

# Northern Kentucky 2017 Regional Natural Hazard Mitigation Plan

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## PLAN INTRODUCTION

### Purpose of the Mitigation Plan

The Northern Kentucky Regional Natural Hazard Mitigation Plan has been created in order to serve as a guide to the counties and cities of the Northern Kentucky region when preparing to mitigate hazards. It is a result of a thorough local and regional planning process designed to identify potential hazards and formulate strategies to prevent or respond to them most effectively. Each political jurisdiction, members of the general public, community agencies, and academic institutions within Northern Kentucky were invited to give input into the hazard mitigation planning process that was coordinated by the Northern Kentucky Area Development District (NKADD).

Hazard Mitigation is the process of reducing the severity of the impacts of natural hazards through planning and preparation. Each hazard may require a specific type of mitigation. For example, engineering methods can be employed (such as building earthquake-resistant buildings) to at least temporarily reduce the impact of a natural hazard. In other cases, the only form of mitigation that is guaranteed to be successful is to limit or prevent human activity and development where hazards are known to occur (such as preventing construction in floodplains). The mitigation planning process will enable the Northern Kentucky Region to make sound planning and development decisions for the future. It also provides a mechanism for coordinating the efforts of individuals, organizations, and local governments concerned with hazard mitigation activities.

### Area Organizations Involvement and Governance

The Northern Kentucky Area Development District (NKADD) was organized as a nonprofit corporation in 1971 and became one of fifteen such local development districts in Kentucky. Although they are public bodies under Kentucky law, the Area Development Districts are neither state agencies nor local governments, but rather

partnerships with local governments. NKADD consists of Boone, Campbell, Carroll, Gallatin, Grant, Kenton, Owen and Pendleton counties and includes 53 incorporated cities. As required by legislation, the district is governed by a board of directors that is composed of 51% elected officials. This includes the county judge/executive and the mayor of each county seat. The remaining members represent the following interests: labor, low income, industry, finance, utilities, the aged, business, minorities, emergency services, women and education. Table 3.0.1 shows the jurisdictions within the Northern Kentucky region.

### 3.0.1 NKADD COUNTY AND CITY GOVERNANCE TYPE AND POPULATION

| County           | 2014 Est.<br>Population <sup>1</sup> | Elected Officials | Governance      | Term<br>(years) |
|------------------|--------------------------------------|-------------------|-----------------|-----------------|
| City             |                                      |                   |                 |                 |
| Boone            | 123,030                              | Judge-Executive   | Fiscal Court    | 4               |
|                  |                                      | 3 Commissioners   |                 | 4               |
| Florence         | 31,038                               | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Union            | 5,569                                | Mayor             | City Commission | 4               |
|                  |                                      | 4 Commissioners   |                 | 2               |
| Walton           | 3,977                                | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Campbell         | 91,268                               | Judge-Executive   | Fiscal Court    | 4               |
|                  |                                      | 3 Commissioners   |                 | 4               |
| Alexandria       | 8,654                                | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Bellevue         | 5,933                                | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| California       | 142                                  | Mayor             | City Commission | 4               |
|                  |                                      | 4 Commissioners   |                 | 2               |
| Cold Spring      | 6,093                                | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Crestview        | 392                                  | Mayor             | City Commission | 4               |
|                  |                                      | 4 Commissioners   |                 | 2               |
| Dayton           | 5,382                                | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Fort Thomas      | 16,250                               | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Highland Heights | 7,152                                | Mayor             | City Council    | 4               |
|                  |                                      | 6 Council Members |                 | 2               |
| Melbourne        | 371                                  | Mayor             | City Commission | 4               |
|                  |                                      | 4 Commissioners   |                 | 2               |
| Mentor           | 207                                  | Mayor             | City Commission | 4               |
|                  |                                      | 4 Commissioners   |                 | 2               |
| Newport          | 15,467                               | Mayor             | City Commission | 4               |
|                  |                                      | 4 Commissioners   |                 | 2               |
| Silver Grove     | 1,272                                | Mayor             | City Council    | 4               |

|              |        |                   |                 |   |
|--------------|--------|-------------------|-----------------|---|
|              |        | 6 Council Members |                 | 2 |
| Southgate    | 3,809  | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Wilder       | 3,060  | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Woodlawn     | 295    | Mayor             | City Commission | 4 |
|              |        | 4 Commissioners   |                 | 2 |
| Carroll      | 10,871 | Judge Executive   | Fiscal Court    | 4 |
|              |        | 3 Magistrates     |                 | 4 |
| Carrollton   | 3,954  | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Ghent        | 376    | Mayor             | City Commission | 4 |
|              |        | 4 Commissioner    |                 | 2 |
| Prestonville | 101    | Mayor             | City Commission | 4 |
|              |        | 3 Commissioners   |                 | 2 |
| Sanders      | 235    | Mayor             | City Commission | 4 |
|              |        | 4 Commissioners   |                 | 2 |
| Worthville   | 216    | Mayor             | City Commission | 4 |
|              |        | 4 Commissioners   |                 | 2 |
| Gallatin     | 8,554  | Judge Executive   | Fiscal Court    | 4 |
|              |        | 4 Magistrates     |                 | 4 |
| Glencoe      | 456    | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Sparta       | 234    | Mayor             | City Commission | 4 |
|              |        | 4 Commissioners   |                 | 2 |
| Warsaw       | 1,860  | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Grant        | 24,667 | Judge Executive   | Fiscal Court    | 4 |
|              |        | 3 Magistrates     |                 | 4 |
| Corinth      | 310    | Mayor             | City Commission | 4 |
|              |        | 4 Commissioners   |                 | 2 |
| Crittenden   | 3,819  | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Dry Ridge    | 2,315  | Mayor             | City Council    | 4 |
|              |        | 6 Council Members |                 | 2 |
| Williamstown | 3,932  | Mayor             | City Council    | 4 |

|                  |         |                    |                 |   |
|------------------|---------|--------------------|-----------------|---|
|                  |         | 6 Council Members  |                 | 2 |
| Kenton           | 161,915 | Judge-Executive    | Fiscal Court    | 4 |
|                  |         | 3 Commissioners    |                 | 4 |
| Bromley          | 735     | Mayor              | City Council    | 4 |
|                  |         | 7 Council Members  |                 | 2 |
| Covington        | 40,712  | Mayor              | City Commission | 4 |
|                  |         | 4 Commissioners    |                 | 2 |
| Crescent Springs | 3,958   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Crestview Hills  | 3,310   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Edgewood         | 8,665   | Mayor              | City Council    | 4 |
|                  |         | 7 Council Members  |                 | 2 |
| Elsmere          | 8,451   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Erlanger         | 18,370  | Mayor              | City Council    | 4 |
|                  |         | 12 Council Members |                 | 2 |
| Fairview         | 166     | Mayor              | City Commission | 4 |
|                  |         | 4 Commissioners    |                 | 2 |
| Ft. Mitchell     | 8,209   | Mayor              | City Council    | 4 |
|                  |         | 8 Council Members  |                 | 2 |
| Ft. Wright       | 5,726   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Independence     | 25,638  | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Kenton Vale      | 106     | Mayor              | City Commission | 4 |
|                  |         | 4 Commissioners    |                 | 2 |
| Lakeside Park    | 2,745   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Ludlow           | 4,533   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Park Hills       | 2,987   | Mayor              | City Council    | 4 |
|                  |         | 6 Council Members  |                 | 2 |
| Ryland Heights   | 1,083   | Mayor              | City Commission | 4 |
|                  |         | 4 Commissioners    |                 | 2 |
| Taylor Mill      | 6,682   | Mayor              | City Commission | 4 |

|                       |         |                   |                 |   |
|-----------------------|---------|-------------------|-----------------|---|
|                       |         | 4 Commissioners   |                 | 2 |
| Villa Hills           | 7,359   | Mayor             | City Council    | 4 |
|                       |         | 5 Council Members |                 | 2 |
| Owen                  | 10,740  | Judge Executive   | Fiscal Court    | 4 |
|                       |         | 4 Magistrates     |                 | 2 |
| Gratz                 | 50      | Mayor             | City Commission | 4 |
|                       |         | 4 Commissioners   |                 | 2 |
| Monterey              | 160     | Mayor             | City Council    | 4 |
|                       |         | 6 Council Members |                 | 2 |
| Owenton               | 1,721   | Mayor             | City Council    | 4 |
|                       |         | 6 Council Members |                 | 2 |
| Pendleton             | 14,642  | Judge Executive   | Fiscal Court    | 4 |
|                       |         | 4 Magistrates     |                 | 2 |
| Butler                | 513     | Mayor             | City Council    | 4 |
|                       |         | 6 Council Members |                 | 2 |
| Falmouth              | 2,278   | Mayor             | City Council    | 4 |
|                       |         | 6 Council Members |                 | 2 |
| Northern Kentucky ADD | 454,020 |                   |                 |   |

1. BASED UPON UNITED STATES CENSUS BUREAU, 2010-2014 AMERICAN COMMUNITY SURVEY 5-YR ESTIMATES ACCESSED THROUGH AMERICAN FACTFINDER

## Northern Kentucky Area Development District Staff

The Area Development District's professional staff has experience in development, human services management, planning, and workforce development. By sharing the services available at the Area Development District, local governments can benefit from staff and services that many counties and cities cannot afford. The Area Development Districts in Kentucky are a product of Federal funding established by the Appalachian Regional Development Act and the Public Work and Economic Development Act of 1965. The intent in forming the Area Development Districts was to promote regional economic development through the participation of locally elected officials, minority groups, business and civic leaders.

## NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT MITIGATION PLANNING EFFORT

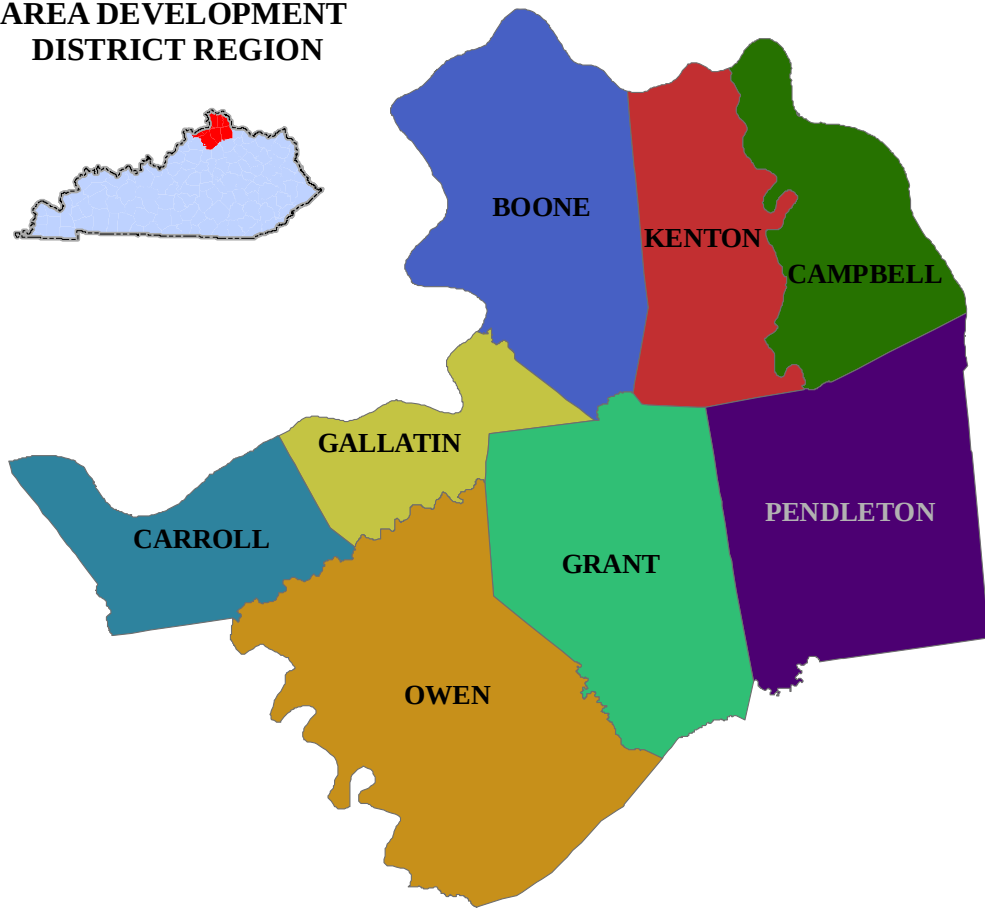
The Mitigation Planning effort results from the partnership between the Kentucky Emergency Management Agency and the Northern Kentucky Area Development District, which was funded by a Mitigation Planning Grant offered by the Federal Emergency Management Agency (FEMA). The first Regional Hazard Mitigation Plan was adopted in September 2006. To guide the original plan, a Regional Mitigation Committee was formed consisting of public officials, emergency management personnel and individual citizens. The Northern Kentucky Area Development District assisted the Regional Mitigation Committee in Mitigation Plan development by organizing broad based and diverse community participation, including activities designed to gain input from individuals with firsthand knowledge of local safety issues. The policies set forth by the Disaster Mitigation Act of 2000 require that Hazard Mitigation Plans undergo a comprehensive update every five (5) years; the result of which is this second plan update. The final Plan is divided into the following 5 sections:

- 3.1 Prerequisites – Adoption by Governing Bodies
- 3.2 A Description of the Planning Process
- 3.3 Risk Assessments by County
- 3.4 Mitigation Strategies
- 3.5 Plan Maintenance Procedure

The Northern Kentucky Regional Mitigation Plan has been developed and updated in accordance with the current rules and regulations governing regional mitigation plans. The plan shall continue to be routinely monitored, as defined in this plan, to maintain compliance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by the Disaster Mitigation Act of 2000 (Public Law 106-390, October 30, 2000).

The following map illustrates the geographic location of the Northern Kentucky Region that this Plan affects.

**NORTHERN KENTUCKY  
AREA DEVELOPMENT  
DISTRICT REGION**





## 3.1 PREREQUISITES

### 3.1.1 ADOPTION BY THE LOCAL GOVERNING BODY

Once the Plan is approved, the NKADD Board of Directors will be asked to pass a resolution to adopt this updated Plan as the official Natural Hazard Mitigation Plan of the Northern Kentucky Area Development District. Each local jurisdiction included in the Plan will also be asked to adopt this Plan as their official Natural Hazard Mitigation Plan in a regular meeting that is open to the public.

### 3.1.2 MULTI-JURISDICTIONAL PLAN ADOPTION

The following chart summarizes the jurisdictions that will be asked to formally adopt this updated plan in a meeting open to the public, after its final review, as their jurisdiction's official Natural Hazard Mitigation plan.

| <b>Jurisdiction</b>      | <b>Adopted</b> | <b>Did Not Adopt</b> | <b>Date of Adoption</b> |
|--------------------------|----------------|----------------------|-------------------------|
| <b>Boone County</b>      |                |                      |                         |
| City of Florence         |                |                      |                         |
| City of Union            |                |                      |                         |
| City of Walton           |                |                      |                         |
| <b>Campbell County</b>   |                |                      |                         |
| City of Alexandria       |                |                      |                         |
| City of Bellevue         |                |                      |                         |
| City of California       |                |                      |                         |
| City of Cold Spring      |                |                      |                         |
| City of Crestview        |                |                      |                         |
| City of Dayton           |                |                      |                         |
| City of Fort Thomas      |                |                      |                         |
| City of Highland Heights |                |                      |                         |
| City of Melbourne        |                |                      |                         |
| City of Mentor           |                |                      |                         |
| City of Newport          |                |                      |                         |
| City of Silver Grove     |                |                      |                         |

| <b>Jurisdiction</b>      | <b>Adopted</b> | <b>Did Not Adopt</b> | <b>Date of Adoption</b> |
|--------------------------|----------------|----------------------|-------------------------|
| City of Southgate        |                |                      |                         |
| City of Wilder           |                |                      |                         |
| City of Woodlawn         |                |                      |                         |
| <b>Carroll County</b>    |                |                      |                         |
| City of Carrollton       |                |                      |                         |
| City of Ghent            |                |                      |                         |
| City of Prestonville     |                |                      |                         |
| City of Sanders          |                |                      |                         |
| City of Worthville       |                |                      |                         |
| <b>Gallatin County</b>   |                |                      |                         |
| City of Glencoe          |                |                      |                         |
| City of Sparta           |                |                      |                         |
| City of Warsaw           |                |                      |                         |
| <b>Grant County</b>      |                |                      |                         |
| City of Corinth          |                |                      |                         |
| City of Crittenden       |                |                      |                         |
| City of Dry Ridge        |                |                      |                         |
| City of Williamstown     |                |                      |                         |
| <b>Kenton County</b>     |                |                      |                         |
| City of Bromley          |                |                      |                         |
| City of Covington        |                |                      |                         |
| City of Crescent Springs |                |                      |                         |
| City of Crestview Hills  |                |                      |                         |
| City of Edgewood         |                |                      |                         |

| <b>Jurisdiction</b>     | <b>Adopted</b> | <b>Did Not Adopt</b> | <b>Date of Adoption</b> |
|-------------------------|----------------|----------------------|-------------------------|
| City of Elsmere         |                |                      |                         |
| City of Erlanger        |                |                      |                         |
| City of Fairview        |                |                      |                         |
| City of Ft. Mitchell    |                |                      |                         |
| City of Ft. Wright      |                |                      |                         |
| City of Independence    |                |                      |                         |
| City of Kenton Vale     |                |                      |                         |
| City of Lakeside Park   |                |                      |                         |
| City of Ludlow          |                |                      |                         |
| City of Park Hills      |                |                      |                         |
| City of Ryland Heights  |                |                      |                         |
| City of Taylor Mill     |                |                      |                         |
| City of Villa Hills     |                |                      |                         |
| <b>Owen County</b>      |                |                      |                         |
| City of Gratz           |                |                      |                         |
| City of Monterey        |                |                      |                         |
| City of Owenton         |                |                      |                         |
| <b>Pendleton County</b> |                |                      |                         |
| City of Butler          |                |                      |                         |
| City of Falmouth        |                |                      |                         |

COPIES OF THE OFFICIAL RESOLUTIONS SIGNED BY EACH JURISDICTION ADOPTING THE PLAN WILL BE PLACED AT THE END OF THIS PLAN IN APPENDIX A: RESOLUTIONS.

## MULTI-JURISDICTIONAL PLANNING PARTICIPATION PROCESS

Public Participation is defined as providing opportunity for officials and citizens throughout the subject area participate in the planning process. Each of the District's counties was represented in the planning and development of this update. Public participation was sought and found at local mitigation committee meetings. The participation plan process followed several stages: Risk Assessment, formulation of the Mitigation Strategy, reviewing findings and finally adoption of the plan. Every jurisdiction in the Northern Kentucky region has been

given the opportunity to participate in these steps through local mitigation committee meetings in each county. Meeting notices were sent to all city and county governments and to other interested parties. The following chart documents the participation of each jurisdiction in the planning process. Each stage of the planning process was open to the public to gather suggestions and feedback from all impacted parties.

## Stages of Plan Participation

### Local Mitigation Committee Meetings

Risk Assessment

Review of *Risk Assessment* and Formulation of *Mitigation Strategy*

Review of Mitigation Strategy

Review, Refinement and Approval of all Findings

Formulation of Implementation Plan

### Individual Jurisdiction Legislative Body Meetings

Plan Adoption by each Jurisdiction

### Future Processes

Plan Evaluation & Updating

## Participation by Jurisdictions in the Planning Area

| Jurisdiction             | Primary Representative's Title/Position | Attendance at Local Meetings | Data Provided | Direct Risk Assessment Participation | Direct Plan Maintenance and Procedures Participation | Adoption of Plan |
|--------------------------|-----------------------------------------|------------------------------|---------------|--------------------------------------|------------------------------------------------------|------------------|
| Boone County             | Mark Ihrig/EM Director                  | X                            | X             | X                                    | X                                                    |                  |
| City of Florence         | Kelly Joe Aylor/Fire Chief              | X                            | X             | X                                    | X                                                    |                  |
| City of Union            | Mark Ihrig/EM Director                  | X                            | X             | X                                    | X                                                    |                  |
| City of Walton           | Mark Ihrig/EM Director                  | X                            | X             | X                                    | X                                                    |                  |
| Campbell County          | Cindy Minter/P&Z Dir.                   | X                            | X             | X                                    | X                                                    |                  |
| City of Alexandria       | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of Bellevue         | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of California       | Jason Cobb                              | X                            | X             | X                                    | X                                                    |                  |
| City of Cold Spring      | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of Crestview        | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of Dayton           | Michael Giffen, City Admin              | X                            | X             | X                                    | X                                                    |                  |
| City of Fort Thomas      | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of Highland Heights | Steve Ehman                             | X                            | X             |                                      |                                                      |                  |
| City of Melbourne        | Ronnie Walton, Mayor                    | X                            | X             | X                                    | X                                                    |                  |
| City of Mentor           | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of Newport          | William Turner, EM Dir.                 | X                            | X             |                                      |                                                      |                  |
| City of Silver Grove     | Neal Bedel, Mayor                       | X                            | X             | X                                    | X                                                    |                  |
| City of Southgate        | James Enzweiler, Councilman             | X                            | X             | X                                    | X                                                    |                  |

|                          |                                     |   |   |   |   |  |
|--------------------------|-------------------------------------|---|---|---|---|--|
| City of Wilder           | William Turner, EM Dir.             | X | X |   |   |  |
| City of Woodlawn         | Cindy Minter, P&Z Dir.              | X | X | X | X |  |
| Carroll County           | Bobby Lee Westrick, Judge-Executive | X | X | X | X |  |
| City of Carrollton       | Ed Webb, EM Dir.                    | X | X | X | X |  |
| City of Ghent            | Ed Webb, EM Dir.                    | X | X | X | X |  |
| City of Prestonville     | Ed Webb, EM Dir.                    | X | X | X | X |  |
| City of Sanders          | Ed Webb, EM Dir.                    | X | X | X | X |  |
| City of Worthville       | Ed Webb, EM Dir.                    | X | X | X | X |  |
| Gallatin County          | Ken McFarland, Judge-Executive      | X | X | X | X |  |
| City of Glencoe          | Brandon Terrell, EM Dir.            | X | X | X | X |  |
| City of Sparta           | Brandon Terrell, EM Dir.            | X | X | X | X |  |
| City of Warsaw           | Brandon Terrell, EM Dir.            | X | X | X | X |  |
| Grant County             | Chief Les Whalen, EM Dir.           | X | X | X | X |  |
| City of Corinth          | Chief Les Whalen, EM Dir.           | X | X | X | X |  |
| City of Crittenden       | James Livingood, Mayor              | X | X | X | X |  |
| City of Dry Ridge        | Rodney Smith, FD                    | X | X |   |   |  |
| City of Williamstown     | Rick Skinner, Mayor                 | X | X | X | X |  |
| Kenton County            | Joe Shriver, County Admin           |   |   |   |   |  |
| City of Bromley          | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Covington        | Sherry Carran, Mayor                | X | X | X | X |  |
| City of Crescent Springs | Alan DePompeii, PW Dir.             | X | X | X | X |  |
| City of Crestview Hills  | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Edgewood         | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Elsmere          | Chris Zerhusen, PW Dir.             | X | X | X | X |  |
| City of Erlanger         | David Hahn                          | X | X | X |   |  |
| City of Fairview         | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Ft. Mitchell     | Gary Auffart, Fire Chief            | X | X | X | X |  |
| City of Ft. Wright       | Steve Schewe, Fire Chief            | X | X |   |   |  |
| City of Independence     | Chris Moriconi, City Admin.         | X | X |   |   |  |
| City of Kenton Vale      | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Lakeside Park    | Dave Schrand, PW                    | X | X |   |   |  |
| City of Ludlow           | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Park Hills       | Steve Hensley, EM Dir.              | X | X | X | X |  |
| City of Ryland Heights   | John Cole, Mayor                    | X | X | X | X |  |
| City of Taylor Mill      | Steve Hensley, EM Dir.              | X | X | X | X |  |

|                     |                               |   |   |   |   |  |
|---------------------|-------------------------------|---|---|---|---|--|
| City of Villa Hills | Buck, PW Dir.                 | X | X | X | X |  |
| Owen County         | Casey Ellis, Judge-Executive  | X | X | X | X |  |
| City of Gratz       | Charles Redmon, Mayor         | X | X |   |   |  |
| City of Monterey    | Charlie Riddle, FD            | X | X |   |   |  |
| City of Owenton     | JO Powers, Fire Chief         | X | X | X | X |  |
| Pendleton County    | David Fields, Judge-Executive | X | X | X | X |  |
| City of Butler      | Mike Moore, EM Dir.           | X | X | X | X |  |
| City of Falmouth    | Chrissy Bezold                | X | X |   |   |  |
| NKADD               | Emily Carnahan                | X | X | X | X |  |

## Northern Kentucky Area Development District Board of Directors

The Northern Kentucky Area Development District Board of Directors is comprised of the County Judge Executive of each county, the Mayor of each county seat, and citizens from each county. The Northern Kentucky Area Development District Board of Directors governs and establishes policy goals and objectives for the Northern Kentucky Region in areas of community development and planning. Board meetings are open to the public and are held each month at the office of the Northern Kentucky Area Development District.

The following chart lists the NKADD Board of Directors, the jurisdiction they represent and their position within the community.

| NKADD BOARD OF DIRECTORS                                                                                                                                                        |                                                                                                                                                                                                                                        |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>OFFICERS</b><br>Harold “Shorty” Tomlinson<br>Lewis Diaz<br>Rick Skinner<br>Kris Knochelmann                                                                                  | <b>POSITION</b><br>Citizen Member, Carroll County, Chair<br>Citizen Member, Boone County, 1 <sup>st</sup> Vice-Chair<br>Mayor, City of Williamstown, 2 <sup>nd</sup> Vice-Chair<br>Judge/Executive, Kenton County, Secretary/Treasurer |                 |
| <b>Boone County</b><br><br>Gary Moore<br><br>Laura Pleiman<br><br>Mark Carnahan<br><br>[Vacant]<br><br>Diane Ewing Whalen<br><br>Josh Wice<br><br>Lewis Diaz<br><br>Pat Raverty | <b>TITLE / AFFILIATION</b><br><br>Judge/Executive<br><br>Alternate<br><br>Mayor, City of Walton<br><br>Alternate<br><br>Mayor, City of Florence<br><br>Alternate<br><br>Citizen Member<br><br>Citizen Member                           | <b>COMMENTS</b> |

|                           |                             |                 |
|---------------------------|-----------------------------|-----------------|
| Louis Kelly               | Citizen Member              |                 |
| Lisa Wilson-Plajer        | Citizen Member              |                 |
| <b>Campbell County</b>    | <b>TITLE / AFFILIATION</b>  | <b>COMMENTS</b> |
| Steven Pendery            | Judge/Executive             |                 |
| Matt Elberfeld            | Alternate                   |                 |
| Jim Hamberg               | Mayor, City of Southgate    |                 |
| Jerry Peluso              | Mayor, City of Newport      |                 |
| Amy Able                  | Alternate                   |                 |
| Joe Cottingham            | Citizen Member              |                 |
| Tome Lampe                | Citizen Member              |                 |
| <b>Carroll County</b>     | <b>TITLE / AFFILIATION</b>  | <b>COMMENTS</b> |
| Bobby Lee Westrick        | Judge/Executive             |                 |
| Gary Mathis               | Alternate                   |                 |
| Robb Adams                | Mayor, City of Carrollton   |                 |
| Harold "Shorty" Tomlinson | Citizen Member              |                 |
| <b>Gallatin County</b>    | <b>TITLE / AFFILIATION</b>  | <b>COMMENTS</b> |
| Ken McFarland             | Judge/Executive             |                 |
| Nelson Brown              | Mayor of Warsaw             |                 |
| George Zubaty             | Citizen Member              |                 |
| <b>Grant County</b>       | <b>TITLE / AFFILIATION</b>  | <b>COMMENTS</b> |
| Steve Wood                | Judge/Executive             |                 |
| Rick Skinner              | Mayor, City of Williamstown |                 |
| Bobby Young               | Citizen Member              |                 |
| <b>Kenton County</b>      | <b>TITLE / AFFILIATION</b>  | <b>COMMENTS</b> |
| Kris Knochelmann          | Judge/Executive             |                 |
| Joe Shriver               | Alternate                   |                 |
| Sherry Carran             | Mayor, City of Covington    |                 |

|                         |                                |                 |
|-------------------------|--------------------------------|-----------------|
| Jordan Huizenga         | Alternate                      |                 |
| Paul Meier              | Mayor, City of Crestview Hills |                 |
| Frank Sommerkamp        | Alternate                      |                 |
| Chris Reinersman        | Mayor, City of Independence    |                 |
| Chris Moriconi          | Alternate                      |                 |
| Tyson Hermes            | Mayor, City of Erlanger        |                 |
| Marc Fields             | Alternate                      |                 |
| Amy Heeger              | Citizen Member                 |                 |
| Billie Bradford         | Citizen Member                 |                 |
| Nyoka Johnston          | Citizen Member                 |                 |
| Willie Schadler         | Citizen Member                 |                 |
| Pat Dressman            | Citizen Member                 |                 |
| <b>Owen County</b>      | <b>TITLE / AFFILIATION</b>     | <b>COMMENTS</b> |
| Casey Ellis             | Judge/Executive                |                 |
| David “Milkweed” Wotier | Mayor of Owenton               |                 |
| Todd Spurgeon           | Citizen Member                 |                 |
| <b>Pendleton County</b> | <b>TITLE / AFFILIATION</b>     | <b>COMMENTS</b> |
| David Fields            | Judge/Executive                |                 |
| Elonda Hinson           | Mayor of Falmouth              |                 |
| Susan Maier             | Citizen Member                 |                 |

#### LOCAL HAZARD MITIGATION COMMITTEES

The local hazard mitigation committees were established in each county to represent all jurisdictions within the county. The local committee in each county is comprised of the County Emergency Management director and appointees by the county judge, city officials, including emergency management personnel, and other persons with knowledge valuable to hazard mitigation planning. The citizens of each county were also invited at the beginning of the process to attend the meetings. The committee was responsible for meeting to develop the mitigation strategy of the Plan by identifying hazards and formulating goals and objectives to address those hazards and decide which action plans meet those goals and objectives. The mitigation strategy was carefully formulated by incorporating the collective experience of local committee members who have firsthand knowledge of the conditions within their communities including possible hazards, historic events, and vulnerabilities. The amount of participation in this iteration of the plan is considerable compared to previous planning processes. This



is likely due to a combination of factors: increased outreach by NKADD staff to encourage involvement, a more open approach to the planning process, as well as an awareness of mitigating hazards before an event happens.

| <b>LOCAL MITIGATION COMMITTEES</b>       |                                                 |
|------------------------------------------|-------------------------------------------------|
| <b>Member Name</b>                       | <b>Title/Affiliation</b>                        |
| <b>Boone County Mitigation Committee</b> |                                                 |
| Kevin Costello                           | Boone County Planning Commission Director       |
| Bob Jonas                                | GIS Specialist                                  |
| Peter Glenn                              | Public Services Department, City of Florence    |
| William Fletcher                         | Deputy Emergency Management Director            |
| Jessica McElroy                          | Northern Kentucky Health Department             |
| Steve Divine                             | Northern Kentucky Health Department             |
| Rusty Williams                           | Owen Electric Cooperative Dir. of Operations    |
| Scotty Pennington                        | Chief Engineer                                  |
| Kelly Bowlin                             | Public Works                                    |
| Melissa Grandstaff                       | Public Works                                    |
| Mark Ihrig                               | Emergency Management Director                   |
| Kelly Aylor                              | Fire/EMS Chief                                  |
| Jerald Noran                             | Chief Building Inspector                        |
| Mark Martin                              | Building Department                             |
| Brad Murphy                              | NKY Water District                              |
| John Sheben                              | Acting Mngr. of Distribution NKY Water District |
| Rodney Bell                              | Sanitation District No. 1                       |
| Nathan Rettig                            | Florence Police Department                      |
| Dan Razor                                | Boone County Schools                            |
| Stephen Ogen                             | Boone County Schools                            |
| David Neff                               | Public Works                                    |

|                                             |                                       |
|---------------------------------------------|---------------------------------------|
| <b>Campbell County Mitigation Committee</b> |                                       |
| William Turner                              | Emergency Management Director         |
| James Enzweiler                             | Councilman, City of Southgate         |
| Jason Cobb                                  | City of California                    |
| Bob Hill                                    | City of Alexandria, KYTC D-6          |
| Kirk Hunter                                 | Solid Waste                           |
| Shannon Turner                              | Silver Grove                          |
| Gary Auffart                                | Newport Fire Department               |
| Steve Rath                                  | Southgate Fire Department             |
| Cindy Minter                                | Planning and Zoning                   |
| Amy Winey                                   | Campbell County Conservation District |
| Debbie Young                                | City of California, resident          |
| Mike Young                                  | City of California, resident          |
| Ross Thomas                                 | City of California, resident          |
| Ann Sparks                                  | City of California, resident          |
| Tom Sparks                                  | City of California, resident          |
| Jeff Baker                                  | NKU                                   |
| Steve Ehman                                 | City of Highland Heights Public Works |
| John Scheben                                | Northern KY Water District            |
| <b>Silver Grove/Melbourne Subcommittee</b>  |                                       |
| Ronda Sandfoss                              | City Clerk, City of Silver Grove      |
| Shannon Turner                              | City of Silver Grove                  |
| Jon Pelle                                   | Councilman, City of Silver Grove      |
| Neal Bedel                                  | Mayor, City of Silver Grove           |
| Randy Stihavek                              | City of Silver Grove                  |
| Ronnie Walton                               | Mayor, City of Melbourne              |

|                                             |                                               |
|---------------------------------------------|-----------------------------------------------|
| Cynthia Minter                              | Campbell County Planning and Zoning           |
| Deborah Blake                               | City of Melbourne                             |
| Douglas Holt                                | Police, City of Silver Grove                  |
| <b>Carroll County Mitigation Committee</b>  |                                               |
| Tony Crutcher                               | Dow Corning                                   |
| John Kyle                                   | Floodplain Coordinator                        |
| Ed Webb                                     | Emergency Management Director                 |
| Terry Roach                                 | Carrollton Utilities                          |
| Bobby Lee Westrick                          | County Judge Executive                        |
| Gary Mathis                                 | Planner                                       |
| <b>Gallatin County Mitigation Committee</b> |                                               |
| Brandon Terrell                             | Emergency Management Director                 |
| Ken McFarland                               | County Judge Executive                        |
| Winslow Baker                               | Planning and Zoning                           |
| Ray Spahn                                   | Gallatin County School District               |
| Ruth Middleton                              | PVA                                           |
| Brent Brown                                 | Public Works                                  |
| Travis Huber                                | Gallatin County Schools                       |
| Renee Cameron                               | Gallatin County Schools                       |
| Alex VanPelt                                | KDOW, NFIP Coordinator                        |
| <b>Grant County Mitigation Committee</b>    |                                               |
| Gilbert McClure                             | Building Inspector                            |
| Jean Caudill                                | Disaster Preparedness Coordinator, NKY Health |
| Jessica McElroy                             | NKY Health Department                         |
| Les Whalen                                  | Emergency Management Director                 |
| Robert Reed                                 | Williamstown Police Department                |

|                                           |                                              |
|-------------------------------------------|----------------------------------------------|
| Sally Skinner                             | Williamstown Independent Schools             |
| Rick Skinner                              | Mayor of Williamstown                        |
| Rodney Smith                              | Dry Ridge Fire Department                    |
| Todd Anderson                             | Williamstown Fire Department                 |
| Dwayne Eckler                             | Williamstown Fire Department                 |
| James Livingood                           | Mayor of Crittenden                          |
| <b>Kenton County Mitigation Committee</b> |                                              |
| Tim Weist                                 | St. Elizabeth Safety Officer                 |
| George Ripberger                          | City Administrator, City of Crescent Springs |
| Alan DePompeii                            | Crescent Springs Building and Zoning         |
| John Cole                                 | Mayor, City of Ryland Heights                |
| Paul LaFontaine                           | Elsmere Fire Chief                           |
| Dave Schrand                              | Lakeside Park Public Works Manager           |
| Joe Shriver                               | Kenton County Administrator                  |
| Steve Hensley                             | Director of HSEM                             |
| Kirk Reinhart                             | HSEM                                         |
| Rick Watkins                              | HSEM                                         |
| Chuck Korzenborn                          | Kenton County Sherriff                       |
| Rodney Bell                               | Sanitation District 1                        |
| Carol Callan-Ramler                       | KYTC District 6 Planning                     |
| Nicole Clements                           | Banklick Watershed                           |
| Chris Zerhusen                            | City of Elsmere Public Works                 |
| Steve Schewe                              | Fort Wright Fire Chief                       |
| Daniel Doss                               | Sanitation District 1Project Manager         |
| Bill Wulfeck                              | Sanitation District 1 Asset Manager          |
| Rob Haney                                 | Director, Kenton County School District      |

|                 |                                                 |
|-----------------|-------------------------------------------------|
| Joyce Rice      | Epidemiology Manager, NKY Health Dept.          |
| Bill Schneider  | South Kenton resident                           |
| Jessica McElroy | NKY Health Dept.                                |
| Stella Barber   | NKY Health Dept.                                |
| David Hahn      | Dir. of Economic Development, City of Erlanger  |
| John Scheben    | Distribution Manager, NKY Water District        |
| Brad Murphy     | NKY Water District                              |
| Andy Juengling  | Planner and Floodplain Admin, City of Covington |
| Adam Koenig     | Zoning Specialist                               |
| Shannon O'Neill | Disaster Program Specialist, Red Cross          |
| Rob Haney       | Kenton County School District                   |
| Chris Moriconi  | City Administrator, City of Independence        |
| Dan Koch        | Independence Public Services                    |
| Dan Kreinest    | Police Chief, City of Fort Wright               |
| Alex Mattingly  | City Administrator City of Elsmere              |
| Greg Jones      | Captain, Covington Police Department            |
| James Sparks    | Area Manager, KY Dept. of Emergency Mgmt.       |
| Sherry Carran   | Mayor, City of Covington                        |
| Dennis Gordon   | PDS of Kenton County                            |
| Emi Randall     | PDS, P&Z Director                               |
| Nick Hendrix    | Kenton County Public Works/Co Engineer          |
| Buck Yelton     | City of Villa Hills Public Works                |
| Jamie Sparks    | KYEM Area 6 Manager                             |
| Gary Auffart    | Fort Mitchell Fire Chief                        |
| Robert Lockman  | TANK Risk Manager                               |
| Kevin Unkraut   | TANK Manager of Dispatch                        |

|                                              |                                                 |
|----------------------------------------------|-------------------------------------------------|
| Scott Smith                                  | Ludlow Police Chief                             |
| <b>Owen County Mitigation Committee</b>      |                                                 |
| Charles Redmon                               | Mayor, City of Gratz                            |
| J.O. Powers                                  | Fire Chief, City of Owenton Fire Department     |
| Tony Dempsey                                 | Manager of Safety, Owen Electric Coop.          |
| Justin Sensabaugh                            | Operations Supervisor, KY American Water        |
| Brad Kinckiner                               | Safety Lead, KY American Water                  |
| Donna Gomez                                  | Disaster Manager, New Horizons Medical Center   |
| Robb Chaney                                  | Fire Chief, Owen County Fire Department         |
| Charlie Riddle                               | Fire Department, City of Monterey               |
| David Lilly                                  | EMA Director/ Owenton VFD                       |
| Larry Karsner                                | EMA Director                                    |
| Dan Logan                                    | Owen Co Schools                                 |
| Greg Smoot                                   | Road Supervisor, Owen County                    |
| Casey Ellis                                  | Owen County Judge Executive                     |
| Dan Brenyo                                   | Owen County EMS                                 |
| <b>Pendleton County Mitigation Committee</b> |                                                 |
| Chrissy Bezold                               | Administrative Assistant, Falmouth Police Dept. |
| Michael Pohlman                              | Asst. Chief of N. Pendleton Fire Dept.          |
| Mike Moore                                   | Emergency Management Director                   |
| Michele Hamilton                             | Pendleton County EMA                            |
| Wayne Lonaker                                | East Pendleton Water District                   |
| Bill Mitchell                                | Director, Pendleton Community Development       |
| David Fields                                 | Judge Executive                                 |
| Craig Peoples                                | Pendleton County Sherriff                       |
| Brian Thompson                               | Floodplain Coordinator and P&Z Director         |

## OVERALL SUMMARY OF THE MULTI-JURISDICTIONAL PLANNING PROCESS

During the formulation of the original plan, the Local Mitigation committees had oversight of each phase of the planning process, guided the sub-committees in each county, and reviewed the risk assessment findings and mitigation strategy input from the NKADD staff and other committees. The local mitigation committees were responsible for developing risk assessments and formulating mitigation strategies. The Northern Kentucky Area Development District staff provided technical information and support as needed by the committees. During the plan update, the Local Mitigation Committees reviewed the risk assessment findings, mitigation strategies and gave final recommendations for the updated plan's content.

Each stage of the planning process was open to the public to allow insight and suggestions from private citizens. The proceedings from each meeting, including meeting minutes, maps, attendance records, public input and all technical information reviewed was documented and will be kept on file at the Northern Kentucky Area Development District office, in accordance with public records retention rules and guidance.

## 3.2 THE PLANNING PROCESS

The following section describes the planning processes used to create and update this mitigation plan.

### OPEN PUBLIC INVOLVEMENT

In order to develop mitigation measures that are supported by all public and private stakeholders and reflect the needs of the community, opportunity for open public involvement was integrated into every stage of the plan update process. Opportunities were provided and achieved by the creation and participation of the local mitigation subcommittees in each county.

### OPPORTUNITY FOR PUBLIC COMMENT

Committee meetings were held within each county to provide convenient access for the public to participate in the mitigation planning process. These meetings were advertised through postings on the NKADD website.

Public comment has been invited in three ways. First and foremost, all Local Hazard Mitigation Subcommittee meetings are open to the public. Additionally, public meetings to review the draft and final plan update are advertised. The updated draft plan is available for viewing on the NKADD website and local government websites, where available.

### OPPORTUNITY FOR PUBLIC/PRIVATE PARTICIPATION

The NKADD staff will be responsible for informing each jurisdiction in the region of the requirements and impacts the mitigation plan will have on their respective jurisdiction. These entities are invited to attend all meetings in their respective counties.

NKADD staff is responsible for informing the committee members and participants about the mitigation planning goals and for notifying members of meetings and schedules as needed. Meetings are advertised on the NKADD website and announcements were sent to each city and county government as well as various public agencies, businesses, non-profits, academia, and other interested agencies and parties. The following chart shows the timeline and attendance at committee meetings.

| Meetings for Hazard Mitigation Plan Update |                                       |                   |
|--------------------------------------------|---------------------------------------|-------------------|
| Record of Attendance                       |                                       |                   |
| Meeting Date                               | Group                                 | # of Participants |
| 7/29/15                                    | Public Kick-Off Meeting               | 10                |
| 10/13/15                                   | KYTC District 6                       | 2                 |
| 10/19/15                                   | Sanitation District No. 1             | 5                 |
| 10/27/15                                   | Owen Electric Cooperative             | 1                 |
| 2/20/16                                    | Kenton County Mayor's Group           | 38                |
| 1/26/16                                    | Campbell County Mayor's Group         | 34                |
| 9/16/16                                    | KAMM Meeting                          | 17                |
| 6/28/16 6:00 pm                            | Campbell County Mitigation Committee  | 3                 |
| 6/28/16 2:00 pm                            | Campbell County Mitigation Committee  | 5                 |
| 3/8/16                                     | Campbell County Mitigation Committee  | 10                |
| 10/14/15                                   | Silver Grove/Melbourne Sub-Committee  | 9                 |
| 9/15/15                                    | Campbell County Mitigation Committee  | 12                |
| 6/15/16                                    | Carroll County Mitigation Committee   | 4                 |
| 3/10/16                                    | Carroll County Mitigation Committee   | 5                 |
| 9/14/15                                    | Carroll County Mitigation Committee   | 4                 |
| 6/20/16                                    | Boone County Mitigation Committee     | 6                 |
| 3/14/16                                    | Boone County Mitigation Committee     | 11                |
| 9/28/15                                    | Boone County Mitigation Committee     | 13                |
| 6/17/16                                    | Gallatin County Mitigation Committee  | 4                 |
| 4/4/16                                     | Gallatin County Mitigation Committee  | 7                 |
| 9/23/15                                    | Gallatin County Mitigation Committee  | 6                 |
| 6/30/16                                    | Grant County Mitigation Committee     | 4                 |
| 3/24/16                                    | Grant County Mitigation Committee     | 7                 |
| 9/30/15                                    | Grant County Mitigation Committee     | 3                 |
| 6/23/16                                    | Kenton County Mitigation Committee    | 17                |
| 3/22/16                                    | Kenton County Mitigation Committee    | 22                |
| 8/18/15                                    | Kenton County Mitigation Committee    | 29                |
| 7/8/16                                     | Owen County Mitigation Committee      | 7                 |
| 4/6/16                                     | Owen County Mitigation Committee      | 10                |
| 9/3/15                                     | Owen County Mitigation Committee      | 10                |
| 7/6/16                                     | Pendleton County Mitigation Committee | 5                 |
| 3/16/16                                    | Pendleton County Mitigation Committee | 8                 |
| 9/2/15                                     | Pendleton County Mitigation Committee | 7                 |
| 11/17/16                                   | Public Review Meeting                 | 18                |



|  |  |               |     |
|--|--|---------------|-----|
|  |  | <b>TOTAL:</b> | 353 |
|--|--|---------------|-----|

The Local Hazard Mitigation Planning Committees solicited participation from multiple agencies with interest and expertise in various subjects related to hazard mitigation. The following list identifies those agencies that participated in the planning process.

| <b>Organization</b>                      | <b>Position</b>                  |
|------------------------------------------|----------------------------------|
| American Red Cross- Greater Cincinnati   | Disaster Program Specialist      |
| Boone County Building Inspector's Office | Chief Building Inspector         |
| Boone County Emergency Management        | EM Director                      |
| Boone County Fire Department             | Fire/EMS Chief                   |
| Boone County Fiscal Court                | Judge Executive                  |
| Boone County Planning Commission         | Director                         |
| Boone County Public Works                | Chief Engineer                   |
| Boone County Schools                     | Superintendent                   |
| Boone County Water District              | Director of Operations           |
| Burlington Fire Protection District      | Fire Chief                       |
| Campbell County Emergency Management     | EM Director                      |
| Campbell County Conservation District    | District Director                |
| Campbell County Fiscal Court             | Judge Executive                  |
| Campbell County Planning and Zoning      | Director of Planning and Zoning  |
| Campbell County Solid Waste              | Solid Waste Coordinator          |
| Carroll County Emergency Management      | EM Director                      |
| Carroll County Fiscal Court              | Judge Executive                  |
| Carroll County Community Development     | Executive Director               |
| Carroll County Floodplain Management     | Floodplain Manager               |
| Carrollton Utilities                     |                                  |
| City of Alexandria                       | Mayor                            |
| City of California                       | Mayor                            |
| City of Covington                        | Mayor                            |
| City of Crescent Springs                 | City Administrator               |
| City of Elsmere                          | City Administrator               |
| City of Erlanger                         | Director of Economic Development |
| City of Florence                         | Public Services Department       |
| City of Gratz                            | Mayor                            |
| City of Independence                     | City Administrator               |
| City of Melbourne                        | Mayor                            |
| City of Ryland Heights                   | Mayor                            |
| City of Silver Grove                     | Mayor                            |
| City of Southgate                        | Councilman                       |
| City of Bellevue                         | Mayor                            |
| City of Bromley                          | Mayor                            |
| City of Butler                           | Mayor                            |
| City of Carrollton                       | Mayor                            |
| City of Cold Spring                      | Mayor                            |
| City of Corinth                          | Mayor                            |
| City of Crestview                        | Mayor                            |
| City of Crestview Hills                  | Mayor                            |
| City of Crittenden                       | Mayor                            |
| City of Dayton                           | Mayor                            |
| City of Dry Ridge                        | Mayor                            |
| City of Edgewood                         | Mayor                            |
| City of Fairview                         | Mayor                            |

|                                          |                                              |
|------------------------------------------|----------------------------------------------|
| City of Falmouth                         | Mayor                                        |
| City of Fort Mitchell                    | Mayor                                        |
| City of Fort Thomas                      | Mayor                                        |
| City of Fort Wright                      | Mayor                                        |
| City of Ghent                            | Mayor                                        |
| City of Glencoe                          | Mayor                                        |
| City of Gratz                            | Mayor                                        |
| City of Highland Heights                 | Mayor                                        |
| City of Kenton Vale                      | Mayor                                        |
| City of Lakeside Park                    | Mayor                                        |
| City of Ludlow                           | Mayor                                        |
| City of Mentor                           | Mayor                                        |
| City of Monterey                         | Mayor                                        |
| City of Newport                          | Mayor                                        |
| City of Owenton                          | Mayor                                        |
| City of Park Hills                       | Mayor                                        |
| City of Prestonville                     | Mayor                                        |
| City of Sanders                          | Mayor                                        |
| City of Sparta                           | Mayor                                        |
| City of Taylor Mill                      | Mayor                                        |
| City of Union                            | Mayor                                        |
| City of Villa Hills                      | Mayor                                        |
| City of Walton                           | Mayor                                        |
| City of Warsaw                           | Mayor                                        |
| City of Wilder                           | Mayor                                        |
| City of Williamstown                     | Mayor                                        |
| City of Woodlawn                         | Mayor                                        |
| City of Worthville                       | Mayor                                        |
| Covington Planning and Floodplain        | Planning Director and Floodplain Coordinator |
| Covington Police Department              | Captain                                      |
| Dow Corning Corporation                  |                                              |
| Dry Ridge Fire Department                | Fire Chief                                   |
| East Pendleton Water District            | Director                                     |
| Florence Fire Department                 | Fire/EMS Chief                               |
| Florence Police Department               | Police Chief                                 |
| Elsmere Fire Department                  | Fire Chief                                   |
| Elsmere Public Works                     |                                              |
| Falmouth Police Department               | Administrative Assistant                     |
| Florence EMS/Fire Department             | Fire/EMS Chief                               |
| Fort Wright Fire Department              | Fire Chief                                   |
| Fort Wright Police Department            | Police Chief                                 |
| Gallatin County Emergency Management     | EM Director                                  |
| Gallatin County Fiscal Court             | Judge Executive                              |
| Gallatin County Planning and Zoning      | Director of Planning and Zoning              |
| Gallatin County Public Works             |                                              |
| Gallatin County PVA                      | Gallatin County PVA                          |
| Gallatin County School District          | Superintendent                               |
| Grant County Building Inspector's Office | Building Inspector                           |
| Grant County Emergency Management        | EM Director                                  |
| Grant County Fiscal Court                | Judge Executive                              |
| Grant County Schools                     | Superintendent                               |
| Kenton County Emergency Management       | HS/EM Director                               |
| Kenton County Fiscal Court               | County Administrator                         |

|                                          |                                                         |
|------------------------------------------|---------------------------------------------------------|
| Kenton County School District            | Director                                                |
| Kenton County Sheriff's Office           | Kenton County Sheriff                                   |
| KY American Water                        | Operations Supervisor                                   |
| KY Department of Emergency Management    | Area Manager                                            |
| KYTC District 6                          |                                                         |
| Lakeside Park Public Works               | Public Works Manager                                    |
| Monterey Fire Department                 | Fire Chief                                              |
| New Horizons Medical Center              | Disaster Manager                                        |
| Newport Fire Department                  | Fire Chief                                              |
| North Pendleton County Fire Department   | Assistant Chief                                         |
| Northern Kentucky ADD                    | Executive Director                                      |
| Northern Kentucky Health Department      | Disaster Preparedness Coordinator                       |
| Northern Kentucky University             | Safety Coordinator                                      |
| Northern Kentucky Water District         | Distribution Manager                                    |
| Owen County Roads                        | Road Supervisor                                         |
| Owen County Emergency Management         | EM Director                                             |
| Owen County EMS                          |                                                         |
| Owen County Fire Department              | Fire Chief                                              |
| Owen Electric Cooperative                | Director of Operations                                  |
| Owen County Fiscal Court                 | Judge Executive                                         |
| Owenton Fire Department                  | Fire Chief                                              |
| Pendleton County Community Development   | Director                                                |
| Pendleton County Emergency Management    | EM Director                                             |
| Pendleton County Fiscal Court            | Judge Executive                                         |
| Pendleton County Planning and Floodplain | Floodplain Coordinator and Planning and Zoning Director |
| Pendleton County Sheriff's Office        | Pendleton County Sheriff                                |
| PDS of Kenton County                     |                                                         |
| St. Elizabeth Health Care Edgewood       | Safety Officer                                          |
| Sanitation District #1                   | Project Manager                                         |
| Silver Grove Police Department           |                                                         |
| South Kenton County Citizen Group        | Citizen Member                                          |
| Southgate Fire Department                |                                                         |
| TANK                                     | General Manager                                         |
| Williamstown Schools                     | Superintendent                                          |

Invitations to participate in the planning process were extended to neighboring communities, businesses, academia, nonprofits, and other interested parties, however, some invited agencies did not actively participate in the planning process. Agencies that were invited, but did not choose to participate are:

| <b>Organization</b>                | <b>Position</b>                |
|------------------------------------|--------------------------------|
| Bellevue McVile Fire Department    | Fire Chief                     |
| Bluegrass ADD                      | Community Planning Director    |
| Boone County PVA                   | Boone PVA                      |
| Boone County Sherriff's Office     | Boone County Sherriff          |
| Boone County Water Rescue          | Captain                        |
| Brighton Center                    | President                      |
| Buffalo Trace ADD                  | Community Development Director |
| Bullock Pen Water District         |                                |
| Campbell County Extension Services |                                |
| Campbell County Fire District #1   | Fire Chief                     |
| Campbell County PVA                | Campbell County PVA            |
| Campbell County Schools            | Superintendent                 |

|                                                                  |                                    |
|------------------------------------------------------------------|------------------------------------|
| Campbell County Sheriff                                          | Campbell County Sheriff            |
| Carroll County Schools                                           | Superintendent                     |
| Carroll County Water District                                    | Manager                            |
| Central Campbell County Fire                                     | Fire Chief                         |
| Citizen Corps                                                    | Public Administration Specialist   |
| Corinth Fire Department                                          | Chief                              |
| CVG Airport                                                      |                                    |
| District 9 EM Indiana                                            | Program Director                   |
| Duke Energy                                                      | Government and Community Relations |
| Gallatin County Fire Department                                  | Fire Chief                         |
| Gallatin County Sheriff's Office                                 | Gallatin County Sheriff            |
| GCTC                                                             | Executive Assistant to President   |
| Glencoe Fire Department                                          | Fire Chief                         |
| Grand Paws Search Dog Association                                | Chief                              |
| Grant County LEPC                                                | LEPC Chair                         |
| Grant County PVA                                                 | Grant County PVA                   |
| Grant County Sheriff's Office                                    | Grant County Sheriff               |
| Grant County Solid Waste                                         | Solid Waste Coordinator            |
| Hamilton County Emergency Management                             | EM/HS Director                     |
| Hebron Fire Protection District                                  | Fire Chief                         |
| Itron Gas Industries                                             | Maintenance Manager                |
| Jonesville Fire Department                                       | Fire Chief                         |
| Kenton County Police Department                                  | Police Chief                       |
| Kentucky Speedway                                                | Director of Operations             |
| Kentucky State Police Post 5                                     | Communications Supervisor          |
| Kentucky Utilities                                               |                                    |
| KIPDA                                                            | Director of Public Administration  |
| Lakeside Park/Crestview Hills Police                             | Police Chief                       |
| New Liberty Fire Department                                      | Fire Chief                         |
| Newport Public Works Division                                    | Community Services Director        |
| NKY Chamber of Commerce                                          | President                          |
| OKI                                                              | CEO                                |
| Owen County Amateur Radio Coordinator                            | HAM Coordinator                    |
| Owen County Applicant Agent                                      |                                    |
| Owen County Schools                                              | Superintendent                     |
| Owen County Search and Rescue                                    | Chief                              |
| Owen County Sheriff                                              | Owen County Sheriff                |
| Pendleton County Ambulance District                              | Director                           |
| Pendleton County Industrial Authority                            | Director                           |
| Pendleton County Schools                                         | Superintendent                     |
| Pendleton County Water District                                  | Director                           |
| Petersburg Fire Protection District                              | Fire Chief                         |
| Point Pleasant Fire Protection District                          | Fire Chief                         |
| St. Elizabeth Florence                                           | Sergeant                           |
| Skyward                                                          | President                          |
| Southern States, Inc.                                            | Manager                            |
| Thomas More College                                              | Director of Campus Safety          |
| Three Rivers Health Dept. (Carroll, Gallatin, Owen, & Pendleton) | Public Health Director             |
| Union Fire Protection District                                   | Fire Chief                         |
| UK-HMGP                                                          | Plan and Grants Manager            |
| Verona Fire Protection District                                  | Fire Chief                         |
| Villa Hills Police Department                                    | Officer                            |

|                                   |                |
|-----------------------------------|----------------|
| Walton Fire Protection District   | Fire Chief     |
| Warsaw Fire Department            | Fire Chief     |
| Warsaw Water and Sewer Department | Superintendent |
| Westside Fire Department          | Fire Chief     |
| Williamstown Police Department    | Police Chief   |

## OPPORTUNITIES FOR PUBLIC INVOLVEMENT DURING THE PLANNING PROCESS

The public was given opportunity throughout the entire planning process to be involved and contribute to the plan. For each local county meeting, notices were posted on the NKADD website. For the Public Kick-Off Meeting, and the Final Public Meeting, public notices were published in the Kentucky Enquirer and the local county newspapers as well as the NKADD website. The counties were also encouraged to post on Facebook or their websites as well.

NKADD staff also conducted a survey utilizing Survey Monkey on the public's perspective of natural hazards in the Northern Kentucky area. The survey was modeled after FEMA's Local Mitigation Planning Handbook Worksheet 3.1 Survey Example. It was modified to be more relevant to the Northern Kentucky area. Over 100 people participated in the survey. See results in Appendix A.

## REVIEW AND INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

NKADD staff researched and reviewed relevant studies, reports, technical information obtained through local communities, and State and Federal agencies. The background material included information obtained from local and national data sources related to natural hazards and Geographic Information Systems models. As appropriate, these materials were reviewed by the local and regional committees and incorporated into the planning process and are documented throughout the Plan. Currently, our communities do not have any existing Mitigation or Community Rating System (CRS) plans due to the fact that five of the jurisdictions have only recently (Fall 2015) been accepted into the CRS program, and no other jurisdiction within the planning area participates in the CRS program. Mitigation activities and projects are taking place in the region on a limited basis. Local mitigation activities were reviewed and were incorporated into the Regional plan as appropriate.

Northern Kentucky ADD staff reviewed relevant mitigation material, including current mitigation studies and reports as the Comprehensive Economic Development Strategies plan (CEDS) completed by the Northern Kentucky ADD. NKADD staff researched and reviewed relevant studies, reports, technical information along with GIS information.

Resources were found containing information on natural hazards, historical damage from natural hazards, vulnerable areas and assets, mitigation actions and mitigation projects. As appropriate, these materials were incorporated into the plan and are documented throughout the plan.

The following items were reviewed in the preparation of this plan:

### A. Comprehensive Plans

Boone County Comprehensive Plan

Pendleton County Comprehensive Plan

Kenton County Comprehensive Plan

Campbell County Comprehensive Plan

Gallatin County Comprehensive Plan

City of Alexandria Comprehensive Plan

City of Bellevue Comprehensive Plan

City of Owenton Comprehensive Plan

City of Cold Spring Comprehensive Plan

City of Carrollton Comprehensive Plan

City of Highland Heights Comprehensive Plan

Comprehensive plans consist of existing conditions and a discussion of future trends, goals, and objectives. Land-use patterns, housing conditions, population, roadways, and other infrastructure are also included. Additionally, educational facilities along with recreation and other government facilities are reviewed. Comprehensive plans deal with the land-use related issues relevant to each of these topics.

B. County Emergency Operations Plans

Boone County Emergency Operations Plan

Campbell County Emergency Operations Plan

Carroll County Emergency Operations Plan

Gallatin County Emergency Operations Plan

Grant County Emergency Operations Plan

Kenton County Emergency Operations Plan

Owen County Emergency Operations Plan

Pendleton County Emergency Operations Plan

Each county creates and maintains an emergency response plan in accordance with KRS Chapters 39A to 39F. These plans were a source for organizational charts and mutual aid agreements. The EOPs include emergency communications capabilities and severe weather warning systems. They include information on first responders, volunteer and nonprofit agencies. These EOPs were a valuable source of information for both risk assessment and vulnerability assessment for the hazard mitigation plan.

#### C. Northern Kentucky ADD Comprehensive Economic Development Strategy

The NKADD Comprehensive Economic Development Strategy (CEDS) is prepared and maintained by the Northern Kentucky Area Development District. It includes an economic analysis of the region and exhaustive lists of information and action plans in areas including the following:

Economy, Education, Workforce Development, Infrastructure, Livable Community, Environment, Health, Housing, Aging, Transportation, and Water/Wastewater

The CEDS also includes a list of projects organized by jurisdiction. This document proved to be a valuable source for the vulnerability assessment phase of the plan and to identify existing and proposed projects to include in the Northern Kentucky Hazard Mitigation Plan.

#### D. Kentucky Agricultural Emergency Response Plan

Kentucky Agricultural Emergency Management Plan

These plans were created by the State Department of Agriculture. The contact is the Office of the State Veterinarian. These response plans are specifically related to the agricultural community. The plans reference food, safety, animal emergencies, and environmental emergencies in addition to natural hazards.

#### E. Northern Kentucky ADD Water Management Plan

Northern Kentucky ADD Wastewater Management Plan

The NKADD Water/Wastewater Management Plans includes information about area water resources, water lines, and wastewater. It includes an infrastructure inventory and plans and projects for counties and cities. Water quality, flood management, water management and land use, and environmental resources are discussed as well.

#### F. OKI Regional Transportation Concept Plan

OKI Regional Transportation Plan

This plan is utilized as a resource document for the entire region while developing goals and objectives for the transportation system, identifying and evaluating needs, reviewing and documenting projects, and throughout the prioritization/ranking process.

#### G. Kentucky Public Service Commission Ike and Ice Report

After the September 2008 wind storm caused by the remnants of Hurricane Ike and the January 2009 ice storm, the Kentucky Public Service Commission (PSC) initiated a review of utility performance. One of the topics addressed included disaster preparedness including, a comprehensive look at the feasibility and advisability of burying many or all above ground electric lines, possible approaches to system hardening, revisions to construction standards, vegetation management and cost recovery.

H. Disaster Declarations in the Commonwealth of Kentucky 2000-2016.

All disaster declarations are included, not just that directly affected the NKADD area because the NKADD area is eligible to apply for hazard mitigation funds through any disaster declaration in Kentucky.

Kentucky Severe Storms, Tornadoes, Flooding, Landslides, and Mudslides (DR-4239)

Incident Period: August 2, 2016 – August 6, 2016

Major Disaster Declaration declared on August 26, 2016

Kentucky Severe Storms, Tornadoes, Straight-line Winds, Flooding, Landslides, and Mudslides (DR-4239)

Incident period: July 11, 2015 to July 20, 2015

Major Disaster Declaration declared on August 12, 2015

Kentucky Severe Winter Storm, Snowstorm, Flooding, Landslides, and Mudslides (DR-4218)

Incident period: March 3, 2015 to March 9, 2015

Major Disaster Declaration declared on May 12, 2015

Kentucky Severe Storms, Tornadoes, Flooding, Landslides, and Mudslides (DR-4217)

Incident period: April 2, 2015 to April 17, 2015

Major Disaster Declaration declared on May 1, 2015

Kentucky Severe Winter Storms, Snowstorms, Flooding, Landslides, and Mudslides (DR-4216)

Incident period: February 15, 2015 to February 22, 2015

Major Disaster Declaration declared on April 30, 2015

Kentucky Severe Storms, Flooding, Landslides, and Mudslides (DR-4196)

Incident period: August 18, 2014 to August 24, 2014

Major Disaster Declaration declared on September 30, 2014

Kentucky Severe Storms, Tornadoes, Straight-line Winds, and Flooding (DR-4057)

Incident period: February 29, 2012 to March 3, 2012

Major Disaster Declaration declared on March 6, 2012

Kentucky Severe Storms, Tornadoes, and Flooding (DR-4008)

Incident period: June 19, 2011 to June 23, 2011

Major Disaster Declaration declared on July 25, 2011

Kentucky Severe Storms, Tornadoes, and Flooding (DR-1976)

Incident period: April 12, 2011 to May 20, 2011

Major Disaster Declaration declared on May 4, 2011

Kentucky Severe Storms, Flooding, and Mudslides (DR-1925)

Incident period: July 17, 2010 to July 30, 2010

Major Disaster Declaration declared on July 23, 2010

Kentucky Severe Storms, Flooding, Mudslides, and Tornadoes (DR-1912)

Incident period: May 1, 2010 to June 1, 2010

Major Disaster Declaration declared on May 11, 2010

Kentucky Severe Storms, Straight-line Winds, and Flooding (DR-1855)

August 4, 2009

Major Disaster Declaration declared on August 14, 2009



Kentucky Severe Storms, Tornadoes, Flooding, and Mudslides (DR-1841)

Incident period: May 3, 2009 to May 20, 2009

Major Disaster Declaration declared on May 29, 2009

Kentucky Severe Winter Storm and Flooding (DR-1818)

Incident period: January 26, 2009 to February 13, 2009

Major Disaster Declaration declared on February 5, 2009

Kentucky Severe Wind Storm associated with Tropical Depression Ike (DR-1802)

Incident period: September 12, 2008 to September 14, 2008

Major Disaster Declaration declared on October 9, 2008

Kentucky Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides (DR-1757)

Incident period: April 3, 2008 to April 4, 2008

Major Disaster Declaration declared on May 19, 2008

Kentucky Severe Storms, Tornadoes, Straight-line Winds, and Flooding (DR-1746)

Incident period: February 5, 2008 to February 6, 2008

Major Disaster Declaration declared on February 21, 2008

Kentucky Severe Storms, Flooding, Mudslides, and Rockslides (DR-1703)

Incident period: April 14, 2007 to April 15, 2007

Major Disaster Declaration declared on May 25, 2007

Kentucky Severe Storms and Tornadoes (DR-1617)

November 15, 2005

Major Disaster Declaration declared on December 1, 2005

Kentucky Severe Winter Storm and Record Snow (DR-1578)

Incident period: December 21, 2004 to December 23, 2004

Major Disaster Declaration declared on February 8, 2005

Kentucky Severe Storms and Flooding (DR-1537)

Incident period: July 13, 2004 to July 15, 2004

Major Disaster Declaration declared on August 6, 2004

Kentucky Severe Storms, Tornadoes, Flooding, and Mudslides (DR-1523)

Incident period: May 26, 2004 to June 18, 2004

Major Disaster Declaration declared on June 10, 2004

Kentucky Severe Storms, Flooding, Mud and Rock Slides, and Tornadoes (DR-1475)

Incident period: June 14, 2003 to June 27, 2003

Major Disaster Declaration declared on July 2, 2003

Kentucky Severe Storms, Flooding, Mud and Rock Slides, and Tornadoes (DR-1471)

Incident period: May 4, 2003 to May 27, 2003

Major Disaster Declaration declared on June 3, 2003

Kentucky Severe Winter Storms (DR-1454)

Incident period: February 15, 2003 to February 26, 2003

Major Disaster Declaration declared on March 14, 2003

Kentucky Severe Storms, Tornadoes and Flooding (DR-1414)  
Incident period: April 27, 2002 to May 10, 2002  
Major Disaster Declaration declared on May 7, 2002

Kentucky Storms and Flooding (DR-1407)  
Incident period: March 17, 2002 to March 21, 2002  
Major Disaster Declaration declared on April 4, 2002

Kentucky Severe Storms and Flooding (DR-1388)  
Incident period: July 27, 2001 to August 21, 2001  
Major Disaster Declaration declared on August 15, 2001

Kentucky Severe Storms And Flooding (DR-1320)  
Incident period: February 18, 2000 to March 2, 2000  
Major Disaster Declaration declared on February 28, 2000

Kentucky Tornadoes, Severe Storms, Torrential Rains And Flash Flooding (DR-1310)  
Incident period: January 3, 2000 to January 4, 2000  
Major Disaster Declaration declared on January 10, 2000

## DOCUMENTATION OF THE PLANNING PROCESS

The mitigation planning process sought input from public officials, emergency management personnel and private citizens of each jurisdiction at every stage development of the Plan. Section 3.1.3 described these stages and the groups and individuals involved in detail.

The Local Mitigation Committees held meetings in their respective counties. The public input from these committees impacted the process and is documented throughout the Plan. Meeting notes, PowerPoints, maps, attendance records, and information reviewed has been documented and is on file at the Northern Kentucky Area Development District office.

All components of the Risk Assessment were developed using the best available data in the Northern Kentucky Region. During the process of Hazard Identification, NKADD staff used GIS resources to identify hazards that affect the Northern Kentucky Region. NKADD staff identified hazards and the mitigation committees reviewed and discussed the information. Local committees evaluated potential hazards and their effects in order to formulate mitigation strategies to respond to them. The county committees used FEMA Publication 386-2, *Understanding Your Risk, section 1, Identify Hazards*. Committee members researched local records of the Emergency Management office, local newspapers, historical knowledge provided by participants, local officials and community members, as well as information from the GIS department of the NKADD.

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

The NKADD staff coordinated the planning process and assisted the County Emergency Manager to chair the committee meetings and provided assistance throughout the planning process. NKADD staff assisted with committee organization and guided the planning process including gathering, presenting and documenting all

supporting data required for the development of the risk assessment and the mitigation strategy. NKADD staff provided input on the establishment of plan maintenance and will assist in the plan adoption process.

NKADD staff provided GIS support required to develop the Plan, including research and data models leading to the identification of hazards, the profiling of hazard events, assessing vulnerabilities and identifying assets. Using ArcGIS 10.2.2 software NKADD staff used available GIS data resources including Census data, USGS topography data, FIRM Floodplain maps, HAZUS-MH and other resources to produce maps, charts and graphs to illustrate the data to be reviewed by the mitigation committees.

### 3.3 RISK ASSESSMENT

The Northern Kentucky Area Development District has developed a Risk Assessment for the Multi-Jurisdictional Hazard Mitigation Plan for the 8 counties and 52 incorporated cities within the planning region. The Risk Assessments that follow are separated into County ‘Annexes’. The purpose of this is to make this plan more user-friendly for the cities and counties, so that they can quickly find the information that pertains to them. There is also a Regional Risk Assessment section, which summarizes and provides an overview of the hazards to all the counties.

#### IDENTIFYING HAZARDS

Based on guidance in the FEMA publication “Understanding Your Risks, Identifying Hazards, and Estimating Losses”, NKADD staff along with mitigation planning committee members researched the natural hazards that could potentially affect the region. An initial list of natural hazards was composed and subsequently narrowed to include only those hazards that pose a significant threat. These judgments were based on historical evidence, probability statistics, and input from committee members and the public. The following natural hazards were considered and identified by the planning committee members as high, moderate, low or no potential threat. These were ranked by county and averaged for the region.

| <b>High</b>                            | <b>Moderate</b>      | <b>Low</b>           | <b>None</b> |
|----------------------------------------|----------------------|----------------------|-------------|
| Flooding                               | Tornadoes            | Drought/Extreme Heat | Tsunami     |
| Thunderstorms/Hail/Straight Line Winds | Severe Winter Storms | Dam/Levee Failure    | Volcanoes   |
|                                        | Landslides           | Earthquakes          |             |
|                                        |                      | Wildfires            |             |
|                                        |                      | Hurricane Wind       |             |
|                                        |                      | Fog                  |             |

## HAZARDS CONSIDERED THREATS TO THE NKADD REGION

| Hazard                        | Data Considered                                                                                                                                                                                                                                                                 | Why Identified as a Risk                                                                                                                                                                                                                                                            |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flooding/<br>Flash Flooding   | <ul style="list-style-type: none"> <li>Review of Past Disaster Damage</li> <li>Local Emergency Management Office Records</li> <li>Public Input</li> <li>Review of FIRMs</li> <li>Review of Previous Projects in Jurisdictions</li> <li>National Climatic Data Center</li> </ul> | <ul style="list-style-type: none"> <li>Affects the Region Frequently</li> <li>The Geographical Features show many streams, rivers</li> <li>Maps show many flood prone areas</li> <li>Review of Existing Reports</li> </ul>                                                          |
| Tornado                       | <ul style="list-style-type: none"> <li>Review of Past Disaster Damage</li> <li>Review of Past Tornado Events from NOAA Storm Prediction Center</li> <li>Public Input</li> <li>Wind Zone Map of United States</li> <li>National Climatic Data Center</li> </ul>                  | <ul style="list-style-type: none"> <li>Numerous Past Events</li> <li>NOAA Storm Prediction Center information shows all jurisdictions affected</li> <li>Local Records identified events</li> <li>Wind Zone Maps identifies region in Highest Wind Zone Area of +250 mph.</li> </ul> |
| Severe Winter Storm           | <ul style="list-style-type: none"> <li>Review of Past Disaster Damages from FEMA</li> <li>Planning Committees and Public Input</li> <li>News Articles</li> <li>National Climatic Data Center</li> </ul>                                                                         | <ul style="list-style-type: none"> <li>Many past events in the Region</li> <li>Widespread – Affects ALL Jurisdictions</li> <li>Variety of events including Snow and Ice Storms</li> </ul>                                                                                           |
| Thunderstorm/Severe Wind/Hail | <ul style="list-style-type: none"> <li>Review of Past Disaster Damages</li> <li>Planning Committees and Public Input</li> <li>National Climatic Data Center</li> </ul>                                                                                                          | <ul style="list-style-type: none"> <li>Many past events in the Region</li> <li>Widespread – Affects ALL Jurisdictions</li> </ul>                                                                                                                                                    |
| Landslide                     | <ul style="list-style-type: none"> <li>Input from organizations that are responsible for road and utility maintenance and repair</li> <li>Hazard areas identified by the Kentucky Geological Survey</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>Local Input identified many areas that are affected</li> <li>Maps show moderate to high risk potential in region.</li> <li>High costs associated with repairing infrastructure.</li> </ul>                                                   |
| Dam/Levee Failure             | <ul style="list-style-type: none"> <li>Kentucky Division of Water dam inventory</li> <li>National Performance of Dams Program</li> <li>US Army Corps of Engineers classifications</li> </ul>                                                                                    | <ul style="list-style-type: none"> <li>Each county has one or a few dams that are high-risk to loss of life and property</li> </ul>                                                                                                                                                 |
| Earthquakes                   | <ul style="list-style-type: none"> <li>Review of Past Disaster Damage</li> <li>Public Input</li> <li>Historical records</li> <li>USGS Earthquake potential models</li> </ul>                                                                                                    | <ul style="list-style-type: none"> <li>Earthquake potential maps show region to be within an area of potential risk</li> <li>Historical records show earthquakes have occurred near the NKADD region</li> </ul>                                                                     |
| Hurricane Wind                | <ul style="list-style-type: none"> <li>Planning Committees and Public Input</li> </ul>                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Hurricane after-effects reach the NKADD area frequently. We have experienced a lot of damage from high winds and flooding from hurricane aftermath</li> </ul>                                                                                |

## HAZARDS NOT CONSIDERED THREATS TO THE NKADD REGION

| Hazard            | Data Considered                                                                                                                                                  | Why Identified as No Risk                                                                                                                                                                        |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tsunami           | <ul style="list-style-type: none"> <li>National Climatic Data Center</li> <li>Tsunami Hazard Maps</li> </ul>                                                     | <ul style="list-style-type: none"> <li>Tsunamis only affect the West Coast and the Caribbean</li> </ul>                                                                                          |
| Fog               | <ul style="list-style-type: none"> <li>Local Input</li> </ul>                                                                                                    | <ul style="list-style-type: none"> <li>While Fog is a risk to for drivers, Fog does not directly cause damages to property.</li> </ul>                                                           |
| Drought/Heat Wave | <ul style="list-style-type: none"> <li>Planning Committees and Public Input</li> </ul>                                                                           | <ul style="list-style-type: none"> <li>Only 2 events of Extreme Heat and No recorded events of drought. Drought has the potential for crop damage/loss, but no information was found.</li> </ul> |
| Wildfires         | <ul style="list-style-type: none"> <li>Review of Maps from Division of forestry of Fire Danger Class</li> <li>Public Input</li> <li>Review of Damages</li> </ul> | <ul style="list-style-type: none"> <li>No damages to property or loss of life due to wildfire.</li> <li>Only 1 minor historical event of disasters in area.</li> </ul>                           |
| Volcanoes         | <ul style="list-style-type: none"> <li>Kentucky Geological Survey</li> <li>United State Geological Survey</li> <li>Local and Public Input</li> </ul>             | <ul style="list-style-type: none"> <li>There are no active volcanoes near the NKADD region.</li> <li>No historical occurrences.</li> </ul>                                                       |

## REGIONAL RISK ASSESSMENT

### PROFILING HAZARDS

This section will discuss each hazard in detail; including the likelihood of occurrence and the risks they pose to the region. Data presented in this section includes both incorporated and unincorporated areas of each county wherever possible. For most datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included in the county total.

### TORNADO

A tornado is a mobile, destructive vortex of violently rotating winds having the appearance of a funnel-shaped cloud and advancing beneath a large storm system. 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. Peak months of tornado activity are usually April, May, and June. However, tornadoes have occurred in every month and at all times of the year. They tend to occur in the afternoons and evenings.

The NKADD region is within wind zone four of the Design Wind Speeds map in the FEMA publication “Taking Shelter From the Storm: Building a Safe Room Inside Your House”. This wind classification places the region in the high risk category for tornados. According to National Severe Storms Laboratory probability statistics for tornados, the NKADD region is likely to experience between ten to fifteen F2 or greater tornado days per century.

## Types of Tornadoes:

The magnitude of a tornado is determined by the Enhanced-Fujita Scale, an updated version of the Fujita-Pearson Scale. The six categories for the EF scale are listed below, in order of increasing intensity. For the actual EF scale in practice, damage indicators (the type of structure which has been damaged) are predominately used in determining the tornado intensity. There are 28 damage indicators and they take into account quality of construction.

| Scale | Wind speed<br>(Estimated) <sup>[5]</sup> | Relative<br>frequency | Potential damage                                                                                                                                                                                                                                                           |
|-------|------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | mph                                      |                       |                                                                                                                                                                                                                                                                            |
|       |                                          |                       | Minor or no damage.                                                                                                                                                                                                                                                        |
| EF0   | 65–85                                    | 53.5%                 | 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.                                    |
|       |                                          |                       | Moderate damage.                                                                                                                                                                                                                                                           |
| EF1   | 86–110                                   | 31.6%                 | Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.                                                                                                                                                 |
|       |                                          |                       | Considerable damage.                                                                                                                                                                                                                                                       |
| EF2   | 111–135                                  | 10.7%                 | 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.                                                                   |
|       |                                          |                       | Severe damage.                                                                                                                                                                                                                                                             |
| EF3   | 136–165                                  | 3.4%                  | 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.                          |
|       |                                          |                       | Extreme damage.                                                                                                                                                                                                                                                            |
| EF4   | 166–200                                  | 0.7%                  | Well-constructed and whole frame houses completely leveled; cars and other large objects thrown and small missiles generated.                                                                                                                                              |
|       |                                          |                       | Total destruction of buildings.                                                                                                                                                                                                                                            |
| EF5   | >200                                     | <0.1%                 | Strong framed, well built houses leveled off foundations and 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. |

<http://www.spc.noaa.gov/efscale/ef-scale.html>

## Impacts:

- The primary impacts of tornado outbreaks affect infrastructure and human life most directly. Catastrophic damage may result from tornadoes leaving houses, businesses, and even streets destroyed.
- The secondary impacts of loss of critical infrastructure may result in hazards and additional problems well after a tornado has passed. Citizens may be without shelter, power, or running water for several days, depending on the severity of the tornado.
- Loss of critical infrastructure may also impact local or regional economies by inhibiting transportation of goods and the availability of certain services.

## Narratives:

Tornado, 3/2/2012, Campbell County: Thunderstorms developed during the afternoon in a high wind shear environment ahead of a strengthening low pressure system. Many of these storms became severe, with large hail, damaging thunderstorm winds, and tornadoes all being the main threats. Isolated flooding also became possible due to the intense rainfall. The tornado initially touched down in south central Campbell County at 1639 EST near Peach Grove Road and crossed Fisher Road northwest of Peach Grove. The tornado then crossed into Pendleton County at 1641 EST after producing high end EF3 damage along Reid Ridge Road near the Campbell and Pendleton County line. The tornado then moved across Mays Road producing significant and widespread EF2 to low end EF3 damage. The tornado then crossed AA highway and eventually the Ohio River, after crossing Kentucky Highway 8. Based on the damage surveyed, the maximum wind speed of the tornado was estimated to be 160 miles per hour in Campbell County and 140 miles per hour in Pendleton County. The tornado traveled a total of 2.68 miles in Campbell County, and 4 miles in Pendleton County. The tornado then moved into Clermont County Ohio at 1646 EST, where it hit the town of Moscow, causing EF3 damage. The tornado continued on the ground across Clermont County, crossing into Brown County at 1658 EST. The tornado then lifted south of Hamersville in western Brown County at 1702 EST. This tornado caused extensive damage to structures and trees along its entire path on both sides of the Ohio River. Numerous homes were very heavily damaged or destroyed. Many homes lost their roofs, having complete exterior wall failure. Some modular homes were completely removed from their foundations, lifted, and thrown in excess of 100 yards where they were destroyed. The damage in Ohio from this tornado was consistent with maximum winds estimated at 160 miles per hour in Clermont County, and 100 miles per hour in Brown County. The tornado traveled a total of 11.04 miles in Clermont County, and 2.69 miles in Brown County.

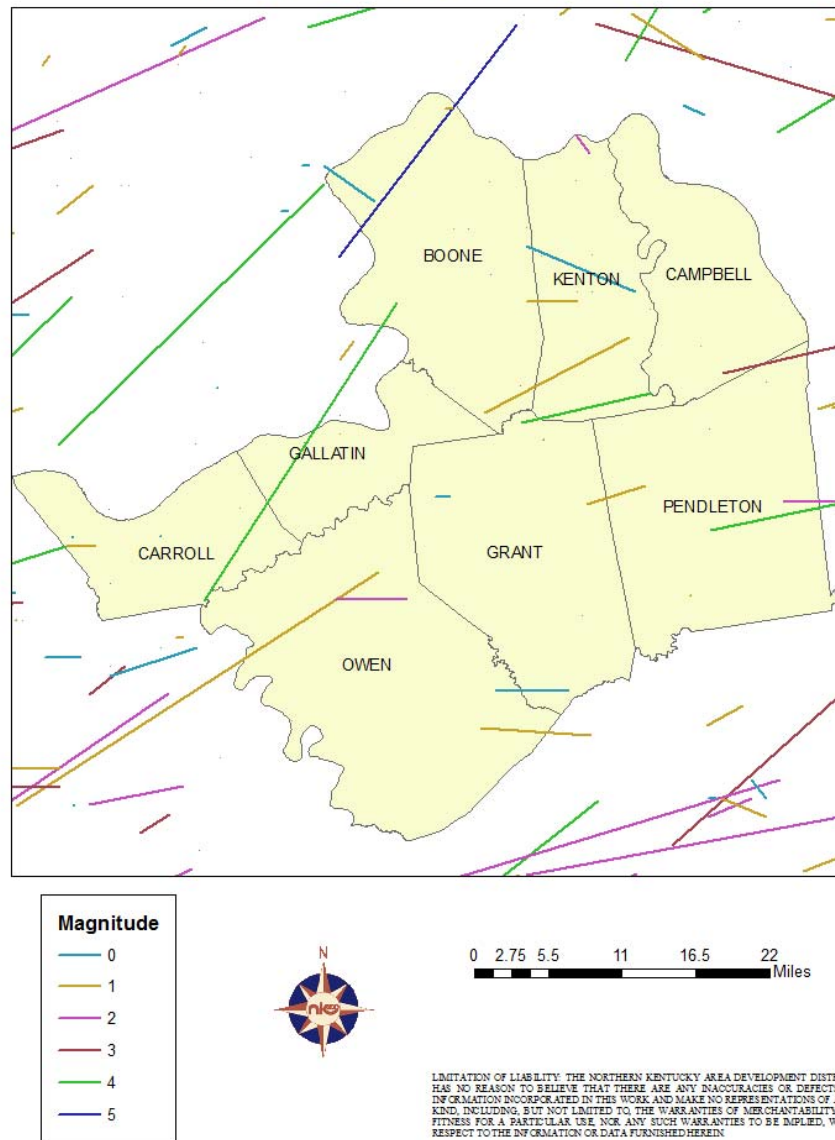
Tornado, 4/23/2011, Grant County: A line of storms moved through during the afternoon hours of April 23rd. Damaging thunderstorm winds, tornadoes, and flash flooding occurred with this event. On Folsom-Jonesville Road the tornado destroyed a garage, damaged a trailer, and damaged another nearby house. When the tornado crossed Warsaw Road it destroyed a barn. Numerous trees were also blown down along the path of the tornado. The maximum estimated wind speed based on damage is 70 miles per hour.

## Profiling Hazards: Tornado

| <b>Tornado Wind Profile Risk Table</b> |                                                                                                                                                                                                                                                  |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                              | All areas in NKADD are susceptible                                                                                                                                                                                                               |
| Period of Occurrence:                  | Spring, Summer, Fall, Winter                                                                                                                                                                                                                     |
| Number of Events (1956-2014):          | 50                                                                                                                                                                                                                                               |
| Annual Rate of Occurrence:             | 0.86                                                                                                                                                                                                                                             |
| Probability of Future Events:          | Likely                                                                                                                                                                                                                                           |
| Warning Time:                          | Minutes to hours                                                                                                                                                                                                                                 |
| Potential Impacts:                     | Utility damage and outages, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases. Impacts human life, health, and public safety. |
| Recorded losses:                       | \$65,596,500.00                                                                                                                                                                                                                                  |
| Annualized Loss:                       | \$1,130,974.10                                                                                                                                                                                                                                   |
| Extent (Scale)                         | Tornado (Pendleton)<br>4/23/1968<br>Scale: F4<br>Damages: 4 deaths, 350 injuries, \$25,000,000                                                                                                                                                   |

*NCDC Storm Events Database: collected 10/6/15*

## Tornado Touchdowns 1950-2014



*Information obtained from the NOAA Storm Prediction Center*

### Tornado Events:

| COUNTY | DATE      | EVENT TYPE | F_SCALE | DEATHS | INJURIES | Property Damage (dollars) |
|--------|-----------|------------|---------|--------|----------|---------------------------|
| BOONE  | 7/13/1956 | Tornado    | F2      | 0      | 12       | 2500000                   |
| BOONE  | 3/19/1963 | Tornado    | F1      | 0      | 4        | 25000                     |
| BOONE  | 2/15/1967 | Tornado    | F1      | 0      | 0        | 25000                     |
| BOONE  | 2/15/1967 | Tornado    | F1      | 0      | 0        | 25000                     |
| BOONE  | 9/29/1973 | Tornado    | F2      | 0      | 0        | 250000                    |



| COUNTY    | DATE       | EVENT TYPE | F_SCALE | DEATHS | INJURIES | Property Damage (dollars) |
|-----------|------------|------------|---------|--------|----------|---------------------------|
| BOONE     | 4/3/1974   | Tornado    | F5      | 0      | 20       | 2500000                   |
| BOONE     | 6/24/1976  | Tornado    | F1      | 0      | 1        | 2500                      |
| BOONE     | 4/2/1977   | Tornado    | F1      | 0      | 0        | 250000                    |
| BOONE     | 4/8/1980   | Tornado    | F2      | 0      | 4        | 25000                     |
| BOONE     | 7/26/1984  | Tornado    | F0      | 0      | 0        | 25000                     |
| BOONE     | 6/2/1990   | Tornado    | F1      | 0      | 0        | 250000                    |
| BOONE     | 4/9/1991   | Tornado    | F1      | 0      | 0        | 250000                    |
| BOONE     | 6/18/1992  | Tornado    | F0      | 0      | 0        | 250                       |
| BOONE     | 11/22/1992 | Tornado    | F4      | 0      | 0        | 2500                      |
| CAMPBELL  | 07/11/1958 | Tornado    | F2      | 0      | 8        | 250.00K                   |
| CAMPBELL  | 11/25/1973 | Tornado    | F1      | 0      | 2        | 25.00K                    |
| CAMPBELL  | 03/02/2012 | Tornado    | EF3     | 0      | 0        | 1.000M                    |
| CARROLL   | 05/22/1957 | Tornado    | F2      | 0      | 0        | 25.00K                    |
| CARROLL   | 02/10/1959 | Tornado    | F3      | 0      | 6        | 2.500M                    |
| CARROLL.  | 03/04/1967 | Tornado    | unkn    | 0      | 0        | 0.00K                     |
| CARROLL   | 09/26/1976 | Tornado    | F1      | 0      | 0        | 25.00K                    |
| CARROLL   | 07/20/1988 | Tornado    | F0      | 0      | 0        | 25.00K                    |
| CARROLL   | 08/08/1991 | Tornado    | F0      | 0      | 0        | 2.50K                     |
| CARROLL   | 11/22/1992 | Tornado    | F4      | 1      | 9        | 2.500M                    |
| CARROLL   | 03/01/2012 | Tornado    | EF1     | 0      | 0        | 1.277M                    |
| GALLATIN  | 05/08/1996 | Tornado    | F1      | 0      | 7        | 10.00K                    |
| GALLATIN  | 07/07/2014 | Tornado    | EF0     | 0      | 0        | 150.00K                   |
| GRANT     | 09/26/1976 | Tornado    | F1      | 1      | 0        | 250.00K                   |
| GRANT     | 04/23/2011 | Tornado    | EF0     | 0      | 0        | 25.00K                    |
| GRANT     | 04/23/2011 | Tornado    | EF1     | 0      | 0        | 30.00K                    |
| KENTON    | 07/09/1965 | Tornado    | F1      | 0      | 0        | 0.25K                     |
| KENTON    | 04/02/1977 | Tornado    | F1      | 0      | 0        | 250.00K                   |
| KENTON    | 11/19/1981 | Tornado    | F1      | 0      | 2        | 2.500M                    |
| KENTON    | 05/02/1983 | Tornado    | F1      | 0      | 0        | 25.00K                    |
| KENTON    | 07/26/1984 | Tornado    | F0      | 0      | 0        | 25.00K                    |
| KENTON    | 04/09/1991 | Tornado    | F1      | 0      | 0        | 250.00K                   |
| KENTON    | 04/23/2011 | Tornado    | EF1     | 0      | 0        | 15.00K                    |
| OWEN CO.  | 04/03/1974 | Tornado    | F1      | 0      | 0        | 2.50K                     |
| OWEN CO.  | 11/22/1992 | Tornado    | F1      | 0      | 0        | 25.00K                    |
| OWEN CO.  | 03/02/2012 | Tornado    | EF2     | 0      | 3        | 320.00K                   |
| PENDLETON | 07/19/1956 | Tornado    | F2      | 0      | 0        | 250.00K                   |
| PENDLETON | 04/23/1968 | Tornado    | F4      | 4      | 350      | 25.000M                   |
| PENDLETON | 11/15/1989 | Tornado    | F1      | 0      | 2        | 25.00K                    |
| PENDLETON | 05/08/1996 | Tornado    | F2      | 0      | 2        | 75.00K                    |
| PENDLETON | 06/04/2008 | Tornado    | EF0     | 0      | 0        | 60.00K                    |
| PENDLETON | 04/23/2011 | Tornado    | EF1     | 0      | 0        | 5.00K                     |

| COUNTY    | DATE       | EVENT TYPE | F_SCALE | DEATHS | INJURIES | Property Damage (dollars) |
|-----------|------------|------------|---------|--------|----------|---------------------------|
| PENDLETON | 03/02/2012 | Tornado    | EF3     | 0      | 0        | 2.000M                    |
| PENDLETON | 12/23/2015 | Tornado    | EF1     | 0      | 3        | 120.00K                   |

## HAIL

Hail is commonly associated with severe storms. While severe storms and super cell storms usually produce the most damaging hail occurrences, many non-super cell storms have produced golf ball size hail. Storms which produce hail are more frequent during the late spring and early summer months.

Although there is no scientific classification of hail, NOAA provides the following comparisons to identify hail sizes with common items.

| NOAA Hail Size Comparison |                   |
|---------------------------|-------------------|
| Non-Severe Sizes          |                   |
| Pea                       | ¼ inch diameter   |
| Marble                    | ½ inch diameter   |
| Severe Sizes              |                   |
| Dime/Penny                | ¾ inch diameter   |
| Nickel                    | 7/8 inch diameter |
| Quarter                   | 1 inch diameter   |
| Ping-Pong Ball            | 1 ½ inch diameter |
| Golf Ball                 | 1 ¾ inch diameter |
| Tennis Ball               | 2 ½ inch diameter |
| Baseball                  | 2 ¾ inch diameter |
| Tea Cup                   | 3 inch diameter   |
| Grapefruit                | 4 inch diameter   |
| Softball                  | 4 ½ inch diameter |

## Hail Impacts:

The primary impacts of hail are mainly property and infrastructure damages, including crop damages, and personal injuries. Although extensive damage occurs as a result of hail, the event by itself causes few, if any, additional hazards.

| Hail Profile Risk Table       |                                                                                                                                                                                                                                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                     | All areas in NKADD are susceptible                                                                                                                                                                                                          |
| Period of Occurrence:         | Any time of the year, but especially April to June                                                                                                                                                                                          |
| Number of Events (1956-2014): | 259                                                                                                                                                                                                                                         |
| Annual Rate of Occurrence:    | 4.47                                                                                                                                                                                                                                        |
| Probability of Future Events: | Highly Likely                                                                                                                                                                                                                               |
| Warning Time:                 | Predicting hail is difficult. Most advance warning comes from knowledge of conditions present that could produce hail; it is minutes to an hour at best.                                                                                    |
| Potential Impacts:            | Impacts to human life, health and public safety are possible. Utility damage and failure, infrastructure damage, structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases are additional impacts. |
| Recorded losses:              | \$165,000.00                                                                                                                                                                                                                                |

|                  |                                                                                            |
|------------------|--------------------------------------------------------------------------------------------|
| Annualized Loss: | \$2,844.83                                                                                 |
| Extent (Scale)   | Hail (Boone)<br>6/25/2009<br>Scale: 1.75 inches<br>Damages: 0 deaths, 0 injuries, \$30,000 |

NCDC Storm Events Database, collected 10/7/15

**Hail Events (past 10 years):**

| COUNTY       | DATE       | EVENT TYPE | Mag.     | DEATHS/INJURIES |   | Property Damage (dollars) |
|--------------|------------|------------|----------|-----------------|---|---------------------------|
| BOONE CO.    | 06/03/2008 | Hail       | 0.75 in. | 0               | 0 | 3.00K                     |
| BOONE CO.    | 06/03/2008 | Hail       | 0.88 in. | 0               | 0 | 3.00K                     |
| BOONE CO.    | 07/22/2008 | Hail       | 0.88 in. | 0               | 0 | 3.00K                     |
| BOONE CO.    | 08/29/2008 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| BOONE CO.    | 02/11/2009 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| BOONE CO.    | 02/11/2009 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| BOONE CO.    | 05/30/2009 | Hail       | 0.88 in. | 0               | 0 | 3.00K                     |
| BOONE CO.    | 06/02/2009 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 06/02/2009 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 06/02/2009 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 06/25/2009 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 06/25/2009 | Hail       | 1.75 in. | 0               | 0 | 30.00K                    |
| BOONE CO.    | 03/12/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 03/12/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 05/21/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/19/2011 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/19/2011 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 05/22/2011 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 06/10/2011 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 03/15/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 03/15/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 03/23/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/25/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/25/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/25/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 05/21/2014 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/09/2015 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/09/2015 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/09/2015 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 04/11/2007 | Hail       | 0.88 in. | 0               | 0 | 2.00K                     |
| CAMPBELL CO. | 04/11/2007 | Hail       | 0.75 in. | 0               | 0 | 2.00K                     |
| CAMPBELL CO. | 04/26/2007 | Hail       | 0.75 in. | 0               | 0 | 2.00K                     |
| CAMPBELL CO. | 11/05/2007 | Hail       | 0.88 in. | 0               | 0 | 1.00K                     |
| CAMPBELL CO. | 05/30/2009 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| CAMPBELL CO. | 06/02/2009 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 09/08/2009 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/17/2010 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 06/10/2011 | Hail       | 2.00 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/20/2011 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/20/2011 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 03/15/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |

| COUNTY       | DATE       | EVENT TYPE | Mag.     | DEATHS/INJURIES |   | Property Damage (dollars) |
|--------------|------------|------------|----------|-----------------|---|---------------------------|
| CAMPBELL CO. | 04/25/2012 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 04/25/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/25/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/26/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 08/09/2012 | Hail       | 1.75 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 08/09/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 05/21/2014 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 08/03/2015 | Hail       | 2.50 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 06/03/2008 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| CARROLL CO.  | 06/02/2009 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 08/04/2009 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 03/12/2010 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 03/02/2012 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 03/02/2012 | Hail       | 4.25 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 03/02/2012 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 03/02/2012 | Hail       | 1.75 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 05/01/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 05/01/2012 | Hail       | 2.50 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 07/19/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 05/21/2014 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| CARROLL CO.  | 05/21/2014 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| GALLATIN CO. | 03/02/2012 | Hail       | 2.75 in. | 0               | 0 | 0.00K                     |
| GALLATIN CO. | 03/15/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| GALLATIN CO. | 05/01/2012 | Hail       | 2.75 in. | 0               | 0 | 20.00K                    |
| GRANT CO.    | 06/04/2008 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| GRANT CO.    | 04/13/2009 | Hail       | 0.88 in. | 0               | 0 | 3.00K                     |
| GRANT CO.    | 06/02/2009 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 06/02/2009 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 05/23/2011 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 03/02/2012 | Hail       | 2.00 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 03/02/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 05/01/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 07/05/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 04/08/2015 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 04/08/2015 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| GRANT CO.    | 04/08/2015 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 04/11/2007 | Hail       | 0.75 in. | 0               | 0 | 2.00K                     |
| KENTON CO.   | 07/15/2007 | Hail       | 0.88 in. | 0               | 0 | 1.00K                     |
| KENTON CO.   | 11/05/2007 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| KENTON CO.   | 11/05/2007 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| KENTON CO.   | 06/25/2009 | Hail       | 1.25 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 09/08/2009 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 03/12/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 05/21/2010 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 05/21/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 10/26/2010 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 04/19/2011 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 05/25/2011 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 03/23/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| KENTON CO.   | 04/25/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |

| COUNTY     | DATE       | EVENT TYPE | Mag.     | DEATHS/INJURIES |   | Property Damage (dollars) |
|------------|------------|------------|----------|-----------------|---|---------------------------|
| KENTON CO. | 04/25/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 04/25/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 04/25/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 07/26/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 08/09/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 08/09/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 04/16/2013 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 04/08/2015 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| KENTON CO. | 06/30/2015 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 04/11/2007 | Hail       | 0.88 in. | 0               | 0 | 3.00K                     |
| OWEN CO.   | 07/17/2007 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| OWEN CO.   | 06/25/2009 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 03/12/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 04/05/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 07/12/2011 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 03/02/2012 | Hail       | 2.75 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 03/02/2012 | Hail       | 2.50 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 04/16/2013 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 04/08/2015 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| OWEN CO.   | 06/18/2015 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 04/11/2007 | Hail       | 0.75 in. | 0               | 0 | 2.00K                     |
| PENDLETON  | 04/13/2009 | Hail       | 0.75 in. | 0               | 0 | 1.00K                     |
| PENDLETON  | 06/25/2009 | Hail       | 0.88 in. | 0               | 0 | 4.00K                     |
| PENDLETON  | 06/15/2010 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 05/10/2011 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 11/14/2011 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 03/15/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 03/15/2012 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 07/08/2012 | Hail       | 0.88 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 07/27/2012 | Hail       | 0.75 in. | 0               | 0 | 0.00K                     |
| PENDLETON  | 04/08/2015 | Hail       | 1.00 in. | 0               | 0 | 0.00K                     |

#### Narratives:

Hail, 6/25/2009, Boone County: A weak boundary along the Ohio River provided a focus for thunderstorm activity ahead of a cold front. This translated to a weak trough axis that extended from northern Kentucky to central Ohio later in the day, also providing a focus for strong storms. Nickel diameter hail to 1.75 inch hail was reported. Trees were blown down. A vehicle and gazebo were damaged. Signs were twisted and a warehouse roof collapsed about one mile north of Hebron.

Hail, 3/15/2012, Gallatin County: A weak upper level disturbance combined with daytime heating to produce thunderstorms during the afternoon and early evening hours. Some of these storms became severe. The main threat from these storms was large hail and localized flooding due to heavy rain.

Hail, 6/30/2015, Owen County: Severe thunderstorms developed ahead of a surface low pressure system and were enhanced by energy from an upper level shortwave.

## THUNDERSTORM/LIGHTNING/STRAIGHT LINE WIND

Thunderstorms often produce extremely severe winds that may cause major damage. Although the intensity of the winds in thunderstorms is less than tornados, they cover a broader geographic area and can leave a much wider damage path. Thunderstorms also occur much more frequently than tornados. Dating back to 1950 in the NKADD region, there were 591 thunderstorm events with severe wind and 203 hail events. The damage in the NCDC database attributes over \$53 million to these thunderstorm events and \$165,000 to hail events. During the same period tornados caused \$65.6 million of damage in 46 events. Thus, the frequency of thunderstorms, which occur over ten times as often as tornados, brings the inflicted damage relatively close to the level of tornados.

Thunderstorm activity can range from mild to severe. Severe thunderstorms can produce winds in excess of 58 miles per hour, ¾ inch diameter hail and/or tornado activity. Four significant considerations when comparing severe thunderstorms and tornadoes: thunderstorms are generally easier for the science community to predict; tornadoes are typically stronger, more intense storms; thunderstorms typically cover a broader, larger area; and, thunderstorms occur far more frequently than tornadoes in Northern Kentucky. For these reasons, the cost of damage resulting from tornados in our region was nearly 25% higher than damage resulting from severe thunderstorms.

Straight-line winds are common with the gust front of a thunderstorm or originate with a downburst from a thunderstorm. These events can cause considerable damage, even in the absence of a tornado. The winds can reach 130 km/h (80 mph) and can last for periods of twenty minutes.

Lightning is a giant spark of electricity in the atmosphere or between the atmosphere and the ground. Although most lightning occurs in the summer, people can be struck at any time of year. Lightning kills an average of 49 people in the United States each year, and hundreds more are severely injured (NOAA).

### Thunderstorm Types:

- Single Cell (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.
- Multicell Cluster. These storms consist of a cluster of storms in varying stages of development. Multicell 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.
- Multicell Line. Multicell 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.
- Supercell. Even though it is the rarest of storm types, the supercell 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.
- Storms with Straight-line Winds. Straight-line winds are convective wind gusts, outflow and downbursts that are produced by the downward momentum in the downdraft of a thunderstorm. An environment conducive to strong straight-line wind is one in which the updrafts and thus downdrafts are strong, the air is dry in the middle troposphere and the storm has a fast forward motion. If these winds meet or exceed 58 miles per hour then the storm is classified as severe by the National Weather Service.
  - A *downdraft* is a small-scale column of air that rapidly sinks toward the ground.
  - A *downburst* is a result of a strong downdraft. A downburst is a strong downdraft with horizontal dimensions larger than 4 km (2.5 mi) resulting in an outward burst of damaging winds on or near

the ground. (Imagine the way water comes out of a faucet and hits the bottom of the sink.) Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.

- A *microburst* is a small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally small (less than 4km across) and short-lived, lasting only 5-10 minutes, with maximum windspeeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- A *gust front* is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- A *derecho* is a widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters. By definition, if the wind damage swath extends more than 240 miles (about 400 kilometers) and includes wind gusts of at least 58 mph (93 km/h) or greater along most of its length, then the event may be classified as a derecho.

#### **There are four different types of lightning:**

1. Cloud to Air. Lightning that occurs when the air around a positively charged cloud top reaches to the negatively charged air around it.
2. Cloud to ground. Lightning that occurs between the cloud and the ground.
  - Bolt from the blue. A positive lightning bolt which originates within the updraft of the storm, typically 2/3rds of the way up, travels horizontally for many miles, then strikes the ground.
  - Anvil Lightning. A positive lightning bolt which develops in the anvil, or top of the thunderstorm cloud, and travels generally straight down to strike the ground.
3. Intra-cloud. The most common type of lightning which happens completely inside the cloud, jumping between different charge regions in the cloud. This is sometimes called sheet lightning because it lights up the sky with a 'sheet' of light.
4. Inter-cloud. Lightning that occurs between two or more separate clouds.

#### **Thunderstorms/Lightning Impacts:**

- Fires may occur in structures such as storage and processing units, aircraft, and electrical infrastructure and components.
- Forest fires may be initiated by lightning. Half the wildfires in the western U.S. are caused by lightning.
- Injury and death to people

#### **Narratives:**

High Wind (Straight Line Wind), 3/9/2002, Boone County: High winds in excess of 60 mph blew down numerous trees, power lines, utility poles, and various signs. Several thousand power outages were noted due to the widespread nature of the winds and the resulting damage.

Thunderstorm, 7/1/2012, Carroll County: An upper level disturbance combined with an unstable air mass to produce numerous thunderstorms during the early evening. The main threat from these storms was damaging winds. Multiple trees were reported down in the area. One tree fell on a car, injuring one person.

| <b>Thunderstorm/Straight Line Wind/ Lightning Profile Risk Table</b> |                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                                                            | All areas in NKADD are susceptible                                                                                                                                                                                                                                                                                                        |
| Period of Occurrence:                                                | Any time of the year, but especially April to June                                                                                                                                                                                                                                                                                        |
| Number of Events (1956-2014):                                        | 725                                                                                                                                                                                                                                                                                                                                       |
| Annual Rate of Occurrence:                                           | 12.5                                                                                                                                                                                                                                                                                                                                      |
| Probability of Future Events:                                        | Highly Likely                                                                                                                                                                                                                                                                                                                             |
| Warning Time:                                                        | Minutes to hours                                                                                                                                                                                                                                                                                                                          |
| Potential Impacts:                                                   | Impacts to human life, health and public safety are possible. Utility damage and failure, infrastructure damage, structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases are additional impacts.                                                                                               |
| Recorded losses:                                                     | \$53,325,250.00                                                                                                                                                                                                                                                                                                                           |
| Annualized Loss:                                                     | \$919,400.86                                                                                                                                                                                                                                                                                                                              |
| Extent (Scale)                                                       | <p>Thunderstorm Wind (Pendleton)<br/>1/3/2000<br/>Scale: 78 kts. EG<br/>Damages: 0 deaths, 0 injuries, \$200,000</p> <p>Lightning (Kenton)<br/>5/15/1996<br/>Damages: 0 deaths, 1 injury, \$50,000</p> <p>High Wind (Straight Line Wind) (Kenton)<br/>9/14/2008<br/>Scale: 60 kts. EG<br/>Damages: 0 deaths, 0 injuries, \$18,200,000</p> |

*NCDC Storm Event Database, collected 10/8/2015*

**Thunderstorm Events (2004-2015)/Wind Events (2000-2015):**

| County    | Date       | Event Type        | Mag. | Deaths | Injuries | Property Damage-\$ |
|-----------|------------|-------------------|------|--------|----------|--------------------|
| BOONE CO. | 08/09/2000 | Thunderstorm Wind | 50   | 0      | 0        | 5.00K              |
| BOONE CO. | 08/17/2000 | Thunderstorm Wind | 50   | 0      | 0        | 5.00K              |
| BOONE CO. | 11/09/2000 | Thunderstorm Wind | 50   | 0      | 0        | 25.00K             |
| BOONE     | 12/11/2000 | High Wind         | 50   | 0      | 0        | 25.00K             |
| BOONE CO. | 04/06/2001 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 06/21/2001 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |
| BOONE CO. | 07/08/2001 | Thunderstorm Wind | 53   | 0      | 0        | 50.00K             |
| BOONE CO. | 07/08/2001 | Thunderstorm Wind | 50   | 0      | 0        | 5.00K              |
| BOONE CO. | 10/24/2001 | Thunderstorm Wind | 52   | 0      | 0        | 0.00K              |
| BOONE     | 03/09/2002 | High Wind         | 55   | 0      | 0        | 12.00K             |
| BOONE CO. | 03/15/2002 | Thunderstorm Wind | 55   | 0      | 0        | 15.00K             |
| BOONE CO. | 04/19/2002 | Thunderstorm Wind | 50   | 0      | 0        | 25.00K             |
| BOONE CO. | 07/29/2002 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 08/11/2002 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |



| County    | Date       | Event Type        | Mag. | Deaths | Injuries | Property Damage-\$ |
|-----------|------------|-------------------|------|--------|----------|--------------------|
| BOONE CO. | 11/10/2002 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |
| BOONE CO. | 07/21/2003 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 05/30/2004 | Thunderstorm Wind | 50   | 0      | 0        | 12.00K             |
| BOONE CO. | 07/10/2004 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 08/04/2004 | Thunderstorm Wind | 50   | 0      | 0        | 30.00K             |
| BOONE CO. | 08/20/2005 | Thunderstorm Wind | 50   | 0      | 0        | 5.00K              |
| BOONE CO. | 03/31/2006 | Thunderstorm Wind | 66   | 0      | 0        | 5.00K              |
| BOONE CO. | 04/02/2006 | Thunderstorm Wind | 60   | 0      | 0        | 0.00K              |
| BOONE CO. | 04/02/2006 | Thunderstorm Wind | 60   | 0      | 0        | 0.00K              |
| BOONE CO. | 04/02/2006 | Thunderstorm Wind | 50   | 0      | 0        | 30.00K             |
| BOONE CO. | 05/18/2006 | Thunderstorm Wind | 52   | 0      | 0        | 3.00K              |
| BOONE CO. | 05/25/2006 | Thunderstorm Wind | 55   | 0      | 0        | 0.00K              |
| BOONE CO. | 05/25/2006 | Thunderstorm Wind | 50   | 0      | 0        | 30.00K             |
| BOONE CO. | 06/07/2006 | Thunderstorm Wind | 52   | 0      | 0        | 4.00K              |
| BOONE CO. | 06/22/2006 | Thunderstorm Wind | 50   | 0      | 0        | 0.00K              |
| BOONE CO. | 12/01/2006 | Thunderstorm Wind | 36   | 0      | 0        | 10.00K             |
| BOONE     | 12/01/2006 | High Wind         | 50   | 0      | 0        | 7.00K              |
| BOONE CO. | 05/15/2007 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 06/08/2007 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 07/15/2007 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |
| BOONE CO. | 10/18/2007 | Thunderstorm Wind | 56   | 0      | 0        | 2.00K              |
| BOONE CO. | 06/04/2008 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 07/08/2008 | Thunderstorm Wind | 61   | 0      | 0        | 12.00K             |
| BOONE CO. | 07/20/2008 | Thunderstorm Wind | 50   | 0      | 0        | 6.00K              |
| BOONE CO. | 07/20/2008 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 07/20/2008 | Thunderstorm Wind | 50   | 0      | 0        | 5.00K              |
| BOONE CO. | 07/20/2008 | Thunderstorm Wind | 50   | 0      | 0        | 10.00K             |
| BOONE CO. | 07/22/2008 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |
| BOONE CO. | 07/22/2008 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |
| BOONE CO. | 08/29/2008 | Thunderstorm Wind | 64   | 0      | 0        | 10.00K             |
| BOONE     | 09/14/2008 | High Wind         | 50   | 0      | 0        | 12.900M            |
| BOONE     | 02/11/2009 | High Wind         | 52   | 0      | 0        | 0.00K              |
| BOONE CO. | 03/08/2009 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE     | 12/09/2009 | High Wind         | 50   | 0      | 0        | 0.00K              |
| BOONE CO. | 06/12/2010 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 06/15/2010 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 06/21/2010 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 06/21/2010 | Thunderstorm Wind | 50   | 0      | 0        | 1.00K              |
| BOONE CO. | 08/14/2010 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 10/26/2010 | Thunderstorm Wind | 60   | 0      | 0        | 0.00K              |
| BOONE CO. | 10/26/2010 | Thunderstorm Wind | 87   | 0      | 0        | 5.00K              |
| BOONE CO. | 04/20/2011 | Thunderstorm Wind | 52   | 0      | 0        | 150.00K            |
| BOONE CO. | 04/20/2011 | Thunderstorm Wind | 50   | 0      | 0        | 0.00K              |
| BOONE CO. | 04/20/2011 | Thunderstorm Wind | 50   | 0      | 0        | 10.00K             |
| BOONE CO. | 05/23/2011 | Thunderstorm Wind | 50   | 0      | 0        | 2.00K              |
| BOONE CO. | 05/25/2011 | Thunderstorm Wind | 58   | 0      | 0        | 1.00K              |
| BOONE CO. | 06/10/2011 | Thunderstorm Wind | 50   | 0      | 0        | 0.00K              |
| BOONE CO. | 08/03/2011 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |
| BOONE CO. | 08/21/2011 | Thunderstorm Wind | 50   | 0      | 0        | 3.00K              |

| County    | Date       | Event Type        | Mag.       | Deaths | Injuries | Property Damage-\$ |
|-----------|------------|-------------------|------------|--------|----------|--------------------|
| BOONE CO. | 07/26/2012 | Thunderstorm Wind | 61         | 0      | 0        | 2.00K              |
| BOONE CO. | 07/27/2012 | Thunderstorm Wind | 55         | 0      | 0        | 0.00K              |
| BOONE CO. | 07/27/2012 | Thunderstorm Wind | 55         | 0      | 0        | 4.00K              |
| BOONE CO. | 07/27/2012 | Thunderstorm Wind | 50         | 0      | 0        | 3.00K              |
| BOONE CO. | 07/27/2012 | Thunderstorm Wind | 50         | 0      | 0        | 1.00K              |
| BOONE CO. | 08/09/2012 | Thunderstorm Wind | 50         | 0      | 0        | 3.00K              |
| BOONE CO. | 08/09/2012 | Thunderstorm Wind | 51         | 0      | 0        | 3.00K              |
| BOONE CO. | 09/07/2012 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| BOONE CO. | 06/23/2013 | Thunderstorm Wind | 54         | 0      | 0        | 5.00K              |
| BOONE CO. | 06/26/2013 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| BOONE CO. | 06/26/2013 | Thunderstorm Wind | 50         | 0      | 0        | 2.00K              |
| BOONE CO. | 11/17/2013 | Thunderstorm Wind | 51         | 0      | 0        | 5.00K              |
| BOONE CO. | 11/17/2013 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| BOONE CO. | 04/28/2014 | Thunderstorm Wind | 50         | 0      | 0        | 1.00K              |
| BOONE CO. | 04/28/2014 | Thunderstorm Wind | 52         | 0      | 0        | 10.00K             |
| BOONE CO. | 04/29/2014 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| BOONE CO. | 04/29/2014 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| BOONE CO. | 04/09/2015 | Thunderstorm Wind | 56         | 0      | 0        | 1.00K              |
| BOONE CO. | 04/09/2015 | Thunderstorm Wind | 56         | 0      | 0        | 7.00K              |
| BOONE CO. | 04/10/2015 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| BOONE CO. | 06/30/2015 | Thunderstorm Wind | 50         | 0      | 0        | 0.75K              |
| BOONE CO. | 06/30/2015 | Thunderstorm Wind | 50         | 0      | 0        | 0.75K              |
| BOONE CO. | 06/30/2015 | Thunderstorm Wind | 50         | 0      | 0        | 0.75K              |
| BOONE CO. | 07/17/2015 | Thunderstorm Wind | 50         | 0      | 0        | 3.00K              |
| BOONE CO. | 07/17/2015 | Thunderstorm Wind | 50         | 0      | 0        | 1.00K              |
| BOONE CO. | 07/17/2015 | Thunderstorm Wind | 50         | 0      | 0        | 0.00K              |
| CAMPBELL  | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CAMPBELL  | 06/14/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| CAMPBELL  | 04/02/2006 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 10.00K             |
| CAMPBELL  | 05/25/2006 | Thunderstorm Wind | 57 kts. MG | 0      | 0        | 0.00K              |
| CAMPBELL  | 07/21/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| CAMPBELL  | 12/01/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| CAMPBELL  | 07/04/2007 | Thunderstorm Wind | 53 kts. MG | 0      | 0        | 1.00K              |
| CAMPBELL  | 07/15/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| CAMPBELL  | 08/16/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 4.00K              |
| CAMPBELL  | 08/29/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CAMPBELL  | 06/03/2008 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 8.00K              |
| CAMPBELL  | 06/04/2008 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 25.00K             |
| CAMPBELL  | 07/20/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CAMPBELL  | 06/26/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 0.00K              |
| CAMPBELL  | 06/12/2010 | Thunderstorm Wind | 52 kts. MG | 0      | 0        | 0.00K              |
| CAMPBELL  | 06/15/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CAMPBELL  | 09/07/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CAMPBELL  | 04/27/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CAMPBELL  | 05/25/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CAMPBELL  | 05/25/2011 | Thunderstorm Wind | 78 kts. EG | 0      | 0        | 20.00K             |
| CAMPBELL  | 04/25/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 0.50K              |
| CAMPBELL  | 04/30/2012 | Thunderstorm Wind | 54 kts. MG | 0      | 0        | 0.00K              |
| CAMPBELL  | 06/29/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| CAMPBELL  | 06/29/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |

| County   | Date       | Event Type        | Mag.       | Deaths | Injuries | Property Damage-\$ |
|----------|------------|-------------------|------------|--------|----------|--------------------|
| CAMPBELL | 07/05/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| CAMPBELL | 07/18/2012 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 10.00K             |
| CAMPBELL | 01/30/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| CAMPBELL | 06/26/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CAMPBELL | 08/31/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| CAMPBELL | 08/31/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| CAMPBELL | 11/17/2013 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 20.00K             |
| CAMPBELL | 11/17/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CAMPBELL | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| CAMPBELL | 05/10/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CAMPBELL | 06/30/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CAMPBELL | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| CAMPBELL | 07/14/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| CAMPBELL | 09/04/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CAMPBELL | 12/23/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 17.50K             |
| CAMPBELL | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |
| CAMPBELL | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 10.00K             |
| CAMPBELL | 09/14/2008 | High Wind         | 60 kts. EG | 0      | 0        | 10.200M            |
| CAMPBELL | 02/11/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |
| CARROLL  | 05/27/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| CARROLL  | 08/04/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 05/19/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| CARROLL  | 01/02/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| CARROLL  | 04/02/2006 | Thunderstorm Wind | 52 kts. MG | 0      | 0        | 4.00K              |
| CARROLL  | 06/28/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 08/16/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 6.00K              |
| CARROLL  | 06/04/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 07/20/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 06/20/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| CARROLL  | 08/10/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 08/10/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| CARROLL  | 06/27/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 07/17/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 10/26/2010 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 5.00K              |
| CARROLL  | 04/20/2011 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 04/28/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| CARROLL  | 11/14/2011 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| CARROLL  | 03/23/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 07/01/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 1        | 10.00K             |
| CARROLL  | 07/01/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| CARROLL  | 07/26/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 07/27/2012 | Thunderstorm Wind | 54 kts. MG | 0      | 0        | 0.00K              |
| CARROLL  | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 05/21/2014 | Thunderstorm Wind | 61 kts. MG | 0      | 0        | 20.00K             |
| CARROLL  | 06/26/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| CARROLL  | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| CARROLL  | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |
| CARROLL  | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 5.00K              |
| CARROLL  | 09/14/2008 | High Wind         | 55 kts. EG | 0      | 0        | 1.200M             |
| CARROLL  | 02/11/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |

| County    | Date       | Event Type        | Mag.       | Deaths | Injuries | Property Damage-\$ |
|-----------|------------|-------------------|------------|--------|----------|--------------------|
| GALLATIN  | 05/27/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| GALLATIN  | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| GALLATIN  | 07/10/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| GALLATIN  | 04/22/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GALLATIN  | 05/19/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 6.00K              |
| GALLATIN  | 07/20/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 6.00K              |
| GALLATIN  | 08/13/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| GALLATIN  | 04/02/2006 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 4.00K              |
| GALLATIN  | 04/11/2007 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 1.00K              |
| GALLATIN  | 07/19/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GALLATIN  | 08/16/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| GALLATIN  | 10/18/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| GALLATIN  | 01/29/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GALLATIN  | 08/27/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GALLATIN  | 10/26/2010 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 2.00K              |
| GALLATIN  | 03/23/2011 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 15.00K             |
| GALLATIN  | 03/23/2011 | Thunderstorm Wind | 56 kts. EG | 0      | 0        | 0.00K              |
| GALLATIN  | 06/29/2012 | Thunderstorm Wind | 52 kts. EG | 0      | 1        | 10.00K             |
| GALLATIN  | 06/29/2012 | Thunderstorm Wind | 61 kts. EG | 0      | 0        | 2.00K              |
| GALLATIN  | 07/08/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GALLATIN  | 07/08/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| GALLATIN  | 07/26/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| GALLATIN  | 09/07/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GALLATIN  | 09/07/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GALLATIN  | 06/26/2013 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 15.00K             |
| GALLATIN  | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| GALLATIN  | 02/20/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| GALLATIN  | 04/29/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| GALLATIN  | 07/07/2014 | Thunderstorm Wind | 70 kts. EG | 0      | 0        | 20.00K             |
| GALLATIN  | 06/18/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| GALLATIN  | 06/26/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| GALLATIN  | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GALLATIN  | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |
| GALLATIN  | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 8.00K              |
| GALLATIN  | 12/01/2006 | High Wind         | 37 kts. ES | 0      | 0        | 14.00K             |
| GALLATIN  | 09/14/2008 | High Wind         | 58 kts. EG | 0      | 0        | 957.00K            |
| GALLATIN  | 02/11/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |
| GRANT CO. | 05/17/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| GRANT CO. | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| GRANT CO. | 09/23/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO. | 03/09/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO. | 04/02/2006 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 10.00K             |
| GRANT CO. | 04/02/2006 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 15.00K             |
| GRANT CO. | 07/14/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO. | 08/09/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO. | 08/09/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| GRANT CO. | 08/16/2007 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 20.00K             |
| GRANT CO. | 02/06/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 20.00K             |
| GRANT CO. | 07/20/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO. | 05/13/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO. | 06/15/2010 | Thunderstorm Wind | 71 kts. EG | 0      | 0        | 0.00K              |

| County     | Date       | Event Type        | Mag.       | Deaths | Injuries | Property Damage-\$ |
|------------|------------|-------------------|------------|--------|----------|--------------------|
| GRANT CO.  | 10/26/2010 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 04/20/2011 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| GRANT CO.  | 04/23/2011 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 12.00K             |
| GRANT CO.  | 04/27/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 04/27/2011 | Thunderstorm Wind | 56 kts. EG | 0      | 0        | 0.00K              |
| GRANT CO.  | 05/25/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 06/29/2012 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| GRANT CO.  | 07/08/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO.  | 07/08/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 07/18/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO.  | 07/18/2012 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO.  | 07/27/2012 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 4.00K              |
| GRANT CO.  | 09/07/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 09/07/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 09/07/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| GRANT CO.  | 11/17/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| GRANT CO.  | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| GRANT CO.  | 10/07/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 0.50K              |
| GRANT CO.  | 06/26/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| GRANT CO.  | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 9.00K              |
| GRANT CO.  | 12/23/2015 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| GRANT      | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |
| GRANT      | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 9.00K              |
| GRANT      | 12/01/2006 | High Wind         | 36 kts. ES | 0      | 0        | 4.00K              |
| GRANT      | 09/14/2008 | High Wind         | 58 kts. EG | 0      | 0        | 2.900M             |
| GRANT      | 02/11/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |
| KENTON CO. | 05/27/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| KENTON CO. | 05/30/2004 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 15.00K             |
| KENTON CO. | 08/20/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 4.00K              |
| KENTON CO. | 05/25/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| KENTON CO. | 05/25/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| KENTON CO. | 06/19/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| KENTON CO. | 06/22/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| KENTON CO. | 07/18/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| KENTON CO. | 12/01/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| KENTON CO. | 06/08/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| KENTON CO. | 07/15/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| KENTON CO. | 06/03/2008 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 5.00K              |
| KENTON CO. | 06/04/2008 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 06/04/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| KENTON CO. | 05/21/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 10/26/2010 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 5.00K              |
| KENTON CO. | 02/28/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| KENTON CO. | 03/23/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 04/19/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 05/23/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 05/23/2011 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| KENTON CO. | 05/25/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 06/29/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 07/18/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 30.00K             |
| KENTON CO. | 07/18/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |

| County     | Date       | Event Type        | Mag.       | Deaths | Injuries | Property Damage-\$ |
|------------|------------|-------------------|------------|--------|----------|--------------------|
| KENTON CO. | 07/27/2012 | Thunderstorm Wind | 56 kts. EG | 0      | 0        | 12.00K             |
| KENTON CO. | 07/27/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 07/27/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 08/20/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 4.00K              |
| KENTON CO. | 04/09/2015 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| KENTON CO. | 05/11/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| KENTON CO. | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| KENTON CO. | 07/17/2015 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 0.00K              |
| KENTON     | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |
| KENTON     | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 12.00K             |
| KENTON     | 12/01/2006 | High Wind         | 36 kts. ES | 0      | 0        | 8.00K              |
| KENTON     | 09/14/2008 | High Wind         | 60 kts. EG | 0      | 0        | 18.200M            |
| KENTON     | 02/11/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |
| OWEN CO.   | 05/25/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| OWEN CO.   | 05/27/2004 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 5.00K              |
| OWEN CO.   | 05/27/2004 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 5.00K              |
| OWEN CO.   | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| OWEN CO.   | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 07/06/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 05/19/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 05/19/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 03/09/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 04/02/2006 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 12.00K             |
| OWEN CO.   | 05/25/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 08/10/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| OWEN CO.   | 08/16/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 08/16/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 07/08/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 4.00K              |
| OWEN CO.   | 07/22/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 08/29/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| OWEN CO.   | 07/25/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 0.00K              |
| OWEN CO.   | 10/26/2010 | Thunderstorm Wind | 52 kts. MG | 0      | 0        | 0.00K              |
| OWEN CO.   | 04/09/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| OWEN CO.   | 04/23/2011 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 15.00K             |
| OWEN CO.   | 05/23/2011 | Thunderstorm Wind | 56 kts. EG | 0      | 0        | 0.00K              |
| OWEN CO.   | 05/23/2011 | Thunderstorm Wind | 51 kts. MG | 0      | 0        | 0.00K              |
| OWEN CO.   | 05/23/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| OWEN CO.   | 06/10/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| OWEN CO.   | 08/03/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| OWEN CO.   | 03/02/2012 | Thunderstorm Wind | 55 kts. MG | 0      | 0        | 0.00K              |
| OWEN CO.   | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 04/07/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 20.00K             |
| OWEN CO.   | 04/29/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| OWEN CO.   | 06/23/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| OWEN CO.   | 06/23/2014 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| OWEN CO.   | 05/11/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 7.00K              |
| OWEN CO.   | 06/26/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| OWEN CO.   | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 9.00K              |
| OWEN CO.   | 07/14/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| OWEN CO.   | 12/23/2015 | Thunderstorm Wind | 65 kts. MG | 0      | 0        | 1.00K              |
| OWEN       | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |

| County    | Date       | Event Type        | Mag.       | Deaths | Injuries | Property Damage-\$ |
|-----------|------------|-------------------|------------|--------|----------|--------------------|
| OWEN      | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 8.00K              |
| OWEN      | 09/14/2008 | High Wind         | 55 kts. EG | 0      | 0        | 1.300M             |
| OWEN      | 02/11/2009 | High Wind         | 50 kts. MG | 0      | 0        | 0.00K              |
| OWEN      | 12/09/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |
| PENDLETON | 05/30/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| PENDLETON | 08/04/2004 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 04/22/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 15.00K             |
| PENDLETON | 06/14/2005 | Lightning         |            | 1      | 0        | 0.00K              |
| PENDLETON | 08/20/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 09/23/2005 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 04/02/2006 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 8.00K              |
| PENDLETON | 07/14/2006 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 08/09/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| PENDLETON | 08/16/2007 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 25.00K             |
| PENDLETON | 08/29/2007 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 02/06/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 5.00K              |
| PENDLETON | 06/03/2008 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 02/11/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| PENDLETON | 04/13/2009 | Thunderstorm Wind | 52 kts. EG | 0      | 0        | 2.00K              |
| PENDLETON | 06/26/2009 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 0.00K              |
| PENDLETON | 05/13/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 05/28/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 06/15/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 2.00K              |
| PENDLETON | 06/21/2010 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| PENDLETON | 10/26/2010 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 2.00K              |
| PENDLETON | 04/04/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| PENDLETON | 04/23/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| PENDLETON | 04/23/2011 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 2.00K              |
| PENDLETON | 04/23/2011 | Thunderstorm Wind | 60 kts. EG | 0      | 0        | 15.00K             |
| PENDLETON | 04/27/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| PENDLETON | 05/26/2011 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 06/29/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 06/29/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| PENDLETON | 07/08/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 10.00K             |
| PENDLETON | 07/18/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 07/27/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 09/07/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 1.00K              |
| PENDLETON | 09/08/2012 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 11/17/2013 | Thunderstorm Wind | 55 kts. EG | 0      | 0        | 5.00K              |
| PENDLETON | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 12/21/2013 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 3.00K              |
| PENDLETON | 07/13/2015 | Thunderstorm Wind | 50 kts. EG | 0      | 0        | 8.00K              |
| PENDLETON | 12/23/2015 | Thunderstorm Wind | 70 kts. EG | 0      | 0        | 85.00K             |
| PENDLETON | 12/11/2000 | High Wind         | 50 kts. E  | 0      | 0        | 0.00K              |
| PENDLETON | 03/09/2002 | High Wind         | 55 kts. E  | 0      | 0        | 8.00K              |
| PENDLETON | 12/01/2006 | High Wind         | 36 kts. ES | 0      | 0        | 2.00K              |
| PENDLETON | 09/14/2008 | High Wind         | 55 kts. EG | 0      | 0        | 1.800M             |
| PENDLETON | 02/11/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |
| PENDLETON | 12/09/2009 | High Wind         | 50 kts. EG | 0      | 0        | 0.00K              |

## SEVERE WINTER STORM

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 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 severe winter storms make driving and walking extremely hazardous. The aftermath of a severe winter storm can impact a community or region for days, weeks, or months.

