1	33.33	0	0.00	1	33.33
Wood	1	0.64	13	8.33	17	10.90	18	11.54	6	3.85	101	64.74

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 127 hospital beds available for use. On the day of the scenario flood event, the model estimates that 127 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	7	2	0	3
Hospitals	2	0	0	0
Police Stations	4	0	0	0
Schools	12	1	2	3

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 39,234 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 41% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,569 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 761 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,002 people (out of a total population of 24,519) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 213.65 million dollars, which represents 22.42 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 212.43 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 52.76% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	74.08	19.40	1.08	6.52	101.08
	Content	38.56	50.42	1.96	19.22	110.16
	Inventory	0.00	0.86	0.27	0.06	1.20
	Subtotal	**112.64**	**70.68**	**3.31**	**25.81**	**212.43**
Business Interruption						
	Income	0.01	0.19	0.00	0.03	0.23
	Relocation	0.04	0.04	0.00	0.02	0.10
	Rental Income	0.01	0.02	0.00	0.00	0.03
	Wage	0.02	0.33	0.00	0.51	0.86
	Subtotal	**0.09**	**0.58**	**0.00**	**0.56**	**1.22**
ALL	**Total**	**112.73**	**71.25**	**3.31**	**26.36**	**213.65**

Appendix A: County Listing for the Region

Kentucky

- Letcher

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Letcher	24,519	1,532,883	448,431	1,981,314
Total	**24,519**	**1,532,883**	**448,431**	**1,981,314**
Total Study Region	**24,519**	**1,532,883**	**448,431**	**1,981,314**

Hazus-MH: Flood Event Report

Region Name: OwsleyCo

Flood Scenario: OwsleyCoSoFrkKyRiver

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 198 square miles and contains 448 census blocks. The region contains over 2 thousand households and has a total population of 4,755 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 2,324 buildings in the region with a total building replacement value (excluding contents) of 295 million dollars (2010 dollars). Approximately 97.33% of the buildings (and 83.58% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 2,324 buildings in the region which have an aggregate total replacement value of 295 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	246,459	83.6%
Commercial	28,773	9.8%
Industrial	3,179	1.1%
Agricultural	1,111	0.4%
Religion	6,089	2.1%
Government	2,452	0.8%
Education	6,826	2.3%
Total	**294,889**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	151,673	76.7%
Commercial	27,211	13.8%
Industrial	3,179	1.6%
Agricultural	834	0.4%
Religion	5,755	2.9%
Government	2,360	1.2%
Education	6,826	3.5%
Total	**197,838**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 3 schools, 2 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	OwsleyCo
Scenario Name:	OwsleyCoSoFrkKyRiver
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 8 buildings will be at least moderately damaged. This is over 25% of the total number of buildings in the scenario. There are an estimated 5 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	1	12.50	1	12.50	1	12.50	0	0.00	5	62.50
Total	**0**		**1**		**1**		**1**		**0**		**5**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	1	16.67	1	16.67	1	16.67	0	0.00	3	50.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

	# Facilities			
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	2	0	0	0
Schools	3	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,518 tons of debris will be generated. Of the total amount, Finishes comprises 25% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 101 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 97 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 101 people (out of a total population of 4,755) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 14.13 million dollars, which represents 7.14 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 14.12 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 84.80% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	8.11	0.60	0.09	0.05	8.85
	Content	3.87	1.08	0.13	0.16	5.24
	Inventory	0.00	0.02	0.01	0.00	0.04
	Subtotal	**11.98**	**1.70**	**0.24**	**0.21**	**14.12**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**
ALL	**Total**	**11.98**	**1.71**	**0.24**	**0.21**	**14.13**

Appendix A: County Listing for the Region

Kentucky
- Owsley

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Owsley	4,755	246,459	48,430	294,889
Total	**4,755**	**246,459**	**48,430**	**294,889**
Total Study Region	**4,755**	**246,459**	**48,430**	**294,889**