**Blizzards** are 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 temperatures and winds, to be classified as a blizzard, a storm must have a sufficient falling or blowing snow. Blizzard snow reduces visibility to less than one-quarter mile for at least three hours. With high winds and heavy snow, these severe storms can punish residents throughout much of the United States during the winter months each year.

An **ice storm** occurs when freezing rain falls from clouds and freezes immediately on impact. Ice storms occur when surface *cold* air overrides warm, moist air at higher altitudes. As the warm air descends over the cold air, precipitation, which falls as rain at high altitudes, becomes super cooled and freezes as it passes through the cold air mass below. In extreme cases, ice may accumulate inches thick, though just a thin coating is often enough to cause severe damage. The weight of ice can produce tree loss, and damage to power lines, and even structures.

From March 12th to the 15th, 1993, what some call the "storm of the century" ravaged the eastern United States. The National Weather Service's sophisticated computer models indicated that a severe storm was forming in the Gulf of Mexico. Later in that same week, the NWS computer models showed that the storm was growing significantly. The storm actually formed from the combination of three different atmospheric disturbances. A major cluster of thunderstorms in the Gulf of Mexico, a band of snow and rain from the Pacific, and gusty winds with light snow from the Arctic Circle all joined over the southeast to create this historic storm. By Thursday, March 12th, the storm was barreling up Florida's west coast with high winds, tornadoes, and a storm surge twelve feet above normal. The next day, the storm was carving a destructive path up the southeastern states, leaving Eastern Kentucky paralyzed. The blizzard of March 1993 was one of the largest winter storms in terms of snowfall and size in Kentucky history. Until that day, the record for a single day's snowfall had been 18 inches. This snowfall record was broken at more than one station in Eastern parts of the state. Most of Eastern and Southeastern Kentucky was covered with up to 30 inches of snow. Snow was not the only damaging factor in the storm. Brutal winds crossed most of Kentucky, making the cleanup effort extremely difficult. Winds up to 30-mph blew over much of the state. The heavy snows, coupled with high winds created large snow drifts over roads and highways. All state and federal highways east of I-75 were closed. Most travel was stopped, leaving over 4,000 motorists stranded. The blizzard of 1993 was responsible for 270 deaths and over \$1 billion of damage throughout the Eastern United States.

The Blizzard of 1996 struck the Northern Kentucky region on January 6, 1996. This massive system brought the greatest snowfall from a single storm in Greater Cincinnati/N. Kentucky airport, as well as the greatest 24-hour snowfall. Total snowfall from this storm at the airport was 14.3 inches, while a typical entire season at this location normally receives only 23 inches of snowfall. Many homes and businesses experienced partial or total roof collapses due to the weight of the snow. Road conditions remained hazardous in some locations for many days. Many believed that this was the worst winter storm since the Blizzard of '78 (source: the National Climatic Data Center).



## Narratives:

Ice Storm, 1/27/09, Carroll County: A frontal boundary was stalled over the Tennessee Valley for the early part of the week. Upper level disturbances crossed through the Ohio Valley during this time and accumulating snowfall began on Tuesday. Warmer air aloft on Tuesday afternoon brought a significant amount of freezing rain to Kentucky. Over four inches of snow accumulated over portions of the county. Significant sleet and freezing rain caused icy accumulation of almost an inch, which kept total snow measurements artificially low.

Winter Storm, 2/4/2014, Boone County: A fast moving winter storm moved across the Ohio Valley on Tuesday evening, February 4th. Locations across northern Kentucky and southern Ohio started with heavy snow and transitioned to sleet and freezing rain. Significant ice accumulations caused tree damage and power outages to 5-10,000 people. Further north, snow mixed briefly with sleet, before changing to freezing rain as precipitation tapered off. The resulting 5 to 10 inches of snow and sleet accumulation in west-central and central Ohio. This storm brought widespread travel impacts with many schools and businesses being closed on Wednesday, February 5th. Snow, sleet, and freezing rain caused a large disruption to the region. Nearby measurements of 4 inches of snow were representative of northern sections of the county before the mixed precipitation cut snowfall totals significantly.

Winter Storm, 2/4/2014, Pendleton County: A fast moving winter storm moved across the Ohio Valley on Tuesday evening, February 4th. Locations across northern Kentucky and southern Ohio started with heavy snow and transitioned to sleet and freezing rain. Significant ice accumulations caused tree damage and power outages to 5-10,000 people. Further north, snow mixed briefly with sleet, before changing to freezing rain as precipitation tapered off. The resulting 5 to 10 inches of snow and sleet accumulated in west-central and central Ohio. This storm brought widespread travel impacts with many schools and businesses being closed on Wednesday, February 5th. Snow, sleet, and freezing rain caused a large disruption to the region although mixed precipitation cut snowfall totals significantly. Numerous trees and large limbs were reported down across the county.

| Severe Winter Storm Profile Risk Table |                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                              | All areas in NKADD are susceptible                                                                                                                                                                                                                                                                                      |
| Period of Occurrence:                  | Most likely in December, January or February                                                                                                                                                                                                                                                                            |
| Number of Events (1996-2014):          | 236                                                                                                                                                                                                                                                                                                                     |
| Annual Rate of Occurrence:             | 4.07                                                                                                                                                                                                                                                                                                                    |
| Probability of Future Events:          | Highly Likely                                                                                                                                                                                                                                                                                                           |
| Warning Time:                          | No official warnings                                                                                                                                                                                                                                                                                                    |
| Potential Impacts:                     | Extreme cold impacts human life, health, and public safety. Rivers and lakes freeze causing transportation issues. Energy consumption goes up and depending on the time of year extreme cold can have large impacts on agriculture. Cold temperatures can also cause ruptured pipes and stressed on engines and motors. |
| Recorded losses:                       | \$2,125,000.00                                                                                                                                                                                                                                                                                                          |
| Annualized Loss:                       | \$36,637.93                                                                                                                                                                                                                                                                                                             |
| Extent (Scale)                         | Winter Storm (Boone & Kenton)<br>1/6/1996<br>Damages: 0 deaths, 0 injuries, \$400,000                                                                                                                                                                                                                                   |

*NCDC Storm Event Database, collected 10/15/15*

**Severe Winter Storm Events (2000-2015):**

| COUNTY       | DATE       | EVENT TYPE   | DEATHS/INJURIES |   | Property Damage (dollars) |
|--------------|------------|--------------|-----------------|---|---------------------------|
| BOONE (ZONE) | 12/13/2000 | Ice Storm    | 0               | 0 | 25.00K                    |
| BOONE (ZONE) | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 12/11/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/20/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/21/2007 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/13/2007 | Ice Storm    | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/05/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/20/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 12/28/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 03/05/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 03/04/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| CAMPBELL     | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 12/11/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 01/29/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 01/20/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL     | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CAMPBELL     | 02/13/2007 | Ice Storm    | 0               | 0 | 0.00K                     |

| COUNTY          | DATE       | EVENT TYPE   | DEATHS/INJURIES |   | Property Damage (dollars) |
|-----------------|------------|--------------|-----------------|---|---------------------------|
| CAMPBELL        | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/03/2009 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CAMPBELL        | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CAMPBELL        | 01/20/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 12/28/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 03/05/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| CAMPBELL        | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| CARROLL (ZONE)  | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |

| COUNTY          | DATE       | EVENT TYPE   | DEATHS/INJURIES |   | Property Damage (dollars) |
|-----------------|------------|--------------|-----------------|---|---------------------------|
| GALLATIN (ZONE) | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 01/07/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/05/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/19/2001 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/21/2007 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/07/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/28/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 03/17/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |

| COUNTY        | DATE       | EVENT TYPE   | DEATHS/INJURIES |   | Property Damage (dollars) |
|---------------|------------|--------------|-----------------|---|---------------------------|
| GRANT (ZONE)  | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)  | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| GRANT (ZONE)  | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/11/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/20/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/21/2007 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/13/2007 | Ice Storm    | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/07/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/05/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/20/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 12/28/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 03/05/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 12/04/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 12/08/2005 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 02/12/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| OWEN (ZONE)   | 02/05/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |

| COUNTY      | DATE       | EVENT TYPE   | DEATHS/INJURIES |   | Property Damage (dollars) |
|-------------|------------|--------------|-----------------|---|---------------------------|
| OWEN (ZONE) | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 12/28/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 03/17/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 02/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 11/16/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 02/15/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 02/21/2015 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 12/13/2000 | Ice Storm    | 0               | 0 | 0.00K                     |
| PENDLETON   | 01/19/2001 | Heavy Snow   | 0               | 0 | 0.00K                     |
| PENDLETON   | 12/05/2002 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 01/25/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 12/22/2004 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 03/21/2006 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/06/2007 | Heavy Snow   | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/21/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 03/07/2008 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 01/27/2009 | Ice Storm    | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/09/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/15/2010 | Heavy Snow   | 0               | 0 | 0.00K                     |
| PENDLETON   | 12/16/2010 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 01/20/2011 | Heavy Snow   | 0               | 0 | 0.00K                     |
| PENDLETON   | 12/28/2012 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 03/17/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 12/06/2013 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 01/20/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/04/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 02/14/2014 | Winter Storm | 0               | 0 | 0.00K                     |
| PENDLETON   | 03/02/2014 | Winter Storm | 0               | 0 | 0.00K                     |

## FLOOD

Flooding is the most frequent and costly natural hazard in the United States. It poses severe problems in portions of the NKADD region and has been identified as the highest regional threat. Floods result from excessive precipitation and are classified under two categories: Flash floods, which are the result of heavy localized precipitation in a short time period over a particular location and, General floods, which are caused by precipitation over a longer time period and over a given geographical area.

Flash floods are characterized by a rapid rise in water level, high velocity and large amounts of debris. Major factors in flash flooding are intensity and duration of rainfall and the watershed steepness and stream gradients. The amount of watershed vegetation, the natural and artificial flood storage areas and the configuration of the streambed and floodplain are also factors. Flash floods may result from the failure of a dam or the sudden breakup of an ice jam. They are capable of tearing out trees, undermining buildings and bridges and scouring new channels.

General floods are long-term events and may last for several days. The primary types of general flooding are riverine, coastal, and urban flooding.

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

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

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

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

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

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

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

behind it is released and becomes a flash flood. Failed dams or levees can create floods that are catastrophic to life and property because of the tremendous energy of the released water. Note: Due to their severe hazard potential of a dam/levee failure and the number of dams within the NKADD region, Dam/levee failure has its own dedicated section.

7. *Debris, Landslide, and Mudflow Flooding* is created by the accumulation of debris, mud, rocks, and logs in a channel, forming a temporary dam. Flooding occurs upstream as water becomes stored behind the temporary dam and then becomes a flash flood when the dam is breached and rapidly washes away. Landslides can create large waves on lakes or embankments and can be deadly. Mudflow floods can occur when volcanic activity rapidly melts mountain snow and glaciers, and the water mixed with mud and debris moves rapidly down slope. Note: The landslide hazard specified in its own section is primarily focused on landslides due to poor soils and gradual erosion, not major flood events.

### **Impacts:**

Though fatalities associated with all types of flooding have steadily declined in the U.S. over the last half century, the average annual death toll is still over 200. Advanced warning systems are now commonplace and give residents time to plan, but an increase in urban and coastal development has caused the monetary losses associated with flooding to increase drastically.

Most homeowners' insurance policies do not cover floodwater damage, so homeowners without flood insurance are at a high risk for loss. Since 1978, over \$51 billion in flood loss payments have been made nationwide by the National Flood Insurance Program with \$314 million paid in the state of Kentucky. *FEMA Policy & Claim Statistics for Flood Insurance, collected 11/10/15*

As a result of Hurricane Katrina, 2005 had by far the most loss dollars paid (almost \$18 billion). The next largest yearly paid loss dollars amount was in 2008 at almost \$3.5 billion, largely as a result of Hurricane Ike. New Jersey had the highest total flood loss payments in 2011 in the United States, followed by New York, Pennsylvania, North Carolina, North Dakota, Connecticut, Vermont, Mississippi, Missouri and Louisiana.

It bears noting that while the NKADD area does not technically experience direct hurricanes, we frequently experience hurricane after affects in the form of strong storms, damaging winds, and flooding.

The NKADD region is located along the Ohio River and is bisected by numerous small rivers and streams. Flooding is inherent to the region. The topography consists of steep sloping hills separated by narrow drainage. This topography makes flash flooding a major issue as fast moving water often exceeds the carrying capacity of these narrow drainages basins. This problem is often exacerbated by deforestation and development that increases the rate and amount of water runoff. In many cases, the drainage system is further hindered by stream channel debris.

Flooding of areas alongside rivers and streams is natural and inevitable; however, the potential effects are often ignored. Development of areas within mapped floodplains continues to occur. As such development occurs there is an increase in loss potential and danger to people who live and work in these areas. Immediate attention has been given to improve floodplain management practices in local jurisdictions throughout the region. Within the NKADD region, there are many homes and structures located within mapped flood prone areas. There are also many locations with repetitive flooding problems that are not located within a mapped floodplain.

### **Severe Repetitive Loss (SRL) and Repetitive Loss (RL) Properties:**

The Kentucky Department of Water (KDOW) has identified 37 "repetitive loss properties" and 5 "severe repetitive loss properties" in the Northern Kentucky Region. A repetitive loss structure is typically defined as any property



which has been paid two or more flood claims (exceeding \$1000) within a 10 year period by the National Flood Insurance Program to be a Repetitive Loss Property. SRL Properties are residential properties that are covered by an NFIP Flood insurance policy and either have had at least 4 NFIP claim payments over \$5,000 each, or at least 2 separate claims payments that exceed the market value of the building.

There are hundreds of structures in the Northern Kentucky Region that have suffered repetitive flood losses. For purposes of this Plan, only those structures meeting FEMA's definition of a repetitive loss structure are considered. In many cases, otherwise eligible structures may have been excluded from the inventory because they were not covered by an active NFIP policy or claims were not filed.

| Northern Kentucky Region |              |              |        |           |
|--------------------------|--------------|--------------|--------|-----------|
| County                   | City         | Total Paid   | Losses | Buildings |
| Boone                    |              | \$94,264.46  | 2      | 1         |
|                          | Florence     | \$4,126.83   | 2      | 1         |
| Campbell                 |              | \$85,232.70  | 2      | 1         |
|                          | Bellevue     | \$70,180.49  | 12     | 5         |
|                          | Dayton       | \$712,498.19 | 25     | 3         |
|                          | Melbourne    | \$211,280.27 | 10     | 4         |
|                          | Newport      | \$15,082.45  | 2      | 2         |
|                          | Silver Grove | \$23,857.00  | 6      | 3         |
| Carroll                  |              |              |        |           |
|                          | Carrollton   | \$9,549.80   | 5      | 2         |
| Gallatin                 |              |              |        |           |
|                          | Sparta       | \$21,473.29  | 2      | 1         |
| Kenton                   |              | \$39,824.60  | 6      | 3         |
|                          | Covington    | \$159,326.63 | 15     | 6         |
|                          | Erlanger     | \$54,843.32  | 4      | 2         |
|                          | Independence | \$11,036.46  | 4      | 2         |
|                          | Ludlow       | \$68,016.52  | 2      | 1         |
| Owen                     |              |              |        |           |
|                          | Monterey     | \$248,390.00 | 18     | 5         |
| Pendleton                |              | \$36,187.32  | 2      | 1         |

There are 42 total properties listed in FEMA's repetitive loss and severe repetitive loss inventory for the Northern Kentucky Region. In respect for the privacy of these homeowners, the NKADD did not map the properties nor identify addresses of repetitive loss structures. In future updates of the plan, committees will continue to obtain new information, local input and tabulation of repetitive loss structures for this region.

The table below shows the number of SRL/RL properties in the NKADD area by county.

| <b>County</b> | <b>Single Family</b> | <b>2-4 Family</b> | <b>Assmd Condo</b> | <b>Other Resident</b> | <b>Non Resident</b> | <b>Total Number of SRL/RL Properties</b> | <b>Total Amount Paid</b> |
|---------------|----------------------|-------------------|--------------------|-----------------------|---------------------|------------------------------------------|--------------------------|
| Boone         | 2                    | 0                 | 0                  | 0                     | 0                   | 2                                        | \$98,391.29              |
| Campbell      | 12                   | 0                 | 1                  | 0                     | 4                   | 17                                       | \$1,118,131.10           |
| Carroll       | 2                    | 0                 | 0                  | 0                     | 0                   | 2                                        | \$9,549.80               |
| Gallatin      | 1                    | 0                 | 0                  | 0                     | 0                   | 1                                        | \$21,473.29              |
| Grant         | 0                    | 0                 | 0                  | 0                     | 0                   | 0                                        | \$0.00                   |
| Kenton        | 9                    | 1                 | 0                  | 2                     | 1                   | 14                                       | \$353,310.55             |
| Owen          | 4                    | 0                 | 1                  | 0                     | 0                   | 5                                        | \$248,389.88             |
| Pendleton     | 1                    | 0                 | 0                  | 0                     | 0                   | 1                                        | \$36,187.32              |

*Source: KY DOW, October 2015*

#### **Narratives:**

Flash Flood, 10/9/2009, Grant County: A large area of rainfall moved across the area producing flash flooding in Grant County during the early morning hours of October 9th. A water rescue occurred on Mt Zion Elliston Road due to heavy rain which caused flash flooding.

Flash Flood, 4/19/2011, Boone County: An area of storms moved through during the morning hours of April 19th. Hail, damaging winds, and flooding occurred with these storms. Multiple intersections were impassible due to the heavy rainfall.

Flood, 4/4/2014, Owen County: Heavy rainfall occurred along and ahead of a cold front moving across the region. Flooding and flash flooding occurred as a result of the heavy rain. Some of this flooding lingered into the evening. Several roads remained closed around Eagle Valley Campground due to high water caused by earlier heavy rainfall.

| <b>Flood Profile Risk Table</b> |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                       | Areas near rivers, creeks and storm water drainage areas are most susceptible                                                                                                                                                                                                                                                                                                                                                 |
| Period of Occurrence:           | River flooding - January through May<br>Flash flooding - Anytime, but primarily in the summer months                                                                                                                                                                                                                                                                                                                          |
| Number of Events (1996-2014):   | 308                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Annual Rate of Occurrence:      | 5.31                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Probability of Future Events:   | Highly Likely                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Warning Time:                   | River flooding - 3 to 5 days<br>Flash flooding - minutes to several hours                                                                                                                                                                                                                                                                                                                                                     |
| Potential Impacts:              | Impacts human life, health, and public safety. Utility damages and outages, infrastructure damage (transportation and communication systems), structural damage, fire, damaged or destroyed critical facilities, and hazardous material releases. Can lead to economic losses such as unemployment, decreased land values, and agribusiness losses. Floodwaters are a public safety issue due to contaminants and pollutants. |
| Recorded losses:                | \$54,413,000.00                                                                                                                                                                                                                                                                                                                                                                                                               |
| Annualized Loss:                | \$938,155.17                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Extent (Scale)                  | Flood of Licking River (City of Falmouth, Pendleton County) + Ohio River 3/1/1997<br>Licking River: 24 feet above flood stage (52-foot crest)<br>Ohio River: 11 feet above flood stage (63-foot crest)<br>Damages (to Falmouth & Pendleton): 5 deaths, 0 injuries, \$35,000,000                                                                                                                                               |

*NCDC Storm Event Database, collected 10/16/15*

#### **Flood Events (2000-2015):**

| COUNTY       | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|--------------|------------|-------------|-----------------|---|---------------------------|
| BOONE CO.    | 01/03/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| BOONE CO.    | 02/13/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| BOONE CO.    | 02/18/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| BOONE CO.    | 05/18/2001 | Flash Flood | 0               | 0 | 5.00K                     |
| BOONE CO.    | 07/18/2001 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE CO.    | 08/11/2001 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 04/21/2002 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 04/28/2002 | Flood       | 0               | 0 | 0.00K                     |
| BOONE CO.    | 05/07/2002 | Flash Flood | 0               | 0 | 2.00K                     |
| BOONE CO.    | 05/08/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 06/06/2002 | Flood       | 0               | 0 | 0.00K                     |
| BOONE CO.    | 05/10/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE CO.    | 05/10/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE CO.    | 06/15/2004 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 07/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 07/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 03/28/2005 | Flood       | 0               | 0 | 0.00K                     |

| COUNTY       | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|--------------|------------|-------------|-----------------|---|---------------------------|
| BOONE (ZONE) | 06/14/2005 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 06/30/2005 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 08/30/2005 | Flood       | 0               | 0 | 0.00K                     |
| BOONE (ZONE) | 11/15/2005 | Flood       | 0               | 0 | 0.00K                     |
| BOONE CO.    | 03/12/2006 | Flash Flood | 0               | 0 | 0.00K                     |
| BOONE CO.    | 04/04/2008 | Flash Flood | 0               | 0 | 1.00K                     |
| BOONE CO.    | 06/04/2008 | Flash Flood | 0               | 0 | 10.00K                    |
| BOONE CO.    | 06/25/2009 | Flash Flood | 0               | 0 | 60.00K                    |
| BOONE CO.    | 07/30/2009 | Flash Flood | 0               | 0 | 2.00K                     |
| BOONE CO.    | 06/09/2010 | Flood       | 0               | 0 | 3.00K                     |
| BOONE CO.    | 06/15/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| BOONE CO.    | 04/19/2011 | Flash Flood | 0               | 0 | 1.00K                     |
| BOONE CO.    | 04/19/2011 | Flash Flood | 0               | 0 | 1.00K                     |
| BOONE CO.    | 01/27/2012 | Flood       | 0               | 0 | 1.00K                     |
| BOONE CO.    | 03/02/2012 | Flood       | 0               | 0 | 0.00K                     |
| BOONE CO.    | 07/06/2013 | Flood       | 0               | 0 | 0.00K                     |
| BOONE CO.    | 07/06/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| BOONE CO.    | 07/17/15   | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 01/03/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| CAMPBELL CO. | 02/18/2000 | Flash Flood | 0               | 0 | 15.00K                    |
| CAMPBELL CO. | 07/18/2001 | Flash Flood | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/18/2001 | Flash Flood | 0               | 0 | 5.00K                     |
| CAMPBELL     | 04/21/2002 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 05/07/2002 | Flash Flood | 0               | 0 | 2.00K                     |
| CAMPBELL CO. | 05/08/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| CAMPBELL     | 06/06/2002 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 11/10/2002 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 05/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 05/10/2003 | Flash Flood | 0               | 0 | 50.00K                    |
| CAMPBELL     | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 07/18/2003 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 08/08/2003 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 08/08/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| CAMPBELL     | 07/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 07/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 03/28/2005 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL     | 11/15/2005 | Flood       | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 03/12/2006 | Flash Flood | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 07/21/2006 | Flash Flood | 0               | 0 | 0.00K                     |
| CAMPBELL CO. | 03/04/2008 | Flood       | 0               | 0 | 3.00K                     |
| CAMPBELL CO. | 03/18/2008 | Flood       | 0               | 0 | 10.00K                    |
| CAMPBELL CO. | 04/04/2008 | Flash Flood | 0               | 0 | 1.00K                     |

| COUNTY         | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|----------------|------------|-------------|-----------------|---|---------------------------|
| CAMPBELL CO.   | 05/15/2008 | Flood       | 0               | 0 | 2.00K                     |
| CAMPBELL CO.   | 06/04/2008 | Flash Flood | 0               | 0 | 10.00K                    |
| CAMPBELL CO.   | 07/30/2009 | Flash Flood | 0               | 0 | 2.00K                     |
| CAMPBELL CO.   | 09/08/2009 | Flood       | 0               | 0 | 10.00K                    |
| CAMPBELL CO.   | 06/15/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 06/15/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 07/13/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 07/21/2010 | Flash Flood | 0               | 0 | 5.00K                     |
| CAMPBELL CO.   | 06/21/2011 | Flash Flood | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 12/05/2011 | Flood       | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 01/27/2012 | Flood       | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 07/01/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| CAMPBELL CO.   | 07/04/2013 | Flood       | 0               | 0 | 50.00K                    |
| CARROLL CO.    | 01/03/2000 | Flash Flood | 0               | 0 | 50.00K                    |
| CARROLL CO.    | 02/18/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| CARROLL CO.    | 08/09/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| CARROLL (ZONE) | 06/25/2002 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL CO.    | 06/25/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 09/27/2002 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL CO.    | 07/09/2003 | Flash Flood | 0               | 0 | 20.00K                    |
| CARROLL (ZONE) | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 08/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 05/27/2004 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 05/30/2004 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 03/28/2005 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL (ZONE) | 05/19/2005 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL CO.    | 03/19/2008 | Flood       | 0               | 0 | 5.00K                     |
| CARROLL CO.    | 08/04/2009 | Flash Flood | 0               | 0 | 10.00K                    |
| CARROLL CO.    | 08/04/2009 | Flood       | 0               | 0 | 1.00K                     |
| CARROLL CO.    | 05/02/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| CARROLL CO.    | 05/02/2010 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL CO.    | 05/12/2010 | Flash Flood | 0               | 0 | 3.00K                     |
| CARROLL CO.    | 07/07/2013 | Flood       | 0               | 0 | 1.00K                     |
| CARROLL CO.    | 12/21/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| CARROLL CO.    | 04/03/2014 | Flood       | 0               | 0 | 0.00K                     |
| CARROLL CO.    | 04/04/2014 | Flash Flood | 0               | 0 | 100.00K                   |
| CARROLL CO.    | 04/04/2014 | Flash Flood | 0               | 0 | 1.00K                     |
| CARROLL CO.    | 04/03/2015 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN CO.   | 01/03/2000 | Flash Flood | 0               | 0 | 25.00K                    |
| GALLATIN CO.   | 02/13/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| GALLATIN CO.   | 02/18/2000 | Flash Flood | 0               | 0 | 10.00K                    |

| COUNTY          | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|-----------------|------------|-------------|-----------------|---|---------------------------|
| GALLATIN CO.    | 05/08/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 02/22/2003 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 05/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN CO.    | 05/10/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| GALLATIN CO.    | 07/09/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 05/27/2004 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 03/28/2005 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 07/20/2005 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN (ZONE) | 11/15/2005 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN CO.    | 03/12/2006 | Flash Flood | 0               | 0 | 0.00K                     |
| GALLATIN CO.    | 03/19/2008 | Flood       | 0               | 0 | 5.00K                     |
| GALLATIN CO.    | 04/04/2008 | Flash Flood | 0               | 0 | 2.00K                     |
| GALLATIN CO.    | 05/15/2008 | Flood       | 0               | 0 | 2.00K                     |
| GALLATIN CO.    | 08/04/2009 | Flash Flood | 0               | 0 | 5.00K                     |
| GALLATIN CO.    | 05/02/2010 | Flash Flood | 0               | 0 | 5.00K                     |
| GALLATIN CO.    | 05/02/2010 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN CO.    | 05/12/2010 | Flash Flood | 0               | 0 | 3.00K                     |
| GALLATIN CO.    | 12/05/2011 | Flood       | 0               | 0 | 1.00K                     |
| GALLATIN CO.    | 01/27/2012 | Flood       | 0               | 0 | 1.00K                     |
| GALLATIN CO.    | 03/15/2012 | Flash Flood | 0               | 0 | 1.00K                     |
| GALLATIN CO.    | 07/01/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| GALLATIN CO.    | 07/06/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| GALLATIN CO.    | 07/06/2013 | Flood       | 0               | 0 | 0.00K                     |
| GALLATIN CO.    | 12/22/2013 | Flash Flood | 0               | 0 | 30.00K                    |
| GALLATIN CO.    | 07/07/2014 | Flood       | 0               | 0 | 0.00K                     |
| GRANT CO.       | 01/03/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| GRANT CO.       | 02/13/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| GRANT CO.       | 02/18/2000 | Flash Flood | 0               | 0 | 15.00K                    |
| GRANT CO.       | 04/03/2000 | Flash Flood | 0               | 0 | 3.00K                     |
| GRANT CO.       | 08/09/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| GRANT CO.       | 06/05/2001 | Flash Flood | 0               | 0 | 50.00K                    |
| GRANT CO.       | 06/06/2001 | Flash Flood | 0               | 0 | 3.00K                     |
| GRANT (ZONE)    | 03/20/2002 | Flood       | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 06/25/2002 | Flood       | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 02/22/2003 | Flood       | 0               | 0 | 0.00K                     |
| GRANT CO.       | 07/09/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| GRANT (ZONE)    | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| GRANT CO.       | 08/11/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| GRANT CO.       | 08/22/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| GRANT CO.       | 05/27/2004 | Flash Flood | 0               | 0 | 0.00K                     |

| COUNTY        | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|---------------|------------|-------------|-----------------|---|---------------------------|
| GRANT (ZONE)  | 05/27/2004 | Flood       | 0               | 0 | 0.00K                     |
| GRANT (ZONE)  | 05/30/2004 | Flood       | 0               | 0 | 0.00K                     |
| GRANT (ZONE)  | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| GRANT (ZONE)  | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| GRANT (ZONE)  | 08/30/2005 | Flood       | 0               | 0 | 0.00K                     |
| GRANT CO.     | 03/18/2008 | Flood       | 0               | 0 | 3.00K                     |
| GRANT CO.     | 04/04/2008 | Flash Flood | 0               | 0 | 2.00K                     |
| GRANT CO.     | 10/09/2009 | Flash Flood | 0               | 0 | 10.00K                    |
| GRANT CO.     | 05/12/2010 | Flash Flood | 0               | 0 | 2.00K                     |
| GRANT CO.     | 04/04/2011 | Flash Flood | 0               | 0 | 1.00K                     |
| GRANT CO.     | 07/06/2013 | Flood       | 0               | 0 | 0.00K                     |
| GRANT CO.     | 07/06/2013 | Flood       | 0               | 0 | 0.00K                     |
| GRANT CO.     | 04/04/2014 | Flash Flood | 0               | 0 | 1.00K                     |
| GRANT CO.     | 07/07/2014 | Flood       | 0               | 0 | 0.00K                     |
| KENTON CO.    | 01/03/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| KENTON CO.    | 02/13/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| KENTON CO.    | 02/18/2000 | Flash Flood | 0               | 0 | 20.00K                    |
| KENTON CO.    | 12/16/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| KENTON CO.    | 05/18/2001 | Flash Flood | 0               | 0 | 5.00K                     |
| KENTON CO.    | 07/18/2001 | Flash Flood | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 04/21/2002 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 04/28/2002 | Flood       | 0               | 0 | 0.00K                     |
| KENTON CO.    | 05/07/2002 | Flash Flood | 0               | 0 | 4.00K                     |
| KENTON CO.    | 05/08/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 06/06/2002 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 11/10/2002 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 02/22/2003 | Flood       | 0               | 0 | 0.00K                     |
| KENTON CO.    | 05/10/2003 | Flash Flood | 0               | 0 | 50.00K                    |
| KENTON CO.    | 05/10/2003 | Flash Flood | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 07/18/2003 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 08/08/2003 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 07/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 07/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| KENTON (ZONE) | 03/28/2005 | Flood       | 0               | 0 | 10.00K                    |
| KENTON (ZONE) | 06/30/2005 | Flood       | 0               | 0 | 0.00K                     |
| KENTON CO.    | 03/12/2006 | Flash Flood | 0               | 0 | 0.00K                     |
| KENTON CO.    | 07/21/2006 | Flash Flood | 0               | 0 | 0.00K                     |
| KENTON CO.    | 03/04/2008 | Flood       | 0               | 0 | 3.00K                     |
| KENTON CO.    | 03/18/2008 | Flood       | 0               | 0 | 5.00K                     |
| KENTON CO.    | 04/04/2008 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.    | 05/15/2008 | Flood       | 0               | 0 | 2.00K                     |

| COUNTY      | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|-------------|------------|-------------|-----------------|---|---------------------------|
| KENTON CO.  | 06/04/2008 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.  | 06/04/2008 | Flash Flood | 0               | 0 | 5.00K                     |
| KENTON CO.  | 07/30/2009 | Flash Flood | 0               | 0 | 2.00K                     |
| KENTON CO.  | 07/13/2010 | Flash Flood | 0               | 0 | 10.00K                    |
| KENTON CO.  | 07/13/2010 | Flash Flood | 0               | 0 | 10.00K                    |
| KENTON CO.  | 07/21/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.  | 04/23/2011 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.  | 04/23/2011 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.  | 07/01/2013 | Flash Flood | 0               | 0 | 50.00K                    |
| KENTON CO.  | 07/01/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.  | 07/04/2013 | Flood       | 0               | 0 | 0.00K                     |
| KENTON CO.  | 07/06/2013 | Flash Flood | 0               | 0 | 5.00K                     |
| KENTON CO.  | 07/06/2013 | Flash Flood | 0               | 0 | 2.00K                     |
| KENTON CO.  | 07/06/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| KENTON CO.  | 09/21/2013 | Flood       | 0               | 0 | 0.00K                     |
| KENTON CO.  | 06/04/2014 | Flood       | 0               | 0 | 0.00K                     |
| OWEN CO.    | 01/03/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| OWEN CO.    | 02/13/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| OWEN CO.    | 02/18/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| OWEN CO.    | 08/09/2000 | Flash Flood | 0               | 0 | 5.00K                     |
| OWEN CO.    | 06/05/2001 | Flash Flood | 0               | 0 | 5.00K                     |
| OWEN CO.    | 06/06/2001 | Flash Flood | 0               | 0 | 3.00K                     |
| OWEN CO.    | 06/20/2001 | Flash Flood | 0               | 0 | 5.00K                     |
| OWEN CO.    | 08/29/2001 | Flash Flood | 0               | 0 | 0.00K                     |
| OWEN CO.    | 01/24/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 03/20/2002 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 06/25/2002 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 06/25/2002 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 08/22/2003 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 05/25/2004 | Flood       | 0               | 0 | 0.00K                     |
| OWEN CO.    | 05/27/2004 | Flash Flood | 0               | 0 | 0.00K                     |
| OWEN CO.    | 05/30/2004 | Flash Flood | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 05/31/2004 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 11/11/2004 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 03/28/2005 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 05/19/2005 | Flood       | 0               | 0 | 0.00K                     |
| OWEN (ZONE) | 08/19/2005 | Flood       | 0               | 0 | 0.00K                     |
| OWEN CO.    | 08/10/2006 | Flash Flood | 0               | 0 | 2.00K                     |
| OWEN CO.    | 09/23/2006 | Flash Flood | 0               | 0 | 5.00K                     |
| OWEN CO.    | 03/19/2008 | Flood       | 0               | 0 | 5.00K                     |
| OWEN CO.    | 04/04/2008 | Flash Flood | 0               | 0 | 1.00K                     |
| OWEN CO.    | 08/04/2009 | Flash Flood | 0               | 0 | 5.00K                     |



| COUNTY        | DATE       | EVENT TYPE  | DEATHS/INJURIES |   | Property Damage (dollars) |
|---------------|------------|-------------|-----------------|---|---------------------------|
| OWEN CO.      | 08/04/2009 | Flash Flood | 0               | 0 | 10.00K                    |
| OWEN CO.      | 08/04/2009 | Flash Flood | 0               | 0 | 10.00K                    |
| OWEN CO.      | 05/02/2010 | Flash Flood | 0               | 0 | 1.00K                     |
| OWEN CO.      | 05/02/2010 | Flood       | 0               | 0 | 0.00K                     |
| OWEN CO.      | 04/23/2011 | Flash Flood | 0               | 0 | 2.00K                     |
| OWEN CO.      | 03/15/2012 | Flash Flood | 0               | 0 | 1.00K                     |
| OWEN CO.      | 07/06/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| OWEN CO.      | 04/04/2014 | Flood       | 0               | 0 | 0.00K                     |
| OWEN CO.      | 04/03/2015 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON CO. | 01/03/2000 | Flash Flood | 0               | 0 | 50.00K                    |
| PENDLETON CO. | 02/18/2000 | Flash Flood | 0               | 0 | 10.00K                    |
| PENDLETON     | 02/18/2000 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON CO. | 12/16/2000 | Flash Flood | 0               | 0 | 100.00K                   |
| PENDLETON CO. | 06/05/2001 | Flash Flood | 0               | 0 | 25.00K                    |
| PENDLETON CO. | 07/25/2001 | Flash Flood | 0               | 0 | 0.00K                     |
| PENDLETON     | 03/20/2002 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON CO. | 04/28/2002 | Flash Flood | 0               | 0 | 0.00K                     |
| PENDLETON     | 05/08/2002 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 02/22/2003 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 05/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 05/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 05/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 07/10/2003 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 05/27/2004 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON     | 10/18/2004 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON CO. | 09/23/2006 | Flash Flood | 0               | 0 | 5.00K                     |
| PENDLETON CO. | 03/04/2008 | Flood       | 0               | 0 | 3.00K                     |
| PENDLETON CO. | 03/19/2008 | Flood       | 0               | 0 | 5.00K                     |
| PENDLETON CO. | 04/04/2008 | Flash Flood | 0               | 0 | 2.00K                     |
| PENDLETON CO. | 06/04/2008 | Flash Flood | 0               | 0 | 5.00K                     |
| PENDLETON CO. | 06/25/2009 | Flash Flood | 0               | 0 | 2.00K                     |
| PENDLETON CO. | 06/25/2009 | Flash Flood | 0               | 0 | 15.00K                    |
| PENDLETON CO. | 09/08/2009 | Flood       | 0               | 0 | 10.00K                    |
| PENDLETON CO. | 05/02/2010 | Flash Flood | 0               | 0 | 5.00K                     |
| PENDLETON CO. | 05/02/2010 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON CO. | 05/12/2010 | Flash Flood | 0               | 0 | 3.00K                     |
| PENDLETON CO. | 05/03/2011 | Flood       | 0               | 0 | 2.00K                     |
| PENDLETON CO. | 12/05/2011 | Flood       | 0               | 0 | 1.00K                     |
| PENDLETON CO. | 01/27/2012 | Flood       | 0               | 0 | 1.00K                     |
| PENDLETON CO. | 07/06/2013 | Flash Flood | 0               | 0 | 1.00K                     |
| PENDLETON CO. | 04/04/2014 | Flash Flood | 0               | 0 | 1.00K                     |
| PENDLETON CO. | 03/04/2015 | Flood       | 0               | 0 | 0.00K                     |
| PENDLETON CO. | 04/03/2015 | Flood       | 0               | 0 | 0.00K                     |

The NKADD region is located along the Ohio River and is bisected by numerous small rivers and streams. Flooding is inherent to the region. The topography consists of steep sloping hills separated by narrow drainage. This topography makes flash flooding a major issue as fast moving water often exceeds the carrying capacity of these narrow drainages basins. This problem is often exacerbated by deforestation and development that increases the rate and amount of water runoff. In many cases, the drainage system is further hindered by stream channel debris.

A few of the jurisdictions provided information on county and city-maintained roads that are prone to flash flooding. This list should be viewed as active, as it is continually updated. Also, the entirety of these roads are not prone to flash flooding, only parts.

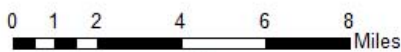
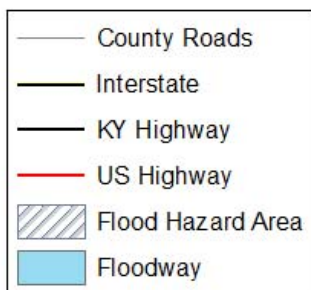
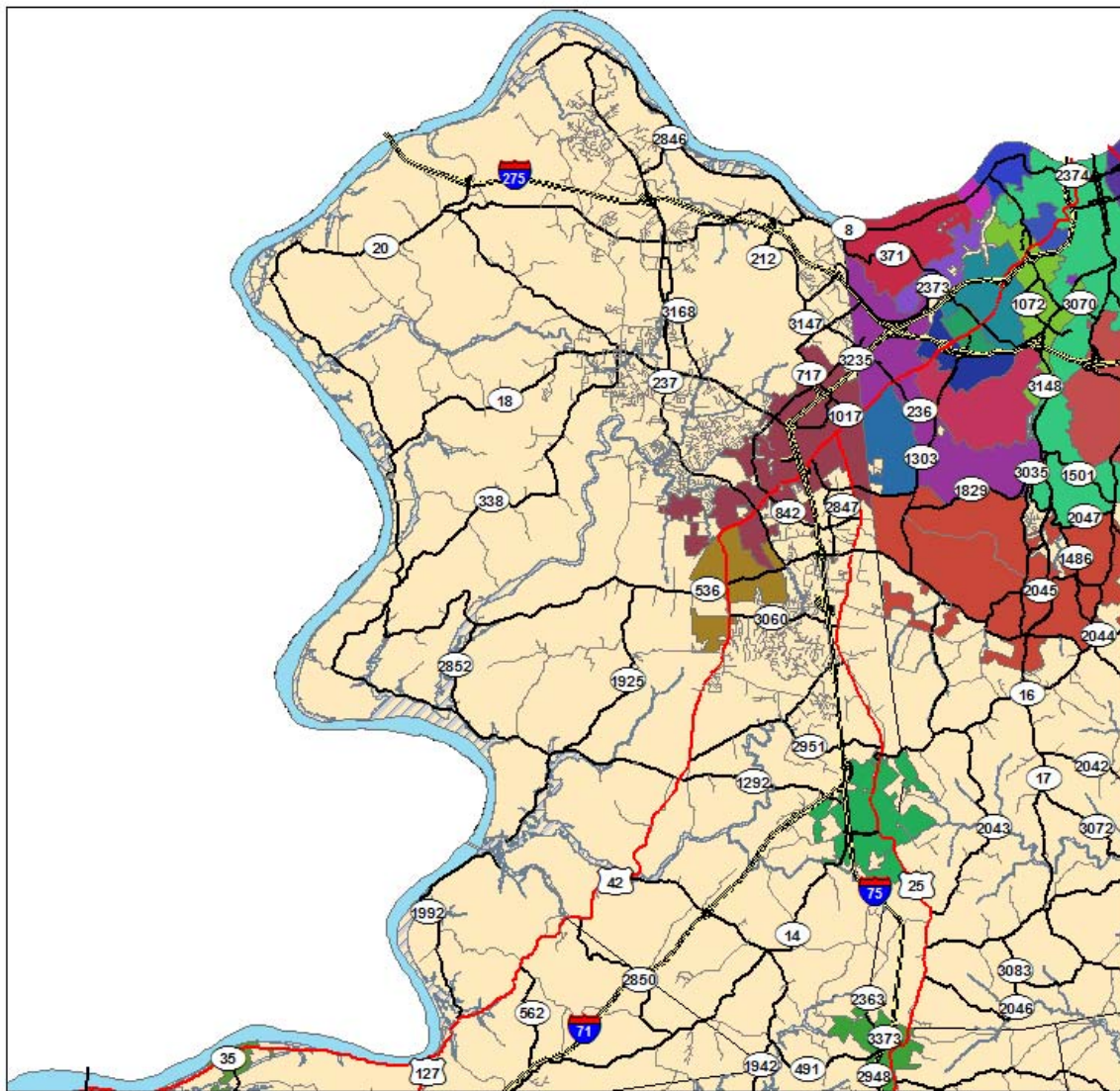
**Roads that frequently experience flash floods:**

| Road Name                   | Jurisdiction |
|-----------------------------|--------------|
| Ashby Fork Road             | Boone County |
| Ashford Drive               | Boone County |
| Big Bone Church Road        | Boone County |
| Briargate Drive             | Boone County |
| Cayton Road                 | Boone County |
| Carr Road                   | Boone County |
| Cedarwood Drive             | Boone County |
| Clarkston Lane              | Boone County |
| Dale Williamson Road        | Boone County |
| Dickerson Road              | Boone County |
| Easton Lane                 | Boone County |
| Lower Easton Lane           | Boone County |
| Elijah Crreek Road          | Boone County |
| Gunpowder Road              | Boone County |
| Hill Road                   | Boone County |
| Jasons Bluff                | Boone County |
| Kite Lane                   | Boone County |
| Limaburg Creek Road (South) | Boone County |
| Longbranch Road             | Boone County |
| Lower River Road            | Boone County |
| Mary's Court                | Boone County |
| Middle Creek                | Boone County |
| Mineola Pike                | Boone County |
| Mudlick Road                | Boone County |
| Priscilla Lane              | Boone County |
| South Fork Road             | Boone County |
| South Fork Church Road      | Boone County |
| Sycamore Lane (Hebron)      | Boone County |
| Utterback Drive             | Boone County |
| Victory School Road         | Boone County |

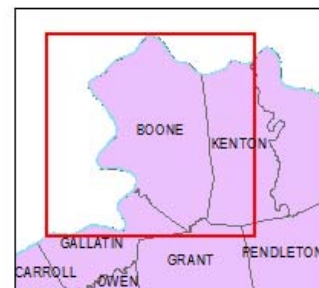
| <b>Road Name</b>                 | <b>Jurisdiction</b> |
|----------------------------------|---------------------|
| Victory School House Road        | Boone County        |
| Waterloo Road                    | Boone County        |
| U.S. 42                          | KYTC                |
| KY 338                           | KYTC                |
| KY 536                           | KYTC                |
| KY 2852                          | KYTC                |
| KY 2951                          | KYTC                |
| KY 3060                          | KYTC                |
| KY 20                            | KYTC                |
| Church Hill Drive                | City of Union       |
| Whispering Trails                | City of Union       |
| Church Street                    | City of Walton      |
| Old Stephenson Mill Road         | City of Walton      |
| Aulick Road                      | Campbell County     |
| Branch Lick Road                 | Campbell County     |
| Craft Road                       | Campbell County     |
| Eight Mile Road                  | Campbell County     |
| Flatwoods Drive                  | Campbell County     |
| Koehler Road -low water crossing | Campbell County     |
| Lee's Road                       | Campbell County     |
| Owl Creek Road                   | Campbell County     |
| Tarvin Road                      | Campbell County     |
| Ten Mile Road                    | Campbell County     |
| Uhl Road                         | Campbell County     |
| Upper and Lower Tug Fork Road    | Campbell County     |
| Vineyard Drive                   | Campbell County     |

Flooding of areas alongside rivers and streams is natural and inevitable; however, the potential effects are often ignored. Development of areas within mapped floodplains continues to occur. As such development occurs, it increases loss potential and danger to people who live and work in these areas. Immediate attention has been given to improve floodplain management practices in local jurisdictions throughout the region. Within the NKADD region, there are many homes and structures located within mapped flood prone areas. There are also many locations with repetitive flooding problems that are not located within a mapped floodplain.

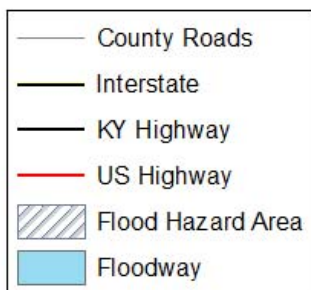
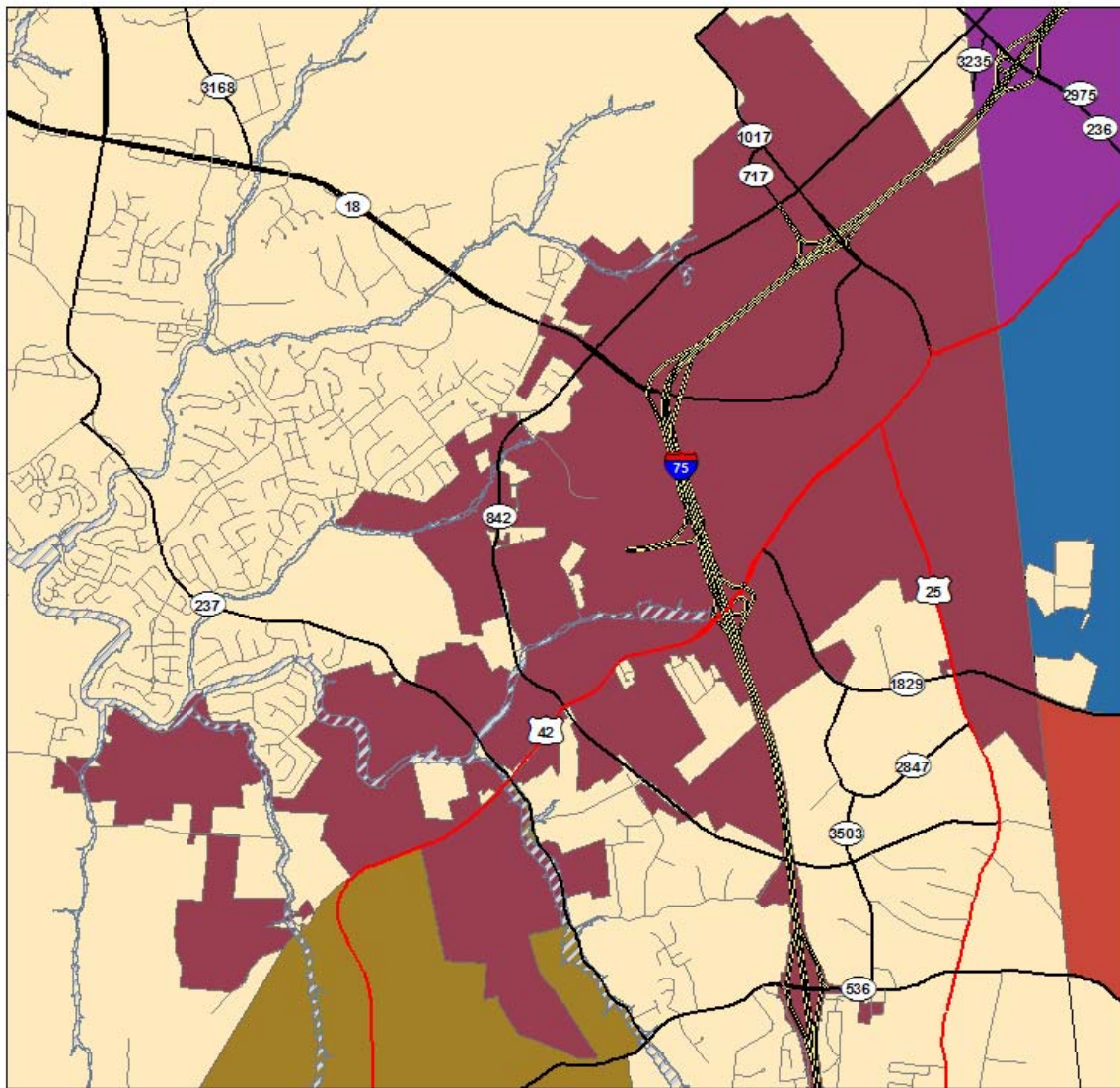
## Boone County Flood Hazard Area



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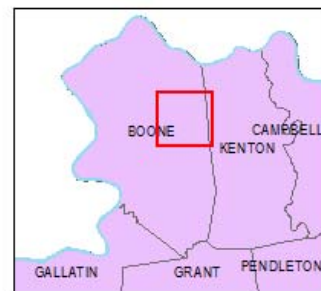
## City of Florence Flood Hazard Area



0 0.2 0.4 0.8 1.2 1.6 Miles

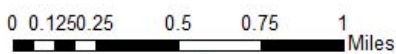
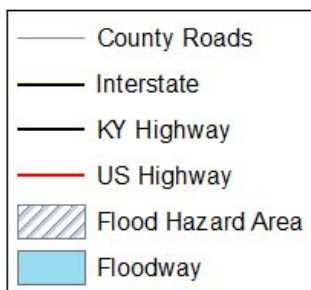
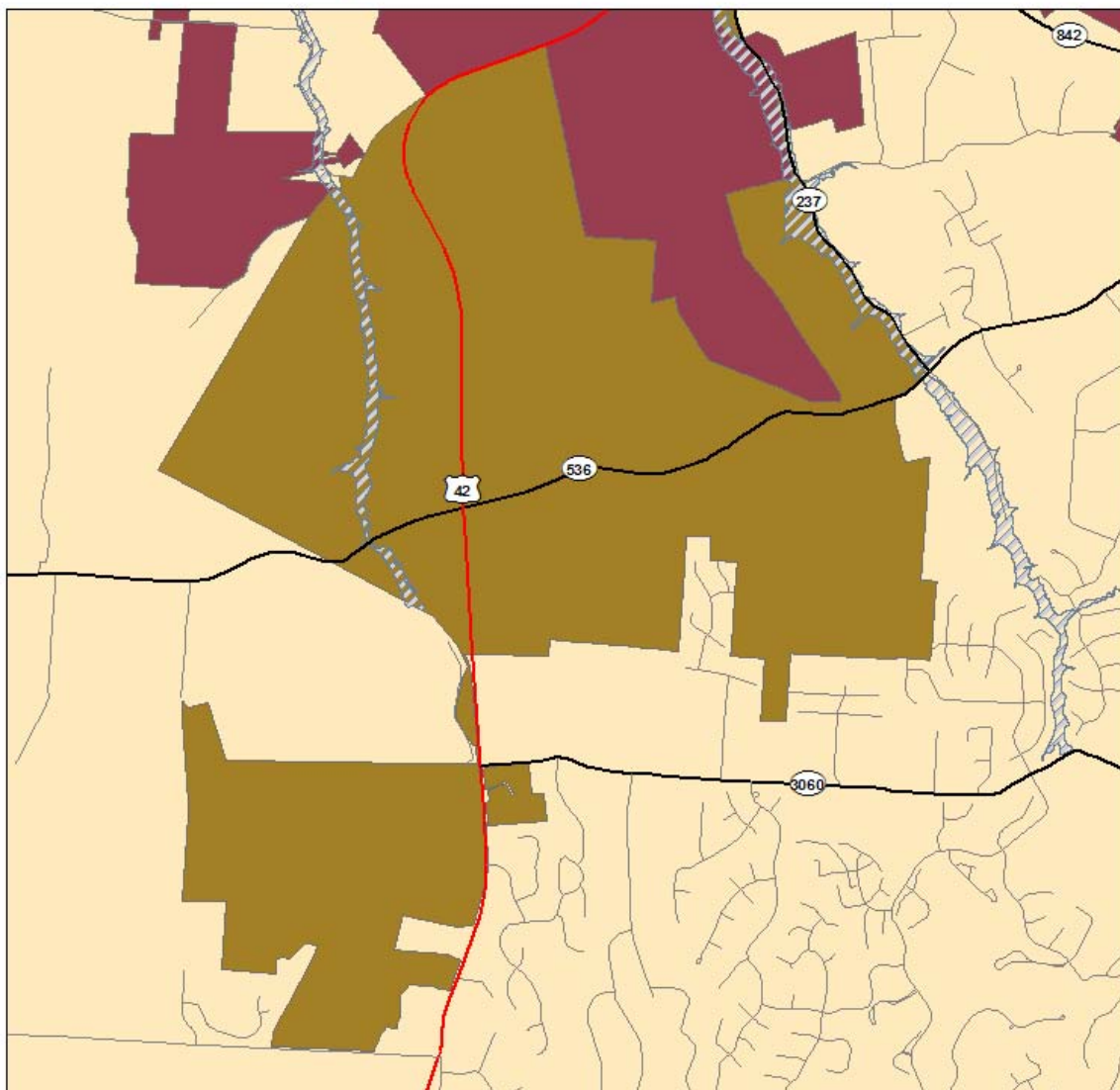


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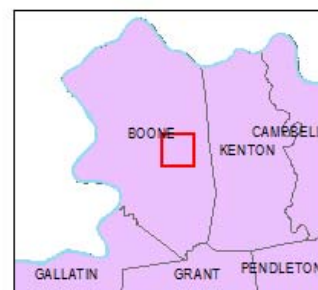




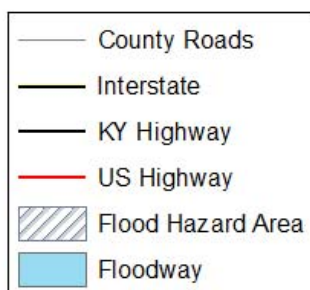
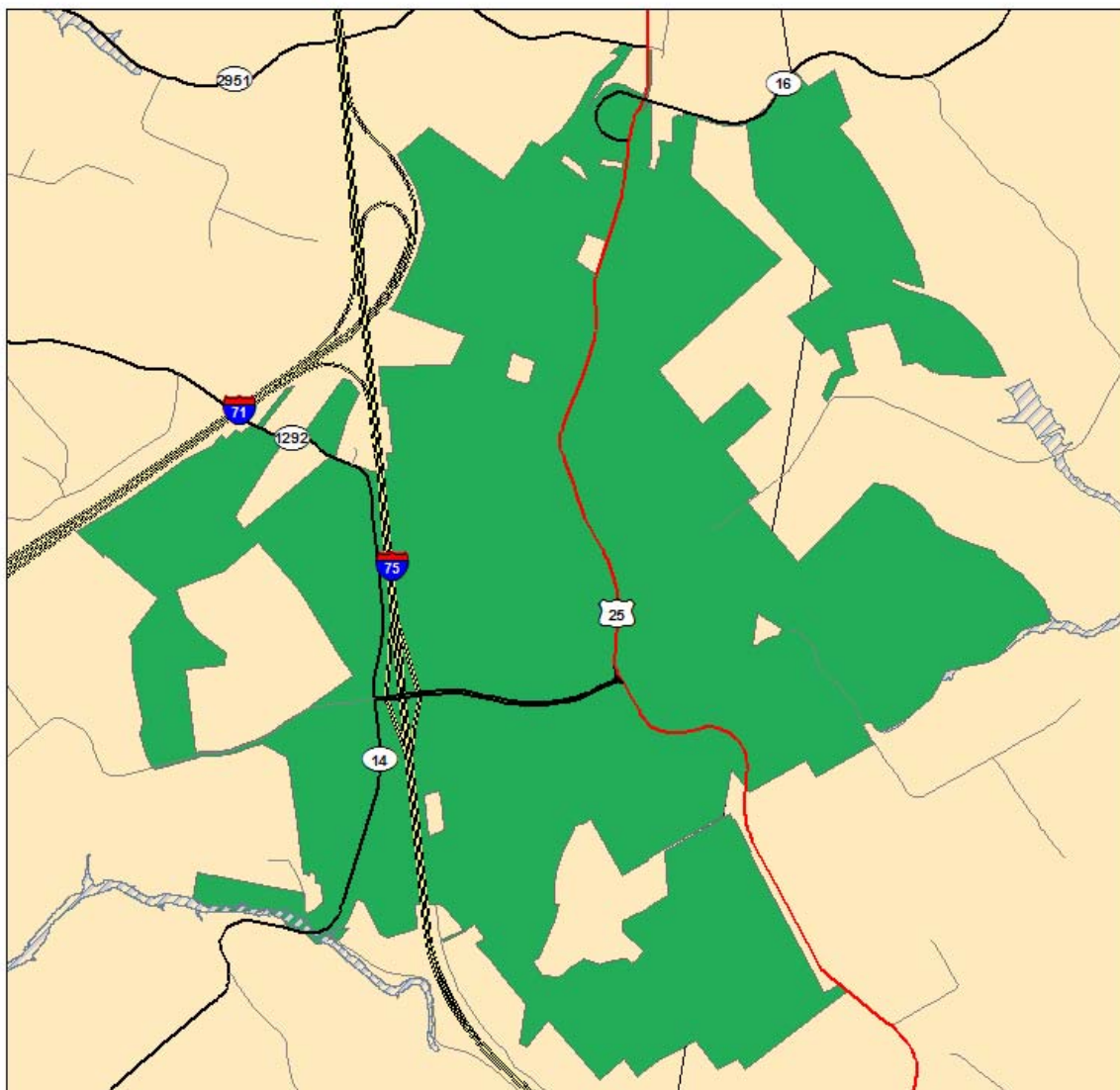
# City of Union Flood Hazard Area



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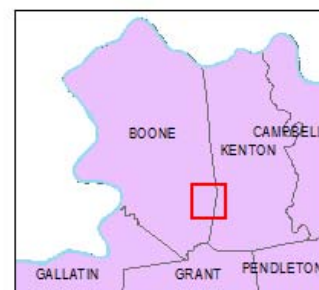
## City of Walton Flood Hazard Area



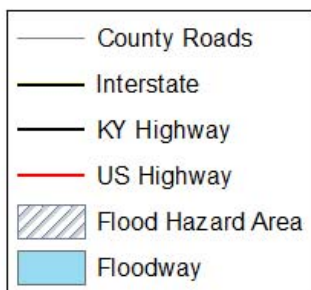
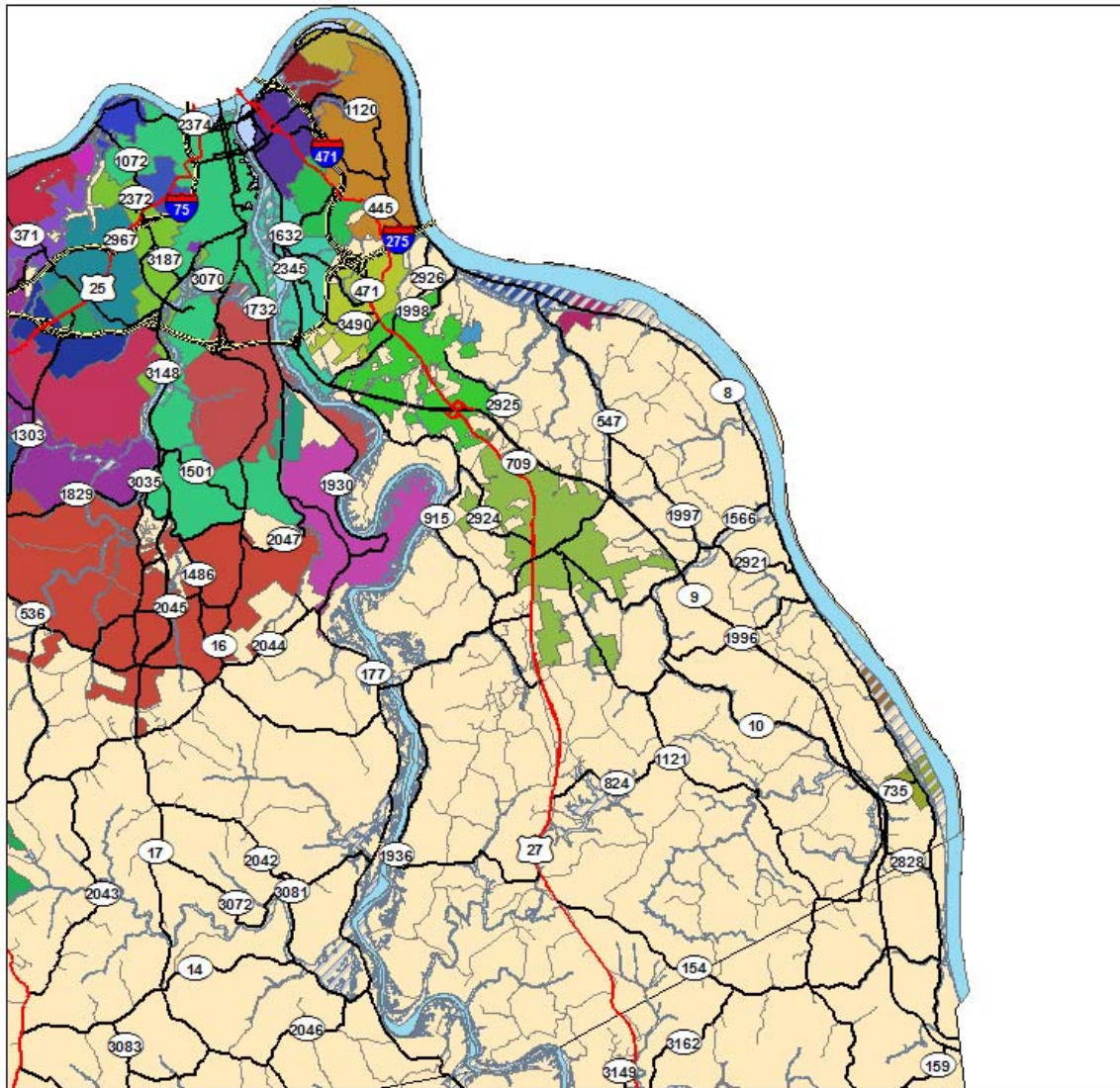
0 0.125 0.25 0.5 0.75 1 Miles



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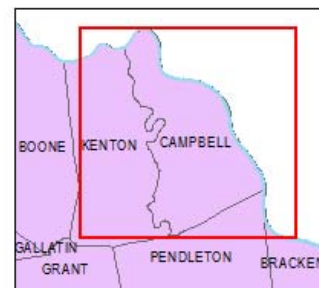
## Campbell County Flood Hazard Area



0 0.75 1.5 3 4.5 6 Miles

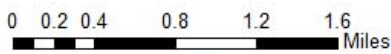
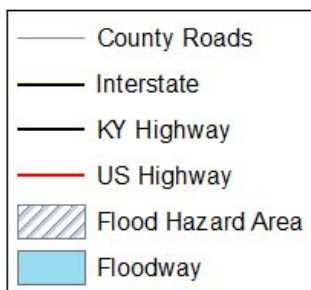
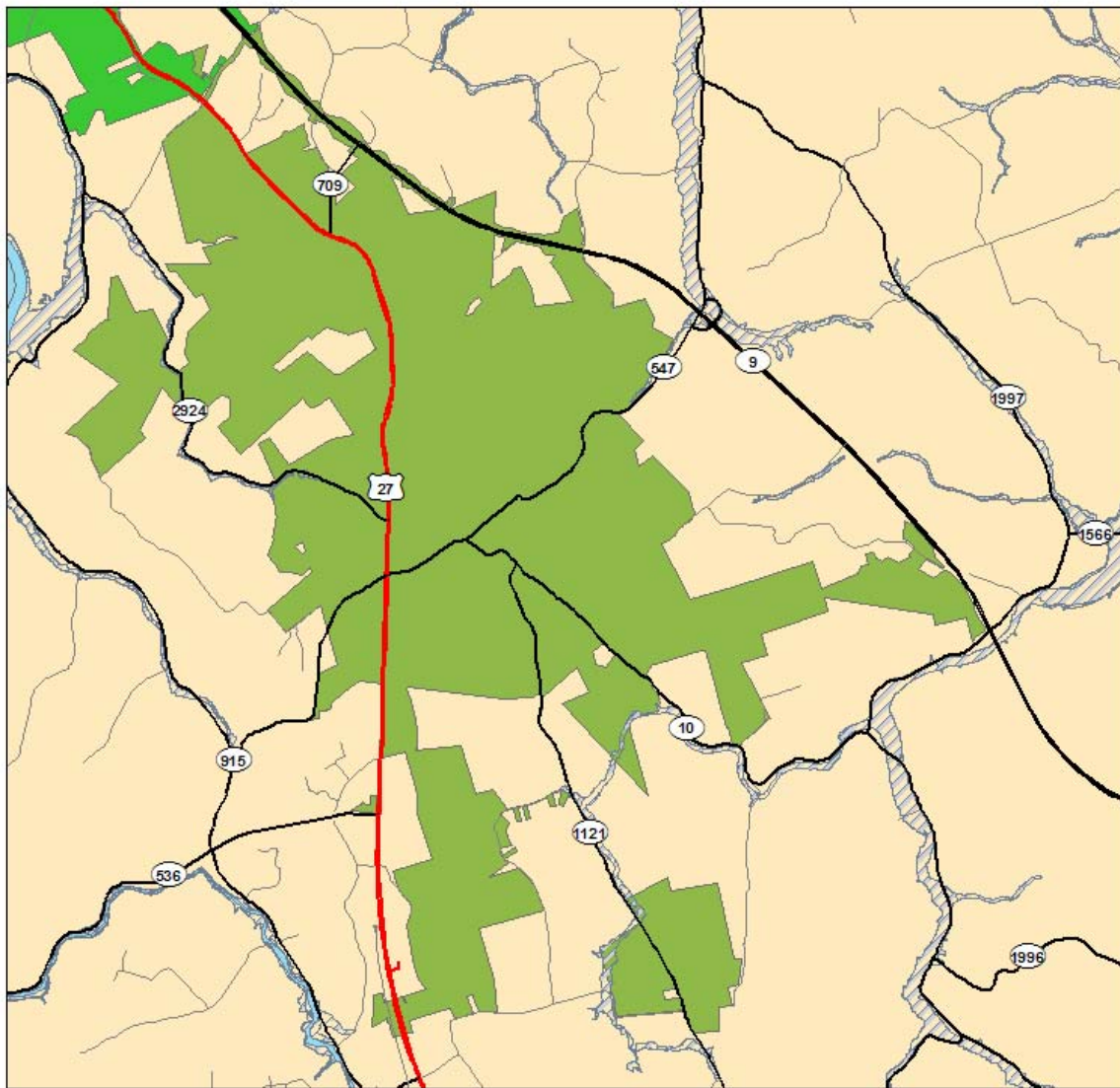


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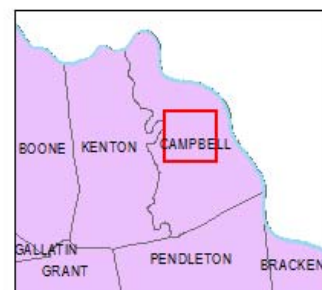




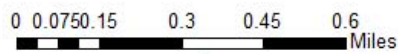
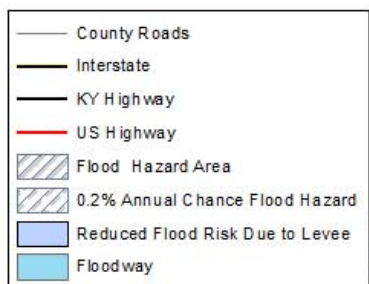
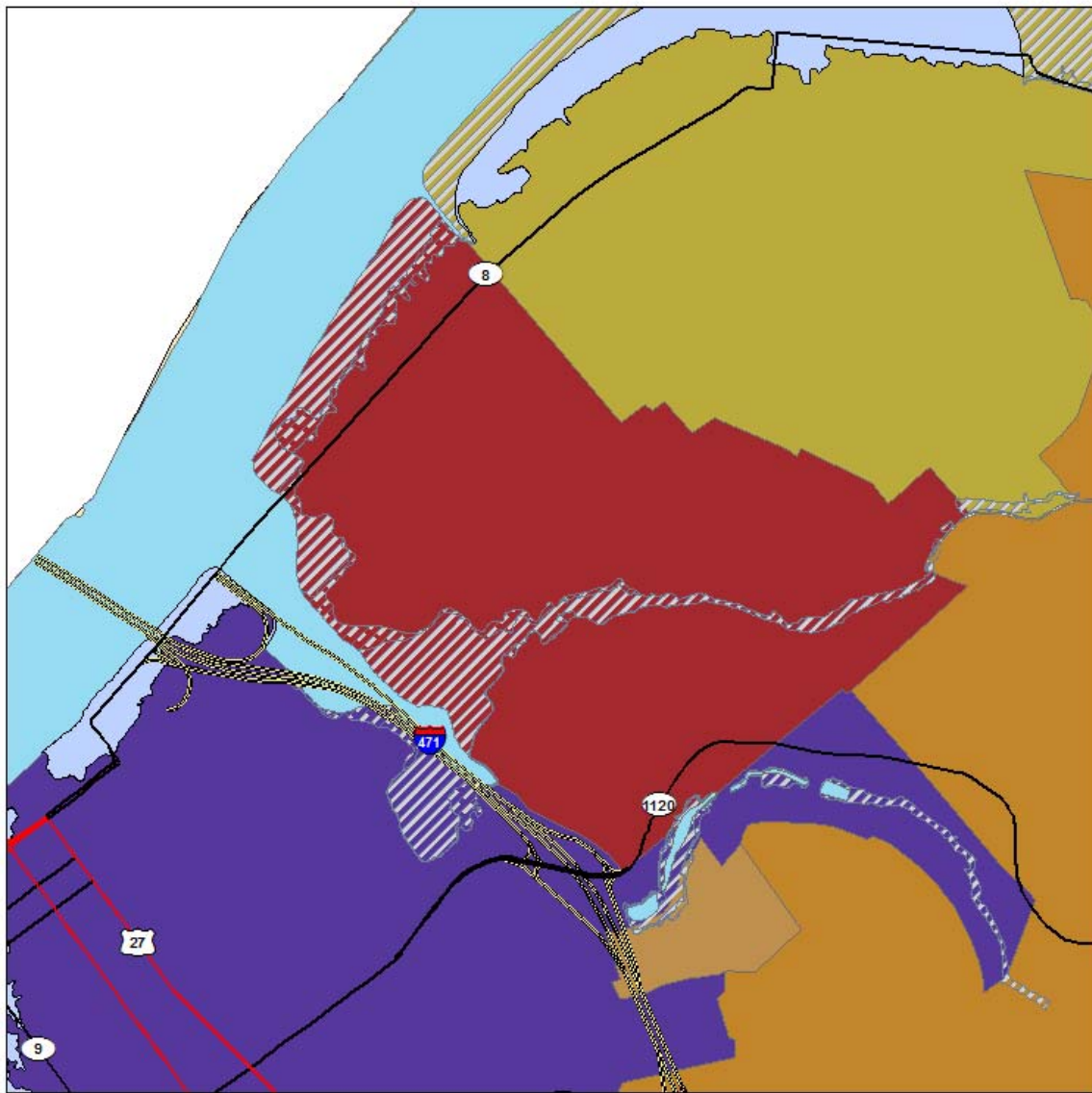
## City of Alexandria Flood Hazard Area



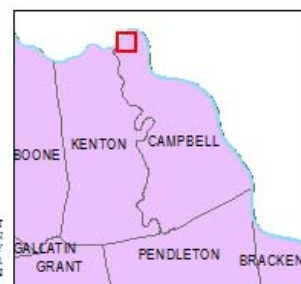
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



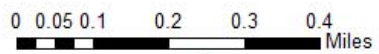
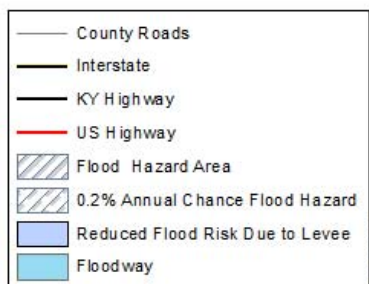
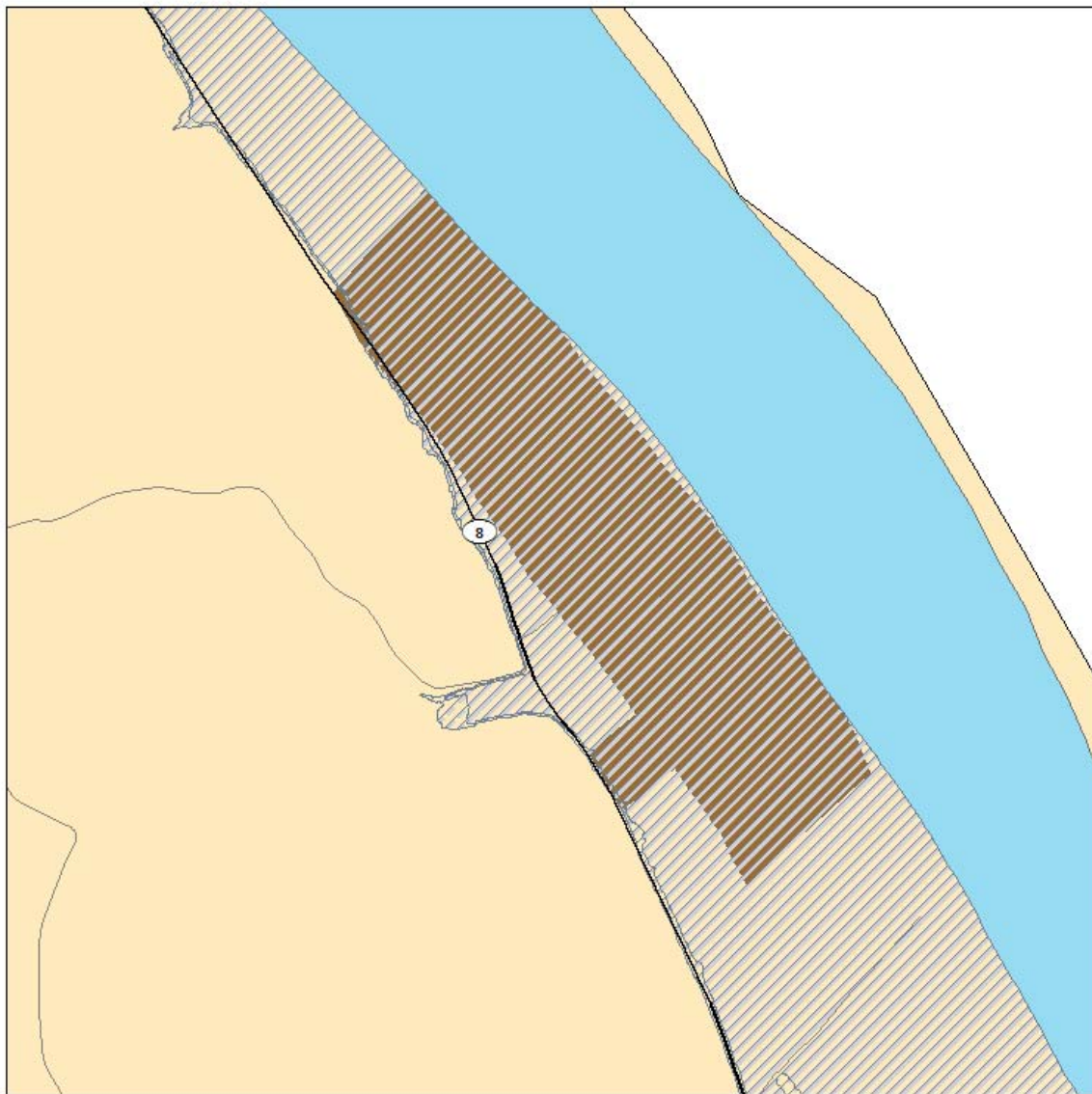
## City of Bellevue Flood Hazard Area



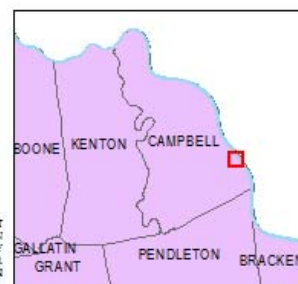
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



## City of California Flood Hazard Area

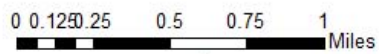
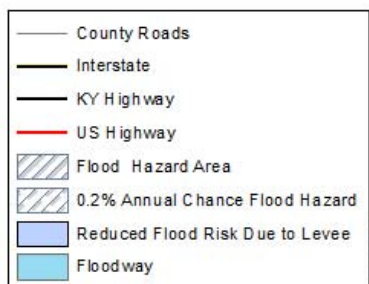
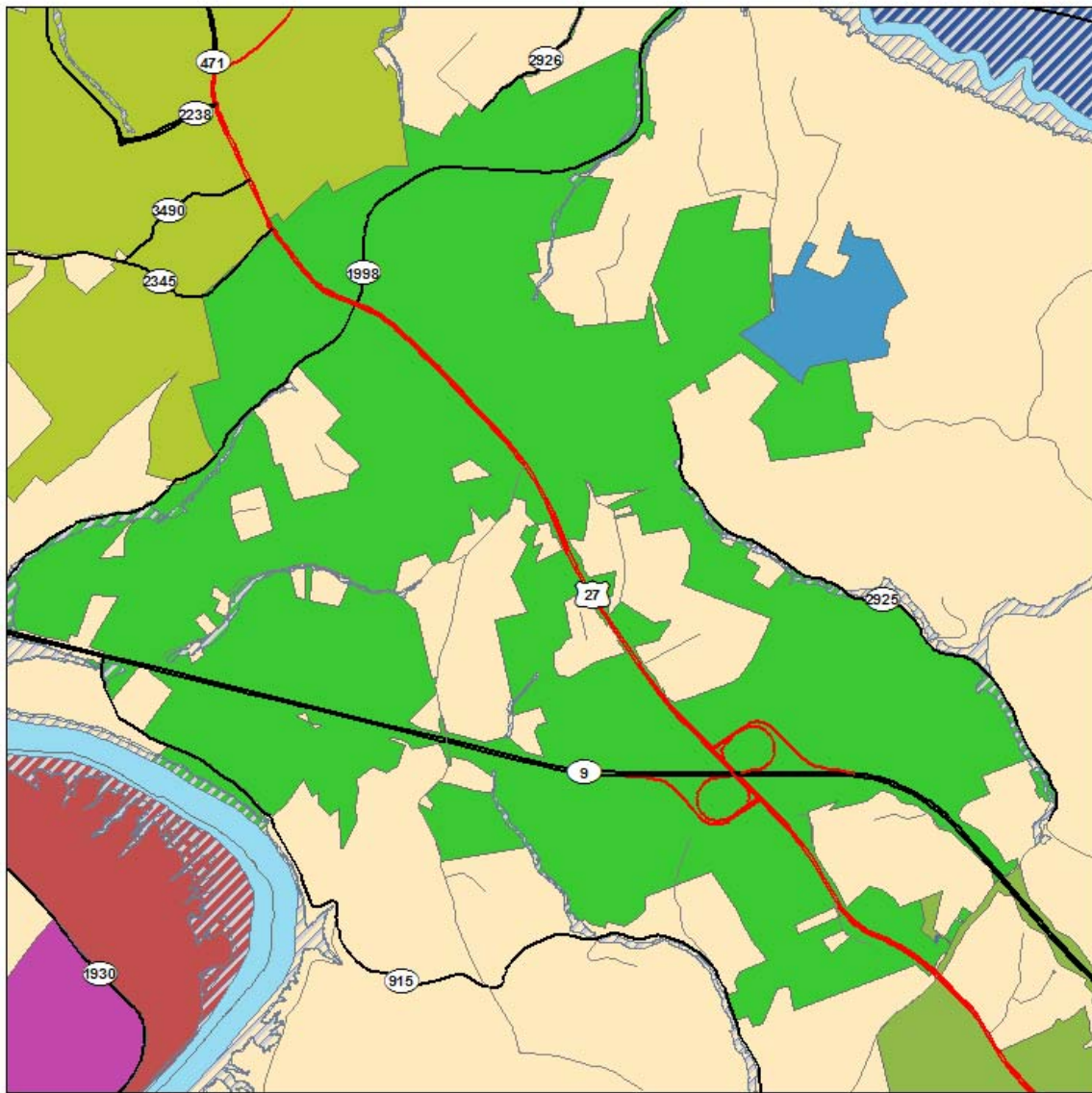


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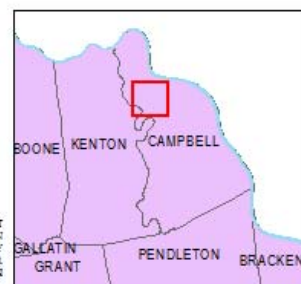




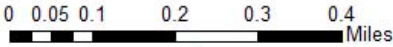
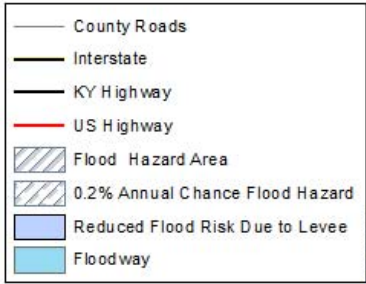
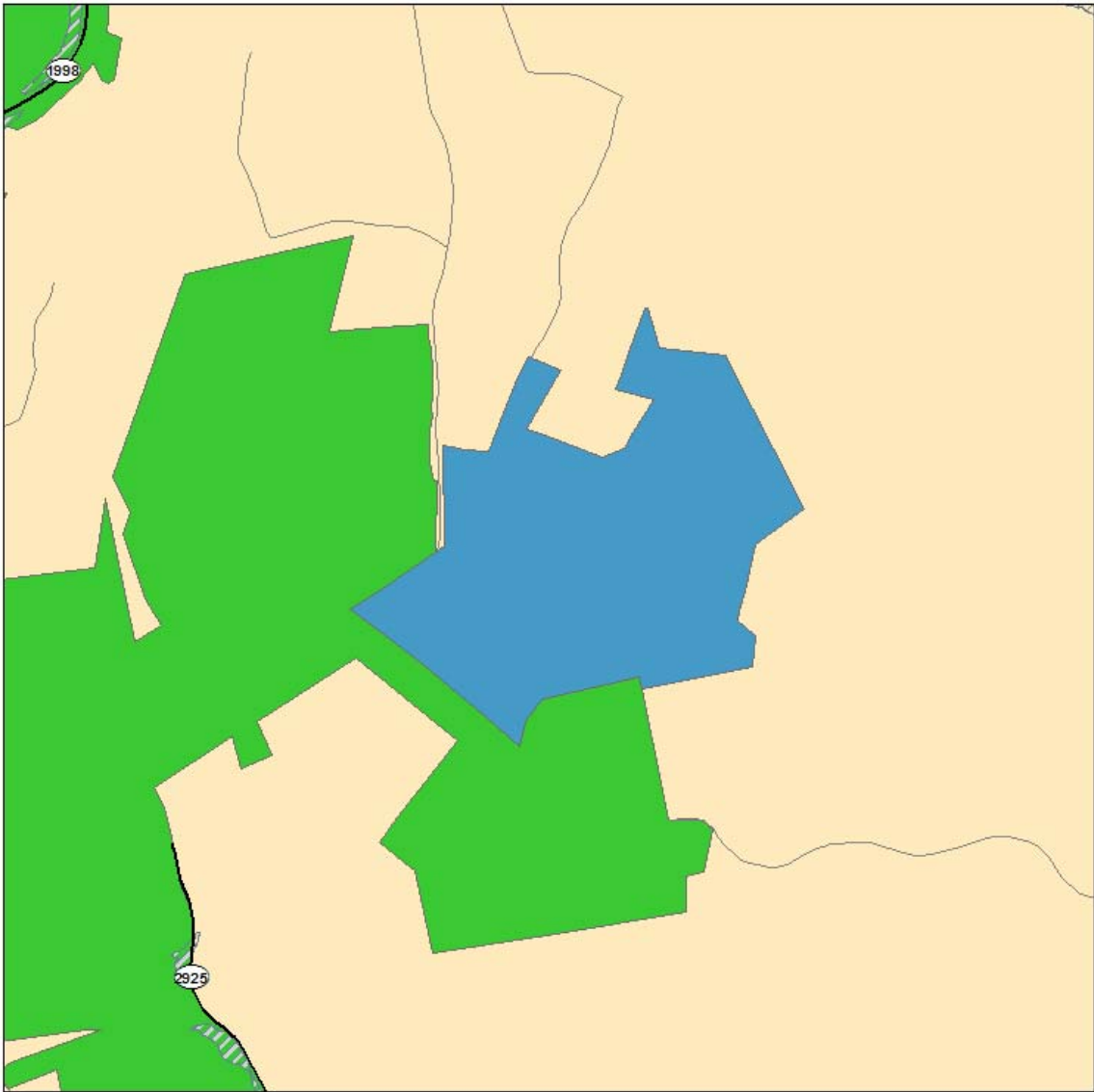
## City of Cold Spring Flood Hazard Area



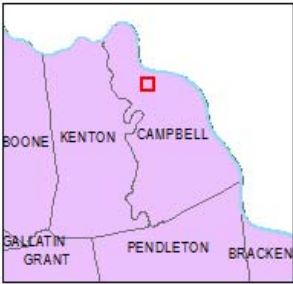
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



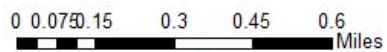
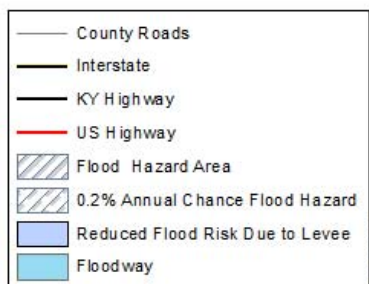
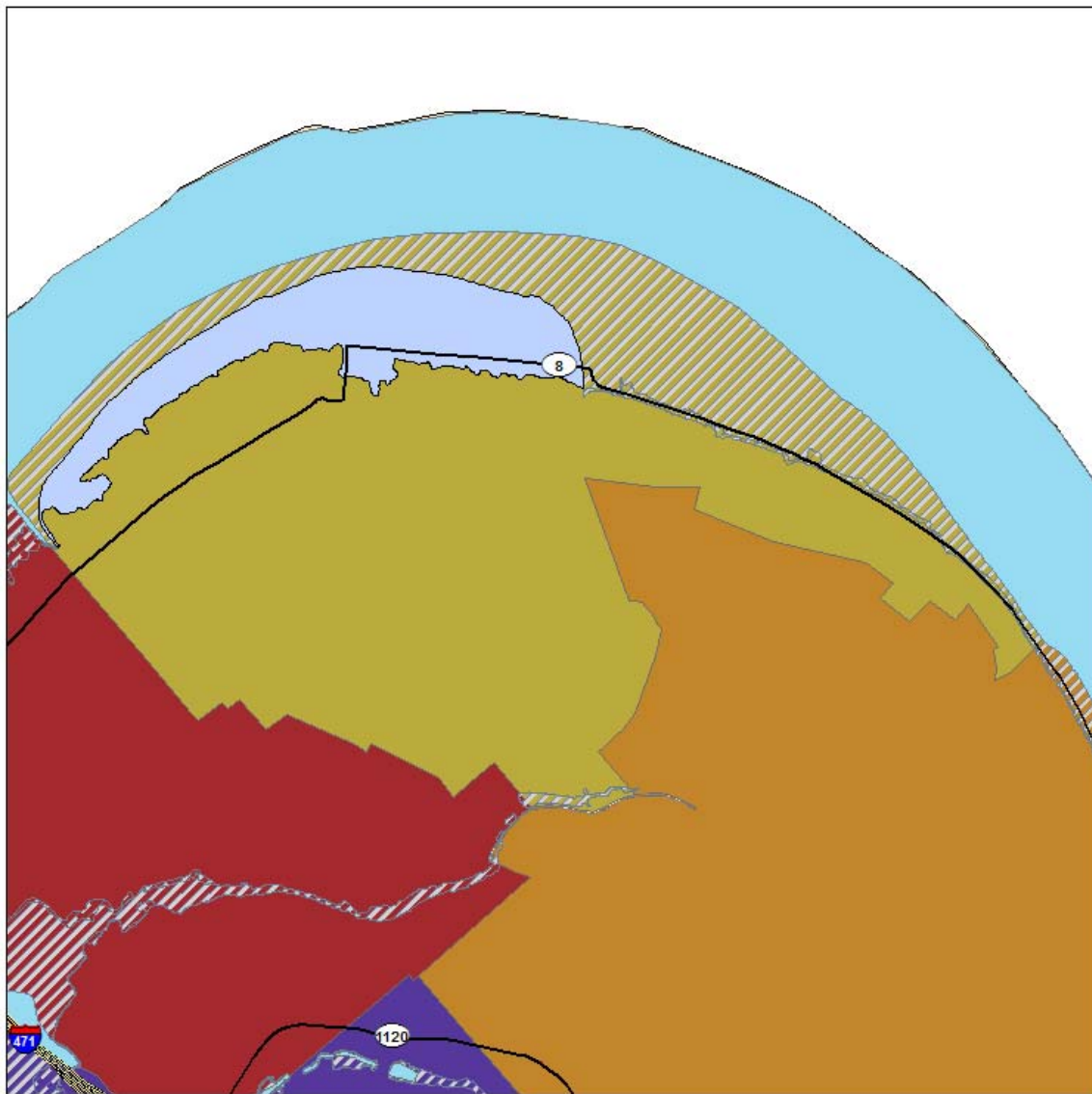
# City of Crestview Flood Hazard Area



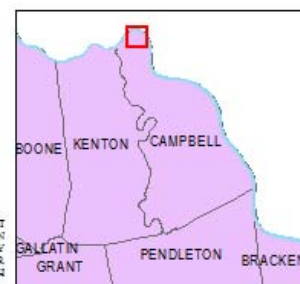
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



## City of Dayton Flood Hazard Area

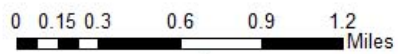
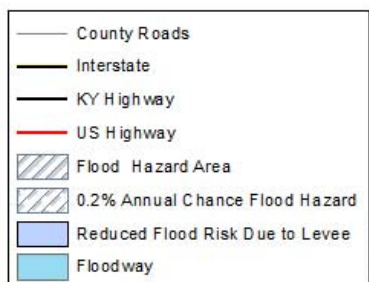
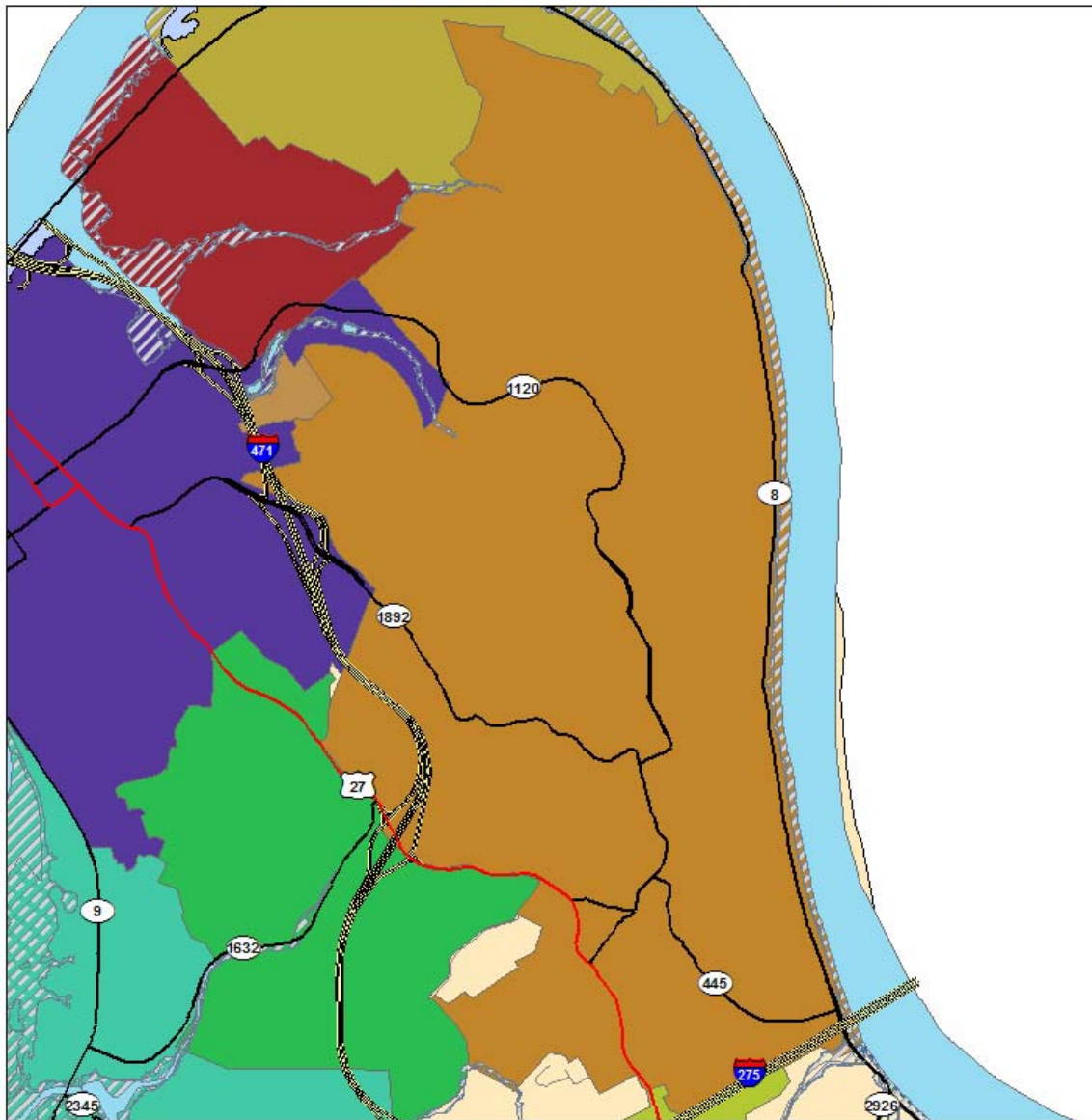


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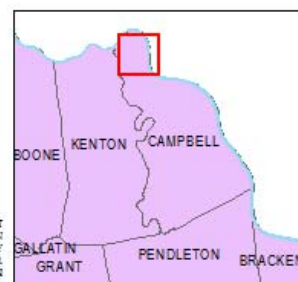




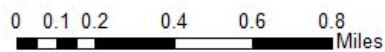
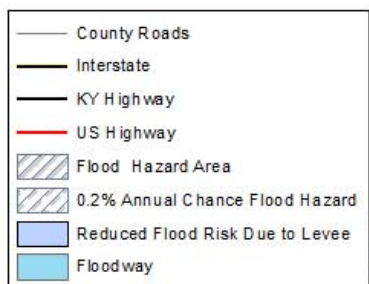
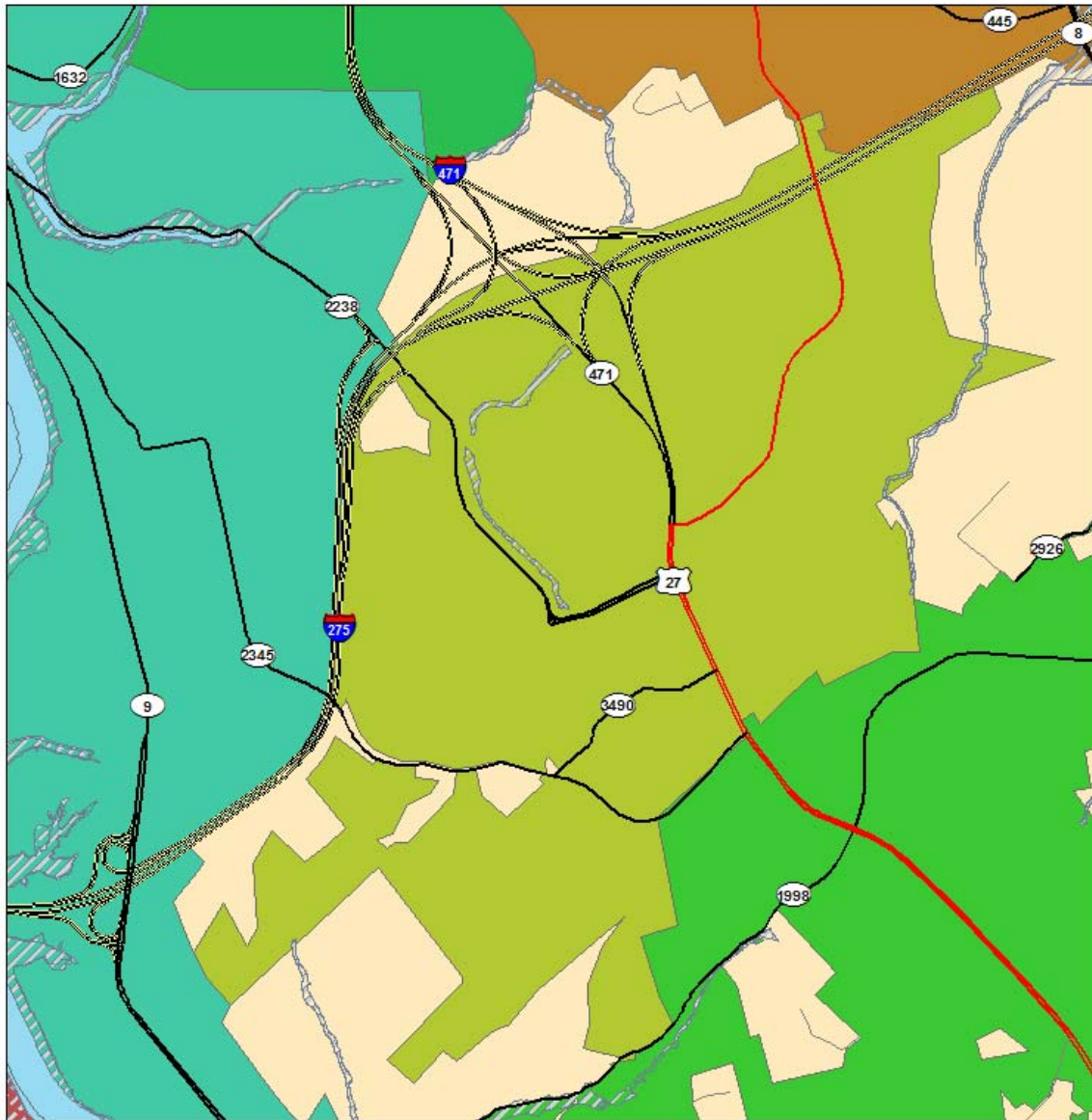
## City of Fort Thomas Flood Hazard Area



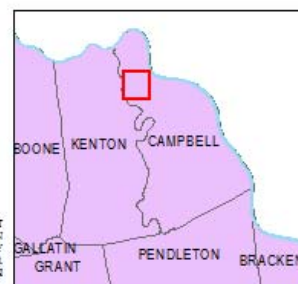
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



# City of Highland Heights Flood Hazard Area

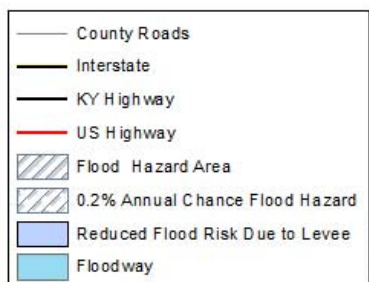
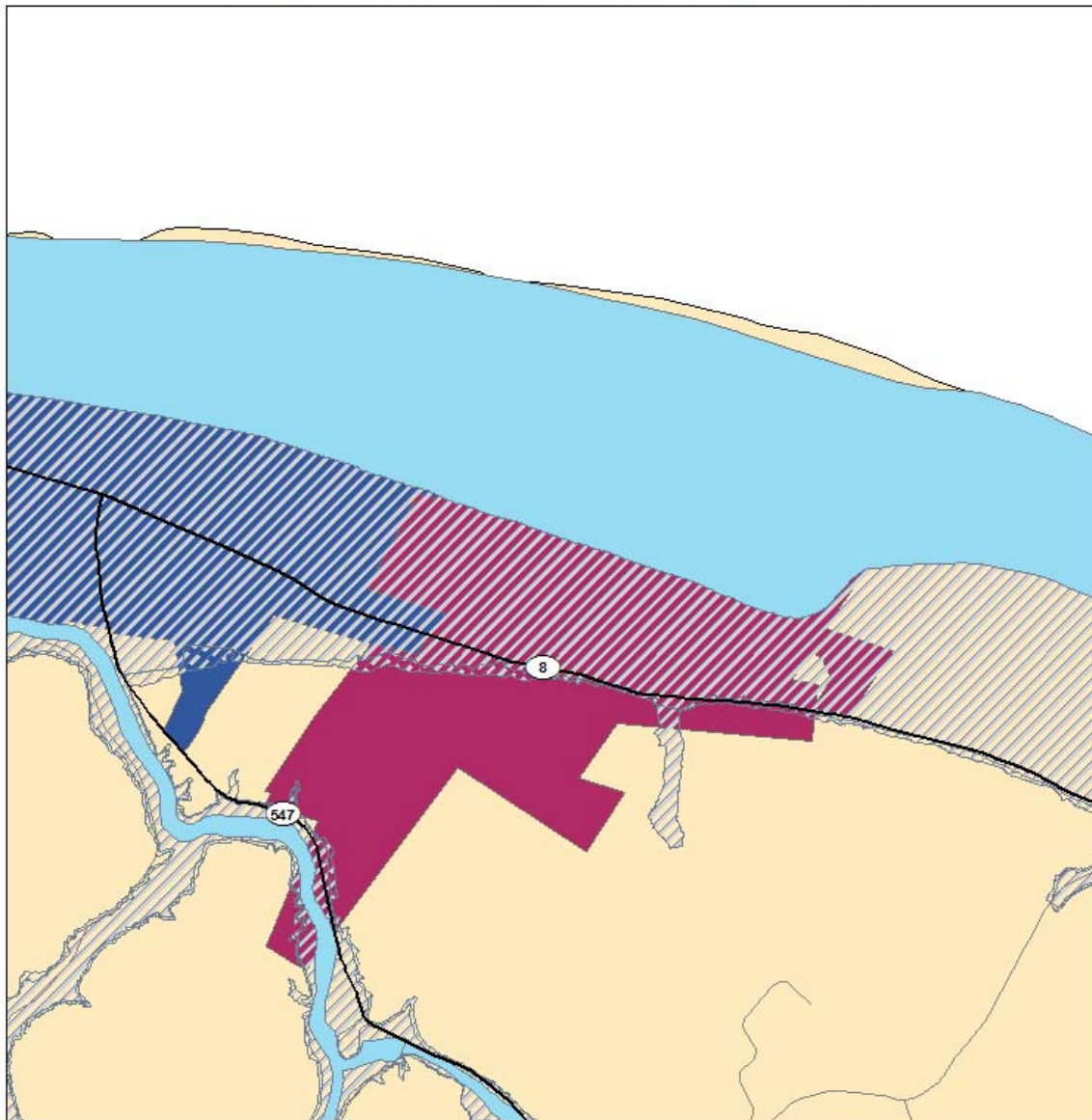


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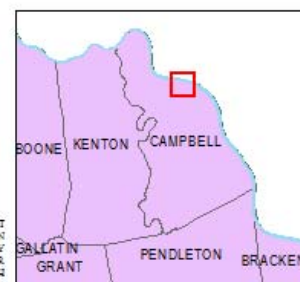
## City of Melbourne Flood Hazard Area



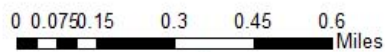
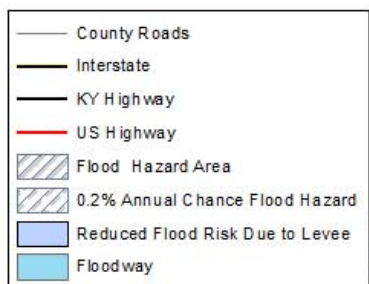
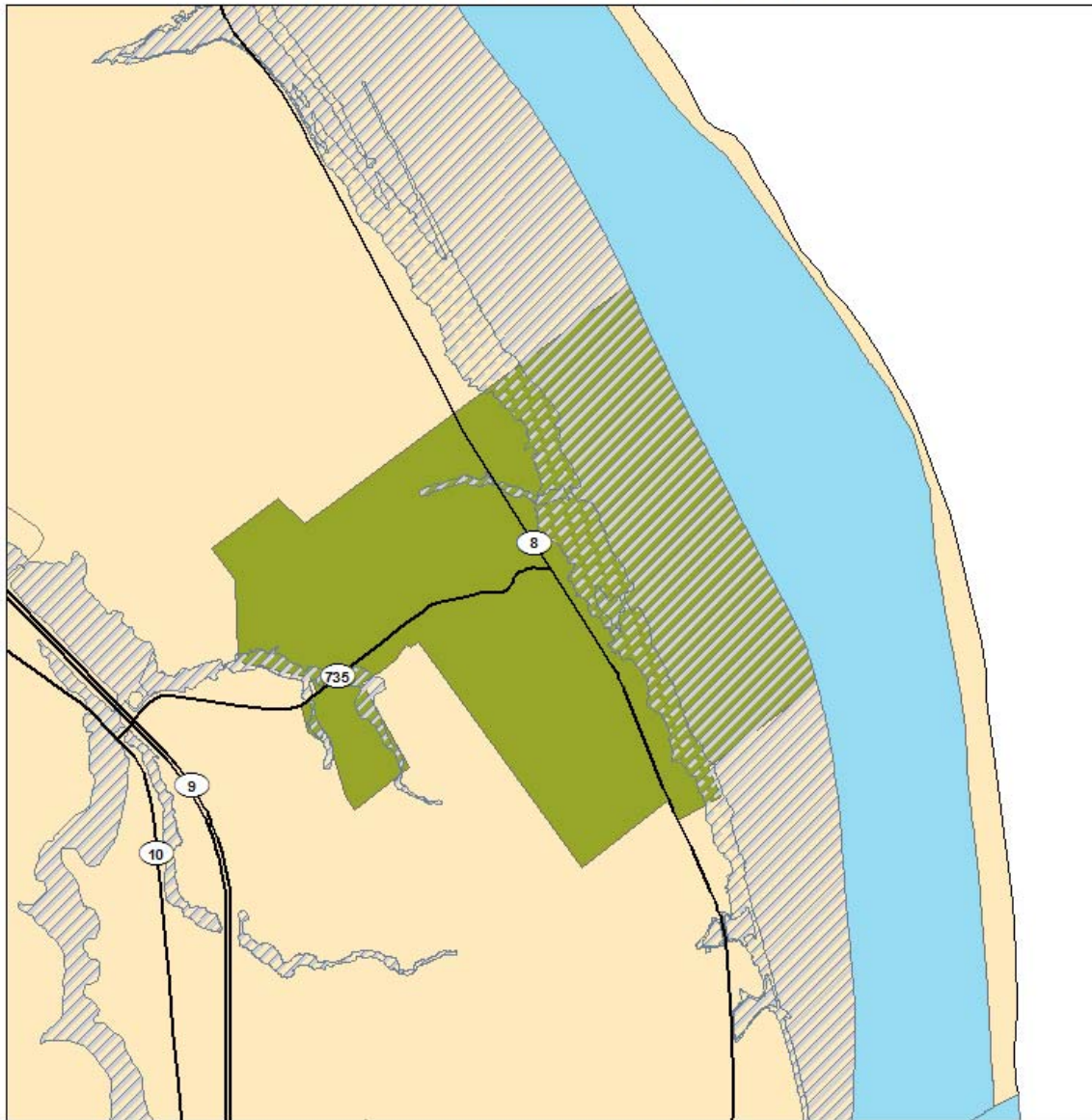
0 0.075 0.15 0.3 0.45 0.6 Miles



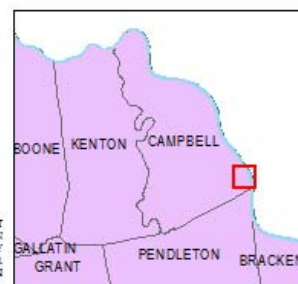
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



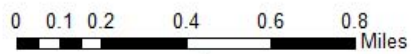
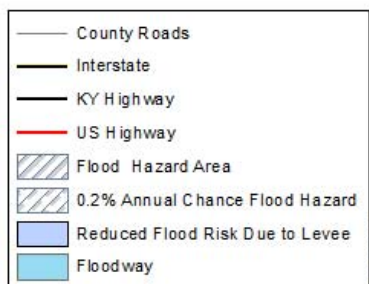
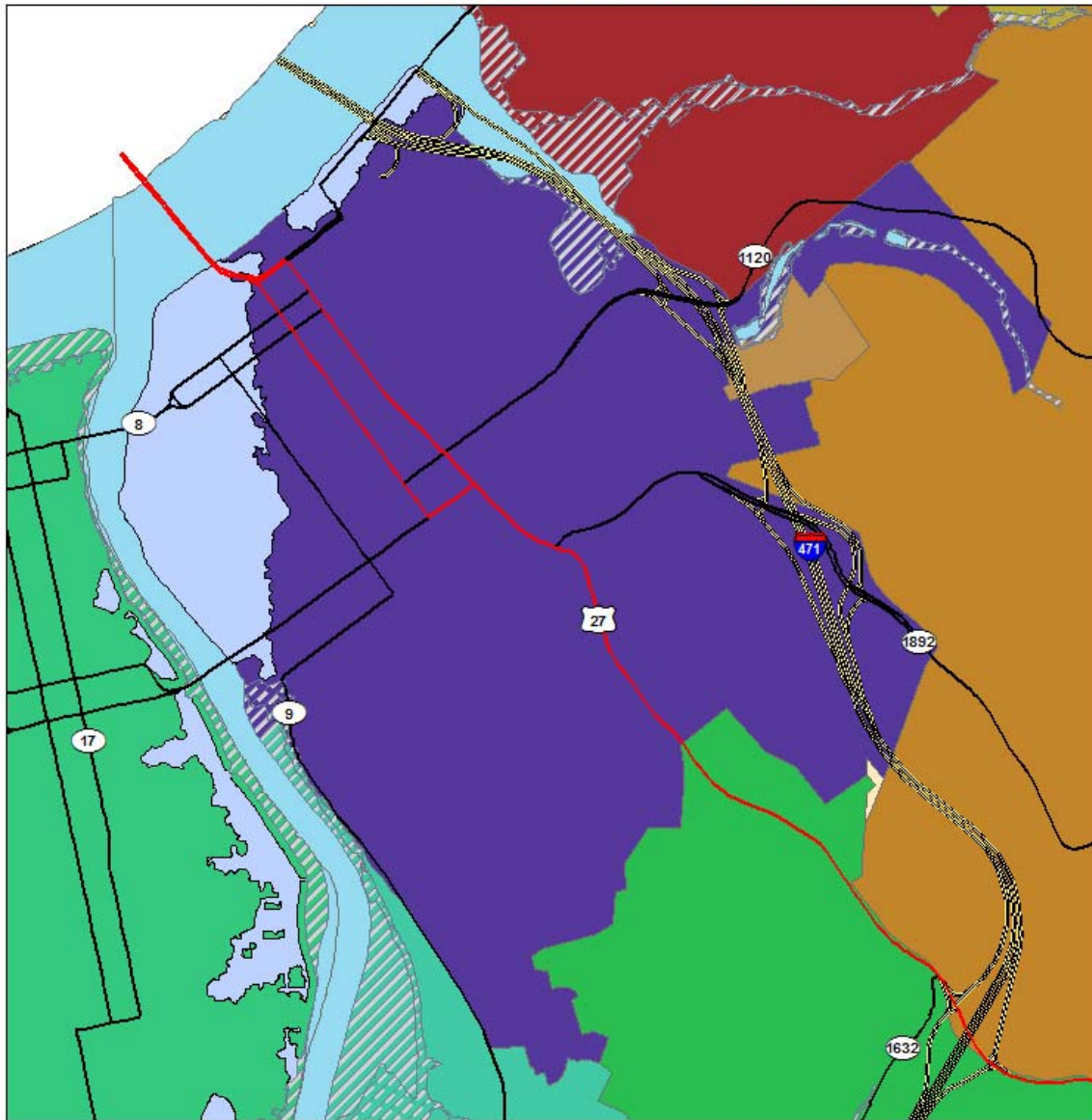
# City of Mentor Flood Hazard Area



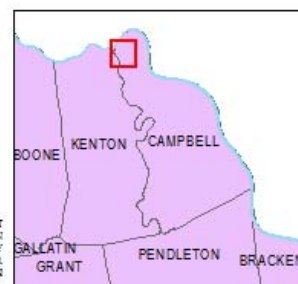
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



## City of Newport Flood Hazard Area

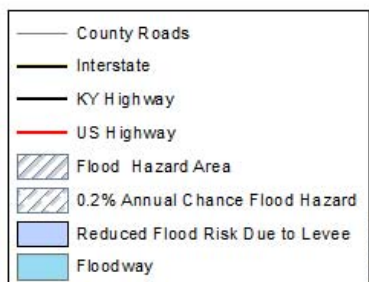
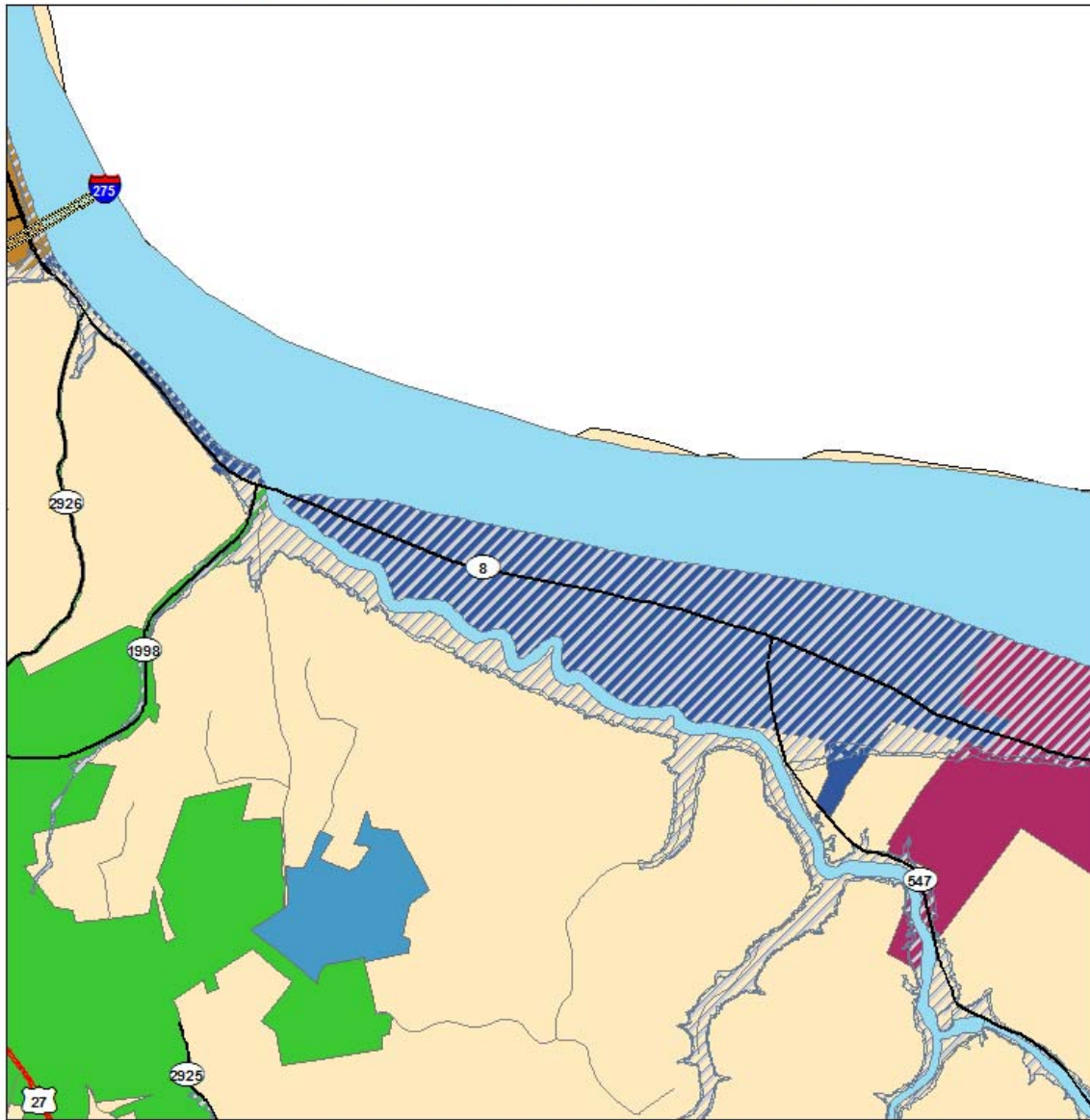


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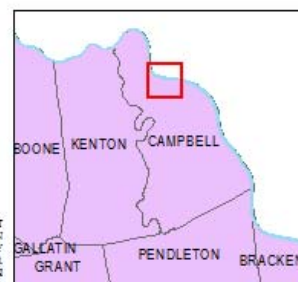
## City of Silver Grove Flood Hazard Area



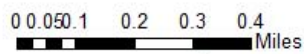
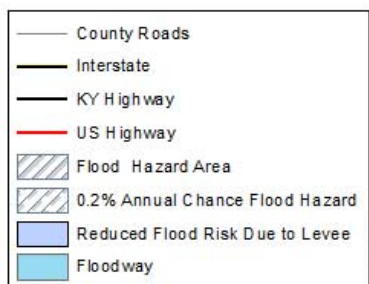
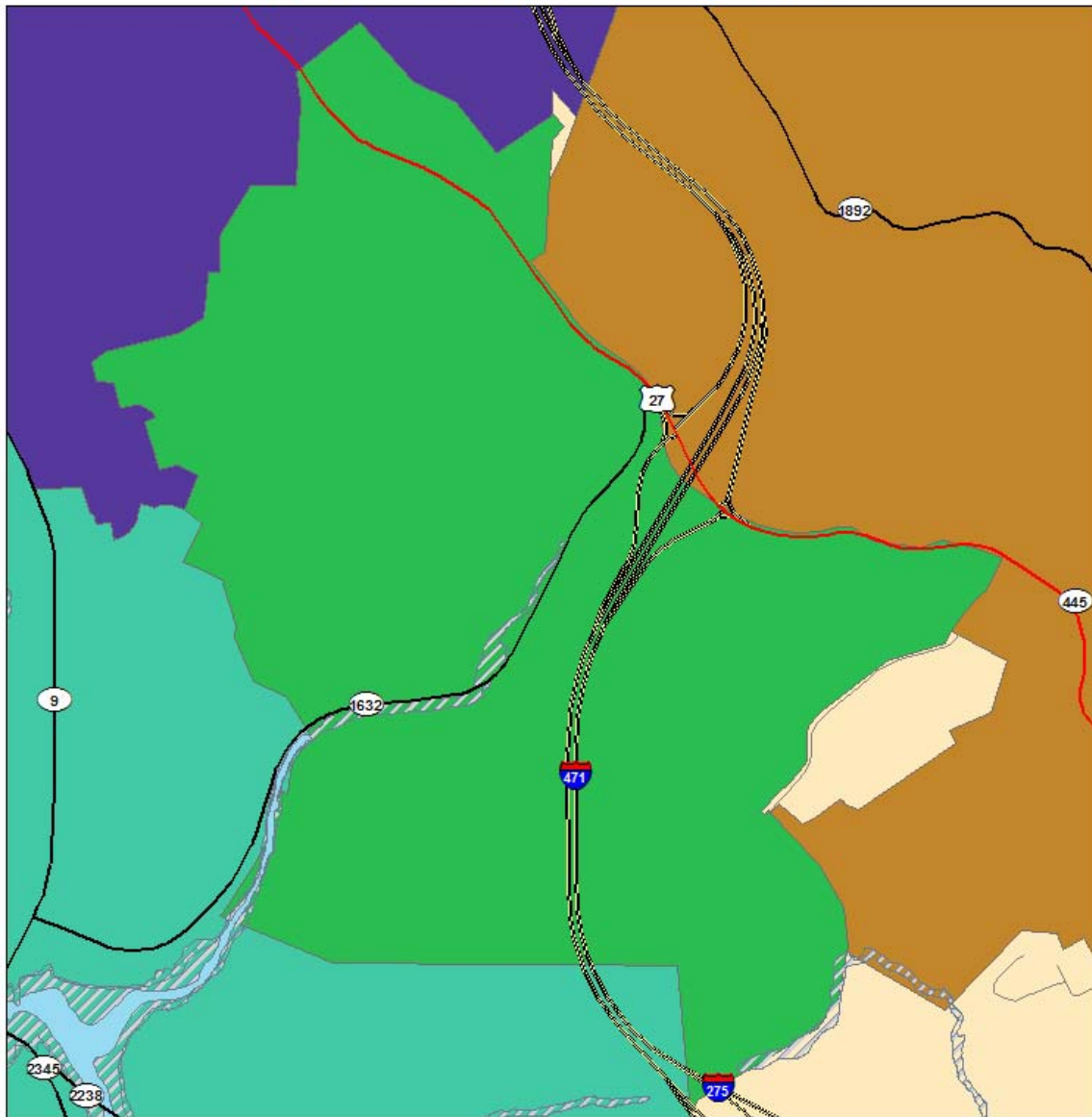
0 0.1250.25 0.5 0.75 1 Miles



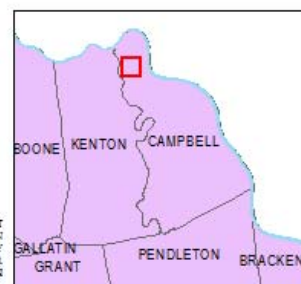
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



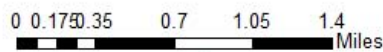
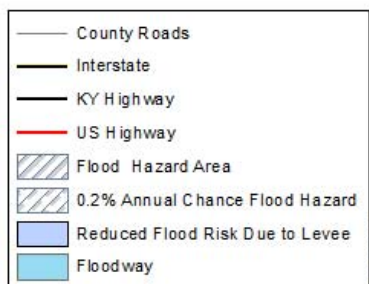
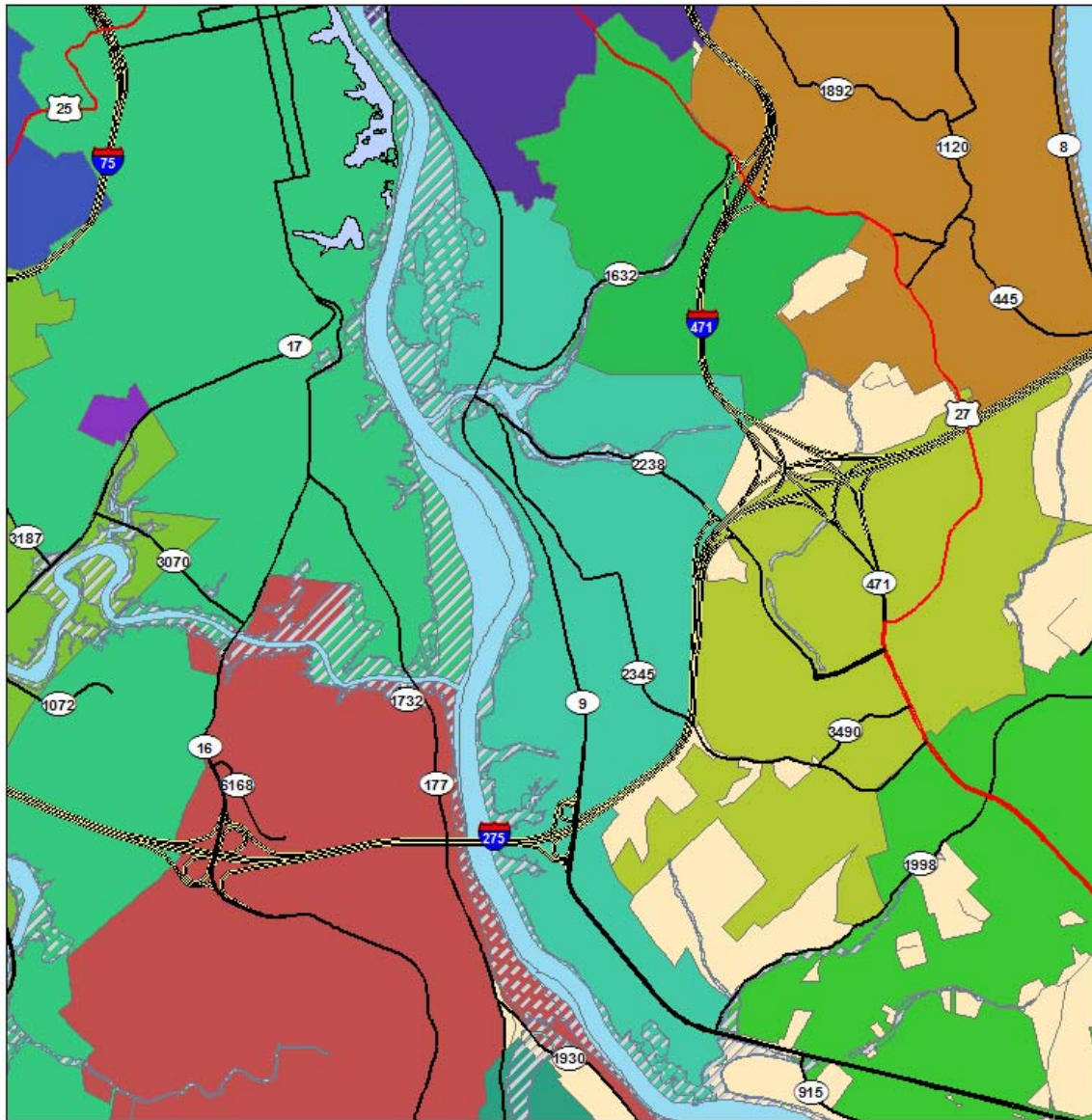
# City of Southgate Flood Hazard Area



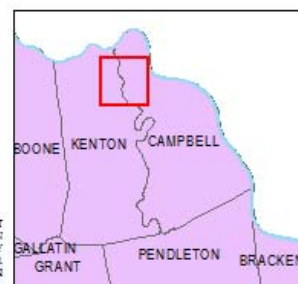
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



# City of Wilder Flood Hazard Area

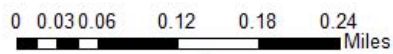
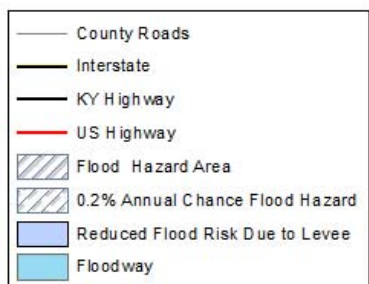
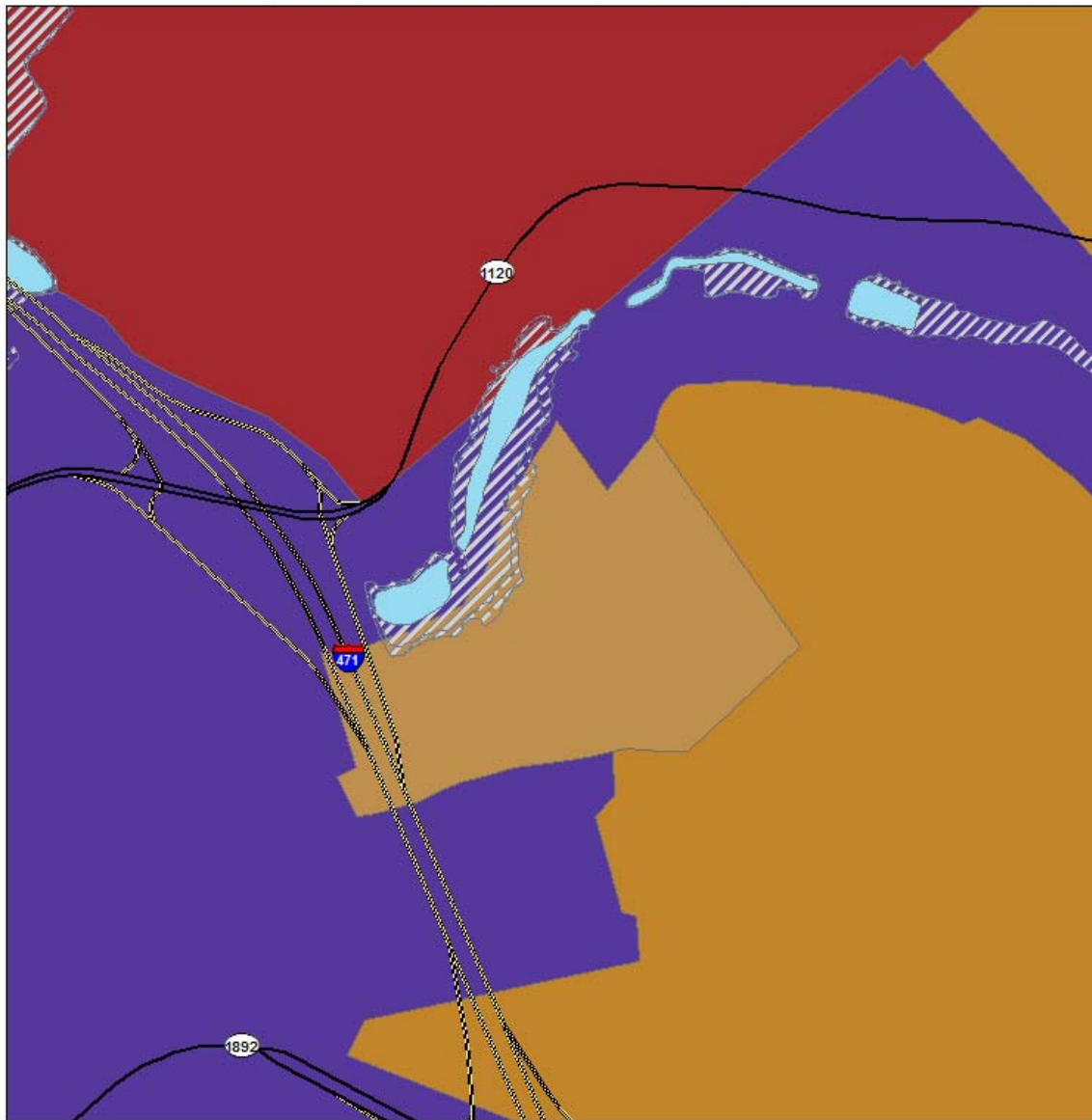


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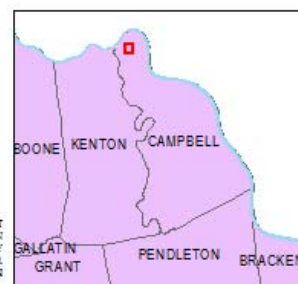




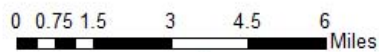
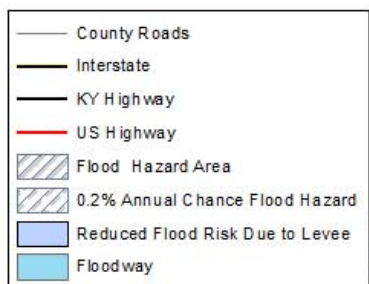
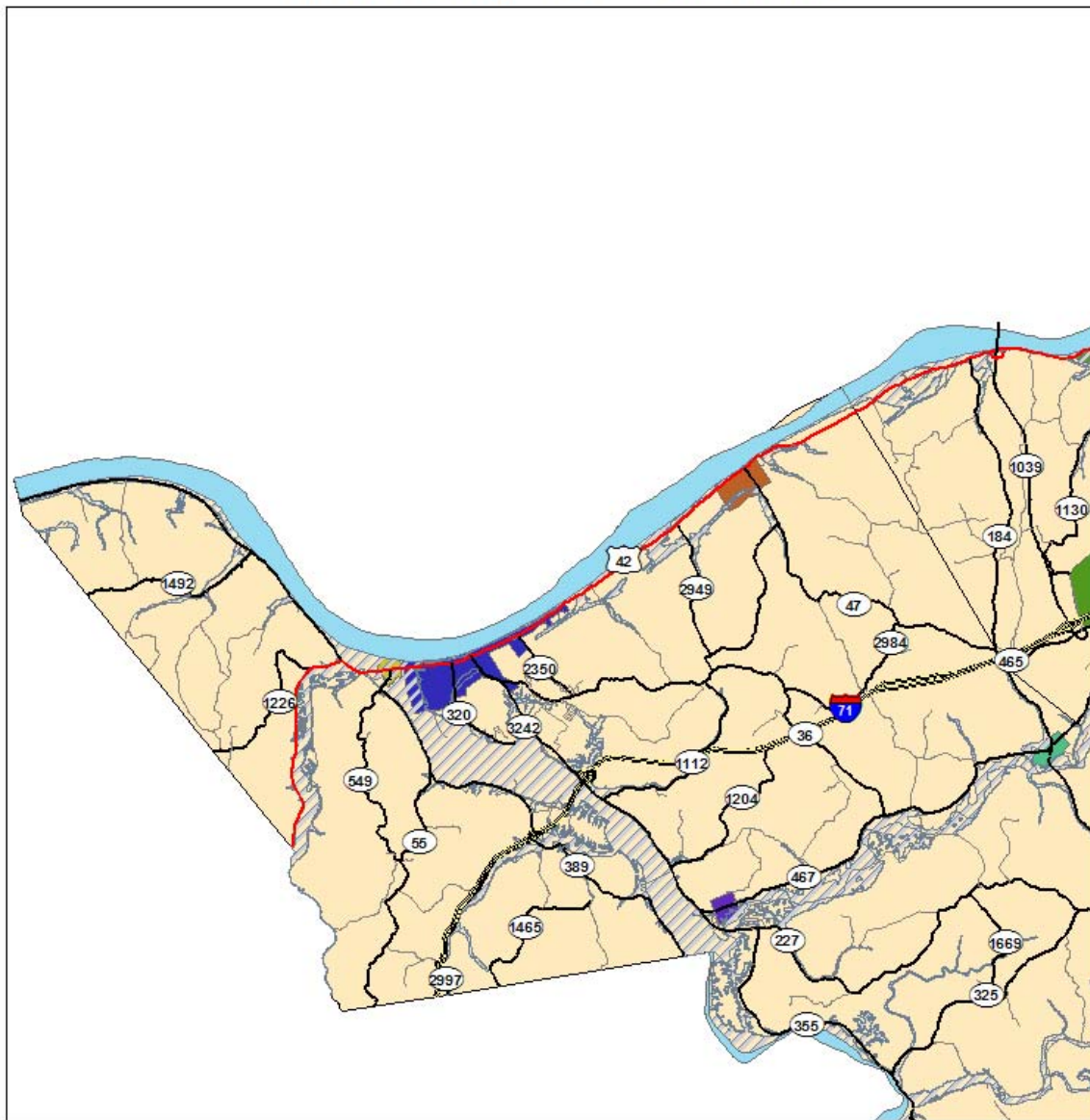
# City of Woodlawn Flood Hazard Area



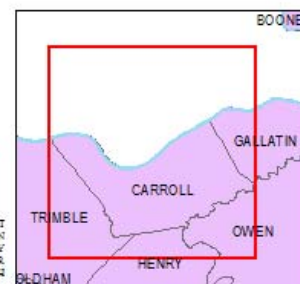
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



# Carroll County Flood Hazard Area

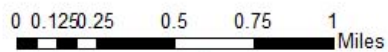
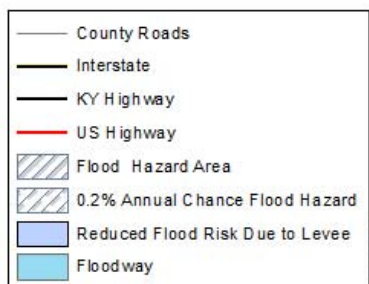
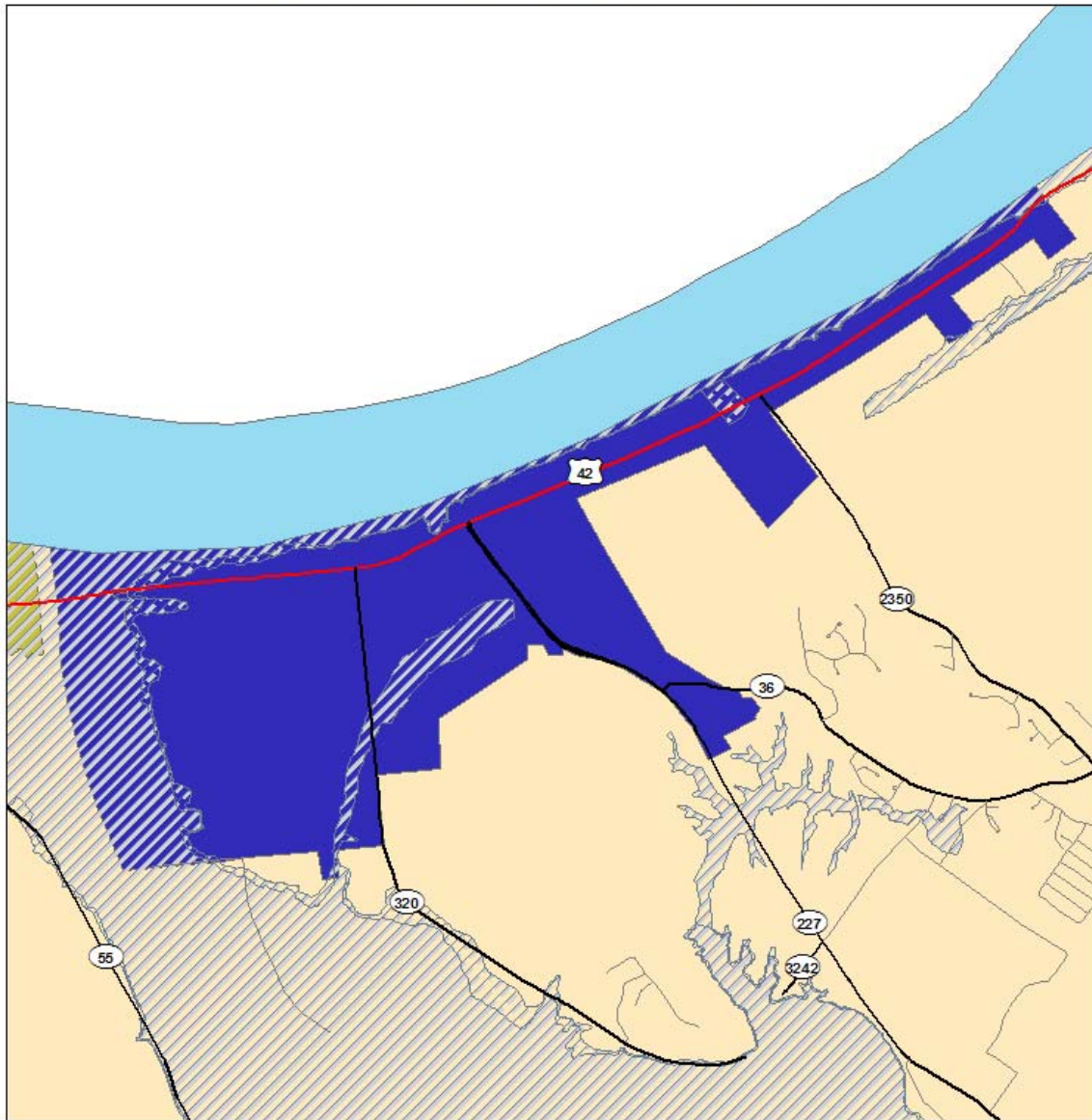


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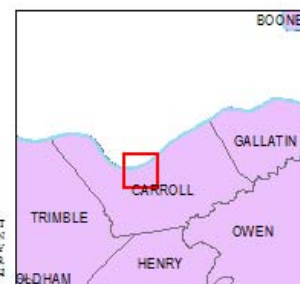




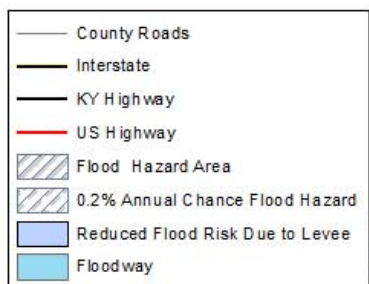
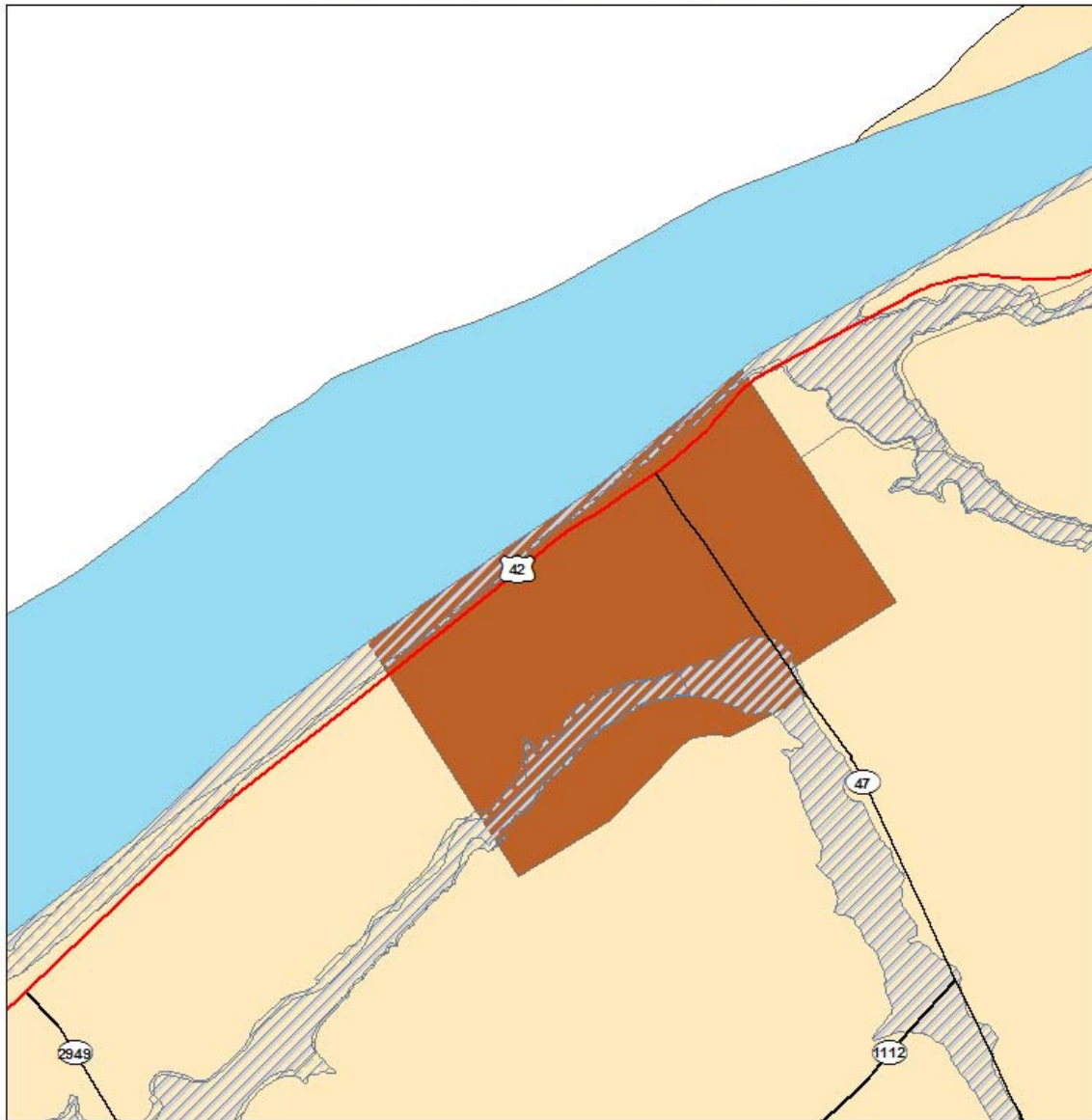
# City of Carrollton Flood Hazard Area



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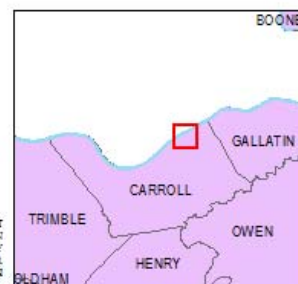
# City of Ghent Flood Hazard Area



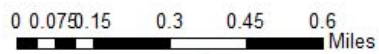
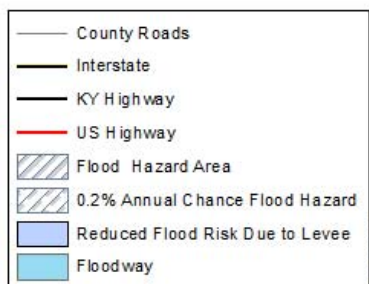
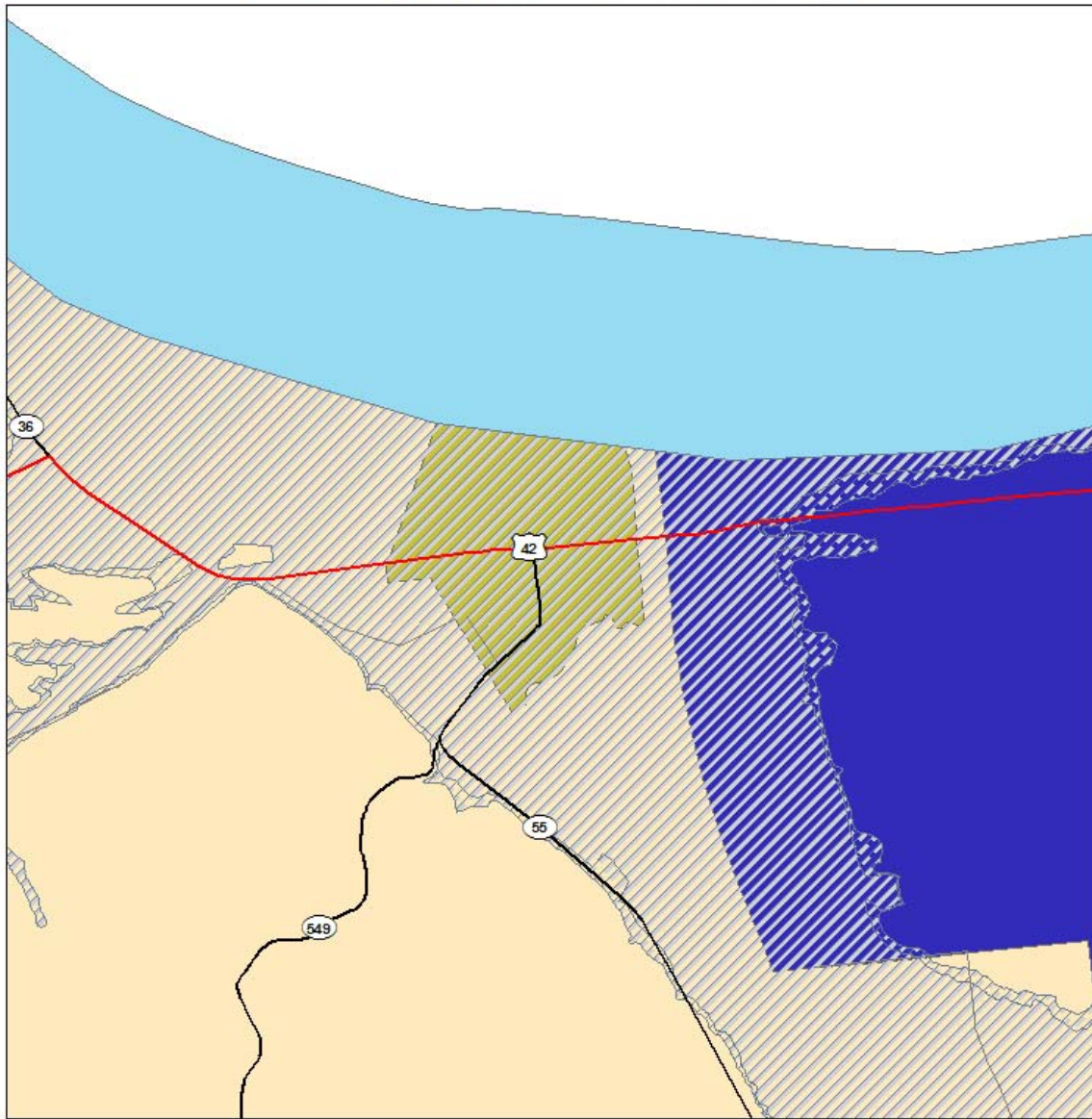
0 0.075 0.15 0.3 0.45 0.6 Miles



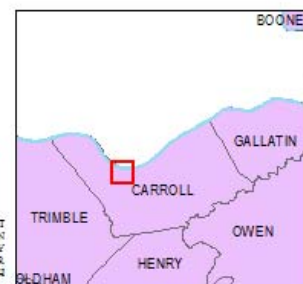
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



## City of Prestonville Flood Hazard Area

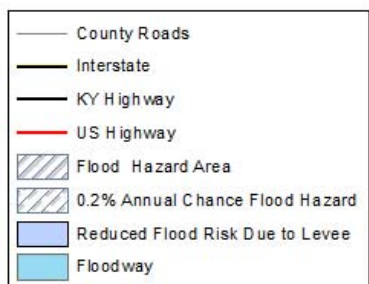
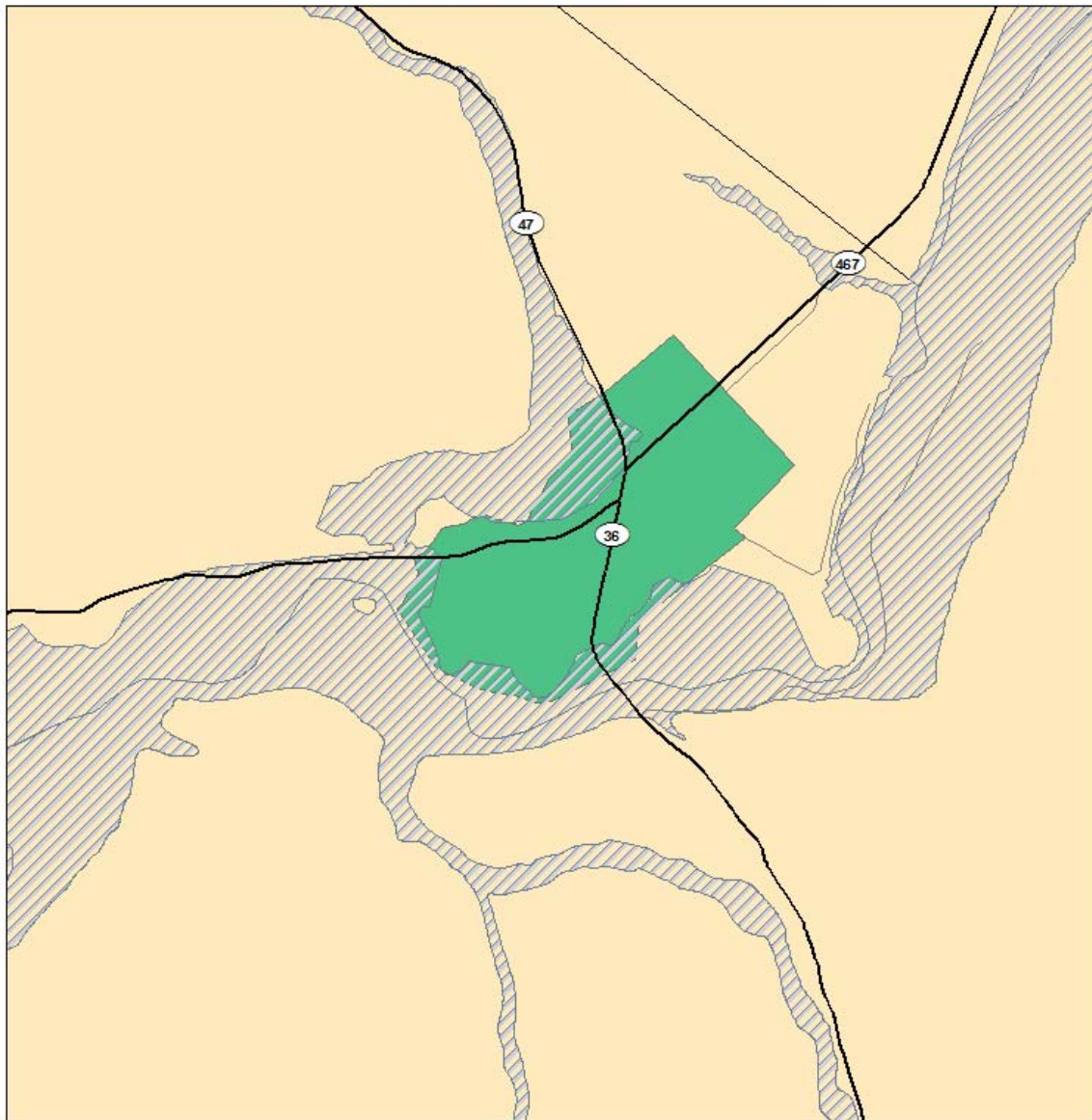


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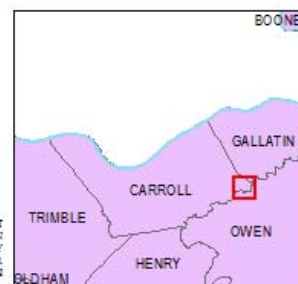
## City of Sanders Flood Hazard Area



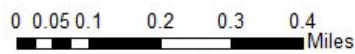
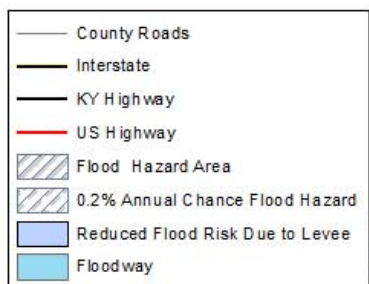
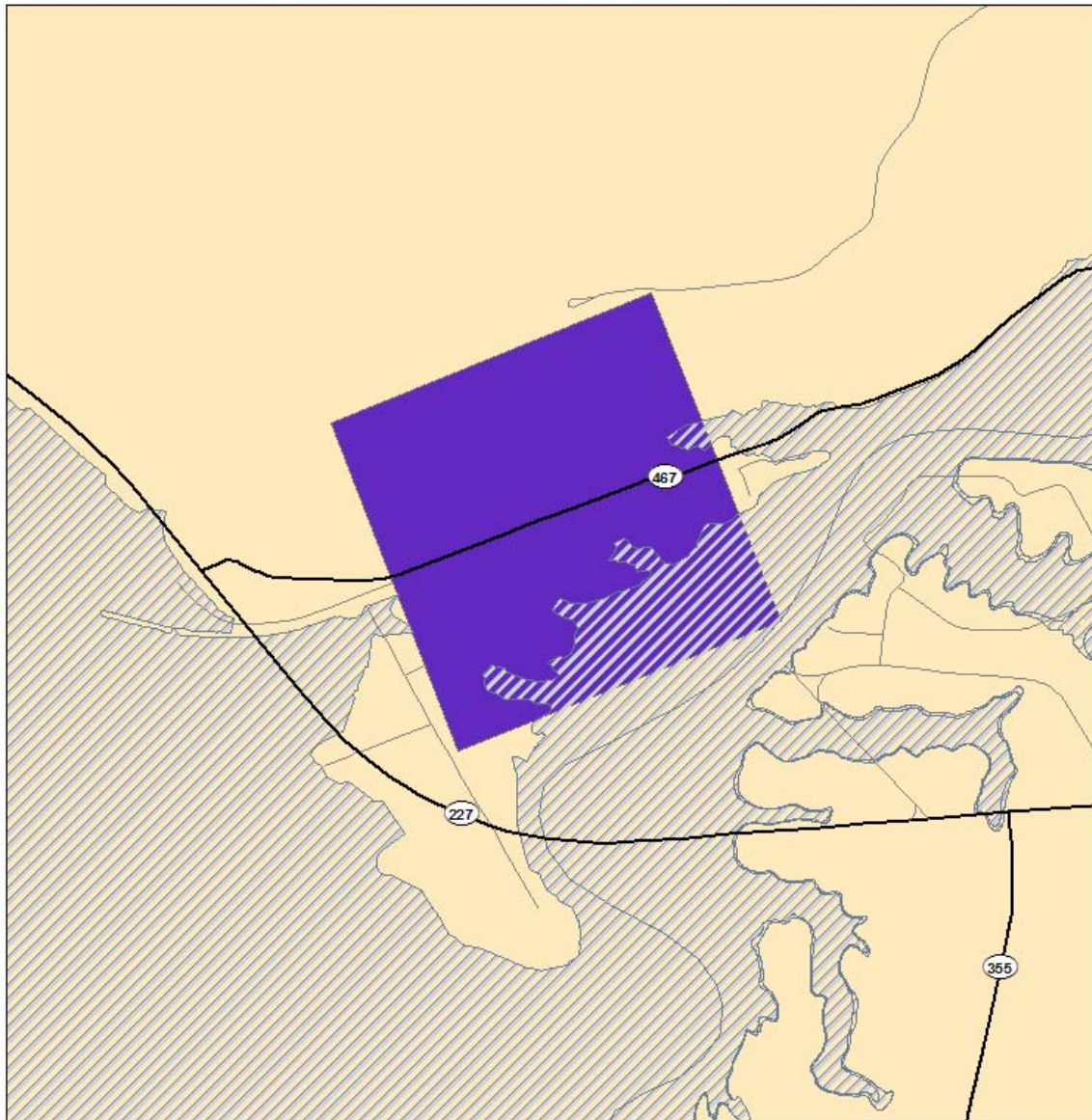
0 0.075 0.15 0.3 0.45 0.6 Miles



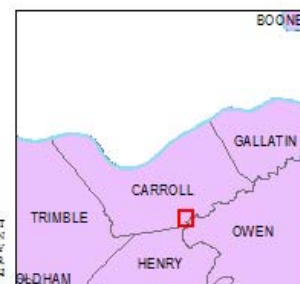
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# City of Worthville Flood Hazard Area

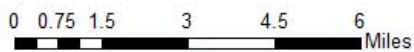
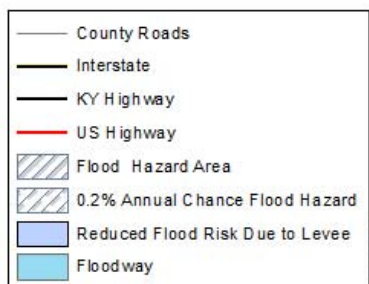
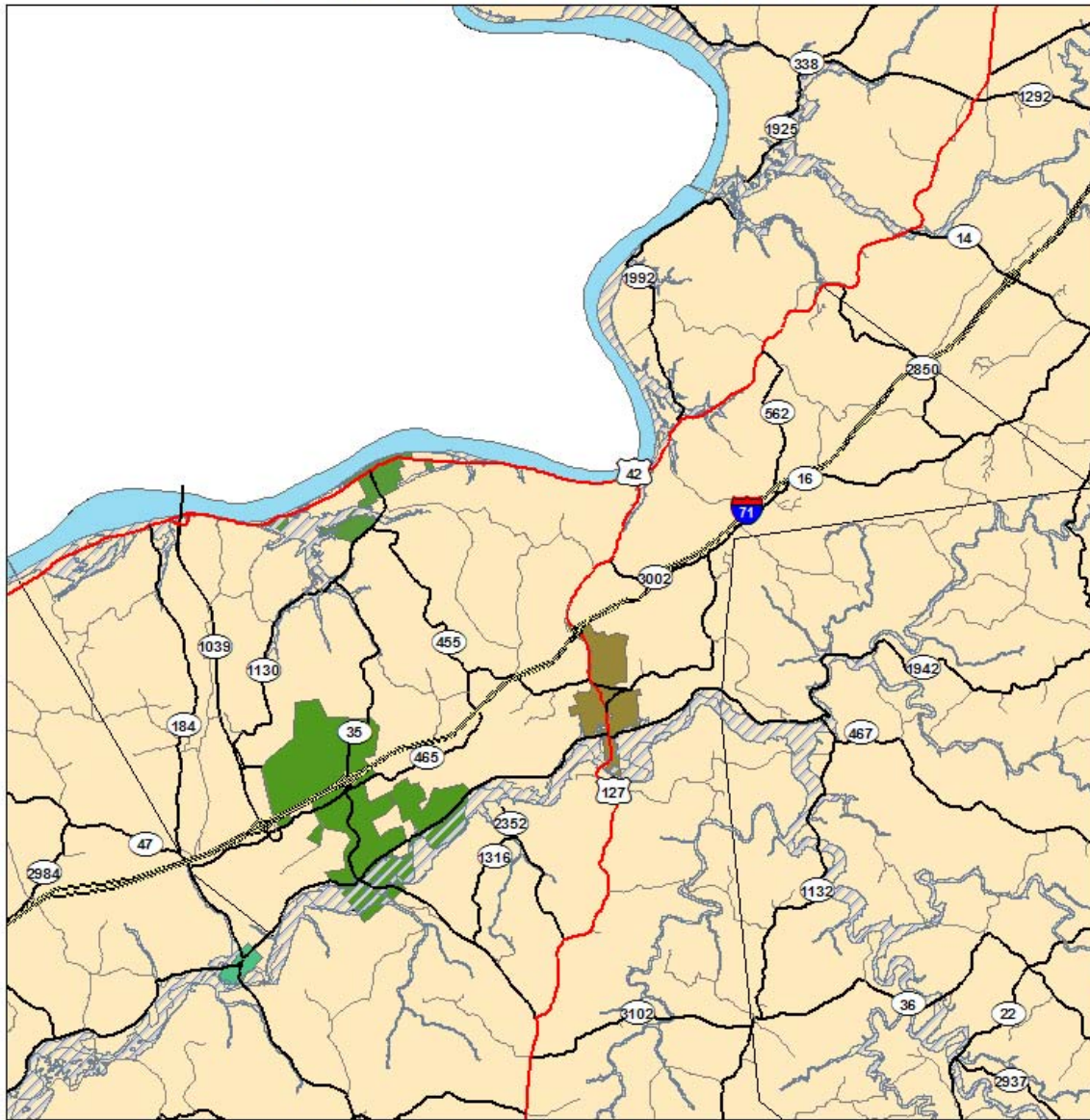


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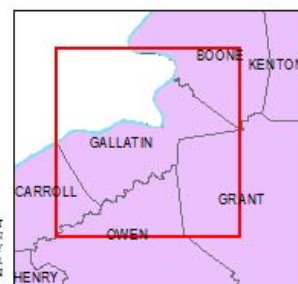




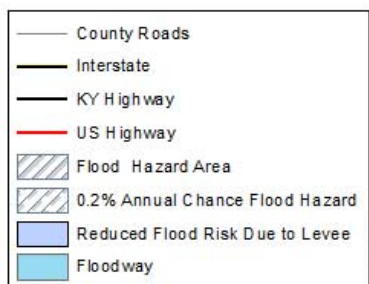
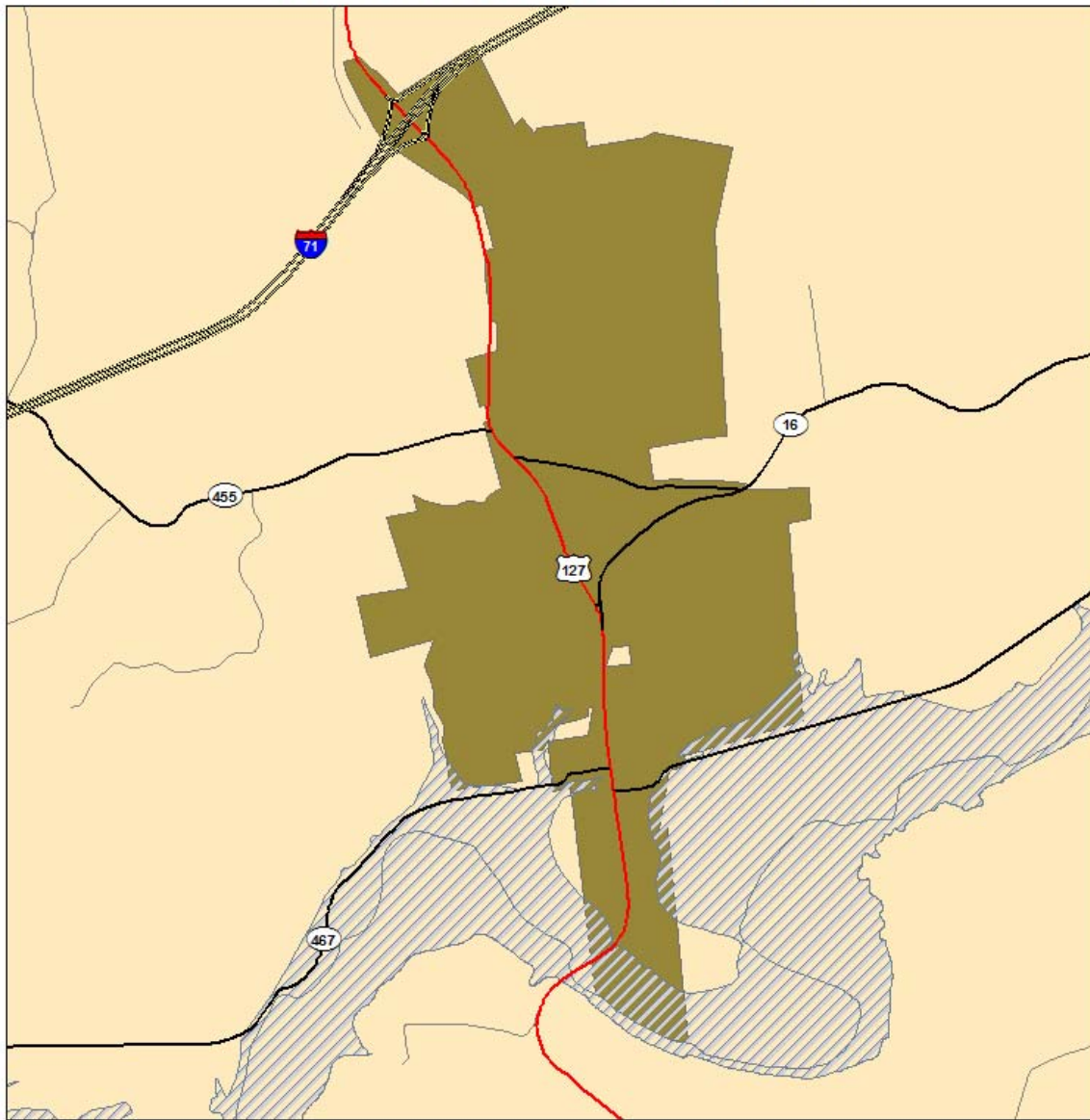
# Gallatin County Flood Hazard Area



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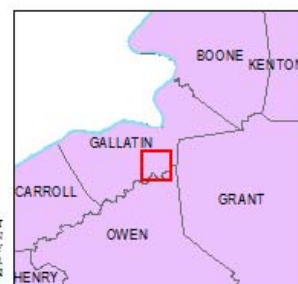
## City of Glencoe Flood Hazard Area



0 0.1 0.2 0.4 0.6 0.8 Miles

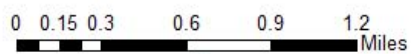
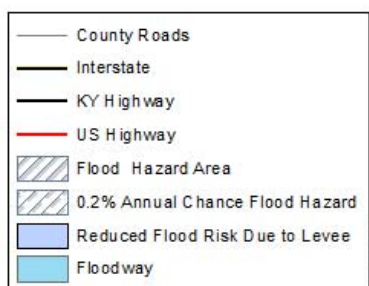
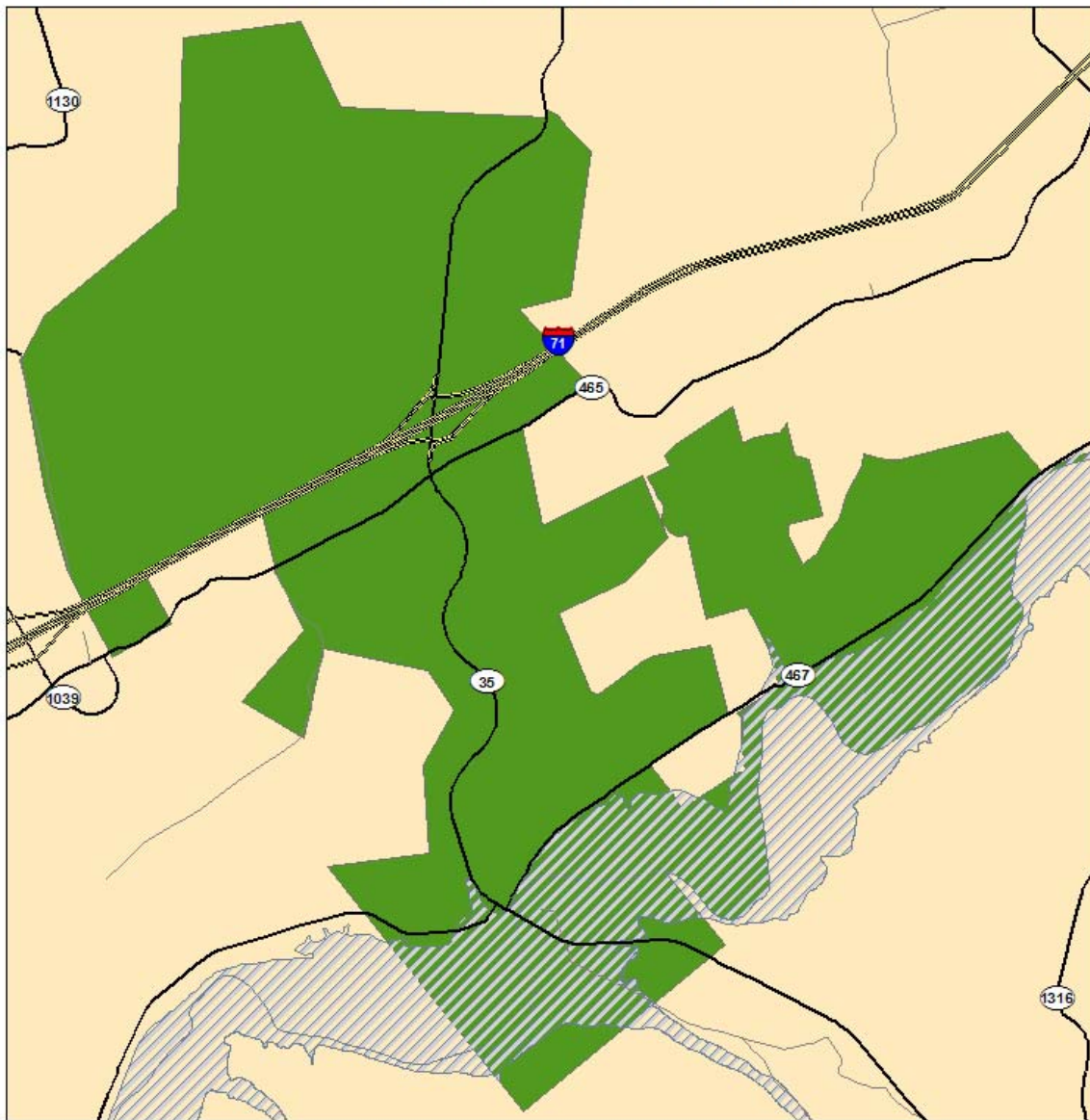


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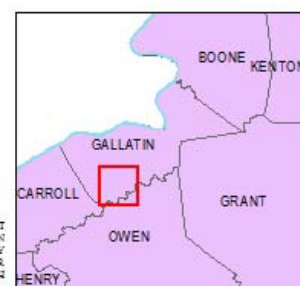




# City of Sparta Flood Hazard Area

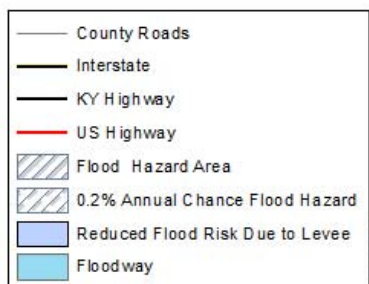
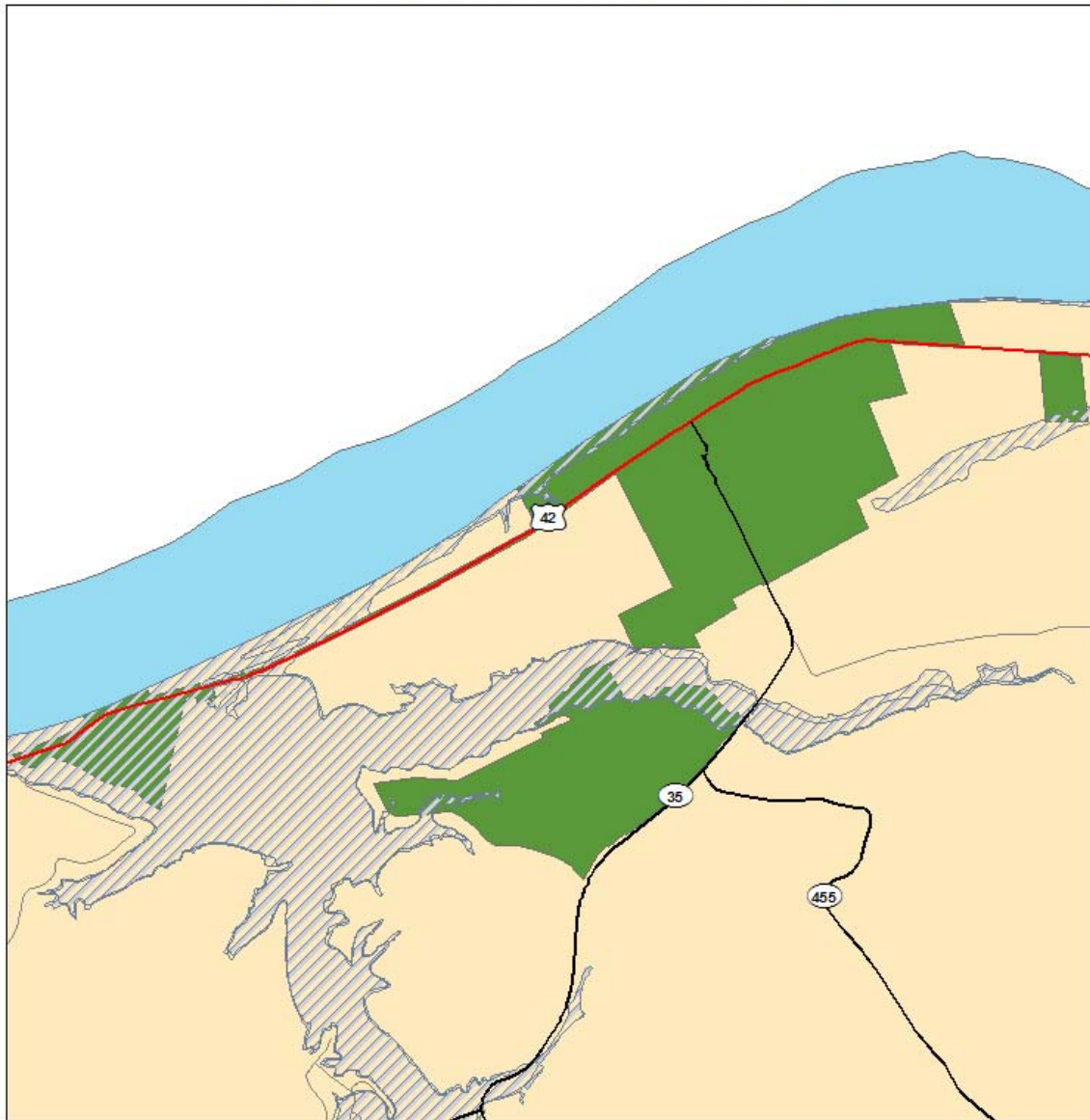


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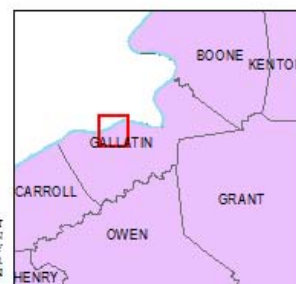
## City of Warsaw Flood Hazard Area

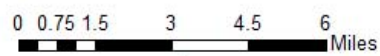
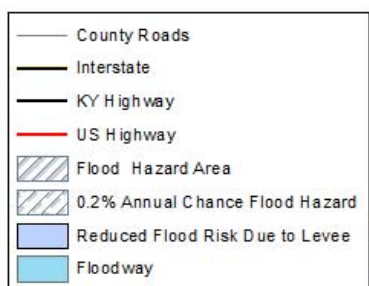


0 0.1 0.2 0.4 0.6 0.8 Miles

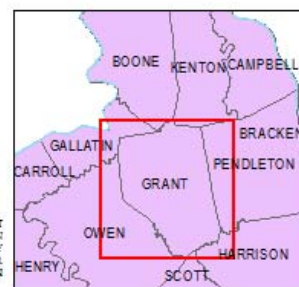


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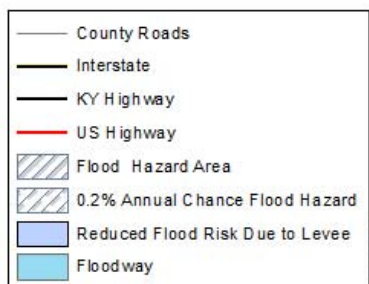
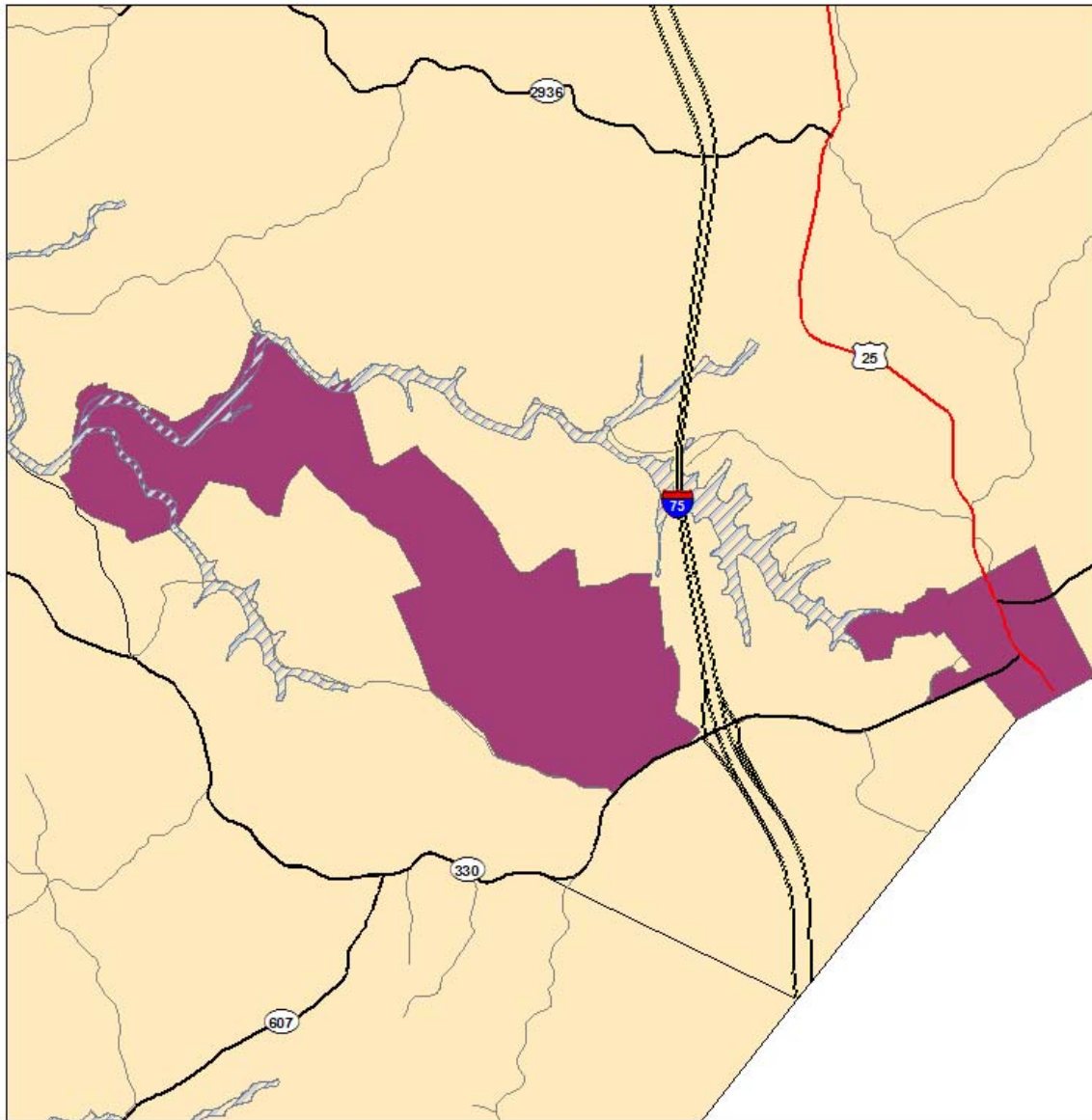


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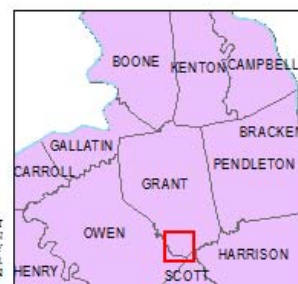
## City of Corinth Flood Hazard Area



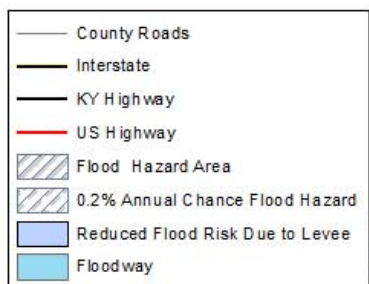
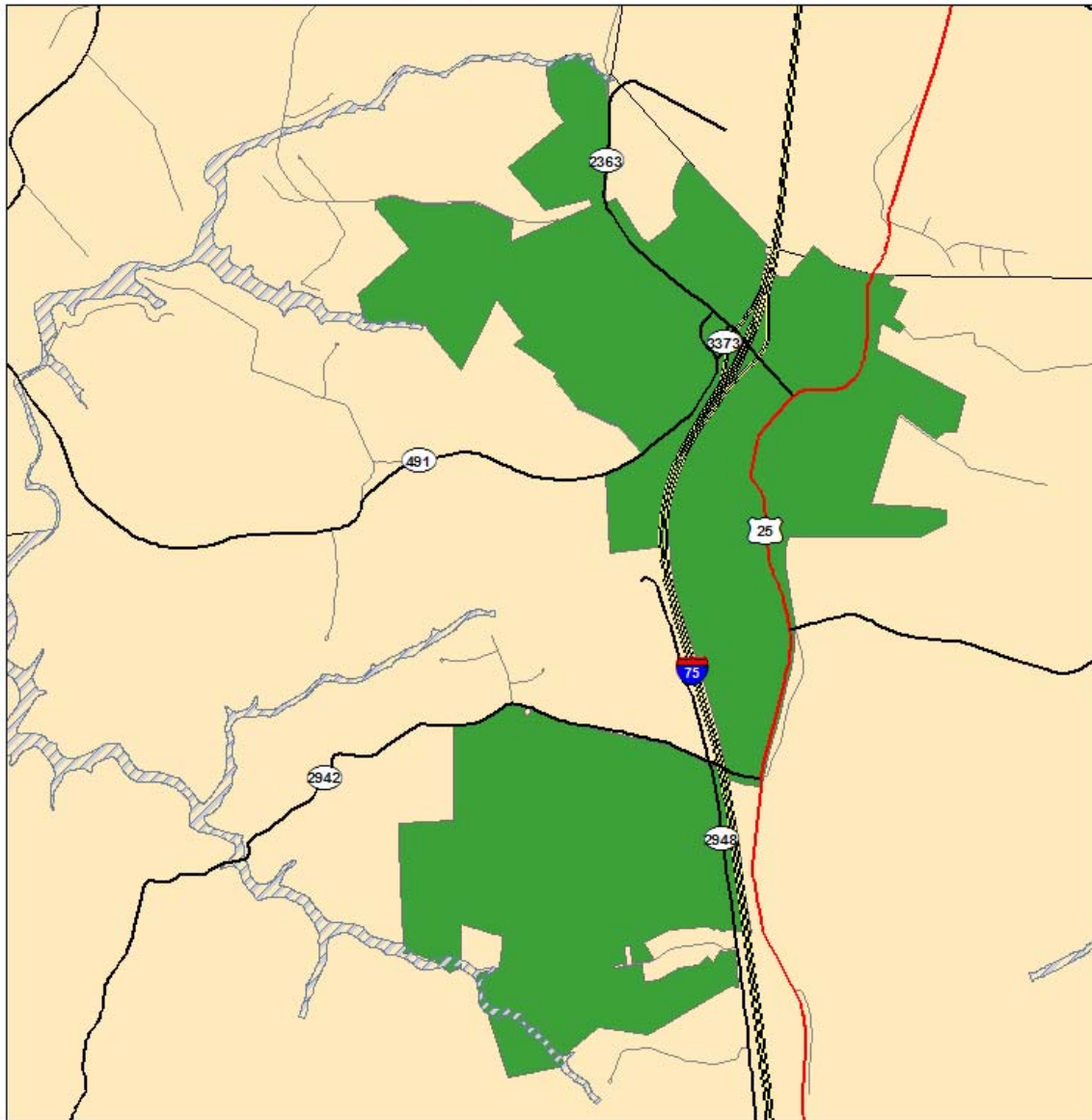
0 0.15 0.3 0.6 0.9 1.2 Miles



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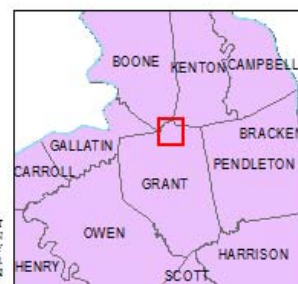
## City of Crittenden Flood Hazard Area



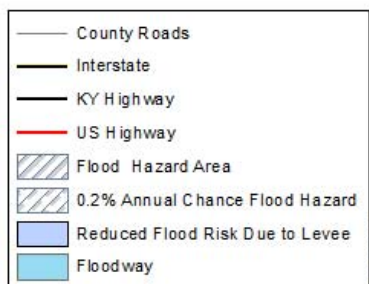
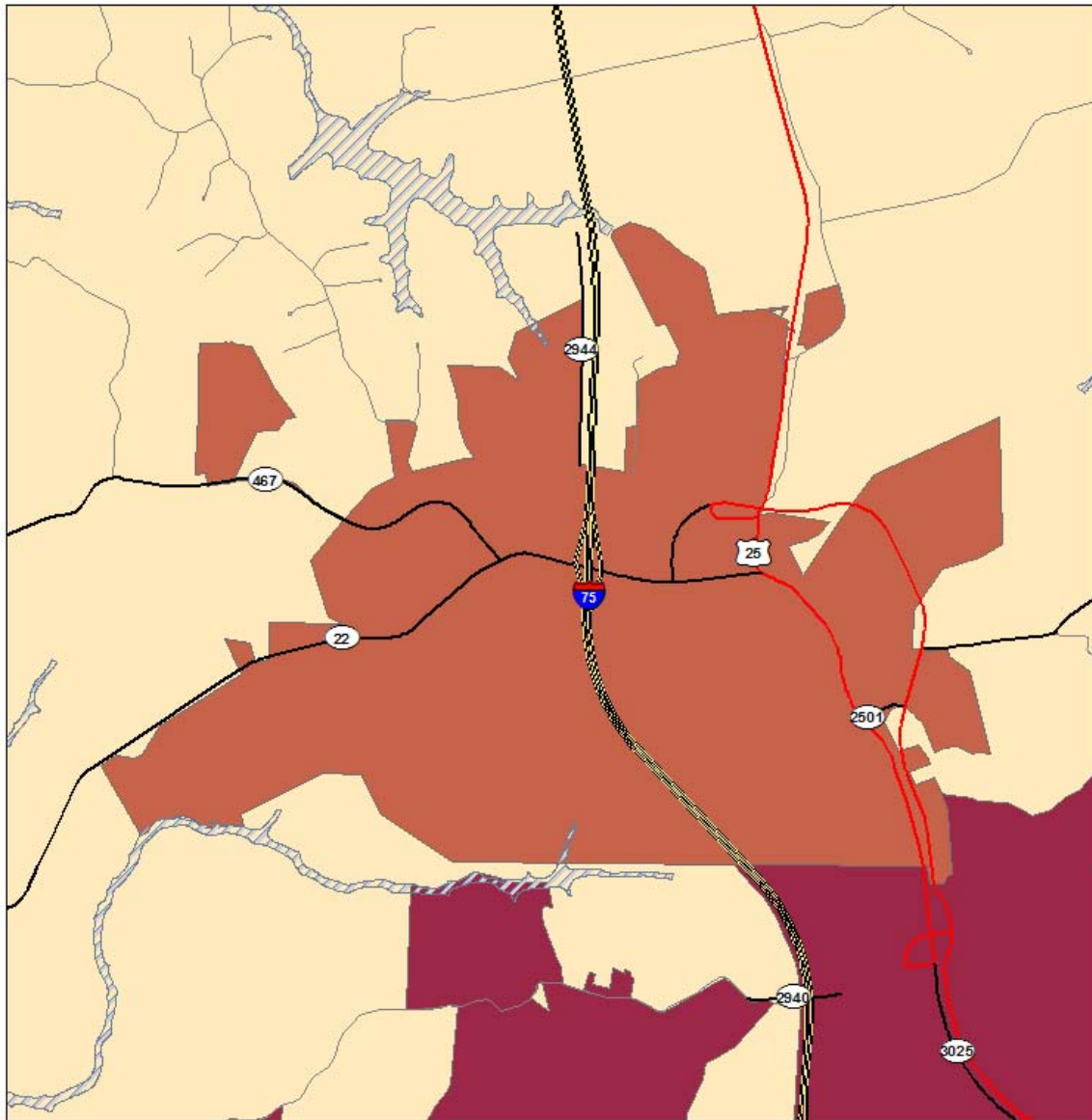
0 0.125 0.25 0.5 0.75 1 Miles



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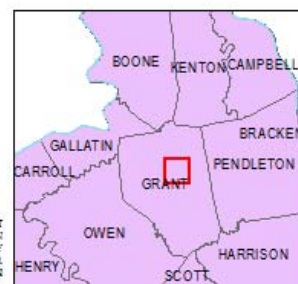
## City of Dry Ridge Flood Hazard Area



0.0 0.125 0.25 0.5 0.75 1 Miles

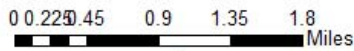
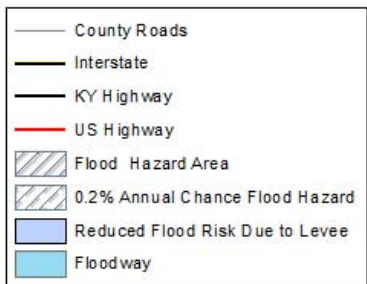
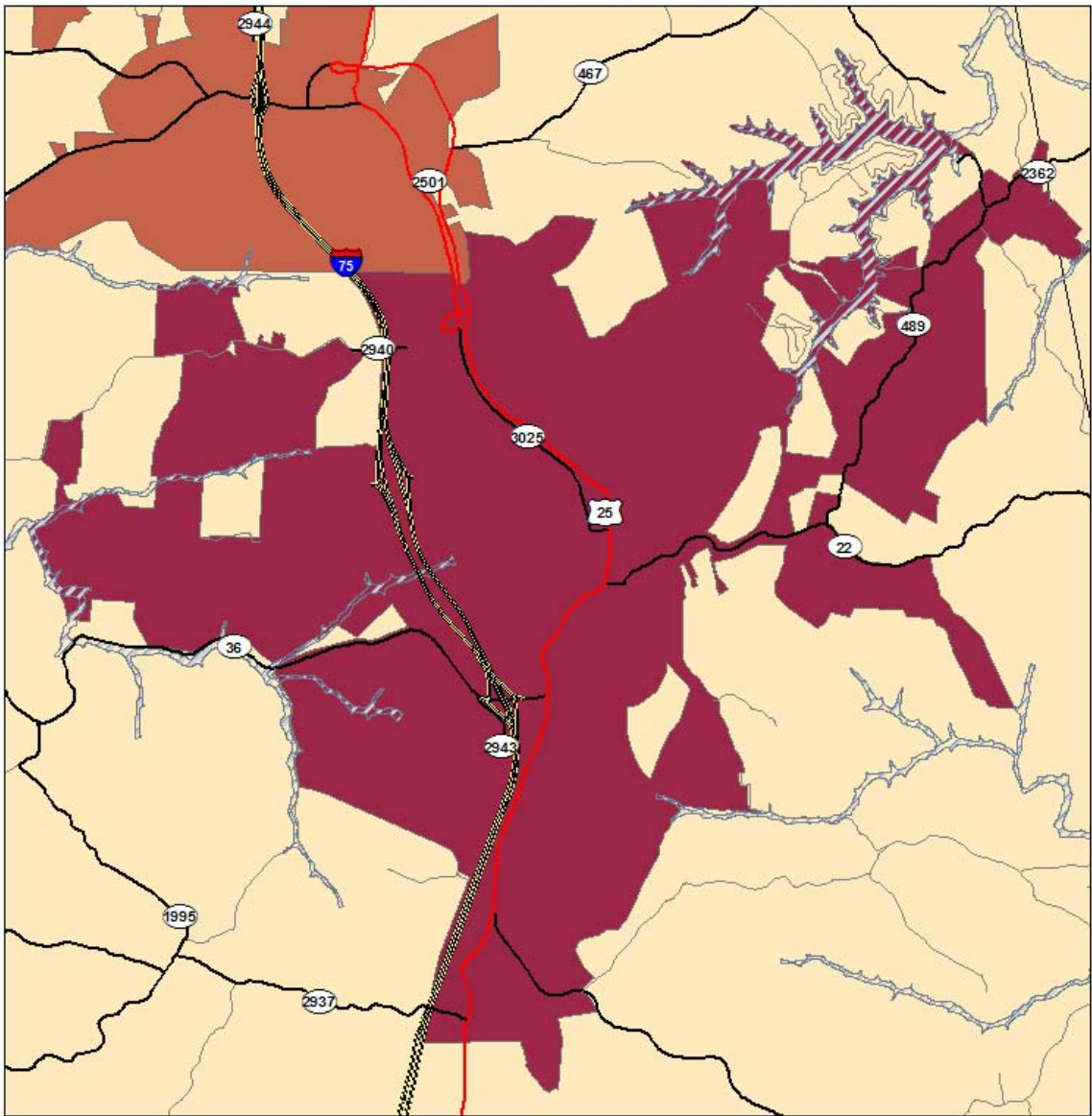


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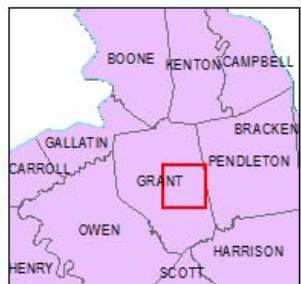




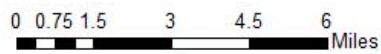
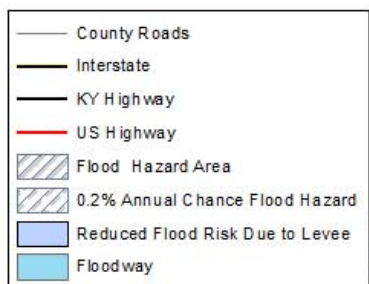
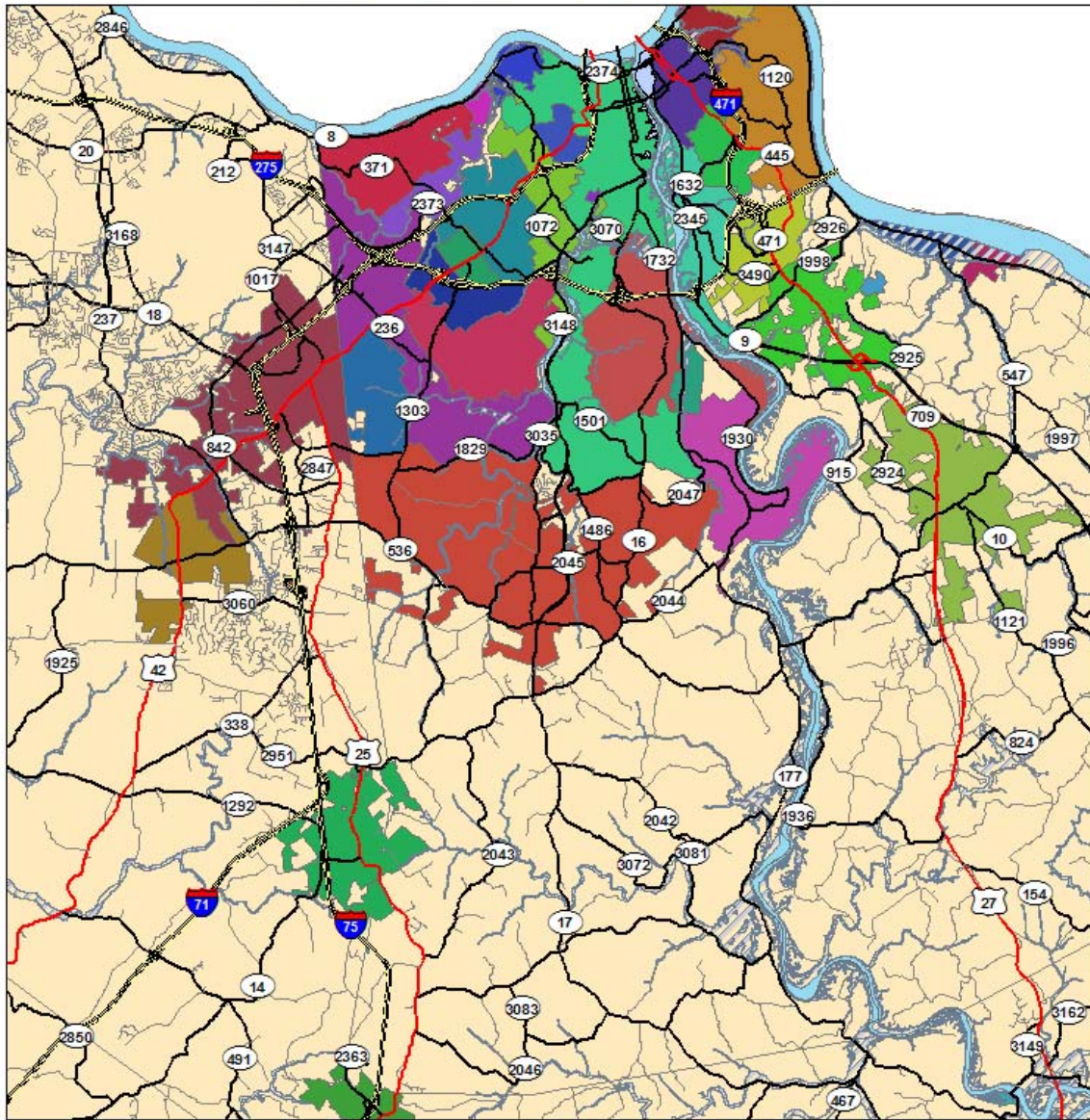
# City of Williamstown Flood Hazard Area



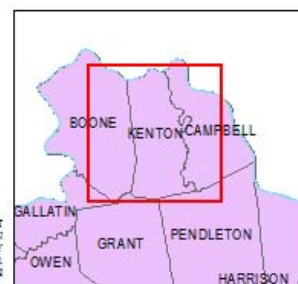
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# Kenton County Flood Hazard Area

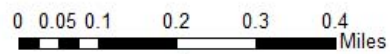
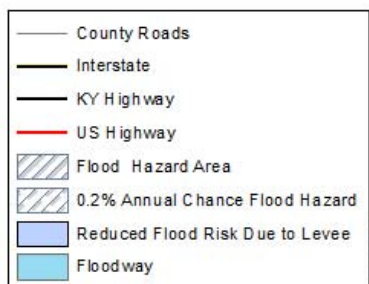


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## City of Bromley Flood Hazard Area

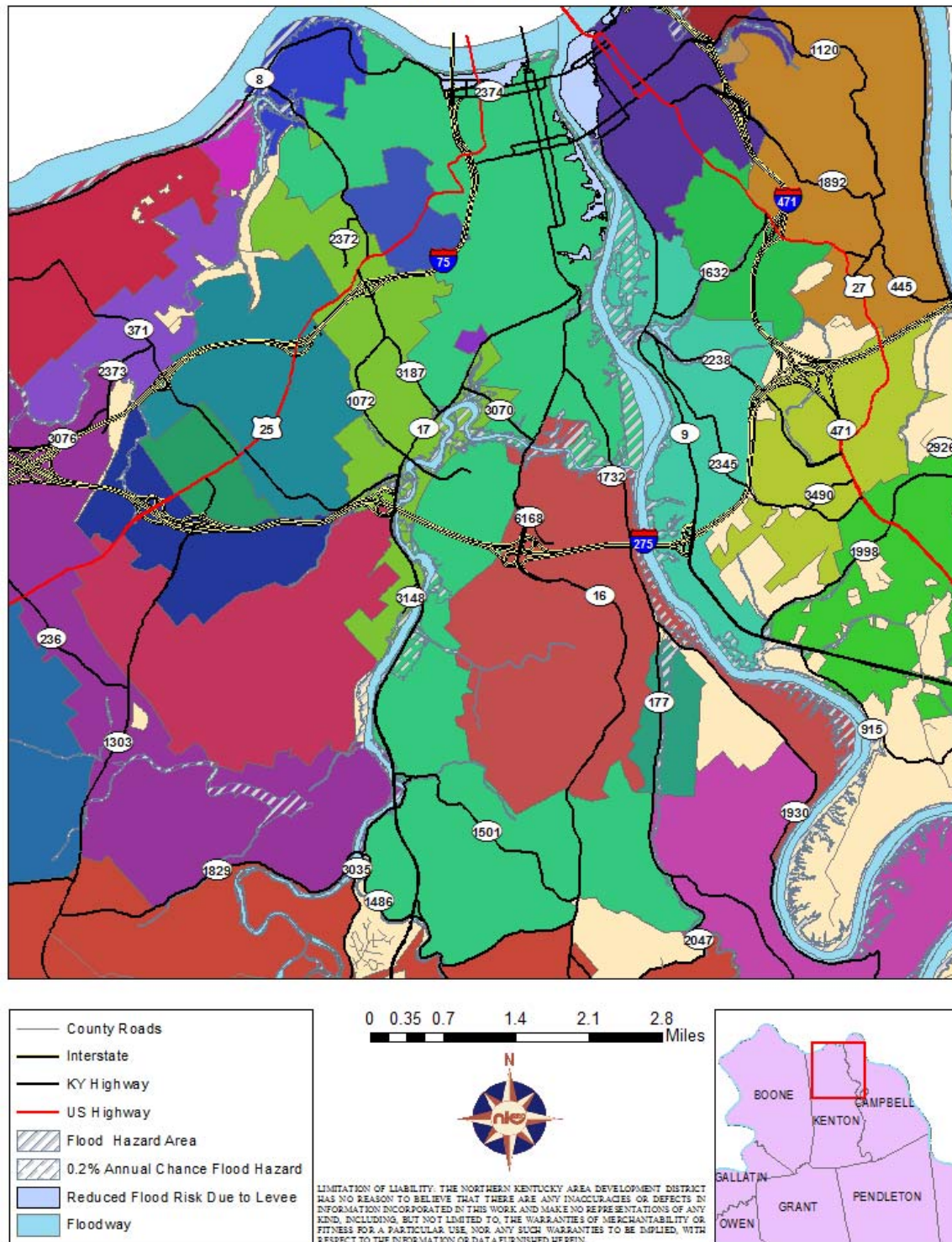


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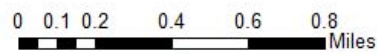
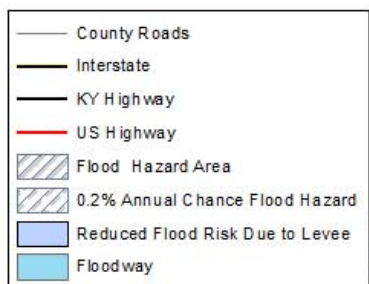
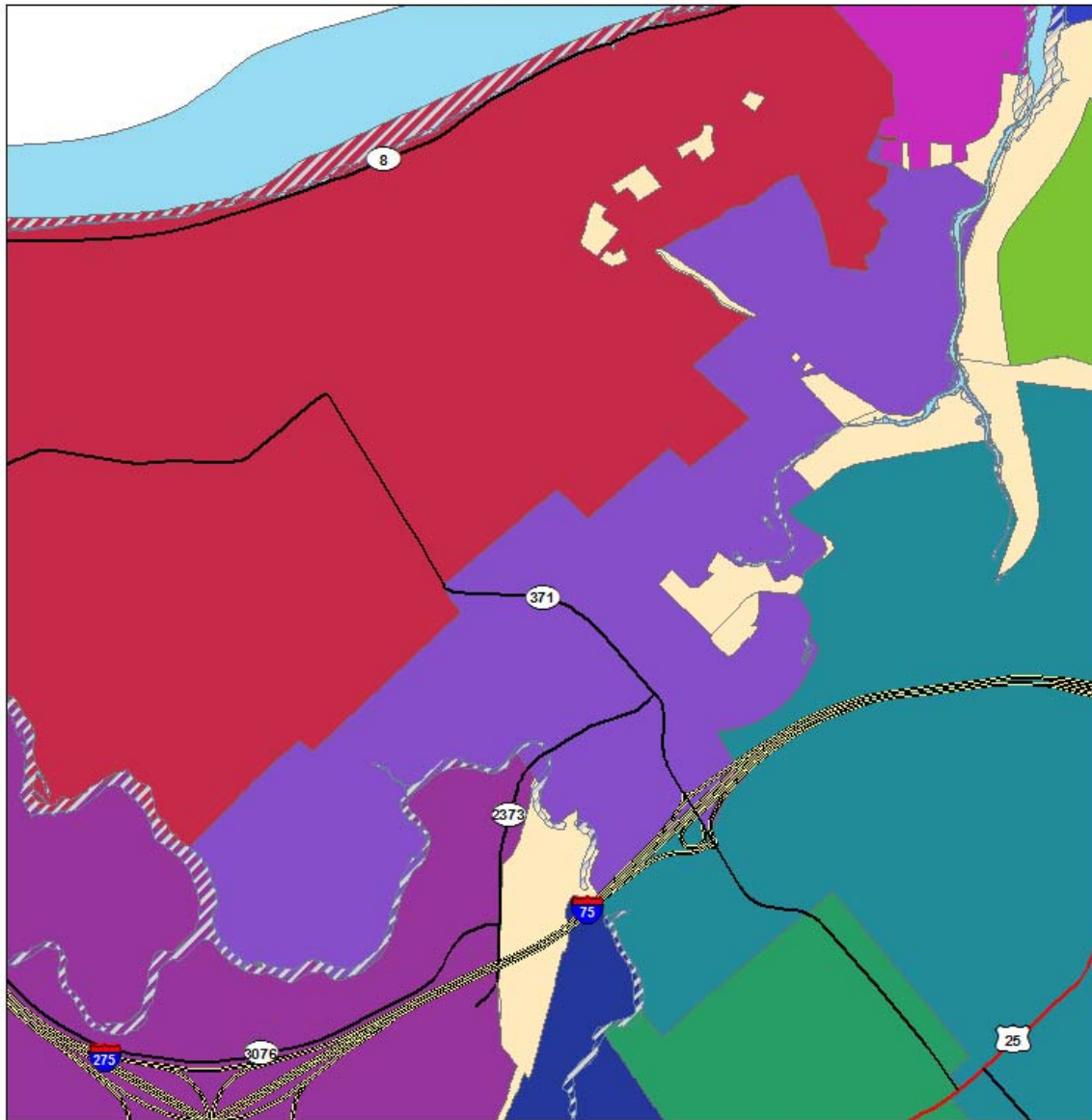




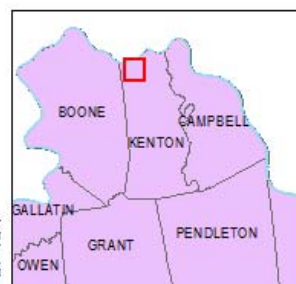
## City of Covington Flood Hazard Area



# City of Crescent Springs Flood Hazard Area

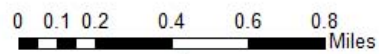
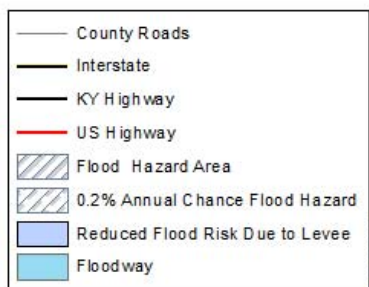
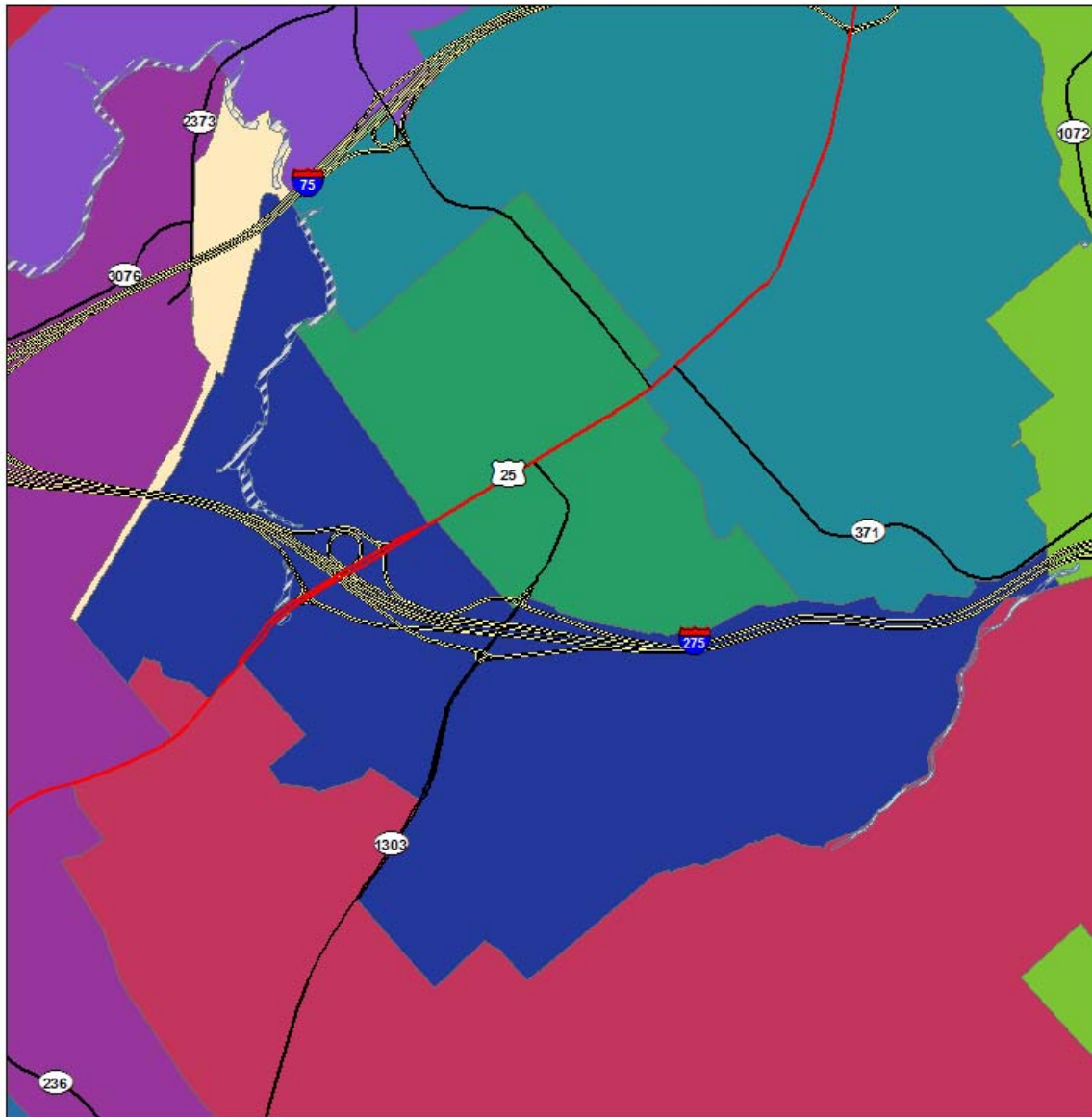


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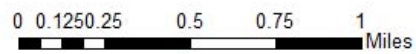
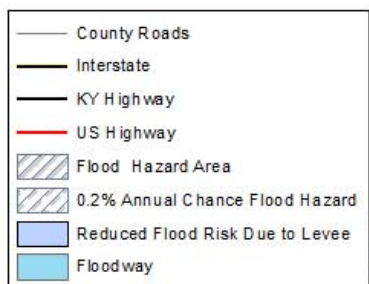
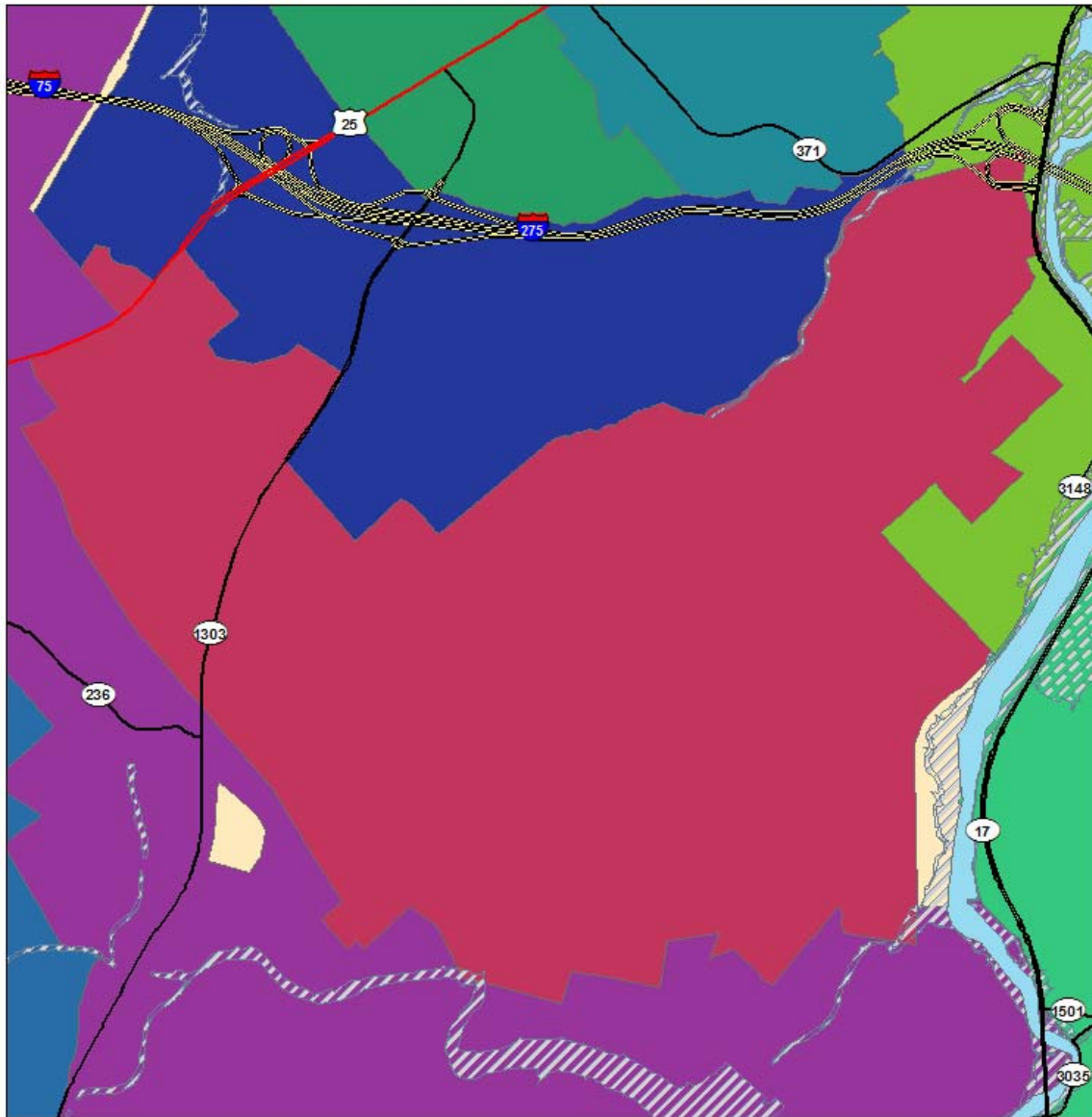
## City of Crestview Hills Flood Hazard Area



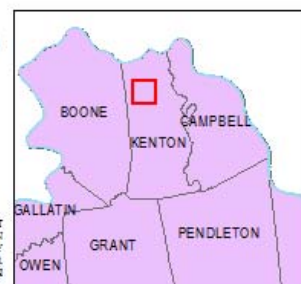
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



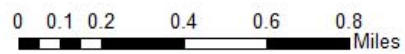
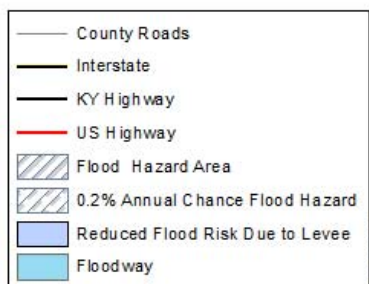
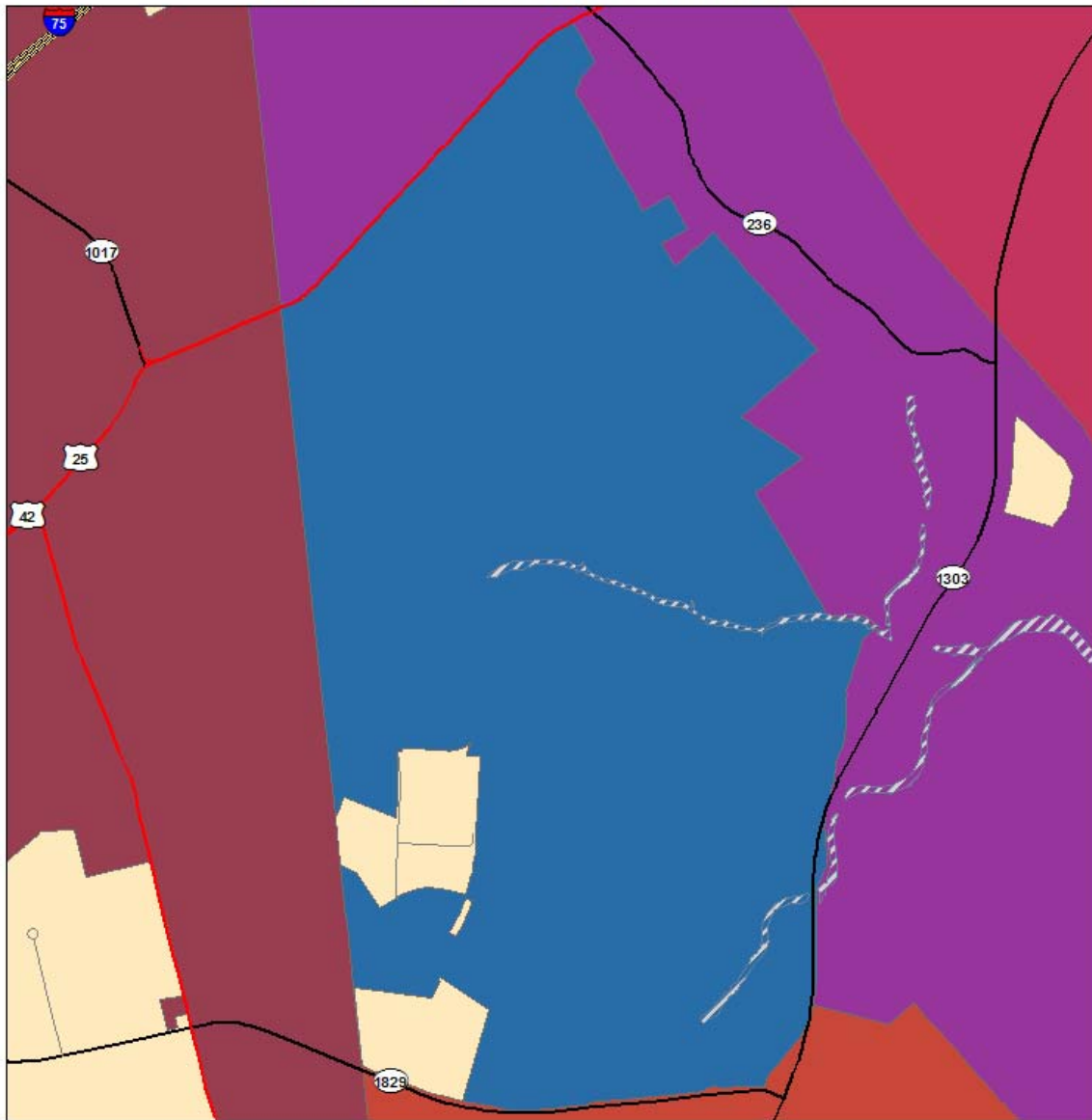
## City of Edgewood Flood Hazard Area



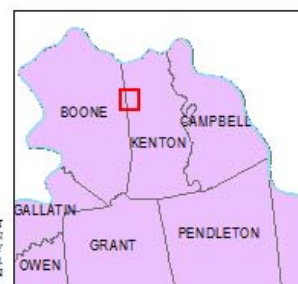
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



## City of Elsmere Flood Hazard Area

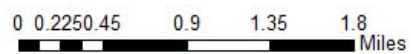
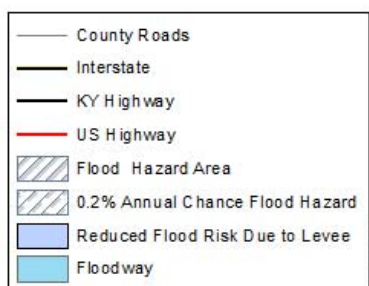
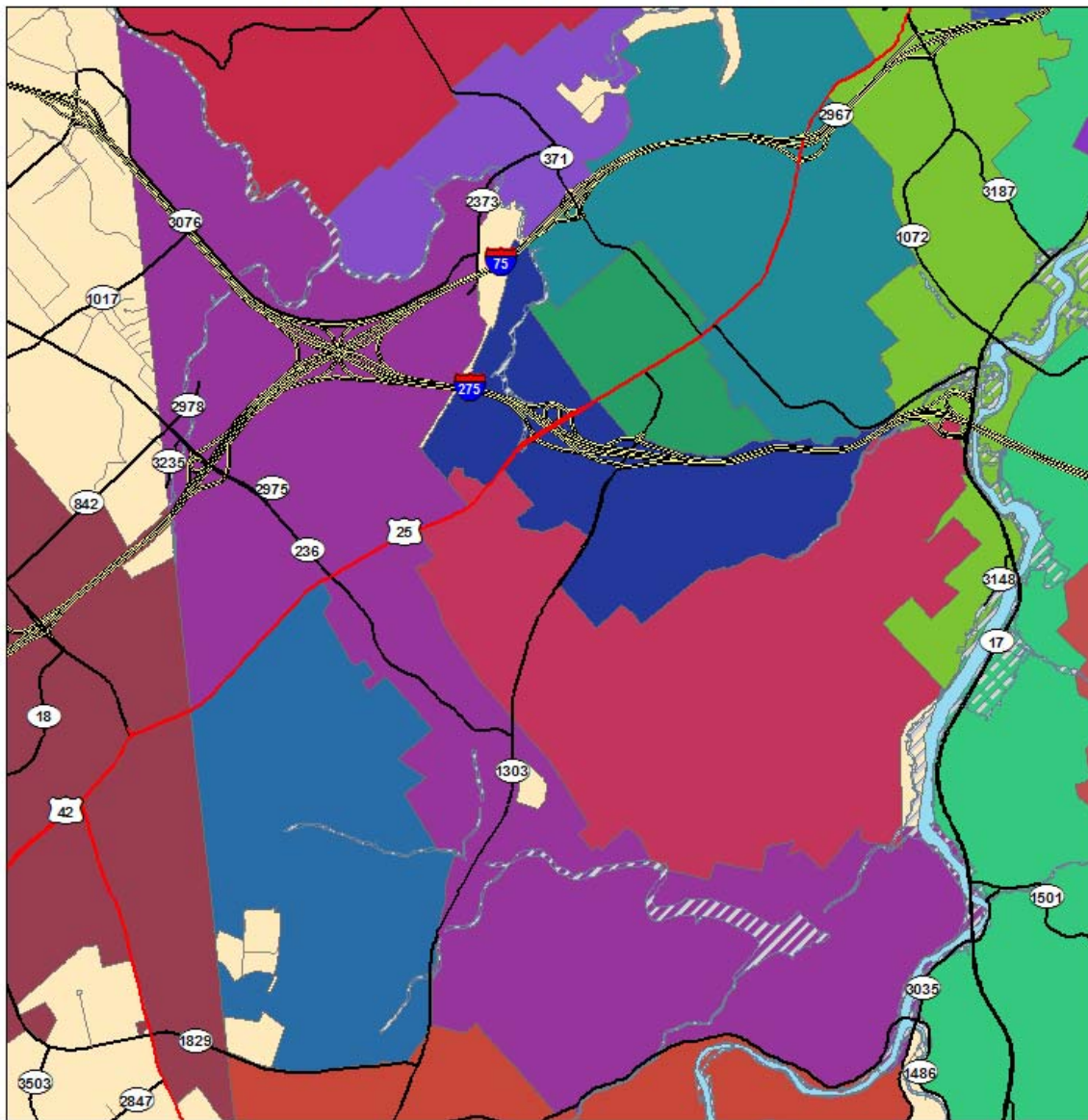


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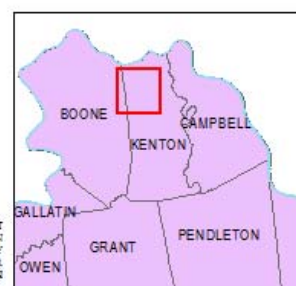




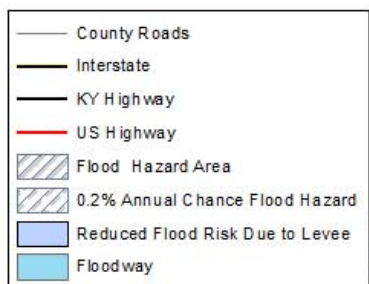
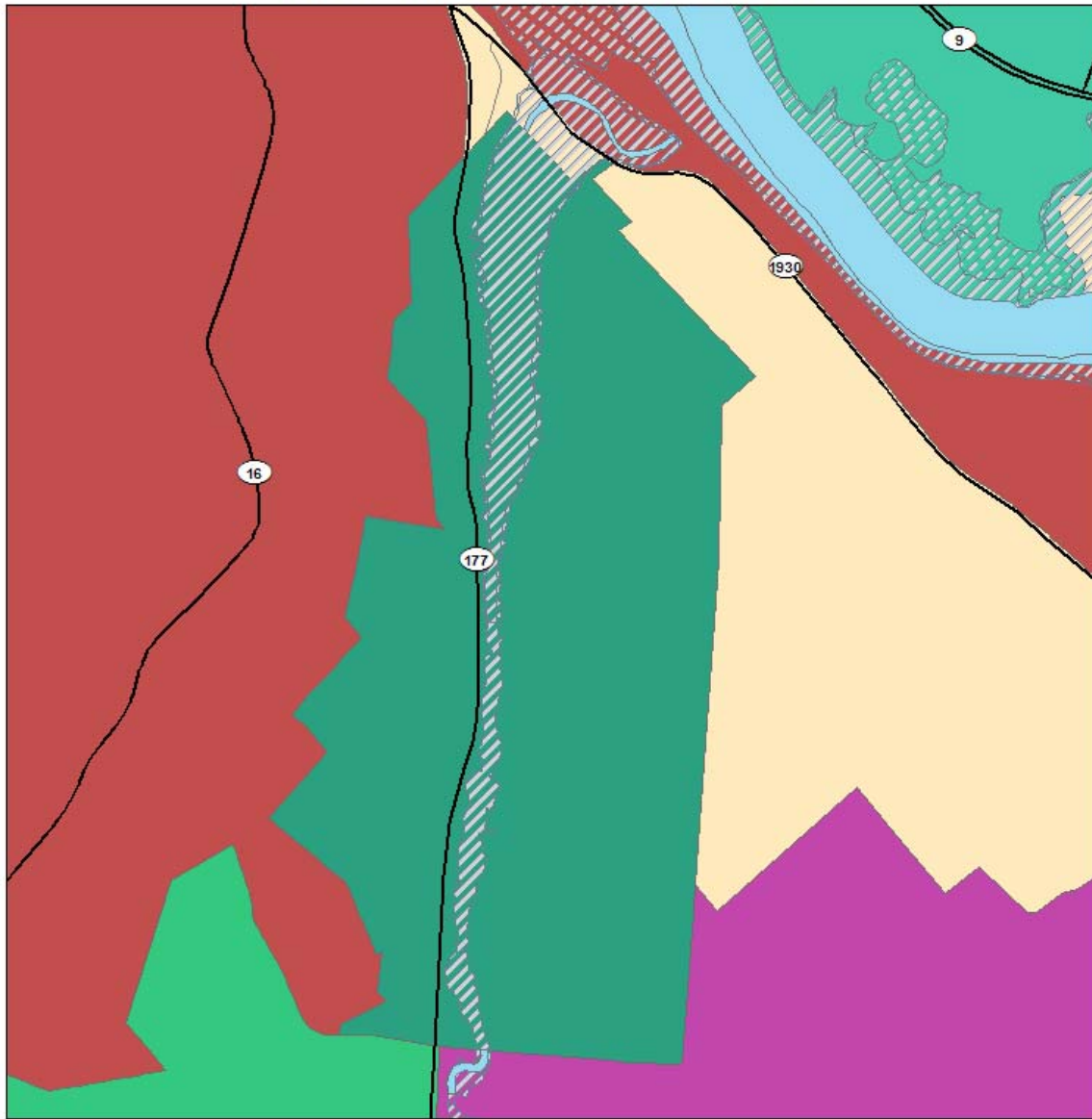
## City of Erlanger Flood Hazard Area



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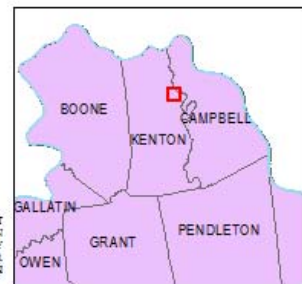
## City of Fairview Flood Hazard Area



0 0.05 0.1 0.2 0.3 0.4 Miles

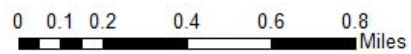
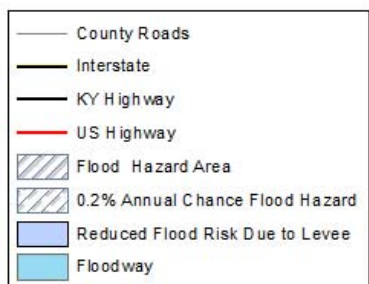
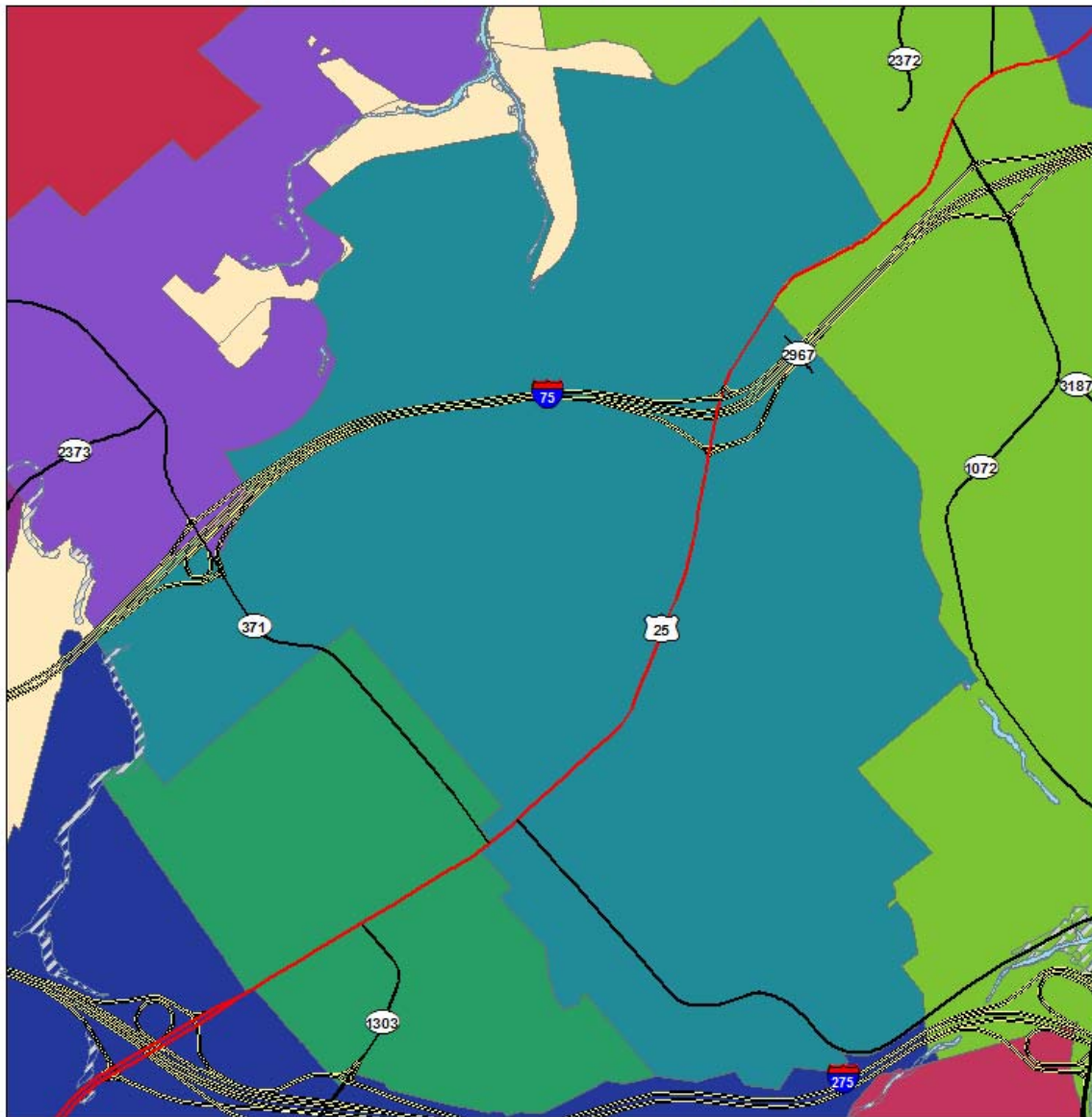