Hazus-MH: Flood Event Report

Region Name: OwsleyCo

Flood Scenario: OwsleyCoSturgeonCrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 198 square miles and contains 448 census blocks. The region contains over 2 thousand households and has a total population of 4,755 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 2,324 buildings in the region with a total building replacement value (excluding contents) of 295 million dollars (2010 dollars). Approximately 97.33% of the buildings (and 83.58% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 2,324 buildings in the region which have an aggregate total replacement value of 295 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	246,459	83.6%
Commercial	28,773	9.8%
Industrial	3,179	1.1%
Agricultural	1,111	0.4%
Religion	6,089	2.1%
Government	2,452	0.8%
Education	6,826	2.3%
Total	**294,889**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	9,532	100.0%
Commercial	0	0.0%
Industrial	0	0.0%
Agricultural	0	0.0%
Religion	0	0.0%
Government	0	0.0%
Education	0	0.0%
Total	**9,532**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 3 schools, 2 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	OwsleyCo
Scenario Name:	OwsleyCoSturgeonCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

	# Facilities			
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	2	0	0	0
Schools	3	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 180 tons of debris will be generated. Of the total amount, Finishes comprises 26% of the total, Structure comprises 34% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 7 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 2 people (out of a total population of 4,755) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 1.02 million dollars, which represents 10.71 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 1.02 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 100.00% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	0.69	0.00	0.00	0.00	0.69
	Content	0.33	0.00	0.00	0.00	0.33
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**1.02**	**0.00**	**0.00**	**0.00**	**1.02**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**1.02**	**0.00**	**0.00**	**0.00**	**1.02**

Appendix A: County Listing for the Region

Kentucky
- Owsley

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Owsley	4,755	246,459	48,430	294,889
Total	**4,755**	**246,459**	**48,430**	**294,889**
Total Study Region	**4,755**	**246,459**	**48,430**	**294,889**

Hazus-MH: Flood Event Report

Region Name: PerryCo

Flood Scenario: PerryCoLostCrk

Print Date: Wednesday, July 20, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 343 square miles and contains 1,685 census blocks. The region contains over 11 thousand households and has a total population of 28,712 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,041 buildings in the region with a total building replacement value (excluding contents) of 2,317 million dollars (2010 dollars). Approximately 91.99% of the buildings (and 69.83% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 13,041 buildings in the region which have an aggregate total replacement value of 2,317 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,618,231	69.8%
Commercial	467,599	20.2%
Industrial	79,565	3.4%
Agricultural	5,716	0.2%
Religion	63,940	2.8%
Government	23,797	1.0%
Education	58,490	2.5%
Total	**2,317,338**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	49,969	65.3%
Commercial	10,023	13.1%
Industrial	7,708	10.1%
Agricultural	91	0.1%
Religion	507	0.7%
Government	1,819	2.4%
Education	6,394	8.4%
Total	**76,511**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 308 beds. There are 19 schools, 9 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	PerryCo
Scenario Name:	PerryCoLostCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Analysis has not been performed for this Scenario.

Table 3: Expected Building Damage by Occupancy

Occupancy	1-10 Count	(%)	11-20 Count	(%)	21-30 Count	(%)	31-40 Count	(%)	41-50 Count	(%)	Substantially Count	(%)

Analysis has not been performed for this Scenario.

Table 4: Expected Building Damage by Building Type

Building Type	1-10 Count	(%)	11-20 Count	(%)	21-30 Count	(%)	31-40 Count	(%)	41-50 Count	(%)	Substantially Count	(%)

Analysis has not been performed for this Scenario.

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 308 hospital beds available for use. On the day of the scenario flood event, the model estimates that 308 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	9	0	1	1
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	19	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 42 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 52 people (out of a total population of 28,712) will seek temporary shelter in public shelters.

Economic Loss

Analysis has not been performed for this Scenario.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

0.00

Analysis has not been performed for this Scenario.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total

Analysis has not been performed for this Scenario.

Appendix A: County Listing for the Region

Kentucky

- Perry

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Perry	28,712	1,618,231	699,107	2,317,338
Total	**28,712**	**1,618,231**	**699,107**	**2,317,338**
Total Study Region	**28,712**	**1,618,231**	**699,107**	**2,317,338**