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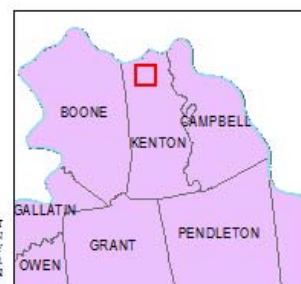




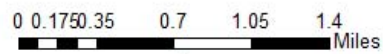
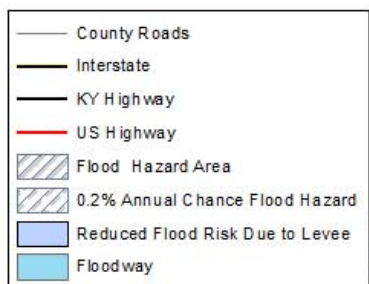
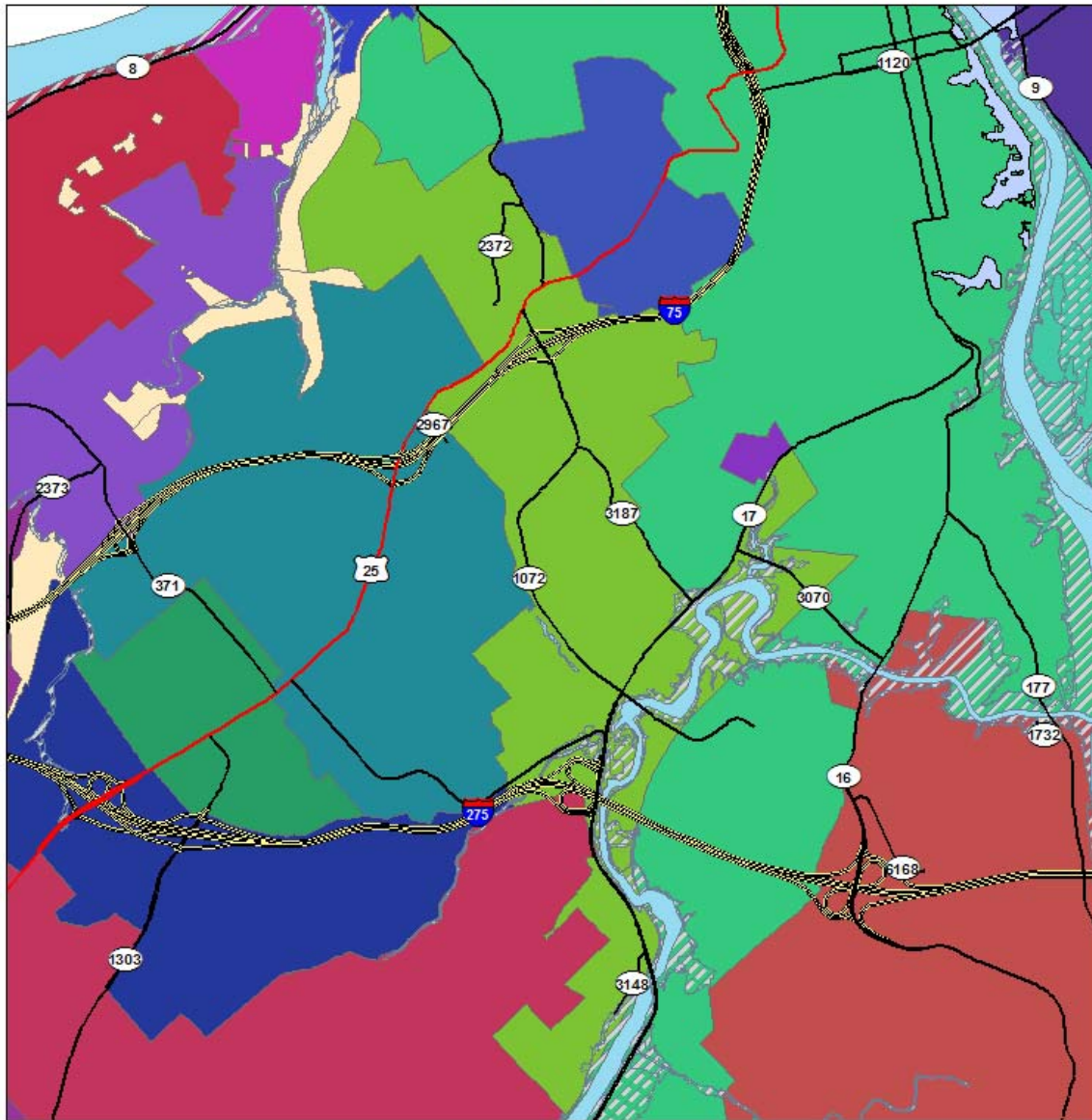
## City of Fort Mitchell Flood Hazard Area



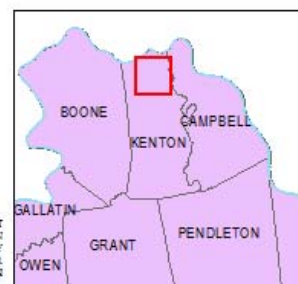
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## City of Fort Wright Flood Hazard Area

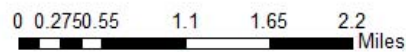
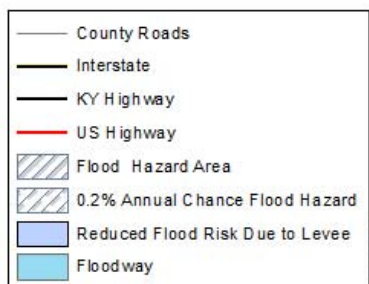
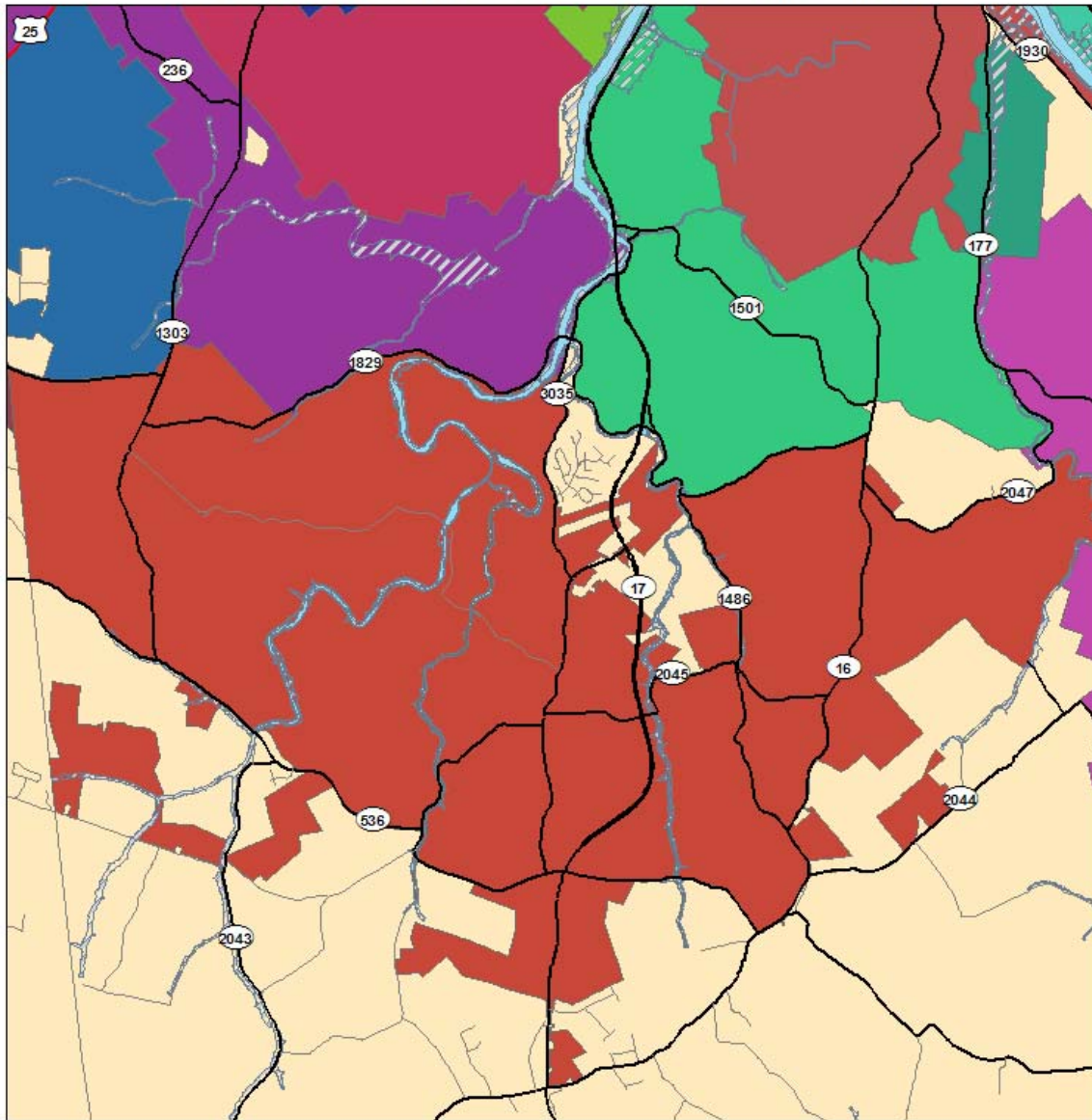


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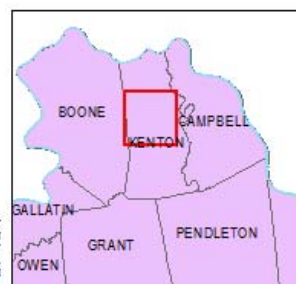




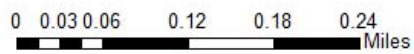
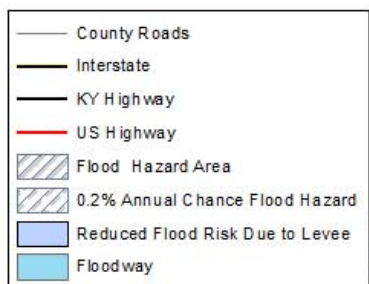
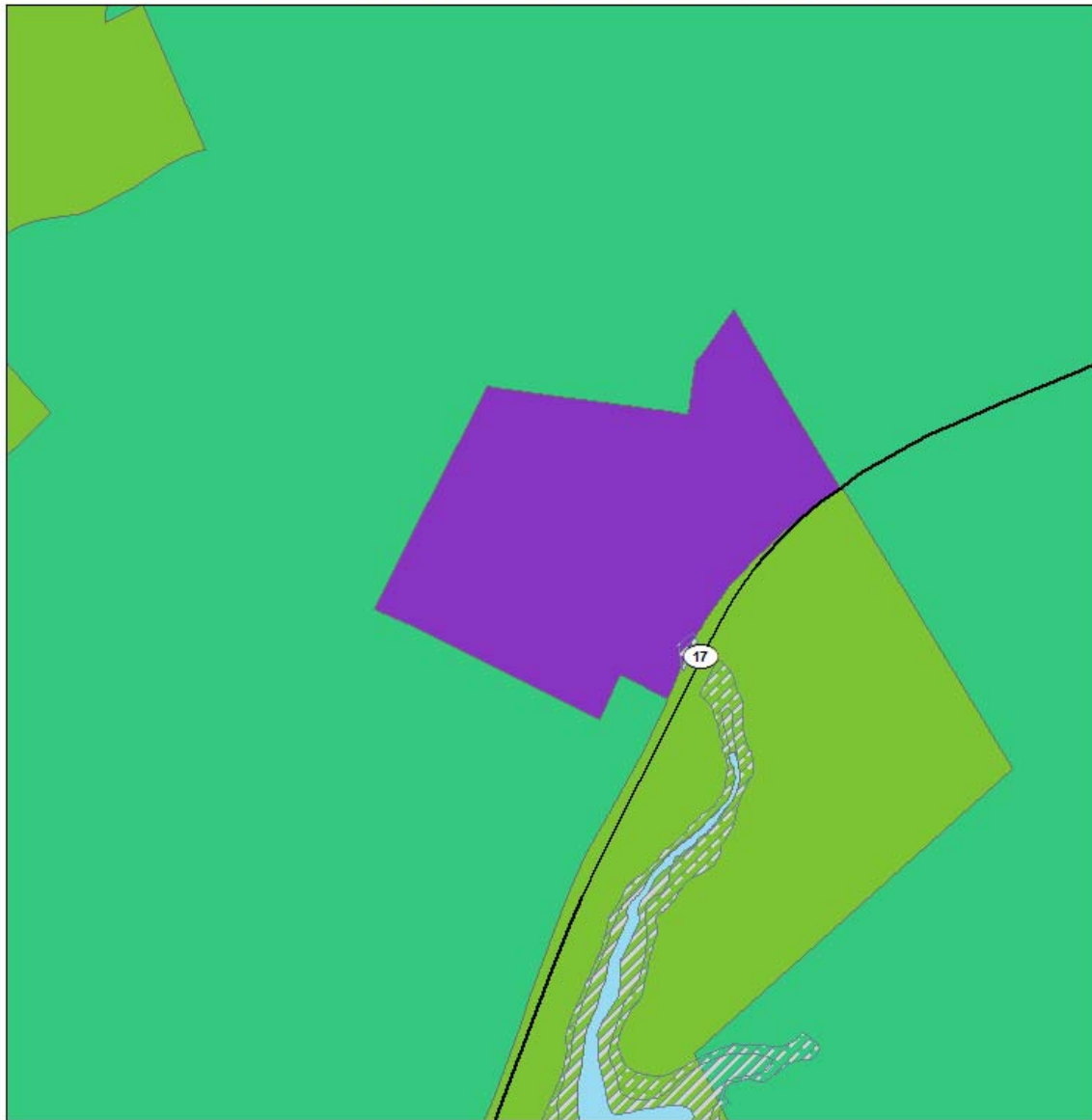
# City of Independence Flood Hazard Area



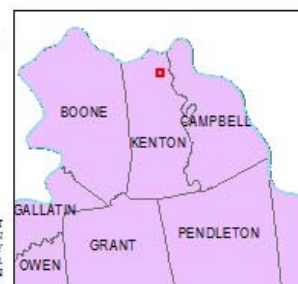
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



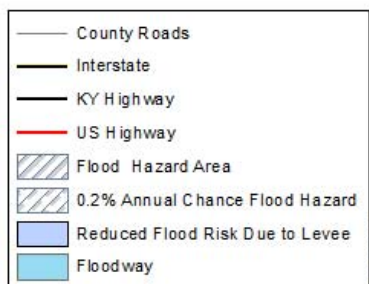
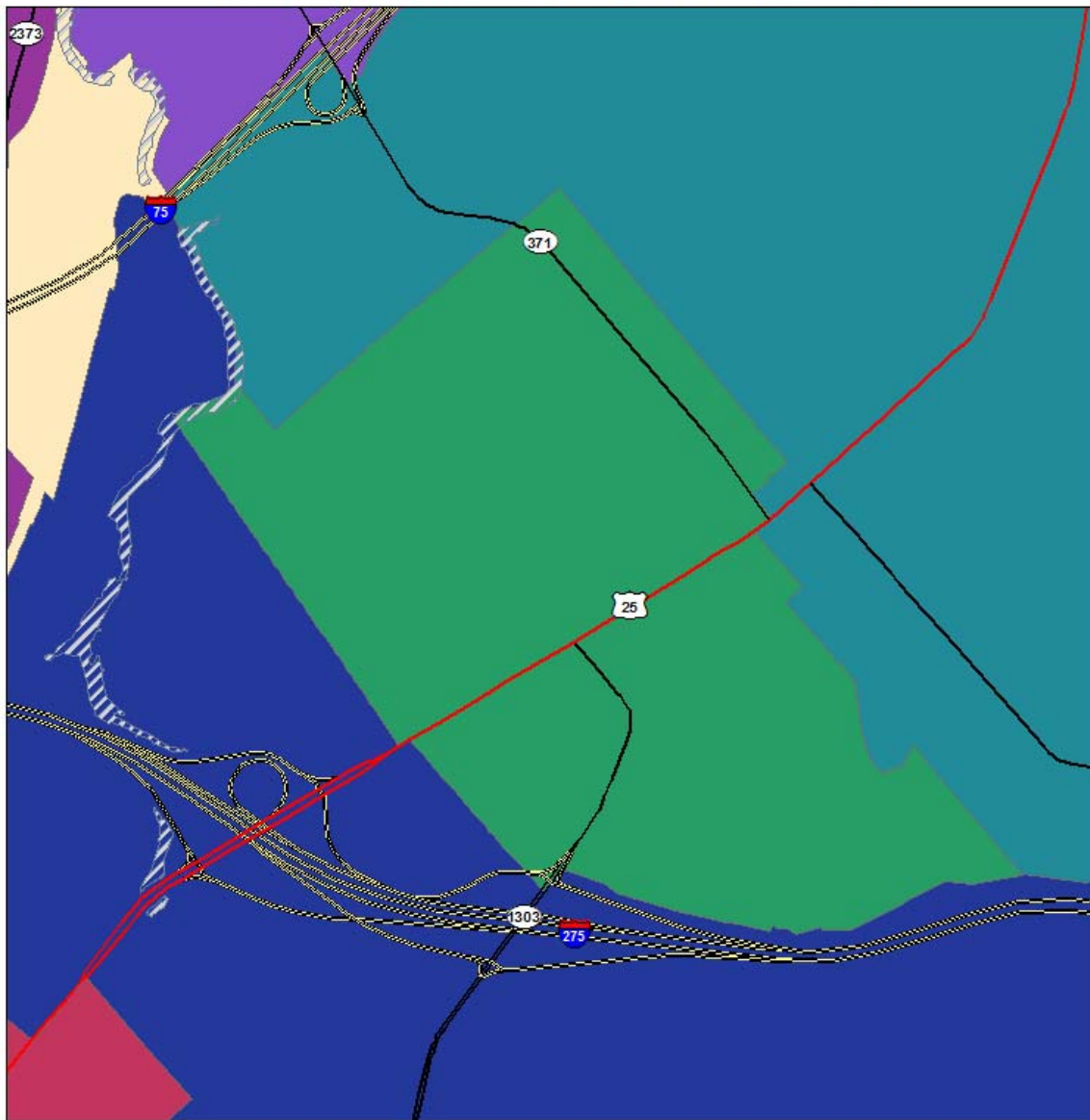
# City of Kenton Vale Flood Hazard Area



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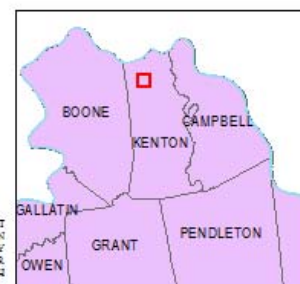
## City of Lakeside Park Flood Hazard Area



0 0.05 0.1 0.2 0.3 0.4 Miles

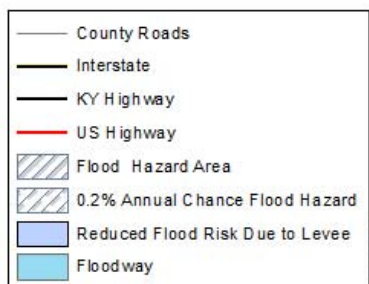
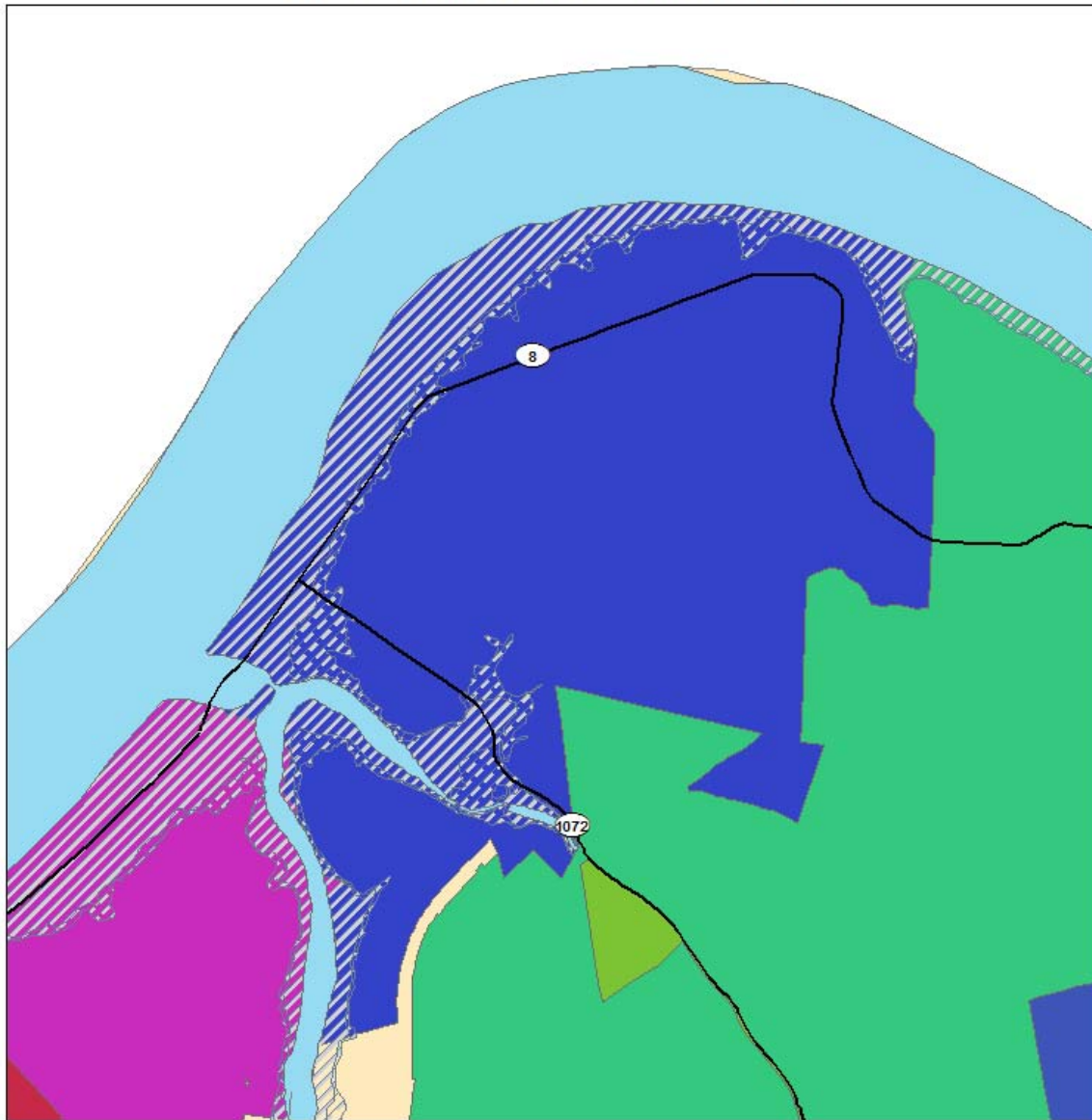


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## City of Ludlow Flood Hazard Area



0 0.05 0.1 0.2 0.3 0.4  
Miles

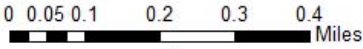
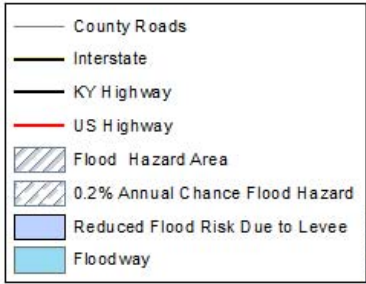


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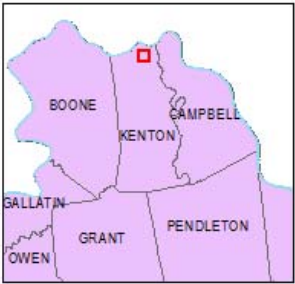




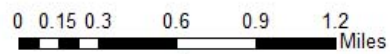
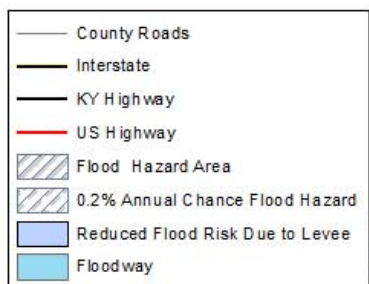
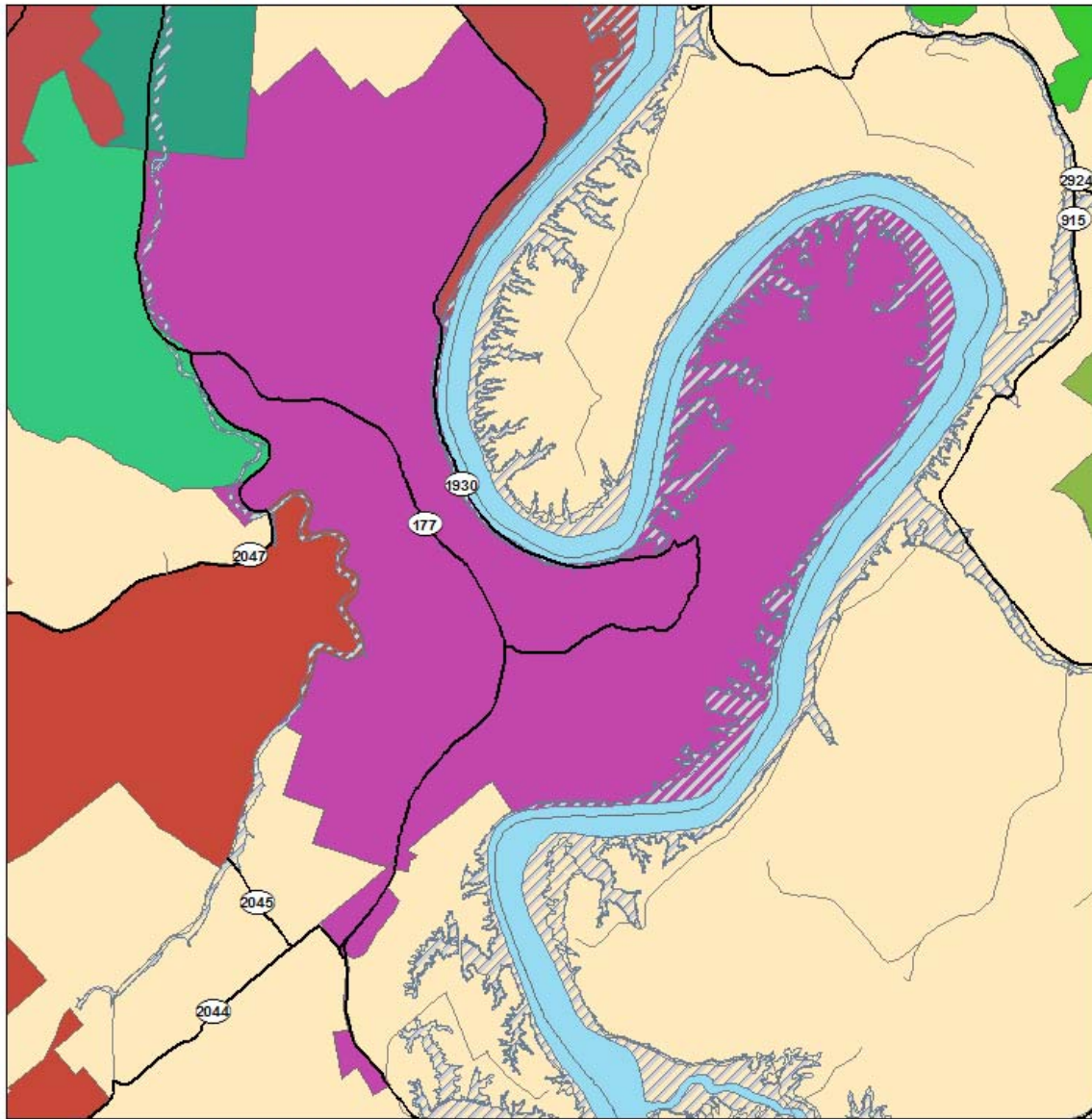
# City of Park Hills Flood Hazard Area



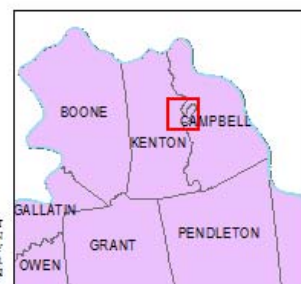
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



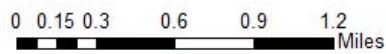
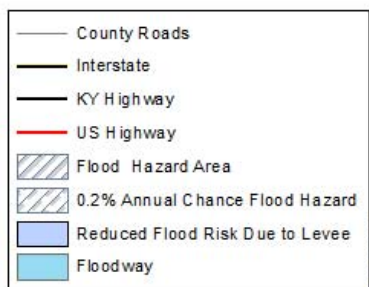
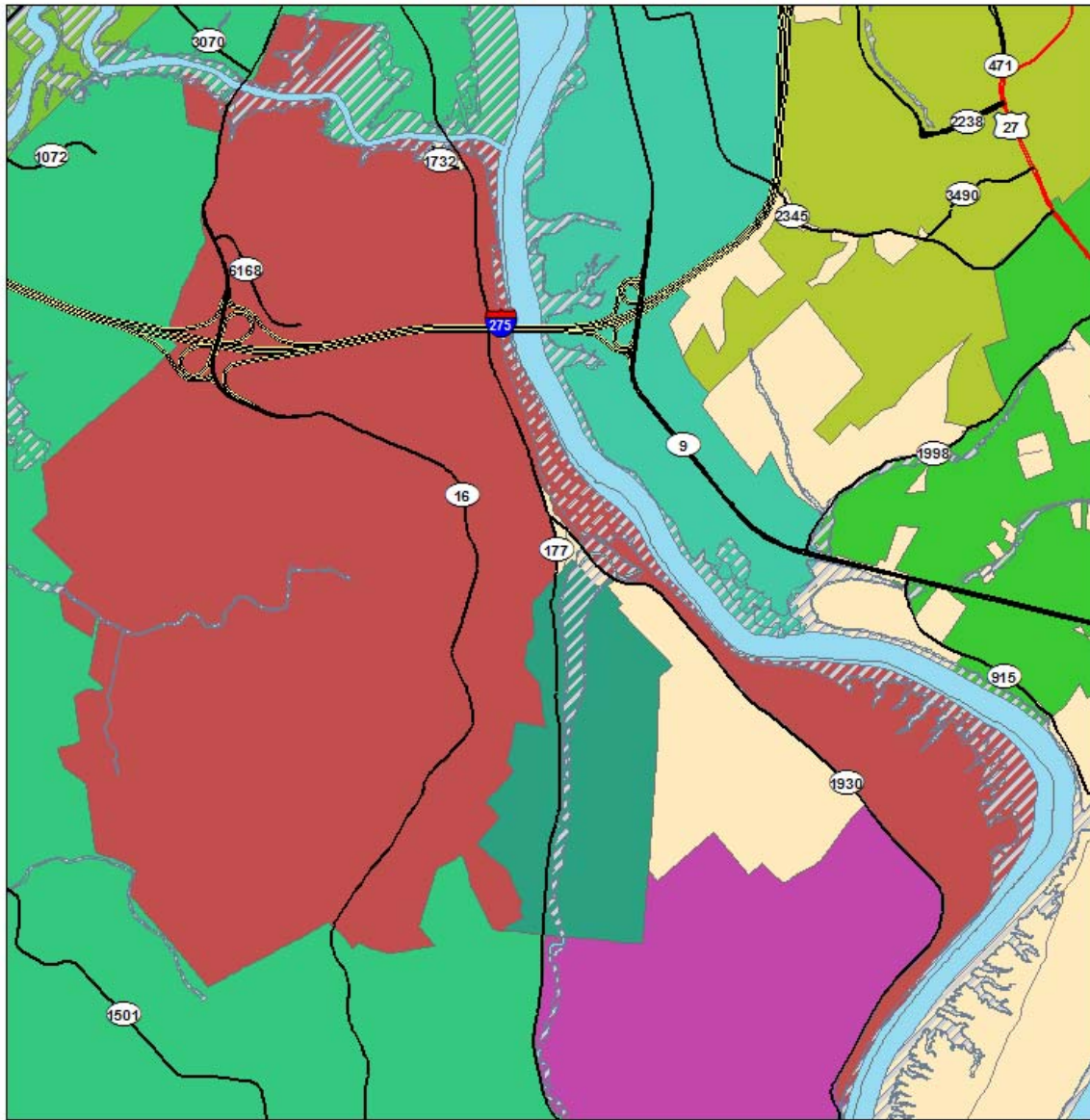
## City of Ryland Heights Flood Hazard Area



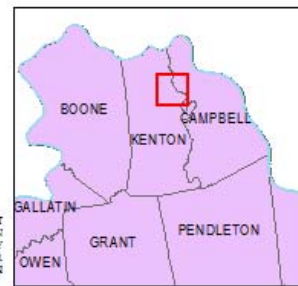
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



# City of Taylor Mill Flood Hazard Area

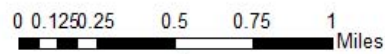
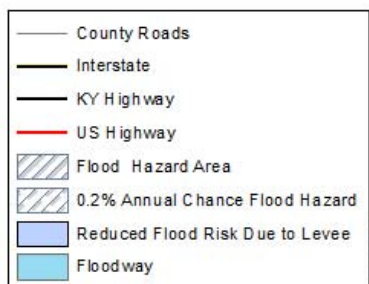
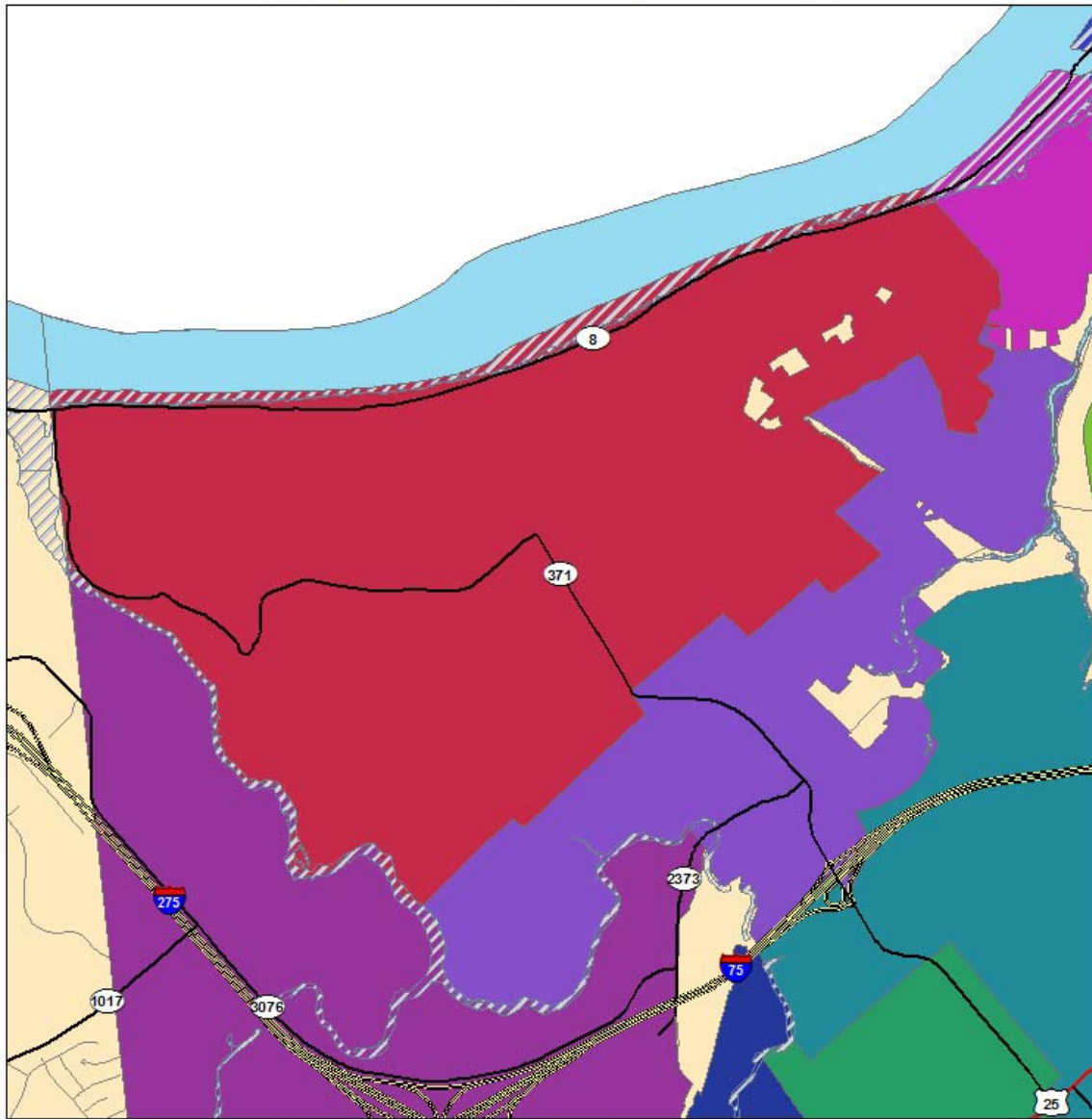


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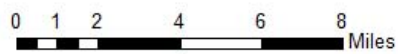
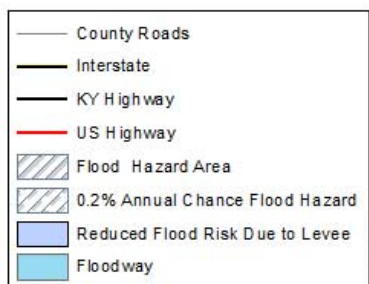
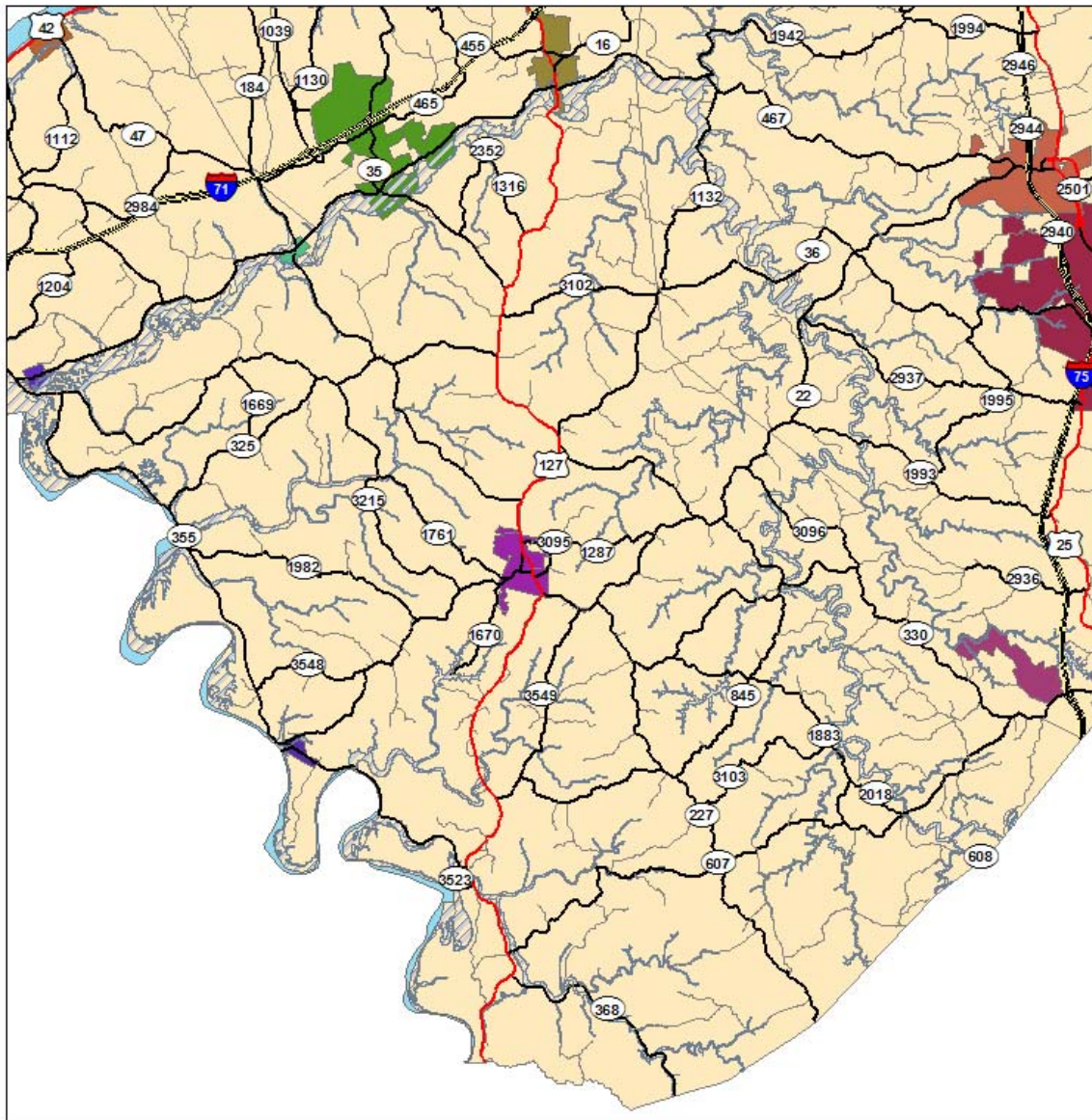
## City of Villa Hills Flood Hazard Area



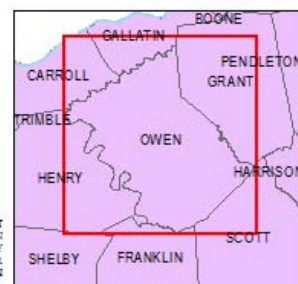
LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.



# Owen County Flood Hazard Area

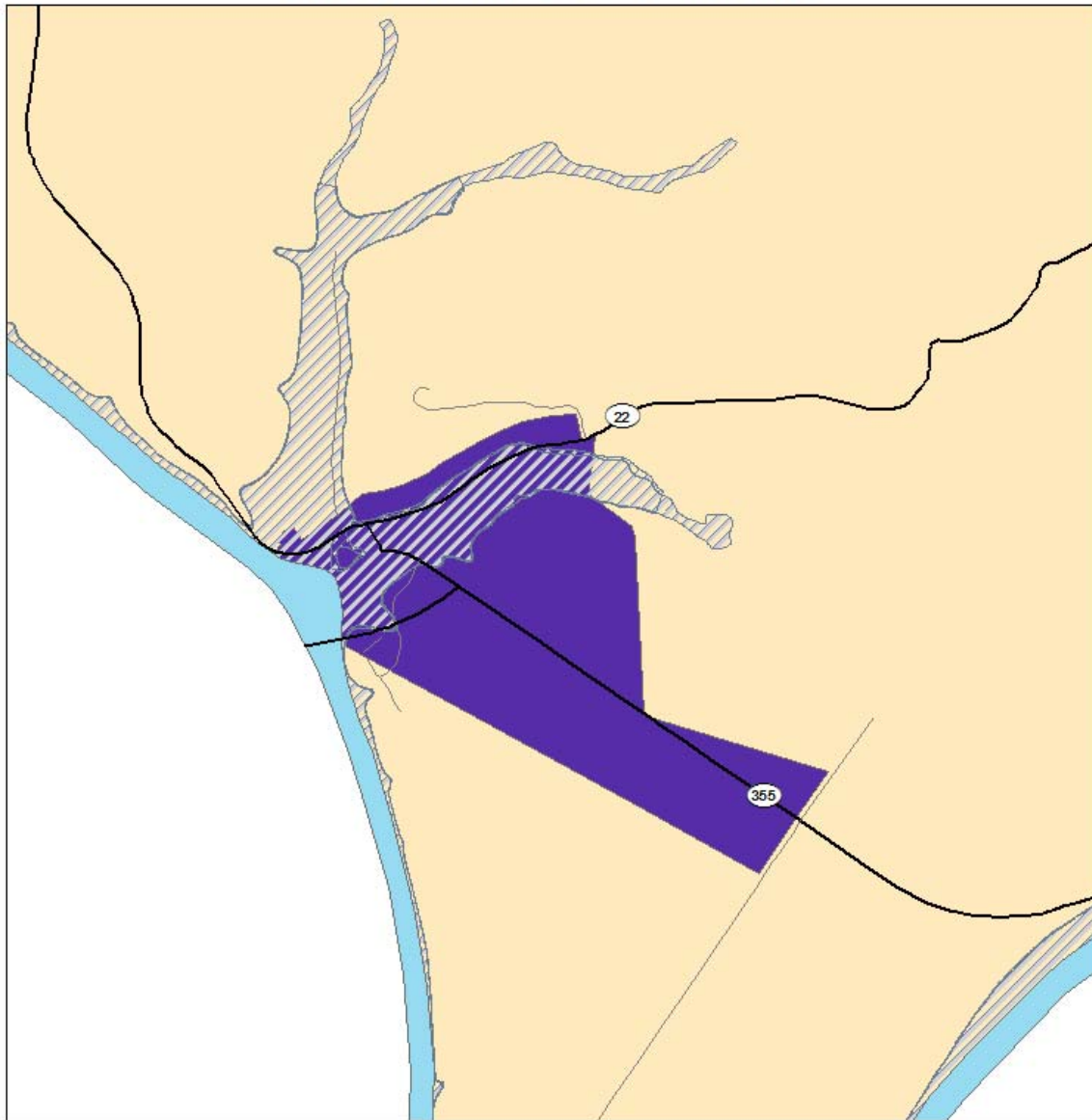


LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATIONS OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.





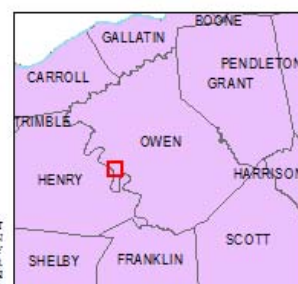
## City of Gratz Flood Hazard Area



0 0.0750.15 0.3 0.45 0.6 Miles

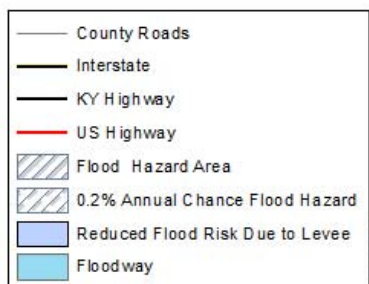
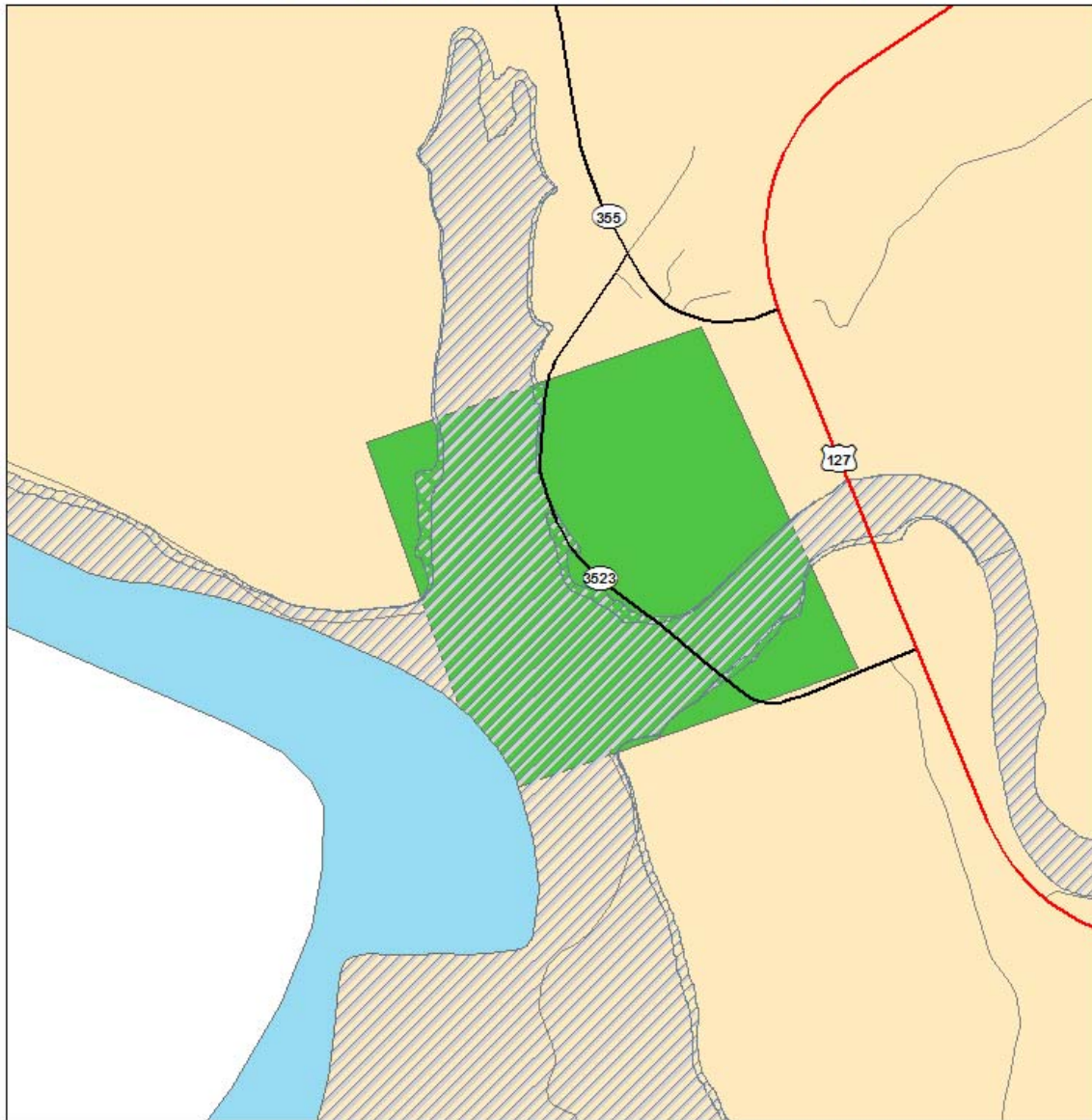


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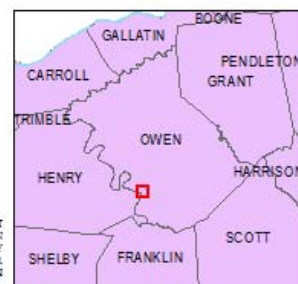
## City of Monterey Flood Hazard Area



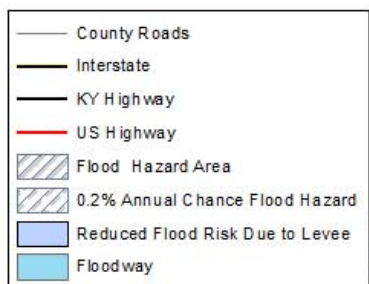
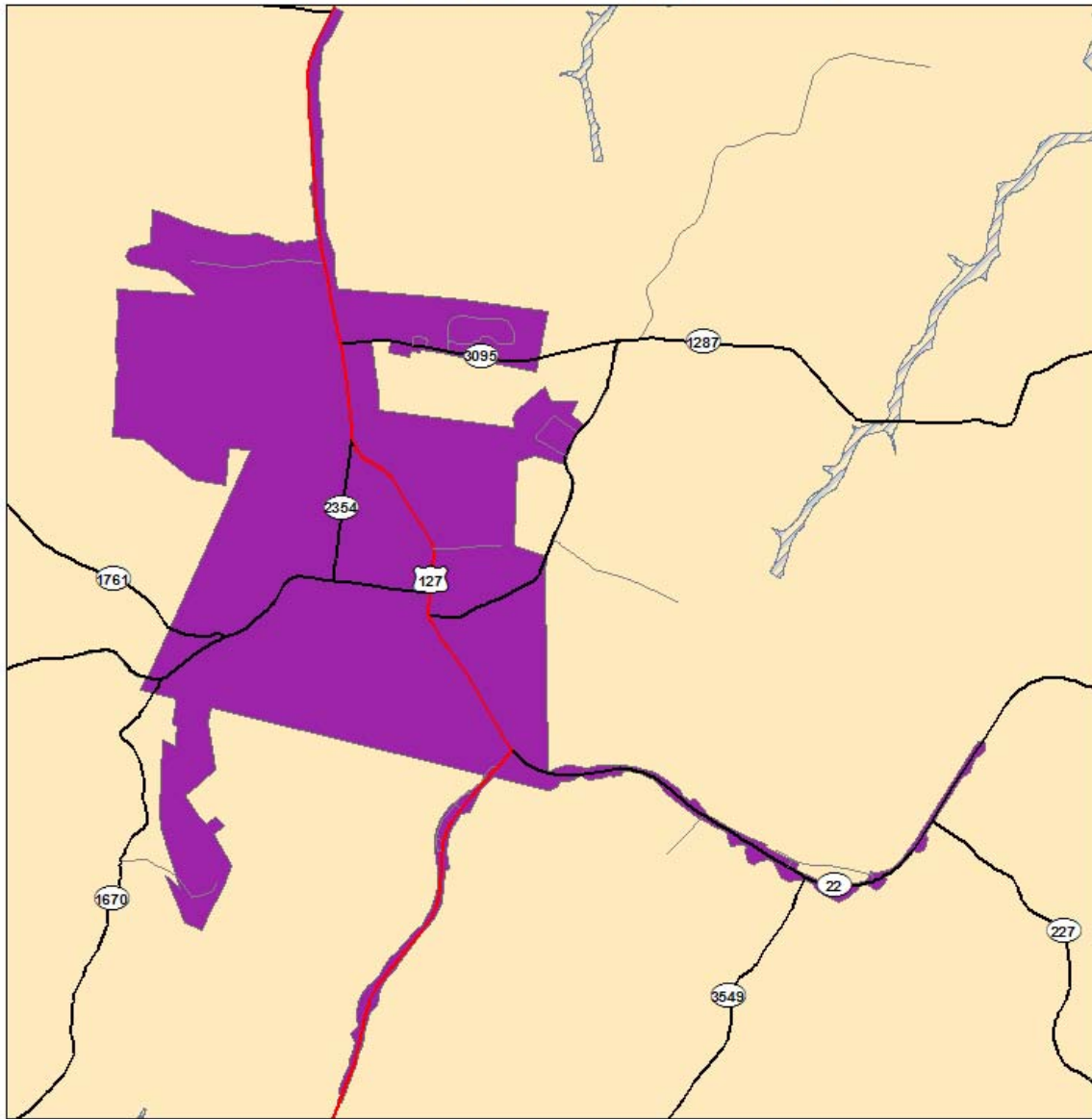
0 0.05 0.1 0.2 0.3 0.4 Miles



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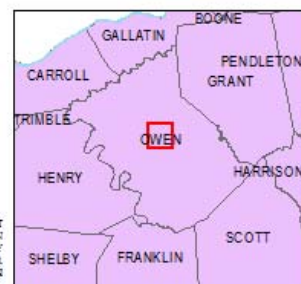
## City of Owenton Flood Hazard Area



0 0.1250.25 0.5 0.75 1 Miles

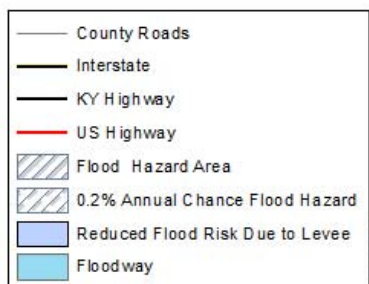
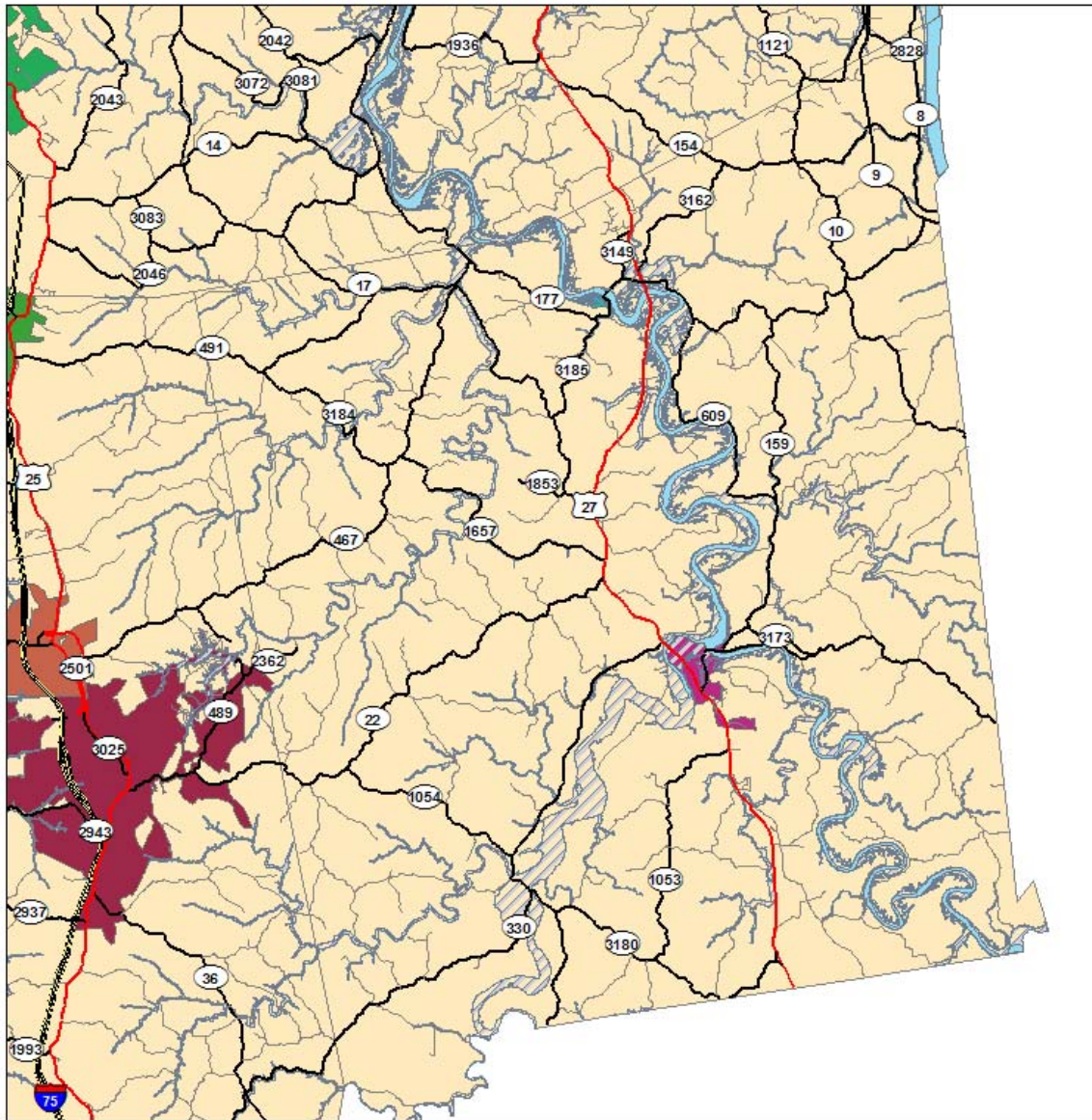


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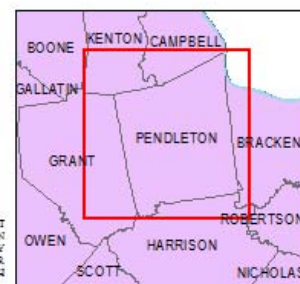
## Pendleton County Flood Hazard Area



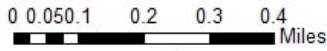
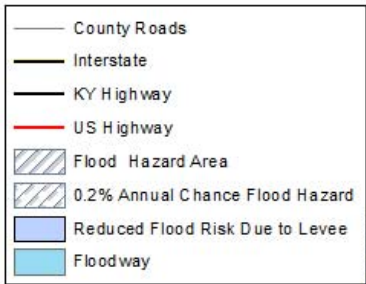
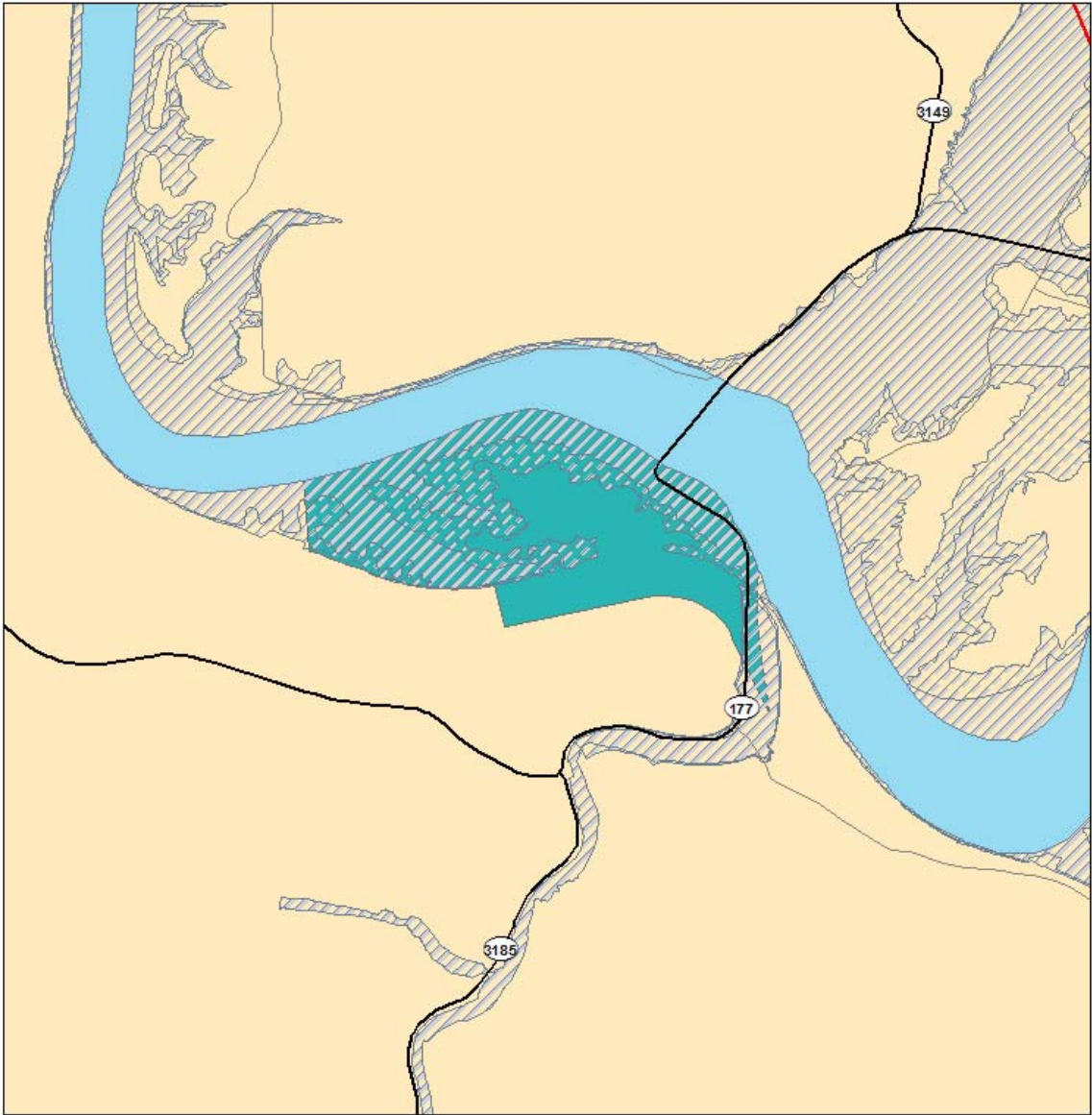
0 0.75 1.5 3 4.5 6 Miles



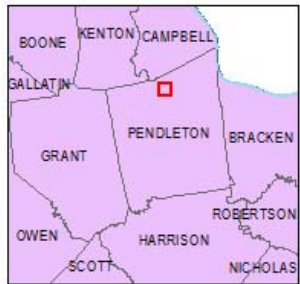
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# City of Butler Flood Hazard Area

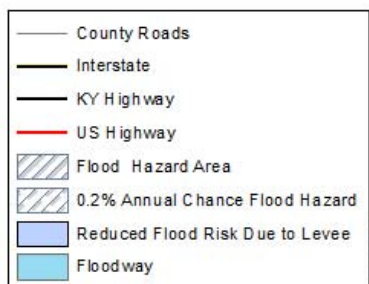
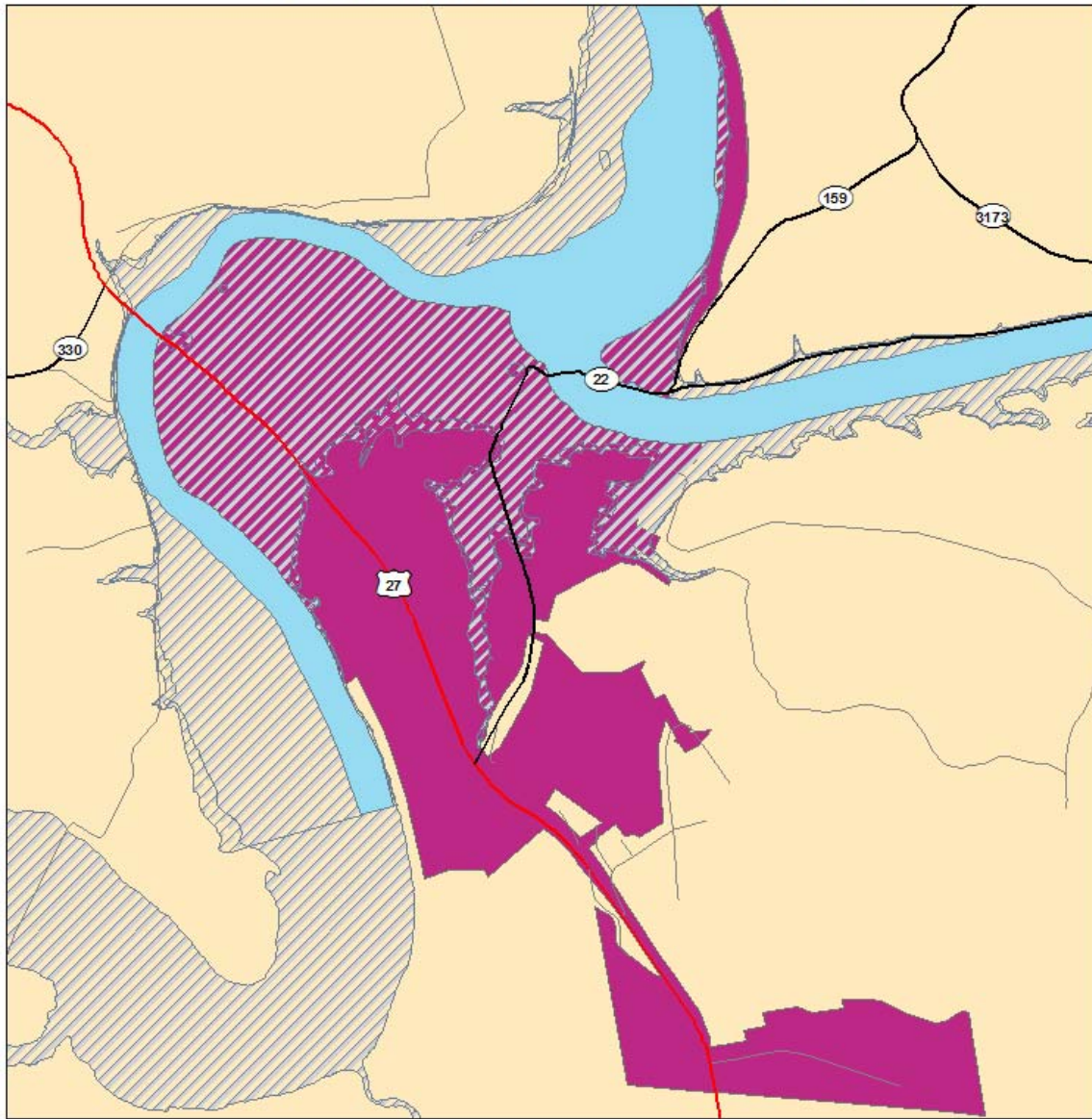


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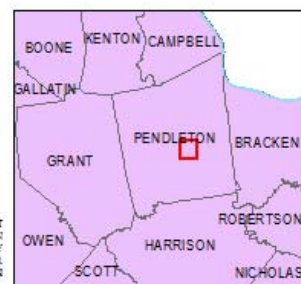
## City of Falmouth Flood Hazard Area



0.0 0.075 0.15 0.3 0.45 0.6 Miles

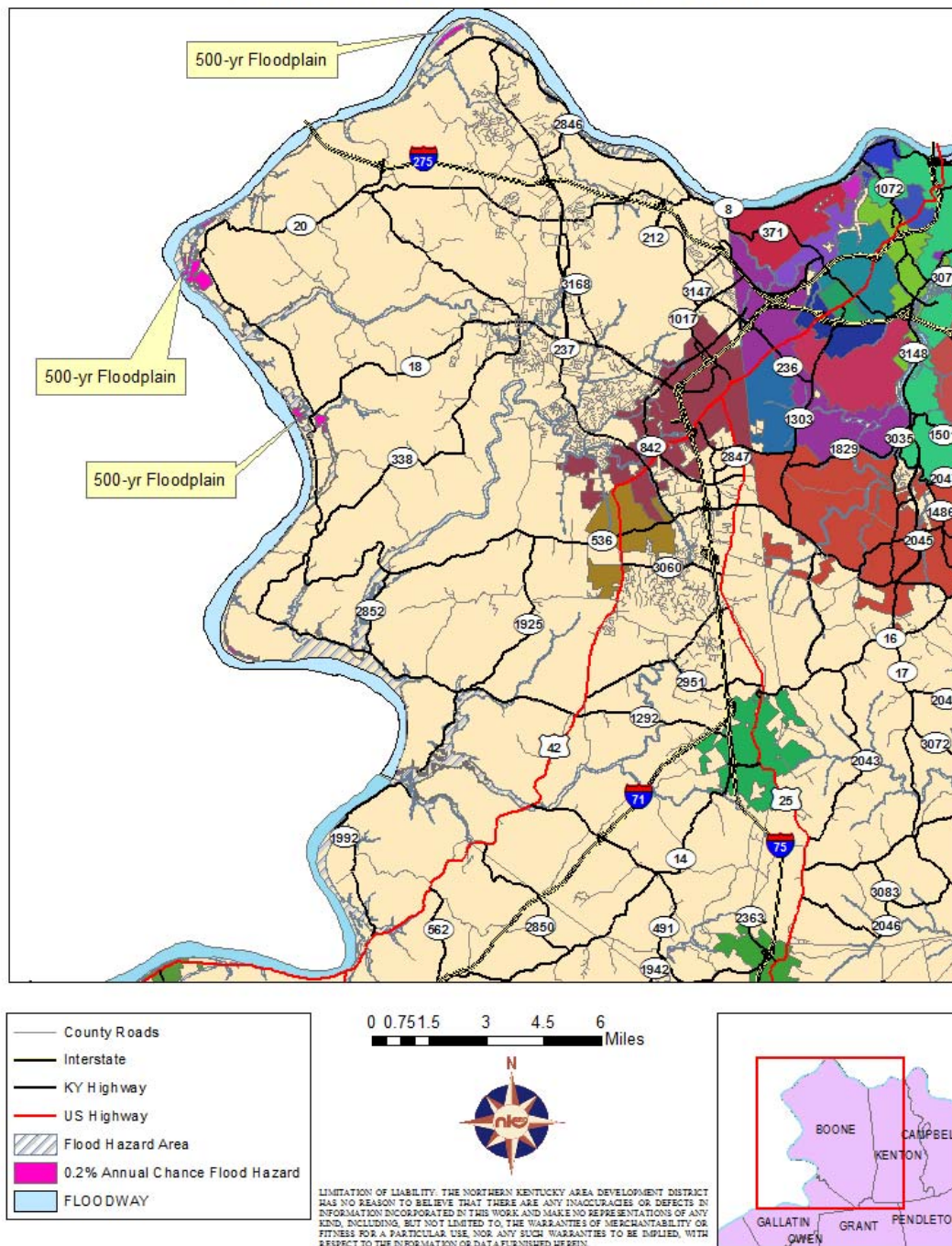


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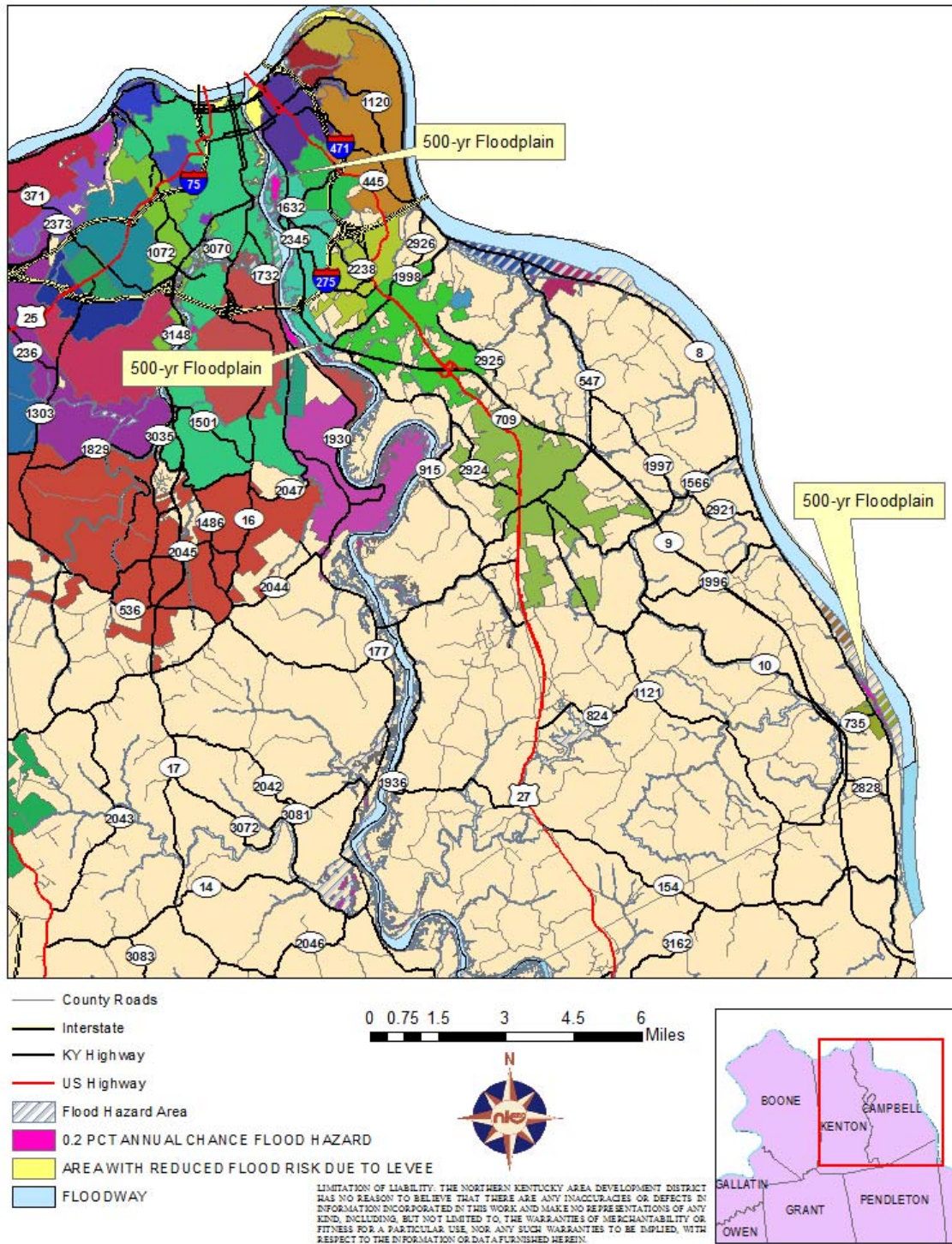
The maps below show the estimated 500-year floodplain, where there is a 0.2% annual chance of a flood. While there is not much difference between the 500-year and 100-year floodplain, there are some areas that will be affected by a larger historic event. It is important to keep in mind that this map does not include flash flooding, where many problems can be anticipated from such an historic event that would cause a 500-year flood. Grant County does not currently have a mapped 500-year floodplain.

## Boone County 500 Year Floodplain

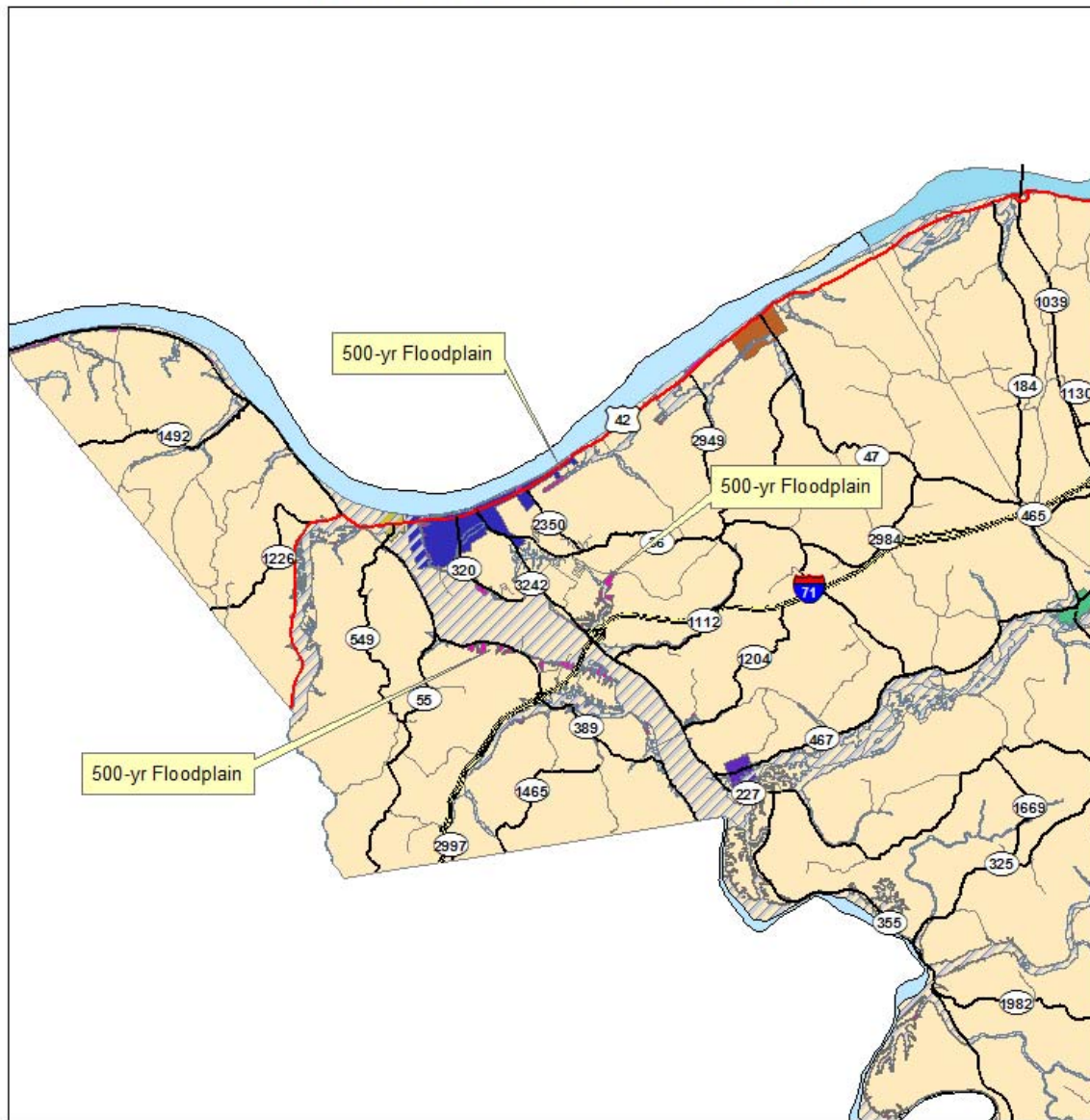




# Campbell County 500 Year Floodplain



# Carroll County 500 Year Floodplain

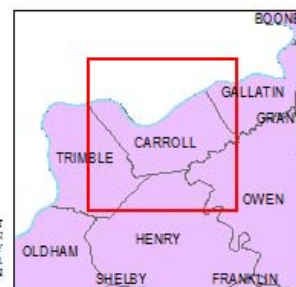


- County Roads
- Interstate
- KY Highway
- US Highway
- ▨ Flood Hazard Area
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
- FLOODWAY

0 0.75 1.5 3 4.5 6 Miles

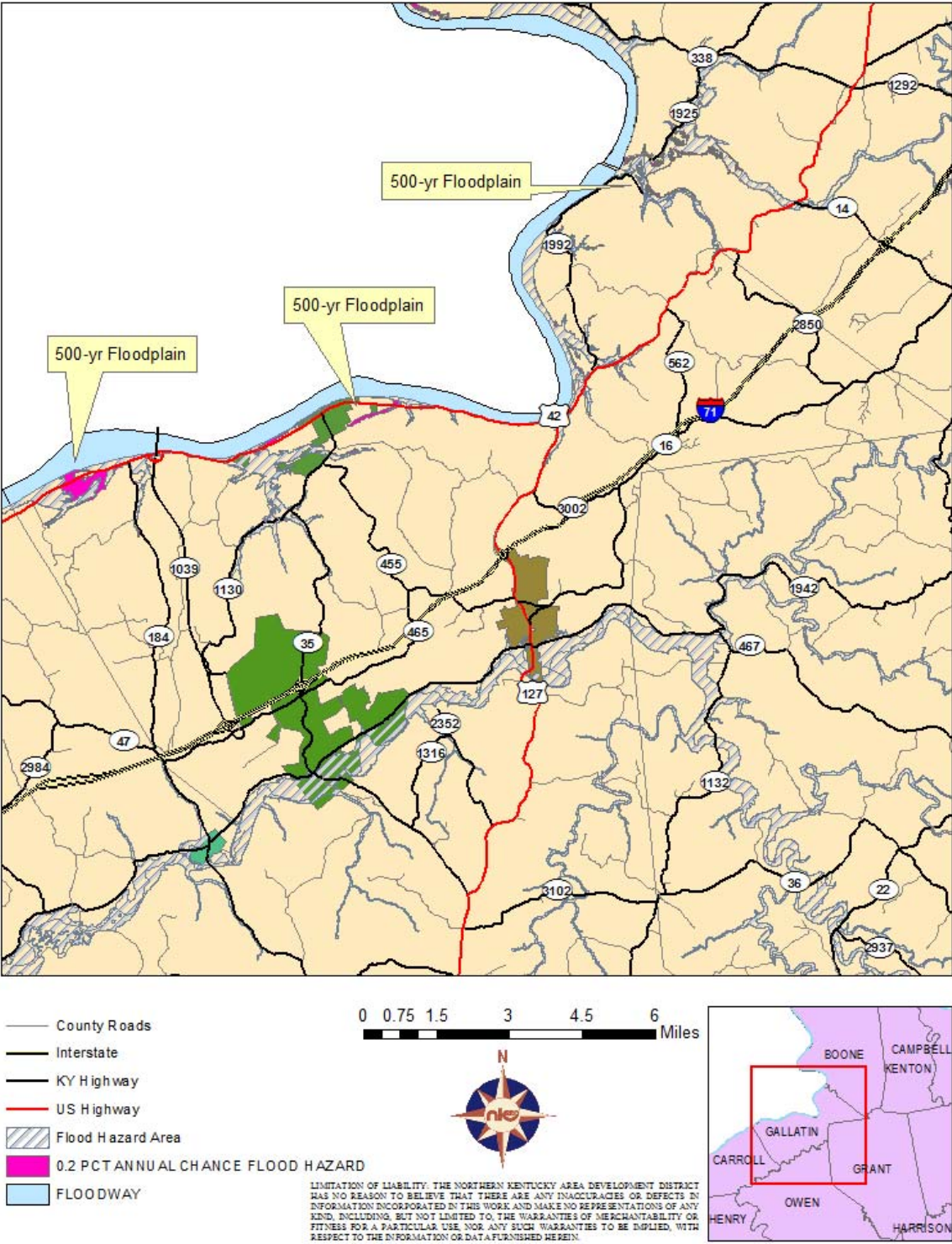


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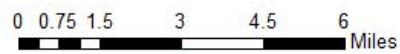
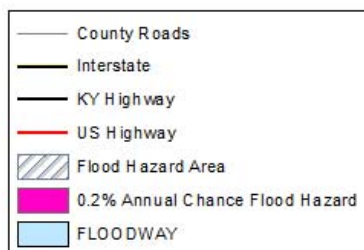
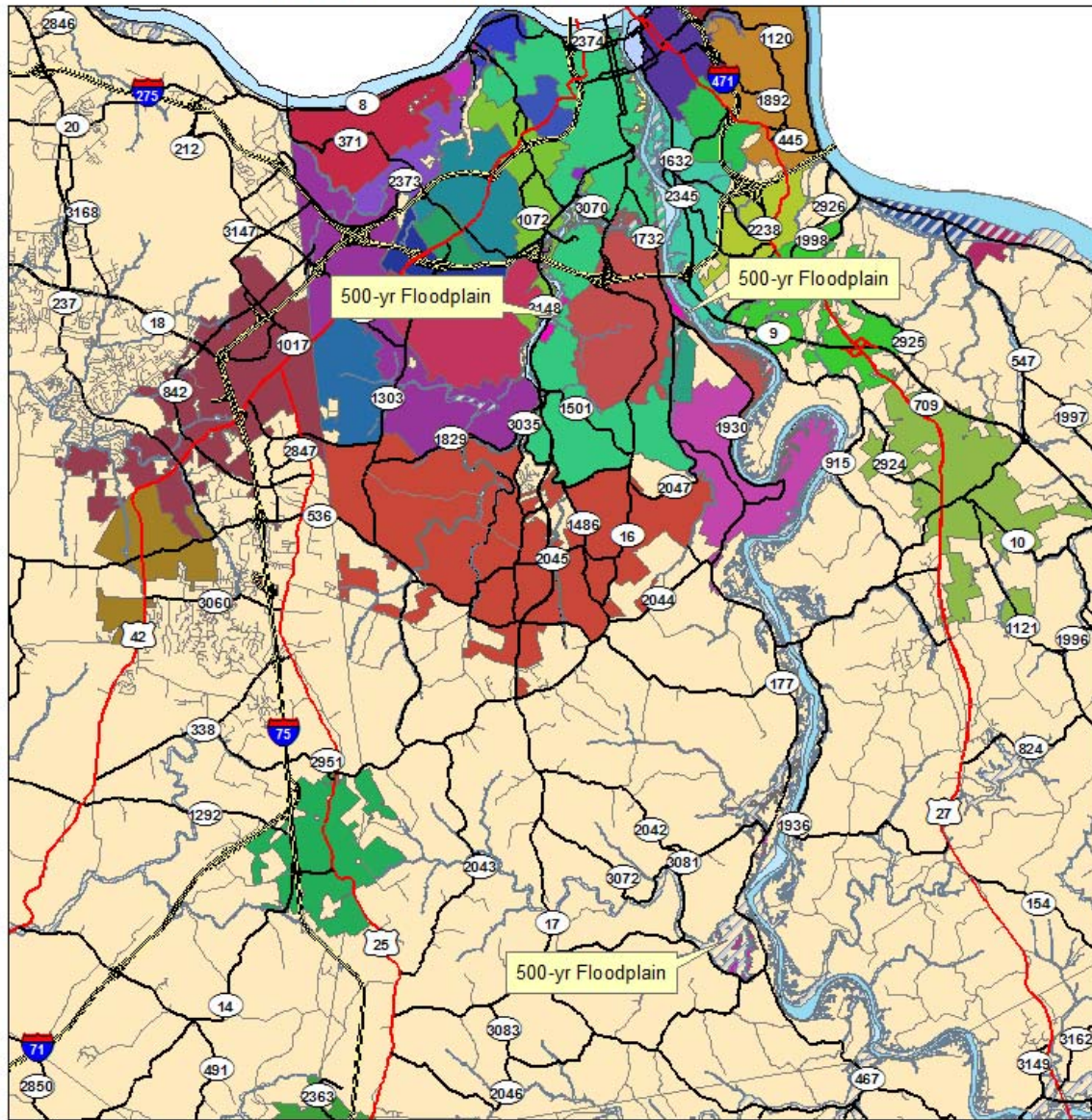


# Gallatin County 500 Year Floodplain

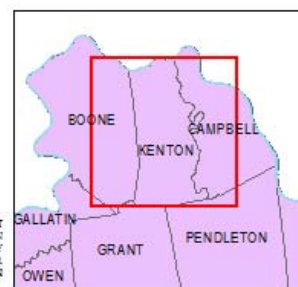




# Kenton County 500 Year Floodplain

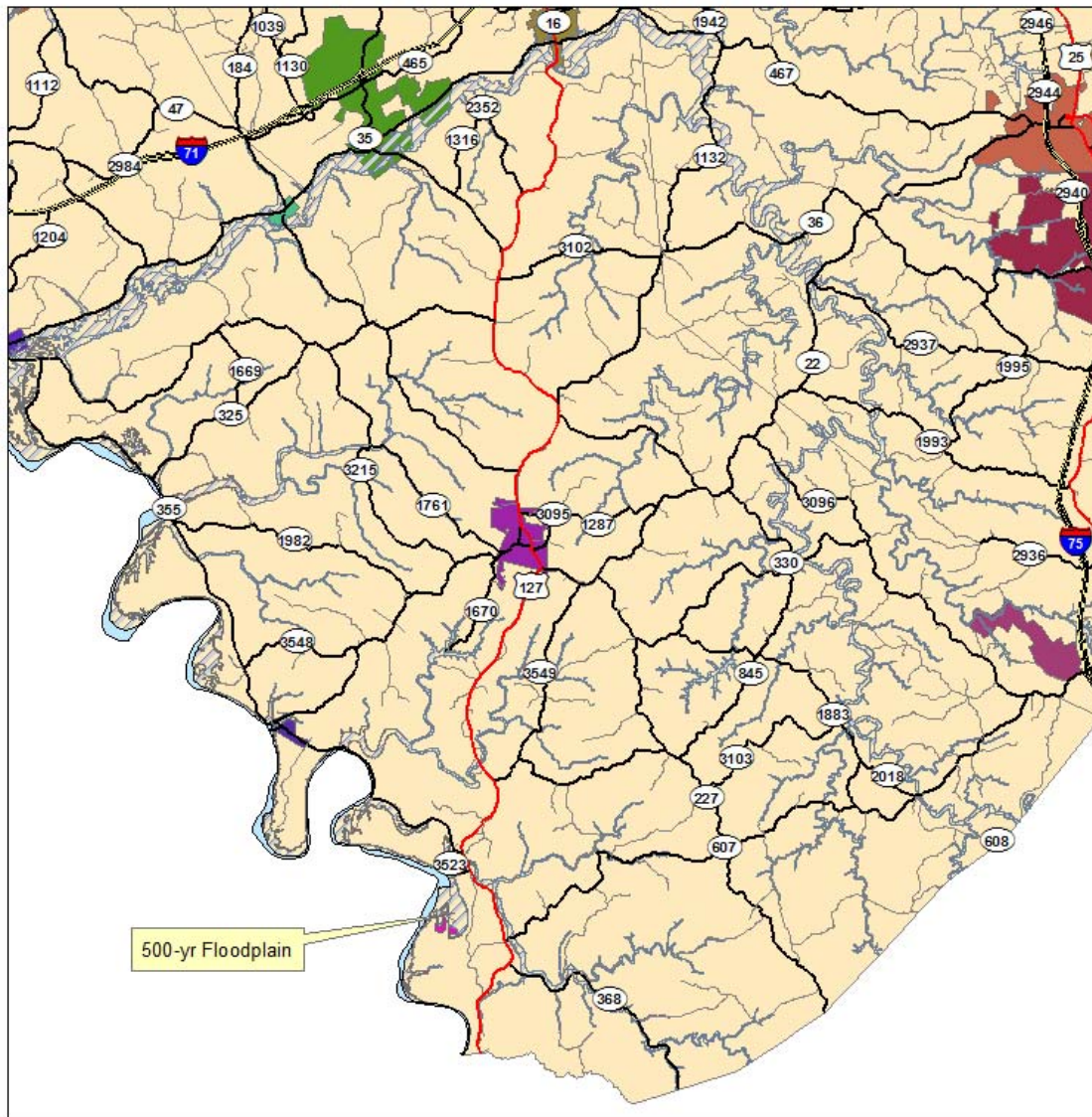


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# Owen County 500 Year Floodplain



County Roads

Interstate

KY Highway

US Highway

Flood Hazard Area

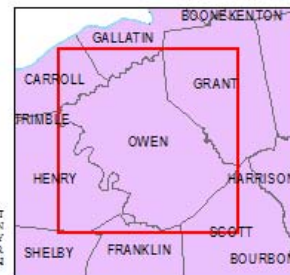
0.2 PCT ANNUAL CHANCE FLOOD HAZARD

FLOODWAY

0 1 2 4 6 8 Miles

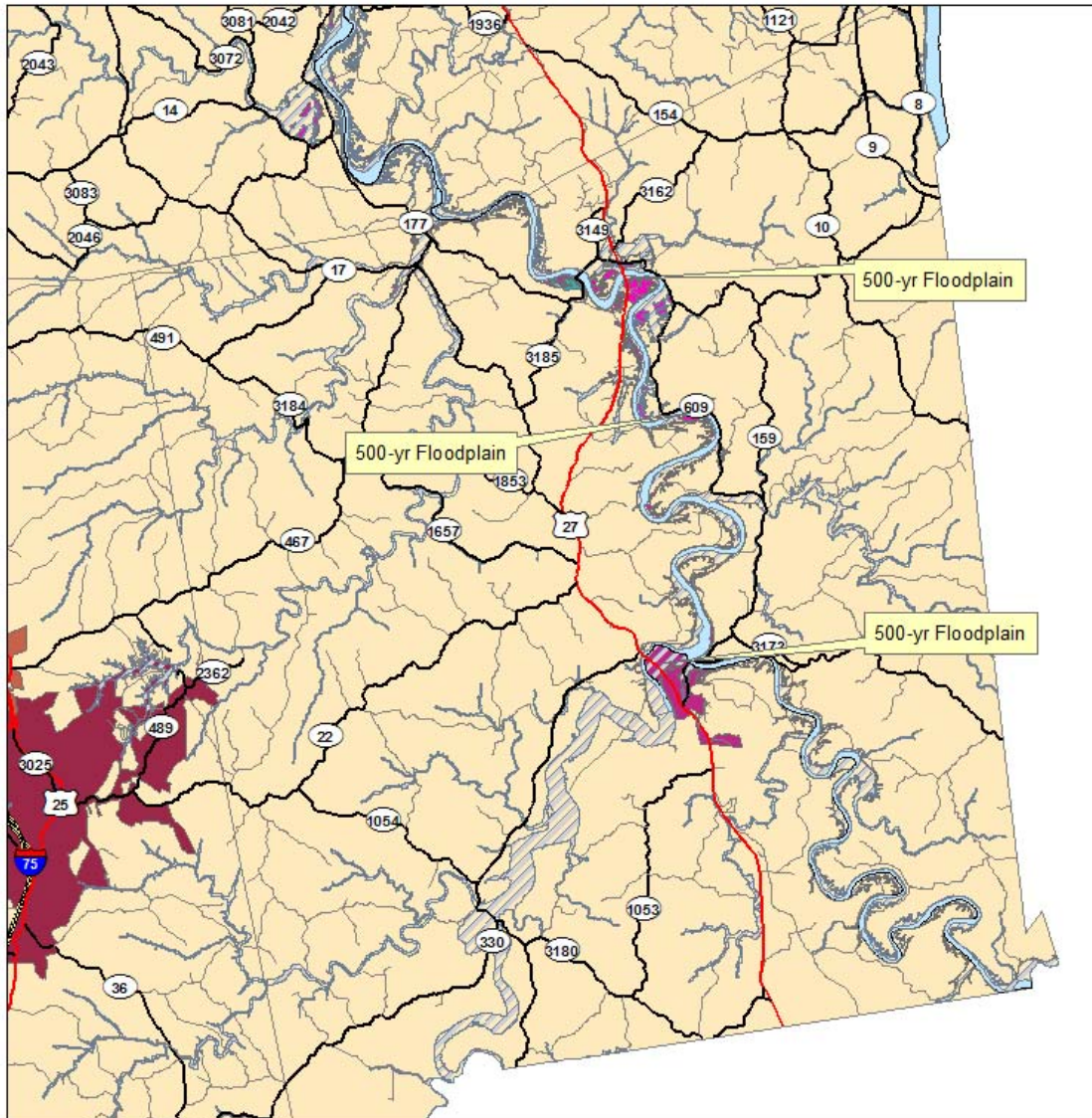


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## Pendleton County 500 Year Floodplain

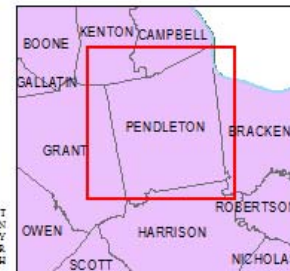


- County Roads
- Interstate
- KY Highway
- US Highway
- ▨ Flood Hazard Area
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
- FLOODWAY

0 0.75 1.5 3 4.5 6 Miles



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## **DAM FAILURE**

### **Types:**

Manmade dams may be classified by: 1) the type of materials used; 2) the methods used in construction; 3) the slope or cross-section of the dam; 4) the way the dam resists water pressure forces; 5) the means for controlling seepage; and 6) the purpose of the dam. Materials used for dams may include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, and miscellaneous materials such as plastic or rubber.

- Embankment dams, the most common type of dam in use today, are made from materials which include natural soil or rock, or waste materials obtained from mining or milling operations. An embankment dam is termed an “earth-fill” or “rock-fill” dam depending on whether it is comprised of compacted earth or of dumped rock. The ability of an embankment dam to resist the reservoir water pressure is primarily a result of the mass weight and the type and strength of the materials from which the dam is made.
- Concrete dams may be categorized as gravity or arch dams according to the design used to resist the stress of reservoir water pressure. Concrete gravity dams use the mass weight of concrete and friction to resist reservoir water pressure. A buttress dam is a specific type of gravity dam in which the large mass of concrete is reduced, and the forces are diverted to the dam foundation through vertical or sloping buttresses.
- Concrete arch dams are typically thin in cross-section. The reservoir water forces acting on an arch dam are carried laterally into the abutments. The shape of the arch may resemble a segment of a circle or an ellipse, and the arch may be curved in the vertical plane as well. Such dams are usually constructed of a series of thin vertical blocks that are keyed together with barriers to stop water from flowing between the blocks.
- Coal impoundments are any structure associated with coal mining operations built to impound water and are either 20 feet high or capable of impounding 20 acre feet of water. Coal impoundments store coal slurry comprised of wastewater and impurities that result from coal washing and processing. A bulkhead or embankment is made of coarse coal refuse and acts as a dam. Behind it lies a pond of coal slurry. Sediment settles out of this turbid mixture, filling the pond, while wastewater is recycled back into the coal washing process. The sizes of the ponds and bulkheads vary, but pond basins are often hundreds of feet deep and hold millions of gallons of slurry. Coal impoundment failures have resulted in property damage, environmental contamination and, in one case, loss of life.

### **Signs of Potential Dam Failure:**

- Seepage. The appearance of seepage on the downstream slope, abutments, or downstream area is cause for concern. If the water is muddy and is coming from a well-defined hole, material is probably being eroded from inside the embankment and a potentially dangerous situation can develop.
- Erosion. Erosion on the dam and spillway is one of the most evident signs of danger. The size of erosion channels and gullies can increase greatly with slight amounts of rainfall.
- Cracks. Cracks are of two types: traverse and longitudinal. Traverse cracks appear perpendicular to the axis of the dam and indicate settlement of the dam. Longitudinal cracks run parallel to the axis of the dam and may be the signal for a slide, or slump, on either face of the dam.
- Slides and Slumps. A massive slide can mean catastrophic failure of the dam. Slides occur for many reasons and their occurrence can mean a major reconstruction effort.

- **Subsidence.** Subsidence is the vertical movement of the foundation materials due to failure of consolidation. Rate of subsidence may be so slow that it can go unnoticed without proper inspection. Foundation settlement is the result of placing the dam and reservoir on an area lacking suitable strength, or over collapsed caves or mines.
- **Structural.** Conduit separations or ruptures can result in water leaking into the embankment and subsequent weakening of the dam. Pipe collapse can result in hydraulic failures due to diminished capacity.
- **Vegetation.** A prominent danger signal is the appearance of "wet environment" types of vegetation such as cattails, reeds, mosses and other wet area vegetation. These types of vegetation can be a sign of seepage.
- **Boils.** Boils indicate seepage water exiting under some pressure and typically occur in areas downstream of the dam.
- **Animal Burrows.** Animal burrows are a potential danger since such activity can undermine the structural integrity of the dam.
- **Debris.** Debris on dams and spillways can reduce the function of spillways, damage structures and valves, and destroy vegetative cover.

#### **Types of Failures:**

- **Hydraulic Failure.** Hydraulic failures result from the uncontrolled flow of water over the dam, around the dam and adjacent to the dam, and the erosive action of water on the dam and its foundation. Earth dams are particularly vulnerable to hydraulic failure since earth erodes at relatively small velocities.
- **Seepage Failure.** All dams exhibit some seepage that must be controlled in velocity and amount. Seepage occurs both through the dam and the foundation. If uncontrolled, seepage can erode material from the foundation of an earth dam to form a conduit through which water can pass. This passing of water often leads to a complete failure of the structure, known as piping.
- **Structural Failure.** Structural failures involve the rupture of the dam or its foundation. This is particularly a hazard for large dams and for dams built of low strength materials such as silts, slag, fly ash, etc. Dam failures generally result from a complex interrelationship of several failure modes. Uncontrolled seepage may weaken the soils and lead to a structural failure. Structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may lead to structural or piping failures.

There are 23 'high-risk' dams in the NKADD region that pose a threat to property and loss of life, however there are only 2 event histories in this region (explained in above profile risk table). High risk is defined as primarily as a loss of life, and secondarily as a loss to commerce, recreation, etc. The condition of the dam is not taken into account in this particular risk definition.

| <b>County</b> | <b>Number of High Risk Dams</b> |
|---------------|---------------------------------|
| Boone         | 1                               |
| Campbell      | 5                               |
| Carroll       | 4                               |
| Gallatin      | 4                               |
| Grant         | 2                               |
| Kenton        | 6                               |
| Owen          | 0                               |
| Pendleton     | 1                               |

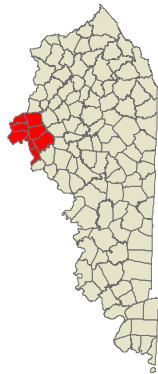
**Impacts:**

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

| <b>Dam Failure Profile Risk Table</b> |                                                                                                                                                                                                                                |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                             | Any area below a dam is susceptible                                                                                                                                                                                            |
| Period of Occurrence:                 | Dam Failure is often precipitated by another event such as flooding or earthquake                                                                                                                                              |
| Number of Events (1978-2014):         | 2                                                                                                                                                                                                                              |
| Annual Rate of Occurrence:            | .03                                                                                                                                                                                                                            |
| Probability of Future Events:         | Occasional                                                                                                                                                                                                                     |
| Warning Time:                         | Can see signs as early as years prior, but actual event warning time is minimal                                                                                                                                                |
| Potential Impacts:                    | Impacts on human life and public safety. Economic loss, environmental damage, and disruption of lifeline facilities.                                                                                                           |
| Recorded losses:                      | Unknown                                                                                                                                                                                                                        |
| Annualized Loss:                      | Unknown                                                                                                                                                                                                                        |
| Extent (Scale)                        | Embankment Slide (Boone)<br>Dam Failure: Yes<br>9/15/1978<br>Height: 18.6 meters<br>Damages: None<br><br>Inflow Flood - Hydrologic Event (Pendleton)<br>Dam Failure: No<br>3/1/1997<br>Height: 18.6 meters<br>Damages: Unknown |

*National Performance of Dam Program, Dam Incident Database, collected 10/20/2015*

# CRITICAL DAMS LOCATED IN THE NORTHERN KENTUCKY REGION



## Dam Hazard Rating

- Low
- Significant
- High

## LOW HAZARD POTENTIAL

Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

## SIGNIFICANT HAZARD POTENTIAL

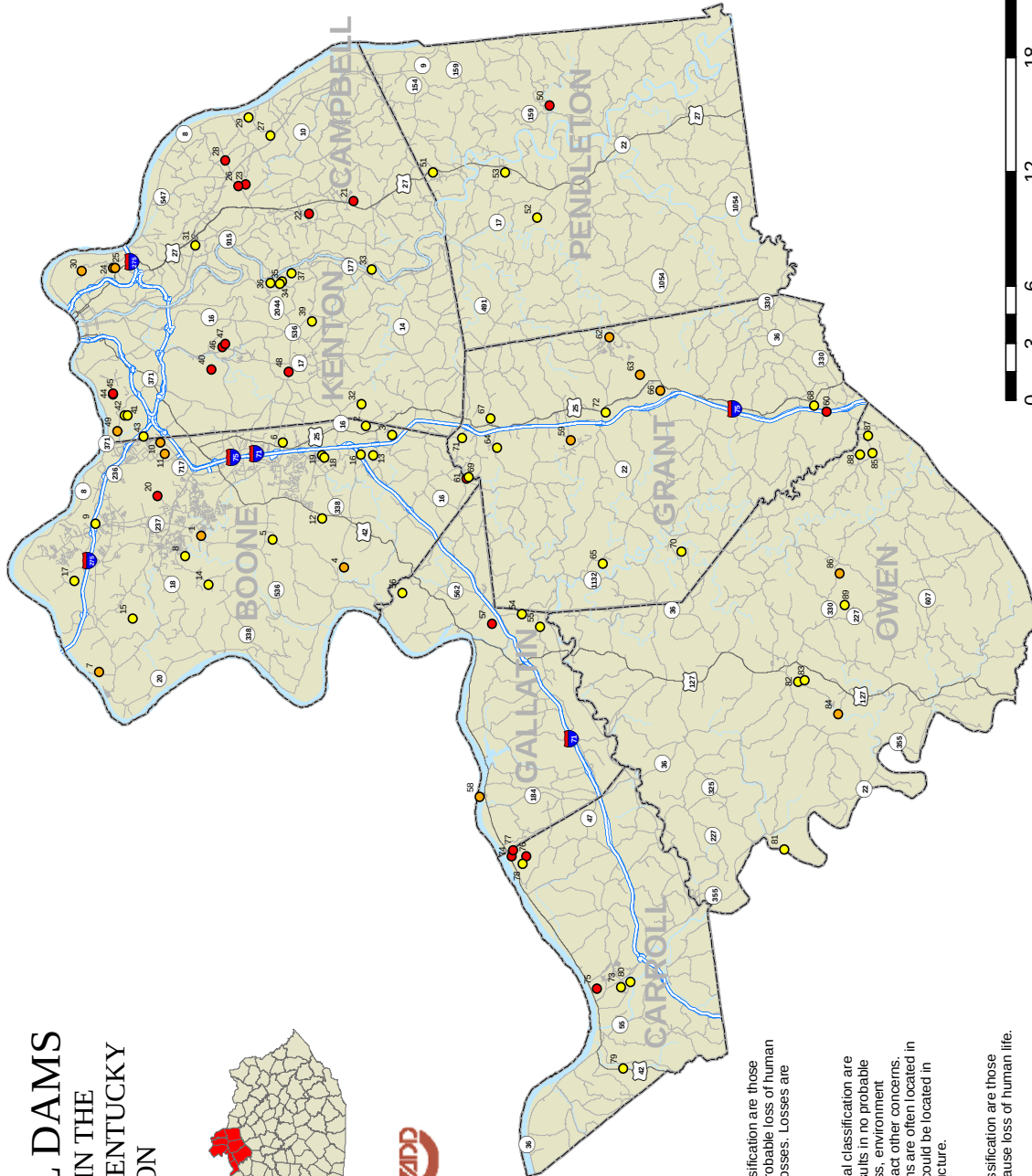
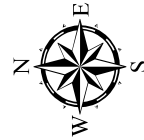
Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

## HIGH HAZARD POTENTIAL

Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

Source: KY Division of Water & US Army Corps of Engineers

| No. | Dam                             |
|-----|---------------------------------|
| 1   | Watershed Flood Dam             |
| 2   | Watershed Reservoir (Boone) Dam |
| 3   | Boone Lake Dam                  |
| 4   | Boone State Park Lake Dam       |
| 5   | Harold Bennett Dam              |
| 6   | East Frogman Country Club Dam   |
| 7   | Boonville Farm Dam              |
| 8   | Boonville Farm Dam              |
| 9   | Larkin Race Track Dam           |
| 10  | DP Kie Lander Lake Dam          |
| 11  | DP Kie Lander Lake Dam          |
| 12  | DP Kie Lander Lake Dam          |
| 13  | DP Kie Lander Lake Dam          |
| 14  | McGowan Lake Dam                |
| 15  | Schwartz Lake Dam               |
| 16  | Stamps Lake Dam                 |
| 17  | Stamps Lake Dam                 |
| 18  | Stamps Lake Dam                 |
| 19  | Stamps Lake Dam                 |
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| 84  | Stamps Lake Dam                 |
| 85  | Stamps Lake Dam                 |
| 86  | Stamps Lake Dam                 |
| 87  | Stamps Lake Dam                 |
| 88  | Stamps Lake Dam                 |
| 89  | Stamps Lake Dam                 |
| 90  | Stamps Lake Dam                 |





**DAM INVENTORY**

| Name                              | Impoundment                     | Hazard <sup>1</sup> | Height | Drainage Area (sq mi) | Lake Area (acres) | Lake Volume | Owner Type <sup>2</sup> | County   |
|-----------------------------------|---------------------------------|---------------------|--------|-----------------------|-------------------|-------------|-------------------------|----------|
| Camp Ernst Dam                    | Camp Ernst Lake                 | S                   | 61     | 0.260                 | 22                | 355         | P                       | Boone    |
| Walton Reservoir (Boone) Dam      | Walton Reservoir (Boone)        | L                   | 22     | 0.250                 | 6                 | 45          | P                       | Boone    |
| Boone Lake Dam                    | Boone Lake                      | L                   | 27     | 0.460                 | 14                | 100         | P                       | Boone    |
| Big Bone Lick State Park Lake Dam | Big Bone Lick State Park Lake   | S                   | 65     | 0.180                 | 9                 | 185         | S                       | Boone    |
| Harold Bennett Dam                | Bennett Lake                    | L                   | 0      | 0.000                 | 0                 | 0           |                         | Boone    |
| East Frogtown Country Club Dam    | East Frogtown Country Club Lake | L                   | 30     | 0.060                 | 6                 | 67          | P                       | Boone    |
| Treasure Lake Dam                 | Lake Jeanclia                   | S                   | 32     | 0.950                 | 0                 | 0           | P                       | Boone    |
| Boontucky Farm Dam                | Boontucky Farm Lake             | L                   | 33     | 0.060                 | 8                 | 102         | P                       | Boone    |
| Lakeview Farm Dam                 | Lakeview Farm Lake              | L                   | 55     | 0.040                 | 7                 | 126         | P                       | Boone    |
| Marydale Dam                      | Marydale Lake                   | S                   | 29     | 0.980                 | 9                 | 92          | P                       | Boone    |
| Turfway Race Track Dam            | Turfway Race Track Lake         | S                   | 44     | 0.180                 | 15                | 166         | P                       | Boone    |
| Lantern Lake Dam                  | Lantern Farm Lake               | L                   | 44     | 0.070                 | 5                 | 0           | P                       | Boone    |
| Wallace Farm Lake Dam             | Wallace Farm Lake               | L                   | 27     | 0.280                 | 13                | 0           | P                       | Boone    |
| McDavid Lake Dam                  | McDavid Lake                    | L                   | 26     | 0.180                 | 3                 | 26          | P                       | Boone    |
| Schneider Lake Dam                | Schneider Lake                  | L                   | 55     | 0.230                 | 5                 | 0           | P                       | Boone    |
| Tackett Industrial Park Dam       | Tackett Lake                    | L                   | 38     | 0.020                 | 2                 | 15          | P                       | Boone    |
| Traditions Golf Course Dam        | Traditions Golf Course Lake     | L                   | 55     | 0.260                 | 9                 | 60          | P                       | Boone    |
| Steeplechase Dam (Upper)          | Steeplechase Lake (Upper)       | L                   | 24     | 0.340                 | 7                 | 49          | P                       | Boone    |
| Steeplechase Dam (Lower)          | Steeplechase Dam (Lower)        | L                   | 15     | 0.600                 | 2                 | 11          | P                       | Boone    |
| Campbell County Lake Dam          | AJ Jolly Park Lake              | H                   | 48     | 6.400                 | 204               | 2,260       | S                       | Campbell |
| Claryville Lake Dam               | Bob White Club Lake             | H                   | 15     | 0.310                 | 13                | 42          | P                       | Campbell |

| Name                               | Impoundment                    | Hazard <sup>1</sup> | Height | Drainage Area (sq mi) | Lake Area (acres) | Lake Volume | Owner Type <sup>2</sup> | County   |
|------------------------------------|--------------------------------|---------------------|--------|-----------------------|-------------------|-------------|-------------------------|----------|
| Alexandria Dam (Old)               | Alexandria Reservoir (Old)     | H                   | 35     | 0.220                 | 6                 | 61          | L                       | Campbell |
| Covington Dam (North)              | Covington Reservoir (North)    | S                   | 22     | 0.050                 | 6                 | 40          | L                       | Campbell |
| Covington Dam (South)              | Covington Reservoir (South)    | S                   | 22     | 0.060                 | 6                 | 40          | L                       | Campbell |
| Alexandria Dam(New)                | Alexandria Reservoir (New)     | H                   | 58     | 0.410                 | 7                 | 111         | L                       | Campbell |
| Milburn Lake                       | Milburn Lake                   | L                   | 42     | 0.100                 | 3                 | 27          | P                       | Campbell |
| Dietz Lake (Lower)Dam)             | Dietz Lake                     | H                   | 35     | 0.170                 | 8                 | 60          | P                       | Campbell |
| River Hills Golf Club Lake         | River Hills Golf Club Lake     | L                   | 47     | 0.180                 | 6                 | 87          | P                       | Campbell |
| Newport Reservoir                  | Newport Reservoir              | S                   | 25     | 0.210                 | 0                 | 0           | L                       | Campbell |
| General Butler State Park Lake Dam | General Butler State Park Lake | L                   | 24     | 0.900                 | 31                | 250         | S                       | Carroll  |
| Kentucky Utilities Fly Ash Dam (1) | Kentucky Utilities Fly Ash (1) | H                   | 52     | 0.270                 | 99                | 900         | P                       | Carroll  |
| General Butler State Park No 2     | Snow Lake                      | H                   | 25     | 0.002                 | 3                 | 0           | S                       | Carroll  |
| KU Ghent Ash Storage No 2          | Ash Storage Dam No 2           | H                   | 175    | 0.310                 | 86                | 2,580       | P                       | Carroll  |
| KU Ghent Gypsum Stack              | Gypsum Stack                   | H                   | 130    | 0.140                 | 88                | 4,720       | P                       | Carroll  |
| KU Ghent Sediment Pond             | Sediment Pond                  | L                   | 60     | 0.510                 | 3                 | 14          | P                       | Carroll  |
| Kemper Dam (South)                 | Harbor Pointe Estates (South)  | L                   | 28     | 0.000                 | 0                 | 0           | P                       | Carroll  |
| Kentucky River Lock & Dam #1       | Kentucky River                 | L                   | 35     | 6,956.0               | 0                 | 0           | F                       | Carroll  |
| Boltz Lake Dam                     | Boltz Lake                     | S                   | 71     | 3.110                 | 92                | 2,200       | S                       | Grant    |
| Corinth Lake Dam                   | Corinth Lake                   | H                   | 67     | 1.200                 | 96                | 1,613       | S                       | Grant    |
| Bullock Pen Lake Dam               | Bullock Pen Lake               | H                   | 55     | 8.000                 | 134               | 2,464       | S                       | Grant    |
| Williamstown Lake Dam              | Williamstown Lake              | S                   | 55     | 8.650                 | 300               | 6,200       | L                       | Grant    |
| Williamstown Reservoir Dam         | Williamstown Reservoir         | S                   | 48     | 0.330                 | 10                | 140         | L                       | Grant    |

| Name                               | Impoundment                    | Hazard <sup>1</sup> | Height | Drainage Area (sq mi) | Lake Area (acres) | Lake Volume | Owner Type <sup>2</sup> | County |
|------------------------------------|--------------------------------|---------------------|--------|-----------------------|-------------------|-------------|-------------------------|--------|
| Eagle Creek Country Club Lake Dam  | Eagle Creek Country Club Lake  | L                   | 46     | 0.050                 | 4                 | 59          | P                       | Grant  |
| Eckerson Dam                       | Eckerson Lake                  | L                   | 27     | 0.040                 | 4                 | 44          | P                       | Grant  |
| Southern Railroad Dam              | Southern Railroad Lake         | S                   | 32     | 0.120                 | 6                 | 64          | P                       | Grant  |
| Lloyd Dam                          | Lloyd Lake                     | L                   | 34     | 0.050                 | 4                 | 45          | S                       | Grant  |
| Frank Taylor Lake Dam              | Taylor Lake                    | L                   | 50     | 0.200                 | 0                 | 0           | P                       | Grant  |
| Rolfes Dam                         | Rolfes Lake                    | L                   | 28     | 0.650                 | 4                 | 21          | P                       | Grant  |
| Stevens Creek Development Lake Dam | Stevens Creek Development Lake | L                   | 0      | 0.220                 | 0                 | 0           | P                       | Grant  |
| MHT Lake                           |                                | L                   | 34     | 0.086                 | 2                 | 23          | P                       | Grant  |
| Dry Ridge City                     | Lake Pollywog                  | L                   | 32     | 0.000                 | 0                 | 0           | L                       | Grant  |
| Walton Reservoir (Kenton) Dam      | Walton Reservoir (Kenton)      | L                   | 39     | 1.260                 | 21                | 205         | P                       | Kenton |
| Thornhill Lake                     | Thornhill Lake                 | L                   | 13     | 0.340                 | 20                | 80          | P                       | Kenton |
| Ryland Lakes Dam No 2              | Ryland Lake #1                 | L                   | 38     | 0.020                 | 7                 | 34          | P                       | Kenton |
| Ryland Lakes Dam No 1              | Ryland Lake #2                 | L                   | 31     | 0.160                 | 3                 | 57          | P                       | Kenton |
| Ryland Lakes Dam No 3              | Ryland Lake 3                  | L                   | 40     | 0.200                 | 6                 | 50          | P                       | Kenton |
| AJ Willenborg Lake                 | Willenborg Lake                | L                   | 19     | 0.470                 | 7                 | 41          | P                       | Kenton |
| White Villa Country Club Lake      | White Villa Country Club Lake  | L                   | 22     | 0.060                 | 7                 | 50          | P                       | Kenton |
| Cavanaugh Farm Lake Dam            | Cavanaugh Farm Lake            | L                   | 28     | 0.080                 | 2                 | 27          | P                       | Kenton |
| Doe Run Lake (Banklick Cr. FRS #3) | Banklick Creek FRS #3          | H                   | 112    | 9.800                 | 51                | 0           | L                       | Kenton |
| Valley Trails                      | Valley Trails                  | L                   | 20     | 0.200                 | 0                 | 0           | P                       | Kenton |
| Villa Hills                        | Villa Hills                    | L                   | 27     | 0.260                 | 0                 | 0           | P                       | Kenton |
| Circleport 4 Lake Dam              | Circleport 4 Lake Dam          | L                   | 50     | 0.005                 | 1                 | 0           | P                       | Kenton |
| County Squire (Upper)              | County Squire (Upper)          | H                   | 35     | 0.027                 | 1                 | 4           | P                       | Kenton |

| Name                           | Impoundment             | Hazard <sup>1</sup> | Height | Drainage Area (sq mi) | Lake Area (acres) | Lake Volume | Owner Type <sup>2</sup> | County    |
|--------------------------------|-------------------------|---------------------|--------|-----------------------|-------------------|-------------|-------------------------|-----------|
| County Squire (Lower)          | County Squire (Lower)   | H                   | 39     | 0.027                 | 0                 | 0           | P                       | Kenton    |
| Crystal Lake Dam No 1          | Crystal Lake No 1       | H                   | 45     | 0.000                 | 0                 | 0           | P                       | Kenton    |
| Crystal Lake Dam No 2          | Crystal Lake No 2       | H                   | 48     | 0.000                 | 0                 | 0           | P                       | Kenton    |
| Independence Towne Centre Dam  | Independence Towne      | H                   | 35     | 0.150                 | 0                 | 0           | P                       | Kenton    |
| Prospect Point Dam             | Prospect Point          | S                   | 45     | 0.050                 | 0                 | 0           | P                       | Kenton    |
| Lake Holiday Dam               | Holiday Lake            | L                   | 44     | 1.450                 | 50                | 610         | P                       | Owen      |
| Thomas Lakes (Upper) Dam       | Thomas Lake (Upper)     | L                   | 29     | 0.120                 | 5                 | 42          | L                       | Owen      |
| Thomas Lakes (Lower) Dam       | Thomas Lake (Lower)     | L                   | 30     | 0.240                 | 6                 | 90          | L                       | Owen      |
| Elmer Davis Lake Dam           | Elmer Davis Lake        | S                   | 68     | 6.600                 | 149               | 3,151       | S                       | Owen      |
| Timberwood Lake Dam            | Timberwood Lake         | L                   | 30     | 0.440                 | 20                | 317         | P                       | Owen      |
| Elk Lake Dam                   | Elk Lake                | S                   | 43     | 0.000                 | 0                 | 0           | P                       | Owen      |
| Et Reed Dam                    | Wild Deer Lake          | L                   | 29     | 0.220                 | 8                 | 68          | P                       | Owen      |
| Richard Detzel Dam             | Detzel Lake             | L                   | 0      | 0.160                 | 6                 | 0           | P                       | Owen      |
| Elk Lake Club Water Supply Dam | Elk Lake Club Reservoir | L                   | 0      | 0.660                 | 0                 | 0           | P                       | Owen      |
| Lock and Dam 2                 | Kentucky River          | Unkn.               | 38     | Unkn.                 | 11(mi. long)      | Unkn.       | S                       | Owen      |
| Lock and Dam 3                 | Kentucky River          | Unkn.               | 38     | Unkn.                 | (23 mi. long)     | Unkn.       | S                       | Owen      |
| Kincaid Creek Dam              | Falmouth Lake           | H                   | 61     | 31.000                | 183               | 2,463       | S                       | Pendleton |
| Mays Lake Dam                  | Mays Lake Dam           | L                   | 27     | 0.320                 | 5                 | 55          | P                       | Pendleton |
| Griffin Industries             | Waste Water Lake        | L                   | 45     | 0.000                 | 0                 | 60          | P                       | Pendleton |
| Pendleton Co. Country Club     | Pendleton Country Club  | L                   | 48     | 0.090                 | 6                 | 58          | P                       | Pendleton |

*US Army of Corps of Engineers, National Inventory of Dams, 2015; and KYDOW*

1. Hazard: H = High, S = Significant, L = Low
2. Owner: F = Federal Government, L = Local Government, S = State Government, P = Private

High risk is defined as primarily being a risk for loss of life, and secondarily as a loss to commerce, recreation, etc. The condition of the dam is not taken into account in this particular risk definition.

#### Bullock Pen Lake Dam

In Fall 2015, the spillway is being upgraded into compliance with current regulations from the Division of Water. As of Spring 2016, there is a study being conducted on the dam since it is leaking.

#### Williamstown Lake Dam

Due to the method of risk evaluation, Williamstown Lake Dam is not categorized 'high-risk'. However, it has experienced some signs of failure in the past and if it failed would likely take out a section of Interstate-75. The Grant County Emergency Management Director considers it a top 3 hazard for the county. It supplies drinking water and is also a popular recreation lake. There have been incidents of landslides associated with the lake as well as a leak that has been fixed. As of Spring 2016, Williamstown Lake Dam has been stabilized.

#### Kincaid Lake

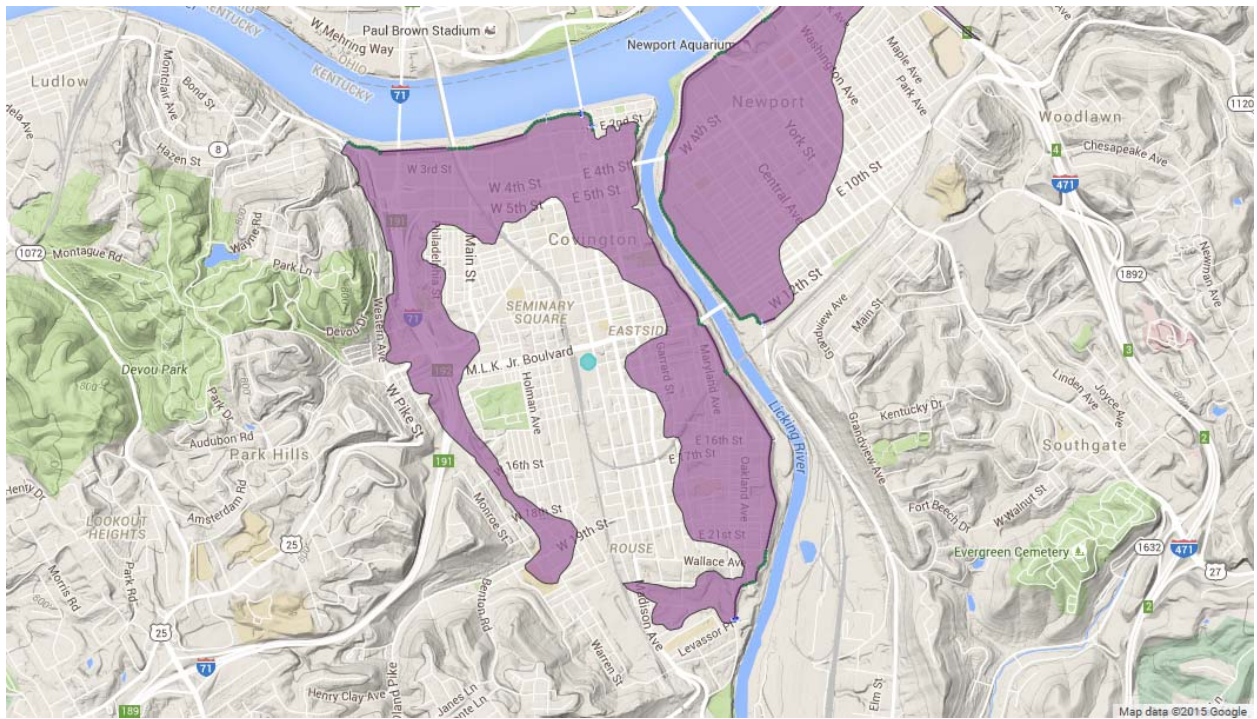
The high risk dam is Kincaid Creek Dam, and the event there was an inflow due to a hydrologic event during the devastating flood on March 1, 1997.

#### Levees:

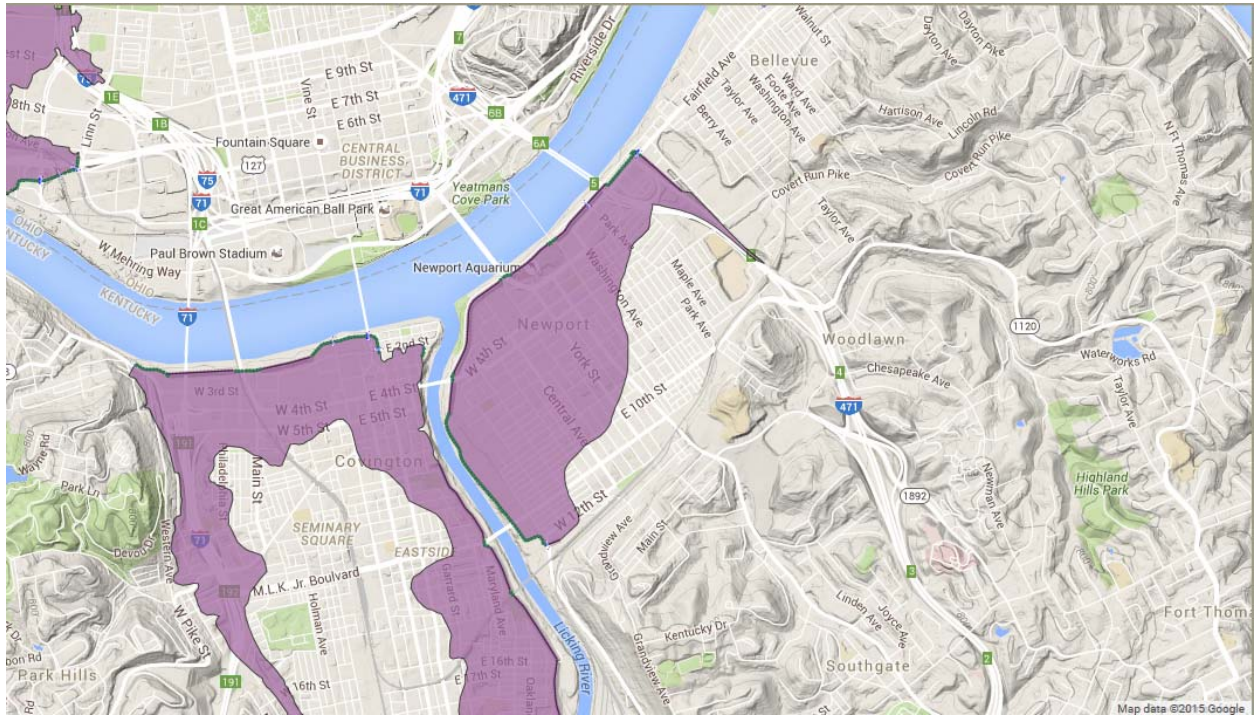
There is 1 levee in Kenton County, along the Ohio River in the City of Covington. According to the US Army Corps of Engineers National Levee Database it is 1.91 miles long, is designed for a 500 year flood with 3 feet of freeboard. The levee construction was completed in 1955. Its last routine inspection date was March 21, 2013 and it was found minimally acceptable. The leveed area is over 666 acres. There are 2 levees in Campbell County, along the Ohio River in the City of Newport and the City of Dayton. According to the US Army Corps of Engineers National Levee Database, the levee in Newport is 1.26 miles long, is designed for a 500 year flood with 3 feet of freeboard. The levee construction was completed in 1951. Its last routine inspection date was March 22, 2013 and it was found minimally acceptable. The leveed area is over 439 acres. The levee in Dayton is 1.45 miles long, is designed for a 500 year flood with 3 feet of free board. The levee construction was completed in 1981. Its last routine inspection February 22, 2013 and it was found minimally acceptable. The leveed area is over 170 acres.



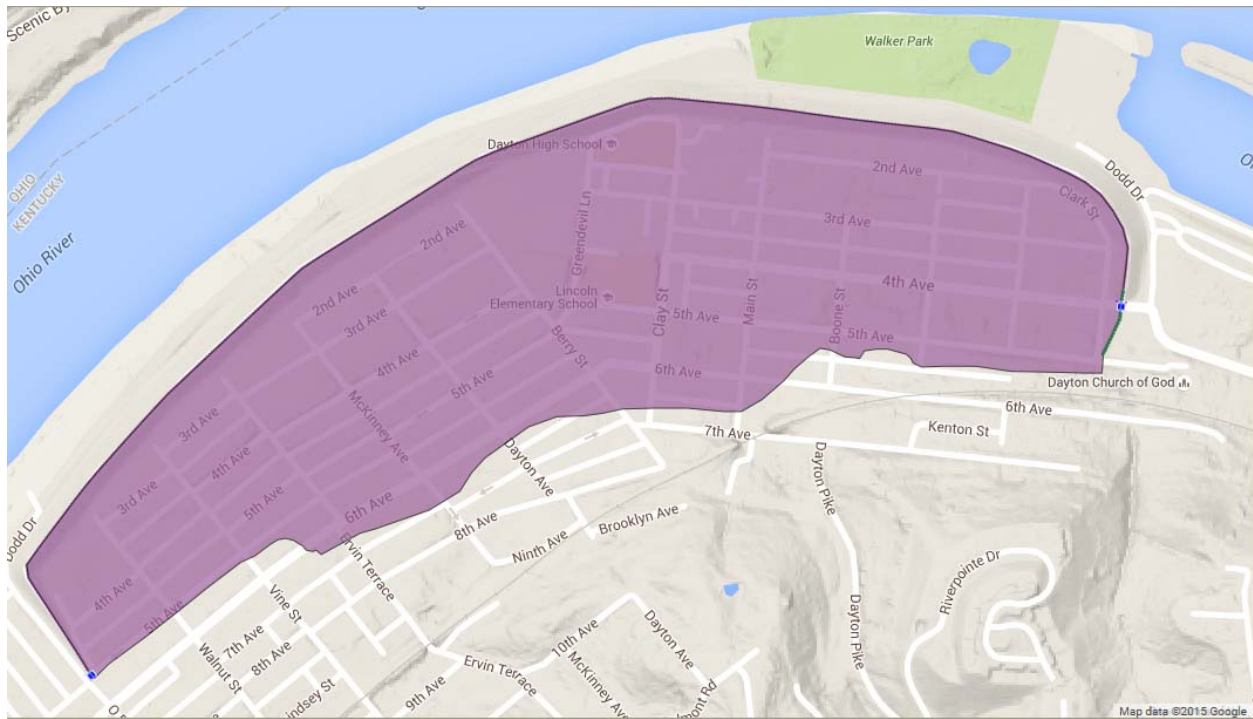
Covington Leveed Area (USACE, National Levee Database):



Newport Leveed Area (USACE, National Levee Database):



Dayton Leveed Area (USACE, National Levee Database):



## LANDSLIDE

A landslide is the movement of a mass of earth or rock from a higher elevation to a lower level under the influence of gravity. Landslides can be large or small, slow or fast.

Several natural and human factors may contribute to or influence landslides. The three principal natural factors are topography, geology, and precipitation. The principal human activities are cut-and-fill construction for highways, construction of buildings and railroads, and mining operations. Landslides are often correlated with other natural hazards. For instance, flooding may trigger a landslide because both involve heavy precipitation, runoff, and ground saturation. Landslides constitute a major geologic hazard because they are widespread and occur in all 50 states. Landslides pose serious threats to roadways, utilities, and structures.

Slumping landslides that occur along roadways are typical in the region where steep slopes, thick colluvial soils, and loading or undercutting of the slope by road construction create slope instability. Landslides regularly close sections of Ky. 8 after sudden movement of the steep slopes along the riverside route washes mud and trees onto the highway.

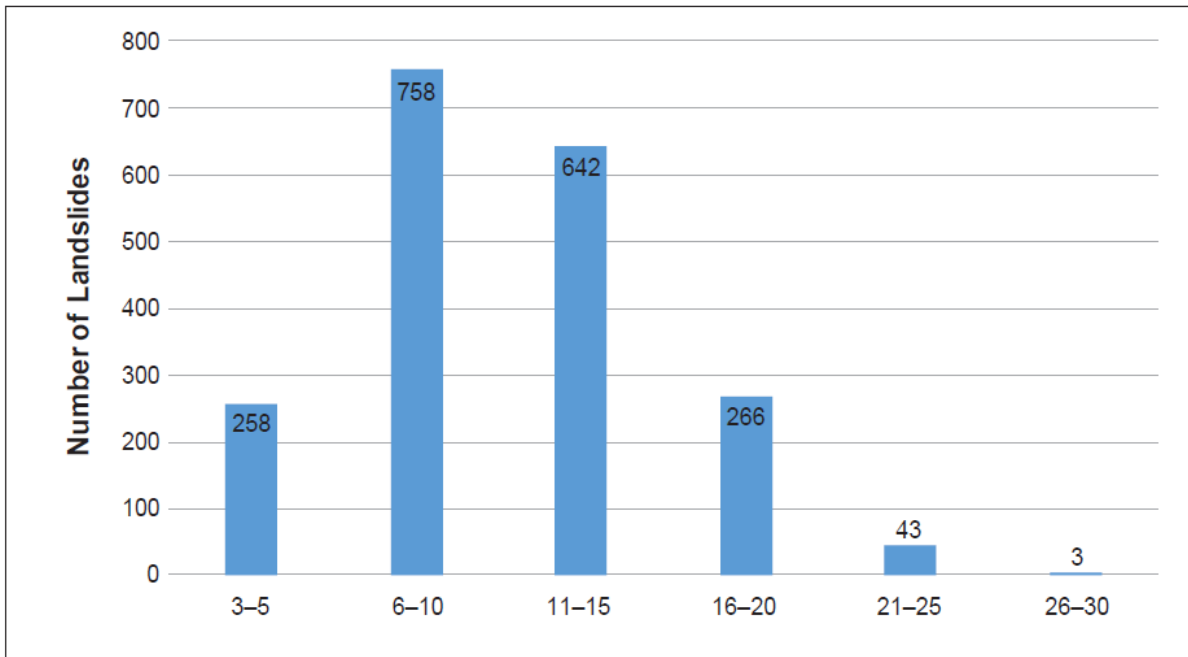


Figure 13. Distribution of landslides by slope angle. Slopes less than 3° not shown.

Landslides have a significant social and economic impact on the Northern Kentucky region, and the costs of landslide prevention and remediation in this area are reportedly among the highest in the nation. To date however, it has been difficult to quantify the cost of landslide damage because of the variety and degree of applicability of accessible records available providing information on the extent of repair and replacement costs or the costs associated with the implementation of procedures to prevent landslide damage (U.S. Geologic Survey).

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 infrastructures. 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.

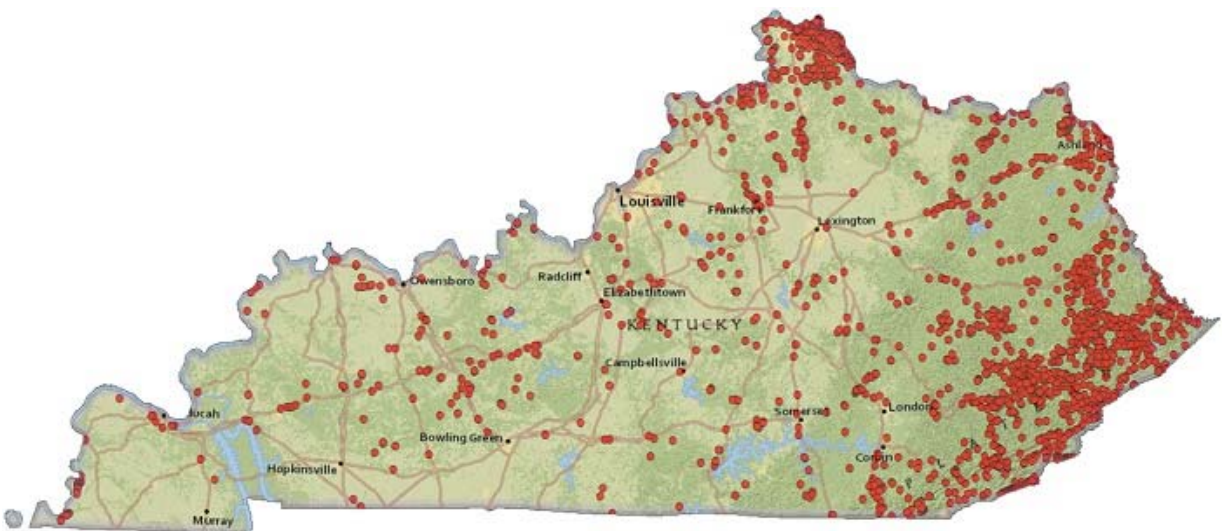
Types – based on the mode of movement

- 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 are characterized by shear strains distributed throughout the mass of material. They are distinguished from slides by high water content and distribution of velocities resembling 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 downslope. The term “debris avalanche” describes a variety of very rapid to extremely rapid debris flows associated with volcanic hazards. Mudflows are flows of fine-grained materials, such as sand, silt, or clay, with high water content and less than 50 percent gravel.
- Lateral spreads are characterized by large elements of distributed, lateral displacement of materials. They occur in rock, but the process is not well-documented and the movement rates 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 occur when masses of rock or other material detach from a steep slope or cliff and descend by free fall, rolling, or bouncing. These movements are rapid to extremely rapid and are commonly triggered by earthquakes. 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 resulting in collapse.

The map below is from the Kentucky Geological Survey’s website and depicts selected locations of landslides. The Northern Kentucky region experiences a vast amount of landslides compared to the rest of the state, particularly when taking into account that the eastern region that experiences numerous landslides also has mines. From the KGS website on the map below: “Selected known landslides in Kentucky. Although exact costs are not documented, landslides affect roads, buildings, pipelines, private residences, and other parts of the built environment. Direct costs such as repair and maintenance exceed \$10 million per year, and indirect costs may exceed direct costs but are difficult to quantify. With a good landslide inventory, citizens can begin to understand landslide processes, assess risk, and prevent damage from the threats they pose.”



Source: Kentucky Geological Survey, University of Kentucky,  
<http://www.uky.edu/KGS/geologichazards/landslide.htm>, last modified 9/18/2015, collected 10/22/2015.

| <b>Landslide Profile Risk Table</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                           | Many areas in NKADD are susceptible, particularly in steep slope with slippery soils. Developed areas are more susceptible than undeveloped areas.                                                                                                                                                                                                                                                                                                                                                |
| Period of Occurrence:               | Anytime, but chance increases after heavy rain, snow/ice melt, or construction activities.                                                                                                                                                                                                                                                                                                                                                                                                        |
| Number of Events (1975-2014):       | dozens - from road cracking to washouts, the exact number is difficult to calculate for all local, county, and state roads                                                                                                                                                                                                                                                                                                                                                                        |
| Annual Rate of Occurrence:          | Several – exact amount very difficult to ascertain                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Probability of Future Events:       | Highly Likely                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Warning Time:                       | Days to Months                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Potential Impacts:                  | Economic losses such as decreased land values, infrastructure damage, and agro-business losses. May cause minimal to severe property damage and destruction.                                                                                                                                                                                                                                                                                                                                      |
| Recorded losses:                    | Unknown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Annualized Loss:                    | Unknown*see below                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Extent (Scale)                      | <p>No current measurement to compare severity of events. Some ‘small’ area slides cause a lot of property damage, while some ‘large’ area slides cause minimal damage.</p> <p>From the limited data gathered on specific landslide events in NKY, one in 1992 in Covington on KY-8 (KYTC) caused approximately \$500,000 in damage to houses and material in roadway. This area is in the Kope Formation; rapid drawdown of the river after heavy rains and erosion of toe caused this slide.</p> |

Estimates for losses due to landslides are difficult to quantify due to the "Earthflow material being removed by a highway crew along the Columbia Parkway, Cincinnati, Ohio. Hamilton County, in the metropolitan Cincinnati area, experienced an average annual economic loss of \$5.80 per person (1975 dollars) between 1973 and 1978, the highest calculated per capita loss of any municipality in the United States." (Rockaway, John. Final Report Northern Kentucky Landslide Documentation Investigation Statewide Considerations). Several studies have shown that the soil and slope environments are similar on both sides of the river. Pohana (Pohana, R.E. 1992, Landslide Remediation and Prevention by the City of Cincinnati: Geological Society of America, Abstracts with Programs, V. 24, No. 7, p. A204) stated that Cincinnati's costs for landslide repair from 1988 to 1992 was \$7.5 million and was projected to increase to \$8.5 million from 1993 to 1997.

The Commonwealth of Kentucky Enhanced Hazard Mitigation Plan: 2013 Version states that the recorded losses from 1975-2013 was \$28,365,706 for the entire state (Kentucky Geological Survey). This number is only for tracked and recorded landslides; it does not account for numerous other issues that local entities cope with before they become major issues.



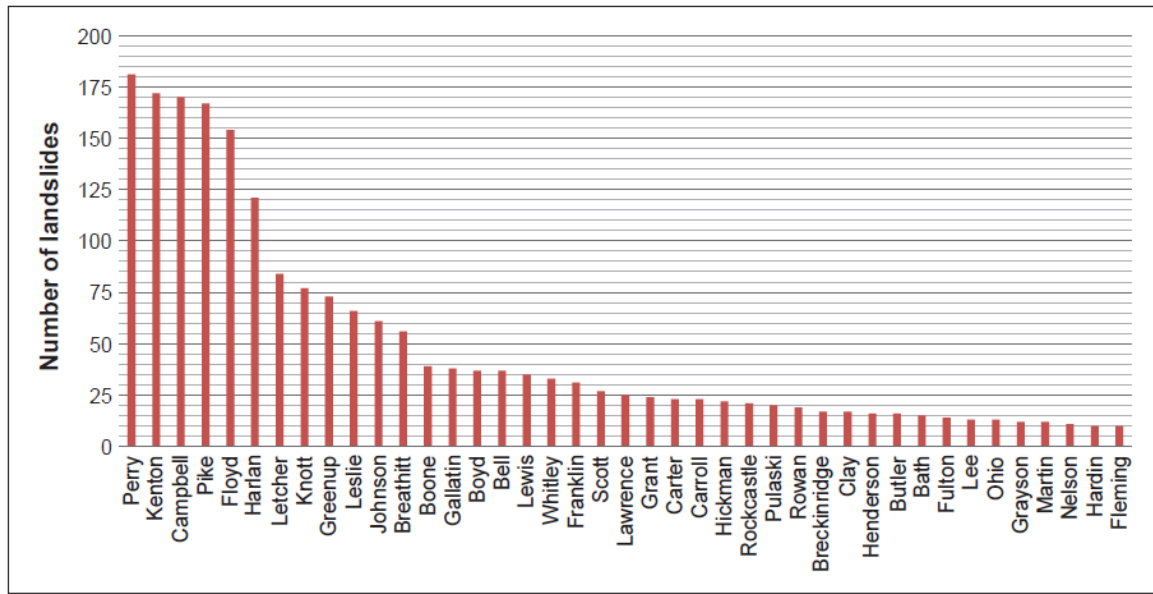


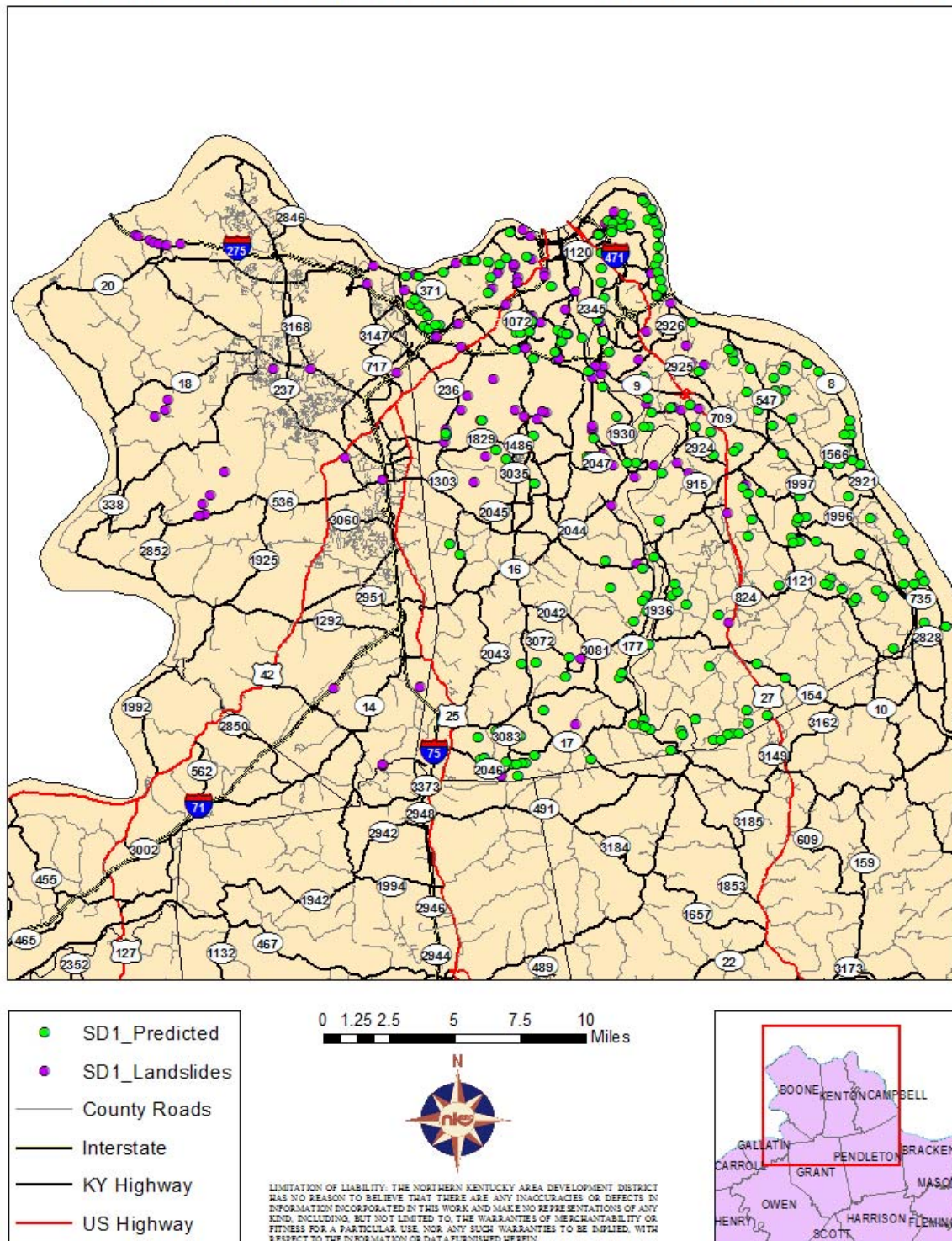
Figure 11. Distribution of landslides by county (10 or more landslides).

#### Event:

One landslide event was recorded by local news station WLWT on March 13, 2014. It happened near the entrance to Devou Park in Covington. An already leaning retaining wall collapsed; the city knew about it and had been coming up with a plan to re-secure the wall. North Park Road was closed while repairs were made. The article also says: “Landslides are common in the Cincinnati area, especially in the spring when melting snow or heavy rains can dislodge soil on any number of hills” (<http://www.wlwt.com/article/2-landslides-close-roads-in-cincinnati-nky/3540517>).

The Landslide map below shows past and predicted events that Sanitation District No. 1 tracks. This information comes from KYTC, PDSKC (formerly NKAPC), KGS, and other sources. Sanitation District No. 1’s jurisdiction only covers Boone, Kenton and Campbell counties, which is why our information is very limited. However, the other counties have generally similar soils and topographies, so we can estimate that they experience the same issues. The Predicted Events are areas that SD1 has observed are susceptible to landslides.

## Boone, Kenton, Campbell Landslide Events, Past & Predicted



The table shows roads primarily in KYTC's jurisdiction that have issues with landslides. It does not account for local city or county roads because that data was unavailable.

| Road Name             | MP/Locator                         | Jurisdiction |
|-----------------------|------------------------------------|--------------|
| <b>BOONE</b>          |                                    |              |
| KY 8 River Rd         | 5-6.5                              | KYTC         |
| KY 18                 | 4.4-5.0                            | KYTC         |
| KY 20                 | 1.0-3.0, 6.6-9.0, 19.9, 20.7       | KYTC         |
| KY 237                | 13.9-14.7                          | KYTC         |
| KY 338                | 7.6-10.0, 11.8-16.0                | KYTC         |
| KY 536                | 0-1.6, 2.9-4.0, 4.6-8.1            | KYTC         |
| KY 1292               | 1.0-2.0                            | KYTC         |
| KY 2846               | 0-0.1                              | KYTC         |
| KY 2852               | 0-1.5                              | KYTC         |
| US 42                 | 0-4.0                              | KYTC         |
| Princeton Drive       | Unkn                               | SD1          |
| KY 8                  | unknown                            | KYTC         |
| <b>CAMPBELL</b>       |                                    |              |
| KY 9                  | in Newport and Wilder              | KYTC         |
| KY 915                | Licking Pike                       | KYTC         |
| Blangey Road          | -84.438986, 39.047314              | County       |
| California Cross Road | -84.323845, 38.874090; -84.306275, | County       |
| Clay Ridge            | -84.420, 38.835                    | County       |
| Covert Run Pike       | -84.459, 39.102                    | County       |
| Dry Creek Road        | -84.440, 39.013                    | County       |
| East Alexandria Pike  | -84.401, 38.998                    | County       |
| Hissem Road           | -84.399412, 38.833937              | County       |
| John Miller Road      | -84.431908, 38.924104              | County       |
| Poplar Thicket Road   | -84.422104, 38.955345              | County       |
| Rifle Range Road      | -84.438081, 38.9613432             | County       |
| Shaw Hess Road        | -84.354932, 38.899160              | County       |
| Upper Tug Fork Road   | -84.380574, 38.993109              | County       |
| Visalia Road          | -84.434, 38.906                    | County       |
| <b>CARROLL</b>        |                                    |              |
| HWY 36                | 5.294-8.132                        | KYTC         |
| <b>GALLATIN</b>       |                                    |              |
| US 42                 | 8.0-12.0                           | KYTC         |
| Walnut Lick Rd        | Not specified                      | County       |
| Knox Lillard Rd       | Not specified                      | County       |
| Roberts Rd            | Not specified                      | County       |
| <b>GRANT</b>          |                                    |              |
| KY 22                 | west of I-75                       | KYTC         |
| KY 36                 | all                                | KYTC         |
| US 25                 | south of Williamstown              | KYTC         |
| KY 1492               | Mt Zion to 467                     | KYTC         |
| KY 467                | all                                | KYTC         |
| other isolated areas  |                                    |              |
| <b>KENTON</b>         |                                    |              |
| KY 177                | Near Licking River                 | KYTC         |
| <b>OWEN</b>           |                                    |              |
| KY 355                | unknown                            | KYTC         |
| KY 1316               | 0-4.0                              | KYTC         |
| <b>PENDLETON</b>      |                                    |              |
| KY 8                  | Slide potential                    | KYTC         |

Boone: Kentucky Route 8 is a particularly problematic road, extremely prone to sliding. In 2015, there was a major slide repair project on KY 8 that required essentially a reconstruction, as maintenance was not feasible. The project was between mile point 6.0 and 6.2 and ran over \$1.68 million dollars. The maintenance approach that KYTC uses is the most cost effective way to deal with landslides on their roads, since reconstruction cannot completely guarantee an area will not slide again.

Campbell: The most landslide prone road is KY 8. There are multiple sections in Campbell County that frequently experience slides. Some of these slides are due to repeated flooding, but often it is due to the geography and soil types on which the road is located. Maintenance is the most cost effective way for KYTC to handle these slides at this time. Reconstruction can cost millions of dollars, without a guarantee that it will not slide again. The need for slide repairs is fairly constant each year. The County Road Department and Planning Office estimate the County will need to spend about \$100,000 each year for the next 10 years on slide related repairs on county roads.

Carroll, Gallatin, Grant, Kenton, Owen and Pendleton: The table above shows roads in KYTC's jurisdiction that have issues with landslides as well as a few roads that the county fixed in 2015. It does not account for local city or county roads because that data was unavailable.

## EARTHQUAKE

An earthquake is a shaking of the ground caused by the sudden release of accumulated strain by an abrupt shift of rock along a fracture in the Earth or by volcanic or magmatic activity, or other sudden stress changes in the Earth (USGS). These fractures are called faults. Fault lines are found anywhere that two or more tectonic plates come together. The tectonic plates are always slowly moving, but they get stuck at their edges due to friction. When the stress on the edge overcomes the friction, there is an earthquake that releases energy in waves that travel through the earth's crust and cause it to shake.

The magnitude of earthquakes is measured on the Richter scale. The scale is based on a logarithmic scale so for each whole number increase on the scale, the amplitude of the ground motion recorded by a seismograph goes up ten times. In other words, a magnitude 5.0 earthquake would result in ten times the level of ground shaking as a magnitude 4.0 earthquake. Each year thousands of earthquakes occur, but most are under a magnitude 2.5 or too small to be felt by most people.

### The Richter Scale

| Magnitude                                                                                                       | Earthquake Effects                                                    | Estimated Number Each Year |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------|
| 2.5 or less                                                                                                     | Usually not felt, but can be recorded by seismograph                  | 900,000                    |
| 2.5 to 5.4                                                                                                      | Often felt, but only causes minor damage                              | 30,000                     |
| 5.5 to 6.0                                                                                                      | Slight damage to buildings and other structures                       | 500                        |
| 6.1 to 6.9                                                                                                      | May cause a lot of damage in very populated areas                     | 100                        |
| 7.0 to 7.9                                                                                                      | Major earthquake. Serious damage                                      | 20                         |
| 8.0 or greater                                                                                                  | Great earthquake. Can totally destroy communities near the epicenter. | One every 5 to 10 years    |
| Source: <a href="http://www.geo.mtu.edu/UPSeis/magnitude.html">http://www.geo.mtu.edu/UPSeis/magnitude.html</a> |                                                                       |                            |

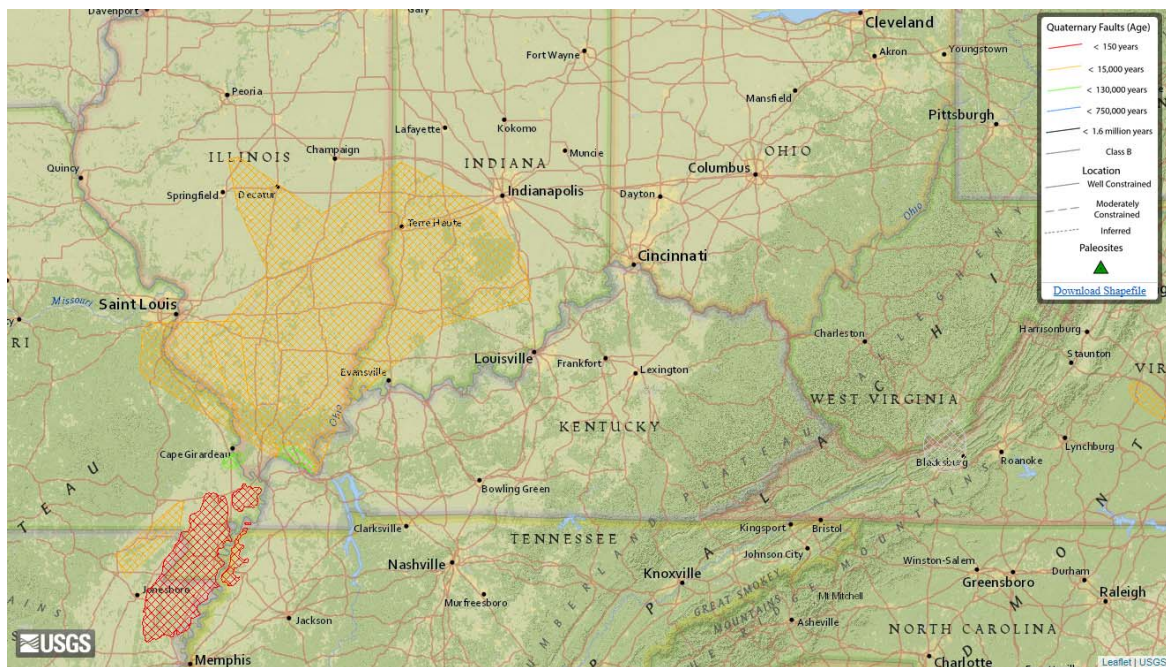
### Types:

Plate boundaries are characterized into four (4) distinct types:



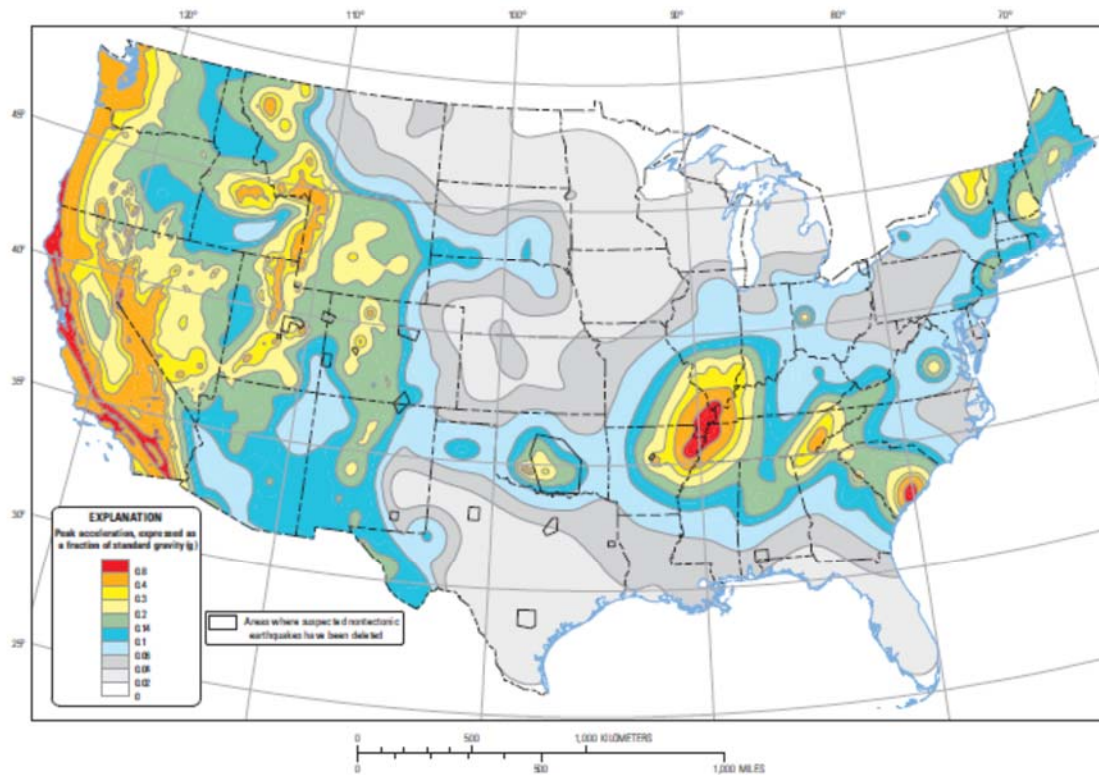
- 1) Divergent boundaries – a new crust is created as two plates move away from another
- 2) Convergent boundaries – areas where two plates are coming together and thus losing crust as one plate slides under another
- 3) Transform boundaries – two plates slide horizontally past one another without creating or destroying boundaries
- 4) Plate boundary zones – broad belts without well-defined boundaries or plate interaction

Earthquakes affect large areas and cause varying amounts of damage that make them difficult to document on a local level. Because of the varying reports of effects and damage caused, historical data is only available on a state level. The following table provides a list of earthquakes that have been felt in Kentucky, along with their origin, magnitude, and the most significant damage reported. While the NKADD region has experienced earthquakes in the past, most seismic activity in Kentucky has occurred in the western portion of the state, near the New Madrid and Wabash Valley Seismic Zones. The New Madrid Seismic Zone is made up of several thrust faults that stretch from Marked Tree, Arkansas to Cairo, Illinois. In December of 1811, the first of three large earthquakes (magnitude 7.5 - 8.0) occurred, where effects were felt as far away as Boston, Massachusetts. In 2002 and 2008, earthquakes emanating from the Wabash Valley Seismic Zone struck Evansville, Indiana (5.0 magnitude) and Mt. Carmel, Illinois (magnitude 5.4). While the potential for a large significant earthquake does exist for the area based on historical accounts and location of fault lines, both of the seismic zones discussed do not extend to the NKADD region. The closest seismic activity stations are located in Maysville, KY, Oxford, OH, and northwest of Paris, KY. The University of Memphis' Center for Earthquake Research and Information collects and catalogs data produced by the stations.



USGS Interactive Fault Map, Collected 10/28/2015. The orange area is the Wabash Valley liquefaction. The red area is the New Madrid seismic zone. The bright green areas are the Fluorspar Area fault complex and the Thebes Gap faults.





**Two-percent probability of exceedance in 50 years map of peak ground acceleration**

| Origin of Earthquake             | Date                               | Magnitude | Property Damage |
|----------------------------------|------------------------------------|-----------|-----------------|
| New Madrid, Missouri             | 1811 to 1812 1874 tremors occurred |           |                 |
| Maysville, Kentucky              | 1828 four shocks                   |           |                 |
|                                  | 11/20/1834                         |           |                 |
| Hickman                          | 12/27/1841                         |           |                 |
|                                  | 11/13/1904                         |           |                 |
|                                  | 11/25/1904                         |           |                 |
| Mayfield                         | 10/26/1915                         |           |                 |
| Mouth of Ohio River              | 12/7/1915                          |           |                 |
| Mouth of Ohio River              | 3/2/1924                           |           |                 |
| Henderson                        | 9/2/1925                           |           | Chimney fell    |
| Middlesboro                      | 1/1/1954                           |           |                 |
| Southern Illinois                | 11/9/1968                          |           | Masonry damage  |
| Maysville, Kentucky              | 7/27/1980                          | 5.1       | \$ 1,000,000    |
| Bardwell, Kentucky               | 6/6/2003                           | 4         |                 |
| Illinois basin-Ozark dome region | 4/18/2008                          | 5.2       |                 |
| Ottawa, Canada                   | 6/23/2010                          | 5.5       |                 |
| Greentown, Howard County, IN     | 12/30/2010                         | 3.8       |                 |
| Richmond, VA                     | 8/23/2011                          | 5.8       |                 |

| <b>Earthquake Profile Risk Table</b> |                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location:                            | All areas of NKADD are susceptible.                                                                                                                                                                                                                                                                                     |
| Period of Occurrence:                | Anytime of the year, anytime of the day                                                                                                                                                                                                                                                                                 |
| Number of Events (1811-2014):        | about 20 that were recorded felt in KY                                                                                                                                                                                                                                                                                  |
| Annual Rate of Occurrence:           | currently unpredictable                                                                                                                                                                                                                                                                                                 |
| Probability of Future Events:        | Unlikely                                                                                                                                                                                                                                                                                                                |
| Warning Time:                        | Almost non-existent                                                                                                                                                                                                                                                                                                     |
| Potential Impacts:                   | Earthquakes can heavily impact human life, health, and public safety. Large events can cause infrastructure damage, utility damage, and critical facilities damage. Secondary events often trigger landslides, dam failure/flooding, and may facilitate the release of hazardous materials from containment structures. |
| Recorded losses:                     | None                                                                                                                                                                                                                                                                                                                    |
| Annualized Loss:                     | \$0.00                                                                                                                                                                                                                                                                                                                  |
| Extent (Scale)                       | Year: 1980<br>Scale: 5.1<br>Damage: \$1,000,000 in Maysville, unknown in NKADD area                                                                                                                                                                                                                                     |

The county hazard mitigation planning committees all agree that earthquakes do pose a threat to the NKADD region. While there are many earthquake prediction theories and programs around the world, there is not a dependable way of predicting earthquakes. Regions that experience a lot of seismic activity, like California and Japan focus on creating early detection and warning systems for their residents. Shaking and ground rupture are the main effects created by earthquakes, principally resulting in more or less severe damage to buildings and other rigid structures. Earthquakes can produce slope instability leading to landslides, fires, soil liquefaction, tsunamis, and floods (if a dam is damaged).

## **ADDITIONAL HAZARD: INVASIVE SPECIES**

### **Primarily: Emerald Ash Borer**

*Please note that the Emerald Ash Borer is not the only invasive species in Northern Kentucky, but it is currently the most problematic and will cost the most money to prevent damage over the next few years. Other invasive species in Kentucky are Bush Honeysuckle, Chinese Silvergrass, Garlic Mustard, Japanese Knotweed, Japanese Stiltgrass, Kudzu, Multi-Flora Rose, Oriental Bittersweet, Purple Loosestrife, and Winged Burningbush (KY Division of Forestry). Bush honeysuckle grows densely and competes with native plants for undergrowth space- this can cause erosion and ultimately soil slippage. Kudzu covers and smothers anything in its path; it can grow up to 1 foot a day.*

### **What is the Emerald Ash Borer and why is it a hazard?**

The emerald ash borer (EAB) is an invasive beetle originating in Asia that has existed in America since at least 2002; some members of the species are confirmed to have entered Kentucky by 2009. As its name suggests, EAB is a major threat to ash trees. However, there is evidence that other species such as the White Fringe tree are at risk. Due to the lack of natural predators and human intervention, the beetle poses an increasingly serious threat to the ash tree population.

Although there are native ash borers that pose less of a threat; the EAB is easy to distinguish from these species. EAB beetles are metallic green ranging about 1/2-1 inch long and 1/8 inch wide. EAB lives 1-2 years and their larvae feed under ash bark, typically from late July/early August until the end of October. It is this early stage that does the most damage to ash trees.

All species of ash tree are susceptible to infestation and trees that have been infected may exhibit several symptoms. Woodpeckers feed on EAB juveniles so excessive damage from woodpeckers to ash trees is an indicator that they are infected with EAB. Other signs that an EAB infestation has occurred are “D” shaped holes in trees about 1/8 inch thick where the beetles exit, snake-like grooves or splitting in the bark, and a reduction in leaf coverage. EAB can kill an ash tree in 3-4 years (Gardener’s Network, <http://www.gardenersnet.com/tree/ashborer.htm>) and it is unlikely that trees with over a 50% canopy reduction will survive.

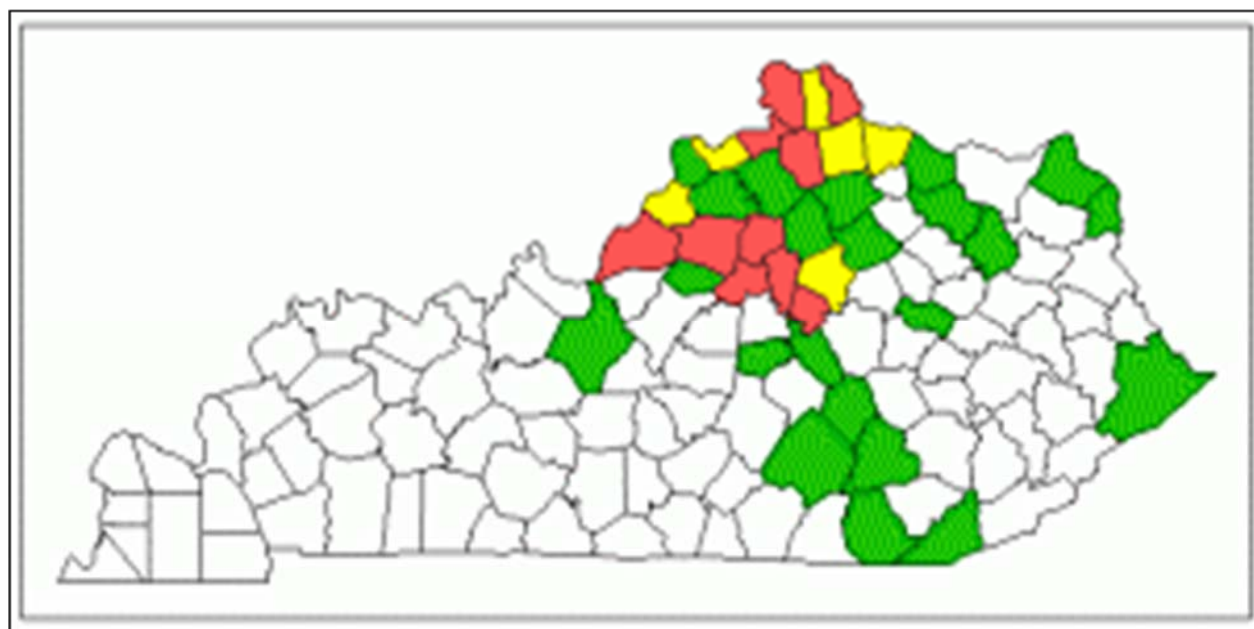
Since EAB are not able to travel far independently, their natural rate of spread would be very slow. However, human intervention has allowed them to expand rapidly. Transporting firewood, logs, felled trees, etc. allows the beetle to spread since its larvae may still reside in felled trees. This rapid spread has compounded the already severe threat posed by EAB.

Many species of ash tree can grow between 40 and 60 feet at maturity, with some growing up to 80 feet. Ash trees also tend to grow in groups. For example, one side of a lake may have a plethora of ash trees, while the other side of the lake may have none. While the grouping of ash trees may make it somewhat easier to cut them down, their height means that they will have detrimental effects to infrastructure such as power lines and roadways, far outside the right-of-way.

#### **Pervasiveness:**

In 2009, EAB was discovered in Campbell, Kenton, and Owen Counties followed by discovery in Boone County in 2010, and Carroll and Pendleton Counties in 2013. Since the infestation began in the US, over 25 million ash trees have been killed by EAB, which most commonly occurs when “the EAB’s larvae enter an ash tree and feed just under its bark” (KYTC D-6).

| County    | # of Stems | Rank in State |
|-----------|------------|---------------|
| Boone     | 2,230,515  | 42            |
| Campbell  | 3,793,681  | 19            |
| Carroll   | 3,020,825  | 34            |
| Gallatin  | 3,760,463  | 20            |
| Grant     | 3,454,077  | 24            |
| Kenton    | 5,538,870  | 8             |
| Owen      | 5,209,244  | 11            |
| Pendleton | 3,317,913  | 25            |



*Red is high infestation, yellow is moderate and green is low.*

#### **Action plans:**

There are three principal methods of treating EAB that have been developed: quarantines, insecticide, and the introduction of predators. The limited options result in low costs for combating EAB (since quarantines have already been implemented and the use of predators is controlled). Although Kentucky removed its own quarantine, the

USDA placed the entirety of Kentucky under quarantine in 2014 (UK, <http://pest.ca.uky.edu/EXT/EAB/welcomeeab.html>). This means that individuals are asked not to transport felled wood anywhere that is not quarantined. Educational programs have been introduced to reinforce quarantines by informing the population and media about the threat of EAB.

The Kentucky Transportation Cabinet has begun treating ash trees within quarantined districts with insecticide in order to prevent the spread of EAB. Insecticide use can be complicated—insects that cause damage beneath tree bark are more difficult to combat—and its effects should be understood before using. There are four different kinds of insecticide: (1) soil applied systemic insecticide; (2) trunk-injected systemic insecticide; (3) noninvasive, systemic basal trunk spray; (4) protective cover spray. A study discovered that emamectin benzoate, or Tree-age, and azadirachtin, both trunk-injected systemic insecticides, tend to provide effective control for up to two years. Professionals are best suited, and in some case the only ones permitted, to apply insecticides.

A relatively recent attempt to control the spread of EAB is by releasing wasp species that are hostile to the EAB (APHIS). This form of biocontrol has been conducted by the USDA using stingless wasps that attack either EAB larvae or eggs. This method is largely controlled by the USDA and its effects are still being studied.

Owen Electric Cooperative, Inc. (OEC), a rural co-operative serving the 8 NKADD counties as well as Scott County, also has an aggressive strategy in place to eliminate risk from falling ash trees. OEC used the estimated number of ash trees by county produced by the USDA Forest Service (above table) and compared it to how many members were in each county and how far the EAB infestation had progressed. The results were a ranking of counties prioritized for ash removal.

The ranking is as follows:

1. Boone
2. Kenton
3. Campbell
4. Grant
5. Gallatin
6. Pendleton
7. Carroll
8. Owen
9. Scott

OEC has ROW crews in multiple counties, but certain infrastructure also ranks higher than others. The first priority for ash tree removal in and near the right-of-way are the 3-phase primary lines that could cause fairly extensive power outages if brought down by falling ash trees. The second priority is the single-phase primary lines, which would cause minimal power outages if damaged by falling ash trees. One issue that OEC runs into is that the ROW for the 3-phase lines is 40 feet and the ROW for the single-phase lines is 20 feet. Ash trees can be very large trees and therefore ash trees outside of the ROW are a threat to the infrastructure and must be professionally taken down. While many property owners do not have a problem with OEC taking down dead trees, obtaining permission to cut down trees outside of the ROW could potentially cause delays to OEC's ash tree removal schedule. The total estimated cost for OEC to remove the ash trees that threaten their infrastructure is an additional \$1,000,000 over the normal 4 year ROW maintenance cycle budget. This is just one example of the time and cost that will be necessary over the next couple of years (2016-2017) as the dead ash trees further degrade and begin to fall on roads, houses, and other important infrastructure.

## ADDITIONAL HAZARD: HURRICANE WIND

Hurricanes are enormous storms that originate in the Atlantic Ocean and threaten the southeastern coast of the United States. They do not always make landfall, but their extreme levels and of water and speed of winds make



them very dangerous. Hurricanes can result in high winds, tornadoes, storms, and flooding. They pose a significant threat to the environment, manmade structures, and human lives.

### Where are they?

This graphic illustrates the path of hurricanes and major storms from 2000-2008. Beginning in the mid-Atlantic, most storms approach the southeastern US where they either make landfall or veer east into the upper Atlantic without affecting land masses. Although the most severe effects are experienced on coastal regions, inland areas also experience hazards related to hurricanes.

### The hazard of hurricane winds:

Since the power of hurricanes continues long after they make landfall, regions such as northern Kentucky frequently experience hurricane after affects in the form of strong storms, damaging winds, and flooding. Important examples include Hurricane Katrina in 2005 and Hurricane Ike in 2008. The former resulted in billions of dollars in damage in the US while the latter, Hurricane Ike, caused straight line winds to blow in northern Kentucky exceeding 60 mph. Such activity resulted in widespread damage “from trees being blown down on power lines”. Straight line winds, which can also accompany thunderstorms, can be powerful enough to cause severe damage. In 2008, Hurricane Ike and the resulting winds caused 700,000 power outages in the area served by Duke Energy.

Flooding is also a serious consideration that can result in the aftermath of a hurricane. Hurricanes or consequent storms that travel inland can cause storm surge flooding, which can occur very rapidly onto areas of land that typically remain dry. Some of the events found in the High Winds (Straight Line Winds) and Floods sections are the result of hurricane aftermath.

### Action plans:

While preparedness is vitally important for residents of coastal regions, inland residents can also prepare for hurricane results. It is advised that households have an emergency plan in place for hazardous events such as hurricanes or floods and for households to assess whether flood insurance is necessary. Such a plan should identify “all of the steps a family needs to take before, during, and after a disaster to ensure maximum personal safety and property protection” (Hurricanes: Science and Society <http://www.hurricanesociety.org/society/impacts/stormsurge/>). Survival kits can also help families in the event of unexpected emergencies.

Safety during hurricane-related hazards is important. When high speed winds have been reported on should remain indoors—while the wind itself may not be harmful, it can be strong enough to blow heavy items that can cause serious harm. In the event of flooding it is important to remember to remain indoors and to “turn off electricity at the main breaker” (Hurricanes: Science and Society). It is also advised to avoid using any electrical items and to turn off appliances if power is lost. In drastic circumstances an evacuation may be called to minimize the risk to human life as a result of flooding.



## ADDITIONAL HAZARD: FOG

### What is it and why is it a hazard?

Fog “is a collection of water droplets suspended in the atmosphere in the vicinity of the earth's surface that affects visibility” (Weather Channel). It is a common weather condition in which clouds lay close to the ground and vary in thickness depending on the density of the water droplets. Fog is common in the northeast, upper west coast, and Appalachian region. The NKADD region falls on the edge of the Appalachian fog area and encounters about 25-30 days per year with dense fog.



Image shows the average days per year with dense fog (defined as reducing visibility to one-quarter mile or less) in the U.S. Areas with most frequent fog are shown in darker gray, red shading. (Image courtesy: NOAA)

There are many varieties of fog, such as radiation, advection, and freezing. Radiation fog is the most common and is caused when moist air cools above the surface of the Earth. This fog, depending on the amount of wind, can become very thick. Advection fog forms when a cold surface encounters warm air, which means it can appear to move along or near the ground. Finally, freezing fog occurs when water droplets in the air freeze in temperatures below freezing—this type may cause an additional hazard of frost or ice on roadways and bridges. Fog dissipates as “vertical mixing brings drier air into the fog’s edge, evaporating it” (Weather Channel <https://weather.com/science/news/how-does-fog-form-20131010> ).

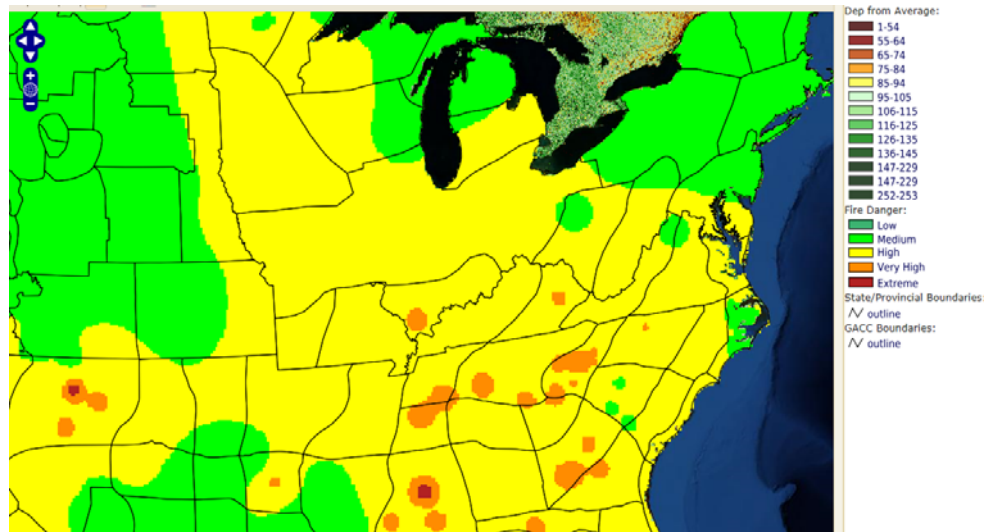
It does not cause direct damage, but fog can obscure vision to a greater or lesser degree. This potential impediment on vision makes it a hazard to people’s lives and well-being, especially when driving. In fact, on average there are 31,385 crashes and 511 deaths annually in fog-related incidents (Weather Channel <https://weather.com/news/news/fog-driving-travel-danger-20121127> ).

## ADDITIONAL HAZARD: WILDFIRES

A wildfire, also known as wildland fire, is a fire in an area of combustible vegetation that occurs in a rural area. Wildfires are particularly dangerous due to their ability to spread quickly and difficulty to control.

### Location

As seen in the map below, wildfires can occur in essentially any rural setting. In urban settings, there is typically not enough vegetation for a fire to spread. The Northern Kentucky area currently has a ‘High’ Fire Danger according to the Wildland Fire Assessment System interactive map (below). Due to the proximity of the rural counties in our area to even more rural and wooded areas, the risk of wildfires is markedly increased. In November 2016, there are wildfires throughout Eastern Kentucky and according to some local news sources, smoke could be detected in Pendleton County, even though the wildfires had not yet entered the county. Additionally, a drought has been declared for all Kentucky counties except for Boone, Kenton and Campbell. Drought is a major catalyst for wildfires.



### Causes

While droughts tend to make wildfires condition worse, they do not cause wildfires. Natural causes of wildfires include lightning, sparks from rock falls, spontaneous combustion, and volcanic eruption. Unnatural (human) causes of wildfires include arson, discarded cigarettes, power-line arcs and sparks from equipment. According to the Kentucky Division of Forestry website, Year-To-Date Fire Statistics, there have been 1,085 fires, burning 37,770 acres in 2016. The causes of those fires have been arson (757), debris (201) and other (127). Other includes lightning, smoking, equipment use, railroads, children, and other methods.

### Effects on Northern Kentucky

While there have not been any major recognized wildfires in our 8 county region in the recent past, there have been a couple of note locally. There was a wildfire in the early 2010s in southern Kenton County and northern Pendleton County. It is unknown what property damage occurred, no one was injured. Many of the rural counties also report fires along interstate highways due to cigarette butts. Most of the 8 counties implement burn bans in the more susceptible summer months to head off accidental wildfires. More education and diligence is needed to continue to decrease the risk of wildfire in this area.

### Events (2000-2016):

| COUNTY | DATE | EVENT TYPE | DEATHS/INJURIES |   | Property Damage (dollars) |
|--------|------|------------|-----------------|---|---------------------------|
| None   | None | None       | 0               | 0 | 0                         |

NCDC Storm Events Database, accessed May 5, 2017.

There are no recorded wildfire events.

### **3.3.3 ASSESSING VULNERABILITY: IDENTIFYING ASSETS, OVERALL SUMMARY**

The vulnerability of structures to Severe Weather and Earthquake Hazards in each County is equal to the total structure value of the County. These hazards are not limited to a particular geographic region. All critical facilities in the Counties were determined to be vulnerable to Severe Weather and Earthquake Hazards.

Each County's vulnerability to flooding was determined by GIS analysis. A GPS derived data base of Critical Facilities, and the Kentucky Infrastructure Authority database for Water and Waste Water facilities were brought into GIS. FEMA revised Flood Hazard Areas were added as an overlay and where the data intersected those structures/facilities were deemed vulnerable. The vulnerability of residential structures was determined by a similar method, laying the Flood Hazard Areas over imagery, to determine which structures were in the flood plain.

The Vulnerability Assessment is also separated into County appendices along with the rest of the Risk Assessment and the Mitigation Strategies. Much of the information will be duplicated as it applies to all jurisdictions or is better used as regional or comparative data.

#### **Impact & Frequency**

The impact and frequency of each hazard has been identified in each hazard profile in the previous section through tables. Impact is addressed further in the charts and narrative discussions found in the following asset identification and vulnerability sections of this plan.

#### **Identification of Assets**

This section of the plan identifies what can be affected in each jurisdiction by the different hazard events that occur in the NKADD region. The information to complete this section was collected from a variety of sources including local jurisdictions, HAZUS Kentucky Data, the National Climatic Data Center, and the 2010 Census. The information was collected, mapped and summarized by the Northern Kentucky Area Development District staff and reviewed and analyzed by each County Mitigation Planning Team.

This section was prepared using the best available data for identifying the number of buildings, infrastructure and critical facilities and costs associated with them. Point data for flood vulnerability and critical facility locations were developed by the NKADD. For this version of the plan, the NKADD staff analyzed imagery, for FEMA mapped flood prone areas of the county and extracted points for vulnerable structures, using these points to better focus this assessment. Location data for critical facilities vice the flood hazard areas were derived from GPS coordinates collected by the NKADD GIS.

Prediction of hazard events is an inexact science. In lieu of precise prediction and modeling information, the approximation for probability is an examination of historical frequency of occurrence. For hazard events with infrequent occurrences (for example, large scale earthquakes in Kentucky) it is difficult to assess probability.

FEMA requires State and Local partners to assess the jurisdiction's overall vulnerability to population, property, infrastructure, critical facilities, and government owned facilities. The Vulnerability Assessment was done using the best available data and methods for the hazards identified. Because this area is low-density and the disaster paths for these hazards tend to affect a broad area and not specific locations, the vulnerability assessment was completed at the county level.

The Vulnerability Ratings were determined by categorizing each hazard by the number of historical events, estimated damage that occurred for all events of that hazard and the annual frequency of each hazard. The hazards were ranked according to a low-moderate-high scale; this scale differed for each hazard since, for example, it is expected that each county will experience several thunderstorms a year, but only one or less tornadoes. Each hazard

received 0 points for low, 1 point for moderate, and 2 points for high. Then each hazards points were added together and if a hazard had 0 to 2 points, the jurisdiction was classified as having a ‘low’ vulnerability to that hazard; 3 to 4 points is ‘moderate’ and 5 to 6 is ‘high’.

County Mitigation Planning Team members reviewed the information to determine the vulnerability in each community. For the hazards of tornados, severe thunderstorms, earthquakes, and severe winter storms, such events were determined to potentially affect anything within the NKADD area. These hazards and their occurrence are not limited to any particular area based on past historical events.

#### Critical Facilities and Infrastructure

For the purpose of this plan, all of the following elements are considered critical facilities except Hazardous Materials Facilities. In past iterations of this plan, Hazardous Materials Facilities have not been included, largely because they are included in Emergency Operations Plans, and therefore their inclusion in this plan is redundant. Furthermore, the NKADD staff and Mitigation committees do not have the expertise necessary to fully understand and calculate the risk and vulnerability associated with such facilities.

#### BOONE COUNTY HAZARD RISK SUMMARY

| <b>Hazard</b>            | <b>Historical Events</b> | <b>Estimated Damage</b> | <b>Annual Frequency</b> | <b>Probability</b> | <b>Vulnerability Rating</b> |
|--------------------------|--------------------------|-------------------------|-------------------------|--------------------|-----------------------------|
| Flash Flood – since 1996 | 29                       | \$ 2,156,000            | 1.03                    | High               | High                        |
| Flood – since 1996       | 18                       | \$ 24,000               | 0.64                    | Moderate           | Moderate                    |
| Landslide                | 19(recorded)             | \$1,860,362 (1 event)   | 0.49                    | Moderate           | Moderate                    |
| Tornado                  | 14                       | \$ 6,130,000            | 0.24                    | Moderate           | Moderate                    |
| Thunderstorm/Wind        | 178                      | \$ 13,514,000           | 3.07                    | High               | High                        |
| Hail                     | 59                       | \$ 71,000               | 1.00                    | High               | High                        |
| Severe Winter Storm      | 45                       | \$ 425,000              | 2.11                    | High               | High                        |
| Dam Failure              | 1                        | None                    | 0.03                    | Low                | Low                         |
| Earthquake               | 20                       | No Data                 | No Data                 | Low                | Low                         |
| <b>TOTAL</b>             | <b>384</b>               | <b>\$ 24,480,362</b>    |                         |                    |                             |

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included in the county total. The data was gathered from best available sources, which varied by county. Where possible, local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

| Boone County                         |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 26                        | 0%        |
| Commercial                           | 0                         | 0%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 0                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>26</b>                 | <b>0%</b> |

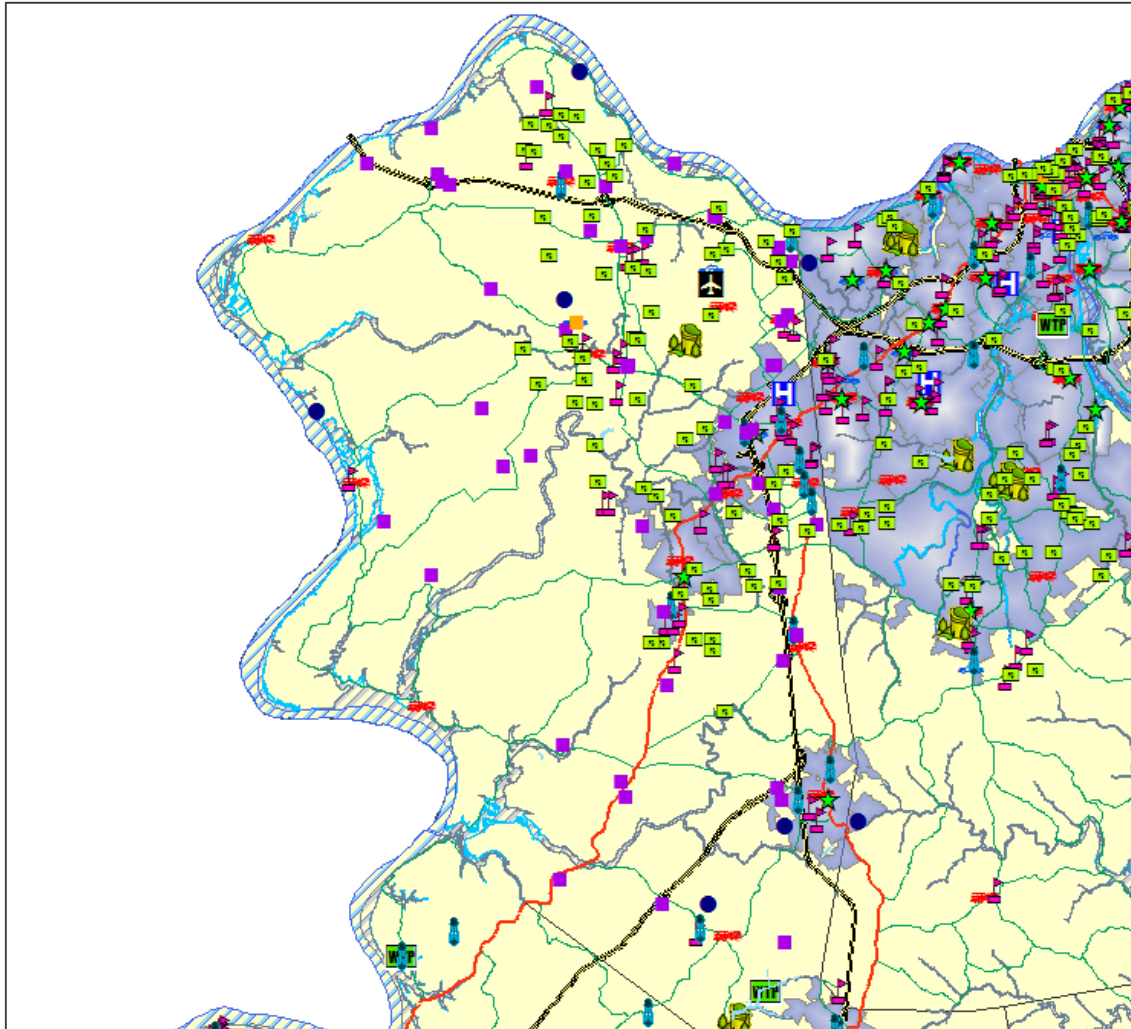
The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.



| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |

The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.

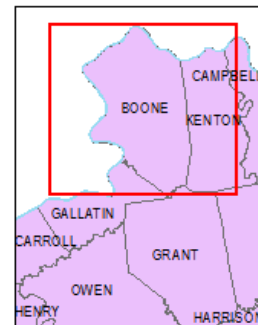
# Boone County Critical Facilities



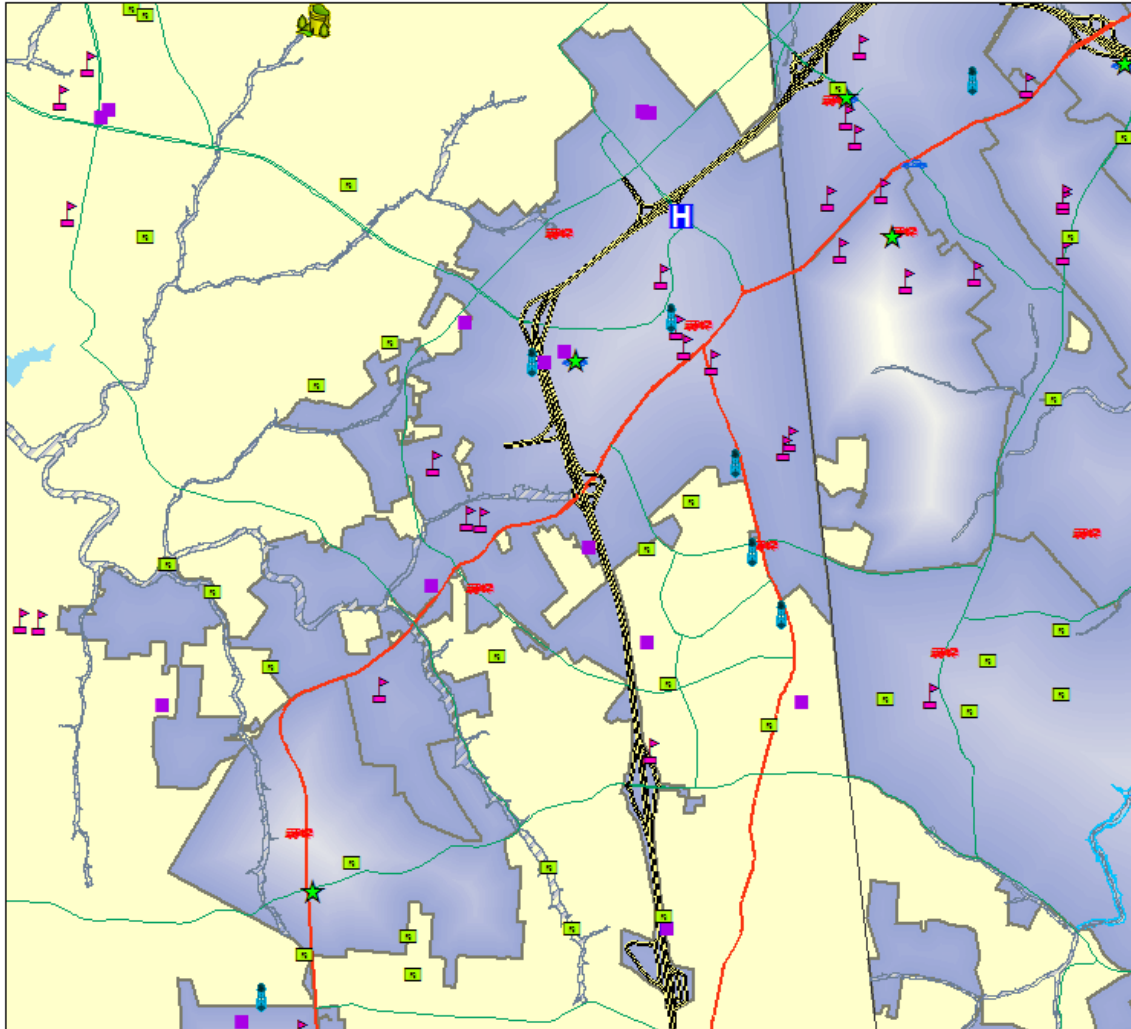
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 3.62 miles



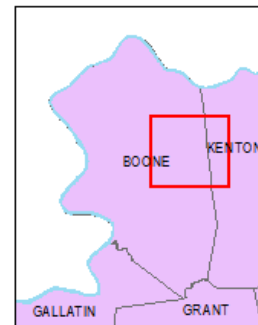
# City of Florence Critical Facilities



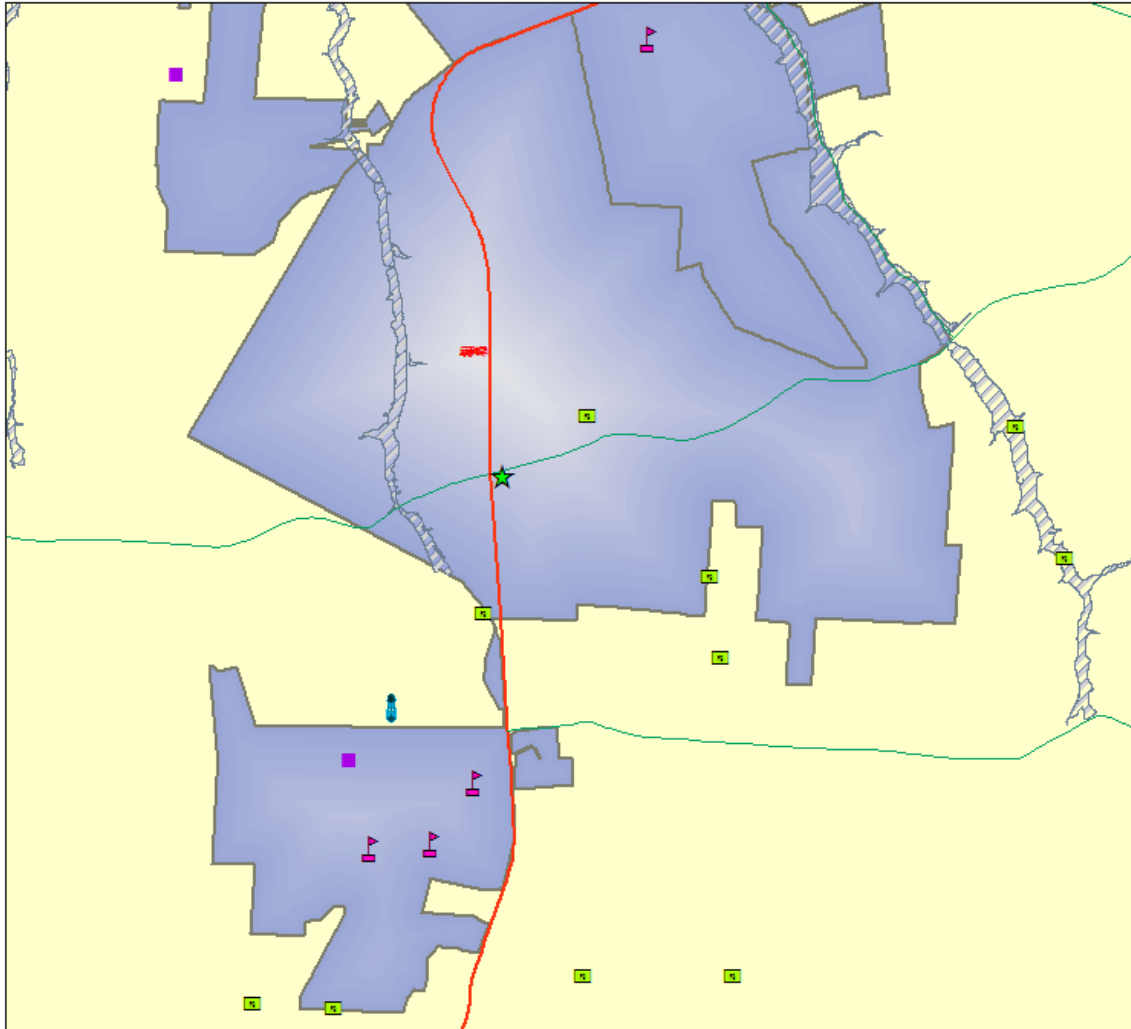
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- SD1\_Liftstations
- EOC
- BooneCell Towers
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.98 miles



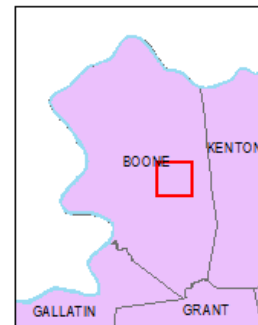
# City of Union Critical Facilities



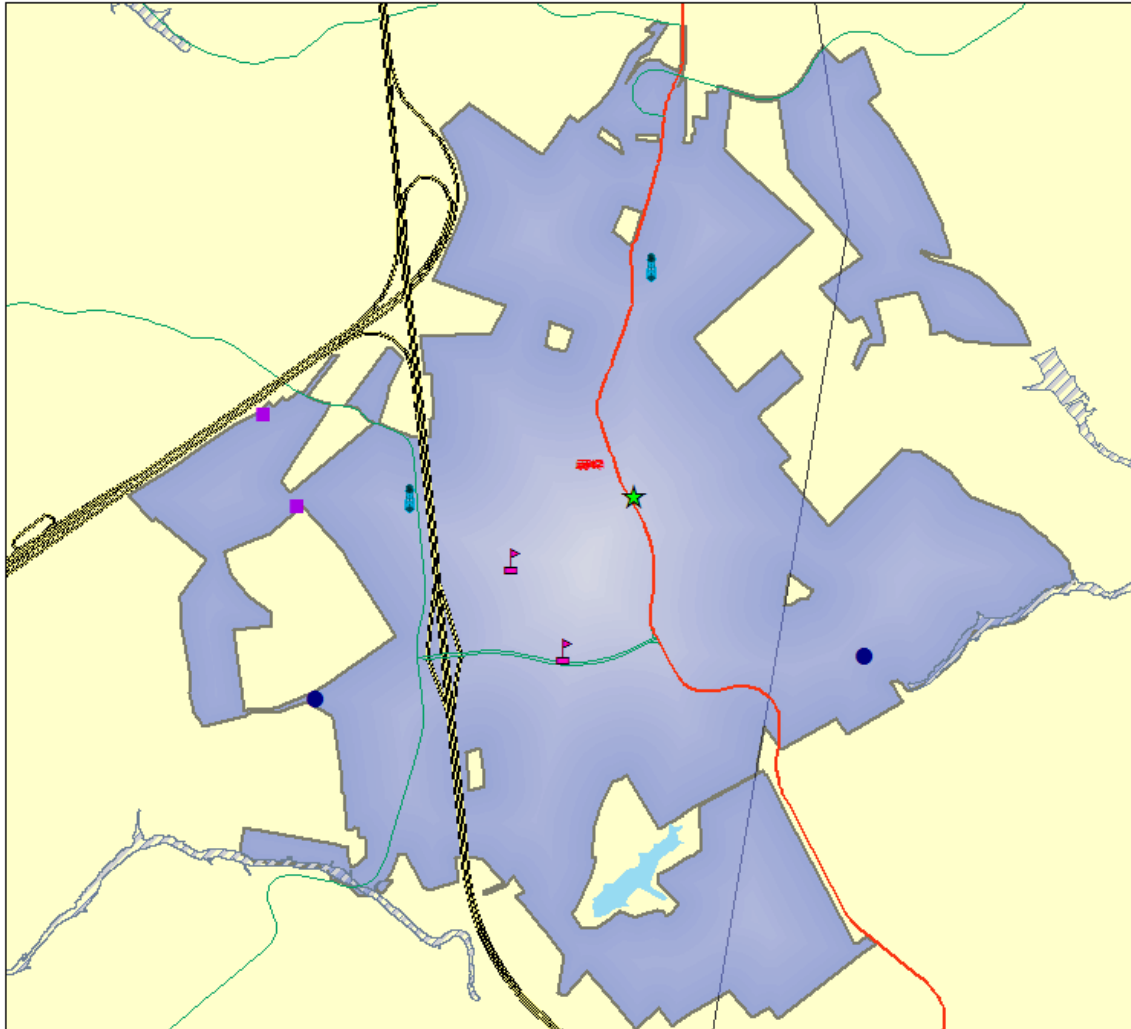
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- SD1\_Liftstations
- EOC
- BooneCell Towers
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.45 miles



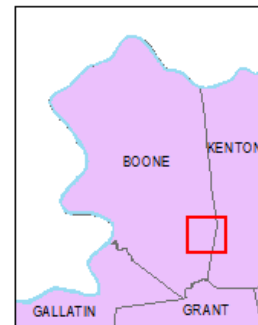
# City of Walton Critical Facilities



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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

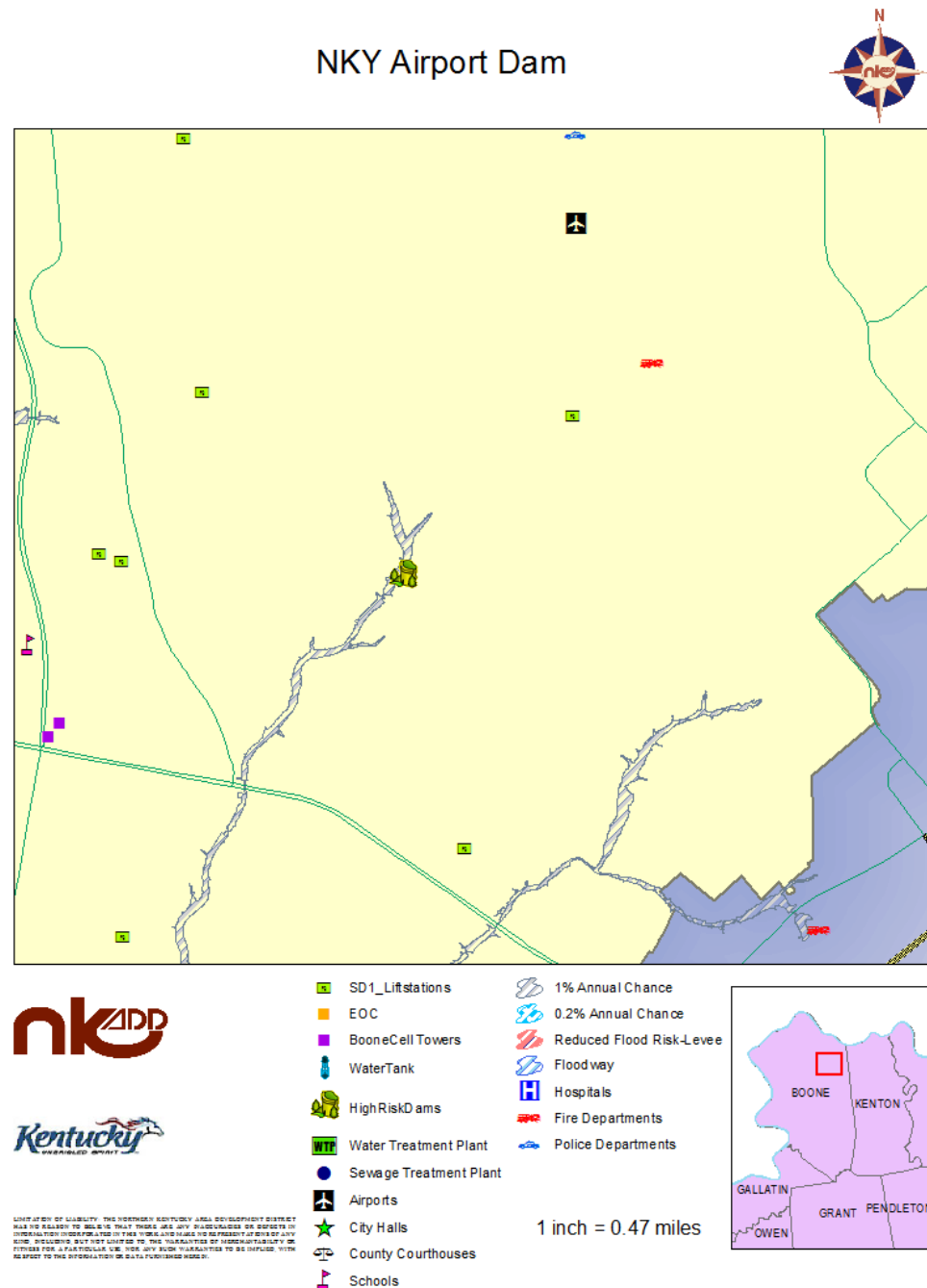
1 inch = 0.48 miles





## HIGH RISK DAM

According to the Kentucky Division of Water, High Hazard (C) Structures located such that failure may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. Moderate Hazard (B) Structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Low Hazard (A) Structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Only High Risk Dams are included in this vulnerability assessment, since they are the only dams that may affect loss of life and also affect important public health facilities such as utilities and transportation routes.



CAMPBELL COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage (# of years vary by hazard) | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|----------------------------------------------|------------------|-------------|----------------------|
| Flash Flood         | 23                | \$ 138,000                                   | 1.28             | High        | High                 |
| Flood               | 21                | \$ 97,000                                    | 1.17             | High        | High                 |
| Landslide           | 22+               | \$950,128+                                   | No Data          | Moderate    | High                 |
| Tornado             | 3                 | \$ 1,275,000                                 | 0.05             | Moderate    | Moderate             |
| Thunderstorm/Wind   | 90                | \$ 10,697,000                                | 1.53             | High        | High                 |
| Hail                | 38                | \$10,000                                     | 0.64             | Moderate    | Moderate             |
| Severe Winter Storm | 40                | \$ 300,000                                   | 2.11             | Moderate    | High                 |
| Dam Failure         | 0                 | No Data                                      | No Data          | Low         | Low                  |
| Earthquake          | 20                | No Data                                      | No Data          | Low         | Moderate             |
| TOTAL               | 257               | \$ 13,467,128                                |                  |             |                      |

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included

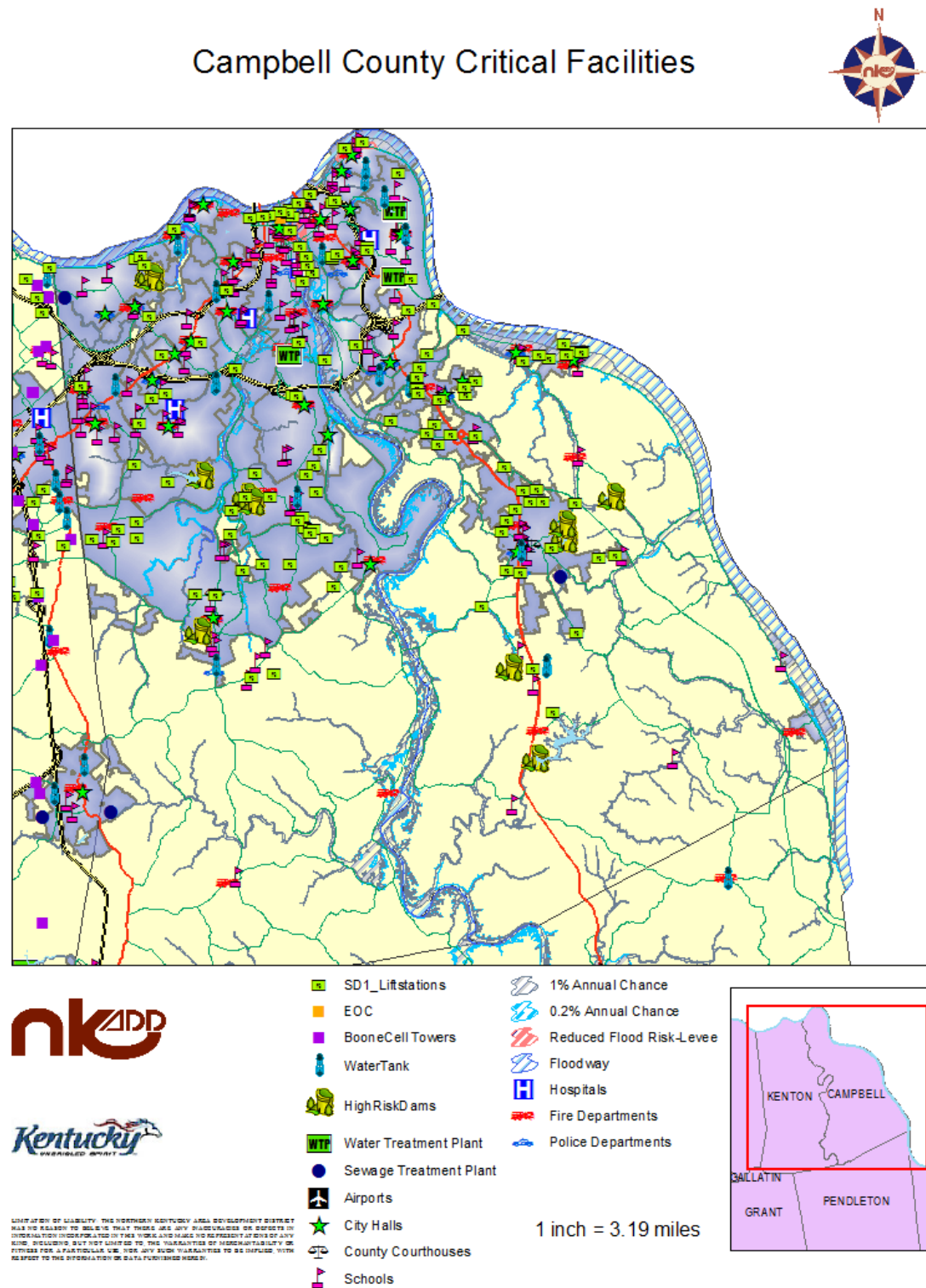
in the county total. The data was gathered from best available sources, which varied by county. Where possible, local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

| Campbell                             |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 2,460                     | 6%        |
| Commercial                           | 0                         | 0%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 0                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>2,460</b>              | <b>6%</b> |

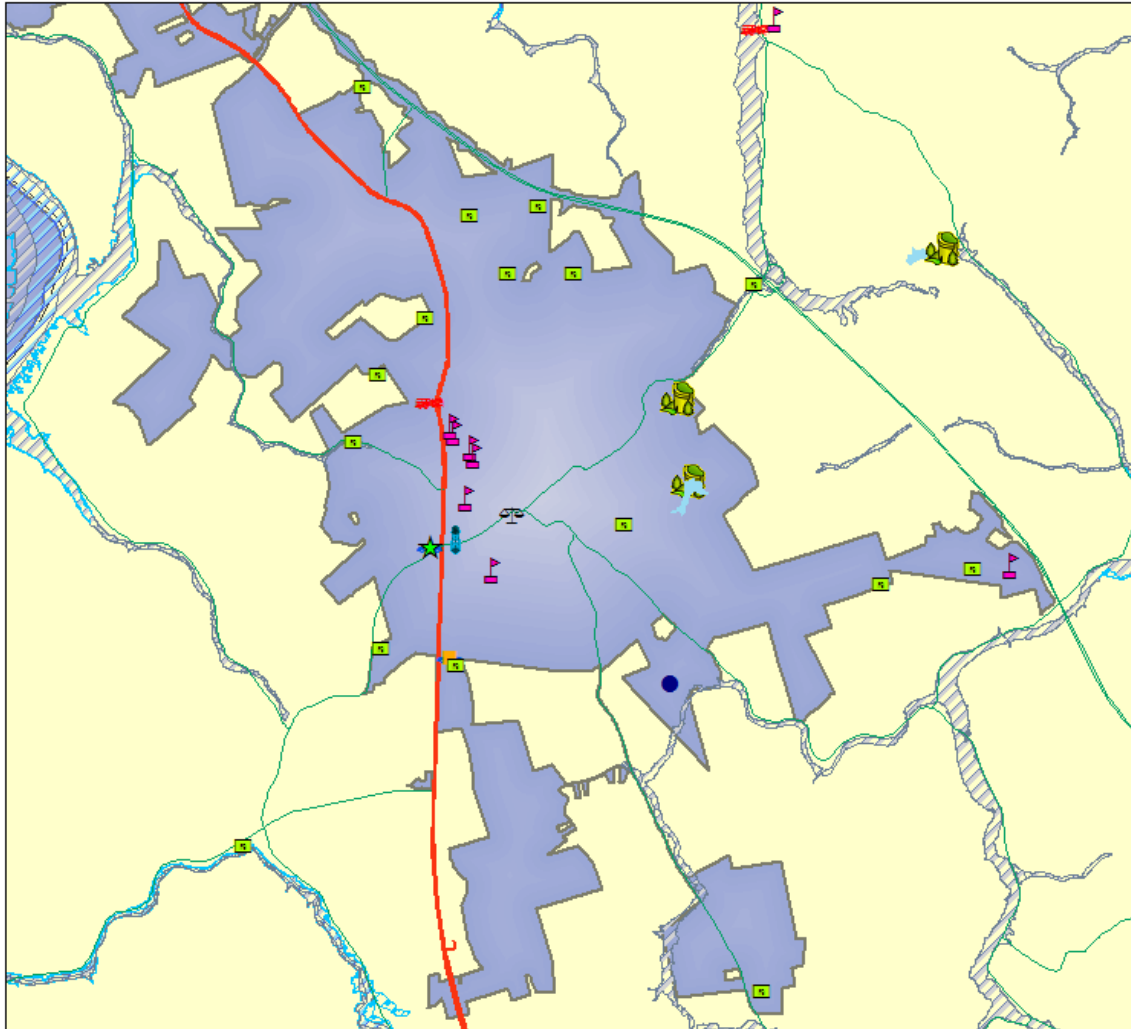
The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |

The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.



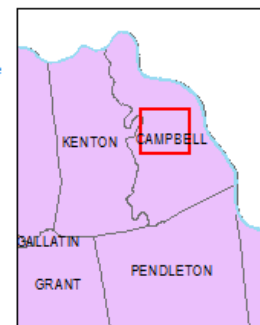
# City of Alexandria Critical Facilities



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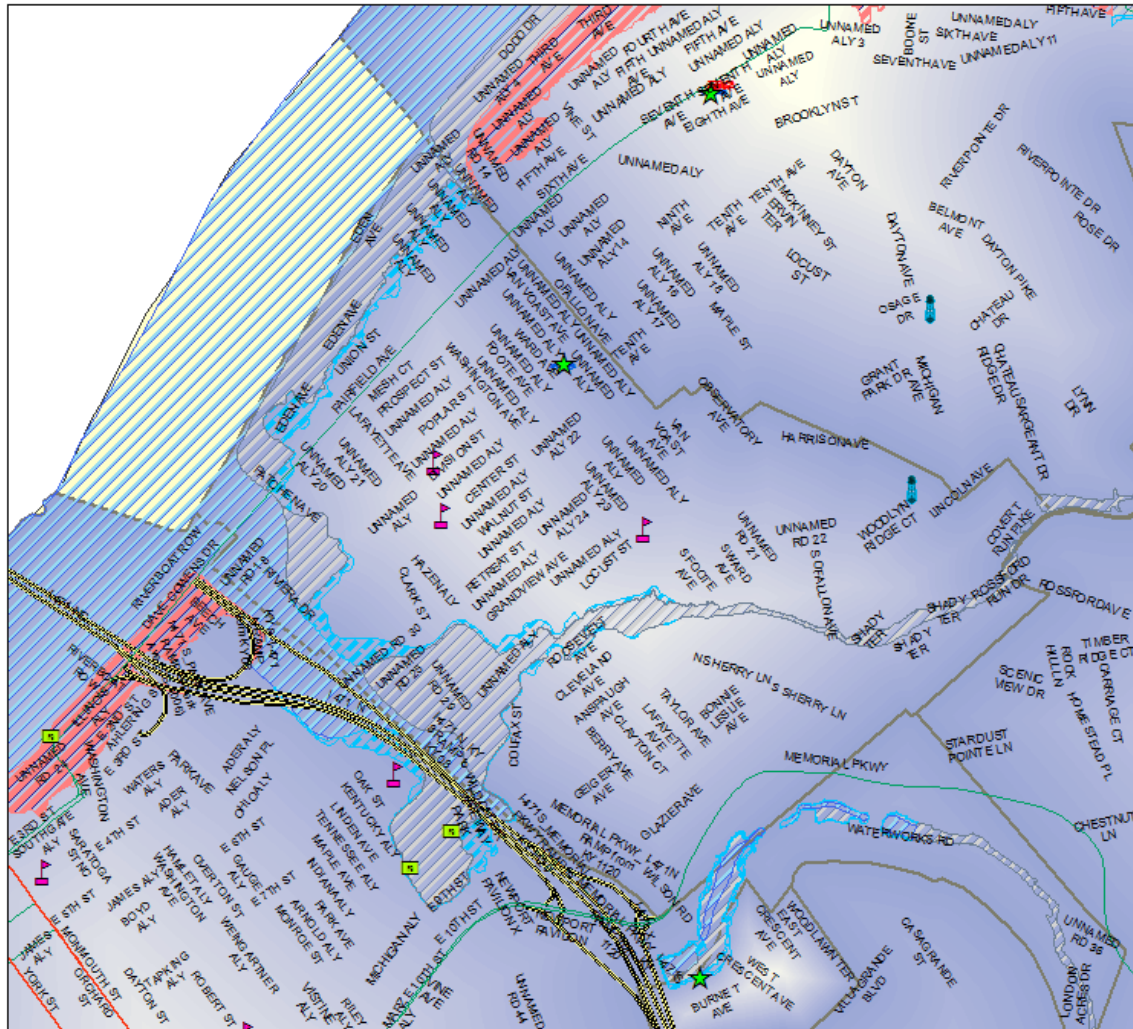
- SD1\_Liftstations
- EOC
- BooneCell Towers
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.72 miles



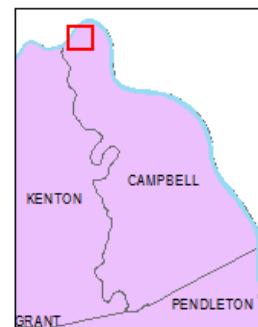


# City of Bellevue Critical Facilities



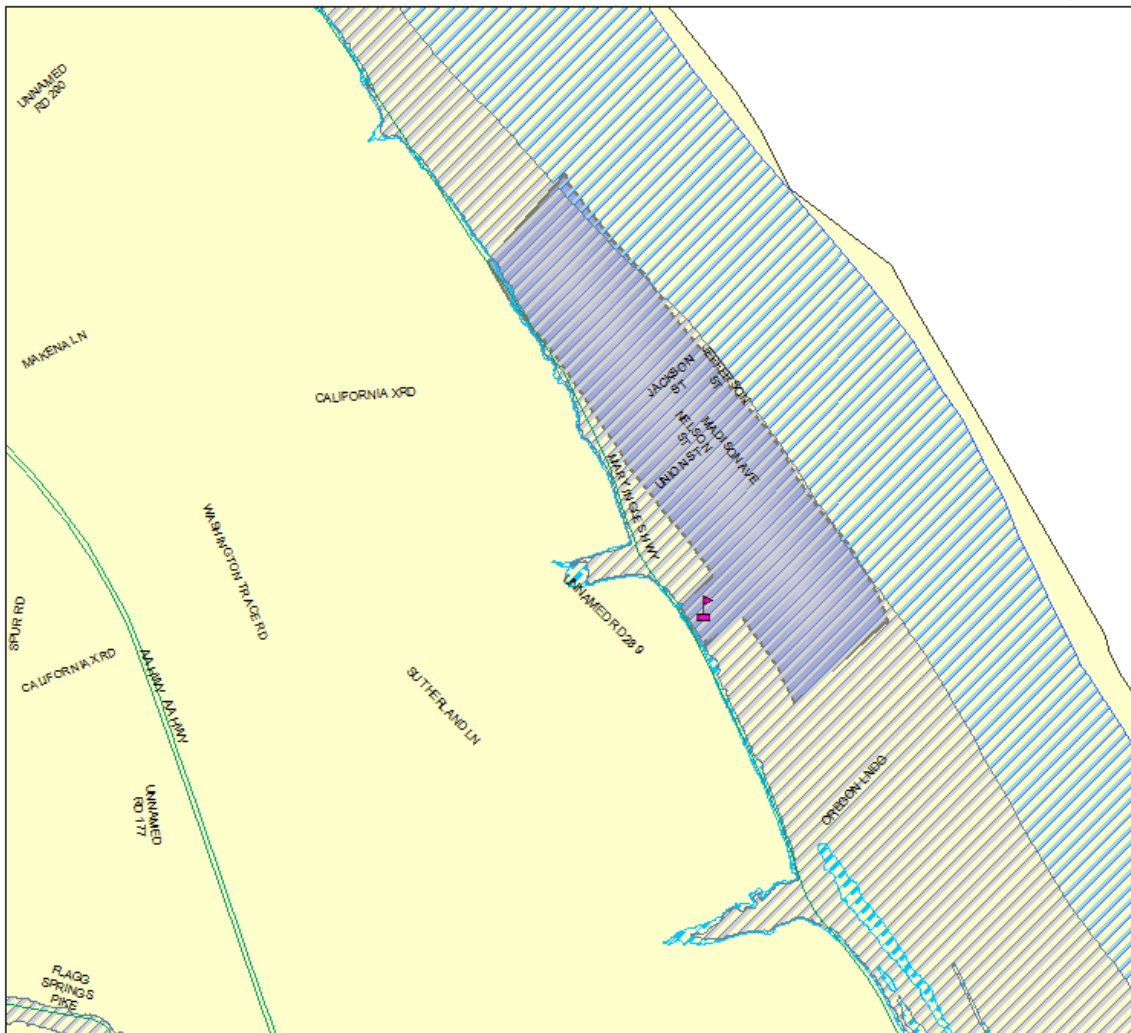
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- SD1\_Liftstations
- EOC
- BooneCell Towers
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments



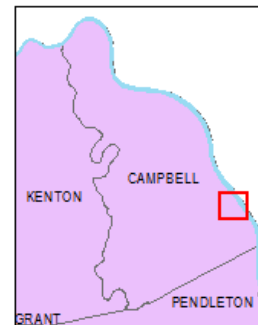
1 inch = 0.24 miles

# City of California Critical Facilities



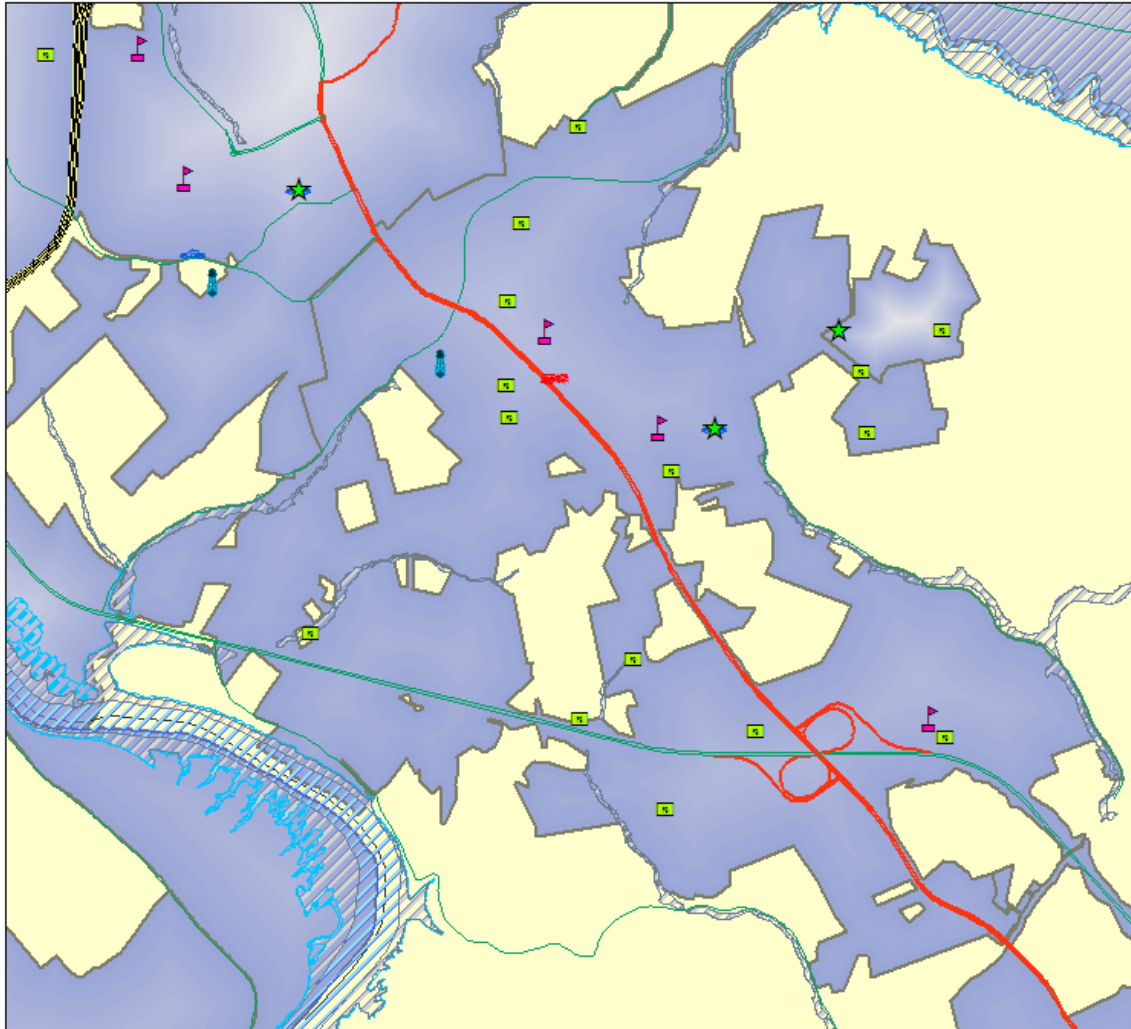
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- SD1\_Liftstations
- EOC
- BooneCell Towers
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments



1 inch = 0.27 miles

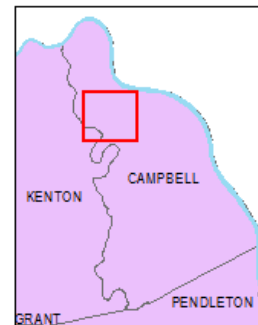
# City of Cold Spring Critical Facilities



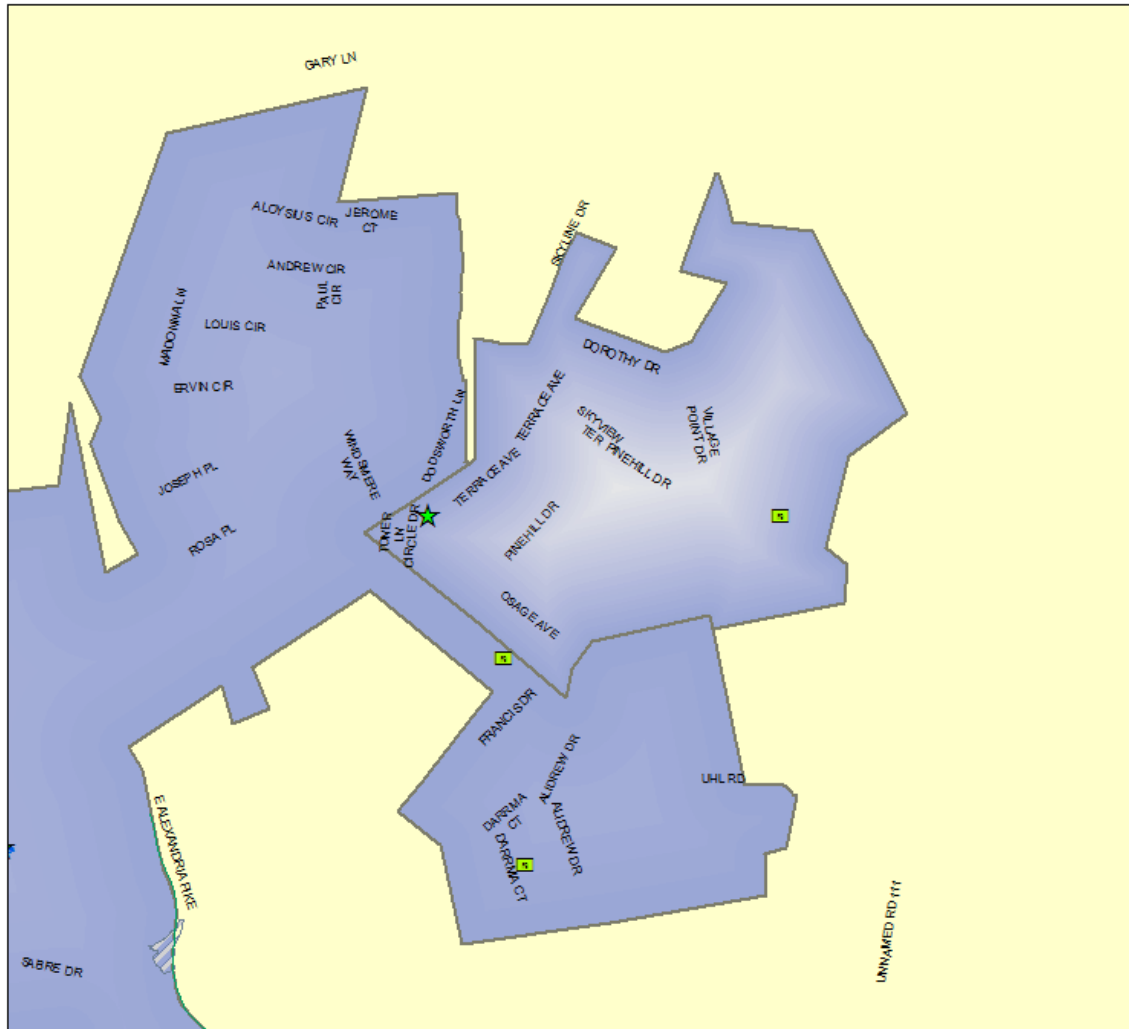
DISCLAIMER OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY INACCURACIES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND HAS TO REPRESENT AT RISK OF ANY SUCH INACCURACIES, BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NOR ANY SUCH WARRANTIES TO BE IMPLIED WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.

- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.52 miles



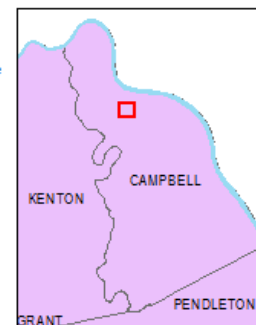
# City of Crestview Critical Facilities



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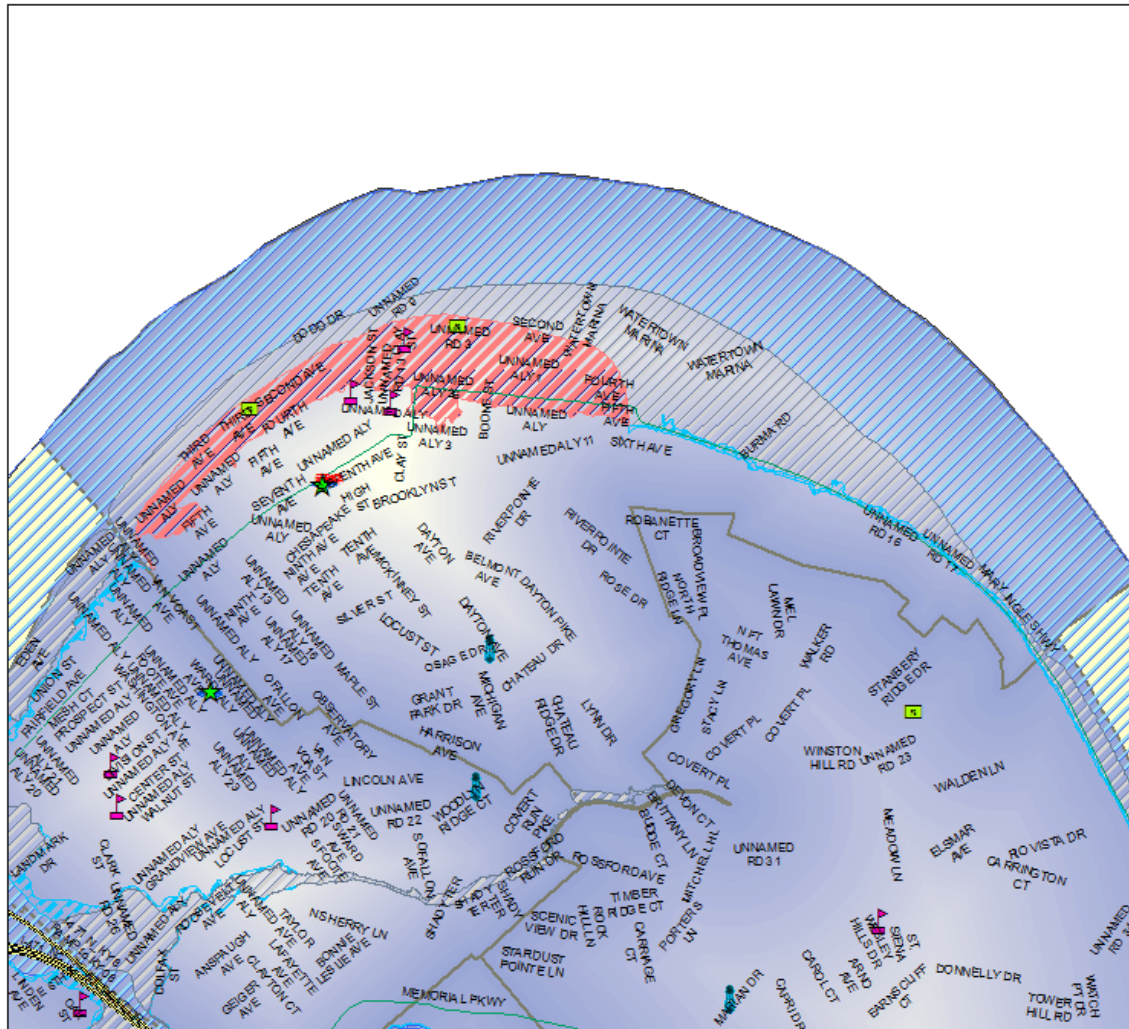
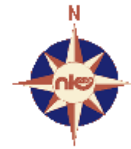
- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.15 miles



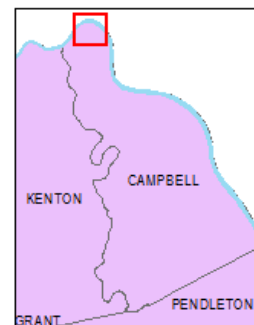


# City of Dayton Critical Facilities



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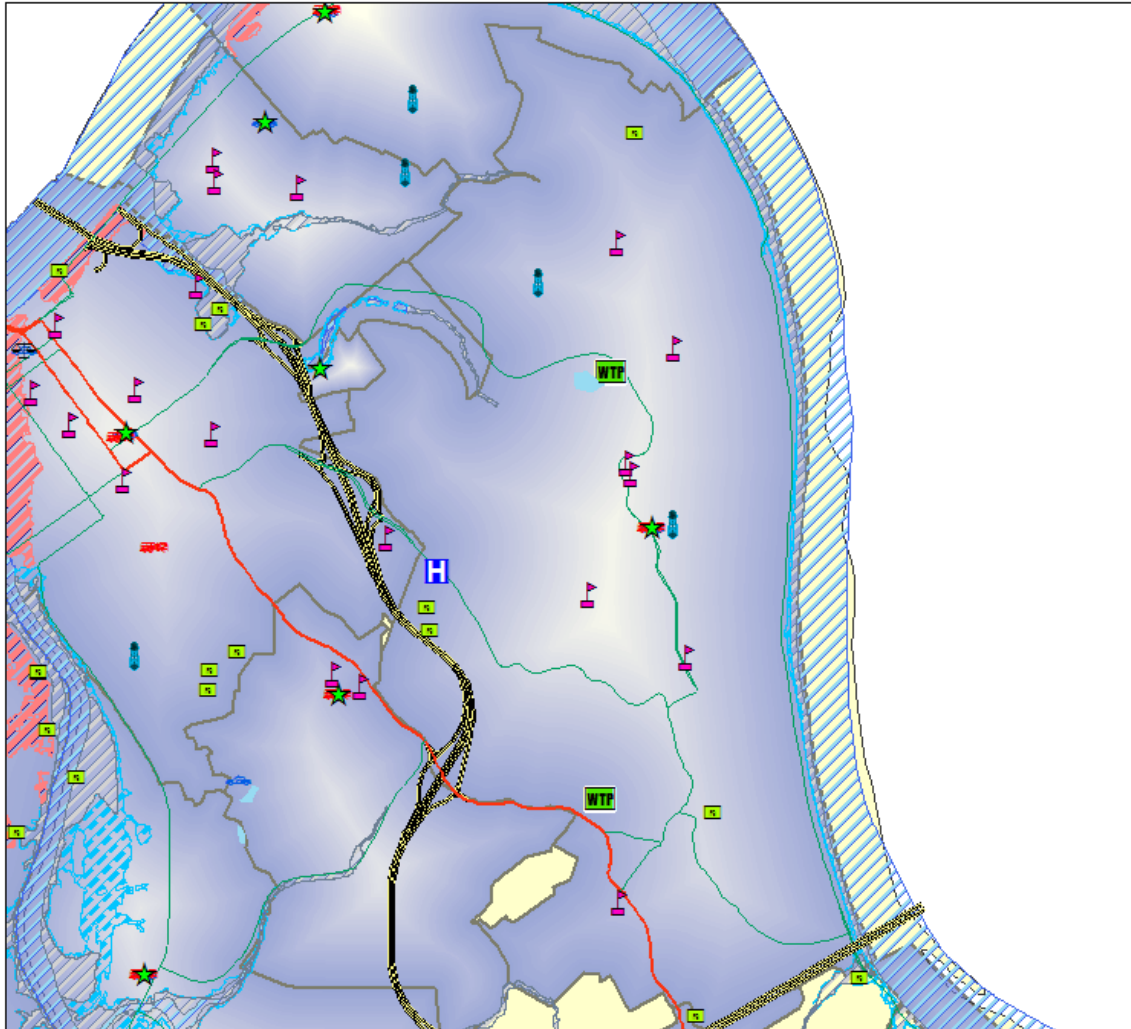
- SD1\_Liftstations
- EOC
- BooneCell Towers
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments



1 inch = 0.32 miles



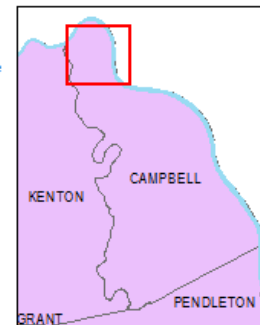
# City of Fort Thomas Critical Facilities



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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.61 miles

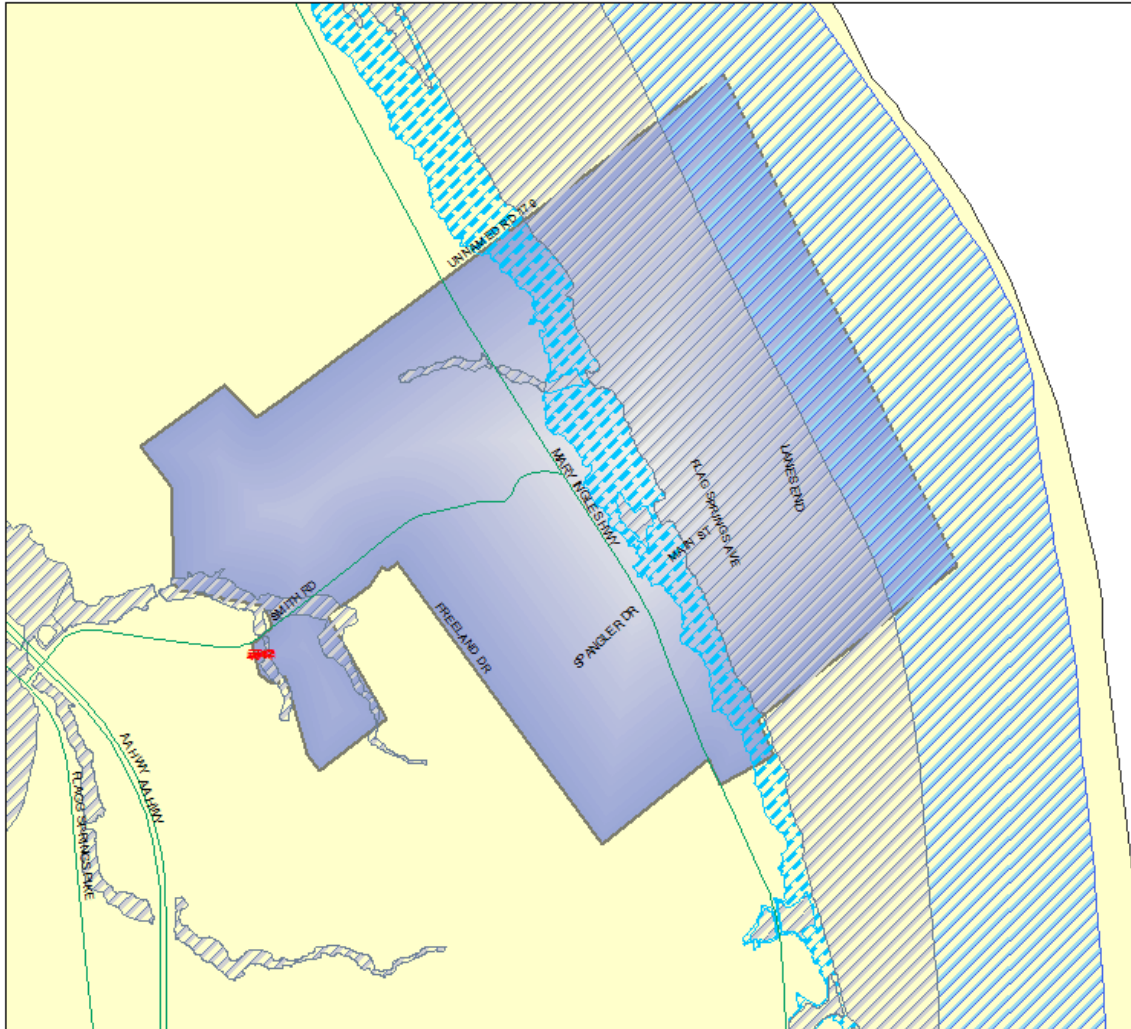








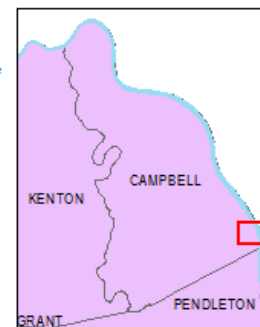
# City of Mentor Critical Facilities



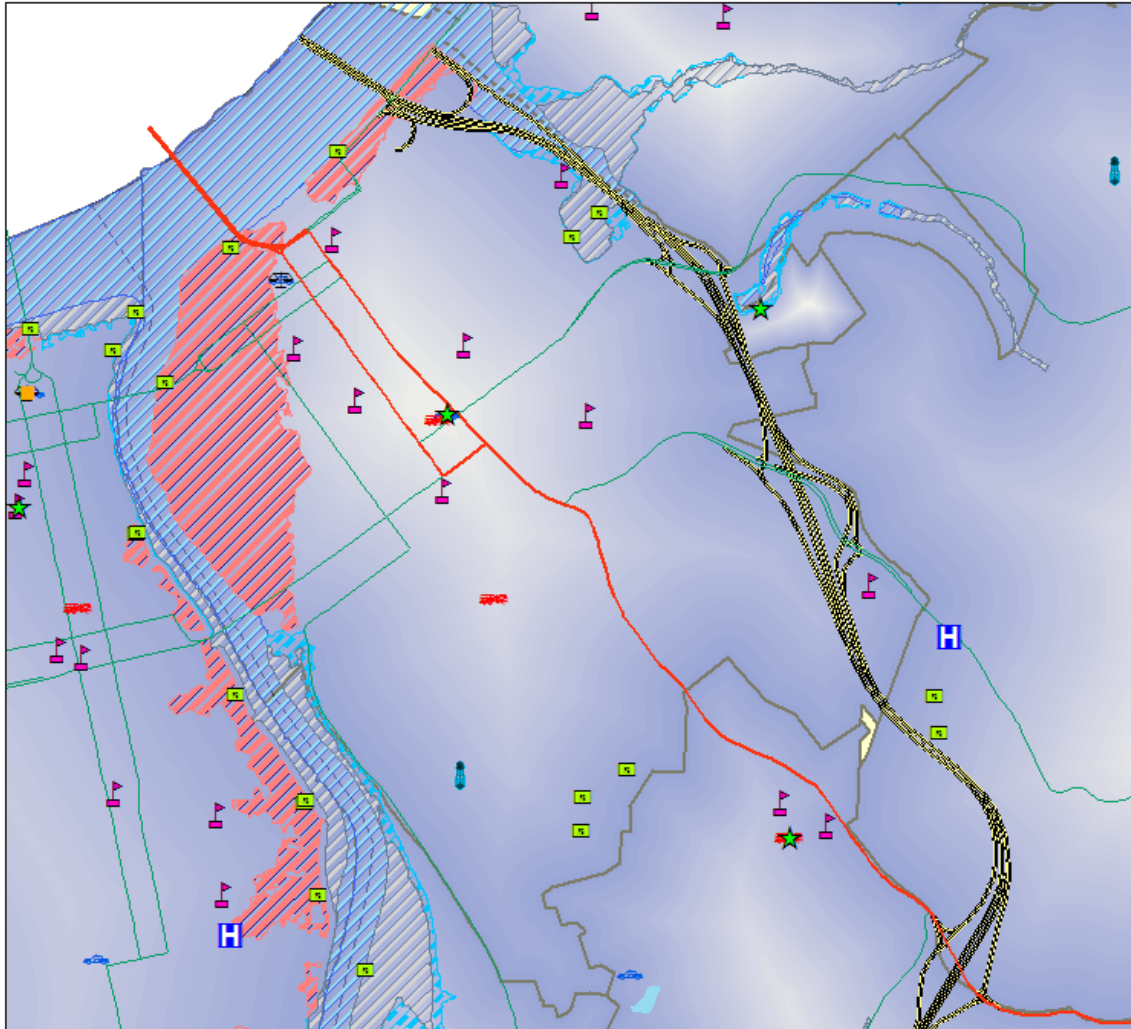
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.23 miles



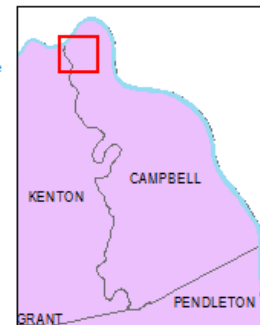
# City of Newport Critical Facilities



DISCLAIMER OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY MISSTATEMENTS OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND HAS TO REPRESENT AT RISK OF ANY SUCH INCLUDING, BUT NOT LIMITED TO, THE ACCURACY OF INFORMATION OR FITNESS FOR A PARTICULAR USE. NOR ANY SUCH WARRANTIES TO BE IMPLIED WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.

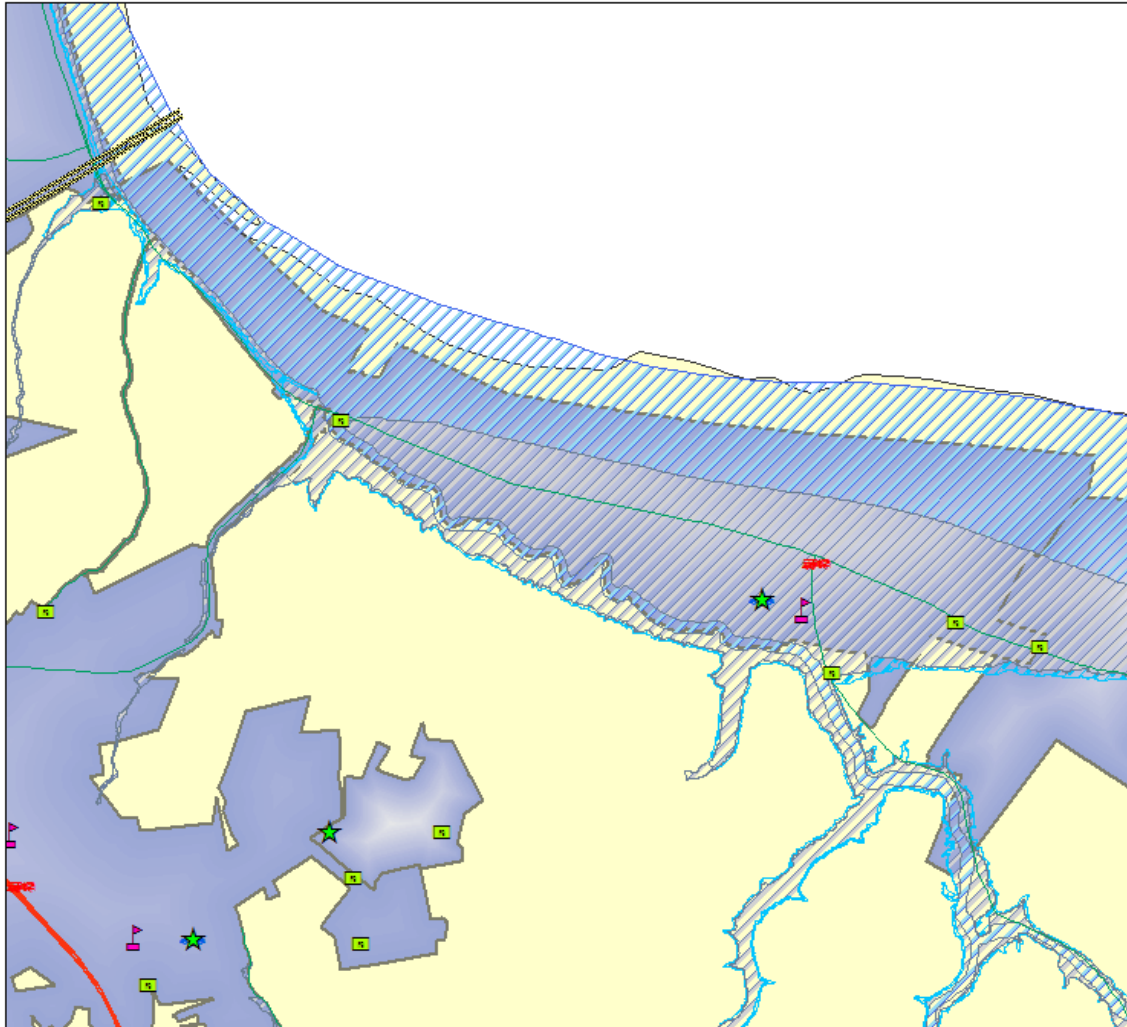
- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.38 miles





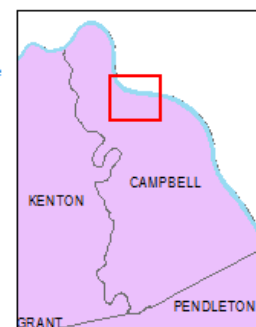
# City of Silver Grove Critical Facilities



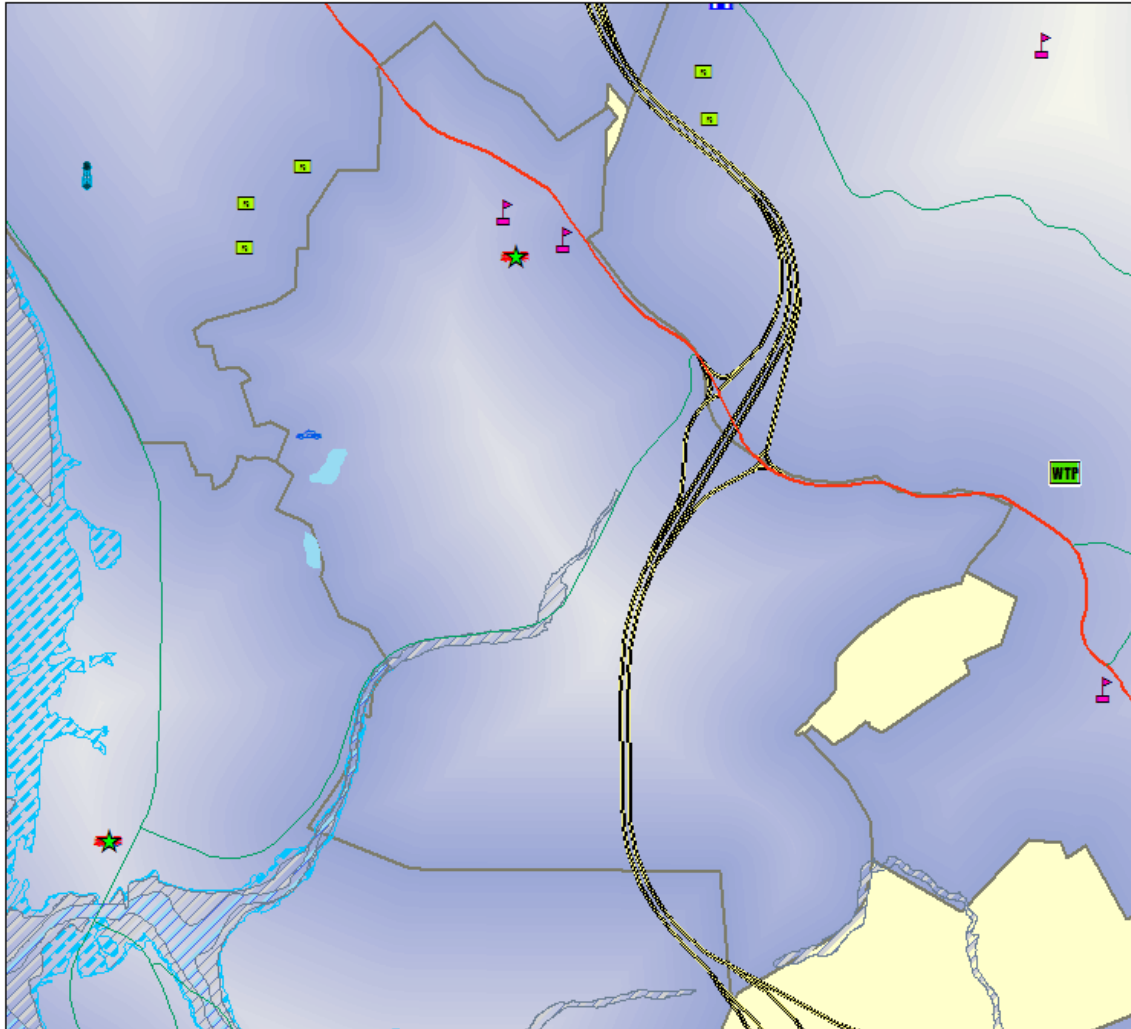
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.48 miles



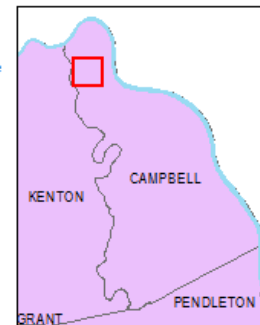
# City of Southgate Critical Facilities



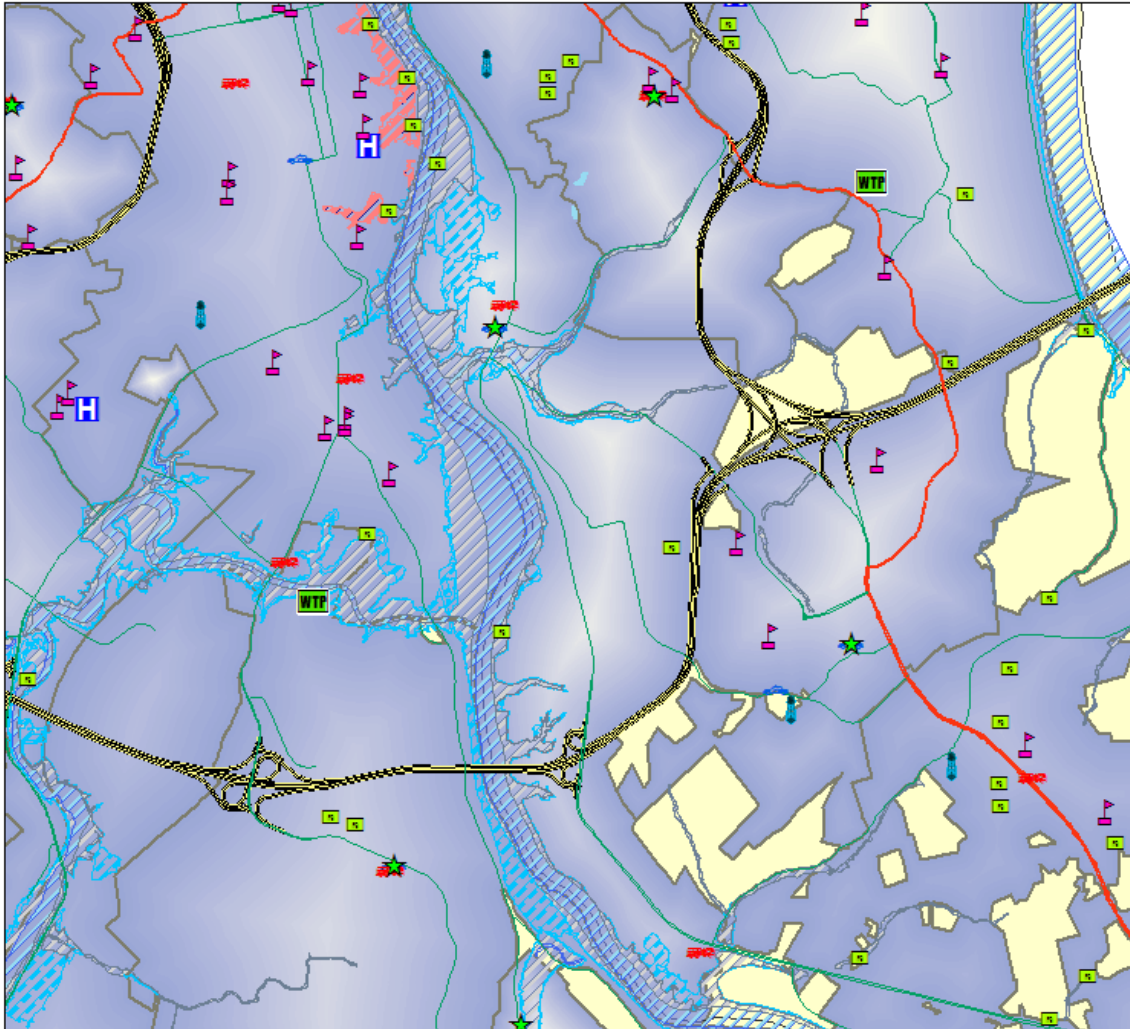
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.29 miles

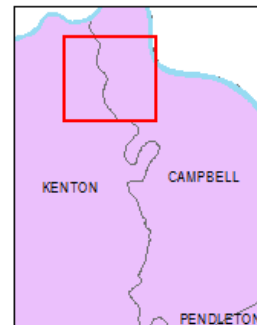


# City of Wilder Critical Facilities



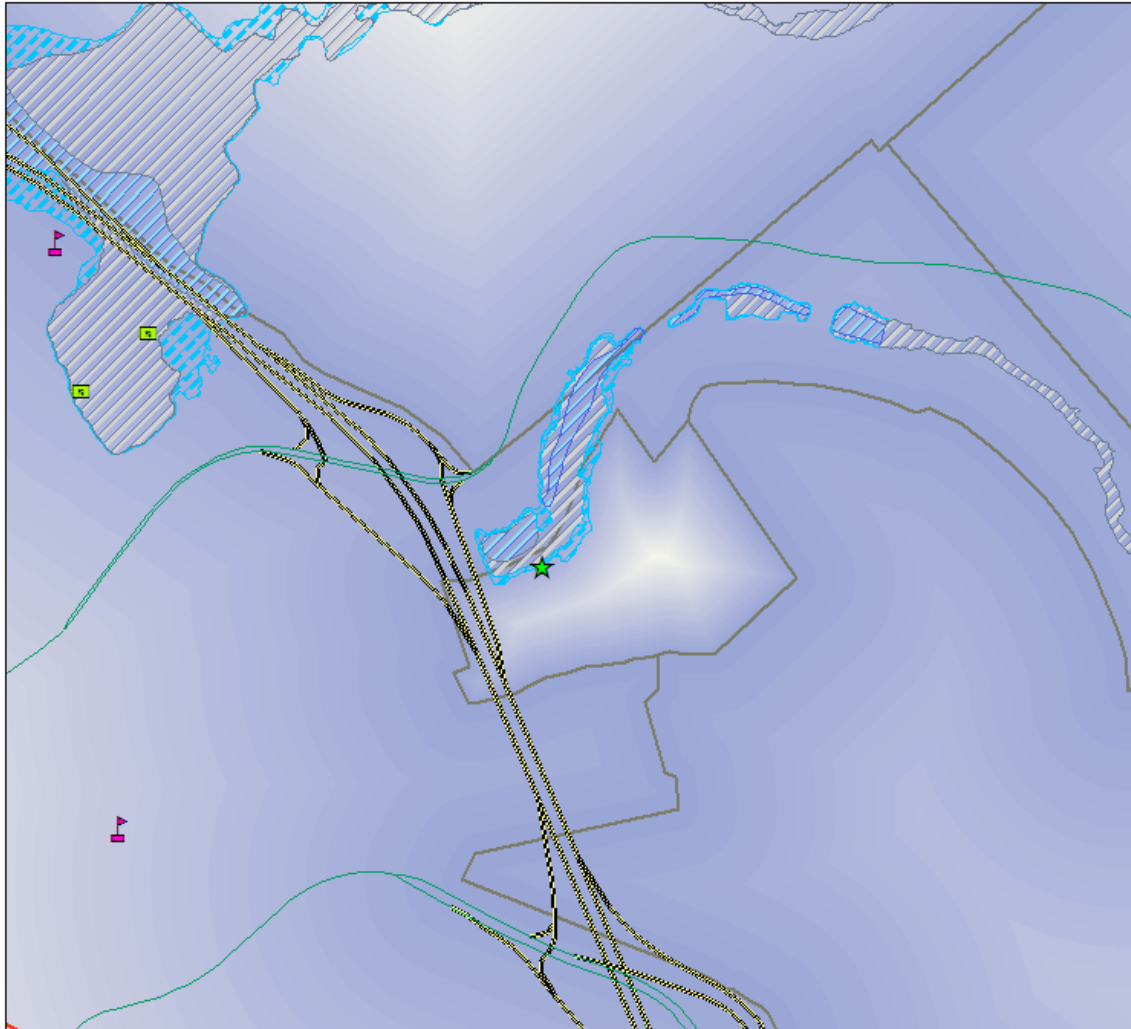
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Fire Departments
- Police Departments
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- SD1\_Liftstations
- Hospitals

1 inch = 0.74 miles



LIMITATION OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY DISCLOSURES OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND MAKE NO REPRESENTATION OF ANY KIND, INCLUDING BUT NOT LIMITED TO THE ACCURACY OF INFORMATION OR FITNESS FOR A PARTICULAR USE. NOR ANY SUCH WARRANTIES TO BE IMPLIED WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.

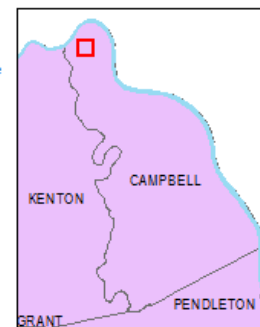
# City of Woodlawn Critical Facilities



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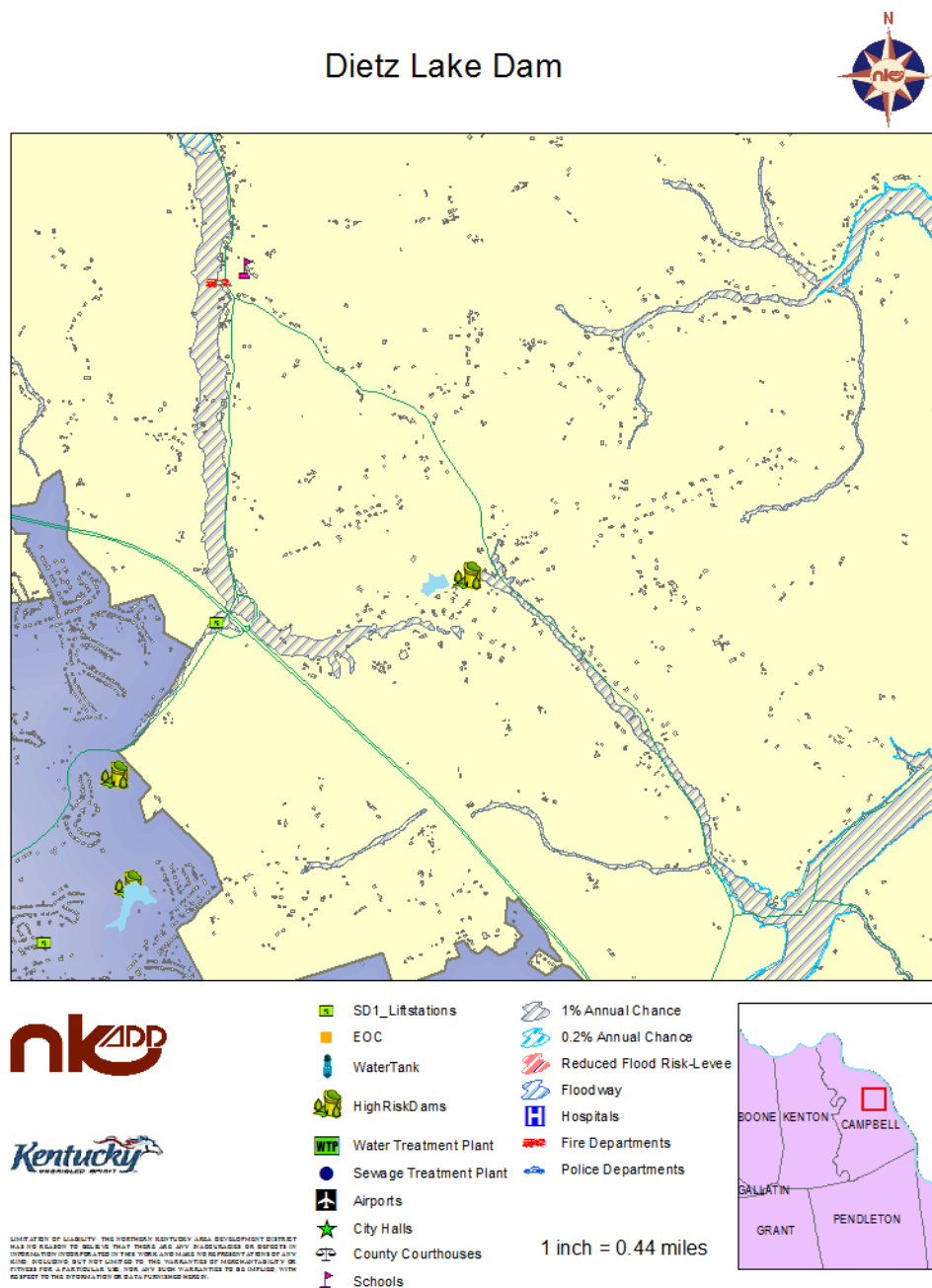
- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| BooneCell Towers       | Reduced Flood Risk-Levee |
| WaterTank              | Floodway                 |
| HighRiskDams           | Hospitals                |
| Water Treatment Plant  | Fire Departments         |
| Sewage Treatment Plant | Police Departments       |
| Airports               |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.15 miles



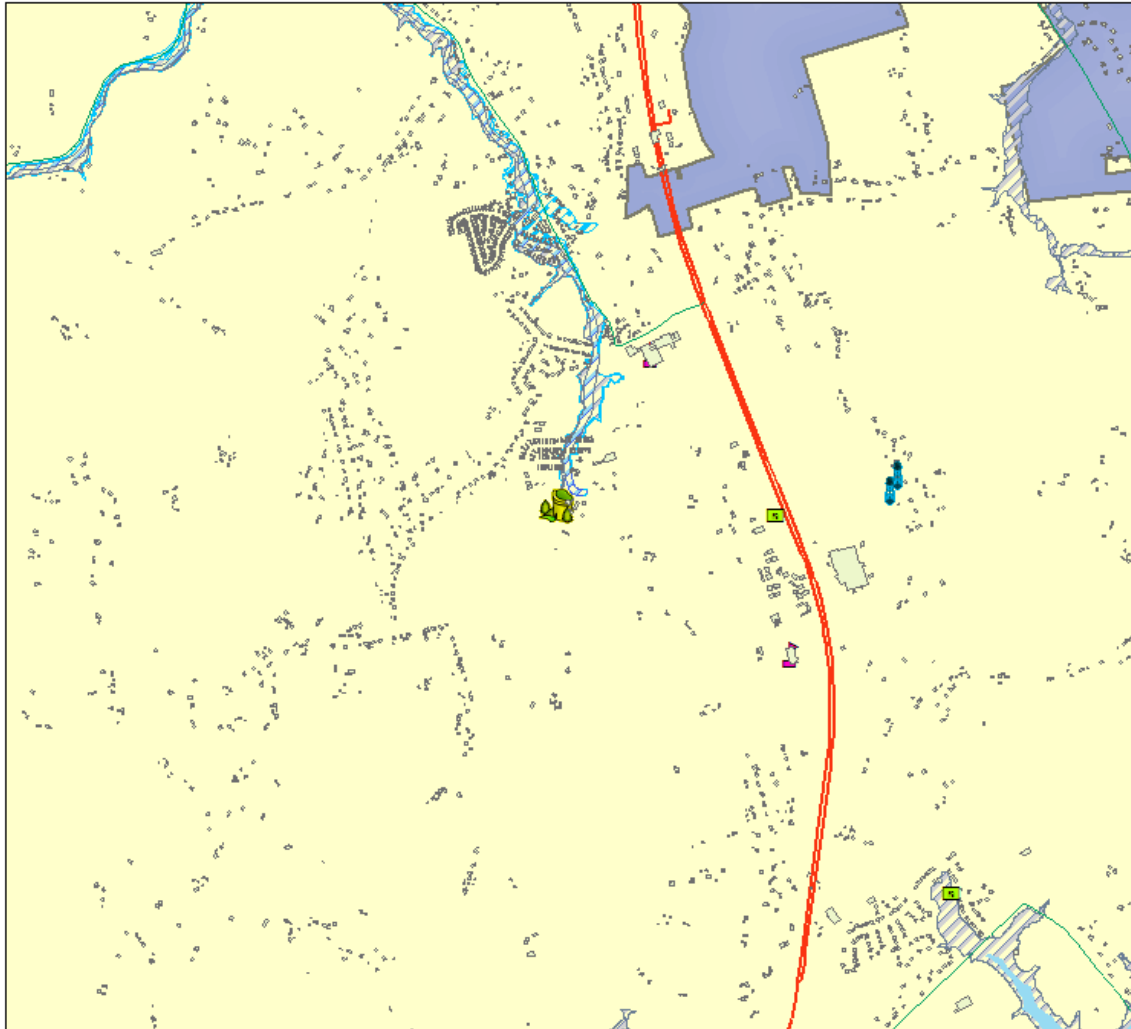
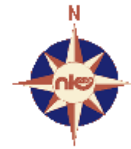
## HIGH RISK DAMS

According to the Kentucky Division of Water, High Hazard (C) Structures located such that failure may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. Moderate Hazard (B) Structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Low Hazard (A) Structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Only High Risk Dams are included in this vulnerability assessment, since they are the only dams that may affect loss of life and also affect important public health facilities such as utilities and transportation routes.





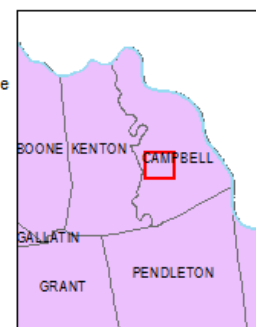
# Claryville Lake Dam



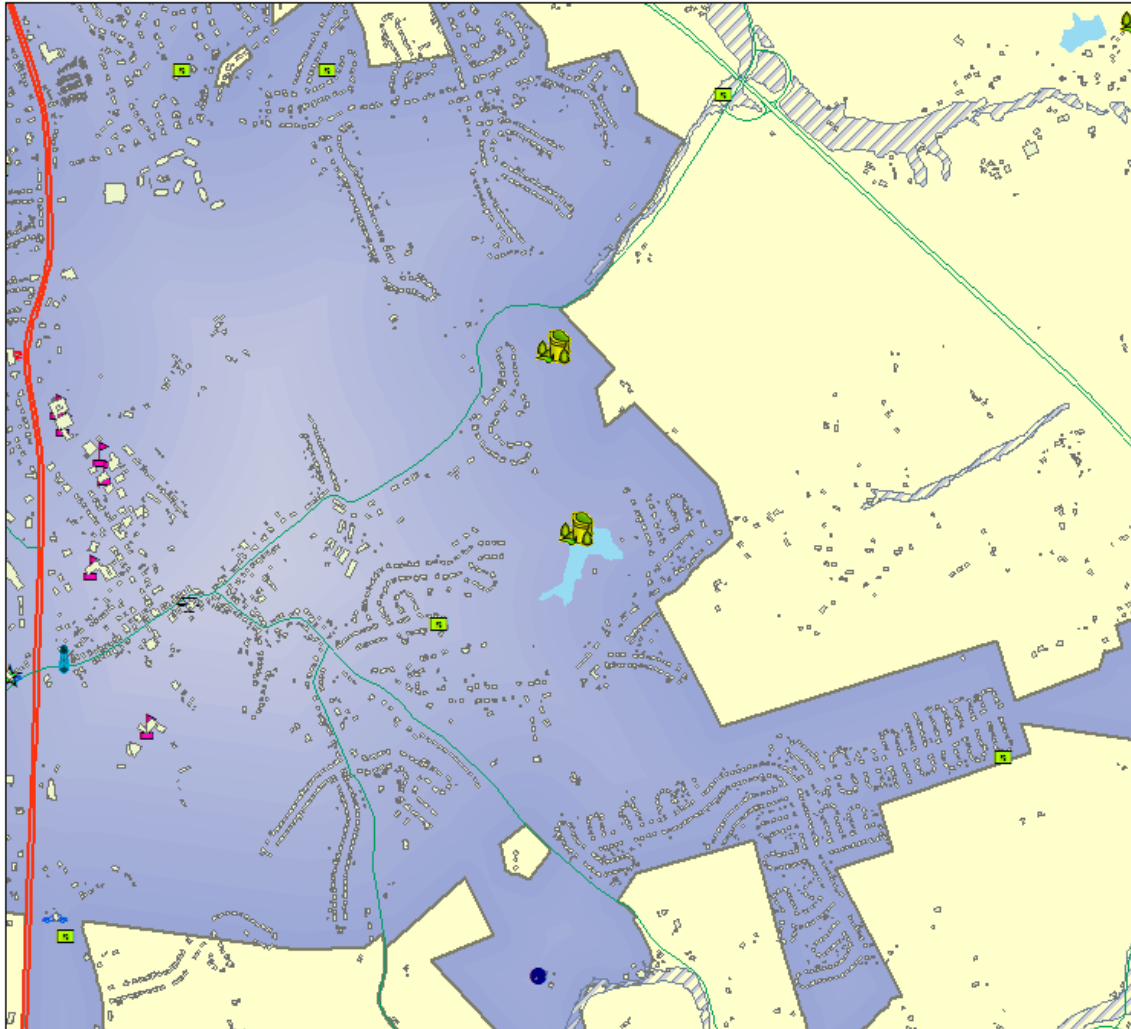
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Lift stations      | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| WTP                    | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.44 miles



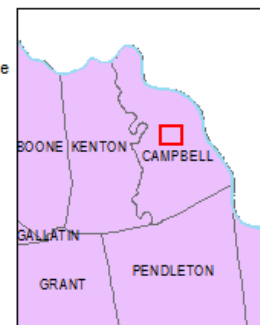
# Alexandria Lake Dams (Old and New)



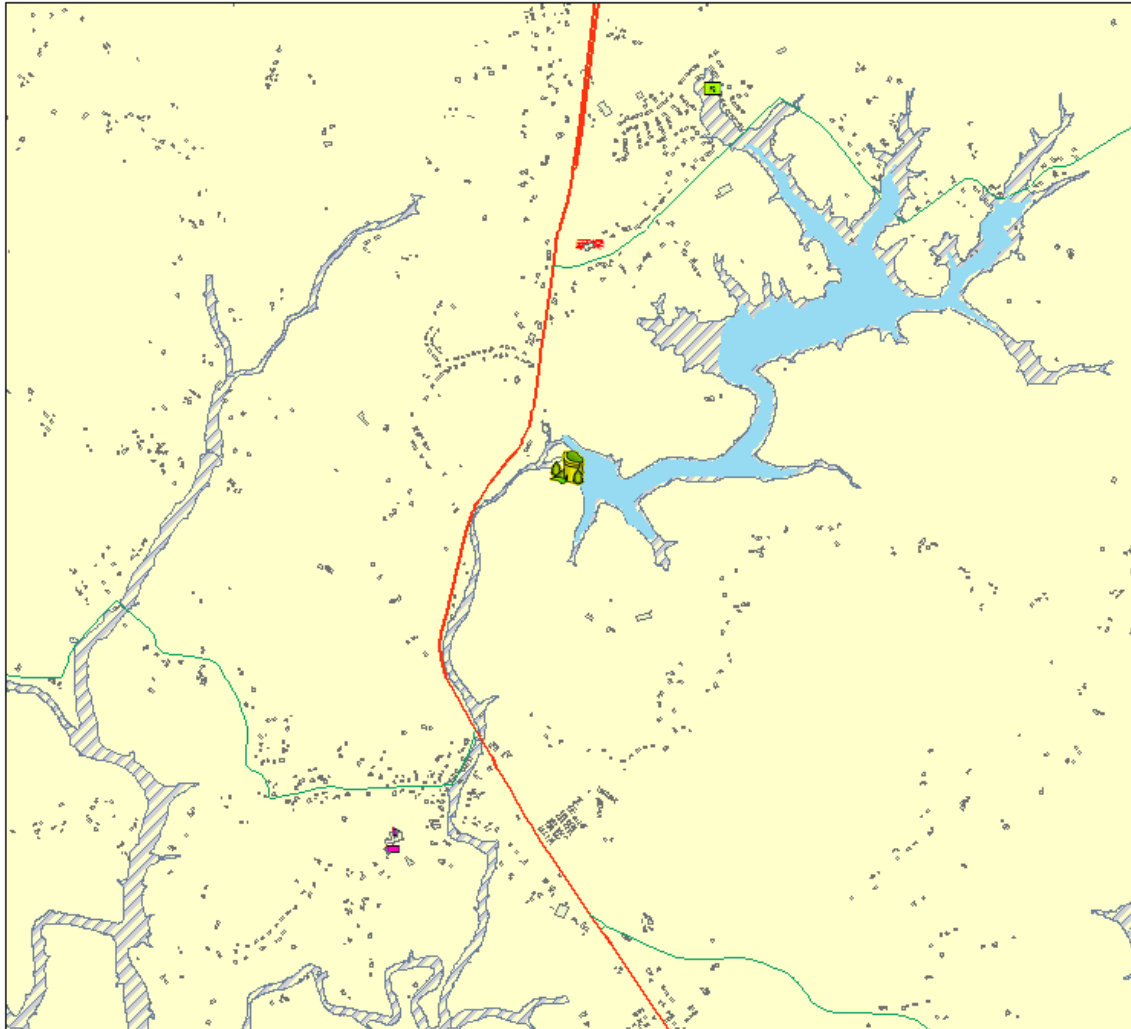
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| WaterTank              | 0.2% Annual Chance       |
| HighRiskDams           | Reduced Flood Risk-Levee |
| Water Treatment Plant  | Floodway                 |
| Sewage Treatment Plant |                          |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |
| Hospitals              |                          |
| Fire Departments       |                          |
| Police Departments     |                          |

1 inch = 0.33 miles



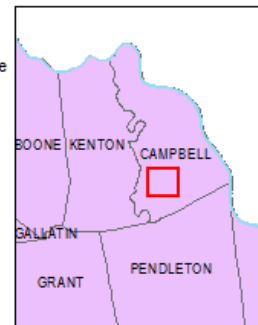
# AJ Jolly Park Lake Dam



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- SD1\_Liftstations
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Hospitals
- Fire Departments
- Police Departments
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway

1 inch = 0.48 miles



CARROLL COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|------------------|------------------|-------------|----------------------|
| Flash Flood         | 19                | \$ 756,000       | 1                | High        | High                 |
| Flood               | 17                | \$ 27,000        | 0.89             | High        | High                 |
| Landslide           | No Data*          | No Data *        | No Data*         | High        | Moderate             |
| Tornado             | 8                 | \$ 6,354,000     | 0.14             | High        | Moderate             |
| Thunderstorm/Wind   | 58                | \$ 1,488,000     | 0.98             | High        | Moderate             |
| Hail                | 23                | \$4,000          | 0.40             | Moderate    | Moderate             |
| Severe Winter Storm | 28                | \$ 200,000       | 1.47             | High        | High                 |
| Dam Failure         | 0                 | No Data          | 0                | Moderate    | Low                  |
| Earthquake          | 20                | No Data          | No Data          | Moderate    | Low                  |
| TOTAL               | 173               | \$ 8,829,000     |                  |             |                      |

\*There are several roads in Carroll County that experience Landslides, but there is not good enough data to include details.

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included

in the county total. The data was gathered from best available sources, which varied by county. Where possible, local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

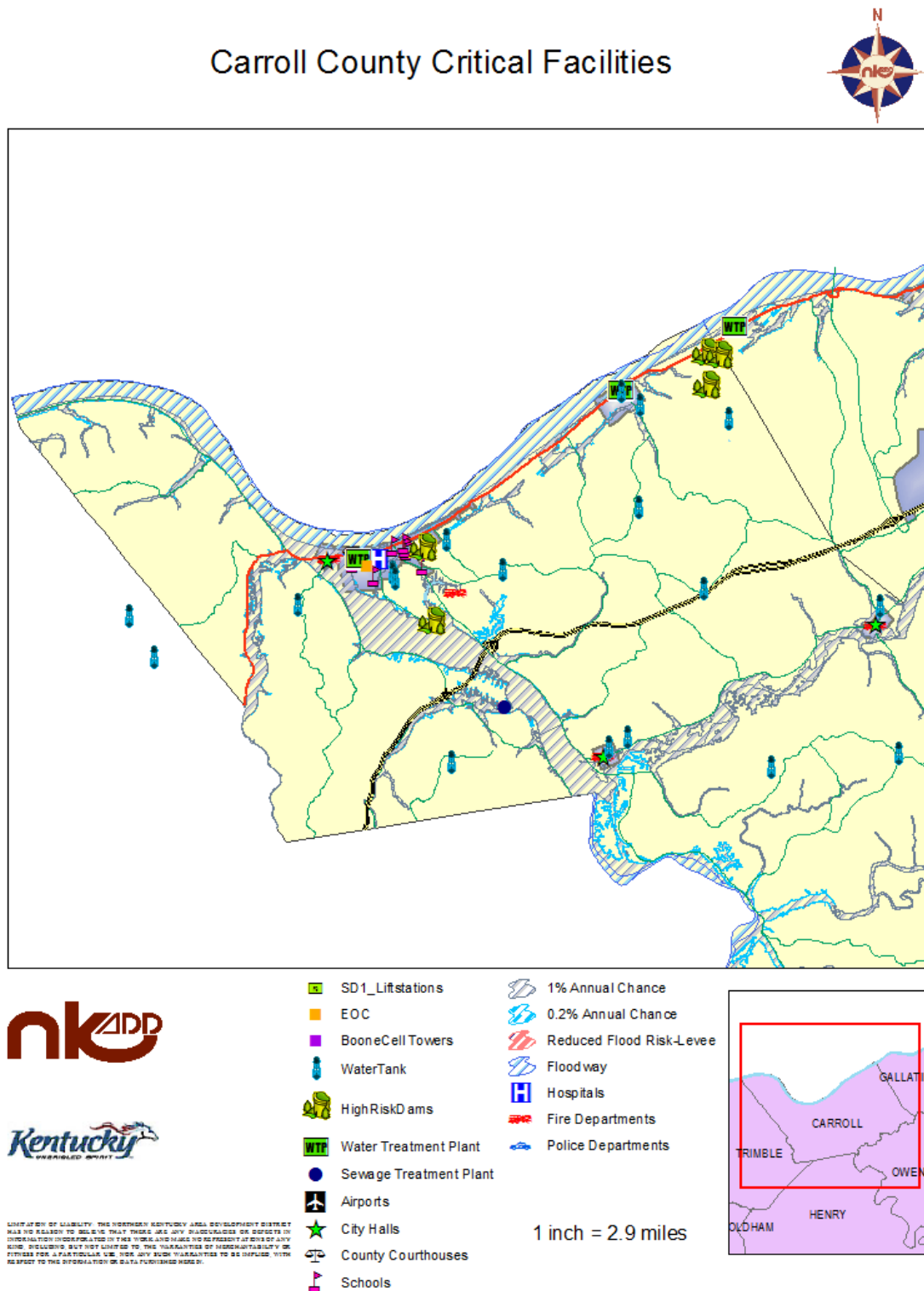
| Carroll                              |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 204                       | 4%        |
| Commercial                           | 10                        | 0%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 2                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>204</b>                | <b>4%</b> |

The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

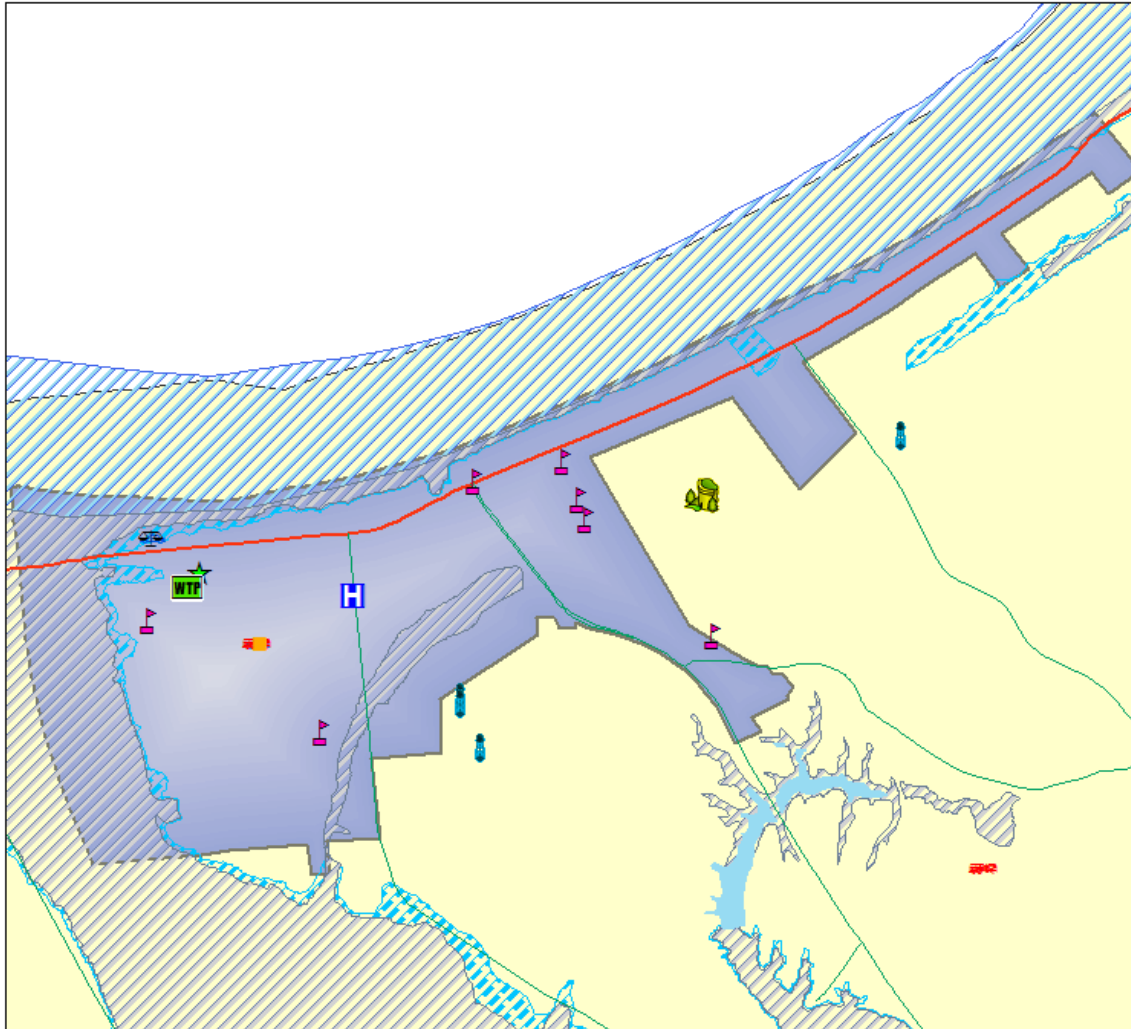
| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |



The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.



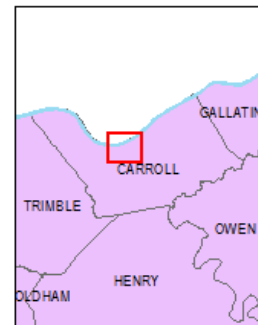
# City of Carrollton Critical Facilities



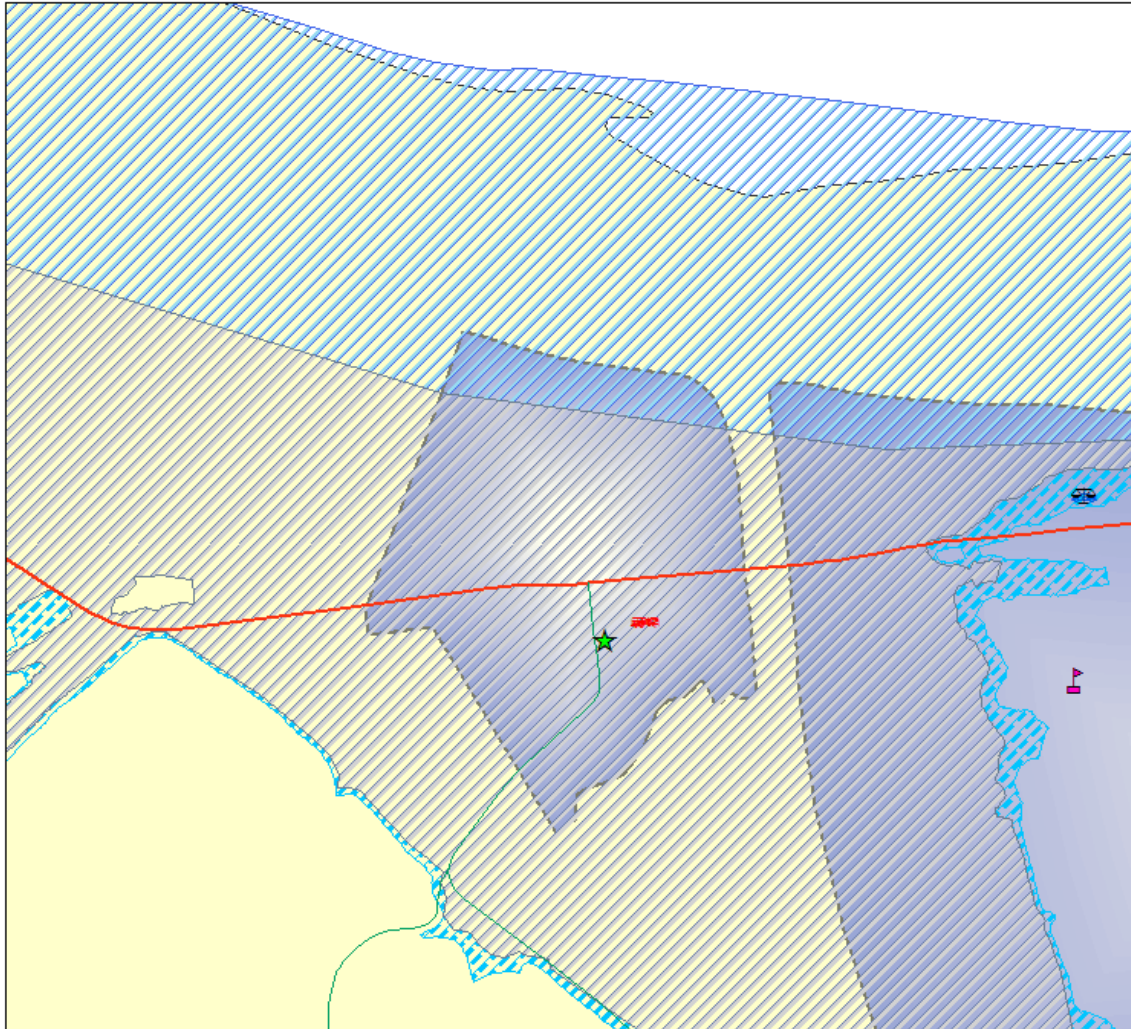
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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.44 miles



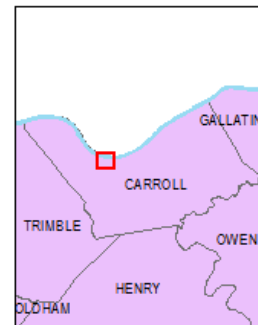
# City of Prestonville Critical Facilities



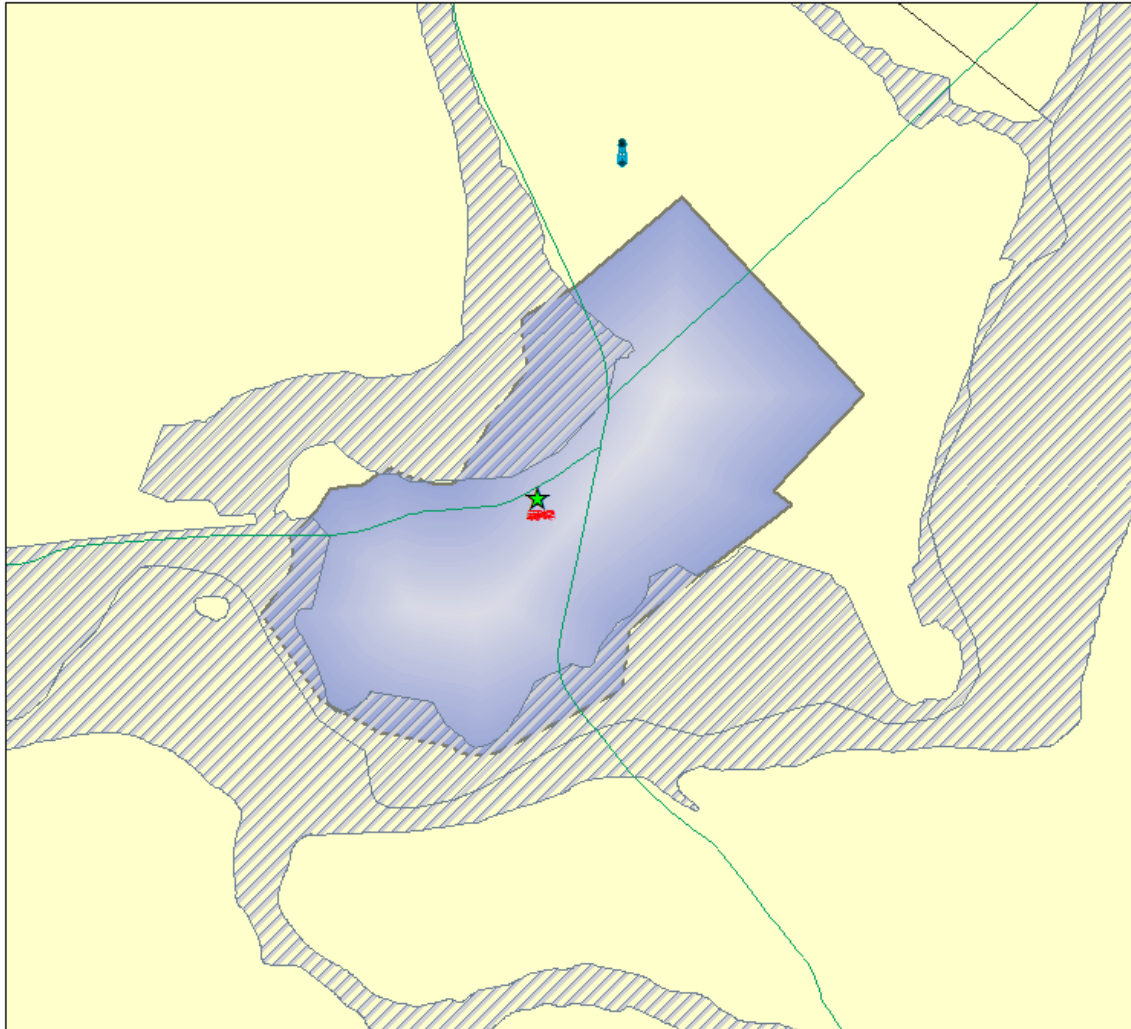
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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.2 miles



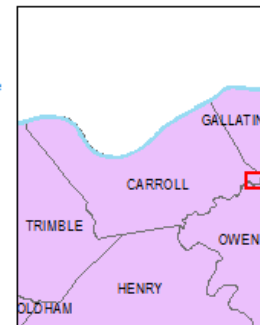
# City of Sanders Critical Facilities



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- |                          |                            |
|--------------------------|----------------------------|
| ■ EOC                    | 1% Annual Chance           |
| ● Water Tank             | 0.2% Annual Chance         |
| ■ High Risk Dams         | Reduced Flood Risk - Levee |
| ■ WTP                    | Floodway                   |
| ● Water Treatment Plant  | Hospitals                  |
| ● Sewage Treatment Plant | Fire Departments           |
| ■ Airports               | Police Departments         |
| ★ City Halls             |                            |
| ■ County Courthouses     |                            |
| ■ Schools                |                            |

1 inch = 0.2 miles

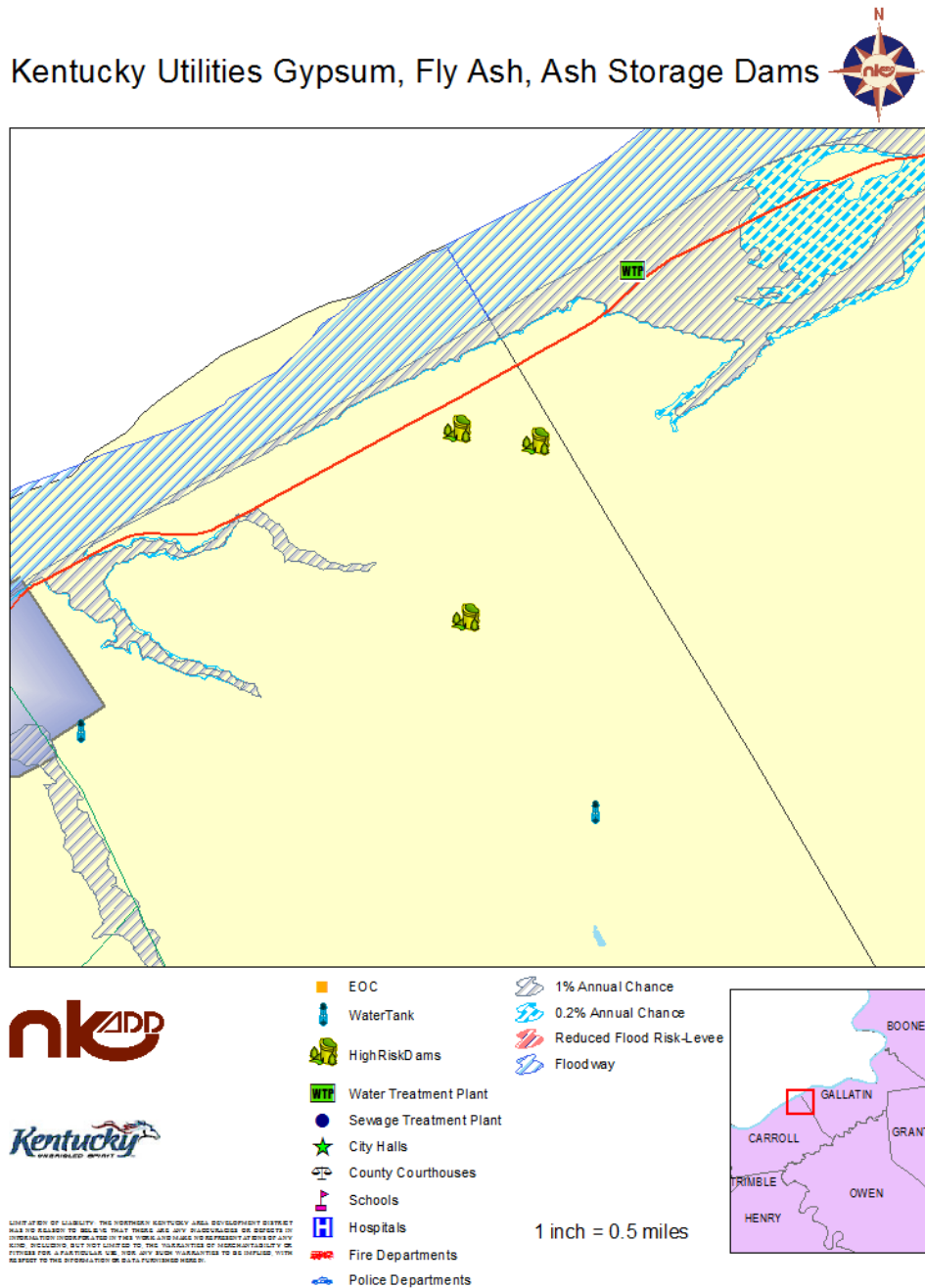






## HIGH RISK DAMS

According to the Kentucky Division of Water, High Hazard (C) Structures located such that failure may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. Moderate Hazard (B) Structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Low Hazard (A) Structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Only High Risk Dams are included in this vulnerability assessment, since they are the only dams that may affect loss of life and also affect important public health facilities such as utilities and transportation routes.



GALLATIN COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage    | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|---------------------|------------------|-------------|----------------------|
| Flash Flood         | 23                | \$ 206,000          | 1.21             | Moderate    | High                 |
| Flood               | 18                | \$ 29,000           | 0.95             | Moderate    | Moderate             |
| Landslide           | 4                 | \$ 200,000          | No Data*         | Moderate    | Moderate             |
| Tornado             | 2                 | \$ 160,000          | 0.03             | Moderate    | Moderate             |
| Thunderstorm/Wind   | 73                | \$ 1,644,500        | 1.24             | Moderate    | High                 |
| Hail                | 14                | \$25,000            | 0.24             | Moderate    | Moderate             |
| Severe Winter Storm | 31                | \$ 200,000          | 1.63             | Moderate    | High                 |
| Dam Failure         | 0                 | No Data             | 0                | Low         | Low                  |
| Earthquake          | 20                | No Data             | No Data          | Low         | Low                  |
| <b>TOTAL</b>        | <b>185</b>        | <b>\$ 2,464,500</b> |                  |             |                      |

\*Gallatin County experiences landslides every year, but the data provided here is an estimate of the past two years – there is not good enough data to include any further historical data.

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only

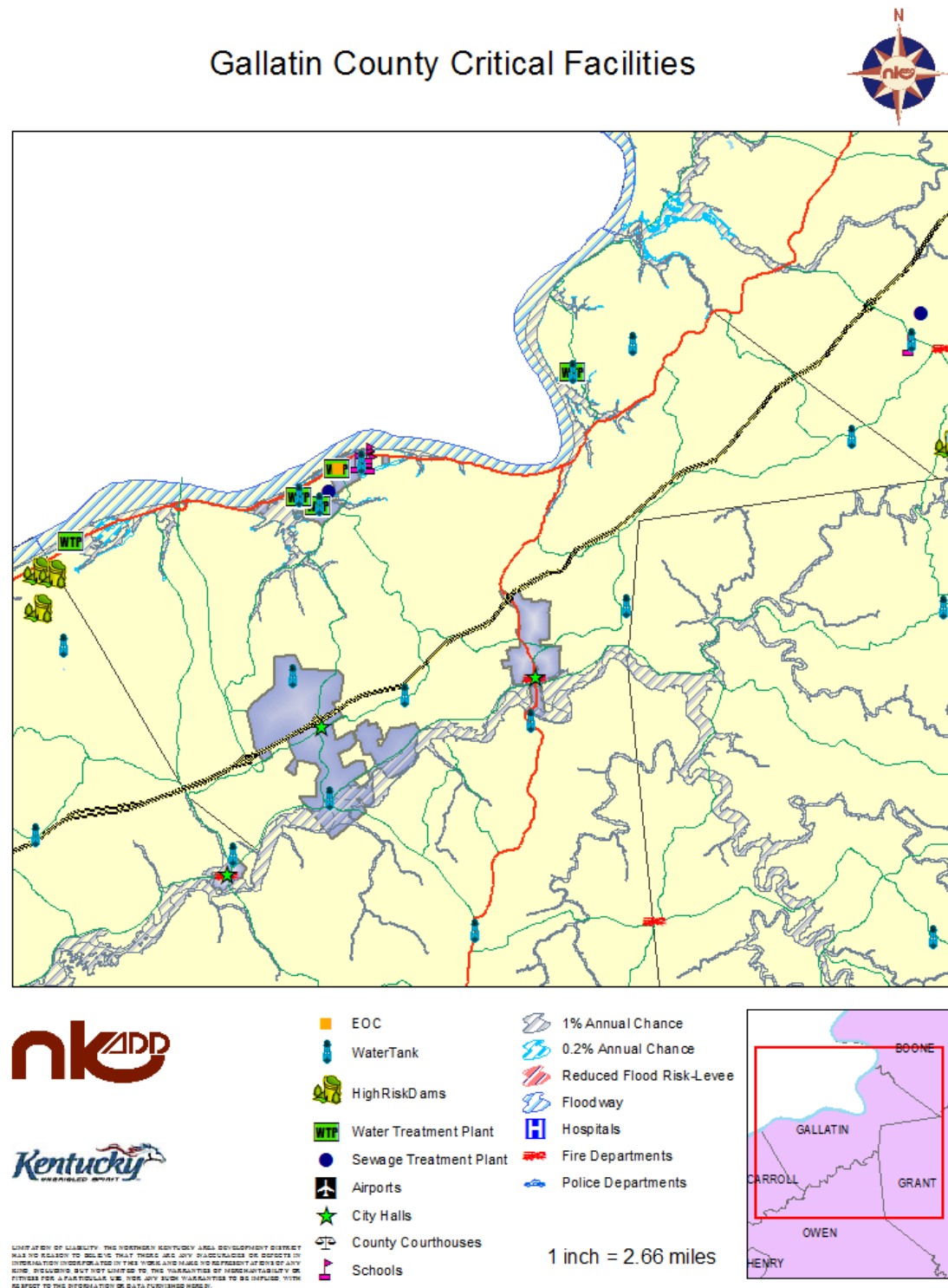
countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included in the county total. The data was gathered from best available sources, which varied by county. Where possible, local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

| Gallatin                          |                           |           |
|-----------------------------------|---------------------------|-----------|
| Type of Structure Occupancy Class | Structures in Hazard Area |           |
|                                   | Number                    | Percent   |
| Residential                       | 148                       | 4%        |
| Commercial                        | 0                         | 0%        |
| Industrial                        | 0                         | 0%        |
| Agricultural                      | 0                         | 0%        |
| Religious                         | 0                         | 0%        |
| Government                        | 1                         | 0%        |
| Education                         | 0                         | 0%        |
| <b>TOTAL</b>                      | <b>149</b>                | <b>4%</b> |

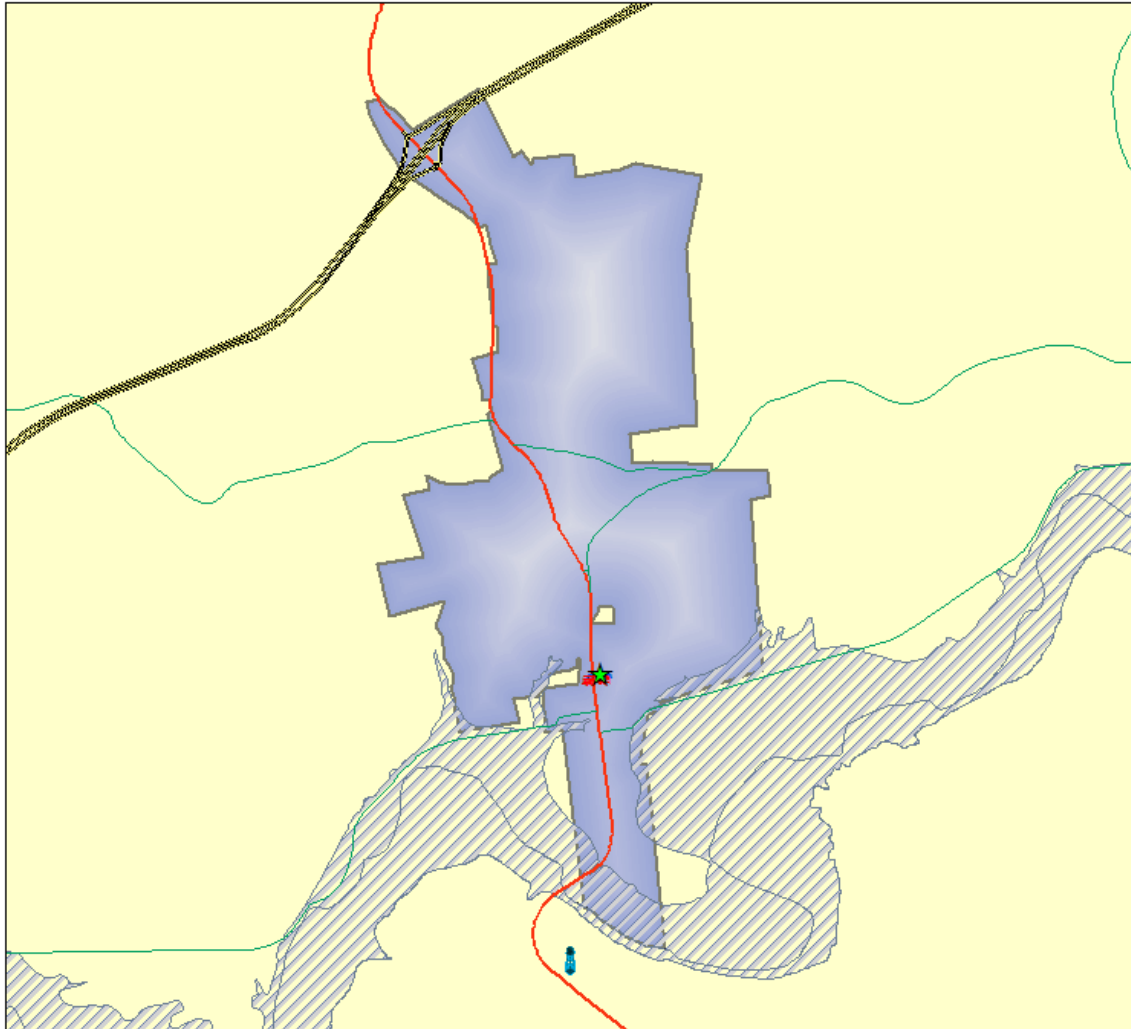
The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |

The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.



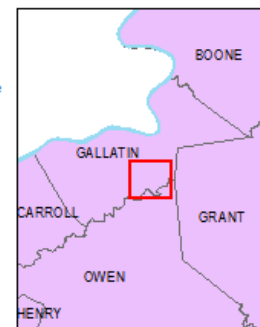
# City of Glencoe Critical Facilities



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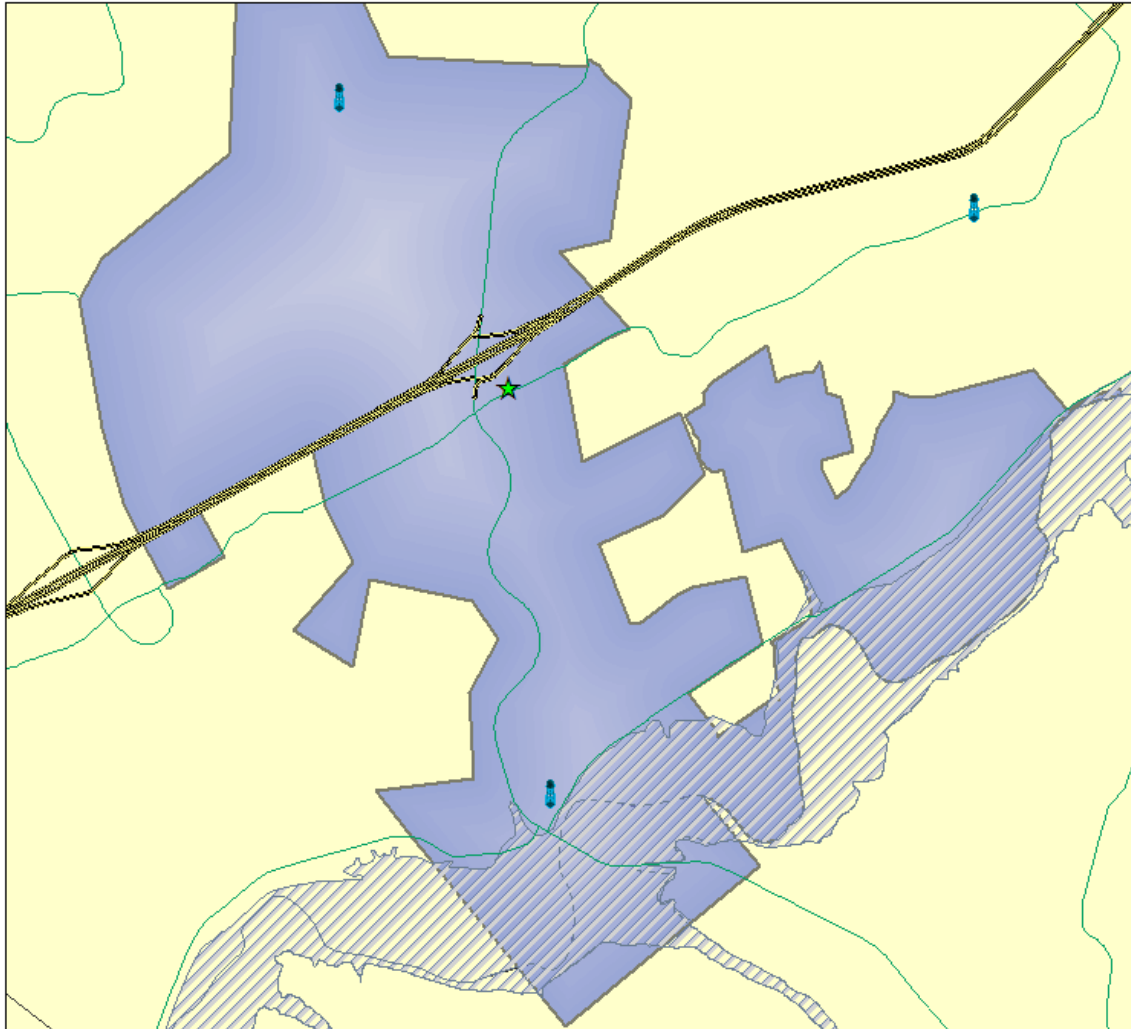
- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.48 miles





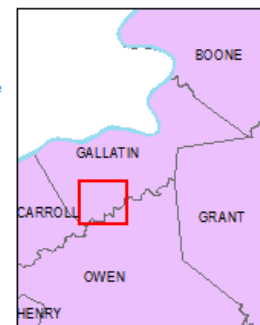
# City of Sparta Critical Facilities



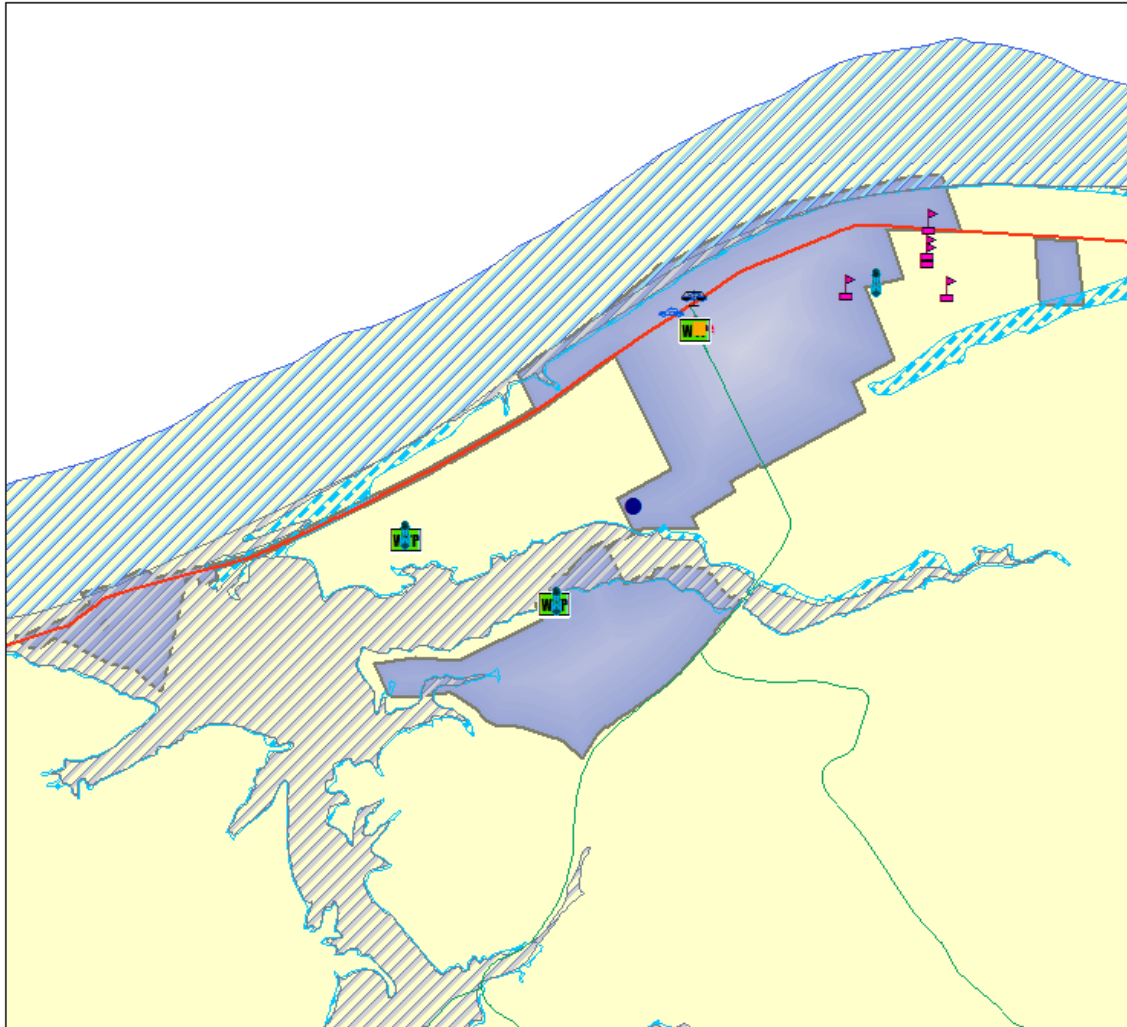
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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.56 miles



# City of Warsaw Critical Facilities



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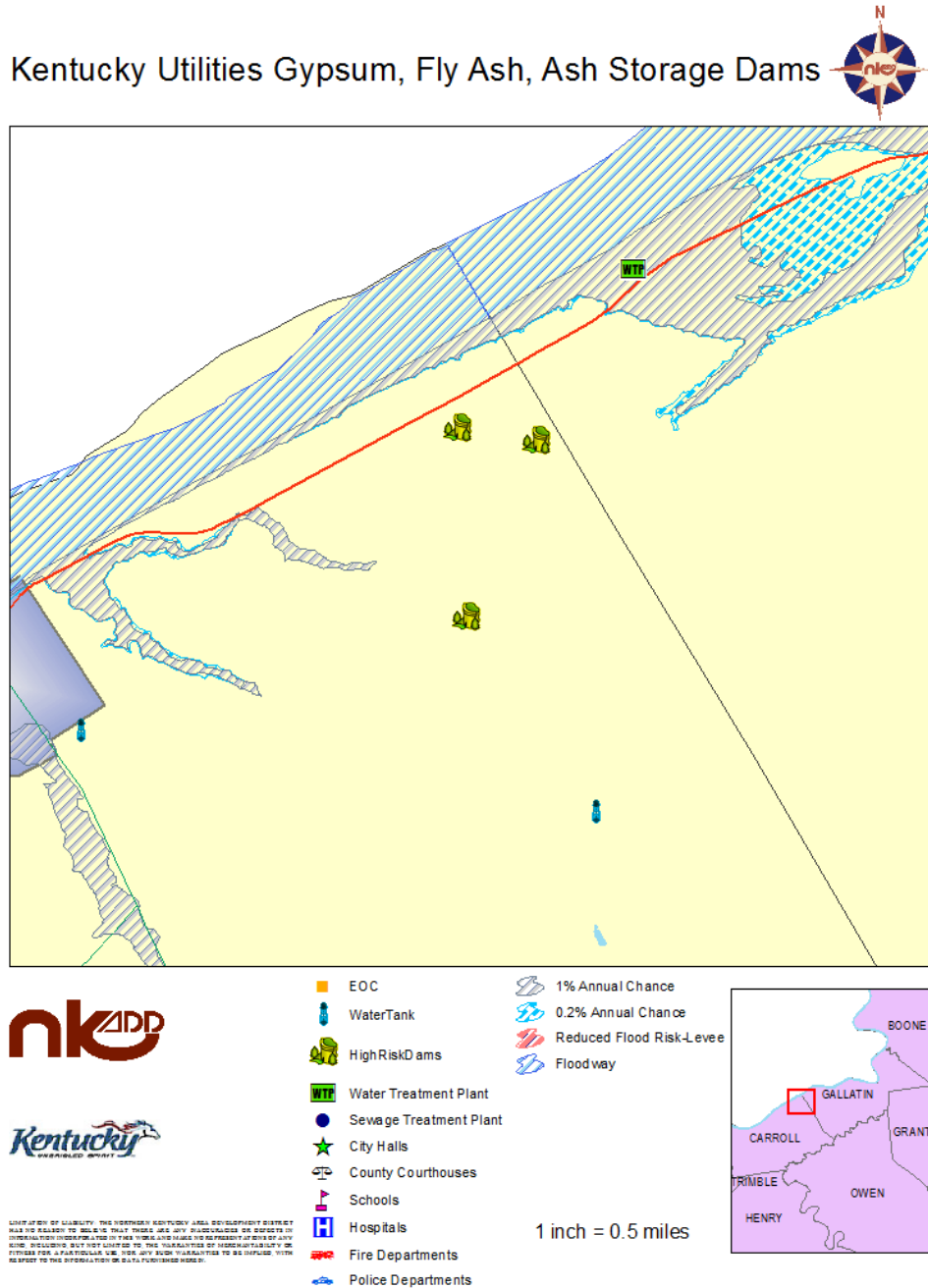
- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.43 miles



HIGH RISK DAMS – These are located in Carroll County, but would affect Gallatin County if failure occurs.

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GRANT COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|------------------|------------------|-------------|----------------------|
| Flash Flood         | 19                | \$ 116,000       | 1.00             | Moderate    | Moderate             |
| Flood               | 14                | \$ 28,500        | 0.74             | Moderate    | Low                  |
| Landslide           | No Data*          | No Data *        | No Data          | Moderate    | Moderate             |
| Tornado             | 4                 | \$ 805,000       | 0.07             | Moderate    | Low                  |
| Thunderstorm/Wind   | 87                | \$ 3,221,500     | 1.47             | Moderate    | High                 |
| Hail                | 34                | \$ 7,000         | 0.58             | Moderate    | Moderate             |
| Severe Winter Storm | 35                | \$ 200,000       | 1.84             | Moderate    | High                 |
| Dam Failure         | 0                 | No Data          | 0                | Moderate    | Low                  |
| Earthquake          | 20                | No Data          | No Data          | Low         | Moderate             |
| TOTAL               | 213               | \$ 4,378,000     |                  |             |                      |

\*Grant County experiences landslides, but there is not enough data available to accurately detail those events.

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included

in the county total. The data was gathered from best available sources, which varied by county. Where possible, local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

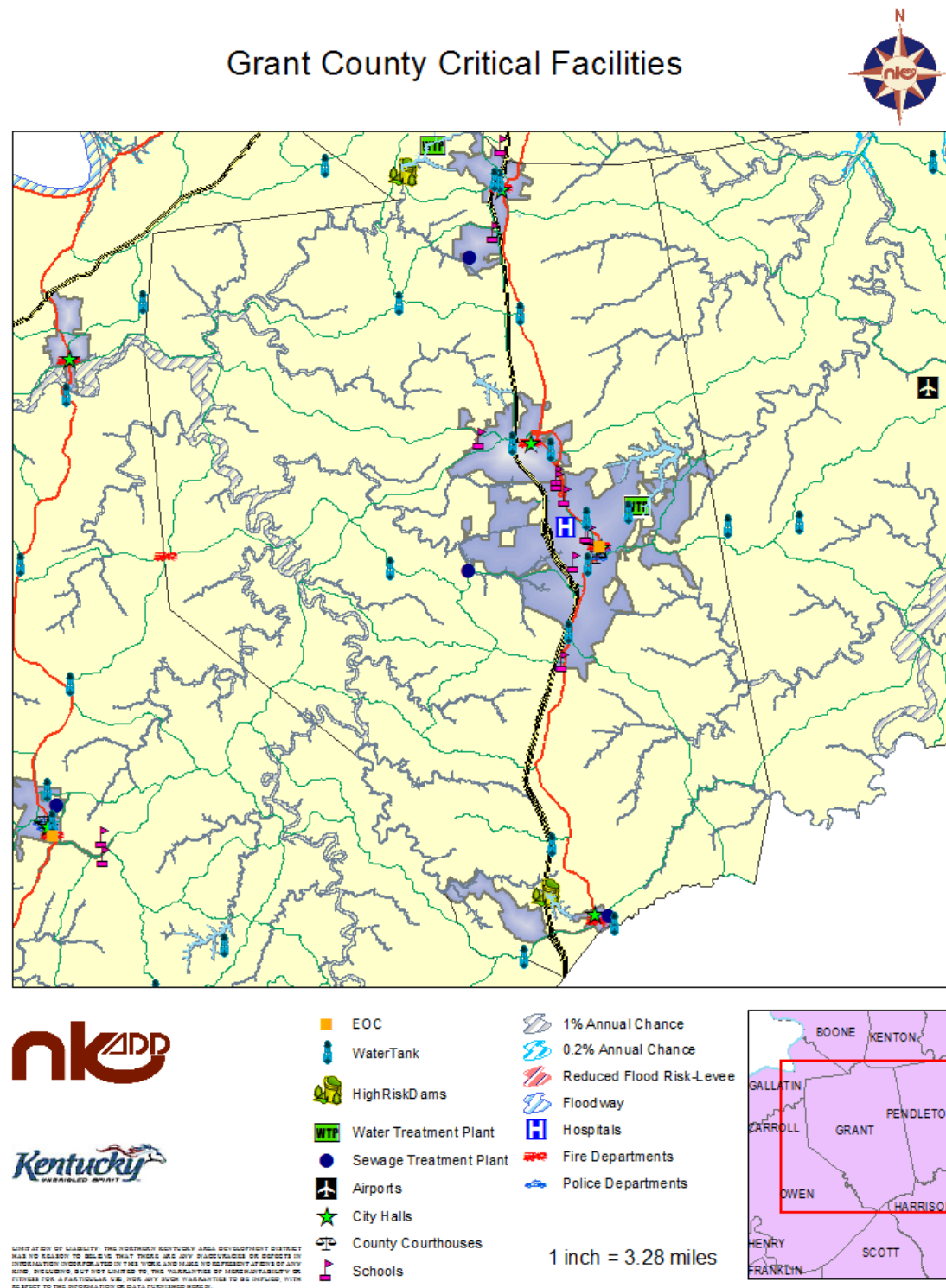
| Grant                                |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 0                         | 0%        |
| Commercial                           | 0                         | 0%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 0                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>0</b>                  | <b>0%</b> |

The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

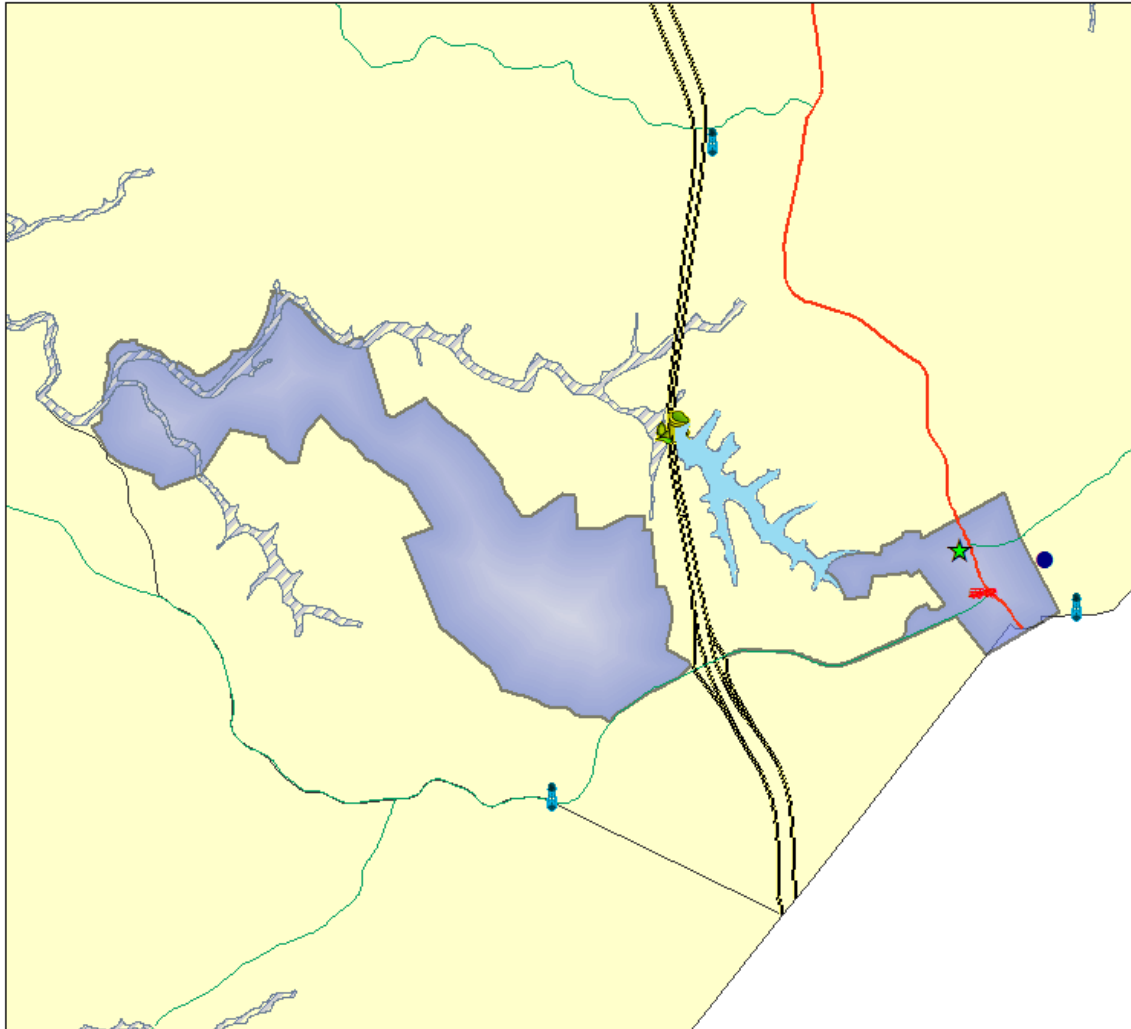
| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |



The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.



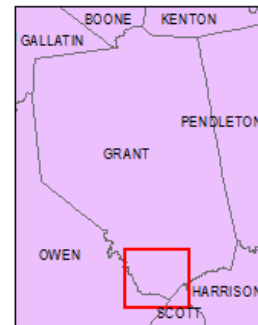
# City of Corinth Critical Facilities



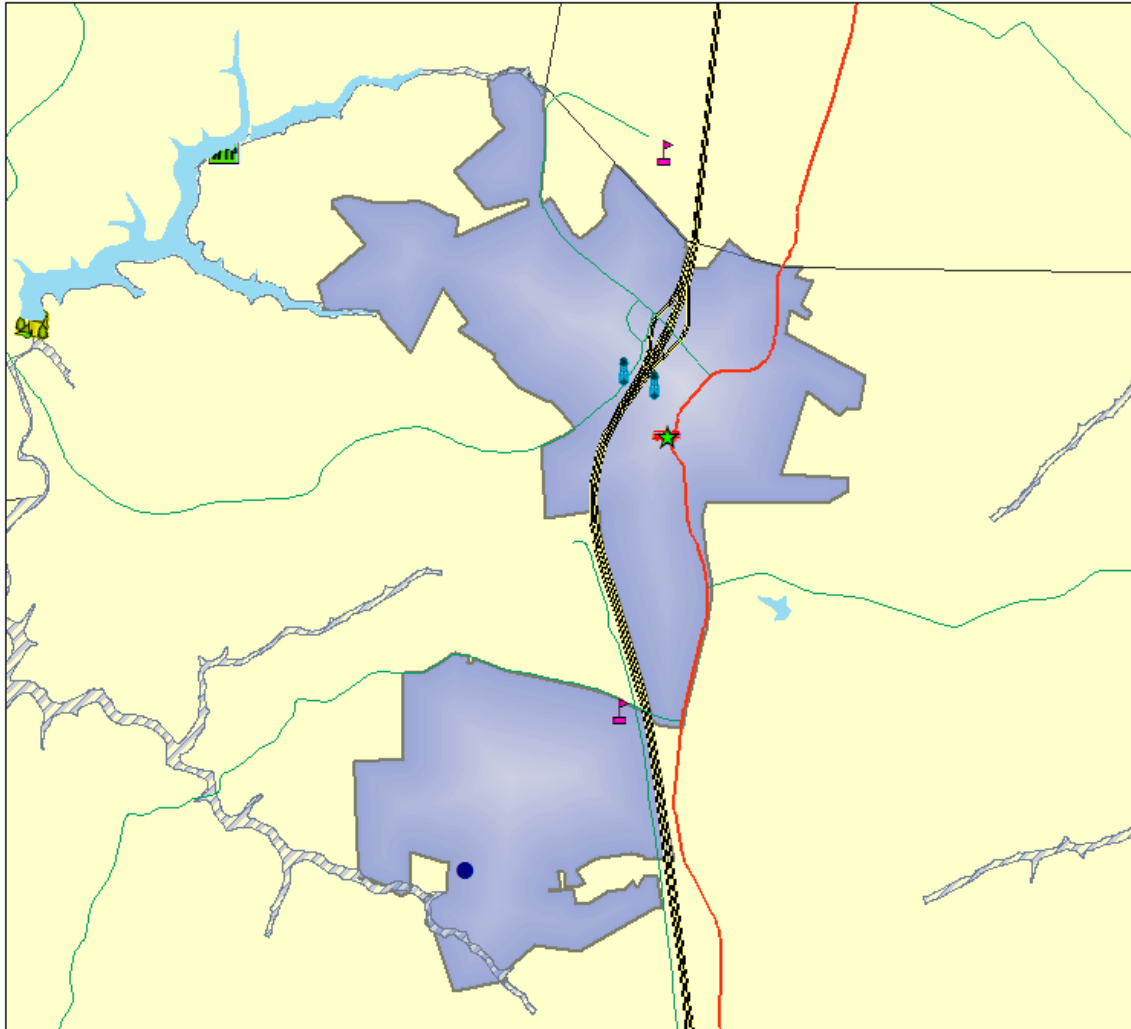
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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- ★ City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.68 miles



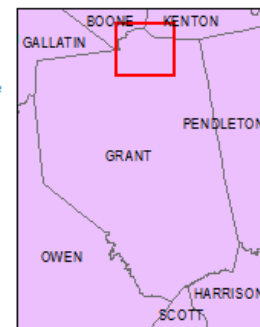
# City of Crittenden Critical Facilities



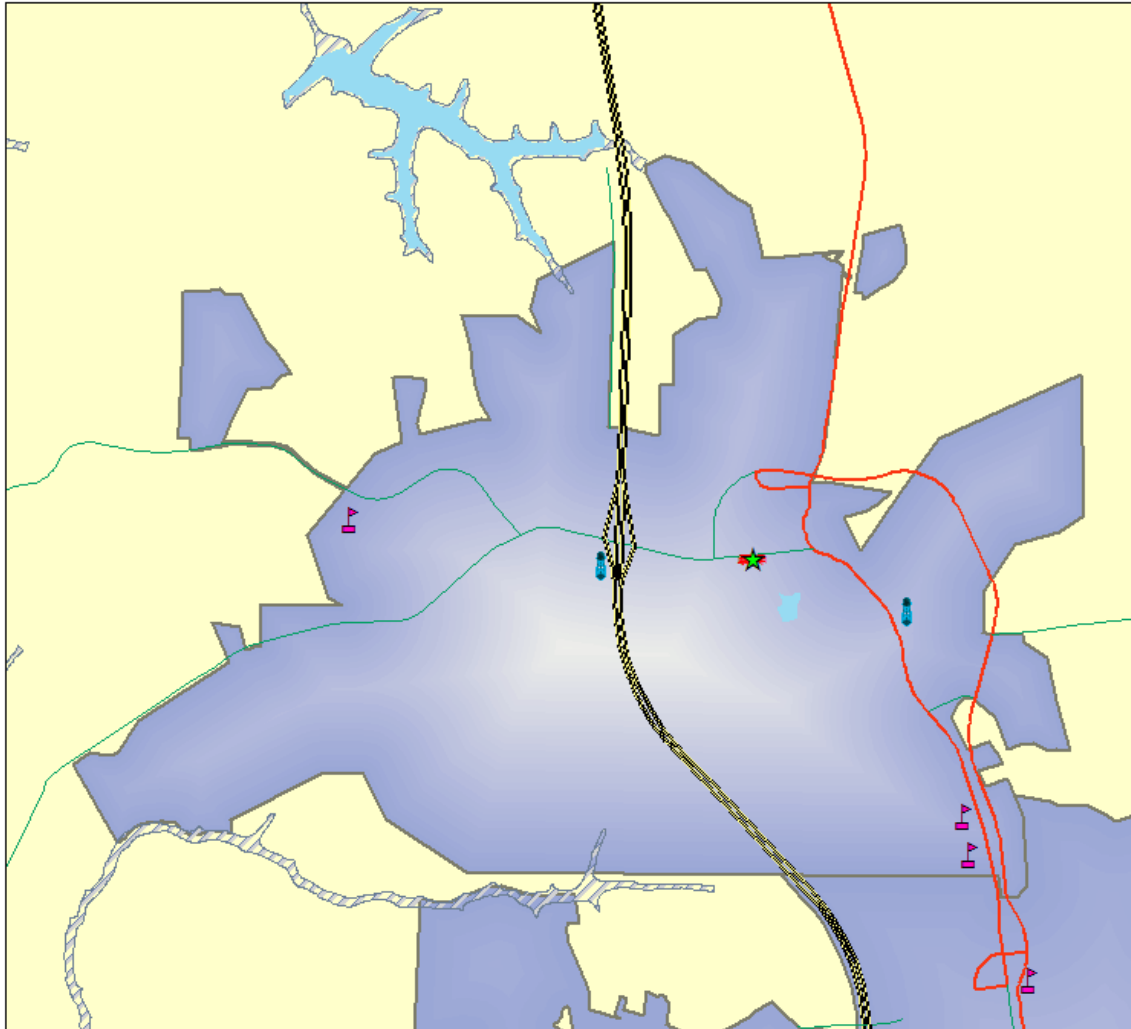
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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- ★ City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.61 miles



# City of Dry Ridge Critical Facilities



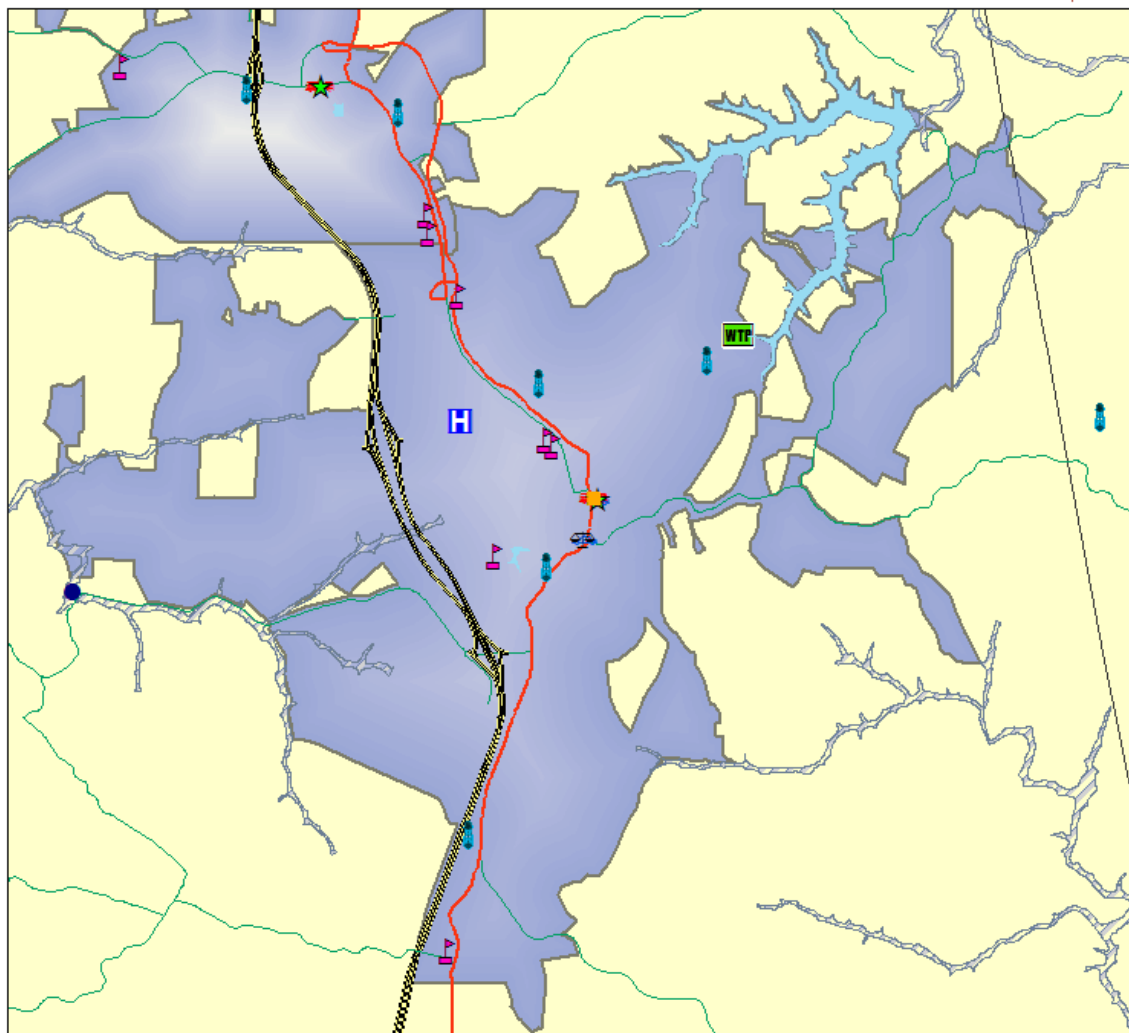
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- |                           |                          |
|---------------------------|--------------------------|
| ■ EOC                     | 1% Annual Chance         |
| WaterTank                 | 0.2% Annual Chance       |
| HighRiskDams              | Reduced Flood Risk-Levee |
| WTP Water Treatment Plant | Floodway                 |
| ● Sewage Treatment Plant  | Hospitals                |
| ✈ Airports                | Fire Departments         |
| ★ City Halls              | Police Departments       |
| County Courthouses        |                          |
| Flags Schools             |                          |

1 inch = 0.5 miles



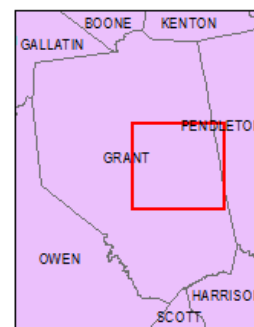
# City of Williamstown Critical Facilities



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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

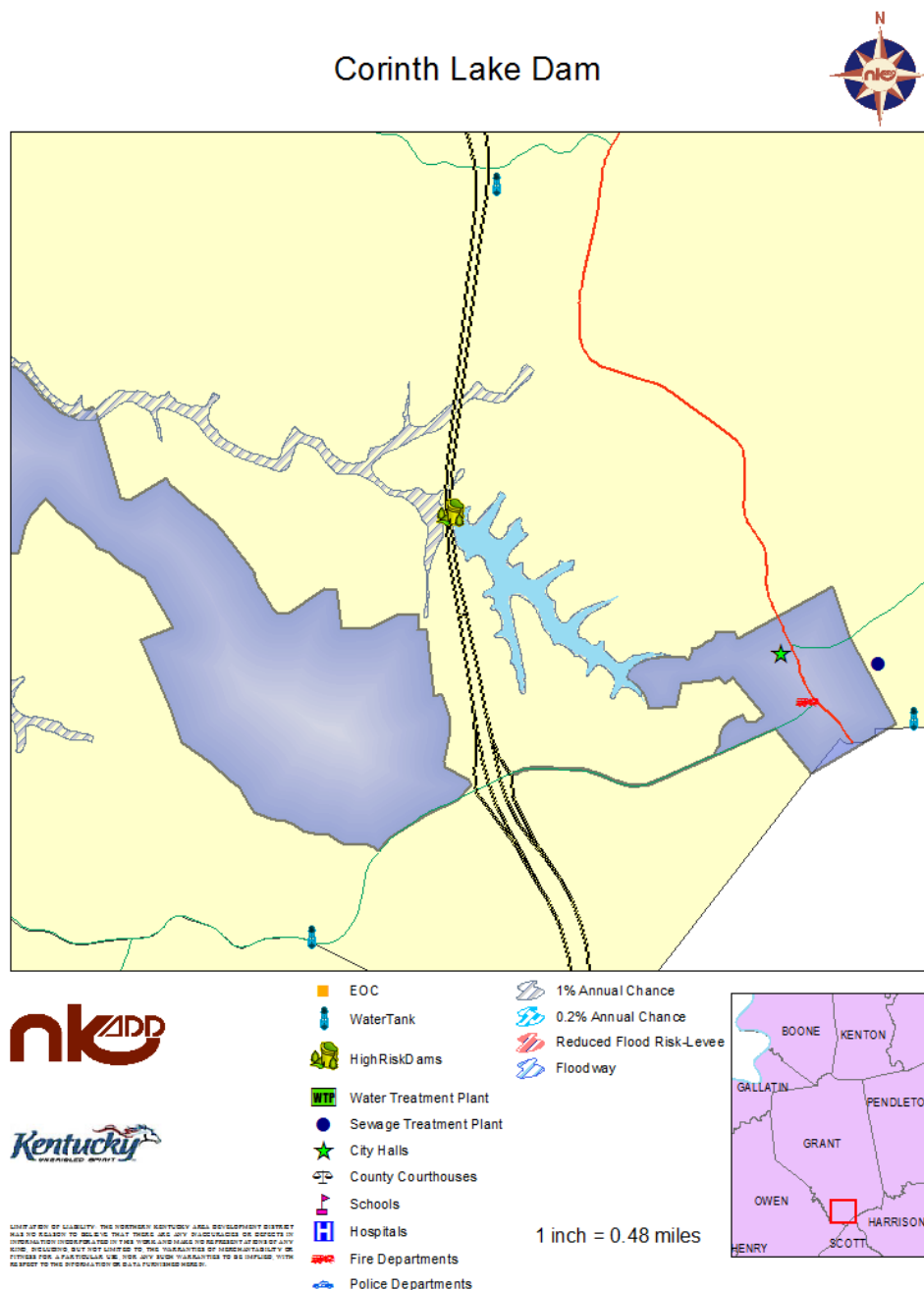
1 inch = 1 miles



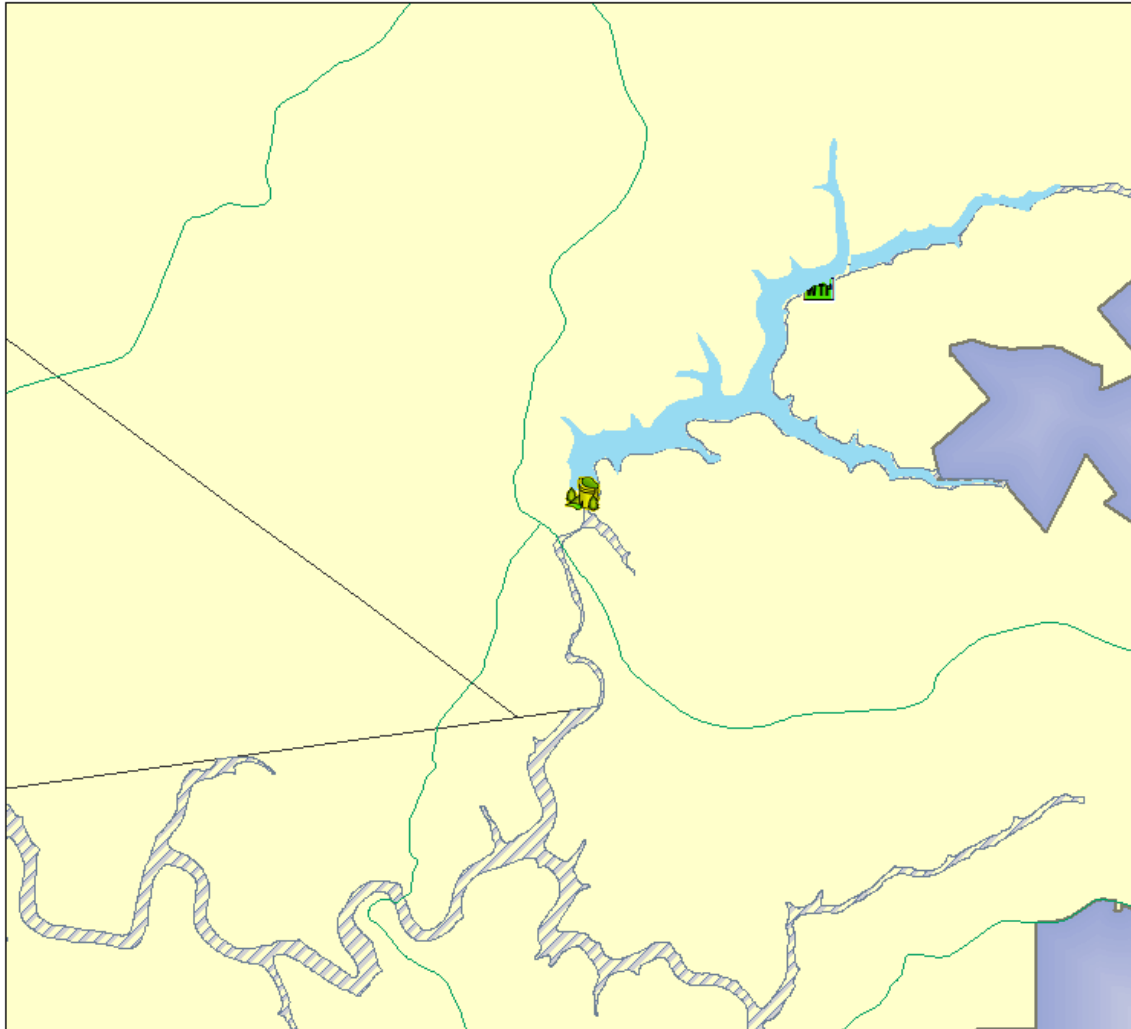


## HIGH RISK DAMS

According to the Kentucky Division of Water, High Hazard (C) Structures located such that failure may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. Moderate Hazard (B) Structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Low Hazard (A) Structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Only High Risk Dams are included in this vulnerability assessment, since they are the only dams that may affect loss of life and also affect important public health facilities such as utilities and transportation routes.



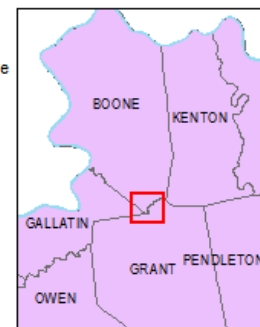
# Bullock Pen Lake Dam



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- EOC
- WaterTank
- High Risk Dams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Hospitals
- Fire Departments
- Police Departments
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway

1 inch = 0.5 miles



KENTON COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|------------------|------------------|-------------|----------------------|
| Flash Flood         | 34                | \$ 2,357,000     | 1.79             | High        | High                 |
| Flood               | 22                | \$ 40,000        | 1.16             | High        | High                 |
| Landslide           | 19 (recorded)     | \$ 1,492,064     | 0.46             | High        | Moderate             |
| Tornado             | 8                 | \$ 23,065,000    | 0.14             | Moderate    | Moderate             |
| Thunderstorm/Wind   | 84                | \$ 18,550,000    | 1.42             | Moderate    | Moderate             |
| Hail                | 42                | \$ 23,000        | 0.71             | Moderate    | Moderate             |
| Severe Winter Storm | 40                | \$ 400,000       | 2.11             | Moderate    | High                 |
| Dam Failure         | 0                 | No Data          | 0                | Moderate    | Low                  |
| Earthquake          | 20                | No Data          | No Data          | Low         | Moderate             |
| TOTAL               | 269               | \$ 45,927,064    |                  |             |                      |

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

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## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included in the county total. The data was gathered from best available sources, which varied by county. Where possible,

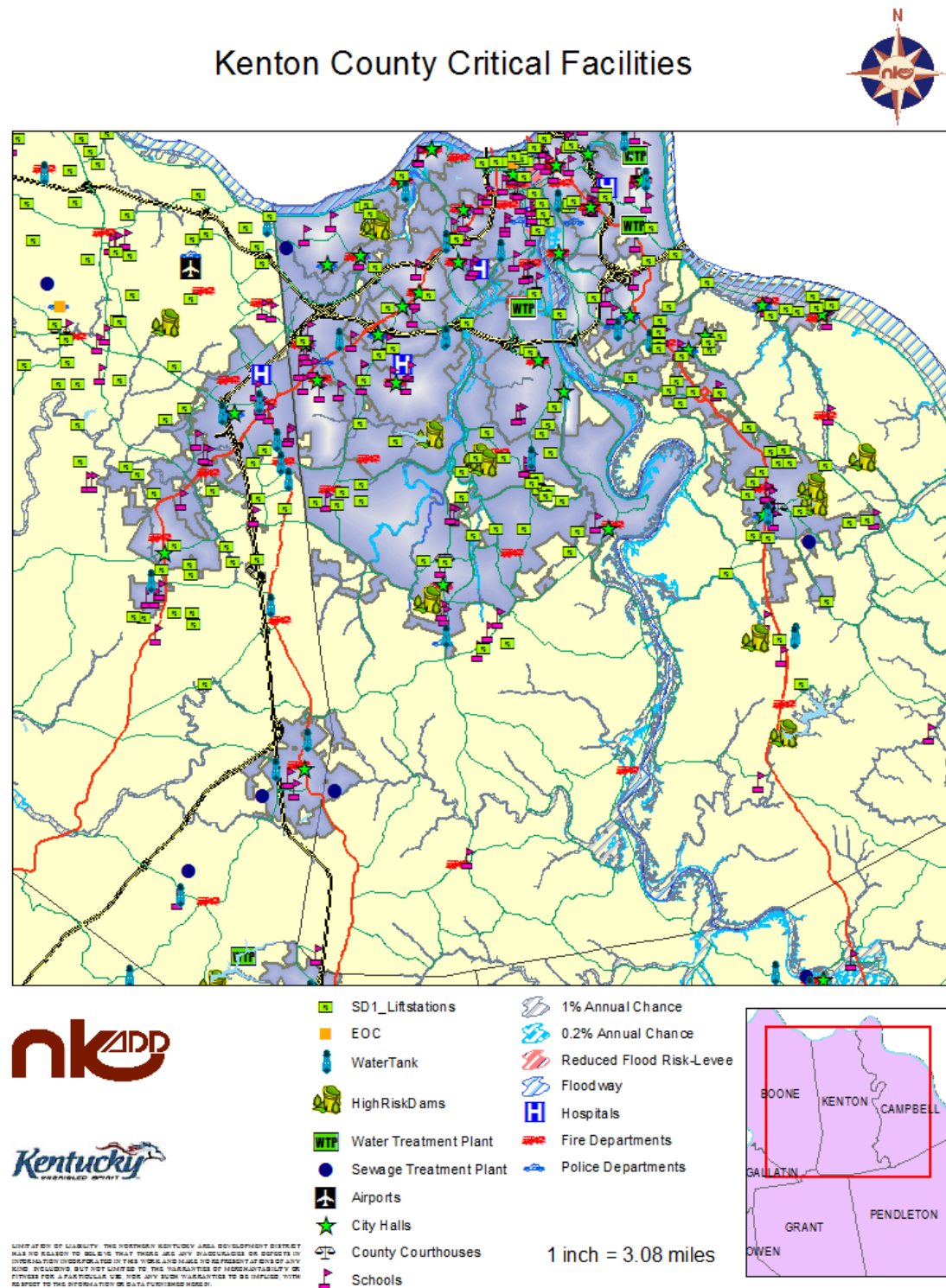
local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

| Kenton                               |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 1,752                     | 2%        |
| Commercial                           | 200                       | 0%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 0                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>1,952</b>              | <b>2%</b> |

The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

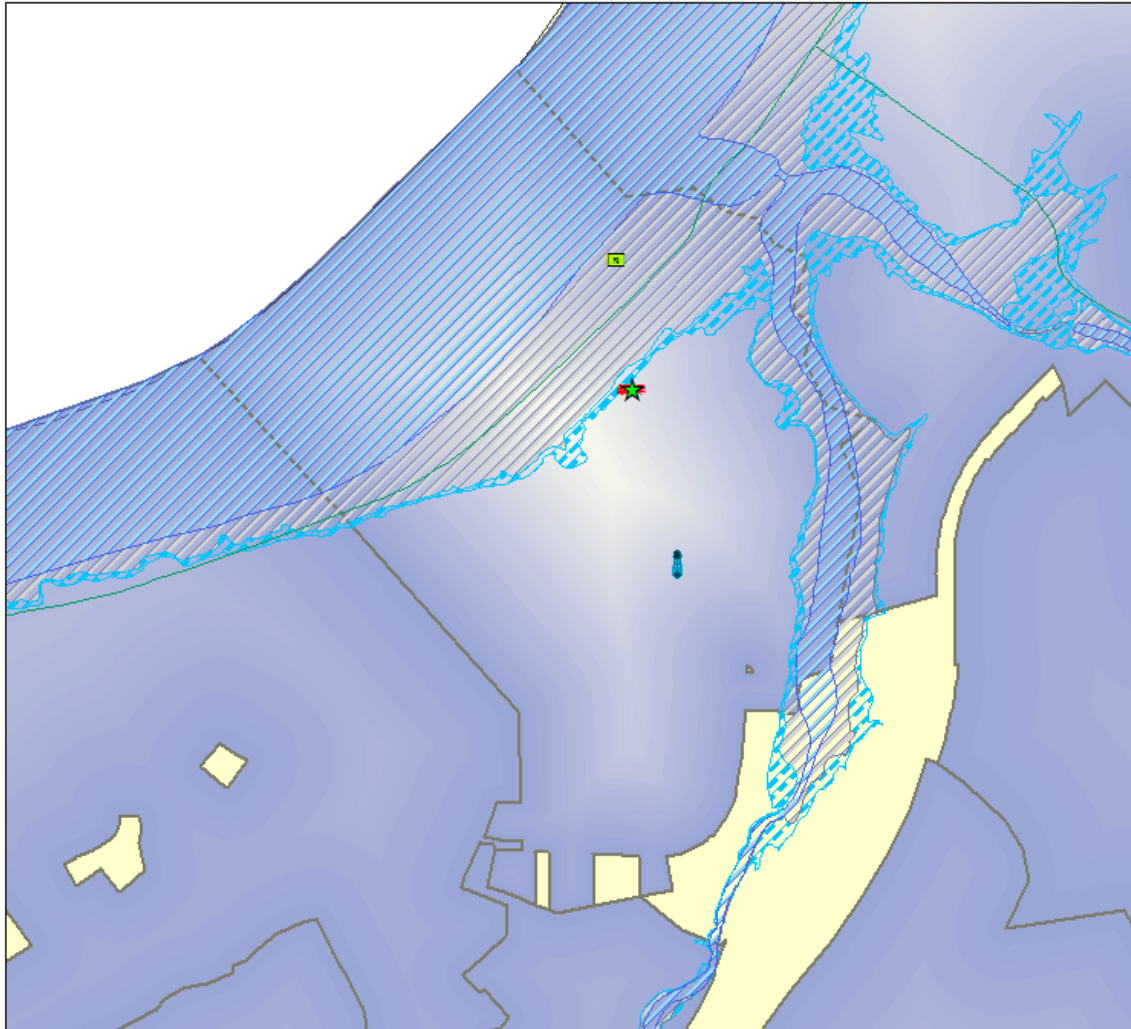
| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |

The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.