Hazus-MH: Flood Event Report

Region Name: PerryCo

Flood Scenario: PerryCoMidFrkKyRiv

Print Date: Tuesday, July 19, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 343 square miles and contains 1,685 census blocks. The region contains over 11 thousand households and has a total population of 28,712 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,041 buildings in the region with a total building replacement value (excluding contents) of 2,317 million dollars (2010 dollars). Approximately 91.99% of the buildings (and 69.83% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 13,041 buildings in the region which have an aggregate total replacement value of 2,317 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,618,231	69.8%
Commercial	467,599	20.2%
Industrial	79,565	3.4%
Agricultural	5,716	0.2%
Religion	63,940	2.8%
Government	23,797	1.0%
Education	58,490	2.5%
Total	**2,317,338**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	26,717	66.5%
Commercial	7,788	19.4%
Industrial	564	1.4%
Agricultural	0	0.0%
Religion	1,781	4.4%
Government	487	1.2%
Education	2,849	7.1%
Total	**40,186**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 308 beds. There are 19 schools, 9 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	PerryCo
Scenario Name:	PerryCoMidFrkKyRiv
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 16 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 16 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	16	100.00
Total	**0**		**0**		**0**		**0**		**0**		**16**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	11	100.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 308 hospital beds available for use. On the day of the scenario flood event, the model estimates that 308 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	9	0	0	0
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	19	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,555 tons of debris will be generated. Of the total amount, Finishes comprises 19% of the total, Structure comprises 42% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 62 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 76 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 114 people (out of a total population of 28,712) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 13.51 million dollars, which represents 33.62 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 13.47 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 56.97% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5.25	0.71	0.08	1.17	7.21
	Content	2.44	1.89	0.15	1.74	6.22
	Inventory	0.00	0.03	0.01	0.00	0.04
	Subtotal	**7.70**	**2.63**	**0.24**	**2.91**	**13.47**
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.01
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.02	0.03
	Subtotal	**0.00**	**0.02**	**0.00**	**0.02**	**0.04**
ALL	**Total**	**7.70**	**2.65**	**0.24**	**2.93**	**13.51**

Appendix A: County Listing for the Region

Kentucky
- Perry

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Perry	28,712	1,618,231	699,107	2,317,338
Total	**28,712**	**1,618,231**	**699,107**	**2,317,338**
Total Study Region	**28,712**	**1,618,231**	**699,107**	**2,317,338**

Hazus-MH: Flood Event Report

Region Name: PerryCo

Flood Scenario: PerryCoNoFrkKyRiver

Print Date: Wednesday, July 20, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 343 square miles and contains 1,685 census blocks. The region contains over 11 thousand households and has a total population of 28,712 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,041 buildings in the region with a total building replacement value (excluding contents) of 2,317 million dollars (2010 dollars). Approximately 91.99% of the buildings (and 69.83% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 13,041 buildings in the region which have an aggregate total replacement value of 2,317 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,618,231	69.8%
Commercial	467,599	20.2%
Industrial	79,565	3.4%
Agricultural	5,716	0.2%
Religion	63,940	2.8%
Government	23,797	1.0%
Education	58,490	2.5%
Total	**2,317,338**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	959,951	70.6%
Commercial	261,131	19.2%
Industrial	44,813	3.3%
Agricultural	4,158	0.3%
Religion	41,922	3.1%
Government	15,071	1.1%
Education	33,429	2.5%
Total	**1,360,475**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 308 beds. There are 19 schools, 9 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	PerryCo
Scenario Name:	PerryCoNoFrkKyRiver
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 468 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the scenario. There are an estimated 437 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	1	20.00	1	20.00	0	0.00	0	0.00	3	60.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Residential	1	0.22	4	0.87	5	1.08	3	0.65	16	3.46	433	93.72
Total	**1**		**6**		**6**		**3**		**16**		**437**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	169	100.00
Masonry	0	0.00	1	11.11	0	0.00	0	0.00	0	0.00	8	88.89
Steel	0	0.00	1	50.00	0	0.00	0	0.00	0	0.00	1	50.00
Wood	1	0.35	4	1.39	5	1.74	3	1.05	16	5.57	258	89.90

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 308 hospital beds available for use. On the day of the scenario flood event, the model estimates that 308 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	9	1	1	2
Hospitals	1	0	0	0
Police Stations	2	1	1	2
Schools	19	0	3	3