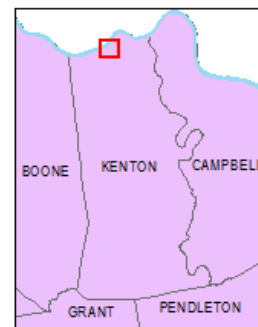
# City of Bromley Critical Facilities



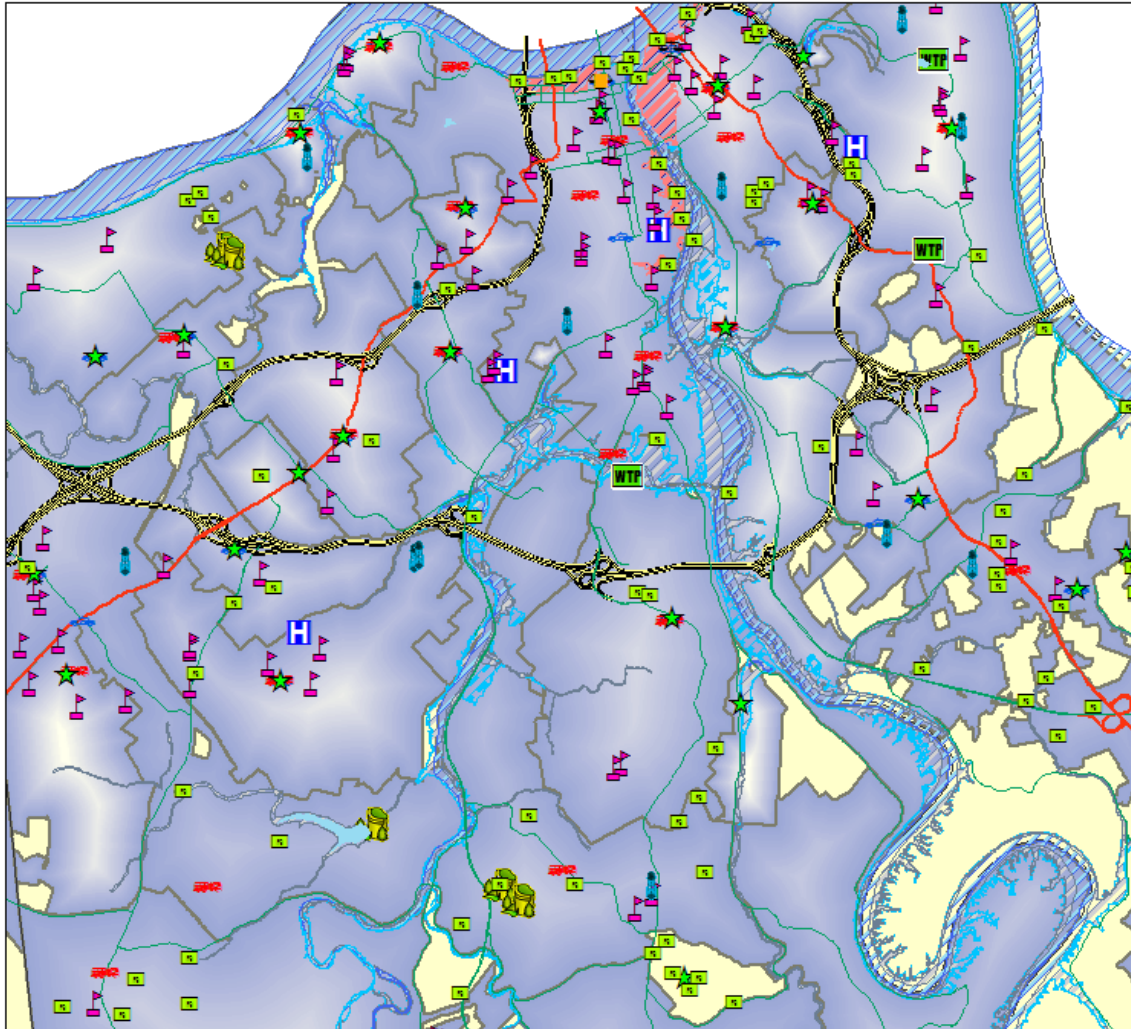
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.19 miles



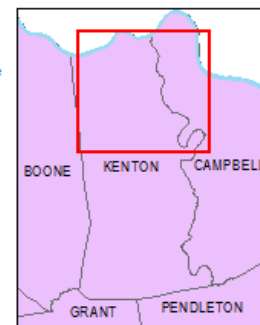
# City of Covington Critical Facilities



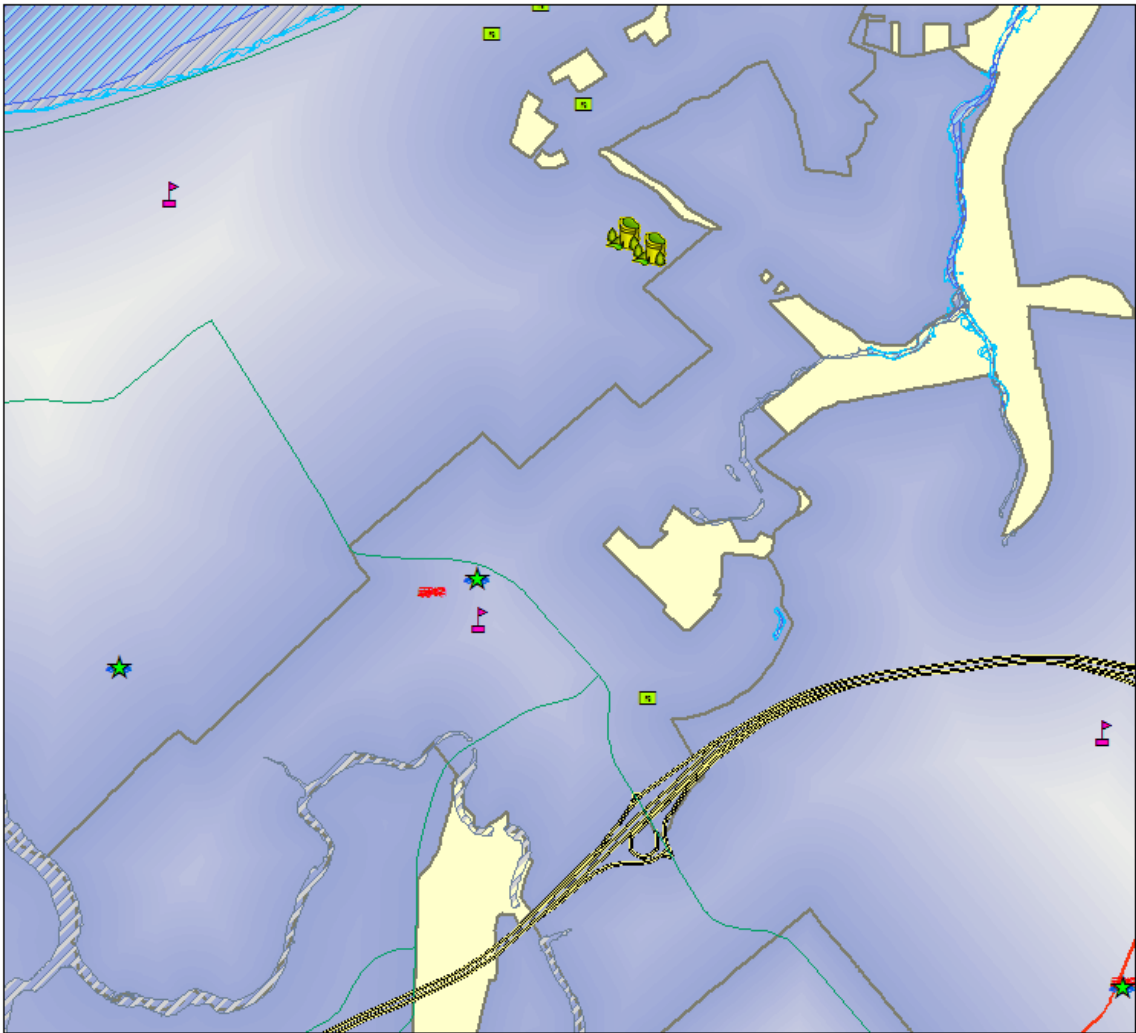
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 1.36 miles



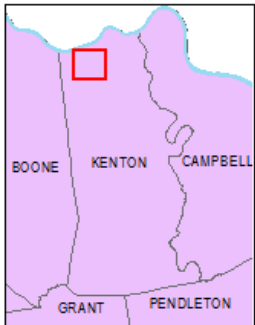
# City of Crescent Springs Critical Facilities



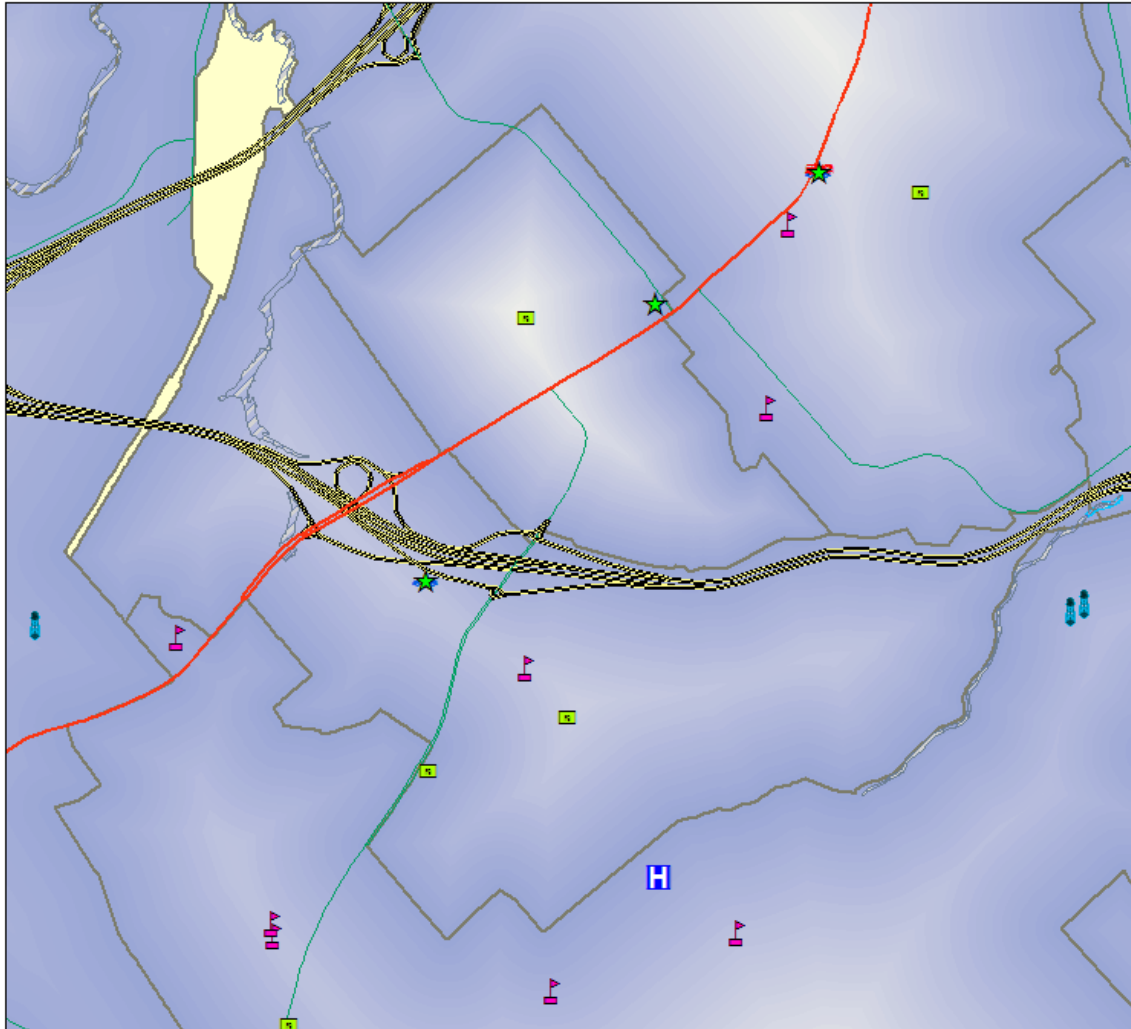
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.34 miles



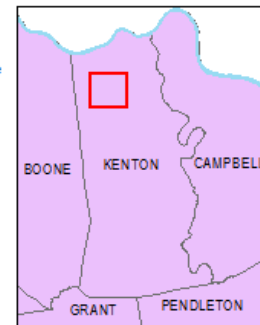
# City of Crestview Hills Critical Facilities



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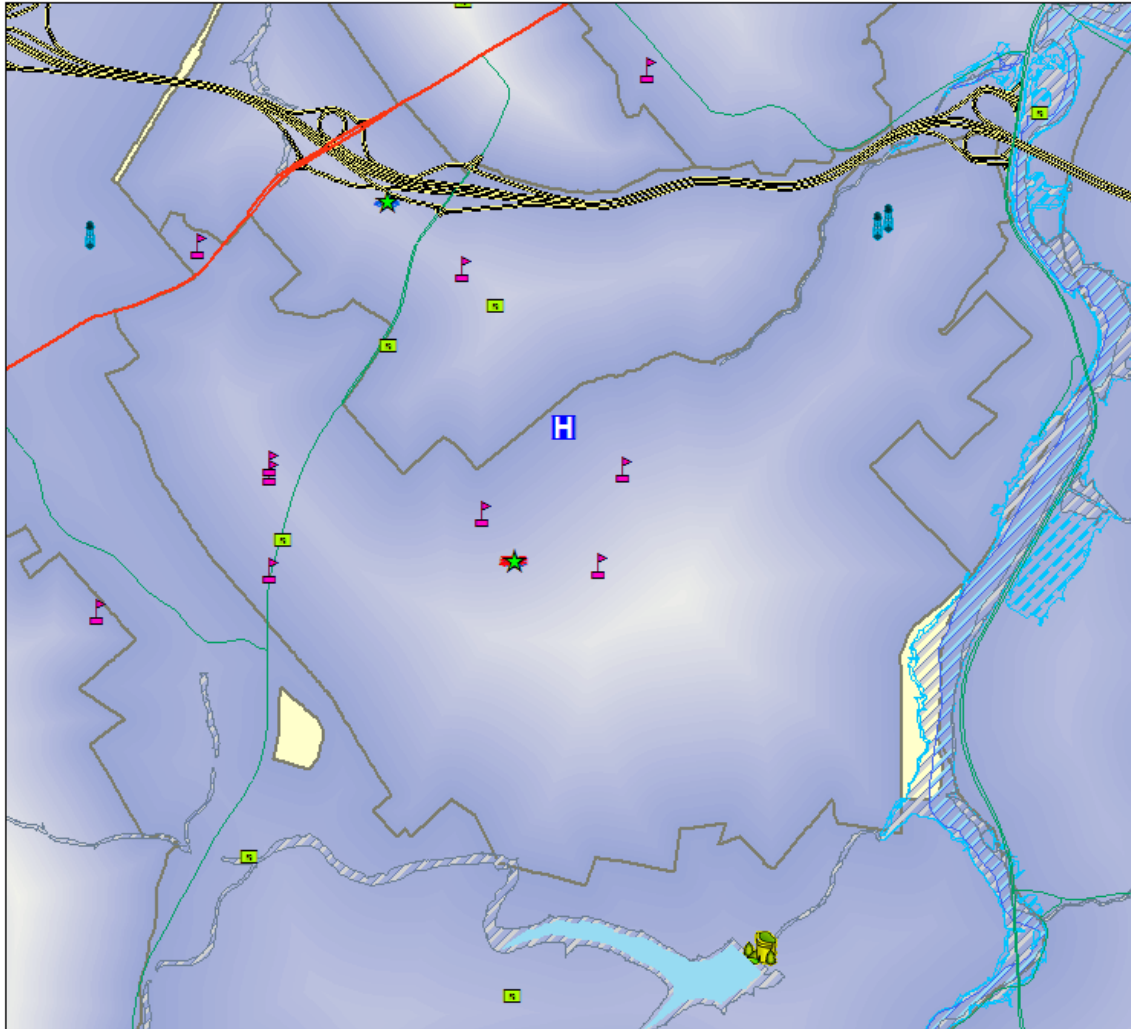
- SD1\_Liftstations
- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.38 miles





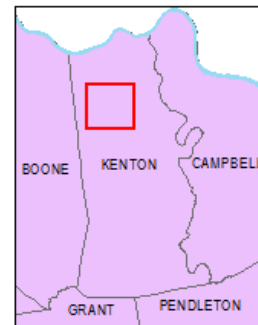
# City of Edgewood Critical Facilities



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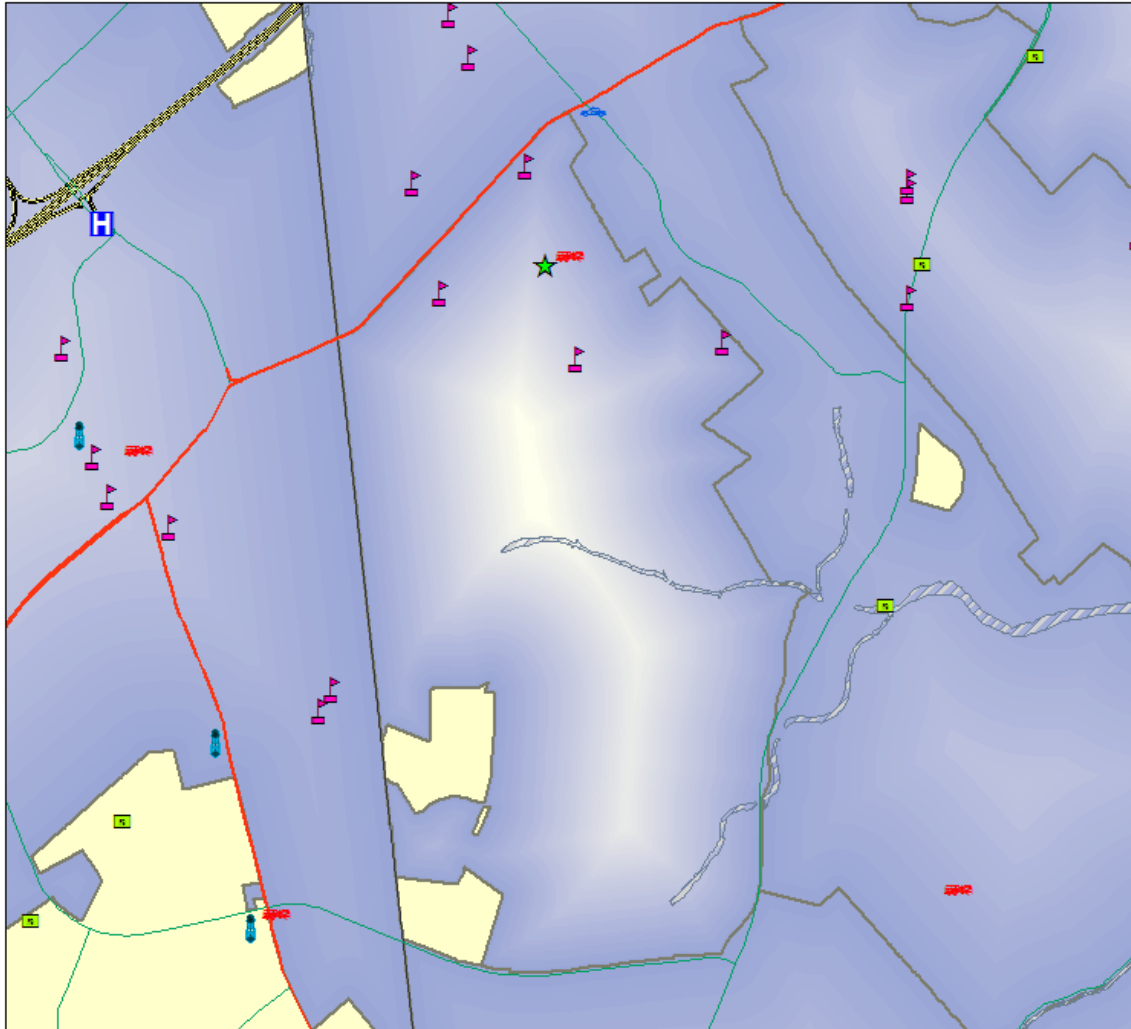
- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.5 miles





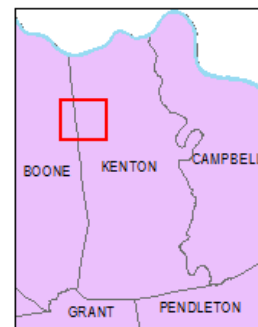
# City of Elsmere Critical Facilities



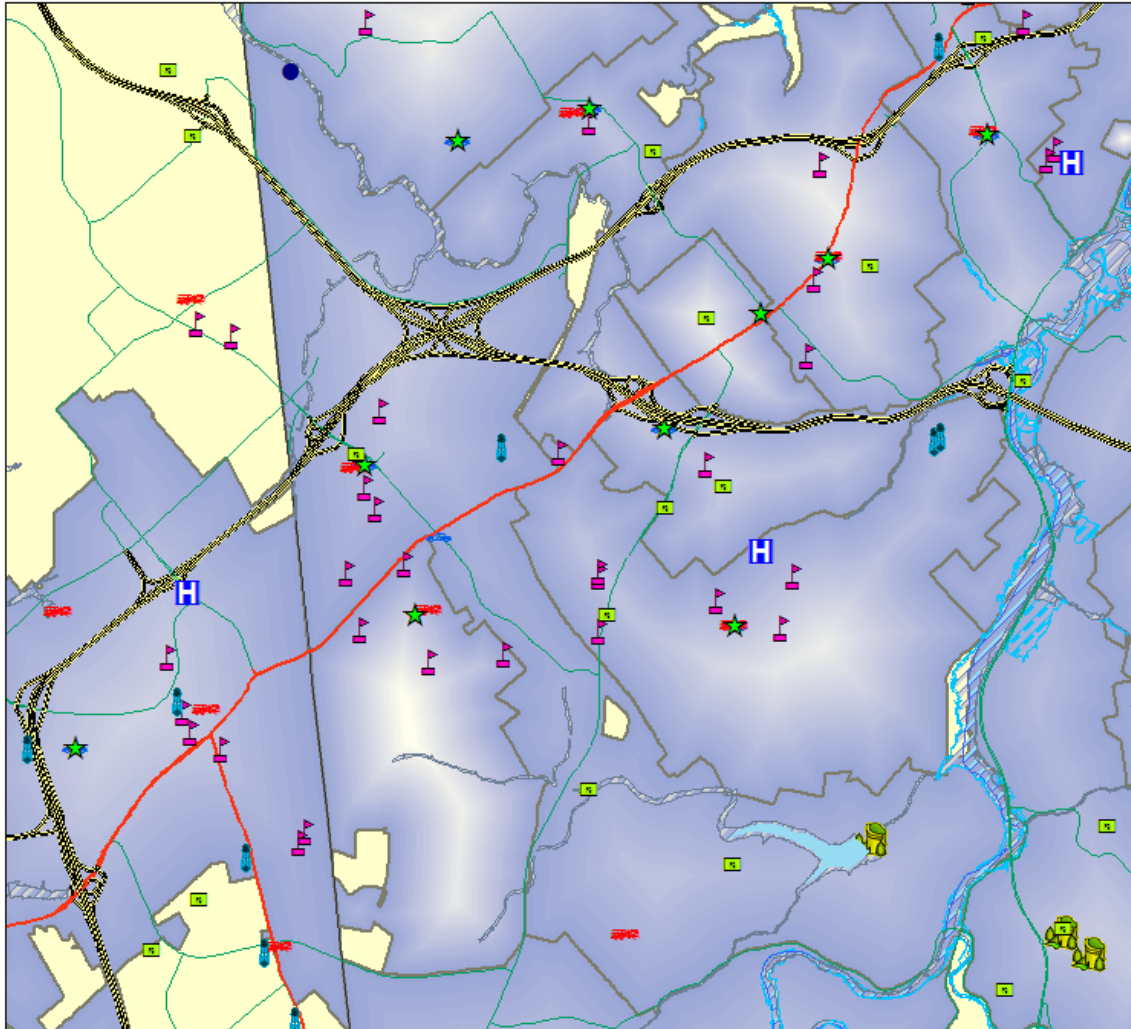
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- SD1\_Liftstations
- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.47 miles



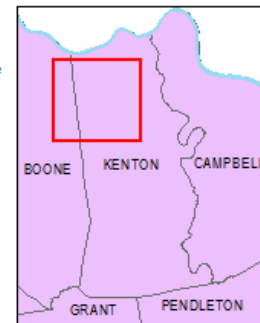
# City of Erlanger Critical Facilities



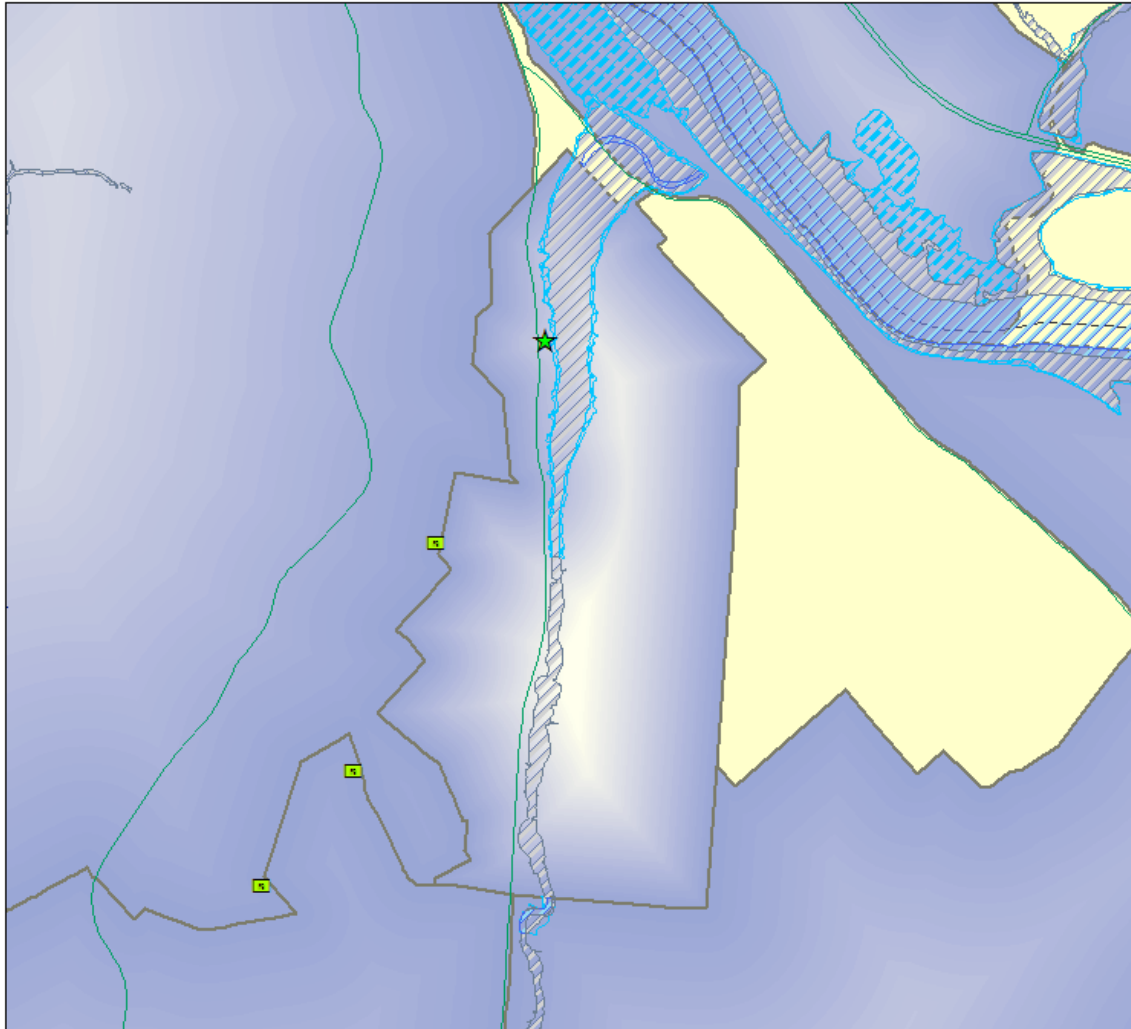
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.91 miles



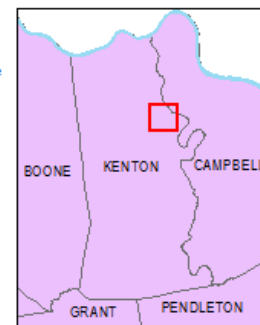
# City of Fairview Critical Facilities



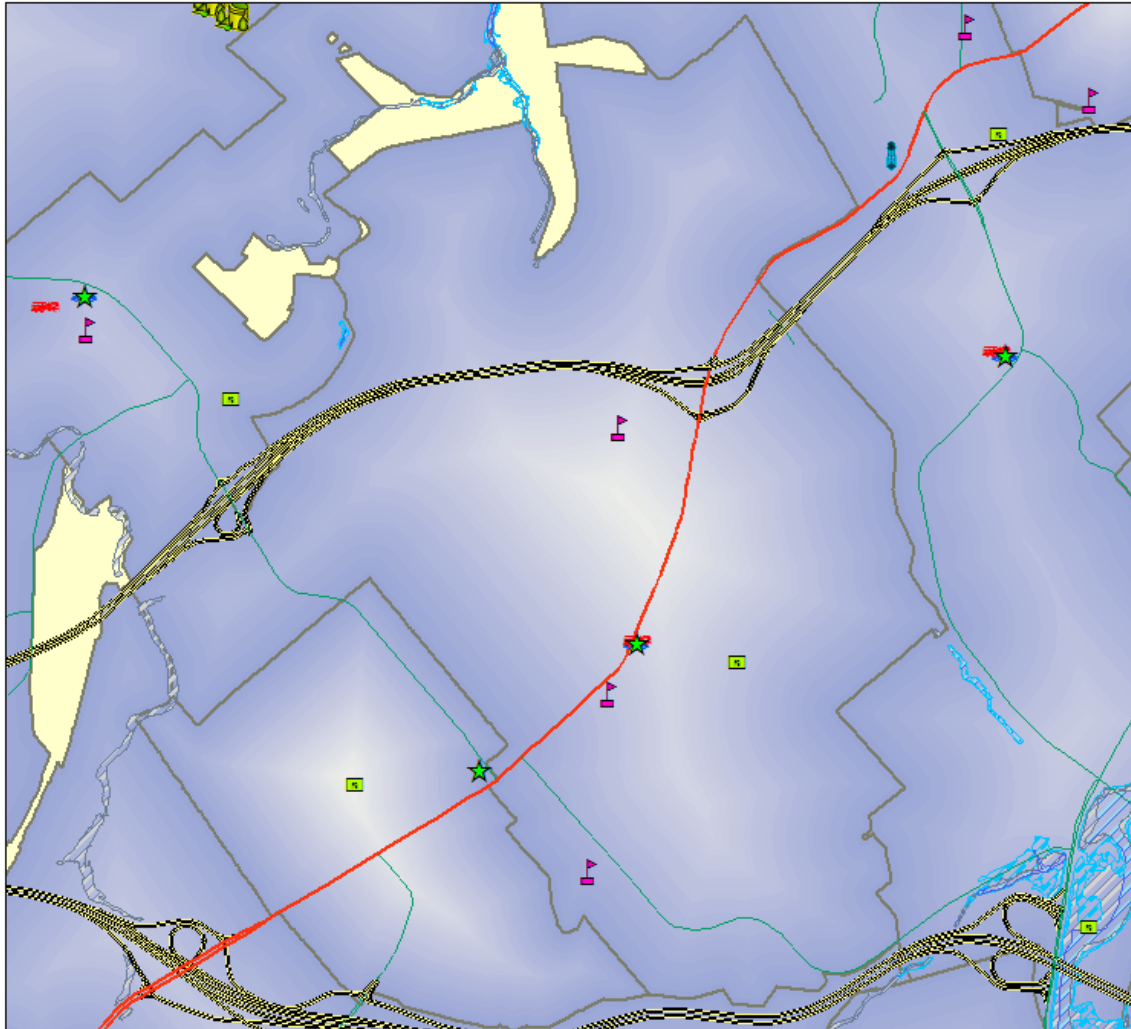
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.29 miles



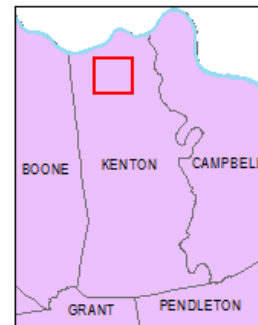
# City of Fort Mitchell Critical Facilities



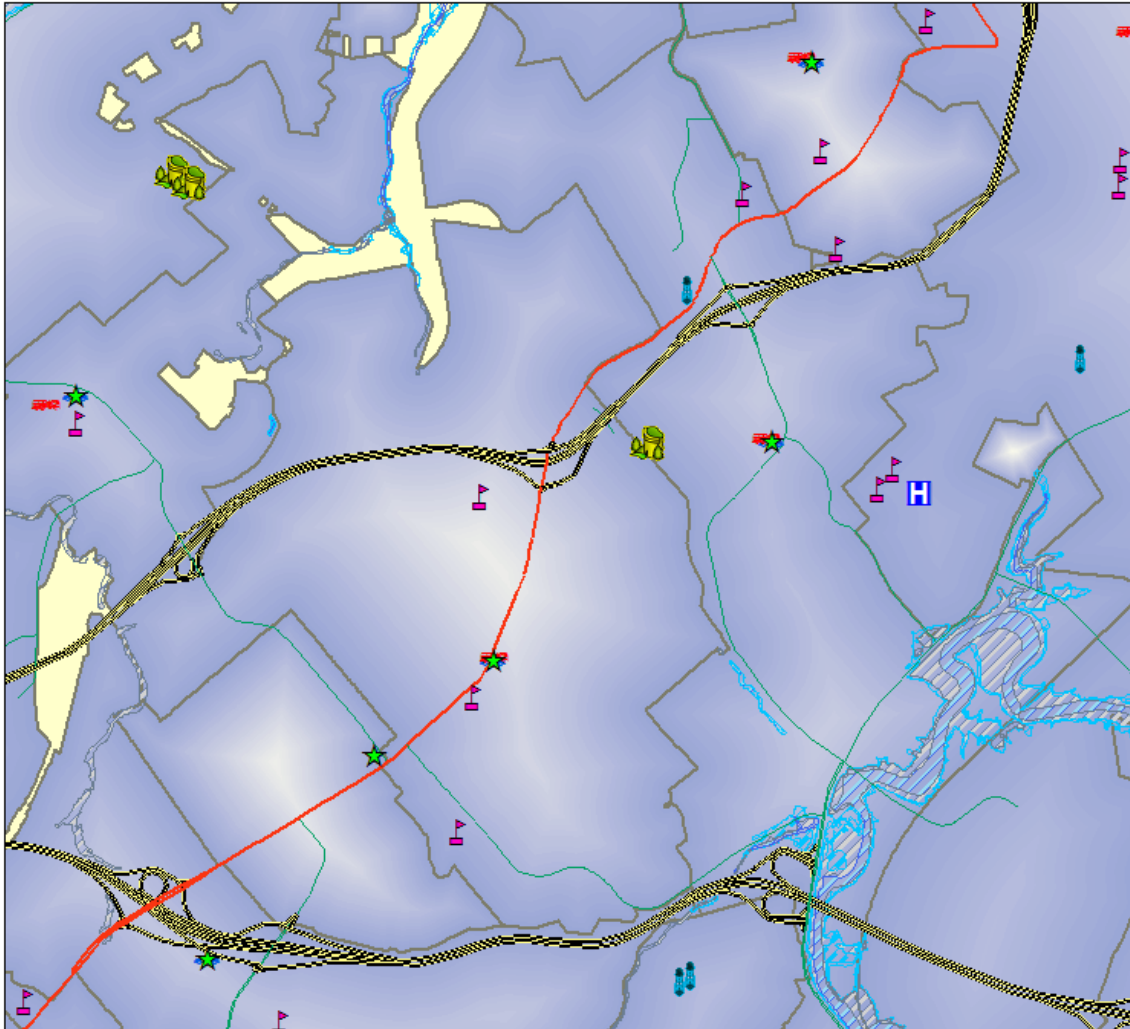
DISCLAIMER OF LIABILITY: THE NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT HAS NO REASON TO BELIEVE THAT THERE ARE ANY MISCELLANEOUS OR DEFECTS IN INFORMATION INCORPORATED IN THIS WORK AND HAS TO REPRESENT AT RISK OF ANY SUCH INCLUDING, BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NOR ANY SUCH WARRANTIES TO BE IMPLIED WITH RESPECT TO THE INFORMATION OR DATA FURNISHED HEREIN.

- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

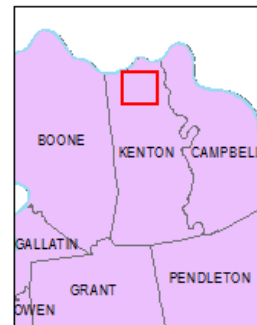
1 inch = 0.39 miles



# City of Fort Wright Critical Facilities



- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Fire Departments
- Police Departments
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway

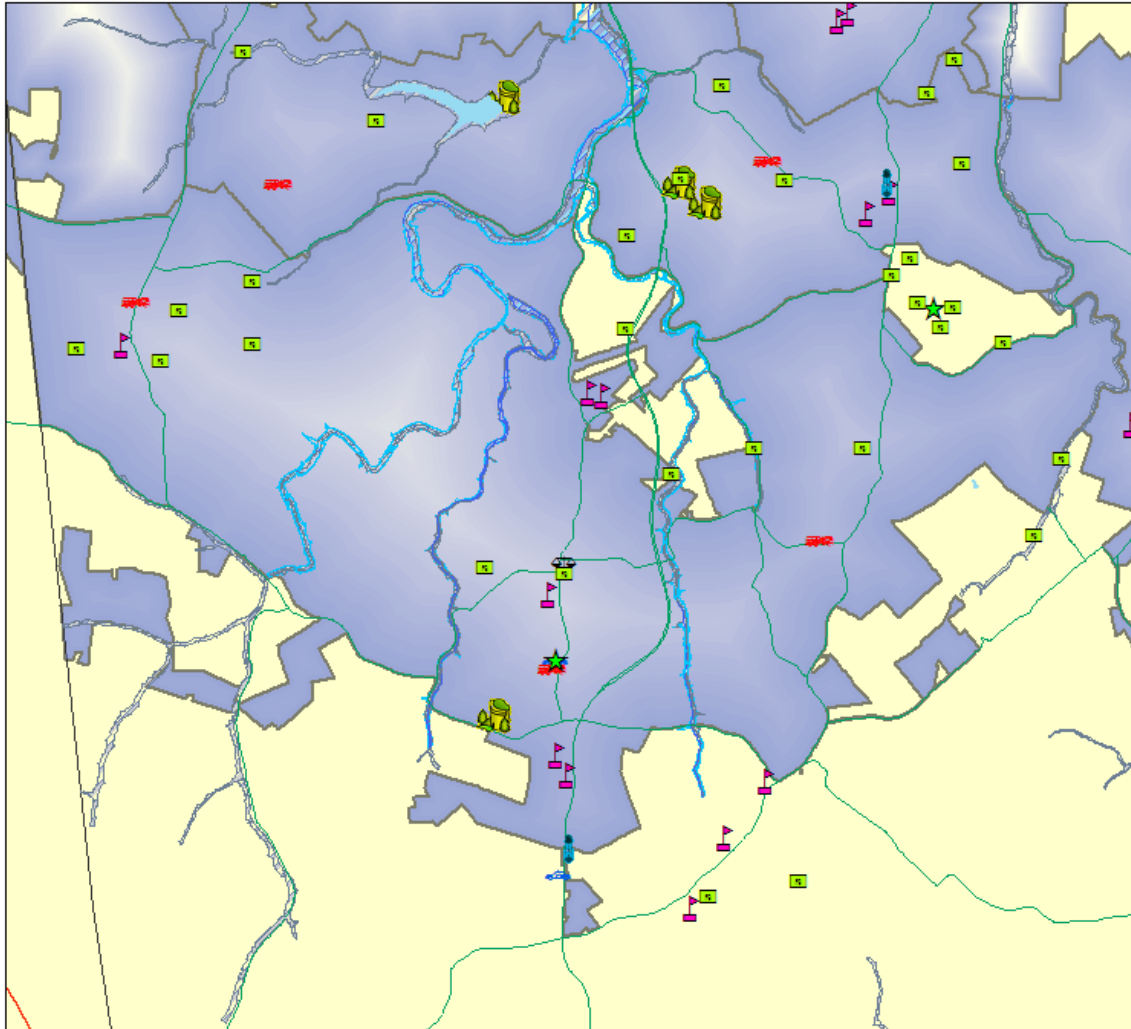


1 inch = 0.52 miles

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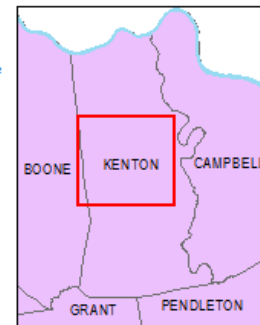
# City of Independence Critical Facilities



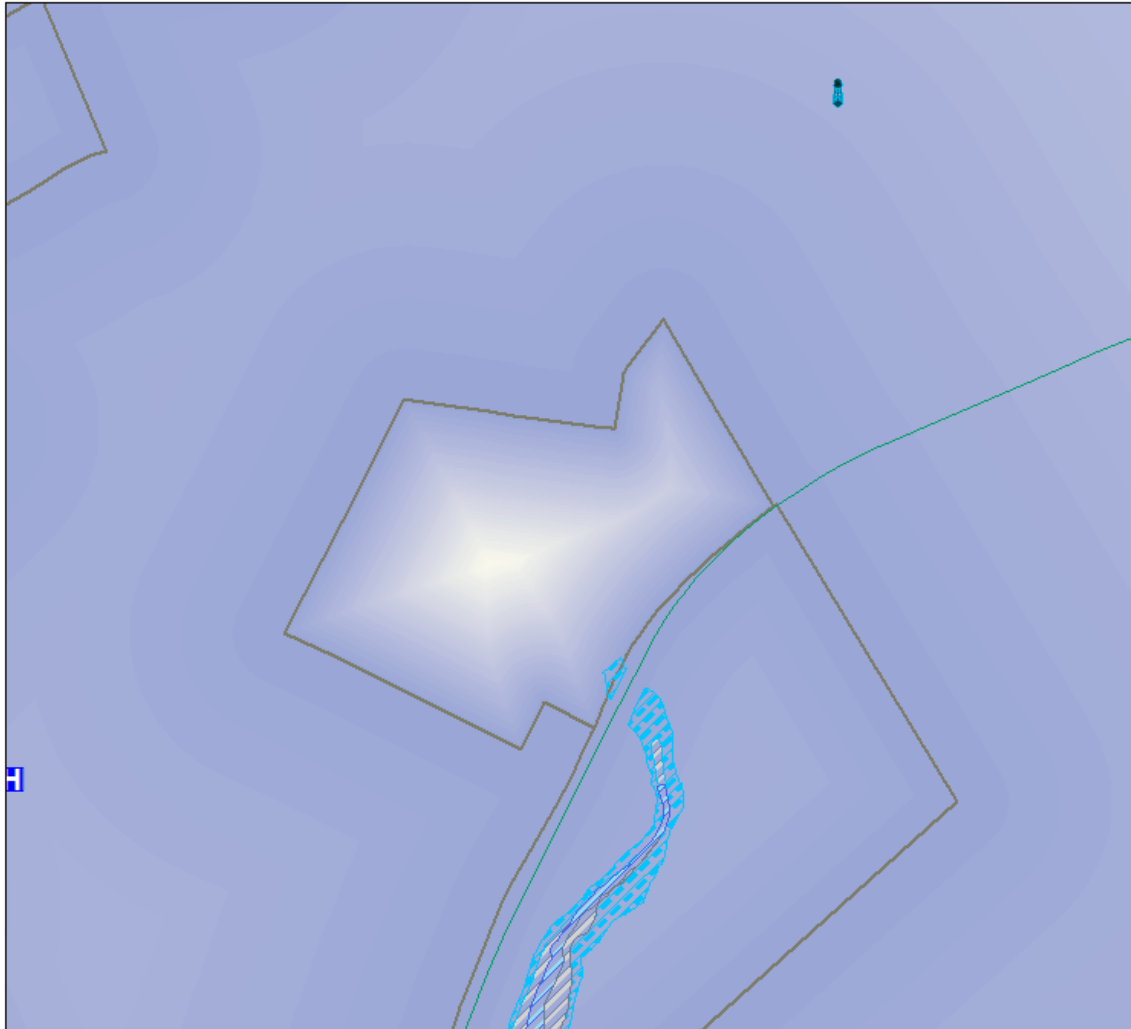
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.99 miles



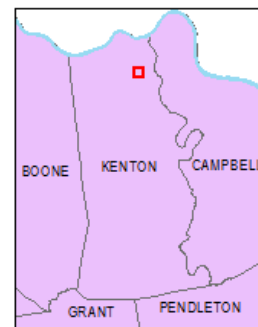
# City of Kenton Vale Critical Facilities



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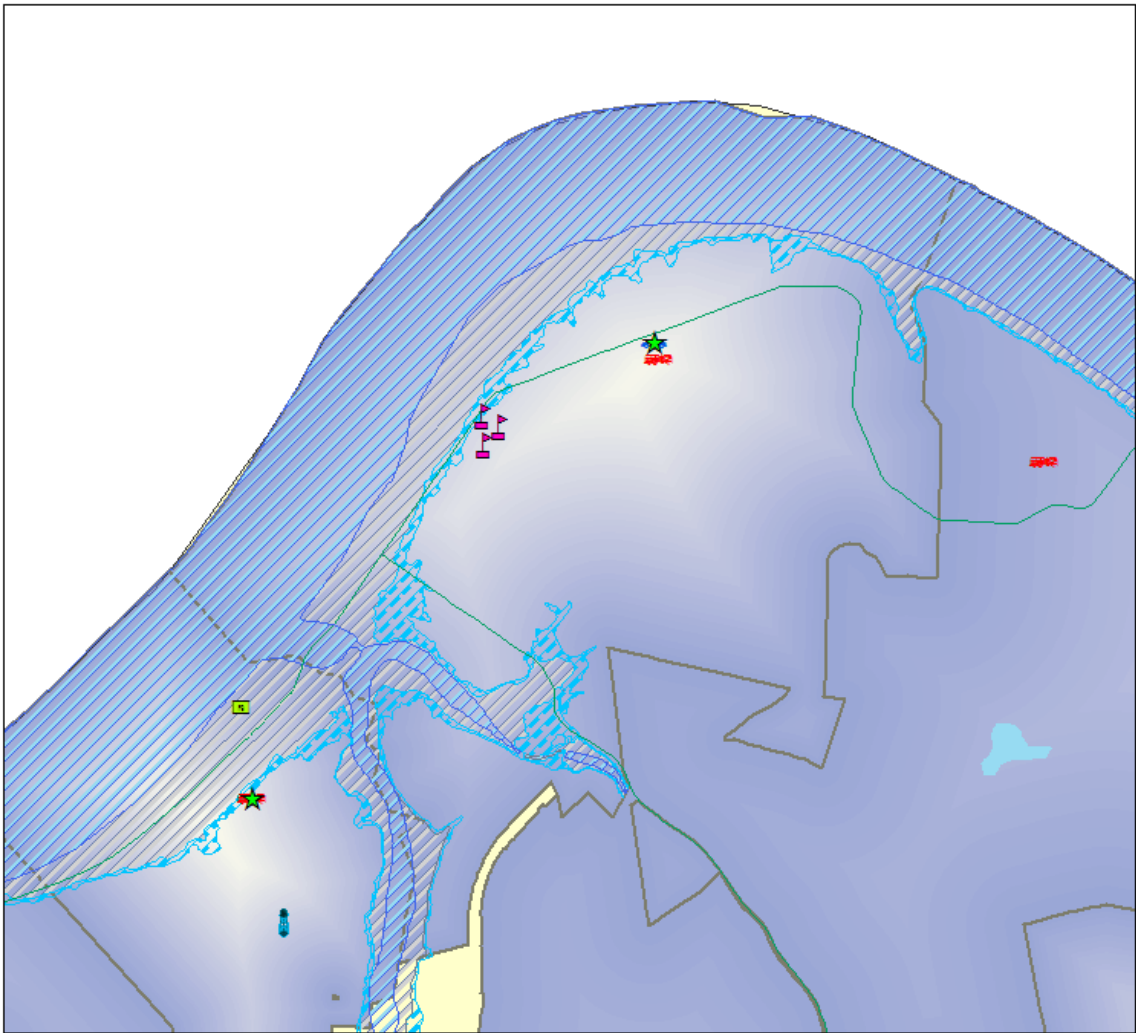
- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.1 miles





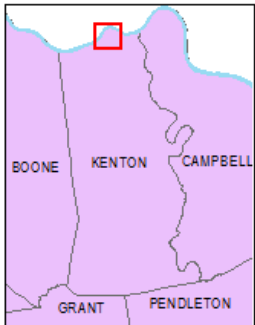
# City of Ludlow Critical Facilities



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- SD1\_Liftstations
- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

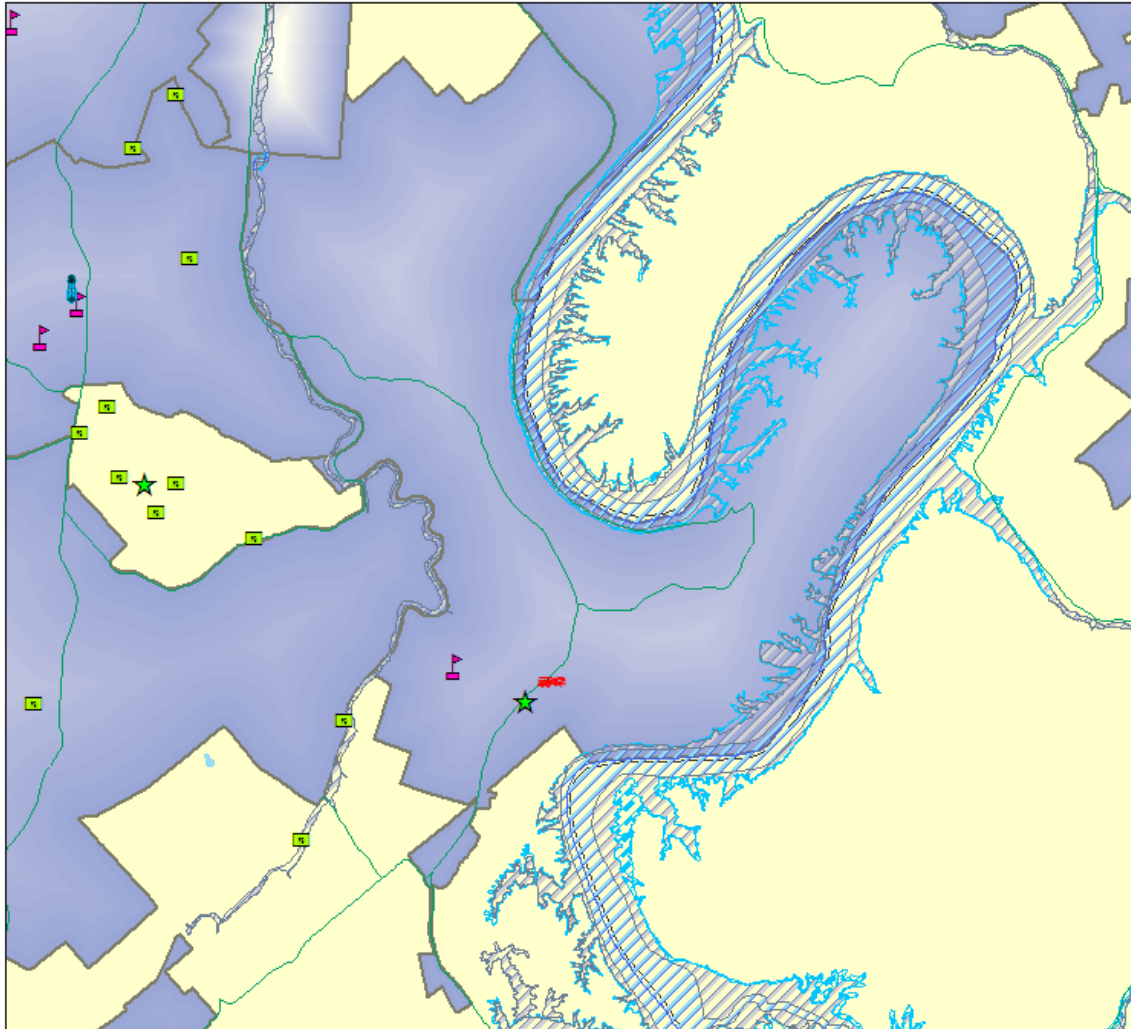
1 inch = 0.27 miles







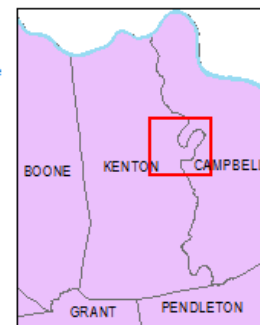
# City of Ryland Heights Critical Facilities



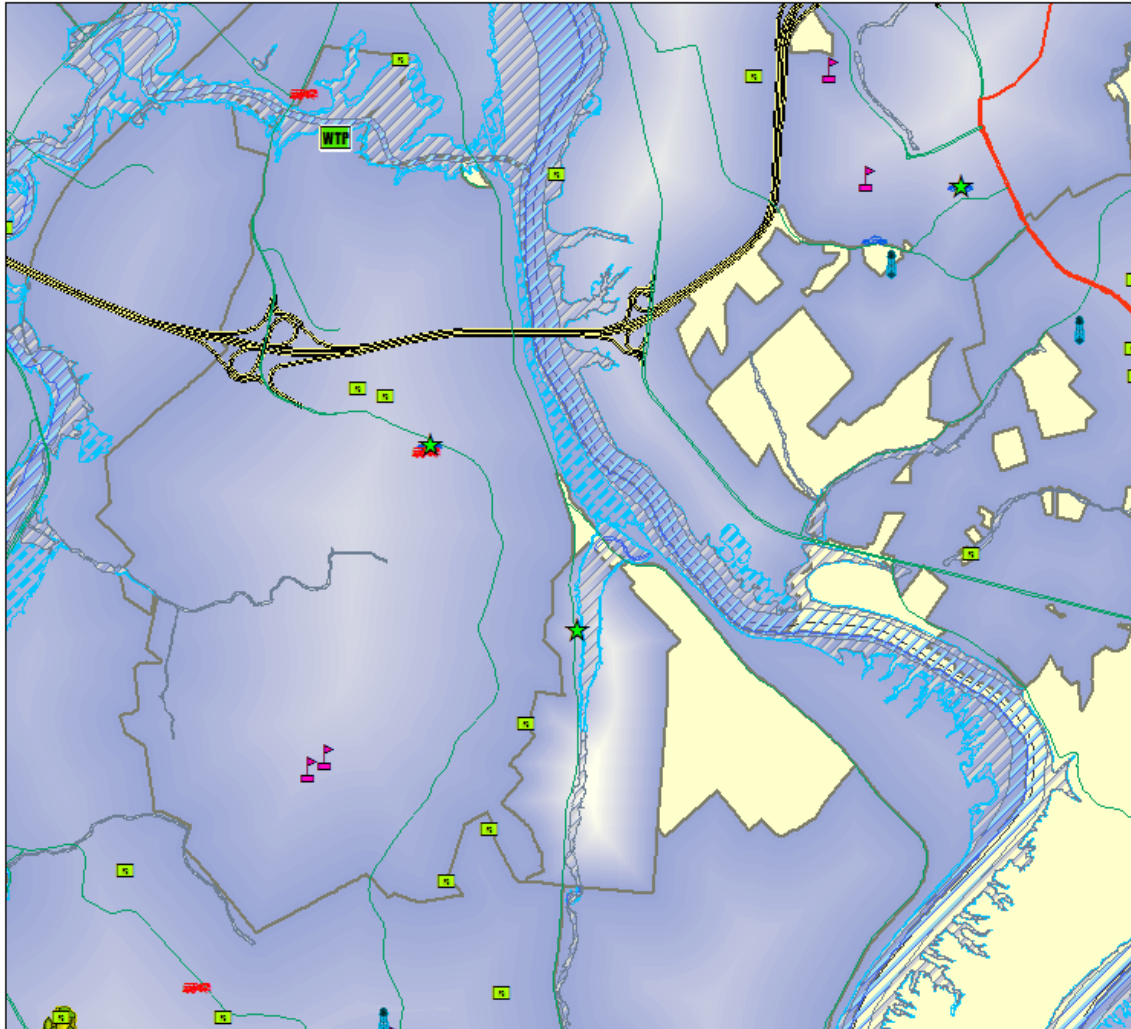
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.63 miles



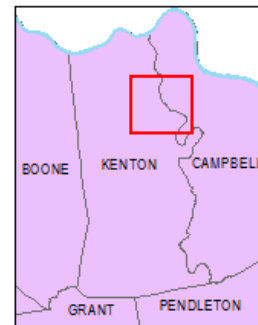
# City of Taylor Mill Critical Facilities



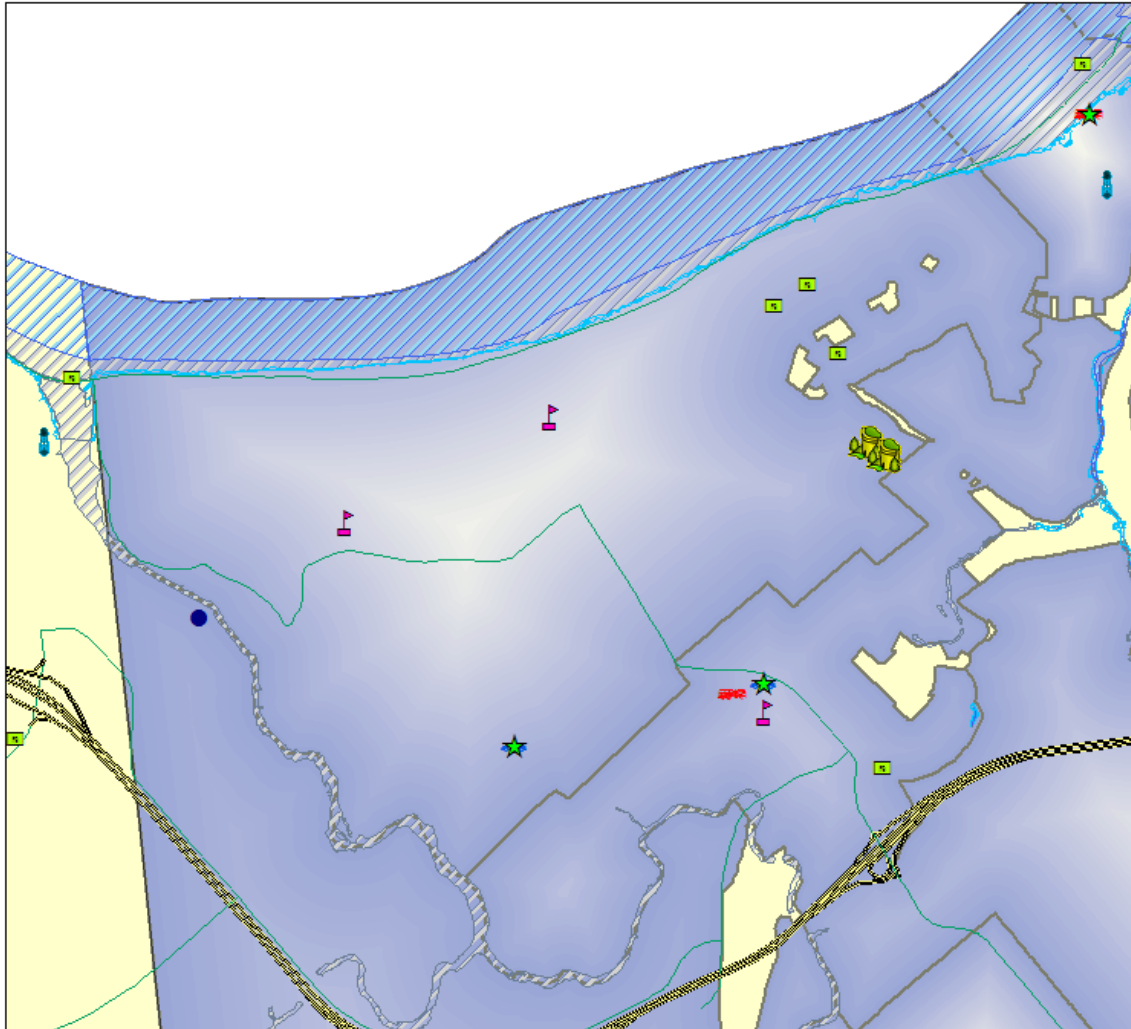
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- |                        |                          |
|------------------------|--------------------------|
| SD1_Liftstations       | 1% Annual Chance         |
| EOC                    | 0.2% Annual Chance       |
| WaterTank              | Reduced Flood Risk-Levee |
| HighRiskDams           | Floodway                 |
| Water Treatment Plant  | Hospitals                |
| Sewage Treatment Plant | Fire Departments         |
| Airports               | Police Departments       |
| City Halls             |                          |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.63 miles



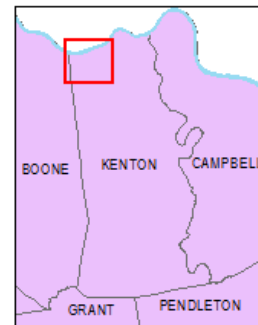
# City of Villa Hills Critical Facilities



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- SD1\_Liftstations
- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.48 miles

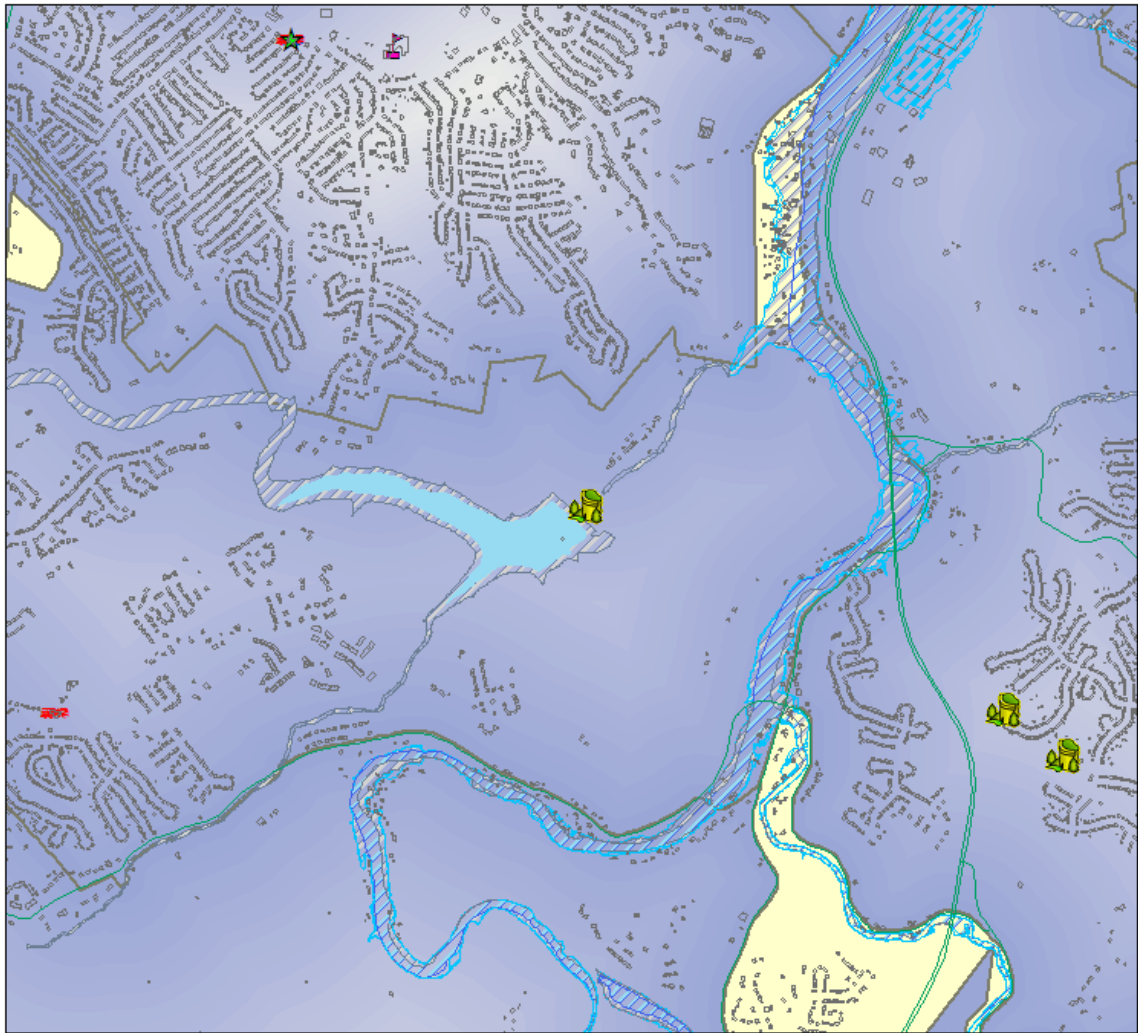


According to the Kentucky Division of Water, High Hazard (C) Structures located such that failure may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. Moderate Hazard (B) Structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Low Hazard (A) Structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Only High Risk Dams are included in this vulnerability assessment, since they are the only dams that may affect loss of life and also affect important public health facilities such as utilities and transportation routes.





Doe Run Lake Dam (Banklick Creek FRS No 3)

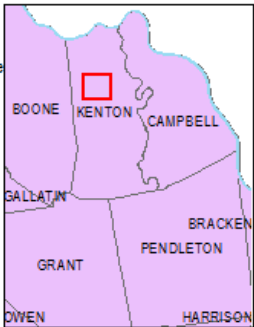


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- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Hospitals
- Fire Departments
- Police Departments

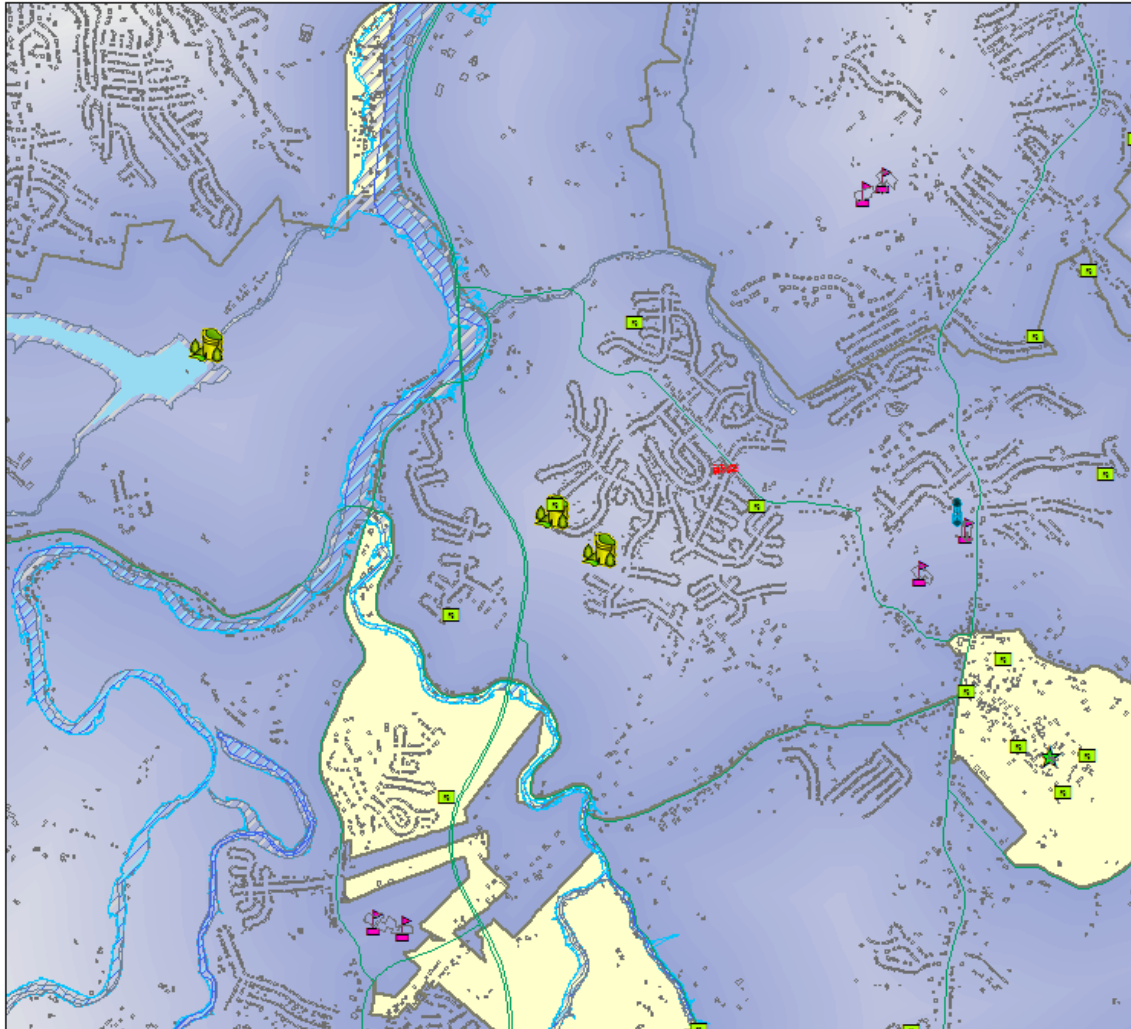
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Level
- Flood way

1 inch = 0.42 miles





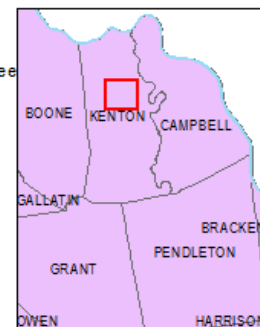
# Crystal Lake Dam No1 & 2



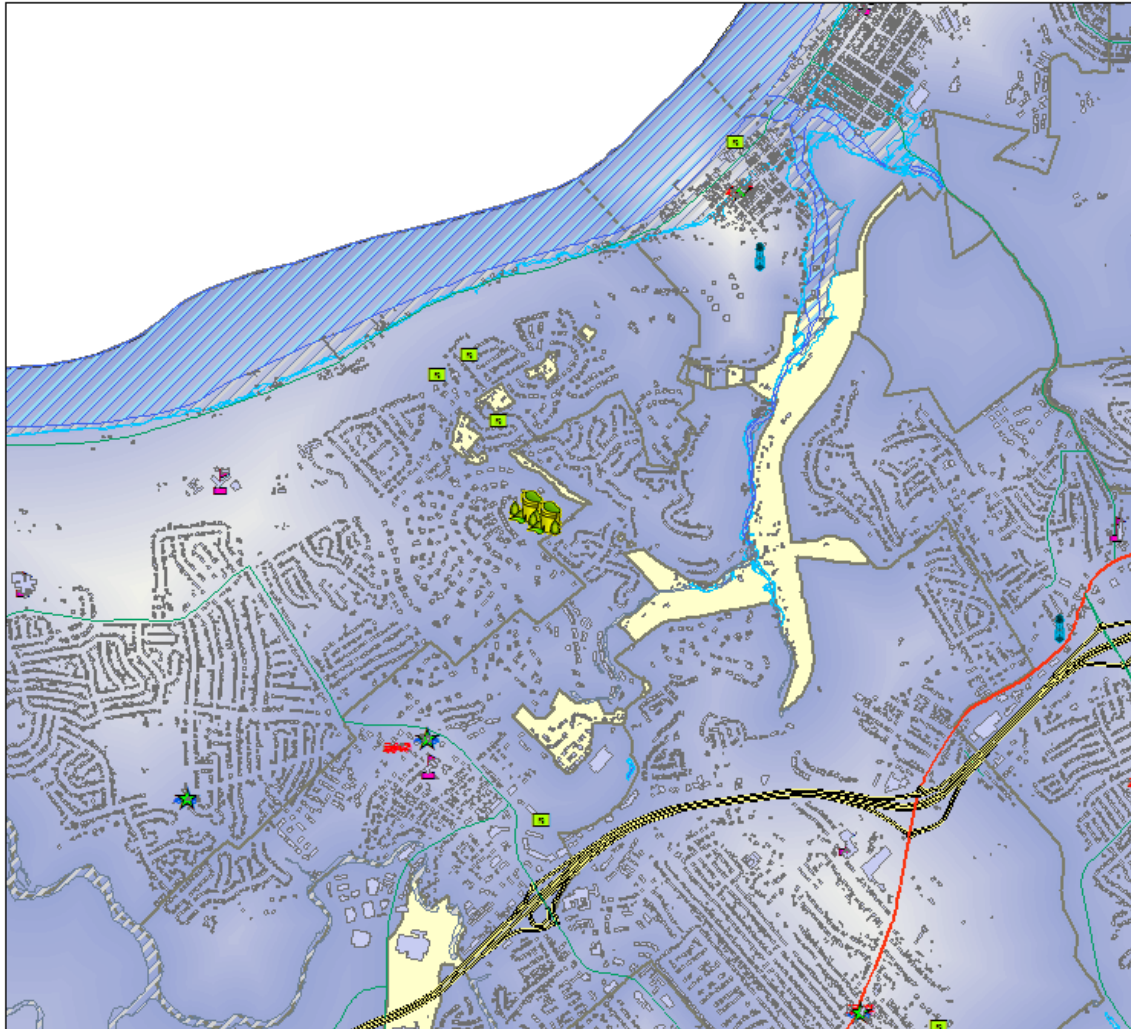
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- SD1\_Liftstations
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Hospitals
- Fire Departments
- Police Departments
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Flood way

1 inch = 0.51 miles



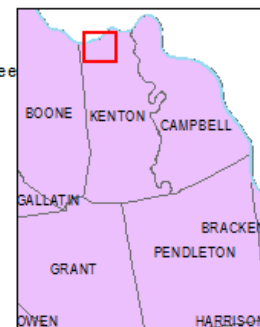
# Country Squire Dams Upper & Lower



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- SD1\_Liftstations
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- City Halls
- County Courthouses
- Schools
- Hospitals
- Fire Departments
- Police Departments
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Lever
- Flood way

1 inch = 0.5 miles



OWEN COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|------------------|------------------|-------------|----------------------|
| Flash Flood         | 25                | \$ 2,206,000     | 1.32             | Moderate    | High                 |
| Flood               | 14                | \$ 5,000         | 0.74             | Moderate    | Moderate             |
| Landslide           | No Data           | No Data          | No Data          | Moderate    | Moderate             |
| Tornado             | 4                 | \$ 392,500       | 0.07             | Low         | Moderate             |
| Thunderstorm/Wind   | 97                | \$ 1,725,000     | 1.64             | Moderate    | High                 |
| Hail                | 28                | \$ 15,000        | 0.47             | Moderate    | Moderate             |
| Severe Winter Storm | 34                | \$ 200,000       | 1.79             | Moderate    | High                 |
| Dam Failure         | 0                 | No Data          | 0                | Low         | Low                  |
| Earthquake          | 20                | No Data          | No Data          | Low         | Low                  |
| TOTAL               | 222               | \$ 4,543,500     |                  |             |                      |

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included in the county total. The data was gathered from best available sources, which varied by county. Where possible,

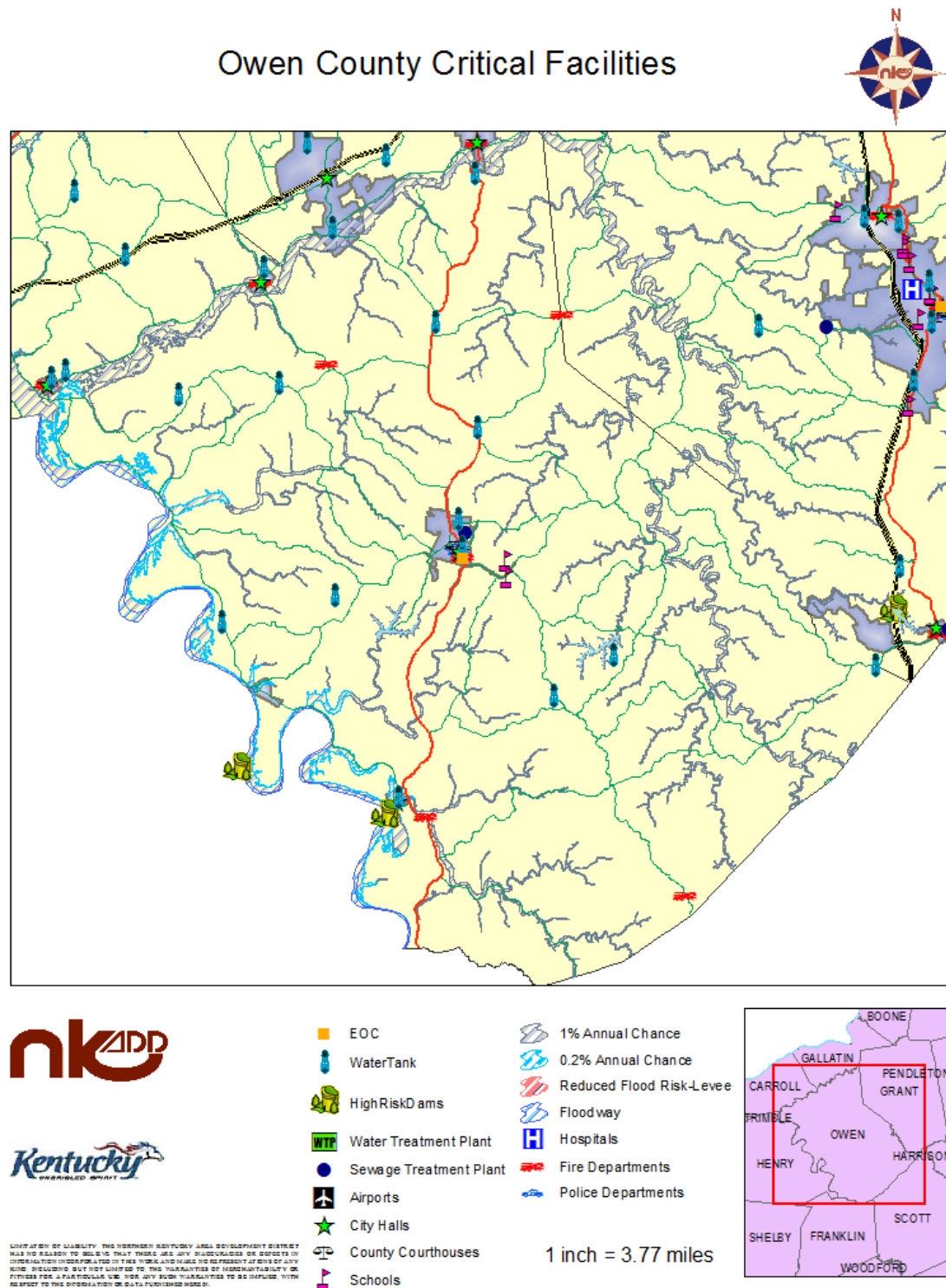
local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

| Owen                                 |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 263                       | 3%        |
| Commercial                           | 0                         | 0%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 0                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>263</b>                | <b>3%</b> |

The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>60</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>376</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |

The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.





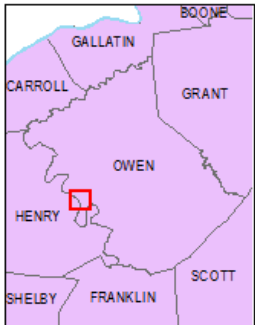
# City of Gratz Critical Facilities



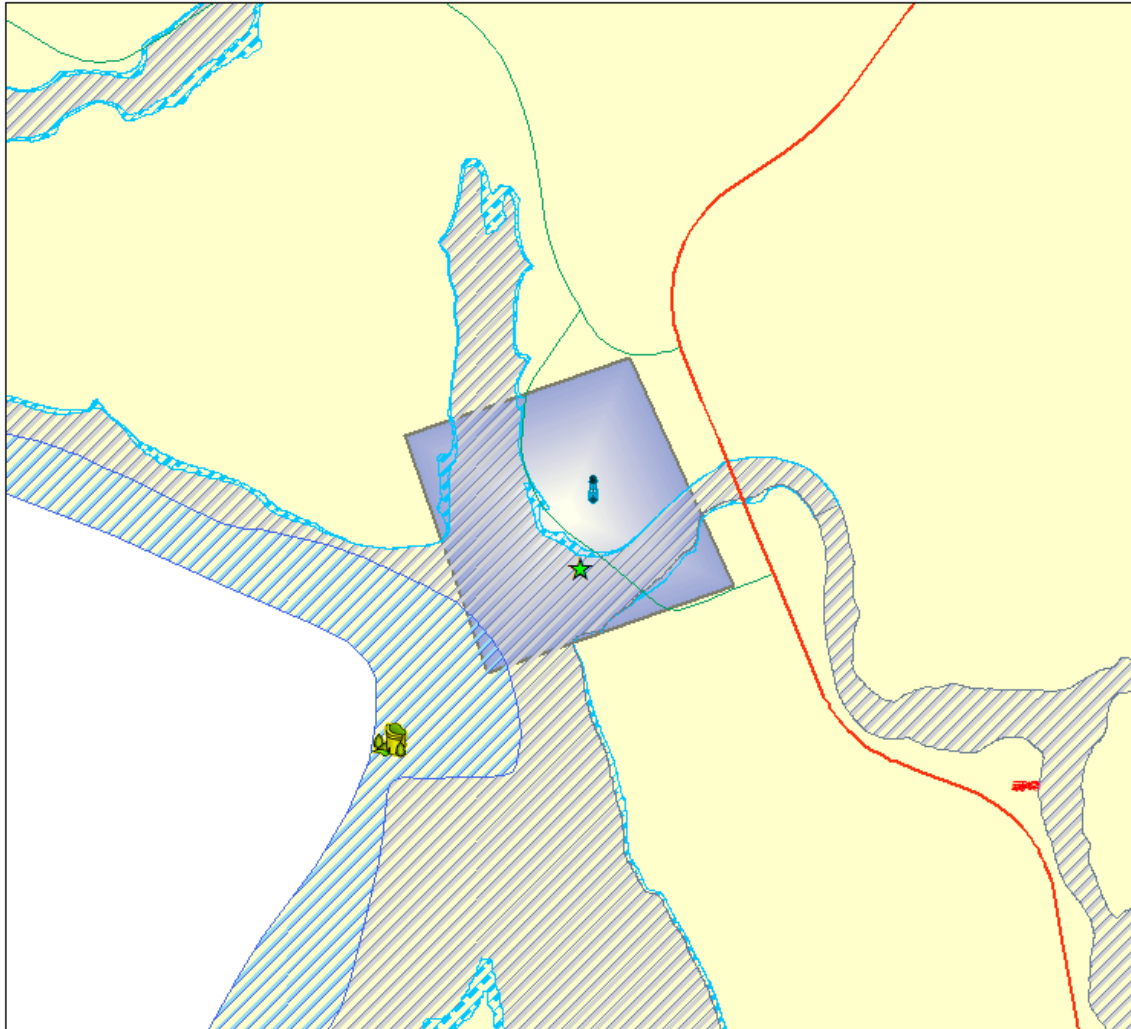
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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- ★ City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.31 miles



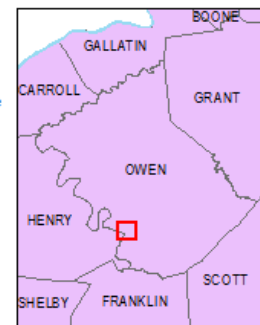
# City of Monterey Critical Facilities



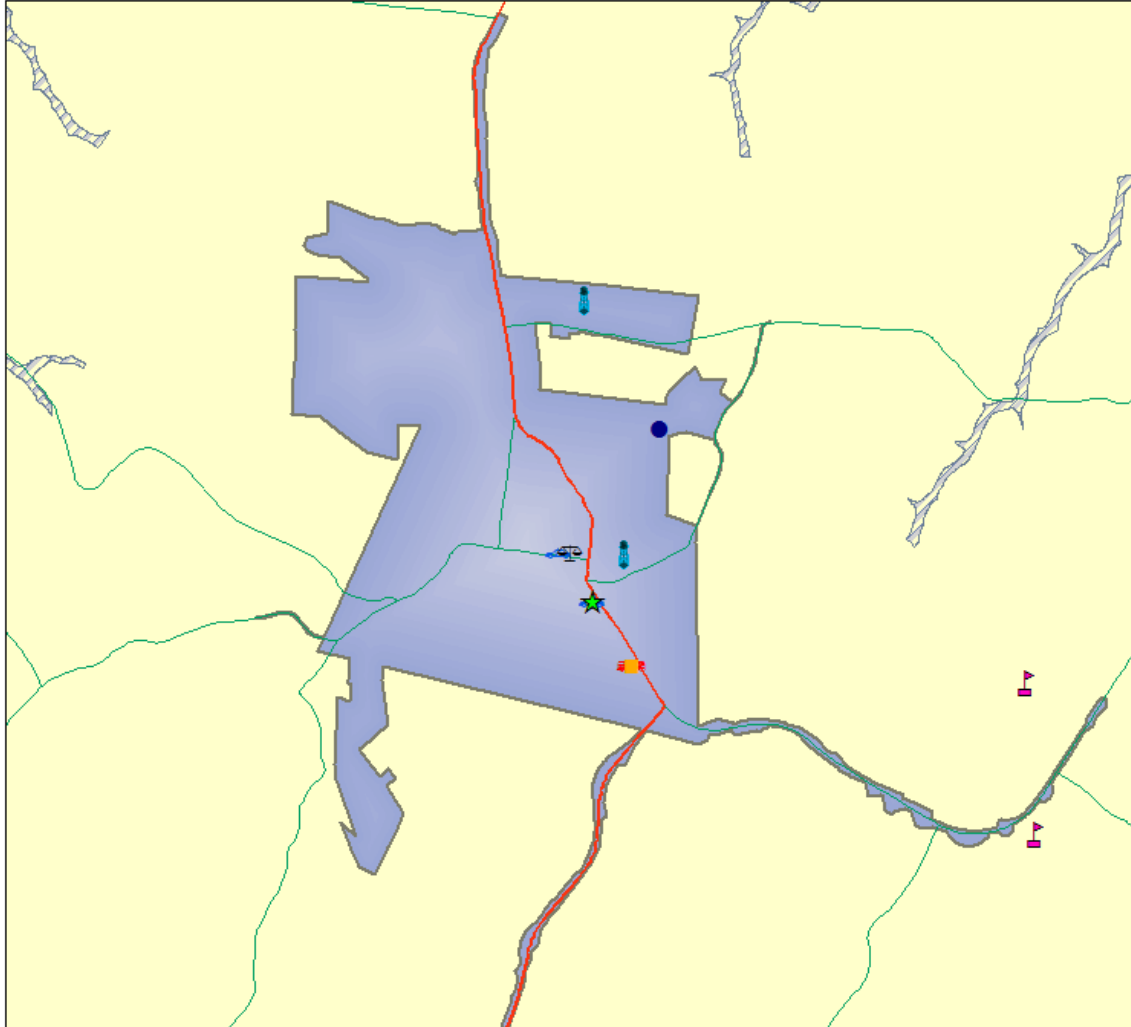
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- |                        |                          |
|------------------------|--------------------------|
| EOC                    | 1% Annual Chance         |
| WaterTank              | 0.2% Annual Chance       |
| HighRiskDams           | Reduced Flood Risk-Levee |
| Water Treatment Plant  | Floodway                 |
| Sewage Treatment Plant | Hospitals                |
| Airports               | Fire Departments         |
| City Halls             | Police Departments       |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.3 miles



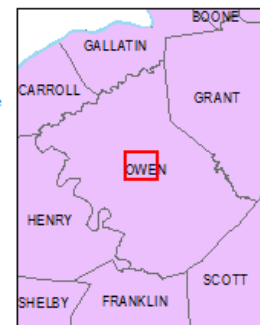
# City of Owenton Critical Facilities



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- EOC
- WaterTank
- HighRiskDams
- WTP Water Treatment Plant
- Sewage Treatment Plant
- Airports
- ★ City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.5 miles



PENDLETON COUNTY  
HAZARD RISK SUMMARY

| Hazard              | Historical Events | Estimated Damage | Annual Frequency | Probability | Vulnerability Rating |
|---------------------|-------------------|------------------|------------------|-------------|----------------------|
| Flash Flood         | 19                | \$ 10,239,000    | 1.00             | High        | High                 |
| Flood               | 21                | \$ 35,042,000    | 1.10             | High        | High                 |
| Landslide           | No Data*          | No Data *        | No Data          | Moderate    | Moderate             |
| Tornado             | 8                 | \$ 27,535,000    | 0.14             | High        | High                 |
| Thunderstorm/Wind   | 84                | \$ 2,466,000     | 1.42             | High        | High                 |
| Hail                | 26                | \$ 10,000        | 0.44             | Moderate    | Moderate             |
| Severe Winter Storm | 31                | \$ 200,000       | 1.63             | High        | High                 |
| Dam Failure         | 1                 | No Data          | 0.03             | Low         | Low                  |
| Earthquake          | 20                | No Data          | No Data          | Low         | Low                  |
| TOTAL               | 210               | \$ 75,492,000    |                  |             |                      |

\*Pendleton county experiences landslides, however the data available is not detailed enough to include.

In addition to profiling hazards and identifying locations where events are likely to occur, this section identifies what can potentially be affected by possible hazard events. Using the hazard area maps found in the profile in the previous section, we map and describe vulnerability to these hazards in terms of types and numbers of existing buildings, infrastructure and critical facilities located in each county

The information was collected from a variety of resources including the HAZUS Kentucky Data, the National Climatic Data Center, and the NKADD GIS data and information. The information was collected, mapped and summarized by the NKADD staff and reviewed and analyzed by the county sub-committees for ultimate inclusion in the plan. This section was prepared using the best data available for identifying types and numbers of existing buildings, infrastructure and critical facilities in each county.

The County PVA offices in Boone, Campbell, Kenton and Pendleton Counties have or are currently developing spatial GIS information. Existing data has been included in this Plan when available and new data will be included in future updates of this plan as it becomes available.

Committee members for each jurisdiction reviewed the maps showing the locations of critical facilities to determine the vulnerabilities of each community. Committee members did not specify areas for certain hazards, namely, tornados, severe thunderstorms, severe winter storms, or earthquakes, because these hazards have been determined by the committees to potentially affect all areas within each jurisdiction. These hazards are not limited to any particular area based on the historical documentation. These particular hazards can affect any jurisdiction, at any time, making every asset vulnerable. For this reason, maps were created for flood hazards and each “high risk” dam.

## Assets

### Flood Plain

The charts on the following pages summarize the assets in the Northern Kentucky region that are located in the 100-year flood plain (FIRMs). Data presented in this section includes incorporated cities and unincorporated areas of each county, wherever possible. For some datasets, city level information is unavailable and therefore only countywide data is listed. In these circumstances, data from the incorporated cities within those counties is included

in the county total. The data was gathered from best available sources, which varied by county. Where possible, local data was used, while some data was generated by HAZUS-MH and represent estimates. The primary data sources were GIS and the 2010 Census.

| Pendleton                            |                           |           |
|--------------------------------------|---------------------------|-----------|
| Type of Structure<br>Occupancy Class | Structures in Hazard Area |           |
|                                      | Number                    | Percent   |
| Residential                          | 160                       | 2%        |
| Commercial                           | 124                       | 1%        |
| Industrial                           | 0                         | 0%        |
| Agricultural                         | 0                         | 0%        |
| Religious                            | 0                         | 0%        |
| Government                           | 5                         | 0%        |
| Education                            | 0                         | 0%        |
| <b>TOTAL</b>                         | <b>291</b>                | <b>3%</b> |

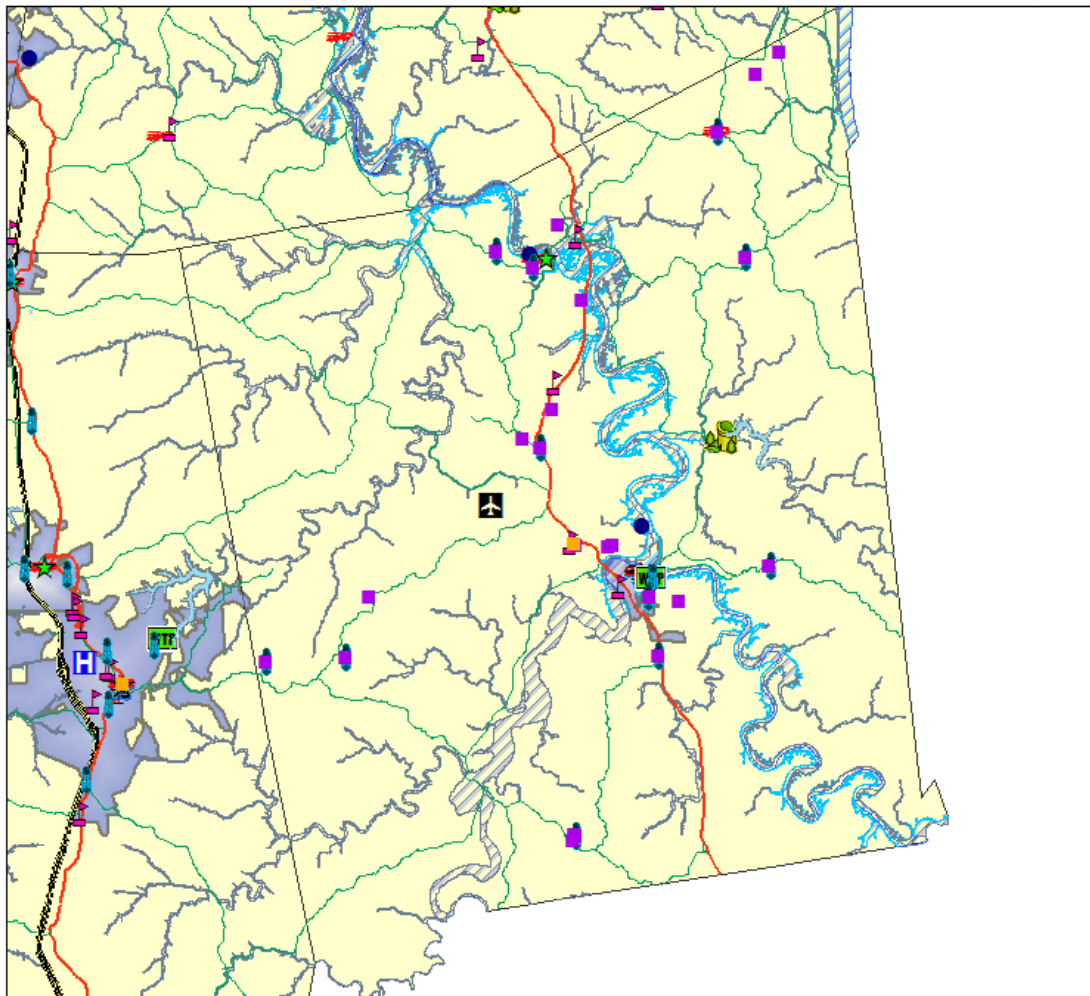
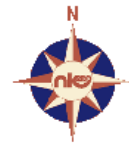
The following chart summarizes the critical facilities identified by county committees. Data is listed by county and includes data from all incorporated cities within each county. This Plan will be expanded to include other facilities such as: communications facilities, power plants, sewage treatment plants, hazardous material sites, and other government facilities in future updates. Each county mitigation committee determined its own criteria for what was a critical facility in that county.

| Critical Facilities within Northern Kentucky Region                                    |              |                 |                |                 |              |               |             |                  |                 |
|----------------------------------------------------------------------------------------|--------------|-----------------|----------------|-----------------|--------------|---------------|-------------|------------------|-----------------|
| Type of Facility                                                                       | Boone County | Campbell County | Carroll County | Gallatin County | Grant County | Kenton County | Owen County | Pendleton County | Total in Region |
| County EOC                                                                             | 2            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 9               |
| Fire Stations                                                                          | 13           | 14              | 3              | 4               | 6            | 18            | 3           | 3                | 64              |
| Police Stations                                                                        | 2            | 10              | 2              | 1               | 3            | 13            | 2           | 2                | 35              |
| Government Buildings <sup>1</sup>                                                      | 4            | 13              | 6              | 4               | 5            | 20            | 3           | 3                | 58              |
| Airports                                                                               | 1            | 0               | 1              | 0               | 0            | 0             | 1           | 1                | 4               |
| Hospitals                                                                              | 1            | 1               | 1              | 0               | 1            | 2             | 1           | 1                | 8               |
| Schools                                                                                | 31           | 33              | 4              | 4               | 9            | 53            | 3           | 4                | 141             |
| Dams <sup>2</sup>                                                                      | 6            | 8               | 4              | 4               | 6            | 7             | 2           | 1                | 38              |
| Health Centers                                                                         | 1            | 1               | 1              | 1               | 1            | 1             | 1           | 1                | 8               |
| Water Treatment Plants                                                                 | 0            | 2               | 2              | 4               | 2            | 1             | 0           | 1                | 12              |
| <b>Total</b>                                                                           | <b>61</b>    | <b>83</b>       | <b>25</b>      | <b>21</b>       | <b>34</b>    | <b>116</b>    | <b>18</b>   | <b>19</b>        | <b>377</b>      |
| Local Data Sources collected and maintained by the NKADD Mapping Services Department   |              |                 |                |                 |              |               |             |                  |                 |
| 1. Includes only administrative buildings (i.e. City Buildings and County Courthouses) |              |                 |                |                 |              |               |             |                  |                 |
| 2. Includes all dams classified as High or Significant hazard                          |              |                 |                |                 |              |               |             |                  |                 |



The locations of these facilities are identified on the floodplain maps in the previous section and maintained digitally as part of the Northern Kentucky Area Development District GIS database. This data will continually be updated as new facilities are constructed or locations of existing facilities change.

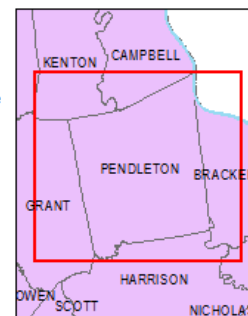
## Pendleton County Critical Facilities



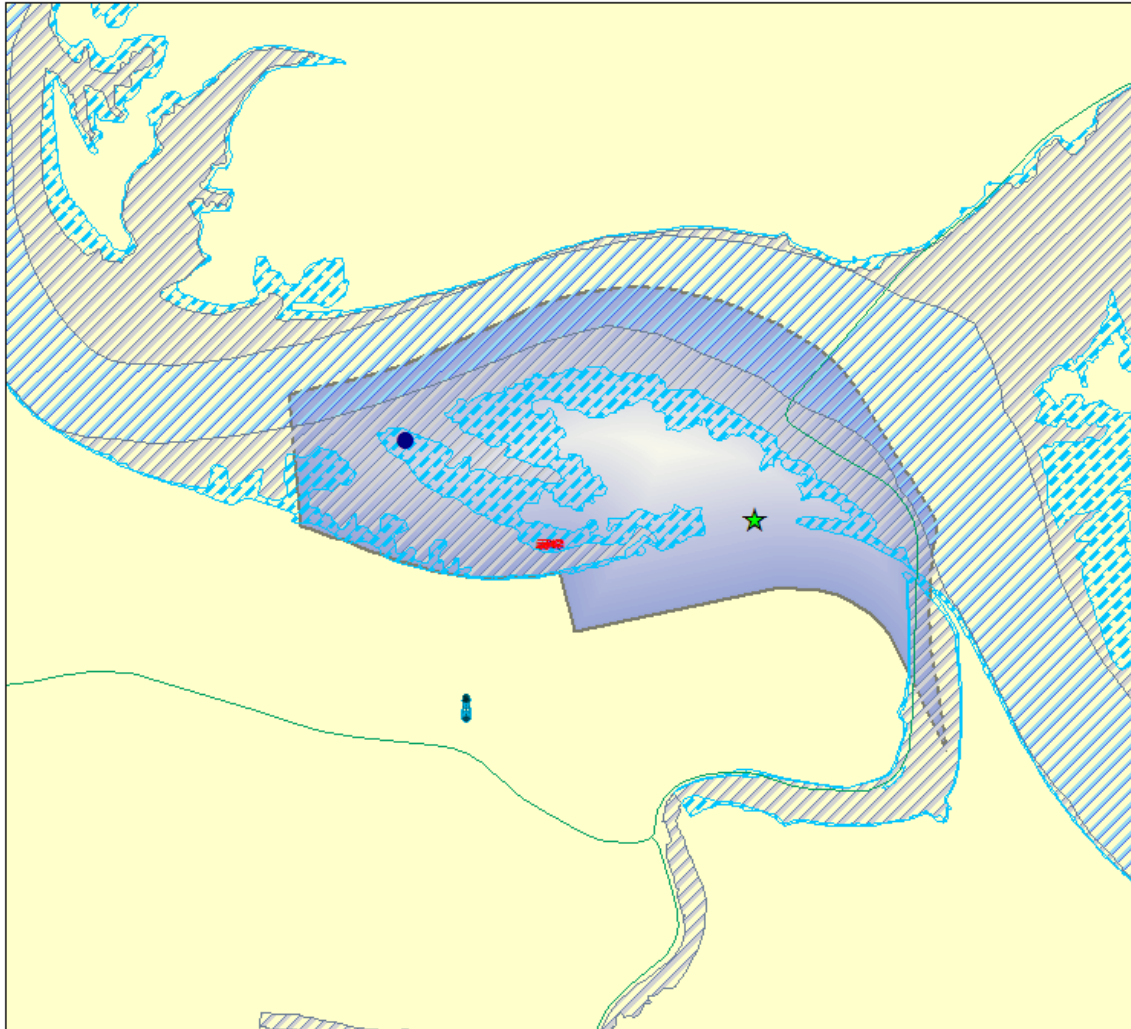
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- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 3.39 miles



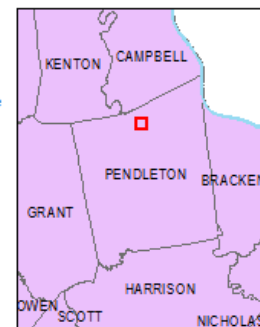
# City of Butler Critical Facilities



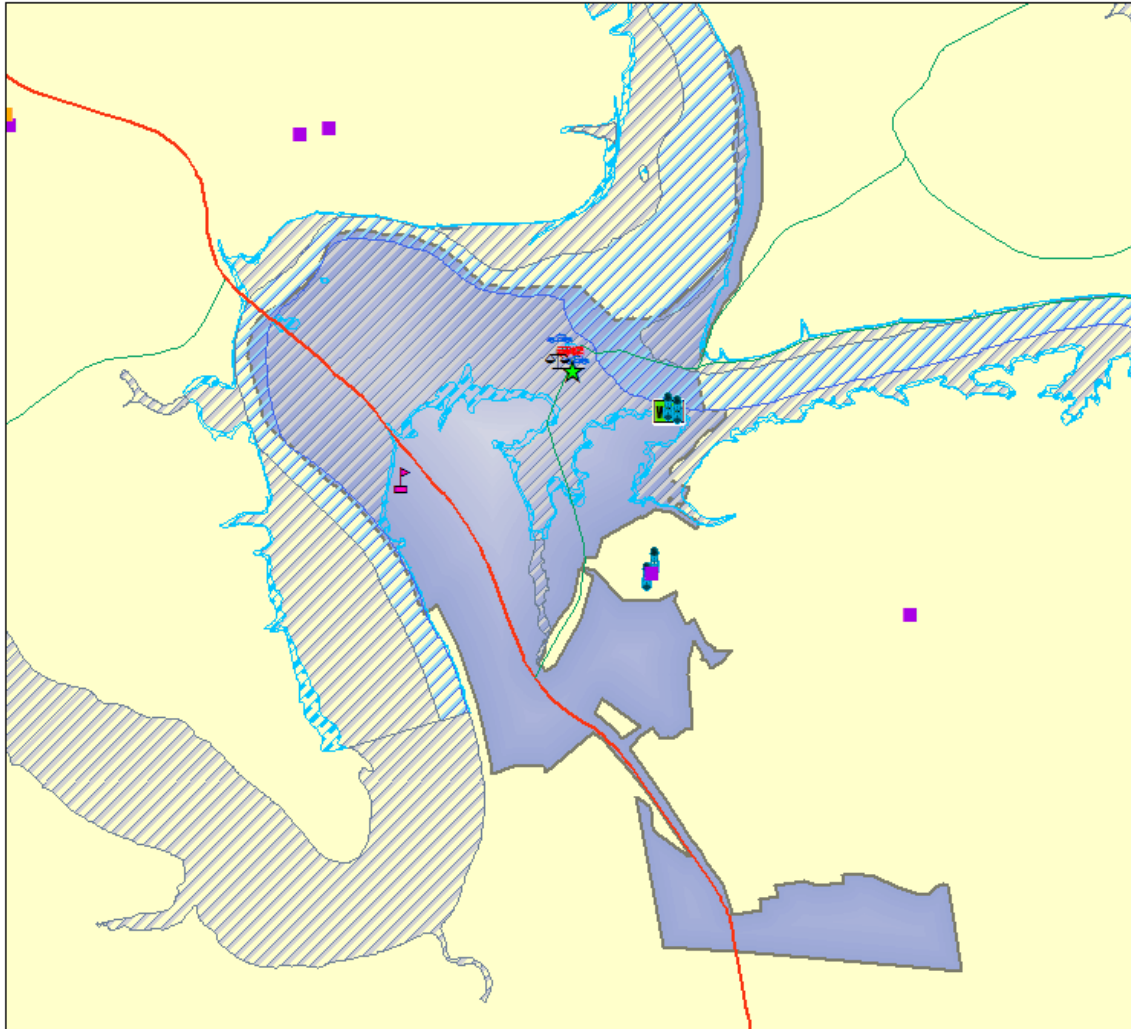
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- |                        |                          |
|------------------------|--------------------------|
| EOC                    | 1% Annual Chance         |
| WaterTank              | 0.2% Annual Chance       |
| HighRiskDams           | Reduced Flood Risk-Levee |
| Water Treatment Plant  | Floodway                 |
| Sewage Treatment Plant | Hospitals                |
| Airports               | Fire Departments         |
| City Halls             | Police Departments       |
| County Courthouses     |                          |
| Schools                |                          |

1 inch = 0.17 miles



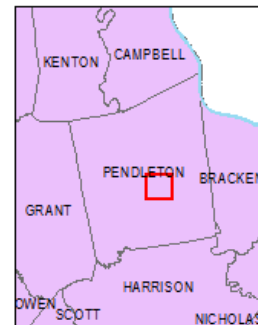
# City of Falmouth Critical Facilities



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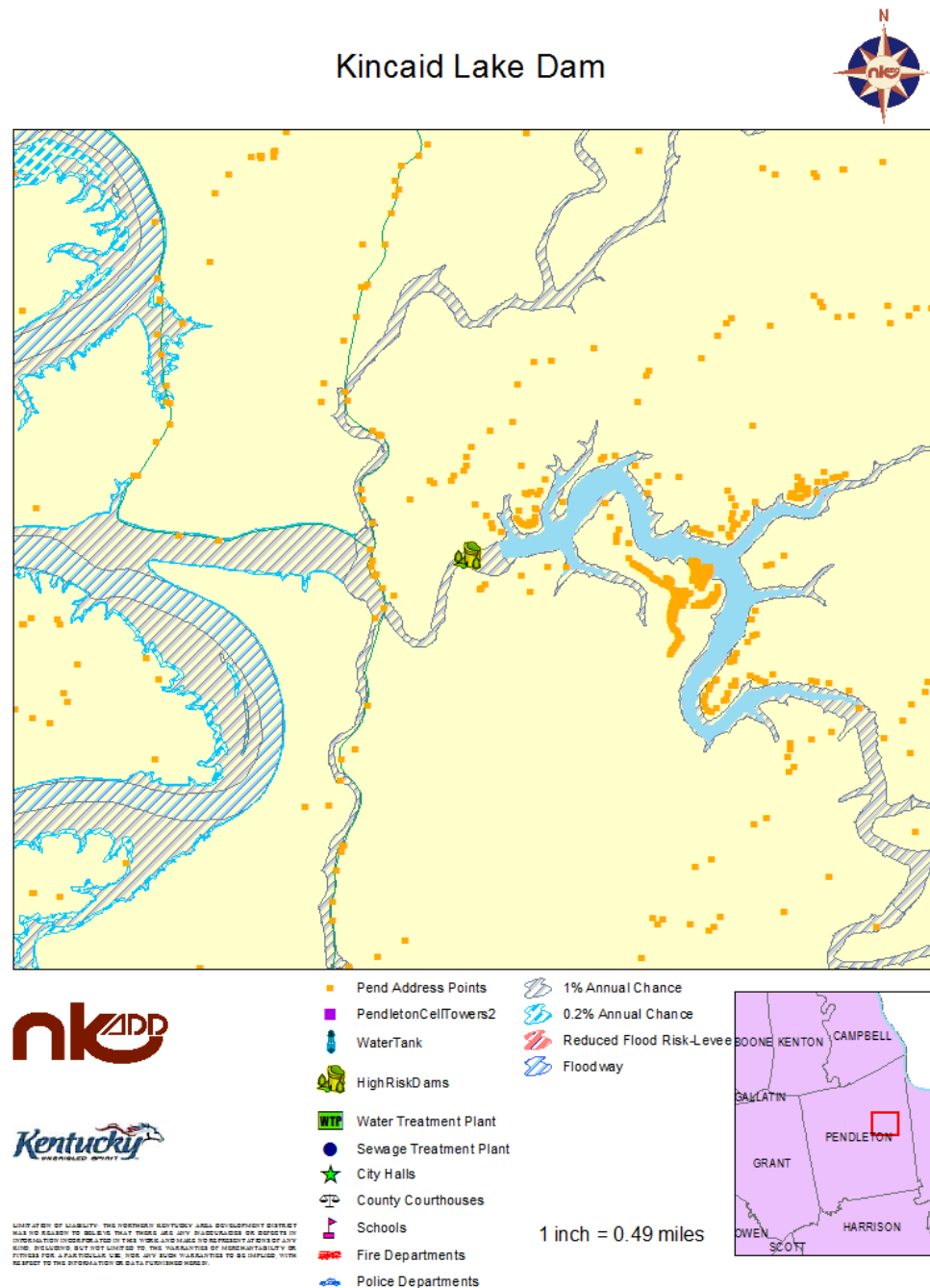
- PendletonCellTowers2
- EOC
- WaterTank
- HighRiskDams
- Water Treatment Plant
- Sewage Treatment Plant
- Airports
- City Halls
- County Courthouses
- Schools
- 1% Annual Chance
- 0.2% Annual Chance
- Reduced Flood Risk-Levee
- Floodway
- Hospitals
- Fire Departments
- Police Departments

1 inch = 0.4 miles



## HIGH RISK DAMS

According to the Kentucky Division of Water, High Hazard (C) Structures located such that failure may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major railroads. Moderate Hazard (B) Structures located such that failure may cause significant damage to property and project operation, but loss of human life is not envisioned. Low Hazard (A) Structures located such that failure would cause loss of the structure itself but little or no additional damage to other property. Only High Risk Dams are included in this vulnerability assessment, since they are the only dams that may affect loss of life and also affect important public health facilities such as utilities and transportation routes.



### 3.3.4 ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

The Northern Kentucky Region is most susceptible to flood hazards. Based on hazard profile data, the structures at risk are those located in the 100-year floodplain, which are shown in 8 counties and in 53 cities of the Northern Kentucky Area Development District. It is estimated that a total of 9,779 structures are at risk in the region. Structures susceptible to damage from flooding include 2 fire stations, 1 sewage treatment plant, 2 water treatment plants and 1 emergency operation center. These critical facilities located inside the 100-year floodplain could cost several million dollars in direct damages for a 0.1% Annual Chance flood. However, when considering the impact of loss of service provided by these facilities, the damages would exceed that amount. There are also several critical facilities located in flash flood areas and the 0.2% Annual Chance floodplain. There are 2 fire stations, 2 police stations, 1 sewage treatment plant, 3 government buildings and 2 schools located in flood prone areas.

The Northern Kentucky Region is also susceptible to landslides, tornados, severe thunderstorms, earthquakes, and severe winter storms. These risk areas are noted in the maps created from local input from each county. Committee members determined from the landslide profile that the greatest potential for damage is to transportation facilities, such as roads and bridges that suffer damage from landslides caused by heavy rains and flooding. See chart on losses to transportation facilities from exposure to these hazards.

The total transportation risk for landslides in the Northern Kentucky Region is not measurable with the current data available but will be added as additional information is made available. Many of the landslides that occur on local and county roads are repaired periodically, rather than replaced, and it is difficult to separate that amount from a road department's overall time and budget, in order to get an accurate amount.

Throughout the profile and asset identification, committee members determined that everything in each jurisdiction is vulnerable to tornados, severe thunderstorms, severe winter storms, and earthquakes. These events cannot be pinpointed to a particular area and affect each jurisdiction at any given time. The total potential loss of assets due to these events could reach almost \$50 billion dollars. Though these storms will not damage everything at one time, the potential for great loss exists.

As committee members reviewed potential dollar losses, they also reviewed past disaster dollar damage totals as provided by National Climatic Data Center. In section 3.3.3, tables for each county are presented on past disaster dollar damage based on this data. Overall, all past disasters have caused an average of \$2,000,000 of damage, per county, per disaster.

Committee members also reviewed data and information for determining future vulnerable structures and critical facilities in hazard areas. Committee members determined that the goals, objectives, and actions of hazard mitigation in Northern Kentucky should be to reduce development of future buildings and structures in known hazard areas.

Hazard impact is documented in each hazard profile (see previous section). The greatest impact on the region is flooding, followed by landslides, tornados, severe thunderstorms, and severe winter storms.

Much of the information related to hazard vulnerabilities and potential loss estimates were derived from HAZUS-MH, a GIS extension tool for estimating potential losses from earthquakes, floods and hurricane winds. "The flood loss estimation methodology consists of two modules that carry out basic analytical processes: flood hazard analysis and flood loss estimation analysis. The hazard analysis module uses characteristics such as frequency,



discharge, and ground elevation to estimate flood depth, flood elevation, and flow velocity. The loss estimation module calculates physical damage and economic loss from the results of the hazard analysis.” (FEMA, Overview of HAZUS-MH)

The following charts note assets which are vulnerable to flooding, tornado, severe thunderstorm and severe winter storm damage. Data is listed by cities and counties.

| Estimated Flood Hazard Vulnerable Assets of the Northern Kentucky Region |                                   |                           |                  |                          |                         |                  |                               |                                        |                  |
|--------------------------------------------------------------------------|-----------------------------------|---------------------------|------------------|--------------------------|-------------------------|------------------|-------------------------------|----------------------------------------|------------------|
| County                                                                   | Number of Structures              |                           |                  | Value of Structures      |                         |                  | Number of People              |                                        |                  |
|                                                                          | Structures in County <sup>1</sup> | Structures in Hazard Area | % in Hazard Area | Value in County          | Value in Hazard Area    | % in Hazard Area | People in County <sup>2</sup> | Population in Hazard Area <sup>3</sup> | % in Hazard Area |
| Boone                                                                    | 66,547                            | 26                        | 0.0%             | \$ 15,011,357,000        | \$ 10,431,000           | 0.0%             | 118,811                       | 70                                     | 0.0%             |
| Campbell                                                                 | 42,286                            | 2,460                     | 5.8%             | \$ 11,032,354,000        | \$ 491,547,362          | 4.5%             | 90,336                        | 5,953                                  | 6.6%             |
| Carroll                                                                  | 4,848                             | 204                       | 4.2%             | \$ 1,122,982,000         | \$ 267,200,269          | 23.8%            | 10,811                        | 626                                    | 5.8%             |
| Gallatin                                                                 | 3,623                             | 149                       | 4.1%             | \$ 662,632,000           | \$ 96,788,000           | 14.6%            | 8,589                         | 400                                    | 4.7%             |
| Grant                                                                    | 16,138                            | 23                        | 0.0%             | \$ 2,231,669,280         | \$ 2,231,669            | 0.0%             | 24,662                        | 64                                     | 0.0%             |
| Kenton                                                                   | 89,064                            | 1,986                     | 2.2%             | \$ 29,879,599,815        | \$ 874,225,482          | 2.9%             | 159,720                       | 4,984                                  | 3.1%             |
| Owen                                                                     | 7,741                             | 263                       | 3.4%             | \$ 958,574,982           | \$ 101,324,495          | 10.6%            | 10,841                        | 662                                    | 6.1%             |
| Pendleton                                                                | 7,756                             | 284                       | 3.7%             | \$ 1,212,853,158         | \$ 278,638,000          | 23.0%            | 14,877                        | 758                                    | 5.1%             |
| <b>TOTAL</b>                                                             | <b>238,003</b>                    | <b>5,395</b>              | <b>2.3%</b>      | <b>\$ 62,112,022,235</b> | <b>\$ 2,122,386,277</b> | <b>3.4%</b>      | <b>438,647</b>                | <b>13,482</b>                          | <b>3.1%</b>      |

**SOURCES: HAZUS-MH, US CENSUS BUREAU, NKADD MAPPING SERVICES DATA.**

1. Includes incorporated cities, estimated from Address Points, Building Shapefiles from NKADD GIS.
2. 2010 Census Estimate, U.S. Census Bureau.
3. Estimated based upon 2010 Census average household size per county.

| Tornados, Severe Thunderstorms, Severe Winter Storms & Earthquake Hazard Vulnerable Assets of the Northern Kentucky Region |                      |                           |                  |                          |                          |                  |                  |                           |                  |
|----------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------|------------------|--------------------------|--------------------------|------------------|------------------|---------------------------|------------------|
|                                                                                                                            | Number of Structures |                           |                  | Value of Structures      |                          |                  | Number of People |                           |                  |
| County                                                                                                                     | Structures in County | Structures in Hazard Area | % in Hazard Area | Value in County          | Value in Hazard Area     | % in Hazard Area | People in County | Population in Hazard Area | % in Hazard Area |
| Boone                                                                                                                      | 66,547               | 66,547                    | 100%             | \$ 15,011,357,000        | \$ 15,011,357,000        | 100.0%           | 118,811          | 118,811                   | 100%             |
| Campbell                                                                                                                   | 42,286               | 42,286                    | 100%             | \$ 11,032,354,000        | \$ 11,032,354,000        | 100.0%           | 90,336           | 90,336                    | 100%             |
| Carroll                                                                                                                    | 4,848                | 4,848                     | 100%             | \$1, 122,982,000         | \$1, 122,982,000         | 100.0%           | 10,811           | 10,811                    | 100%             |
| Gallatin                                                                                                                   | 3,623                | 3,623                     | 100%             | \$ 662,632,000           | \$ 662,632,000           | 100.0%           | 8,589            | 8,589                     | 100%             |
| Grant                                                                                                                      | 16,138               | 16,138                    | 100%             | \$ 2,231,669,280         | \$ 2,231,669,280         | 100.0%           | 24,662           | 24,662                    | 100%             |
| Kenton                                                                                                                     | 89,064               | 89,064                    | 100%             | \$ 29,923,786,000        | \$ 29,923,786,000        | 100.0%           | 159,720          | 159,720                   | 100%             |
| Owen                                                                                                                       | 7,741                | 7,741                     | 100%             | \$ 1,121,861,000         | \$ 1,121,861,000         | 100.0%           | 10,841           | 10,841                    | 100%             |
| Pendleton                                                                                                                  | 7,756                | 7,756                     | 100%             | \$ 1, 269,345,000        | \$ 1, 269,345,000        | 100.0%           | 14,844           | 14,844                    | 100%             |
| <b>TOTAL</b>                                                                                                               | <b>238,003</b>       | <b>238,003</b>            | <b>100%</b>      | <b>\$ 62,375,986,280</b> | <b>\$ 62,375,986,280</b> | <b>100.0%</b>    | <b>438,647</b>   | <b>438,647</b>            | <b>100%</b>      |

**SOURCES: HAZUS-MH, US CENSUS BUREAU, NKADD MAPPING SERVICES DATA.**

1. Includes incorporated cities, estimated from Address Points, Building Shapefiles from NKADD GIS.
2. 2010 Census Estimate, U.S. Census Bureau.
3. Estimated based upon 2010 Census median household size per county.