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 46,597 tons of debris will be generated. Of the total amount, Finishes comprises 16% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,864 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,296 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 2,183 people (out of a total population of 28,712) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 411.97 million dollars, which represents 30.28 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 410.01 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 47.40% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	131.97	56.98	4.38	16.95	210.27
	Content	63.19	93.37	7.27	32.32	196.15
	Inventory	0.00	2.43	0.99	0.18	3.60
	Subtotal	**195.16**	**152.78**	**12.63**	**49.44**	**410.01**
Business Interruption						
	Income	0.01	0.34	0.00	0.07	0.41
	Relocation	0.08	0.06	0.00	0.03	0.17
	Rental Income	0.01	0.03	0.00	0.00	0.04
	Wage	0.02	0.44	0.00	0.88	1.34
	Subtotal	**0.11**	**0.88**	**0.00**	**0.97**	**1.96**
ALL	**Total**	**195.27**	**153.66**	**12.63**	**50.41**	**411.97**

Appendix A: County Listing for the Region

- Kentucky
  - Perry

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Kentucky				
Perry	28,712	1,618,231	699,107	2,317,338
Total	**28,712**	**1,618,231**	**699,107**	**2,317,338**
Total Study Region	**28,712**	**1,618,231**	**699,107**	**2,317,338**

Hazus-MH: Flood Event Report

Region Name: PerryCo

Flood Scenario: PerryCoTroublesomeCrk

Print Date: Wednesday, July 20, 2016

Disclaimer:
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Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 343 square miles and contains 1,685 census blocks. The region contains over 11 thousand households and has a total population of 28,712 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,041 buildings in the region with a total building replacement value (excluding contents) of 2,317 million dollars (2010 dollars). Approximately 91.99% of the buildings (and 69.83% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 13,041 buildings in the region which have an aggregate total replacement value of 2,317 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,618,231	69.8%
Commercial	467,599	20.2%
Industrial	79,565	3.4%
Agricultural	5,716	0.2%
Religion	63,940	2.8%
Government	23,797	1.0%
Education	58,490	2.5%
Total	**2,317,338**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	92,289	73.7%
Commercial	12,124	9.7%
Industrial	7,260	5.8%
Agricultural	0	0.0%
Religion	3,261	2.6%
Government	2,113	1.7%
Education	8,229	6.6%
Total	**125,276**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 308 beds. There are 19 schools, 9 fire stations, 2 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	PerryCo
Scenario Name:	PerryCoTroublesomeCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 50 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 50 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	49	100.00
Total	**0**		**0**		**0**		**0**		**0**		**50**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	30	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 308 hospital beds available for use. On the day of the scenario flood event, the model estimates that 308 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	9	0	0	0
Hospitals	1	0	0	0
Police Stations	2	0	0	0
Schools	19	2	0	2

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,858 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 38% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 74 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 139 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 180 people (out of a total population of 28,712) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 32.17 million dollars, which represents 25.68 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 32.10 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 69.50% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	15.34	1.33	0.03	2.08	18.78
	Content	7.01	2.31	0.05	3.87	13.24
	Inventory	0.00	0.08	0.00	0.00	0.08
	Subtotal	**22.35**	**3.72**	**0.08**	**5.95**	**32.10**
Business Interruption						
	Income	0.00	0.00	0.00	0.01	0.02
	Relocation	0.01	0.00	0.00	0.01	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.04	0.04
	Subtotal	**0.01**	**0.01**	**0.00**	**0.05**	**0.07**
ALL	**Total**	**22.36**	**3.73**	**0.08**	**6.00**	**32.17**

Appendix A: County Listing for the Region

Kentucky
- Perry

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Perry	28,712	1,618,231	699,107	2,317,338
Total	**28,712**	**1,618,231**	**699,107**	**2,317,338**
Total Study Region	**28,712**	**1,618,231**	**699,107**	**2,317,338**

Hazus-MH: Flood Event Report

Region Name: WolfeCo

Flood Scenario: WolfeCoLoDevilCrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 223 square miles and contains 536 census blocks. The region contains over 3 thousand households and has a total population of 7,355 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 3,668 buildings in the region with a total building replacement value (excluding contents) of 477 million dollars (2010 dollars). Approximately 94.87% of the buildings (and 78.99% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 3,668 buildings in the region which have an aggregate total replacement value of 477 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	376,934	79.0%
Commercial	51,581	10.8%
Industrial	11,893	2.5%
Agricultural	3,254	0.7%
Religion	11,660	2.4%
Government	5,278	1.1%
Education	16,611	3.5%
Total	**477,211**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential		
Commercial		
Industrial		
Agricultural		
Religion		
Government		
Education		
Total		

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	WolfeCo
Scenario Name:	WolfeCoLoDevilCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Analysis has not been performed for this Scenario.

Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Analysis has not been performed for this Scenario.

Analysis has not been performed for this Scenario.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

Analysis has not been performed for this Scenario.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Analysis has not been performed for this Scenario.						

Appendix A: County Listing for the Region

Kentucky
- Wolfe

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Wolfe	7,355	376,934	100,277	477,211
Total	**7,355**	**376,934**	**100,277**	**477,211**
Total Study Region	**7,355**	**376,934**	**100,277**	**477,211**

Hazus-MH: Flood Event Report

Region Name: WolfeCo

Flood Scenario: WolfeCoUpDevilCrk

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 223 square miles and contains 536 census blocks. The region contains over 3 thousand households and has a total population of 7,355 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 3,668 buildings in the region with a total building replacement value (excluding contents) of 477 million dollars (2010 dollars). Approximately 94.87% of the buildings (and 78.99% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 3,668 buildings in the region which have an aggregate total replacement value of 477 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
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Agricultural	3,254	0.7%
Religion	11,660	2.4%
Government	5,278	1.1%
Education	16,611	3.5%
Total	**477,211**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	0	0.0%
Commercial	33	52.4%
Industrial	0	0.0%
Agricultural	30	47.6%
Religion	0	0.0%
Government	0	0.0%
Education	0	0.0%
Total	**63**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	WolfeCo
Scenario Name:	WolfeCoUpDevilCrk
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Analysis has not been performed for this Scenario.

Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 0 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 0 people (out of a total population of 7,355) will seek temporary shelter in public shelters.

Analysis has not been performed for this Scenario.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

Analysis has not been performed for this Scenario.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Analysis has not been performed for this Scenario.						

Appendix A: County Listing for the Region

Kentucky

- Wolfe

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Wolfe	7,355	376,934	100,277	477,211
Total	**7,355**	**376,934**	**100,277**	**477,211**
Total Study Region	**7,355**	**376,934**	**100,277**	**477,211**

Hazus-MH: Flood Event Report

Region Name: WolfeCo

Flood Scenario: WolfeCo

Print Date: Thursday, July 21, 2016

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard 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 multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Kentucky

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 223 square miles and contains 536 census blocks. The region contains over 3 thousand households and has a total population of 7,355 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 3,668 buildings in the region with a total building replacement value (excluding contents) of 477 million dollars (2010 dollars). Approximately 94.87% of the buildings (and 78.99% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 3,668 buildings in the region which have an aggregate total replacement value of 477 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	376,934	79.0%
Commercial	51,581	10.8%
Industrial	11,893	2.5%
Agricultural	3,254	0.7%
Religion	11,660	2.4%
Government	5,278	1.1%
Education	16,611	3.5%
Total	**477,211**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	90,729	92.5%
Commercial	5,344	5.4%
Industrial	610	0.6%
Agricultural	317	0.3%
Religion	880	0.9%
Government	196	0.2%
Education	0	0.0%
Total	**98,076**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	WolfeCo
Scenario Name:	WolfeCo
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 10 buildings will be at least moderately damaged. This is over 10% of the total number of buildings in the scenario. There are an estimated 8 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes 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

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	1	10.00	0	0.00	0	0.00	1	10.00	8	80.00
Total	**0**		**1**		**0**		**0**		**1**		**8**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	8	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	1	50.00	0	0.00	0	0.00	1	50.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	1	0	1

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,745 tons of debris will be generated. Of the total amount, Finishes comprises 28% of the total, Structure comprises 30% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 70 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 62 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 32 people (out of a total population of 7,355) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 4.83 million dollars, which represents 4.92 % of the total replacement value of the scenario buildings.

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 4.83 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 95.84% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	3.15	0.07	0.00	0.00	3.22
	Content	1.48	0.10	0.01	0.02	1.61
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**4.63**	**0.16**	**0.01**	**0.03**	**4.83**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**4.63**	**0.16**	**0.01**	**0.03**	**4.83**

Appendix A: County Listing for the Region

Kentucky
- Wolfe

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Kentucky				
Wolfe	7,355	376,934	100,277	477,211
Total	**7,355**	**376,934**	**100,277**	**477,211**
Total Study Region	**7,355**	**376,934**	**100,277**	**477,211**