The following chart summarizes the potential dollar losses for each hazard risk. These numbers were generated by HAZUS-MH, which aggregates probable damages, and edited with local knowledge.

| Jurisdiction             | Flood          | Landslide     | Tornados          | Severe Thunderstorm | Severe Winter Storms | Dam Failure   |
|--------------------------|----------------|---------------|-------------------|---------------------|----------------------|---------------|
| Boone County             | \$ 10,431,000  | Not Available | \$ 15,011,357,000 | \$ 15,011,357,000   | \$ 15,011,357,000    | Not available |
| City of Florence         | \$1,420,082    | Not Available | \$604,957,687     | \$604,957,687       | \$604,957,687        | \$ -          |
| City of Union            | \$129,880      | Not Available | \$187,641,963     | \$187,641,963       | \$187,641,963        | \$ -          |
| City of Walton           | \$174,120      | Not Available | \$250,689,662     | \$250,689,662       | \$250,689,662        | \$ -          |
| unincorporated area      | \$8,706,918    | Not Available | \$13,960,562,010  | \$13,960,562,010    | \$13,960,562,010     | Not available |
| Campbell County          | \$ 491,547,362 | Not Available | \$ 11,032,354,000 | \$ 11,032,354,000   | \$ 11,032,354,000    | Not available |
| City of Alexandria       | \$1,063,616    | Not Available | \$482,113,870     | \$482,113,870       | \$482,113,870        | Not available |
| City of Bellevue         | \$21,433,049   | Not Available | \$62,443,123      | \$62,443,123        | \$62,443,123         | Not available |
| City of California       | \$17,320,796   | Not Available | \$17,320,796      | \$17,320,796        | \$17,320,796         | \$ -          |
| City of Cold Spring      | \$7,483,700    | Not Available | \$326,557,678     | \$326,557,678       | \$326,557,678        | \$ -          |
| City of Crestview        | \$0            | Not Available | \$10,701,383      | \$10,701,383        | \$10,701,383         | \$ -          |
| City of Dayton           | \$13,074,686   | Not Available | \$133,491,483     | \$133,491,483       | \$133,491,483        | Not available |
| City of Fort Thomas      | \$7,044,131    | Not Available | \$393,855,038     | \$393,855,038       | \$393,855,038        | \$ -          |
| City of Highland Heights | \$0            | Not Available | \$179,827,370     | \$179,827,370       | \$179,827,370        | \$ -          |
| City of Melbourne        | \$50,229,038   | Not Available | \$53,506,917      | \$53,506,917        | \$53,506,917         | \$ -          |
| City of Mentor           | \$10,955,366   | Not Available | \$41,591,974      | \$41,591,974        | \$41,591,974         | \$ -          |
| City of Newport          | \$104,776,830  | Not Available | \$208,511,491     | \$208,511,491       | \$208,511,491        | Not available |
| City of Silver Grove     | \$102,643,179  | Not Available | \$114,736,482     | \$114,736,482       | \$114,736,482        | \$ -          |
| City of Southgate        | \$0            | Not Available | \$97,084,715      | \$97,084,715        | \$97,084,715         | \$ -          |
| City of Wilder           | \$56,050,652   | Not Available | \$263,673,261     | \$263,673,261       | \$263,673,261        | \$ -          |
| City of Woodlawn         | \$1,074,638    | Not Available | \$3,254,544       | \$3,254,544         | \$3,254,544          | \$ -          |
| unincorporated area      | \$98,397,681   | Not Available | \$8,605,236,120   | \$8,605,236,120     | \$8,605,236,120      | Not available |
| Carroll County           | \$ 267,200,269 | Not Available | \$1, 122,982,000  | \$1, 122,982,000    | \$1, 122,982,000     | Not available |
| City of Carrollton       | \$10,010,637   | Not Available | \$16,732,432      | \$16,732,432        | \$16,732,432         | Not available |

| Jurisdiction             | Flood          | Landslide     | Tornados          | Severe Thunderstorm | Severe Winter Storms | Dam Failure   |
|--------------------------|----------------|---------------|-------------------|---------------------|----------------------|---------------|
| City of Ghent            | \$371,298      | Not Available | \$5,727,208       | \$5,727,208         | \$5,727,208          | \$ -          |
| City of Prestonville     | \$1,639,554    | Not Available | \$1,639,554       | \$1,639,554         | \$1,639,554          | \$ -          |
| City of Sanders          | \$83,899       | Not Available | \$2,436,871       | \$2,436,871         | \$2,436,871          | \$ -          |
| City of Worthville       | \$89,281       | Not Available | \$2,459,331       | \$2,459,331         | \$2,459,331          | \$ -          |
| unincorporated area      | \$255,005,600  | Not Available | \$1,089,292,540   | \$1,089,292,540     | \$1,089,292,540      | \$ -          |
| Gallatin County          | \$ 96,788,000  | Not Available | \$ 662,632,000    | \$ 662,632,000      | \$ 662,632,000       | Not available |
| City of Glencoe          | \$585,214      | Not Available | \$15,376,724      | \$15,376,724        | \$15,376,724         | \$ -          |
| City of Sparta           | \$1,312,507    | Not Available | \$18,597,309      | \$18,597,309        | \$18,597,309         | \$ -          |
| City of Warsaw           | \$17,002,155   | Not Available | \$99,215,638      | \$99,215,638        | \$99,215,638         | \$ -          |
| unincorporated area      | \$77,888,124   | Not Available | \$529,763,548     | \$529,763,548       | \$529,763,548        | Not available |
| Grant County             | \$ 2,231,669   | Not Available | \$ 2,231,669,280  | \$ 2,231,669,280    | \$ 2,231,669,280     | Not available |
| City of Corinth          | none           | Not Available | \$ 11,984,269     | \$ 11,984,269       | \$ 11,984,269        | Not available |
| City of Crittenden       | none           | Not Available | \$ 175,246,474    | \$ 175,246,474      | \$ 175,246,474       | \$ -          |
| City of Dry Ridge        | none           | Not Available | \$ 184,041,469    | \$ 184,041,469      | \$ 184,041,469       | \$ -          |
| City of Williamstown     | none           | Not Available | \$ 324,212,931    | \$ 324,212,931      | \$ 324,212,931       | \$ -          |
| unincorporated area      | \$ 2,231,669   | Not Available | \$ 1,536,184,139  | \$ 1,536,184,139    | \$ 1,536,184,139     | \$ -          |
| Kenton County            | \$ 874,225,482 | Not Available | \$ 29,879,599,815 | \$ 29,879,599,815   | \$ 29,879,599,815    | Not available |
| City of Bromley          | \$63,525,835   | Not Available | \$117,967,457     | \$117,967,457       | \$117,967,457        | \$ -          |
| City of Covington        | \$243,327,555  | Not Available | \$4,795,456,775   | \$4,795,456,775     | \$4,795,456,775      | Not available |
| City of Crescent Springs | \$6,678,051    | Not Available | \$892,594,869     | \$892,594,869       | \$892,594,869        | \$ -          |
| City of Crestview Hills  | \$4,098,082    | Not Available | \$1,140,854,434   | \$1,140,854,434     | \$1,140,854,434      | \$ -          |
| City of Edgewood         | \$5,482,730    | Not Available | \$3,295,037,531   | \$3,295,037,531     | \$3,295,037,531      | \$ -          |
| City of Elsmere          | \$23,966,430   | Not Available | \$1,471,029,864   | \$1,471,029,864     | \$1,471,029,864      | \$ -          |
| City of Erlanger         | \$74,724,190   | Not Available | \$3,169,284,221   | \$3,169,284,221     | \$3,169,284,221      | Not available |
| City of Fairview         | \$1,239,096    | Not Available | \$7,999,668       | \$7,999,668         | \$7,999,668          | \$ -          |
| City of Fort Mitchell    | \$1,882,987    | Not Available | \$2,037,024,454   | \$2,037,024,454     | \$2,037,024,454      | \$ -          |

| Jurisdiction           | Flood                   | Landslide     | Tornados                 | Severe<br>Thunderstorm   | Severe Winter<br>Storms  | Dam Failure   |
|------------------------|-------------------------|---------------|--------------------------|--------------------------|--------------------------|---------------|
| City of Fort Wright    | \$152,123,558           | Not Available | \$1,743,951,264          | \$1,743,951,264          | \$1,743,951,264          | \$ -          |
| City of Independence   | \$97,689,395            | Not Available | \$3,268,494,116          | \$3,268,494,116          | \$3,268,494,116          | Not available |
| City of Kenton Vale    | \$111,007               | Not Available | \$23,788,875             | \$23,788,875             | \$23,788,875             | \$ -          |
| City of Lakeside Park  | \$563,608               | Not Available | \$821,849,785            | \$821,849,785            | \$821,849,785            | \$ -          |
| City of Ludlow         | \$118,601,267           | Not Available | \$622,361,653            | \$622,361,653            | \$622,361,653            | \$ -          |
| City of Park Hills     | \$0                     | Not Available | \$776,958,006            | \$776,958,006            | \$776,958,006            | \$ -          |
| City of Ryland Heights | \$25,116,867            | Not Available | \$171,200,273            | \$171,200,273            | \$171,200,273            | \$ -          |
| City of Taylor Mill    | \$55,141,408            | Not Available | \$1,844,922,560          | \$1,844,922,560          | \$1,844,922,560          | \$ -          |
| City of Villa Hills    | \$24,253,167            | Not Available | \$2,818,944,466          | \$2,818,944,466          | \$2,818,944,466          | Not available |
| unincorporated area    | \$25,700,249            | Not Available | \$859,879,544            | \$859,879,544            | \$859,879,544            | \$ -          |
| Owen County            | \$ 101,324,495          | Not Available | \$ 958,574,982           | \$ 958,574,982           | \$ 958,574,982           | \$ -          |
| City of Gratz          | \$3,031,690             | Not Available | \$3,031,690              | \$3,031,690              | \$3,031,690              | \$ -          |
| City of Monterey       | \$4,102,007             | Not Available | \$5,911,591              | \$5,911,591              | \$5,911,591              | \$ -          |
| City of Owenton        | \$0                     | Not Available | \$102,467,852            | \$102,467,852            | \$102,467,852            | \$ -          |
| unincorporated area    | \$94,190,798            | Not Available | \$847,163,849            | \$847,163,849            | \$847,163,849            | \$ -          |
| Pendleton County       | \$ 278,638,000          | Not Available | \$ 1,212,853,158         | \$ 1,212,853,158         | \$ 1,212,853,158         | Not available |
| City of Butler         | \$24,455,631            | Not Available | \$28,052,750             | \$28,052,750             | \$28,052,750             | \$ -          |
| City of Falmouth       | \$77,342,203            | Not Available | \$134,370,991            | \$134,370,991            | \$134,370,991            | Not available |
| unincorporated area    | \$166,840,166           | Not Available | \$1,050,429,417          | \$1,050,429,417          | \$1,050,429,417          | \$ -          |
| <b>NKADD Total</b>     | <b>\$ 2,122,386,277</b> | Not Available | <b>\$ 62,112,022,235</b> | <b>\$ 62,112,022,235</b> | <b>\$ 62,112,022,235</b> | Not available |

Source: HAZUS-MH 3.0, city level data is estimated



| NORTHERN KENTUCKY AREA DEVELOPMENT DISTRICT                                         |           |         |              |        |         |           |
|-------------------------------------------------------------------------------------|-----------|---------|--------------|--------|---------|-----------|
| HAZARD AREA - TRANSPORTATION SYSTEM DOLLAR EXPOSURE (* All values are in thousands) |           |         |              |        |         |           |
|                                                                                     | Highway   | Railway | Bus Facility | Ports  | Airport | Total     |
| <b>Boone County</b>                                                                 |           |         |              |        |         |           |
| Segments                                                                            | 1,137,155 | 27,660  | 0            | 0      | 151,856 | 1,316,671 |
| Bridges                                                                             | 62932     | 629     | 0            | 0      | 0       | 63,561    |
| Tunnels                                                                             | 0         | 0       | 0            | 0      | 2,000   | 2,000     |
| Facilities                                                                          | 0         | 7,989   | 1,000        | 15,976 | 10,651  | 35,616    |
| County Total                                                                        | 1,200,087 | 36,278  | 1,000        | 15,976 | 164,507 | 1,417,848 |

|                        | Highway | Railway | Bus Facility | Ports  | Airport | Total   |
|------------------------|---------|---------|--------------|--------|---------|---------|
| <b>Campbell County</b> |         |         |              |        |         |         |
| Segments               | 765,849 | 45,081  | 0            | 0      | 0       | 801,930 |
| Bridges                | 163,688 | 332     | 0            | 0      | 0       | 164,020 |
| Tunnels                | 0       | 0       | 0            | 0      | 0       | 0       |
| Facilities             | 0       | 0       | 0            | 25,961 | 0       | 29,494  |
| County Total           | 929,537 | 45,413  | 0            | 25,961 | 0       | 995,444 |

|                       | Highway | Railway | Bus Facility | Ports | Airport | Total   |
|-----------------------|---------|---------|--------------|-------|---------|---------|
| <b>Carroll County</b> |         |         |              |       |         |         |
| Segments              | 416,774 | 53,822  | 0            | 0     | 0       | 470,596 |
| Bridges               | 36,875  | 700     | 0            | 0     | 0       | 37,575  |
| Tunnels               | 1,000   | 800     | 0            | 0     | 0       | 1,800   |

|              |         |        |   |        |   |         |
|--------------|---------|--------|---|--------|---|---------|
| Facilities   | 7,500   | 3,500  | 0 | 11,988 | 0 | 15,988  |
| County Total | 462,149 | 58,822 | 0 | 11,988 | 0 | 525,959 |

|                        | Highway | Railway | Bus Facility | Ports  | Airport | Total   |
|------------------------|---------|---------|--------------|--------|---------|---------|
| <b>Gallatin County</b> |         |         |              |        |         |         |
| Segments               | 434,022 | 20,251  | 0            | 0      | 0       | 454,273 |
| Bridges                | 26,156  | 0       | 0            | 0      | 0       | 26,156  |
| Tunnels                | 0       | 0       | 0            | 0      | 0       | 0       |
| Facilities             | 6,000   | 0       | 0            | 21,997 | 0       | 27,997  |
| County Total           | 466,178 | 20,251  | 0            | 21,997 | 0       | 508,426 |

|                     | Highway | Railway | Bus Facility | Ports | Airport | Total   |
|---------------------|---------|---------|--------------|-------|---------|---------|
| <b>Grant County</b> |         |         |              |       |         |         |
| Segments            | 548,262 | 46,020  | 0            | 0     | 0       | 594,282 |
| Bridges             | 26,215  | 0       | 0            | 0     | 0       | 26,215  |
| Tunnels             | 0       | 0       | 0            | 0     | 0       | 0       |
| Facilities          | 0       | 0       | 0            | 0     | 0       | 0       |
| County Total        | 574,477 | 46,020  | 0            | 0     | 0       | 620,497 |

|                      | Highway | Railway | Bus Facility | Ports | Airport | Total |
|----------------------|---------|---------|--------------|-------|---------|-------|
| <b>Kenton County</b> |         |         |              |       |         |       |

|              |         |        |       |        |   |         |
|--------------|---------|--------|-------|--------|---|---------|
| Segments     | 582,423 | 84,309 | 0     | 0      | 0 | 666,732 |
| Bridges      | 215,516 | 2,322  | 0     | 0      | 0 | 217,838 |
| Tunnels      | 0       | 3,000  | 0     | 0      | 0 | 3,000   |
| Facilities   | 3,000   | 2,663  | 8,136 | 13,979 | 0 | 27,778  |
| County Total | 800,939 | 92,294 | 8,136 | 13,979 | 0 | 915,348 |

|                    | Highway | Railway | Bus Facility | Ports | Airport | Total   |
|--------------------|---------|---------|--------------|-------|---------|---------|
| <b>Owen County</b> |         |         |              |       |         |         |
| Segments           | 562,748 | 0       | 0            | 0     | 0       | 562,748 |
| Bridges            | 5,080   | 0       | 0            | 0     | 0       | 5,080   |
| Tunnels            | 0       | 0       | 0            | 0     | 0       | 0       |
| Facilities         | 3,000   | 0       | 2,000        | 0     | 0       | 5,000   |
| County Total       | 570,828 | 0       | 2,000        | 0     | 0       | 572,828 |

|                         | Highway | Railway | Bus Facility | Ports | Airport | Total   |
|-------------------------|---------|---------|--------------|-------|---------|---------|
| <b>Pendleton County</b> |         |         |              |       |         |         |
| Segments                | 357,254 | 45,628  | 0            | 0     | 37,964  | 440,846 |
| Bridges                 | 12,328  | 1,180   | 0            | 0     | 0       | 13,508  |
| Tunnels                 | 0       | 2,500   | 0            | 0     | 0       | 2,500   |
| Facilities              | 0       | 0       | 0            | 5,991 | 10,651  | 16,642  |
| County Total            | 369,582 | 49,308  | 0            | 5,991 | 48,615  | 473,496 |

### 3.3.5 ASSESSING VULNERABILITY: ANALYZING DEVELOPMENT TRENDS

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The Northern Kentucky Area Development District is a diverse area. The eight counties vary widely from urbanized to rural. There are variations in the transportation systems, natural resources, economic developments, physical and social components.

The following section provides a basic overview of the region.

#### AREA ASSESSMENT

##### GOVERNMENT

In the eight county region, there are 61 local governments. While residents often value a sense of community provided by the variety of governments, the business community sometimes considers the number and variety of local governments to be an impediment to development. Communication between the local governments is vital to the success of the region. One of the real strengths of Northern Kentucky is effective communication. City managers, mayors, municipal clerks, public works officials, and police chiefs all meet regularly to discuss issues. The NKADD Board, primarily consisting of local elected officials, meets monthly.

Effective and efficient local governments are key components to the quality of life and economic viability of the region. The wealth, population, and governance issues of cities and counties differ greatly. Providing information to and between local governments is a primary function of the NKADD and is vital to the success of the region. The NKADD will continue to support and promote regional cooperation.

##### TRANSPORTATION

The Northern Kentucky Region is served by two transportation-planning organizations. Boone, Campbell, and Kenton counties are served by the Ohio-Kentucky-Indiana Regional Council of Governments (OKI). The NKADD Area Transportation Committee serves the remaining five rural counties; Carroll, Gallatin, Grant, Owen and Pendleton. Both organizations serve the transportation needs of the area. Fostering consensus between local, state and federal governments and planning agencies for multi-jurisdictional transportation projects is a high priority for the area. Local governments and other organizations have secured federal funds for the greater Northern Kentucky area over the years. There are many projects identified for the region, both planned and unscheduled. Major needs identified in the region include replacement and rehabilitation of the Brent Spence Bridge, which carries I-71/75 across the Ohio River from Cincinnati into the City of Covington, rehabilitation of the I-471 corridor, widening US-42 in Carroll County, reconstruction of US-42 in Gallatin County due to damage from landslides, widening of KY-536 in Kenton and Boone Counties, and widening of US-27 in Campbell and Pendleton Counties.

##### NATURAL RESOURCES AND THE PHYSICAL ENVIRONMENT

As Northern Kentucky continues to grow, threats to natural resources and the environment increase. The U.S. Department of Environmental Protection has designated parts of Northern Kentucky as non-attainment areas. According to the EPA, *The Clean Air Act identifies six common air pollutants that are found all over the United States. These pollutants can injure health, harm the environment and cause property damage. EPA calls these pollutants criteria air pollutants because the agency has developed health-based criteria (science-based guidelines) as the basis for setting permissible levels in the air we breathe. PM<sub>2.5</sub> is a criteria pollutant. EPA establishes national ambient air quality standards for each of the criteria pollutants. These standards apply to the concentration of a pollutant in outdoor air. If the air quality in a geographic area meets or is cleaner than the*

*national standard, it is called an attainment area; areas that don't meet the national standard are called nonattainment areas.*

This designation can hinder transportation and economic development activities. In the urban areas of Northern Kentucky, promoting economic growth and preserving natural resources present unique collaborative challenges. Rapid growth, green space preservation and natural resource management, require planning, consensus and funding. Growth management is an on-going concern. Funding is limited. Creative and innovative ideas are necessary to meet the demands of a growing region while preserving land. Boone County, the region's fastest growing county, recently created a conservation foundation to purchase property for land preservation. Exploring means of cooperation between local governments is necessary to help meet the recreational needs of the citizens of Northern Kentucky. The region has a history of working together. An example of this cooperation is the management of solid waste. Open dumps have been cleaned up and counties have hired solid waste coordinators.

#### HUMAN RESOURCES AND PROFESSIONAL SERVICES

The Northern Kentucky population is growing older. Demand for services is rising and will continue to do so for decades. Funds for programs are diverse and very limited. Growth in funding for senior services is stagnant. Addressing service issues is important. A Council on Aging serves the District. This is the NKADD's oldest standing committee. It is made up of volunteers from each county. The Council on Aging is very active, well developed and vibrant. Its *Single Point of Entry* system (NKADD's Case Management Division) acts as a one-stop system for senior citizens to access in-home services. The one-stop system is efficient and customer friendly.

Conversely, staffing these services can be problematic. The need for professional aids and registered nurses exceeds the supply. These direct service provider positions are typically lower paying and demanding.

#### PUBLIC SAFETY AND EMERGENCY SERVICES

Public protection in Northern Kentucky continues to receive a high priority on both a regional and local government scale. Regional assets like combined dispatching centers, a regional drug enforcement agency, a regional Police Chiefs Association, and a wide range of services to assist Northern Kentucky communities with technical assistance, has had a very positive impact on the District. Cooperation seems to be flourishing. For example, the Cities of Bellevue and Dayton, after an NKADD study, merged their fire departments for greater efficiency. Local governments continue to provide professional law enforcement and emergency medical personnel and services. In the past, communities have utilized resources from the federal government through the Crime Bill to improve services. Expanding the use of mobile data terminals is an ongoing need. Previously, the NKADD helped Kenton County obtain a million dollars for mobile data terminals. It is important to continue to provide regional services to assist law enforcement agencies in improving operations. Assisting fire departments support volunteers remains a priority in the region. As evident in this report, volunteers provide invaluable service to Northern Kentucky.

#### ECONOMY

The economy of Northern Kentucky, especially Boone County, has been impacted by the expansion of the Greater Cincinnati/ Northern Kentucky International Airport, the Interstate system, land availability, and cooperative efforts to attract quality jobs and diversify the region's economy.

Many stakeholders contribute to the region's growth. In addition to the Area Development District, stakeholders include the Commonwealth of Kentucky, city and county governments, the Tri-County Economic Development Corporation, SouthBank Partners, Skyward, and the various Chambers of Commerce.



In spite of overall positive development trends, all parts of the district are not enjoying the same level of growth. The northern part of the district experiences the greatest growth. The southern counties have improved water and sewer infrastructures, which have provided business growth and quality job creation. However, more needs to be done. And, as was previously stated, new development challenges historic and natural resource preservation. Finding the balance between investment and protection is an ongoing evaluation.

Northern Kentucky has many assets that persuade economic development. A root source of economic development in this area is the region's transportation system, including the Greater Cincinnati/Northern Kentucky International Airport, the interstate system and rivers. Northern Kentucky has earned the reputation for being coordinated and cooperative in recruiting businesses regionally rather than parochially. Land has traditionally been prevalent in the southern portion of the region, which is another significant recruitment tool. The business sector is active in the Chamber of Commerce, legislative matters, community projects, Church festivals, school sports, etc. Northern Kentucky University, Thomas More College, and Gateway Technical and Community College, are reputable, highly regarded colleges in our region that provide research and information. These institutions are charged with delivering a portion of the area's workforce and collaborate with business needs. At this time, the southern portion of the district is categorized as "below income" and "un" or "underemployed" by the Economic Development Administration, while the northern, urban portion of the district presents a qualified labor shortage.

#### INFRASTRUCTURE AND SERVICES

The Northern Kentucky region has made a lot of progress as it relates to Infrastructure. The Northern Kentucky Sanitation District has within the last ten years consolidated the numerous municipal systems into one. Northern Kentucky's three urban counties now have a truly consolidated sanitation district. Improvements to the system are ongoing because the area served contains many older communities requiring upgrades. Cooperation can also be seen in other parts of the NKADD. For example, the Carrolton Utilities has undertaken a project to construct and improve the wastewater collection and treatment system of a multi-county area.

The region also improved the water infrastructure. The NKADD is involved with the 20/20 project aimed at bringing potable water to all areas of the district within twenty years. The planning process includes seven county councils and one regional council. Projects are prioritized at the county and then regional level. The prioritization eventually will be reviewed by NKADD Board of Directors and submitted to the State. Several projects have resulted from this process. Capacity is a problem in the fastest growing counties of the region including Boone, Gallatin, and Grant. Simultaneously, supply has been a problem with new water source needs. The regional water district's acquisition of the City of Newport's water system is another example of cooperative governing. Boone County now receives water from the Greater Cincinnati Water Works Department; a great example of interstate collaboration.

#### DEMOGRAPHICS

The important general characteristics of Northern Kentucky addressed in this section include population, economic data, and other characteristics.

##### POPULATION

The population of the Northern Kentucky Area Development District saw dramatic growth from 2000-2014. Overall the population of the NKADD region grew by 13.9 percent from 2000-2014. Some NKADD counties experienced extraordinary growth, led by Boone County (43.1%), Grant County (10.2%), and Owen County (6.9%). Pendleton County's growth was the smallest of any NKADD County at 0.2 percent. The Commonwealth of Kentucky percentage change was 8.4 percent from 2000-2014.

TABLE 1: POPULATION GROWTH, 1990-2014

| Geography       | 1990 Census Population | 2000 Census Population | 2010 Census Population | 2014 Census Estimates |
|-----------------|------------------------|------------------------|------------------------|-----------------------|
| Boone           | 57,589                 | 85,991                 | 118,811                | 123,030               |
| Campbell        | 83,866                 | 88,616                 | 90,336                 | 91,268                |
| Carroll         | 9,292                  | 10,155                 | 10,811                 | 10,871                |
| Gallatin        | 5,393                  | 7,870                  | 8,589                  | 8,554                 |
| Grant           | 15,737                 | 22,384                 | 24,662                 | 24,667                |
| Kenton          | 142,031                | 151,464                | 159,720                | 161,915               |
| Owen            | 9,035                  | 10,547                 | 10,841                 | 10,740                |
| Pendleton       | 12,036                 | 14,390                 | 14,877                 | 14,642                |
| <b>NKADD</b>    | <b>334,979</b>         | <b>391,417</b>         | <b>438,647</b>         | <b>445,687</b>        |
| <b>Kentucky</b> | <b>3,660,777</b>       | <b>4,041,769</b>       | <b>4,339,367</b>       | <b>4,383,272</b>      |

SOURCE: US CENSUS BUREAU

## RACE

While growth rates are readily apparent from the above charts, it is important to also explore who makes up the Northern Kentucky Population. Table 2 presents the racial composition of the population by percentage. The Table covers the Kentucky part of the Cincinnati PMSA. It also separately lists Carroll and Owen Counties, which are not a part of the Cincinnati PMSA. Population groups comprising one percent or more of the population are listed.

TABLE 2: RACIAL COMPOSITION IN 2010

| Geography            | White         | Black        | Hispanic     | Other        |
|----------------------|---------------|--------------|--------------|--------------|
| Boone                | 91.9%         | 3.1%         | 3.8%         | 1.2%         |
| Campbell             | 93.9%         | 3.0%         | 1.8%         | 1.3%         |
| Carroll              | 93.9%         | 1.7%         | 6.9%         |              |
| Gallatin             | 93.2%         | 1.5%         | 2.1%         | 3.2%         |
| Grant                | 95.2%         | 0.2%         | 2.4%         | 2.2%         |
| Kenton               | 90.6%         | 4.6%         | 2.8%         | 2.0%         |
| Owen                 | 96.2%         | 1.6%         | 2.4%         |              |
| Pendleton            | 98.3%         | 0.5%         | 1.1%         | 0.1%         |
| <b>NKADD</b>         | <b>94.15%</b> | <b>2.03%</b> | <b>2.91%</b> | <b>0.91%</b> |
| <b>Kentucky</b>      | <b>87.7%</b>  | <b>7.9%</b>  | <b>3.2%</b>  | <b>1.2%</b>  |
| <b>United States</b> | <b>73.8%</b>  | <b>12.6%</b> | <b>16.9%</b> |              |

SOURCE: US CENSUS BUREAU

## AGE

Table 3 shows the ages of the Northern Kentucky 2014 Population Estimates, U.S. Census.

TABLE 3: AGE BY PERCENT OF TOTAL POPULATION IN 2014

| Geography            | 9 and younger | 10 to 19     | 20 to 34     | 35 to 59     | 60 and older |
|----------------------|---------------|--------------|--------------|--------------|--------------|
| Boone                | 15.7%         | 14.3%        | 18.5%        | 35.7%        | 16.0%        |
| Campbell             | 12.5%         | 13.2%        | 21.9%        | 33.6%        | 18.9%        |
| Carroll              | 14.4%         | 13.7%        | 19.2%        | 30.9%        | 21.8%        |
| Gallatin             | 14.6%         | 14.1%        | 17.4%        | 35.0%        | 18.9%        |
| Grant                | 14.3%         | 15.9%        | 18.1%        | 34.4%        | 17.2%        |
| Kenton               | 14.0%         | 12.9%        | 21.3%        | 34.5%        | 17.3%        |
| Owen                 | 11.5%         | 14.6%        | 16.4%        | 34.7%        | 22.9%        |
| Pendleton            | 11.6%         | 13.8%        | 18.1%        | 37.1%        | 19.4%        |
| <b>NKADD</b>         | <b>13.6%</b>  | <b>14.1%</b> | <b>18.9%</b> | <b>34.5%</b> | <b>19.1%</b> |
| <b>Kentucky</b>      | <b>12.7%</b>  | <b>13.2%</b> | <b>19.9%</b> | <b>34.2%</b> | <b>20.1%</b> |
| <b>United States</b> | <b>12.9%</b>  | <b>13.4%</b> | <b>20.5%</b> | <b>33.7%</b> | <b>19.4%</b> |

SOURCE: US CENSUS BUREAU

## EDUCATIONAL ATTAINMENT

TABLE 4: EDUCATIONAL ATTAINMENT BY COUNTY IN 2014

| Geography       | High School Graduate or Higher | Bachelor's Degree or Higher |
|-----------------|--------------------------------|-----------------------------|
| Boone           | 91.9%                          | 30.8%                       |
| Campbell        | 89.2%                          | 28.1%                       |
| Carroll         | 74.4%                          | 11.1%                       |
| Gallatin        | 77.8%                          | 11.8%                       |
| Grant           | 81.8%                          | 11.4%                       |
| Kenton          | 88.7%                          | 28.9%                       |
| Owen            | 85.7%                          | 14.0%                       |
| Pendleton       | 83.6%                          | 12.6%                       |
| <b>NKADD</b>    | <b>84.1%</b>                   | <b>18.6%</b>                |
| <b>Kentucky</b> | <b>83.5%</b>                   | <b>21.8%</b>                |

SOURCE: US CENSUS BUREAU, 2014 CENSUS

## ECONOMIC ANALYSIS

Northern Kentucky has been affected by the downturn in the world economy. However, signs are pointing to a recovery throughout the nation, and an increase in economic activity has been noted in the Northern Kentucky region.

According to the Northern Kentucky Chamber of Commerce:

“While the recovery has been painfully slow, the regional economy did grow in 2011. The latest data show that the Cincinnati USA metropolitan area is on track to end the year posting an increase in gross regional product and number of jobs. In addition, the region’s unemployment rate is lower compared to this time last year. While the rate of growth will continue to be slow, economic growth is expected in 2012 as well.”

“After increasing 2.1% in 2010, Cincinnati’s growth in 2011 slowed with real GRP increasing an estimated 1.7% for the year. Based on the anticipated strength of the national economy, GRP is expected to increase 2.4% in 2012, keeping pace with the forecasted 2.4% increase nationally.

- Personal consumption expenditures account for roughly 70% of U.S. Gross Domestic Product. As such, trends in consumer spending patterns have a large impact on growth. Trends in personal income growth are a good indicator of future consumer spending patterns.
- Cincinnati’s personal income increased 2.6% between 2009 and 2010. Despite the weak labor market in 2010, half of Cincinnati’s 2.6% increase was from net earnings, which were up 1.3% with the other half arising from increases in transfer payments (such as unemployment and social security payments) also up 1.3%.

- The trends in wage and salary income and transfer payments highlight the dichotomy within the labor market. Those that have jobs are seeing more hours and higher wages while the unemployed languish for months and even years looking for work.”

## EMPLOYMENT

TABLE 5: LABOR FORCE ESTIMATES, 2015

| Geography    | Civilian Labor Force | Total Employment | Total Unemployment | Unemployment Rate 2015 |
|--------------|----------------------|------------------|--------------------|------------------------|
| Boone        | 65,546               | 61,454           | 4,092              | 6.2%                   |
| Campbell     | 49,526               | 45,481           | 4,045              | 8.2%                   |
| Carroll      | 4,934                | 4,184            | 750                | 15.2%                  |
| Gallatin     | 4,117                | 3,725            | 392                | 9.5%                   |
| Grant        | 11,350               | 10,208           | 1,142              | 10.1%                  |
| Kenton       | 85,229               | 78,082           | 7,147              | 8.4%                   |
| Owen         | 4,864                | 4,415            | 449                | 9.2%                   |
| Pendleton    | 7,064                | 6,526            | 538                | 7.6%                   |
| <b>NKADD</b> | <b>232,630</b>       | <b>209,891</b>   | <b>18,555</b>      | <b>9.3%</b>            |

SOURCE: U.S. CENSUS BUREAU, 2014 CENSUS ESTIMATES

## INCOME

Per-capita and median household income levels for all NKADD counties are near or above the state and national averages.

TABLE 6: INCOME LEVELS, 1989 – 2014 IN HISTORIC DOLLARS

| Geography            | Median Household Income |                  |                  | Per-Capita Income |                  |                  |
|----------------------|-------------------------|------------------|------------------|-------------------|------------------|------------------|
|                      | in 1989                 | in 1999          | in 2014          | in 1989           | in 1999          | in 2014          |
| Boone                | \$ 34,485               | \$ 21,587        | \$ 67,286        | \$ 13,576         | \$ 53,593        | \$ 29,656        |
| Campbell             | \$ 29,228               | \$ 18,093        | \$ 54,482        | \$ 12,603         | \$ 41,903        | \$ 27,479        |
| Carroll              | \$ 20,179               | \$ 23,535        | \$ 39,668        | \$ 10,202         | \$ 35,925        | \$ 19,711        |
| Gallatin             | \$ 21,454               | \$ 20,637        | \$ 48,917        | \$ 9,717          | \$ 36,422        | \$ 20,507        |
| Grant                | \$ 24,502               | \$ 17,057        | \$ 46,382        | \$ 10,356         | \$ 38,438        | \$ 19,872        |
| Kenton               | \$ 30,516               | \$ 16,416        | \$ 54,817        | \$ 13,587         | \$ 43,906        | \$ 27,788        |
| Owen                 | \$ 21,067               | \$ 16,776        | \$ 40,995        | \$ 9,559          | \$ 33,310        | \$ 22,346        |
| Pendleton            | \$ 22,500               | \$ 22,085        | \$ 46,085        | \$ 9,525          | \$ 38,125        | \$ 23,755        |
| <b>NKADD</b>         | <b>\$ 25,491</b>        | <b>\$ 19,523</b> | <b>\$ 49,829</b> | <b>\$ 11,141</b>  | <b>\$ 40,203</b> | <b>\$23,889</b>  |
| <b>Kentucky</b>      | <b>\$ 22,534</b>        | <b>\$ 15,521</b> | <b>\$ 43,342</b> | <b>\$ 11,153</b>  | <b>\$ 33,672</b> | <b>\$ 23,741</b> |
| <b>United States</b> | <b>\$ 30,056</b>        | <b>\$ 16,551</b> | <b>\$ 53,482</b> | <b>\$ 14,420</b>  | <b>\$ 41,994</b> | <b>\$ 28,555</b> |

SOURCE: US CENSUS BUREAU, 1990 &amp; 2000 CENSUS &amp; 2014 CENSUS ESTIMATES

## COST OF LIVING INDEX

ACCRA (formerly the American Chamber of Commerce Researchers Association) publishes the Cost of Living Index quarterly. The index measures differences between areas in living expenses such as housing, groceries, transportation, utilities, health care, and consumer goods and services, excluding taxes and non-consumer expenditures. The composite index is the average of all living expenses weighted by the average percent spent on each cost.

The Cost of Living Index of Northern Kentucky (Boone, Campbell and Kenton Counties) is 87.8, which ranks below the national average set at 100. This means that one would expect to pay 87.8% for goods that cost the average American 100%.

TABLE 7: COST OF LIVING INDEX 2014

| Location                       | Composite Index |
|--------------------------------|-----------------|
| New York, NY (Manhattan)       | 220.4           |
| Honolulu, HI                   | 169.1           |
| San Francisco, CA              | 161.6           |
| San Jose, CA                   | 149.3           |
| Stamford, CT                   | 144.1           |
| Orange County, CA              | 141.6           |
| Washington, DC / Arlington, VA | 140.1           |
| Boston, MA                     | 139.7           |
| Oakland, CA                    | 136.1           |
| Los Angeles / Long Beach, CA   | 130.4           |
| San Diego, CA                  | 130.0           |
| Seattle, WA                    | 119.1           |
| Chicago, IL                    | 115.3           |
| Asheville, NC                  | 103.6           |
| Richmond, VA                   | 101.7           |

| Location                                    | Composite Index |
|---------------------------------------------|-----------------|
| Charleston SC                               | 100.2           |
| United States (average)                     | 100.0           |
| Columbia, SC                                | 96.6            |
| Phoenix, AZ                                 | 96.0            |
| Dallas, TX                                  | 95.9            |
| Charlotte, NC                               | 95.7            |
| Jacksonville, FL                            | 95.3            |
| Atlanta, GA                                 | 95.3            |
| Salt Lake City, UT                          | 94.5            |
| Raleigh, NC                                 | 93.6            |
| <b>Cincinnati OH-KY-IN Metro Cincinnati</b> | <b>91.7</b>     |
| Roanoke, VA                                 | 91.1            |
| Birmingham, AL                              | 87.7            |
| Nashville, TN                               | 87.6            |
| <b>Cincinnati OH-KY-IN Metro Covington</b>  | <b>86.5</b>     |
| Memphis, TN                                 | 85.4            |

SOURCE: COUNCIL FOR COMMUNITY AND ECONOMIC RESEARCH, COST OF LIVING INDEX 2014

TABLE 8: DETAILED COST OF LIVING INDEX FOR NORTHERN KENTUCKY

| Composite Index | Grocery Items                  | Housing      | Utilities     | Transportation | Health Care  | Misc. goods and Services |
|-----------------|--------------------------------|--------------|---------------|----------------|--------------|--------------------------|
| <b>100%</b>     | <b>13.96% (% of composite)</b> | <b>27.8%</b> | <b>10.23%</b> | <b>12.12%</b>  | <b>4.41%</b> | <b>31.48%</b>            |
| 87.8            | 91.4                           | 72.7         | 93.7          | 99.6           | 102.2        | 91.2                     |

SOURCE: TRI-COUNTY ECONOMIC DEVELOPMENT CORPORATION, ACCRA, 2014

## AGRICULTURE

TABLE 9: AGRICULTURAL EMPLOYMENT AND DISTRICT FOUR AGRICULTURAL DATA 2012

| Geography       | Farms (number) | Average size of farm (acres) |
|-----------------|----------------|------------------------------|
| Boone           | 608            | 111                          |
| Campbell        | 504            | 84                           |
| Carroll         | 278            | 193                          |
| Gallatin        | 185            | 150                          |
| Grant           | 812            | 121                          |
| Kenton          | 459            | 83                           |
| Owen            | 701            | 188                          |
| Pendleton       | 810            | 125                          |
| <b>NKADD</b>    | <b>4,357</b>   | <b>132</b>                   |
| <b>Kentucky</b> | <b>77,064</b>  | <b>169</b>                   |

SOURCE: USDA CENSUS OF AGRICULTURE 2012



TABLE 10: MAJOR EMPLOYERS

The following is a listing of the major employers located in or near the NKADD.

| Company                                                | Product/Service              | Employment |
|--------------------------------------------------------|------------------------------|------------|
| <b>Northern Kentucky Manufacturing</b>                 |                              |            |
| Bosch (formerly ZF Steering Systems)                   | US HQ; steering systems      | 1,200      |
| Mubea NA                                               | Automotive parts             | 1,200      |
| Mazak Corp.                                            | CNC and 5 Axis machines      | 900        |
| Schwan's Global Supply Chain Inc.                      | Frozen foods                 | 900        |
| Hilex Poly (formerly Duro Bag)                         | Paper and plastic bags       | 800        |
| Tyson Foods (formerly Hillshire Brands)                | Meat products                | 575        |
| Fives Cincinnati (formerly MAG-IAS)                    | Machine tools                | 450        |
| US Playing Card Company                                | HQ, playing cards            | 450        |
| WILD Flavors                                           | HG, food flavorings          | 415        |
| Zumbiel Packaging                                      | Paperboard packaging         | 350        |
| <b>Northern Kentucky Non-Manufacturing<sup>1</sup></b> |                              |            |
| St. Elizabeth Medical Center                           | Health Care Provider         | 7,270      |
| Internal Revenue Service                               | Government Agency            | 4,200      |
| Fidelity Investments                                   | Regional HQ                  | 3,900      |
| Boone County Schools                                   | Public School System         | 3,600      |
| Kroger Company                                         | Grocery                      | 3,545      |
| Citicorp Credit Services                               | Call Center                  | 2,500      |
| Kenton County Schools                                  | Public School System         | 2,200      |
| DHL Airways                                            | Air Freight Center           | 2,160      |
| Northern Kentucky University                           | Public University            | 2,133      |
| Delta Air Lines Inc.                                   | Transportation               | 2,120      |
| <b>Tri-State Manufacturing</b>                         |                              |            |
| The Procter & Gamble Co.                               | Consumer products            | 14,000     |
| GE Aviation                                            | Aircraft engines             | 7,300      |
| AK Steel Corp                                          | Carbon flat-rolled steel     | 6,200      |
| United Dairy Farmers                                   | Dairy Products               | 3,000      |
| Ethicon Endo-Surgery                                   | Medical Equipment & Supplies | 1,480      |
| Ford Motor Company                                     | Automobiles                  | 1,400      |
| LSI Industries                                         | Lighting products            | 1,400      |
| <b>Tri-State Non-Manufacturing</b>                     |                              |            |
| The Kroger Company                                     | Retail food stores           | 17,000     |
| University of Cincinnati                               | Public university & hospital | 15,162     |
| Cincinnati Children's Hospital                         | Pediatric medical center     | 12,057     |

| <b>Company</b>            | <b>Product/Service</b>         | <b>Employment</b> |
|---------------------------|--------------------------------|-------------------|
| TriHealth Inc.            | Health services                | 9,898             |
| Mercy Health Partners     | Health services                | 8,550             |
| Archdiocese of Cincinnati | Human services                 | 8,000             |
| Wal-mart Stores           | Retail                         | 6,932             |
| St. Elizabeth Healthcare  | Health Care Provider           | 6,839             |
| Fifth Third Bancorp       | Banking and financial services | 6,771             |
| Internal Revenue Service  | Government Agency              | 5,500             |

*SOURCE: NORTHERN KENTUCKY TRI-COUNTY ECONOMIC DEVELOPMENT CORPORATION, 2012*

*SOURCE: CITY OF CINCINNATI DATA CENTER*

## TOURISM

Cincinnati/Northern Kentucky International Airport (CVG) offers 190 daily departures to more than 55 non-stop cities, including non-stop international service to Paris, Toronto, Montreal and Cancun. CVG offers more daily flights and serves more non-stop destinations than surrounding regional airports, including Dayton, Columbus, Indianapolis, Lexington and Louisville. Airline passengers worldwide have rated CVG one of the nation's best airports for the 16th year in a row (2010 J.D. Power & Associates survey). No other U.S. airport has been consistently rated as highly in so many independent surveys. CVG was ranked #1 on a list of America's Safest Airports (Travel & Leisure Magazine, 2011). CVG was ranked Best Regional Airport in North America (Skytrax, 2011).

The opening of the Northern Kentucky Convention Center in Covington has stimulated a 400 percent increase in convention-related visitors to the area. Convention events generate approximately \$225 in revenue per hotel room per night, including spending on food, transportation, entertainment and ancillary purchases. Concomitantly, the City of Newport is home to the \$40 million Newport Aquarium that opened in May, 1999, and is one of the anchor attractions of the \$170 million Newport on the Levee entertainment complex. Newport is also the site of the 62,000-pound World Peace Bell, the world's largest free-swinging bell.

Tourism is the Commonwealth's third leading industry and second leading employer after healthcare. In 1998, the Northern Kentucky economy benefited through expenditures in excess of \$176 million generated by the hospitality and tourism industry. In 2000 Northern Kentucky enjoyed its best tourism year ever (source - Northern Kentucky Convention and Visitors Bureau). However, in 2001, due to a variety of adverse factors, including the September 11th terrorist attacks and national economic slump, tourism and travel revenue declined by 11 percent in Boone and Kenton Counties and 3 percent in Campbell County. Three Northern Kentucky counties, Carroll, Gallatin, and Pendleton, experienced increases in tourism revenues. In Gallatin County, tourism revenues increased by 22 percent to \$28.4 million. Much of the increase is attributed to the success of the \$160 million, 68,000-seat Northern Kentucky Speedway in the City of Sparta.

## HOUSING

In the mid-2000s, Northern Kentucky's stable economy also provided a strong housing market. When the national economy deteriorated toward the end of the decade, Kentucky was adversely impacted, just as all States were. According to Rebecca Trout, former president of the Northern Kentucky Board of Realtors which represents Boone, Kenton and Campbell Counties, the declining housing sales market improved from 2007 until 2009 (news release January 25, 2010). While number of sales did not exceed prior years during this period of time, housing prices dropped as well. First time homeowner incentives boosted home sales, yet yielded lower average prices. Average prices began to rise in 2010. Northern Kentucky's homebuilders and realtors have strong coalitions which are advocates for the housing economy.

Some communities, especially those along the river, have an older housing stock. An important priority for the region has been rehabilitating this older inventory. Providing affordable rental housing has been an issue. As previously stated, many of the NKADD's rural communities need infrastructure to support housing development.

The homeless continue to be underserved. Continued support for this vulnerable population is necessary for permanent, temporary and transitional housing needs. Northern Kentucky Area Development District provides much needed information and referral services to a network of resources for the region.

TABLE 11

| <b>Geography</b>     | <b>Total Housing Units</b> | <b>Average Household Size</b> |
|----------------------|----------------------------|-------------------------------|
| Boone                | 47,052                     | 2.78                          |
| Campbell             | 39,705                     | 2.49                          |
| Carroll              | 4,689                      | 2.55                          |
| Gallatin             | 3,813                      | 2.79                          |
| Grant                | 9,953                      | 2.93                          |
| Kenton               | 69,242                     | 2.57                          |
| Owen                 | 5,642                      | 2.46                          |
| Pendleton            | 6,321                      | 2.70                          |
| <b>NKADD</b>         | <b>186,417</b>             | <b>2.66</b>                   |
| <b>Kentucky</b>      | <b>1,938,836</b>           | <b>2.50</b>                   |
| <b>United States</b> | <b>132,741,033</b>         | <b>2.63</b>                   |

SOURCE: US CENSUS BUREAU, 2014 AMERICAN COMMUNITY SURVEY

#### HOUSING PROVIDERS

The following is a listing of the housing authorities located in the NKADD:

Carrollton Housing Authority  
Housing Authority of Covington  
Housing Authority of Dayton  
Falmouth Housing Authority  
Newport Housing Authority  
Boone County Assisted Housing Department  
Campbell County Housing Department

#### HEALTH

The Northern Kentucky region is served by many high-quality, professional health care providers. The urban areas closest to Cincinnati are particularly well served through quality hospitals, emergency facilities, outpatient clinics and awareness programs. The two public health districts provide a wide range of services and have developed comprehensive health plans for Northern Kentucky. A report card has been published for the region. Northern Kentucky has many health care needs, including an aging population and heroin-related issues. Local governments have begun wellness initiatives to improve the quality of life, especially for youth.

#### HOSPITALS

The following is a list of hospitals and care facilities located in the NKADD region:

St. Elizabeth Medical Center– North  
401 E. 20<sup>th</sup> Street  
Covington KY 41014  
(859) 292-4000

St. Elizabeth Medical Center– South  
1 Medical Village Drive  
Edgewood KY 41017  
(859) 344-2000

St. Elizabeth Medical Center– Grant County  
238 Barnes Road  
Williamstown KY 41097  
(859) 824-2400

St. Elizabeth – Fort Thomas  
85 N. Grand Avenue  
Ft. Thomas KY 41075  
(859) 572-3100

St. Elizabeth - Florence  
7380 Turfway Road  
Florence KY 41042  
(859) 962-5200

Healthsouth Rehabilitation  
201 Medical Village Drive  
Edgewood KY 41017  
(859) 341-2044

Gatewood Rehabilitation  
5940 Merchants Drive  
Florence KY 41042  
(859) 426-2400

Carroll County Hospital  
309 11<sup>th</sup> Street  
Carrollton, KY 41008  
(502) 732-4321

NorthKey Community Care  
P.O. Box 2680  
Covington, KY 41012  
(859) 578-3200

#### **3.3.5.1 ANALYZING DEVELOPMENT TRENDS -BOONE**

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Boone County is experiencing the most rapid growth in the Northern Kentucky region and is projected to increase in population 29.56% between 2010 and the 2020 Census.

Western Boone County is rural and undeveloped in nature with a growing suburban population on the east side of the county. There, residential development has occurred largely near Interstate 75, but is spreading westward. Further residential construction and expansion can be expected over the next decade as development proceeds

toward the more sparsely populated portion of the county. This is supported by estimates that the population of Boone County will almost double by 2050.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| <b>Northern Kentucky Area Development District<br/>Population Projections</b> |                        |                        |                    |             |             |             |             |             |
|-------------------------------------------------------------------------------|------------------------|------------------------|--------------------|-------------|-------------|-------------|-------------|-------------|
|                                                                               | <b>Census<br/>2000</b> | <b>Census<br/>2010</b> | <b>Projections</b> |             |             |             |             |             |
|                                                                               |                        |                        | <b>2015</b>        | <b>2020</b> | <b>2025</b> | <b>2030</b> | <b>2040</b> | <b>2050</b> |
| <b>Kentucky</b>                                                               | 4,041,769              | 4,339,367              | 4,509,429          | 4,672,754   | 4,820,390   | 4,951,178   | 5,162,292   | 5,349,720   |
| <b>NKADD</b>                                                                  | 391,417                | 438,647                | 463,305            | 488,377     | 511,667     | 533,079     | 569,385     | 600,098     |
| <b>Boone</b>                                                                  | 85,991                 | 118,811                | 135,584            | 153,933     | 172,101     | 190,270     | 224,687     | 256,223     |
| <b>Campbell</b>                                                               | 88,616                 | 90,336                 | 91,199             | 91,642      | 91,475      | 90,731      | 88,012      | 84,589      |
| <b>Carroll</b>                                                                | 10,155                 | 10,811                 | 11,140             | 11,440      | 11,691      | 11,886      | 12,197      | 12,427      |
| <b>Gallatin</b>                                                               | 7,870                  | 8,589                  | 8,945              | 9,264       | 9,525       | 9,695       | 9,863       | 9,906       |
| <b>Grant</b>                                                                  | 22,384                 | 24,662                 | 25,832             | 26,917      | 27,912      | 28,768      | 30,090      | 31,069      |
| <b>Kenton</b>                                                                 | 151,464                | 159,720                | 164,307            | 168,458     | 171,990     | 174,699     | 177,963     | 180,193     |
| <b>Owen</b>                                                                   | 10,547                 | 10,841                 | 11,125             | 11,336      | 11,474      | 11,541      | 11,455      | 11,173      |
| <b>Pendleton</b>                                                              | 14,390                 | 14,877                 | 15,173             | 15,387      | 15,499      | 15,489      | 15,118      | 14,518      |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Boone County economy are trade, transportation, and utilities as well as services. The following table presents the expansion and location of plants in Boone County from 2013 to present. It also includes the major employment sectors for Boone County as compared to the labor market area. There is some discussion of encouraging growth in the river industry along Boone County's northern border. This has not come to fruition yet, but could affect an already landslide-susceptible area.

#### BUSINESS & INDUSTRY

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | <b>Reported</b> |                   |
|------------------------------|---|-----------------|-------------------|
|                              |   | <b>Jobs</b>     | <b>Investment</b> |
| Manufacturing Location       | 0 | 0               | \$0               |
| Manufacturing Expansion      | 8 | 700             | \$179,680,607     |
| Supportive/Service Location  | 2 | 120-172         | \$11,400,000      |
| Supportive/Service Expansion | 7 | 802-814         | \$20,630,946      |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|                                            | Boone County |         | Labor Market Area |         |
|--------------------------------------------|--------------|---------|-------------------|---------|
|                                            | Employment   | Percent | Employment        | Percent |
| All Industries                             | 76,673       | 100.0   | 751,603           | 100.0   |
| Agriculture, Forestry, Fishing and Hunting | 0            | 0.0     | N/A               | N/A     |
| Mining                                     | 0            | 0.0     | N/A               | N/A     |
| Construction                               | 2,042        | 2.7     | 27,898            | 3.7     |
| Manufacturing                              | 11,707       | 15.3    | 75,787            | 10.1    |
| Trade, Transportation, and Utilities       | 26,483       | 34.5    | 141,548           | 18.8    |
| Information                                | 933          | 1.2     | 11,295            | 1.5     |
| Financial Activities                       | 3,885        | 5.1     | 47,018            | 6.3     |
| Services                                   | 25,679       | 33.5    | 383,693           | 51.0    |
| Public Administration                      | 2,391        | 3.1     | 26,066            | 3.5     |
| Other                                      | 35           | 0.0     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Boone County exhibits a large decline in the number of farms, although its average farm size has increased since 2002.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                                 | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
|                                                          |                 |        |                  |            |                        |        |
| NKADD                                                    | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
|                                                          |                 |        |                  |            |                        |        |
| Boone                                                    | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                                 | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                                  | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                                 | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                                    | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                                   | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                                     | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                                | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1



Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
|                                                                                              |                                |             |                       |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
|                                                                                              |                                |             |                       |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

*Source: American Fact Finder DP03 survey 2010 & 2000*

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Boone County has one of the highest percent changes in its household income, which rose well over \$10,000 in ten years and its residents currently receive the most median revenue. As Boone County is developed for residential communities and commercial enterprises are brought to the county, the economy is expected to continue to expand and earnings to rise.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. Tornadoes will stand to do much more destruction, thunderstorms and straight line winds will affect more homes, and floods could impact more people as well. Similarly, drainage and sewage must be provided to new structures, meaning there is an increased chance of utility apparatuses flooding as well. New developments in Boone County must be accompanied by accounting for the hazards to which they are vulnerable.

#### 3.3.5.2 ANALYZING DEVELOPMENT TRENDS - CAMPBELL

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Campbell County is experiencing the decline in growth and is projected to increase in population 1.45% between 2010 and the 2020 Census.

Development in Campbell County is concentrated in the north and central areas of the county and, outside of small subdivision construction in some cities new development in Campbell County is sparse. In the future, development is unlikely to spread south as suggested by the population projections. In fact, Campbell County is

the only county in the Northern Kentucky region expected to have a lower population in 2050 than it did in 2000. Although it will remain the third most populous county in the region, development in Campbell County may have peaked.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| Northern Kentucky Area Development District<br>Population Projections |                |                |             |           |           |           |           |           |
|-----------------------------------------------------------------------|----------------|----------------|-------------|-----------|-----------|-----------|-----------|-----------|
|                                                                       | Census<br>2000 | Census<br>2010 | Projections |           |           |           |           |           |
|                                                                       |                |                | 2015        | 2020      | 2025      | 2030      | 2040      | 2050      |
| <b>Kentucky</b>                                                       | 4,041,769      | 4,339,367      | 4,509,429   | 4,672,754 | 4,820,390 | 4,951,178 | 5,162,292 | 5,349,720 |
| <b>NKADD</b>                                                          | 391,417        | 438,647        | 463,305     | 488,377   | 511,667   | 533,079   | 569,385   | 600,098   |
| <b>Boone</b>                                                          | 85,991         | 118,811        | 135,584     | 153,933   | 172,101   | 190,270   | 224,687   | 256,223   |
| <b>Campbell</b>                                                       | 88,616         | 90,336         | 91,199      | 91,642    | 91,475    | 90,731    | 88,012    | 84,589    |
| <b>Carroll</b>                                                        | 10,155         | 10,811         | 11,140      | 11,440    | 11,691    | 11,886    | 12,197    | 12,427    |
| <b>Gallatin</b>                                                       | 7,870          | 8,589          | 8,945       | 9,264     | 9,525     | 9,695     | 9,863     | 9,906     |
| <b>Grant</b>                                                          | 22,384         | 24,662         | 25,832      | 26,917    | 27,912    | 28,768    | 30,090    | 31,069    |
| <b>Kenton</b>                                                         | 151,464        | 159,720        | 164,307     | 168,458   | 171,990   | 174,699   | 177,963   | 180,193   |
| <b>Owen</b>                                                           | 10,547         | 10,841         | 11,125      | 11,336    | 11,474    | 11,541    | 11,455    | 11,173    |
| <b>Pendleton</b>                                                      | 14,390         | 14,877         | 15,173      | 15,387    | 15,499    | 15,489    | 15,118    | 14,518    |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Campbell County economy are trade, transportation, and utilities and especially services. The following table presents the expansion and location of plants in Campbell County from 2013 to present. It also includes the major employment sectors for Campbell County as compared to the labor market area.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | Reported |              |
|------------------------------|---|----------|--------------|
|                              |   | Jobs     | Investment   |
| Manufacturing Location       | 1 | 32-40    | \$19,926,175 |
| Manufacturing Expansion      | 4 | N/A      | \$1,013,413  |
| Supportive/Service Location  | 3 | 94-169   | \$5,651,469  |
| Supportive/Service Expansion | 1 | 40       | \$50,000     |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|                                            | Campbell County |         | Labor Market Area |         |
|--------------------------------------------|-----------------|---------|-------------------|---------|
|                                            | Employment      | Percent | Employment        | Percent |
| All Industries                             | 28,273          | 100.0   | 825,196           | 100.0   |
| Agriculture, Forestry, Fishing and Hunting | 0               | 0.0     | N/A               | N/A     |
| Mining                                     | N/A             | N/A     | N/A               | N/A     |
| Construction                               | 0               | 0.0     | 29,922            | 3.6     |
| Manufacturing                              | 2,433           | 8.6     | 85,942            | 10.4    |
| Trade, Transportation, and Utilities       | 4,997           | 17.7    | 154,582           | 18.7    |
| Information                                | 254             | 0.9     | 13,028            | 1.6     |
| Financial Activities                       | 1,116           | 3.9     | 51,876            | 6.3     |
| Services                                   | 12,275          | 43.4    | 423,445           | 51.3    |
| Public Administration                      | 1,036           | 3.7     | 29,402            | 3.6     |
| Other                                      | 12              | 0.0     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website  
<http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Campbell County exhibits a large decline in the number of farms, the acreage of total farmland, and the average size of farms.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                                 | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
|                                                          |                 |        |                  |            |                        |        |
| NKADD                                                    | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
|                                                          |                 |        |                  |            |                        |        |
| Boone                                                    | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                                 | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                                  | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                                 | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                                    | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                                   | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                                     | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                                | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1

Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Campbell County has the third highest percent change in its household income, which increased by just under \$10,000 in ten years. Although new development in Campbell County is unlikely to be substantial, the economy can be forecast to expand as current growth trends continue and existing businesses are strengthened.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. New development is not expected to increase concern for natural disasters, but precautions must continue for existing buildings that remain vulnerable.

#### 3.3.5.3 ANALYZING DEVELOPMENT TRENDS - CARROLL

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Carroll County is experiencing mild growth and is projected to increase in population 5.82% between 2010 and the 2020 Census.

Carroll County is rural and mostly undeveloped in nature with a handful of small cities. The county's projected growth will most likely be seen in these cities and can be attributed to normal growth of a population rather than any particular new development. By 2050 the population is projected to exceed 12,000. This estimation probably does not reflect substantial new development.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| Northern Kentucky Area Development District<br>Population Projections |                |                |             |           |           |           |           |           |
|-----------------------------------------------------------------------|----------------|----------------|-------------|-----------|-----------|-----------|-----------|-----------|
|                                                                       | Census<br>2000 | Census<br>2010 | Projections |           |           |           |           |           |
|                                                                       |                |                | 2015        | 2020      | 2025      | 2030      | 2040      | 2050      |
| <b>Kentucky</b>                                                       | 4,041,769      | 4,339,367      | 4,509,429   | 4,672,754 | 4,820,390 | 4,951,178 | 5,162,292 | 5,349,720 |
| <b>NKADD</b>                                                          | 391,417        | 438,647        | 463,305     | 488,377   | 511,667   | 533,079   | 569,385   | 600,098   |
| <b>Boone</b>                                                          | 85,991         | 118,811        | 135,584     | 153,933   | 172,101   | 190,270   | 224,687   | 256,223   |
| <b>Campbell</b>                                                       | 88,616         | 90,336         | 91,199      | 91,642    | 91,475    | 90,731    | 88,012    | 84,589    |
| <b>Carroll</b>                                                        | 10,155         | 10,811         | 11,140      | 11,440    | 11,691    | 11,886    | 12,197    | 12,427    |
| <b>Gallatin</b>                                                       | 7,870          | 8,589          | 8,945       | 9,264     | 9,525     | 9,695     | 9,863     | 9,906     |
| <b>Grant</b>                                                          | 22,384         | 24,662         | 25,832      | 26,917    | 27,912    | 28,768    | 30,090    | 31,069    |
| <b>Kenton</b>                                                         | 151,464        | 159,720        | 164,307     | 168,458   | 171,990   | 174,699   | 177,963   | 180,193   |
| <b>Owen</b>                                                           | 10,547         | 10,841         | 11,125      | 11,336    | 11,474    | 11,541    | 11,455    | 11,173    |
| <b>Pendleton</b>                                                      | 14,390         | 14,877         | 15,173      | 15,387    | 15,499    | 15,489    | 15,118    | 14,518    |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Carroll County economy are manufacturing and services. The following table presents the expansion of plants in Carroll County from 2013 to present. It also includes the major employment sectors for Carroll County as compared to the labor market area.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | Reported  |               |
|------------------------------|---|-----------|---------------|
|                              |   | Companies | Investment    |
| Manufacturing Location       | 0 | 0         | \$0           |
| Manufacturing Expansion      | 4 | 61-87     | \$171,668,000 |
| Supportive/Service Location  | 0 | 0         | \$0           |
| Supportive/Service Expansion | 0 | 0         | \$0           |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|  |                                            | Carroll County |         | Labor Market Area |         |
|--|--------------------------------------------|----------------|---------|-------------------|---------|
|  |                                            | Employment     | Percent | Employment        | Percent |
|  | All Industries                             | 6,448          | 100.0   | 188,525           | 100.0   |
|  | Agriculture, Forestry, Fishing and Hunting | 0              | 0.0     | N/A               | N/A     |
|  | Mining                                     | N/A            | N/A     | N/A               | N/A     |
|  | Construction                               | 0              | 0.0     | 5,477             | 2.9     |
|  | Manufacturing                              | 2,152          | 33.4    | 23,748            | 12.6    |
|  | Trade, Transportation, and Utilities       | 933            | 14.5    | 41,940            | 22.2    |
|  | Information                                | 14             | 0.2     | 1,829             | 1.0     |
|  | Financial Activities                       | 114            | 1.8     | 10,350            | 5.5     |
|  | Services                                   | 1,513          | 23.5    | 68,612            | 36.4    |
|  | Public Administration                      | 135            | 2.1     | 11,254            | 6.0     |
|  | Other                                      | N/A            | N/A     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Carroll County exhibits a decline in the number of farms, although its average farm size has increased since 2002.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                                 | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
|                                                          |                 |        |                  |            |                        |        |
| NKADD                                                    | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
|                                                          |                 |        |                  |            |                        |        |
| Boone                                                    | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                                 | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                                  | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                                 | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                                    | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                                   | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                                     | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                                | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1



Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Carroll County had one of the lowest household incomes in 2000 and has improved with a reassuring 20% increase. Since the development of Carroll County is not indicated to increase, economic growth can be expected on this trajectory if leaders protect and expand upon recent improvements. Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. New development is not expected to increase concern for natural disasters, but precautions must continue for existing buildings that remain vulnerable.

#### 3.3.5.4 ANALYZING DEVELOPMENT TRENDS - GALLATIN

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Gallatin County is experiencing mild growth and is projected to increase in population 7.86% between 2010 and the 2020 Census.

Gallatin County is rural and undeveloped in nature with a couple of small cities. The county's projected growth will most likely be seen in these cities and can be attributed to normal growth of a population rather than any particular new development. By 2050 the population is projected to approach 10,000. This estimation probably does not reflect substantial new development.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| Northern Kentucky Area Development District<br>Population Projections |                |                |             |           |           |           |           |           |
|-----------------------------------------------------------------------|----------------|----------------|-------------|-----------|-----------|-----------|-----------|-----------|
|                                                                       | Census<br>2000 | Census<br>2010 | Projections |           |           |           |           |           |
|                                                                       |                |                | 2015        | 2020      | 2025      | 2030      | 2040      | 2050      |
| <b>Kentucky</b>                                                       | 4,041,769      | 4,339,367      | 4,509,429   | 4,672,754 | 4,820,390 | 4,951,178 | 5,162,292 | 5,349,720 |
| <b>NKADD</b>                                                          | 391,417        | 438,647        | 463,305     | 488,377   | 511,667   | 533,079   | 569,385   | 600,098   |
| <b>Boone</b>                                                          | 85,991         | 118,811        | 135,584     | 153,933   | 172,101   | 190,270   | 224,687   | 256,223   |
| <b>Campbell</b>                                                       | 88,616         | 90,336         | 91,199      | 91,642    | 91,475    | 90,731    | 88,012    | 84,589    |
| <b>Carroll</b>                                                        | 10,155         | 10,811         | 11,140      | 11,440    | 11,691    | 11,886    | 12,197    | 12,427    |
| <b>Gallatin</b>                                                       | 7,870          | 8,589          | 8,945       | 9,264     | 9,525     | 9,695     | 9,863     | 9,906     |
| <b>Grant</b>                                                          | 22,384         | 24,662         | 25,832      | 26,917    | 27,912    | 28,768    | 30,090    | 31,069    |
| <b>Kenton</b>                                                         | 151,464        | 159,720        | 164,307     | 168,458   | 171,990   | 174,699   | 177,963   | 180,193   |
| <b>Owen</b>                                                           | 10,547         | 10,841         | 11,125      | 11,336    | 11,474    | 11,541    | 11,455    | 11,173    |
| <b>Pendleton</b>                                                      | 14,390         | 14,877         | 15,173      | 15,387    | 15,499    | 15,489    | 15,118    | 14,518    |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Gallatin County economy are trade, transportation, and utilities as well as services. The following table presents the expansion and location of plants in Gallatin County from 2013 to present. It also includes the major employment sectors for Gallatin County as compared to the labor market area.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | Reported |             |
|------------------------------|---|----------|-------------|
|                              |   | Jobs     | Investment  |
| Manufacturing Location       | 2 | 15-92    | \$5,730,000 |
| Manufacturing Expansion      | 0 | 0        | \$0         |
| Supportive/Service Location  | 0 | 0        | \$0         |
| Supportive/Service Expansion | 1 | 80       | \$6,534,182 |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|  |                                            | Gallatin County |         | Labor Market Area |         |
|--|--------------------------------------------|-----------------|---------|-------------------|---------|
|  |                                            | Employment      | Percent | Employment        | Percent |
|  | All Industries                             | 2,363           | 100.0   | 710,549           | 100.0   |
|  | Agriculture, Forestry, Fishing and Hunting | 0               | 0.0     | N/A               | N/A     |
|  | Mining                                     | 0               | 0.0     | N/A               | N/A     |
|  | Construction                               | 34              | 1.4     | 25,060            | 3.5     |
|  | Manufacturing                              | 0               | 0.0     | 73,513            | 10.3    |
|  | Trade, Transportation, and Utilities       | 237             | 10.0    | 128,561           | 18.1    |
|  | Information                                | 0               | 0.0     | 10,362            | 1.5     |
|  | Financial Activities                       | 29              | 1.2     | 43,758            | 6.2     |
|  | Services                                   | 344             | 14.6    | 360,987           | 50.8    |
|  | Public Administration                      | 113             | 4.8     | 25,444            | 3.6     |
|  | Other                                      | 0               | 0.0     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Gallatin County exhibits a decline in the number of farms and farm acreage, although farm size has minutely decreased as well.

| Northern Kentucky Area Development District |                 |        |                  |            |                        |        |
|---------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
| Farm Data                                   |                 |        |                  |            |                        |        |
|                                             | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                             | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                    | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
| NKADD                                       | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
| Boone                                       | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                    | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                     | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                    | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                       | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                      | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                        | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                   | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1

Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Gallatin County experienced a small percent jump in its median household income, but in 2010 it had the lowest levels in the Northern Kentucky region. Since the development of Gallatin County is not indicated to increase, economic growth can be expected on this trajectory if leaders protect and expand upon recent improvements.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. New development is not expected to increase concern for natural disasters, but precautions must continue for existing buildings that remain vulnerable.

#### 3.3.5.5 ANALYZING DEVELOPMENT TRENDS - GRANT

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Grant County is experiencing mild growth and is projected to increase in population 9.14% between 2010 and the 2020 Census.

Grant County is rural and mostly undeveloped in nature with a handful of small cities. The county's projected growth will most likely be seen in these cities and can be attributed to normal growth of a population rather than any particular new development. By 2050 the population is projected to exceed 12,000. This estimation probably does not reflect substantial new development.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| Northern Kentucky Area Development District<br>Population Projections |                |                |             |           |           |           |           |           |
|-----------------------------------------------------------------------|----------------|----------------|-------------|-----------|-----------|-----------|-----------|-----------|
|                                                                       | Census<br>2000 | Census<br>2010 | Projections |           |           |           |           |           |
|                                                                       |                |                | 2015        | 2020      | 2025      | 2030      | 2040      | 2050      |
| <b>Kentucky</b>                                                       | 4,041,769      | 4,339,367      | 4,509,429   | 4,672,754 | 4,820,390 | 4,951,178 | 5,162,292 | 5,349,720 |
| <b>NKADD</b>                                                          | 391,417        | 438,647        | 463,305     | 488,377   | 511,667   | 533,079   | 569,385   | 600,098   |
| <b>Boone</b>                                                          | 85,991         | 118,811        | 135,584     | 153,933   | 172,101   | 190,270   | 224,687   | 256,223   |
| <b>Campbell</b>                                                       | 88,616         | 90,336         | 91,199      | 91,642    | 91,475    | 90,731    | 88,012    | 84,589    |
| <b>Carroll</b>                                                        | 10,155         | 10,811         | 11,140      | 11,440    | 11,691    | 11,886    | 12,197    | 12,427    |
| <b>Gallatin</b>                                                       | 7,870          | 8,589          | 8,945       | 9,264     | 9,525     | 9,695     | 9,863     | 9,906     |
| <b>Grant</b>                                                          | 22,384         | 24,662         | 25,832      | 26,917    | 27,912    | 28,768    | 30,090    | 31,069    |
| <b>Kenton</b>                                                         | 151,464        | 159,720        | 164,307     | 168,458   | 171,990   | 174,699   | 177,963   | 180,193   |
| <b>Owen</b>                                                           | 10,547         | 10,841         | 11,125      | 11,336    | 11,474    | 11,541    | 11,455    | 11,173    |
| <b>Pendleton</b>                                                      | 14,390         | 14,877         | 15,173      | 15,387    | 15,499    | 15,489    | 15,118    | 14,518    |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Grant County economy are trade, transportation, and utilities as well as manufacturing. The following table presents the expansion of plants in Grant County from 2013 to present. It also includes the major employment sectors for Grant County as compared to the labor market area.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | Reported  |              |
|------------------------------|---|-----------|--------------|
|                              |   | Companies | Investment   |
| Manufacturing Location       | 0 | 0         | \$0          |
| Manufacturing Expansion      | 5 | 150       | \$25,439,000 |
| Supportive/Service Location  | 0 | 0         | \$0          |
| Supportive/Service Expansion | 0 | 0         | \$0          |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|  |                                            | Grant County |         | Labor Market Area |         |
|--|--------------------------------------------|--------------|---------|-------------------|---------|
|  |                                            | Employment   | Percent | Employment        | Percent |
|  | All Industries                             | 4,713        | 100.0   | 927,647           | 100.0   |
|  | Agriculture, Forestry, Fishing and Hunting | N/A          | N/A     | N/A               | N/A     |
|  | Mining                                     | N/A          | N/A     | N/A               | N/A     |
|  | Construction                               | 89           | 1.9     | 32,625            | 3.5     |
|  | Manufacturing                              | 562          | 11.9    | 94,998            | 10.2    |
|  | Trade, Transportation, and Utilities       | 1,054        | 22.4    | 166,014           | 17.9    |
|  | Information                                | 32           | 0.7     | 16,022            | 1.7     |
|  | Financial Activities                       | 168          | 3.6     | 52,223            | 5.6     |
|  | Services                                   | 266          | 5.6     | 446,078           | 48.1    |
|  | Public Administration                      | 353          | 7.5     | 42,108            | 4.5     |
|  | Other                                      | 2            | 0.0     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Grant County exhibits a significant decline in the number of farms and their acreage, but its average farm size has increased since 2002.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                                 | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
|                                                          |                 |        |                  |            |                        |        |
| NKADD                                                    | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
|                                                          |                 |        |                  |            |                        |        |
| Boone                                                    | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                                 | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                                  | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                                 | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                                    | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                                   | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                                     | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                                | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1



Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Gallatin County experienced the lowest increase in median household income over the ten year period as well as one of the lowest levels for that value. had one of the lowest household incomes in 2000 and has improved with a reassuring 20% increase. Since the development of Gallatin County is not indicated to increase, economic growth can be expected on this trajectory if leaders protect and expand upon recent improvements.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. New development is not expected to increase concern for natural disasters, but precautions must continue for existing buildings that remain vulnerable.

Grant County is projected to see a substantial increase in tourism beginning July 2016 with the opening of the Ark Encounter, this life-size replica of Noah's Ark from the Bible is expected to bring in thousands of visitors each year. Along with Noah's Ark, the owners plan to create other exhibits to complete the theme park. This influx of tourism will hopefully increase other areas of growth in the county as well.

#### 3.3.5.6 ANALYZING DEVELOPMENT TRENDS - KENTON

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Kenton County is experiencing the mild and is projected to increase in population 5.47% between 2010 and the 2020 Census. Despite this comparably low increase, Kenton County is expected to remain the most populous county until around 2025 and by 2050 will be the second most populous county in the Northern Kentucky region.

Kenton County is almost evenly split between an urban and suburban north and rural south. Residential development has occurred largely between the urban core hugging the Ohio River and the beginning of rural areas. Further residential construction and expansion can be expected over the next decade as development proceeds toward the more sparsely populated portion of the county and is enhanced in the suburban cities. This is supported by estimates that the population of Kenton County will increase at a steady rate of about 3,000 new residents per year until at least 2050.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| <b>Northern Kentucky Area Development District<br/>Population Projections</b> |                        |                        |                    |             |             |             |             |             |
|-------------------------------------------------------------------------------|------------------------|------------------------|--------------------|-------------|-------------|-------------|-------------|-------------|
|                                                                               | <b>Census<br/>2000</b> | <b>Census<br/>2010</b> | <b>Projections</b> |             |             |             |             |             |
|                                                                               |                        |                        | <b>2015</b>        | <b>2020</b> | <b>2025</b> | <b>2030</b> | <b>2040</b> | <b>2050</b> |
| <b>Kentucky</b>                                                               | 4,041,769              | 4,339,367              | 4,509,429          | 4,672,754   | 4,820,390   | 4,951,178   | 5,162,292   | 5,349,720   |
| <b>NKADD</b>                                                                  | 391,417                | 438,647                | 463,305            | 488,377     | 511,667     | 533,079     | 569,385     | 600,098     |
| <b>Boone</b>                                                                  | 85,991                 | 118,811                | 135,584            | 153,933     | 172,101     | 190,270     | 224,687     | 256,223     |
| <b>Campbell</b>                                                               | 88,616                 | 90,336                 | 91,199             | 91,642      | 91,475      | 90,731      | 88,012      | 84,589      |
| <b>Carroll</b>                                                                | 10,155                 | 10,811                 | 11,140             | 11,440      | 11,691      | 11,886      | 12,197      | 12,427      |
| <b>Gallatin</b>                                                               | 7,870                  | 8,589                  | 8,945              | 9,264       | 9,525       | 9,695       | 9,863       | 9,906       |
| <b>Grant</b>                                                                  | 22,384                 | 24,662                 | 25,832             | 26,917      | 27,912      | 28,768      | 30,090      | 31,069      |
| <b>Kenton</b>                                                                 | 151,464                | 159,720                | 164,307            | 168,458     | 171,990     | 174,699     | 177,963     | 180,193     |
| <b>Owen</b>                                                                   | 10,547                 | 10,841                 | 11,125             | 11,336      | 11,474      | 11,541      | 11,455      | 11,173      |
| <b>Pendleton</b>                                                              | 14,390                 | 14,877                 | 15,173             | 15,387      | 15,499      | 15,489      | 15,118      | 14,518      |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Kenton County economy are trade, transportation, and utilities and especially services. The following table presents the expansion and location of plants in Kenton County from 2013 to present. It also includes the major employment sectors for Kenton County as compared to the labor market area.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | <b>Reported</b> |                   |
|------------------------------|---|-----------------|-------------------|
|                              |   | <b>Jobs</b>     | <b>Investment</b> |
| Manufacturing Location       | 2 | 32-85           | \$11,590,000      |
| Manufacturing Expansion      | 9 | 259-291         | \$28,265,000      |
| Supportive/Service Location  | 0 | 0               | \$0               |
| Supportive/Service Expansion | 5 | 633             | \$9,215,200       |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|                                            | Kenton County |         | Labor Market Area |         |
|--------------------------------------------|---------------|---------|-------------------|---------|
|                                            | Employment    | Percent | Employment        | Percent |
| All Industries                             | 62,595        | 100.0   | 746,406           | 100.0   |
| Agriculture, Forestry, Fishing and Hunting | 0             | 0.0     | N/A               | N/A     |
| Mining                                     | 0             | 0.0     | N/A               | N/A     |
| Construction                               | 2,347         | 3.7     | 27,390            | 3.7     |
| Manufacturing                              | 4,764         | 7.6     | 75,990            | 10.2    |
| Trade, Transportation, and Utilities       | 7,716         | 12.3    | 140,640           | 18.8    |
| Information                                | 525           | 0.8     | 11,199            | 1.5     |
| Financial Activities                       | 4,669         | 7.5     | 46,587            | 6.2     |
| Services                                   | 29,826        | 47.6    | 381,824           | 51.2    |
| Public Administration                      | 5,819         | 9.3     | 26,211            | 3.5     |
| Other                                      | 27            | 0.0     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Kenton County exhibits a moderate decline in the number of farms as well as decreases in average farm size and farm acreage.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                                 | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
|                                                          |                 |        |                  |            |                        |        |
| NKADD                                                    | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
|                                                          |                 |        |                  |            |                        |        |
| Boone                                                    | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                                 | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                                  | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                                 | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                                    | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                                   | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                                     | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                                | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1

Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. With the exception of Boone County, Kenton County has the highest median household income and its percent rate of change is competitive with other counties in the Northern Kentucky region. As Kenton County is developed for residential communities and commercial enterprises are brought to the county, the economy is expected to continue to expand and earnings to rise.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. Tornadoes will stand to do much more destruction, thunderstorms and straight line winds will affect more homes, and floods could impact more people as well. Similarly, drainage and sewage must be provided to new structures, meaning there is an increased chance of utility apparatuses flooding as well. New developments in Kenton County must be accompanied by accounting for the hazards to which they are vulnerable.

#### 3.3.5.7 ANALYZING DEVELOPMENT TRENDS - OWEN

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Owen County is experiencing mild growth and is projected to increase in population 4.57% between 2010 and the 2020 Census.

Owen County is rural and mostly undeveloped in nature with a handful of small cities. Between 2015 and 2050 and population is only expected to have increased by 48 people after it peaks in 2030 and begins to decline thereafter. For this reason new development is extremely unlikely.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| Northern Kentucky Area Development District<br>Population Projections |                |                |             |           |           |           |           |           |
|-----------------------------------------------------------------------|----------------|----------------|-------------|-----------|-----------|-----------|-----------|-----------|
|                                                                       | Census<br>2000 | Census<br>2010 | Projections |           |           |           |           |           |
|                                                                       |                |                | 2015        | 2020      | 2025      | 2030      | 2040      | 2050      |
| <b>Kentucky</b>                                                       | 4,041,769      | 4,339,367      | 4,509,429   | 4,672,754 | 4,820,390 | 4,951,178 | 5,162,292 | 5,349,720 |
| <b>NKADD</b>                                                          | 391,417        | 438,647        | 463,305     | 488,377   | 511,667   | 533,079   | 569,385   | 600,098   |
| <b>Boone</b>                                                          | 85,991         | 118,811        | 135,584     | 153,933   | 172,101   | 190,270   | 224,687   | 256,223   |
| <b>Campbell</b>                                                       | 88,616         | 90,336         | 91,199      | 91,642    | 91,475    | 90,731    | 88,012    | 84,589    |
| <b>Carroll</b>                                                        | 10,155         | 10,811         | 11,140      | 11,440    | 11,691    | 11,886    | 12,197    | 12,427    |
| <b>Gallatin</b>                                                       | 7,870          | 8,589          | 8,945       | 9,264     | 9,525     | 9,695     | 9,863     | 9,906     |
| <b>Grant</b>                                                          | 22,384         | 24,662         | 25,832      | 26,917    | 27,912    | 28,768    | 30,090    | 31,069    |
| <b>Kenton</b>                                                         | 151,464        | 159,720        | 164,307     | 168,458   | 171,990   | 174,699   | 177,963   | 180,193   |
| <b>Owen</b>                                                           | 10,547         | 10,841         | 11,125      | 11,336    | 11,474    | 11,541    | 11,455    | 11,173    |
| <b>Pendleton</b>                                                      | 14,390         | 14,877         | 15,173      | 15,387    | 15,499    | 15,489    | 15,118    | 14,518    |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Owen County economy are trade, transportation, and utilities as well as services. The following table presents the expansion of plants in Owen County from 2013 to present. It also includes the major employment sectors for Owen County as compared to the labor market area. Itron, one of the largest businesses in Owen County, is also planning on expanding in 2016 or 2017; this will be a capital expansion, likely not adding jobs.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | Reported |            |
|------------------------------|---|----------|------------|
|                              |   | Jobs     | Investment |
| Manufacturing Location       | 0 | 0        | \$0        |
| Manufacturing Expansion      | 2 | 20       | \$783,000  |
| Supportive/Service Location  | 0 | 0        | \$0        |
| Supportive/Service Expansion | 0 | 0        | \$0        |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|  |                                            | Owen County |         | Labor Market Area |         |
|--|--------------------------------------------|-------------|---------|-------------------|---------|
|  |                                            | Employment  | Percent | Employment        | Percent |
|  | All Industries                             | 1,677       | 100.0   | 222,702           | 100.0   |
|  | Agriculture, Forestry, Fishing and Hunting | 0           | 0.0     | N/A               | N/A     |
|  | Mining                                     | N/A         | N/A     | N/A               | N/A     |
|  | Construction                               | 23          | 1.4     | 5,956             | 2.7     |
|  | Manufacturing                              | 0           | 0.0     | 32,995            | 14.8    |
|  | Trade, Transportation, and Utilities       | 243         | 14.5    | 45,260            | 20.3    |
|  | Information                                | 11          | 0.7     | 2,117             | 1.0     |
|  | Financial Activities                       | 0           | 0.0     | 10,671            | 4.8     |
|  | Services                                   | 472         | 28.1    | 74,858            | 33.6    |
|  | Public Administration                      | 166         | 9.9     | 21,312            | 9.6     |
|  | Other                                      | N/A         | N/A     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Owen County exhibits a decline in the number of farms, farm acreage, and farm size since 2002.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| Kentucky                                                 | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
| NKADD                                                    | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
| Boone                                                    | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| Campbell                                                 | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| Carroll                                                  | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| Gallatin                                                 | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| Grant                                                    | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| Kenton                                                   | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| Owen                                                     | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| Pendleton                                                | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1



Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| <b>Northern Kentucky Area Development District<br/>2000 and 2010 Median Household Income</b> |                                |             |                       |
|----------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|
|                                                                                              | <b>Median Household Income</b> |             |                       |
|                                                                                              | <b>2000</b>                    | <b>2010</b> | <b>Percent Change</b> |
| <b>Kentucky</b>                                                                              | \$33,672                       | \$41,576    | 23.47%                |
| <b>NKADD</b>                                                                                 | \$38,281.50                    | \$45,454    | 18.74%                |
| <b>Boone</b>                                                                                 | \$53,593                       | \$66,549    | 24.17%                |
| <b>Campbell</b>                                                                              | \$41,903                       | \$51,482    | 22.86%                |
| <b>Carroll</b>                                                                               | \$35,925                       | \$43,440    | 20.92%                |
| <b>Gallatin</b>                                                                              | \$36,422                       | \$41,310    | 13.42%                |
| <b>Grant</b>                                                                                 | \$38,438                       | \$42,475    | 10.5%                 |
| <b>Kenton</b>                                                                                | \$43,906                       | \$53,213    | 21.2%                 |
| <b>Owen</b>                                                                                  | \$33,310                       | \$46,238    | 38.81%                |
| <b>Pendleton</b>                                                                             | \$38,125                       | \$44,670    | 17.17%                |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Owen County had the lowest median household income in 2000, but has improved with an impressive 38% increase—much higher than any other jump in the region. Surprisingly, this progression in household income is not matched by expectations of population growth. Since the development of Owen County is therefore not indicated to increase, economic growth may slow, but is likely to continue to expand.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. New development is not expected to increase concern for natural disasters, but precautions must continue for existing buildings that remain vulnerable.

#### 3.3.5.8 ANALYZING DEVELOPMENT TRENDS - PENDLETON

The population served by the Northern Kentucky Area Development District grew 12.07% between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. Pendleton County is experiencing very light growth at 3.43% between 2010 and the 2020 Census.

Pendleton County is rural and mostly undeveloped in nature with two small cities. The county's projected growth may be seen in these cities, but after passing 15,000 the population will most likely dip back to the 14,500 range by 2050. This estimation probably does not indicate substantial new development.

One aspect of development that may induce in-migration is Cincinnati Bell is currently installing Broadband internet in the county. This is often a requirement for younger families to stay and for new people to move in.

The following table represents growth trends in the Northern Kentucky Area Development District as reported by the Kentucky State Data Center using 2010 Census information.

| Northern Kentucky Area Development District<br>Population Projections |                |                |             |           |           |           |           |           |
|-----------------------------------------------------------------------|----------------|----------------|-------------|-----------|-----------|-----------|-----------|-----------|
|                                                                       | Census<br>2000 | Census<br>2010 | Projections |           |           |           |           |           |
|                                                                       |                |                | 2015        | 2020      | 2025      | 2030      | 2040      | 2050      |
| <b>Kentucky</b>                                                       | 4,041,769      | 4,339,367      | 4,509,429   | 4,672,754 | 4,820,390 | 4,951,178 | 5,162,292 | 5,349,720 |
| <b>NKADD</b>                                                          | 391,417        | 438,647        | 463,305     | 488,377   | 511,667   | 533,079   | 569,385   | 600,098   |
| <b>Boone</b>                                                          | 85,991         | 118,811        | 135,584     | 153,933   | 172,101   | 190,270   | 224,687   | 256,223   |
| <b>Campbell</b>                                                       | 88,616         | 90,336         | 91,199      | 91,642    | 91,475    | 90,731    | 88,012    | 84,589    |
| <b>Carroll</b>                                                        | 10,155         | 10,811         | 11,140      | 11,440    | 11,691    | 11,886    | 12,197    | 12,427    |
| <b>Gallatin</b>                                                       | 7,870          | 8,589          | 8,945       | 9,264     | 9,525     | 9,695     | 9,863     | 9,906     |
| <b>Grant</b>                                                          | 22,384         | 24,662         | 25,832      | 26,917    | 27,912    | 28,768    | 30,090    | 31,069    |
| <b>Kenton</b>                                                         | 151,464        | 159,720        | 164,307     | 168,458   | 171,990   | 174,699   | 177,963   | 180,193   |
| <b>Owen</b>                                                           | 10,547         | 10,841         | 11,125      | 11,336    | 11,474    | 11,541    | 11,455    | 11,173    |
| <b>Pendleton</b>                                                      | 14,390         | 14,877         | 15,173      | 15,387    | 15,499    | 15,489    | 15,118    | 14,518    |

Source: <http://ksdc.louisville.edu/data-downloads/projections>

#### Economic and Social Growth Trends

The economy in the Northern Kentucky Area Development District is experiencing trends better than current state trends. The strongest sectors of the Pendleton County economy are trade, transportation, and utilities as well as manufacturing. One of the larger businesses in Pendleton County, Jay-Gee Welding Inc., is currently expanding their location by about \$1 million. The following table presents the major employment sectors for Pendleton County as compared to the labor market area.

#### Business & Industry

##### Summary of Recent Locations and Expansions, 2013-Present

|                              |   | Reported  |            |
|------------------------------|---|-----------|------------|
|                              |   | Companies | Investment |
| Manufacturing Location       | 0 | 0         | \$0        |
| Manufacturing Expansion      | 0 | 0         | \$0        |
| Supportive/Service Location  | 0 | 0         | \$0        |
| Supportive/Service Expansion | 0 | 0         | \$0        |

Source: Kentucky Cabinet for Economic Development (2/12/2016).

### Employment by Major Industry by Place of Work, 2013

|  |                                            | Pendleton County |         | Labor Market Area |         |
|--|--------------------------------------------|------------------|---------|-------------------|---------|
|  |                                            | Employment       | Percent | Employment        | Percent |
|  | All Industries                             | 2,320            | 100.0   | 134,019           | 100.0   |
|  | Agriculture, Forestry, Fishing and Hunting | N/A              | N/A     | N/A               | N/A     |
|  | Mining                                     | 0                | 0.0     | N/A               | N/A     |
|  | Construction                               | 0                | 0.0     | 3,025             | 2.3     |
|  | Manufacturing                              | 320              | 13.8    | N/A               | N/A     |
|  | Trade, Transportation, and Utilities       | 320              | 13.8    | 19,212            | 14.3    |
|  | Information                                | 0                | 0.0     | 959               | 0.7     |
|  | Financial Activities                       | 0                | 0.0     | 6,785             | 5.1     |
|  | Services                                   | 93               | 4.0     | 49,200            | 36.7    |
|  | Public Administration                      | 166              | 7.2     | 8,633             | 6.4     |
|  | Other                                      | N/A              | N/A     | N/A               | N/A     |

Source: U.S. Department of Labor, Bureau of Labor Statistics.

This information was retrieved from the KY Cabinet for Economic Development website <http://thinkkentucky.com/selectkentucky/>.

An important aspect of the development of the Northern Kentucky region is in relation to rural areas. The 21st century has seen a diminishing number of farms and pushed the border between rural and suburban areas south, shrinking the availability of farmland. The table below illustrates this trend as the total number of farms and their acreage has been reduced. Pendleton County exhibits a decline in each of the listed topics below.

| Northern Kentucky Area Development District<br>Farm Data |                 |        |                  |            |                        |        |
|----------------------------------------------------------|-----------------|--------|------------------|------------|------------------------|--------|
|                                                          | Number of Farms |        | Farmland (acres) |            | Avg. Farm Size (acres) |        |
|                                                          | 2002            | 2012   | 2002             | 2012       | 2002                   | 2012   |
| <b>Kentucky</b>                                          | 86,541          | 77,064 | 13,843,706       | 13,049,347 | 160                    | 169    |
|                                                          |                 |        |                  |            |                        |        |
| <b>NKADD</b>                                             | 5,177           | 4,357  | 627,854          | 560,494    | 132.63                 | 131.88 |
|                                                          |                 |        |                  |            |                        |        |
| <b>Boone</b>                                             | 743             | 608    | 74,915           | 67,211     | 101                    | 111    |
| <b>Campbell</b>                                          | 581             | 504    | 50,383           | 42,164     | 87                     | 84     |
| <b>Carroll</b>                                           | 339             | 278    | 61,122           | 53,562     | 180                    | 193    |
| <b>Gallatin</b>                                          | 247             | 185    | 37,595           | 27,783     | 152                    | 150    |
| <b>Grant</b>                                             | 1,020           | 812    | 16,454           | 98,372     | 114                    | 121    |
| <b>Kenton</b>                                            | 495             | 459    | 46,479           | 38,144     | 94                     | 83     |
| <b>Owen</b>                                              | 788             | 701    | 154,787          | 131,959    | 196                    | 188    |
| <b>Pendleton</b>                                         | 964             | 810    | 132,402          | 101,299    | 137                    | 125    |

Source: [www.agcensus.usda.gov](http://www.agcensus.usda.gov) 2002 & 2012 Kentucky Census Volume 1, Chapter 2: County Level Data; table 1

Social growth trends also play an important role in the economy of the Northern Kentucky region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. The following table describes the median household income as retrieved from the Kentucky State Data Center.

| Northern Kentucky Area Development District<br>2000 and 2010 Median Household Income |                         |          |                |
|--------------------------------------------------------------------------------------|-------------------------|----------|----------------|
|                                                                                      | Median Household Income |          |                |
|                                                                                      | 2000                    | 2010     | Percent Change |
| <b>Kentucky</b>                                                                      | \$33,672                | \$41,576 | 23.47%         |
| <b>NKADD</b>                                                                         | \$38,281.50             | \$45,454 | 18.74%         |
| <b>Boone</b>                                                                         | \$53,593                | \$66,549 | 24.17%         |
| <b>Campbell</b>                                                                      | \$41,903                | \$51,482 | 22.86%         |
| <b>Carroll</b>                                                                       | \$35,925                | \$43,440 | 20.92%         |
| <b>Gallatin</b>                                                                      | \$36,422                | \$41,310 | 13.42%         |
| <b>Grant</b>                                                                         | \$38,438                | \$42,475 | 10.5%          |
| <b>Kenton</b>                                                                        | \$43,906                | \$53,213 | 21.2%          |
| <b>Owen</b>                                                                          | \$33,310                | \$46,238 | 38.81%         |
| <b>Pendleton</b>                                                                     | \$38,125                | \$44,670 | 17.17%         |

Source: American Fact Finder DP03 survey 2010 & 2000

An important note is that each county's economy has grown since the turn of the century and each are expected to continue to rise. Pendleton County had a moderate household income in 2000 and has improved with a 17% increase. Since the development of Pendleton County is not indicated to increase, economic growth can be expected on this trajectory if leaders protect and expand upon recent improvements.

#### Development and Hazard Mitigation

As the Northern Kentucky region continues to develop, hazards are being amplified and, in some cases, created. Construction of houses and other new buildings will result in higher financial costs in the event of disasters as well as an increased risk of human casualties. New development is not expected to increase concern for natural disasters, but precautions must continue for existing buildings that remain vulnerable.

### 3.3.6 Multi-Jurisdictional Risk Assessment

The following is a summary that assesses the risks to the entire Northern Kentucky Region. The following chart summarizes the hazard risk for each jurisdiction and the hazards that affect each jurisdiction.

| Jurisdiction           | Flood <sup>1</sup> | Landslide <sup>2</sup> | Tornados | Severe Thunder storm | Severe Winter Storms | Dam Failure | Earthquake |
|------------------------|--------------------|------------------------|----------|----------------------|----------------------|-------------|------------|
| <b>Boone County</b>    | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Florence       | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Union          | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Walton         | NO                 | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| <b>Campbell County</b> | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Alexandria     | YES                | NO                     | YES      | YES                  | YES                  | YES         | YES        |
| City of Bellevue       | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of California     | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Cold Spring    | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Crestview      | NO                 | YES                    | YES      | YES                  | YES                  | NO          | YES        |

| Jurisdiction             | Flood <sup>1</sup> | Landslide <sup>2</sup> | Tornados | Severe Thunder storm | Severe Winter Storms | Dam Failure | Earthquake |
|--------------------------|--------------------|------------------------|----------|----------------------|----------------------|-------------|------------|
| City of Dayton           | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Fort Thomas      | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Highland Heights | NO                 | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Melbourne        | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Mentor           | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Newport          | YES                | YES                    | YES      | YES                  | YES                  | YES (LEVEE) | YES        |
| City of Silver Grove     | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Southgate        | NO                 | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Wilder           | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Woodlawn         | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| <b>Carroll County</b>    | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Carrollton       | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Ghent            | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Prestonville     | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Sanders          | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Worthville       | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| <b>Gallatin County</b>   | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Glencoe          | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Sparta           | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Warsaw           | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| <b>Grant County</b>      | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Corinth          | NO                 | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Crittenden       | NO                 | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Dry Ridge        | NO                 | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Williamstown     | NO                 | NO                     | YES      | YES                  | YES                  | YES         | YES        |
| <b>Kenton County</b>     | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Bromley          | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Covington        | YES                | YES                    | YES      | YES                  | YES                  | YES (LEVEE) | YES        |
| City of Crescent Springs | NO                 | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Crestview Hills  | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Edgewood         | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Elsmere          | NO                 | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Erlanger         | YES                | YES                    | YES      | YES                  | YES                  | YES         | YES        |
| City of Fairview         | YES                | NO                     | YES      | YES                  | YES                  | NO          | YES        |
| City of Ft. Mitchell     | NO                 | YES                    | YES      | YES                  | YES                  | NO          | YES        |
| City of Ft. Wright       | YES                | YES                    | YES      | YES                  | YES                  | NO          | YES        |

| <b>Jurisdiction</b>     | <b>Flood<sup>1</sup></b> | <b>Landslide<sup>2</sup></b> | <b>Tornados</b> | <b>Severe Thunder storm</b> | <b>Severe Winter Storms</b> | <b>Dam Failure</b> | <b>Earthquake</b> |
|-------------------------|--------------------------|------------------------------|-----------------|-----------------------------|-----------------------------|--------------------|-------------------|
| City of Independence    | YES                      | YES                          | YES             | YES                         | YES                         | YES                | YES               |
| City of Kenton Vale     | NO                       | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Lakeside Park   | NO                       | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Ludlow          | YES                      | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Park Hills      | NO                       | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Ryland Heights  | YES                      | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Taylor Mill     | YES                      | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Villa Hills     | YES                      | YES                          | YES             | YES                         | YES                         | YES                | YES               |
| <b>Owen County</b>      | YES                      | YES                          | YES             | YES                         | YES                         | NO                 | YES               |
| City of Gratz           | YES                      | NO                           | YES             | YES                         | YES                         | NO                 | YES               |
| City of Monterey        | YES                      | NO                           | YES             | YES                         | YES                         | NO                 | YES               |
| City of Owenton         | NO                       | NO                           | YES             | YES                         | YES                         | NO                 | YES               |
| <b>Pendleton County</b> | YES                      | YES                          | YES             | YES                         | YES                         | YES                | YES               |
| City of Butler          | YES                      | NO                           | YES             | YES                         | YES                         | NO                 | YES               |
| City of Falmouth        | YES                      | NO                           | YES             | YES                         | YES                         | YES                | YES               |

1. Based upon FEMA FIRMs

2. Based upon USGS Landslide Susceptibility Geology Data

### 3.4 Mitigation Strategy

The Mitigation Strategy of this plan was created by the input of the Local Mitigation Committees as a result of reviewing the finding of the hazard profiles and vulnerability assessment of this plan. Mitigation committees utilized ideas from the FEMA “how to guide” on Mitigation Strategies as a guide to developing the Mitigation goals, objectives and actions.

#### 3.4.1 CAPABILITY ASSESSMENT

Mitigation strategies have been developed in response to the hazard profiles and vulnerability of the assets in each jurisdiction. These strategies provides each jurisdiction a blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, resources, and its ability to expand on and improve these existing tools.

The capabilities assessments of this study will be divided into the following three sections:

- A. Existing Authorities, Policies, Programs, and Resources
- B. Existing Governmental Structure
- C. Existing Professional Staff Departments

The purpose of conducting this capabilities assessment is to identify potential hazard mitigation opportunities available to the jurisdictions through their daily operations as units of local government. Careful analysis should detect any existing gaps, shortfalls or weaknesses within existing government activities that could increase community vulnerability. The assessment will also highlight the positive measures already in place at the jurisdictional level, which should continue to be supported and enhanced through future mitigation



efforts. The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for jurisdictions to pursue under this Plan, but ensures that those goals and objectives are realistically achievable under given local conditions.

#### EXISTING AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES

Northern Kentucky ADD staff and local committees evaluated existing authorities, policies, programs, and resources of each jurisdiction. The following chart is a summary of each jurisdiction and the current status of these items. Local committee members evaluated this information to determine what goals, objectives, and actions are necessary to effectively mitigate vulnerabilities, and what resources each jurisdiction currently has to begin implementation of the Mitigation Strategies of this plan.

Committee members compiled a list of potential authorities, policies, programs and resources based upon the public input and research of the committee members. Committee members consulted with State and Federal Agencies to determine what resources were available and proven effective for other jurisdictions.

## CAPABILITIES ASSESSMENT

| Jurisdiction             | Floodplain Management Ordinance | CRS and FMA Plans | Zoning Regulations | Subdivision Regulations | Land Development Plans | Fire Prevention Codes | Comprehensive Plans | Capital Improvement Plans | Stormwater Management Plans | CERT Team | NWS Storm Ready Program | Local Economic Development | Regional Development Agency |
|--------------------------|---------------------------------|-------------------|--------------------|-------------------------|------------------------|-----------------------|---------------------|---------------------------|-----------------------------|-----------|-------------------------|----------------------------|-----------------------------|
| <b>Boone County</b>      | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | YES       | YES                     | YES                        | YES**                       |
| City of Florence         | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | YES       | YES                     | YES                        | YES**                       |
| City of Union            | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | YES                        | YES**                       |
| City of Walton           | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | YES                        | YES**                       |
| <b>Campbell County</b>   | YES                             | YES               | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | YES                        | YES**                       |
| City of Alexandria       | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Bellevue         | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of California       | YES                             | NO                | YES                | NO                      | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Cold Spring      | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Crestview        | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Dayton           | YES                             | NO                | YES                | YES                     | YES                    | YES                   | NO                  | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Fort Thomas      | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Highland Heights | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Melbourne        | YES                             | YES               | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Mentor           | YES                             | NO                | YES                | NO                      | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Newport          | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Silver Grove     | YES                             | YES               | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |

| Jurisdiction           | Floodplain Management Ordinance | CRS and FMA Plans | Zoning Regulations | Subdivision Regulations | Land Development Plans | Fire Prevention Codes | Comprehensive Plans | Capital Improvement Plans | Stormwater Management Plans | CERT Team | NWS Storm Ready Program | Local Economic Development | Regional Development Agency |
|------------------------|---------------------------------|-------------------|--------------------|-------------------------|------------------------|-----------------------|---------------------|---------------------------|-----------------------------|-----------|-------------------------|----------------------------|-----------------------------|
| City of Southgate      | YES                             | YES               | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Wilder         | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | NO        | YES                     | NO                         | YES**                       |
| City of Woodlawn       | YES                             | YES               | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | NO        | YES                     | NO                         | YES**                       |
| <b>Carroll County</b>  | YES                             | NO                | NO                 | NO                      | NO                     | YES                   | NO                  | YES                       | NO                          | NO        | YES                     | YES                        | YES**                       |
| City of Carrollton     | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | NO                          | NO        | YES                     | YES                        | YES**                       |
| City of Ghent          | NO                              | NO                | NO                 | NO                      | NO                     | NO                    | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Prestonville   | YES                             | NO                | NO                 | NO                      | NO                     | NO                    | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Sanders        | YES                             | NO                | NO                 | NO                      | NO                     | NO                    | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Worthville     | NO                              | NO                | NO                 | NO                      | NO                     | NO                    | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| <b>Gallatin County</b> | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | YES       | YES                     | YES                        | YES**                       |
| City of Glencoe        | YES                             | NO                | YES                | YES                     | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Sparta         | YES                             | NO                | YES                | YES                     | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Warsaw         | YES                             | NO                | YES                | YES                     | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| <b>Grant County</b>    | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | NO                          | NO        | NO                      | YES                        | YES**                       |
| City of Corinth        | NO                              | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | NO                          | NO        | NO                      | YES                        | YES**                       |
| City of Crittenden     | NO                              | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | NO                          | NO        | NO                      | YES                        | YES**                       |
| City of Dry Ridge      | NO                              | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | NO                          | NO        | NO                      | YES                        | YES**                       |
| City of Williamstown   | NO                              | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | NO                          | NO        | NO                      | YES                        | YES**                       |
| <b>Kenton County</b>   | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | YES                         | YES       | YES                     | YES                        | YES**                       |

| Jurisdiction            | Floodplain Management Ordinance | CRS and FMA Plans | Zoning Regulations | Subdivision Regulations | Land Development Plans | Fire Prevention Codes | Comprehensive Plans | Capital Improvement Plans | Stormwater Management Plans | CERT Team | NWS Storm Ready Program | Local Economic Development | Regional Development Agency |
|-------------------------|---------------------------------|-------------------|--------------------|-------------------------|------------------------|-----------------------|---------------------|---------------------------|-----------------------------|-----------|-------------------------|----------------------------|-----------------------------|
| City of Bromley         | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Covington       | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City Crescent Springs   | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Crestview Hills | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Edgewood        | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Elsmere         | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Erlanger        | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Fairview        | YES                             | NO                | YES                | YES                     | YES                    | YES                   | NO                  | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Ft. Mitchell    | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Ft. Wright      | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Independence    | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Kenton Vale     | YES                             | NO                | YES                | YES                     | YES                    | YES                   | NO                  | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Lakeside Park   | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Ludlow          | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Park Hills      | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Ryland Heights  | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Taylor Mill     | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | NO                         | YES**                       |
| City of Villa Hills     | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | NO                      | NO                         | YES**                       |
| <b>Owen County</b>      | YES                             | NO                | NO                 | NO                      | NO                     | YES                   | YES                 | NO                        | NO                          | NO        | YES                     | YES                        | YES**                       |

| Jurisdiction            | Floodplain Management Ordinance | CRS and FMA Plans | Zoning Regulations | Subdivision Regulations | Land Development Plans | Fire Prevention Codes | Comprehensive Plans | Capital Improvement Plans | Stormwater Management Plans | CERT Team | NWS Storm Ready Program | Local Economic Development | Regional Development Agency |
|-------------------------|---------------------------------|-------------------|--------------------|-------------------------|------------------------|-----------------------|---------------------|---------------------------|-----------------------------|-----------|-------------------------|----------------------------|-----------------------------|
| City of Gratz           | NO                              | NO                | NO                 | NO                      | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Monterey        | YES                             | NO                | NO                 | NO                      | NO                     | YES                   | NO                  | NO                        | NO                          | NO        | YES                     | NO                         | YES**                       |
| City of Owenton         | NO                              | NO                | YES                | YES                     | NO                     | YES                   | YES                 | NO                        | YES                         | NO        | YES                     | YES                        | YES**                       |
| <b>Pendleton County</b> | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | YES                       | NO                          | YES       | YES                     | YES                        | YES**                       |
| City of Butler          | YES                             | NO                | NO                 | YES                     | YES                    | YES                   | YES                 | NO                        | NO                          | YES       | YES                     | YES                        | YES**                       |
| City of Falmouth        | YES                             | NO                | YES                | YES                     | YES                    | YES                   | YES                 | NO                        | YES                         | YES       | YES                     | YES                        | YES**                       |

\*\* Jurisdictions are members of the Northern Kentucky Area Development District.

The previously listed existing authorities, policies and programs are further explained in relation to the existing governmental structure and powers of the local jurisdiction. It is presently the responsibility of each local jurisdiction to develop, enact, and enforce the above authorities and programs.

#### I. Legal Authority of Local Jurisdictions

Local governments in Kentucky have a wide range of tools available to them for implementing mitigation programs, policies and actions. A hazard mitigation program can utilize any or all of the four broad types of government powers granted by the State of Kentucky, which are (a) Regulation; (b) Acquisition; (c) Taxation; and (d) Spending.

##### REGULATORY POWERS OF LOCAL JURISDICTIONS

###### GENERAL POLICE POWER

Local governments have been granted broad regulatory powers in their jurisdictions. Kentucky Revised Statutes bestow the general police power on local governments, allowing them to enact and enforce ordinances, which define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances (including public health nuisances). Since hazard mitigation can be included under the police power (as protection of public health, safety and welfare), towns, cities and counties may include requirements for hazard mitigation in local ordinances. Local governments may also use their ordinance-making power to abate “nuisances,” which could include, by local definition, any activity or condition that threatens the general health and safety of the public.

All Jurisdictions in the planning area have enacted and enforces regulatory ordinances designed to promote the public health, safety and general welfare of its citizenry.

###### BUILDING CODES AND INSPECTIONS

Many structural mitigation measures involve constructing and retrofitting homes, businesses and other structures according to standards designed to make the buildings more resilient to the impacts of natural hazards. Many of these standards are imposed through the use of building codes.

Jurisdictions have the opportunity and the power to develop and enforce building codes. The option for jurisdictions in the planning area to develop building codes to address hazard issues exists. It could be a great tool toward ensuring that mitigation strategies are in place.

###### LAND USE

Regulatory powers granted by the state to local governments are the most basic manner in which a local government can control the use of land within its jurisdiction. Through various land use regulatory powers, a local government can control the amount, timing, density, quality, and location of new development. All these characteristics of growth can determine the level of vulnerability of the community in the event of a natural hazard. Land use regulatory powers include the power to engage in planning, enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls.

###### PLANNING

Local jurisdictions have the authority to perform a number of duties related to planning, including: make studies of the area; determine objectives; prepare and adopt plans for achieving those



objectives; develop and recommend policies, ordinances, and administrative means to implement plans.

#### ZONING

Zoning is the traditional and most common tool available to local governments to control the use of land. The statutory purpose for the grant of power is to promote health, safety, morals, or the general welfare of the community. Land “uses” controlled by zoning include the type of use (e.g., residential, commercial, industrial) as well as minimum specifications for use such as lot size, building height and setbacks, density of population, etc.

#### SUBDIVISION REGULATIONS

Subdivision regulations control the division of land into parcels for the purpose of building development or sale. Flood-related subdivision controls typically require that subdividers install adequate drainage facilities and design water and sewer systems to minimize flood damage and contamination. They prohibit the subdivision of land subject to flooding unless flood hazards are overcome through filling or other measures, and they prohibit filling of floodway areas. Subdivision regulations require that subdivision plans be approved prior to the division/sale of land. Subdivision regulations are a more limited tool than zoning and only indirectly affect the type of use made of land or minimum specifications for structures.

#### FLOODPLAIN ORDINANCE

The purpose of the local floodplain Ordinances is to (1) minimize the extent of floods by preventing obstructions that inhibit water flow and increase flood height and damage; (2) prevent and minimize loss of life, injuries, property damage and other losses in flood hazard areas; and (3) promote the public health, safety and welfare of citizens of the jurisdiction in flood hazard areas.

The ordinance also makes certain that they meet the minimum requirements of participation in the National Flood Insurance Program (NFIP).

The incentive for local governments adopting such ordinances is that they will afford their residents the ability to purchase flood insurance through the NFIP and be eligible for state Hazard Mitigation funding.

#### POWER OF ACQUISITION

The power of acquisition can be a useful tool for pursuing local mitigation goals. Local governments may find the most effective method for completely “hazard-proofing” a particular piece of property or area is to acquire the property (either in fee or a lesser interest, such as an easement), thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development occurring. The state of Kentucky legislation empowers cities, towns, and counties to acquire property for public purpose.

#### POWER TO LEVY TAXES

The power to levy taxes and special assessments is an important tool delegated to local governments by the State of Kentucky. The power of taxation extends beyond merely the collection of revenue, and can have a profound impact on the pattern of development in the community.

#### POWER TO MAKE EXPENDITURES

The fourth major power that has been delegated from the Kentucky General Assembly to local governments is the power to make expenditures in the public interest. Hazard mitigation principles can be made a routine part of all spending decisions made by the local government, including the adoption annual budgets.

#### NFIP PARTICIPATION

| CID     | Community Name           | County    | Init FHBM Identified | Init FIRM Identified | Curr Eff Map Date | Reg-Emer Date |
|---------|--------------------------|-----------|----------------------|----------------------|-------------------|---------------|
| 210391# | City of Alexandria       | Campbell  |                      | 9/30/2004            | 3/3/2014          | 12/8/2009     |
| 210035# | City of Bellevue         | Campbell  | 2/1/1974             | 4/15/1980            | 3/3/2014          | 4/15/1980     |
| 210013# | Boone County             | Boone     | 12/27/1974           | 6/15/1981            | 6/4/2007          | 6/15/1981     |
| 210253# | City of Bromley          | Kenton    | 2/1/1974             | 4/15/1980            | 3/16/2009         | 4/15/1980     |
| 210188# | City of Butler           | Pendleton | 1/16/1974            | 4/30/1986            | 6/18/2013         | 4/30/1986     |
| 210036# | City of California       | Campbell  | 3/15/1974            | 4/3/1978             | 3/3/2014          | 4/3/1978      |
| 210034# | Campbell County          | Campbell  | 12/27/1974           | 9/30/1981            | 3/3/2014          | 9/30/1981     |
| 210045# | Carroll County           | Carroll   | 2/25/1977            | 9/1/1998             | 7/17/2007         | 9/1/1998      |
| 210232# | City of Carrollton       | Carroll   | 6/14/1974            | 9/4/1985             | 7/17/2007         | 9/4/1985      |
| 210395# | City of Cold Spring      | Campbell  |                      | 9/30/2004            | 3/3/2014          | 5/11/2007     |
| 210129# | City of Covington        | Kenton    | 3/15/1974            | 6/15/1979            | 5/16/2013         | 6/15/1979     |
| 210450# | City of Crescent Springs | Kenton    |                      | 3/16/2009            | 5/16/2013         | 4/20/2011     |
| 210451# | City of Crestview Hills  | Kenton    |                      | 3/16/2009            | 5/16/2013         | 6/11/2009     |
| 210037# | City of Dayton           | Campbell  | 2/1/1974             | 8/15/1980            | 3/3/2014          | 8/15/1980     |
| 210452# | City of Edgewood         | Kenton    |                      | 3/16/2009            | 5/16/2013         | 11/22/2010    |
| 210378# | City of Erlanger         | Kenton    |                      | 3/16/2009            | 5/16/2013         | 3/16/2009     |
| 210189# | City of Falmouth         | Pendleton | 5/24/1974            | 7/3/1986             | 6/18/2013         | 7/3/1986      |
| 210238# | City of Florence         | Boone     | 2/1/1974             | 7/3/1986             | 6/4/2007          | 7/3/1986      |
| 210038# | City of Fort Thomas      | Campbell  | 1/25/1974            | 9/1/1998             | 3/3/2014          | 9/1/1998      |
| 210249# | City of Fort Wright      | Kenton    | 1/17/1975            | 9/30/1980            | 5/16/2013         | 10/21/1980    |
| 210281# | Gallatin County          | Gallatin  | 9/3/1976             | 8/19/1987            | 3/18/2008         | 7/20/1997     |
| 210046# | City of Ghent            | Carroll   | 1/16/1974            | 9/18/1986            | 7/17/2007         | 9/18/1986     |
| 210078# | City of Glencoe          | Gallatin  | 2/1/1974             | 3/18/2008            | 3/18/2008         | 7/8/2008      |
| 210337# | Grant County             | Grant     |                      | 8/5/2010             | 8/5/2010          | 8/5/2010      |
| 210321# | City of Gratz            | Owen      | 7/22/1977            | 8/19/1986            | 6/2/2011          | 8/19/1986     |
| 210240# | City of Independence     | Kenton    | 2/8/1974             | 9/17/1980            | 5/16/2013         | 9/17/1980     |
| 210128# | Kenton County            | Kenton    | 10/18/1974           | 7/2/1981             | 5/16/2013         | 7/2/1981      |
| 210266# | City of Ludlow           | Kenton    | 2/1/1974             | 9/28/1979            | 5/16/2013         | 9/28/1979     |
| 210250# | City of Melbourne        | Campbell  | 2/1/1974             | 3/28/1980            | 3/3/2014          | 3/28/1980     |
| 210275# | City of Mentor           | Campbell  | 7/18/1975            | 3/4/1980             | 3/3/2014          | 3/4/1980      |
| 210295# | City of Monterey         | Owen      | 3/28/1975            | 8/5/1986             | 6/2/2011          | 8/5/1986      |
| 210039# | City of Newport          | Campbell  | 2/1/1974             | 11/5/1980            | 3/3/2014          | 11/5/1980     |
| 210186# | Owen County              | Owen      | 10/18/1974           | 7/1/1999             | 6/2/2011          | 7/1/1999      |
| 210297# | Pendleton County         | Pendleton | 7/30/1976            | 8/1/1999             | 6/18/2013         | 8/1/1999      |

|         |                        |               |           |            |           |            |
|---------|------------------------|---------------|-----------|------------|-----------|------------|
| 210047# | City of Prestonville   | Carroll       | 8/16/1974 | 9/18/1986  | 7/17/2007 | 9/18/1986  |
| 210389# | City of Ryland Heights | Kenton        |           | 3/16/2009  | 5/16/2013 | 9/18/2001  |
| 210048# | Town of Sanders        | Carroll       | 1/18/1974 | 9/27/1985  | 7/17/2007 | 9/27/1985  |
| 210040# | City of Silver Grove   | Campbell      | 2/1/1974  | 10/15/1980 | 3/3/2014  | 10/15/1980 |
| 210276# | City of Southgate      | Campbell      | 8/1/1975  | 9/30/2004  | 3/3/2014  | 7/8/2008   |
| 210079# | City of Sparta         | Owen/Gallatin | 1/25/1974 | 8/19/1986  | 3/18/2008 | 8/19/1986  |
| 210246# | City of Taylor Mill    | Kenton        | 2/15/1974 | 9/28/1979  | 5/16/2013 | 9/28/1979  |
| 210270# | City of Union          | Boone         | 8/1/1975  | 6/4/2007   | 6/4/2007  | 6/4/2007   |
| 210456# | City of Villa Hills    | Kenton        |           | 3/16/2009  | 5/16/2013 | 5/22/2009  |
| 210379# | City of Walton         | Boone         |           | 6/4/2007   | 6/4/2007  | 6/4/2007   |
| 210080# | City of Warsaw         | Gallatin      | 2/1/1974  | 8/19/1987  | 3/18/2008 | 8/19/1987  |
| 210041# | City of Wilder         | Campbell      | 2/15/1974 | 10/15/1980 | 3/3/2014  | 10/15/1980 |
| 210318# | City of Woodlawn       | Campbell      |           | 9/30/2004  | 3/3/2014  | 6/27/2013  |
| 210049# | City of Worthville     | Carroll       | 1/23/1974 | 7/17/1986  | 7/17/2007 | 7/17/1986  |

Continued Compliance with NFIP

*\*please note the below information may be incomplete, the information below is what was available*

| CID     | Community Name           | County    | PERMIT | BFE Standards | Most Recent FIRMs | Public Outreach Program |
|---------|--------------------------|-----------|--------|---------------|-------------------|-------------------------|
| 210391# | City of Alexandria       | Campbell  |        |               | x                 |                         |
| 210035# | City of Bellevue         | Campbell  | x      | x             | x                 |                         |
| 210013# | Boone County             | Boone     | x      | x             | x                 |                         |
| 210253# | City of Bromley          | Kenton    |        |               | x                 |                         |
| 210188# | City of Butler           | Pendleton |        |               | x                 |                         |
| 210036# | City of California       | Campbell  | x      |               | x                 | x                       |
| 210034# | Campbell County          | Campbell  | x      | x             | x                 | x                       |
| 210045# | Carroll County           | Carroll   | x      | x             | x                 |                         |
| 210232# | City of Carrollton       | Carroll   | x      | x             | x                 |                         |
| 210395# | City of Cold Spring      | Campbell  |        |               | x                 |                         |
| 210129# | City of Covington        | Kenton    | x      | x             | x                 | x                       |
| 210450# | City of Crescent Springs | Kenton    |        |               | x                 |                         |
| 210451# | City of Crestview Hills  | Kenton    |        |               | x                 |                         |
| 210037# | City of Dayton           | Campbell  | x      | x             | x                 | x                       |

|         |                        |               |   |   |   |   |
|---------|------------------------|---------------|---|---|---|---|
| 210452# | City of Edgewood       | Kenton        |   |   | x |   |
| 210378# | City of Erlanger       | Kenton        |   |   | x |   |
| 210189# | City of Falmouth       | Pendleton     |   |   | x |   |
| 210238# | City of Florence       | Boone         |   |   | x |   |
| 210038# | City of Fort Thomas    | Campbell      |   |   | x |   |
| 210249# | City of Fort Wright    | Kenton        | x | x | x |   |
| 210281# | Gallatin County        | Gallatin      | x | x | x |   |
| 210046# | City of Ghent          | Carroll       |   |   | x |   |
| 210078# | City of Glencoe        | Gallatin      |   |   | x |   |
| 210337# | Grant County           | Grant         |   |   | x |   |
| 210321# | City of Gratz          | Owen          |   |   | x |   |
| 210240# | City of Independence   | Kenton        |   |   | x |   |
| 210128# | Kenton County          | Kenton        |   |   | x |   |
| 210266# | City of Ludlow         | Kenton        | x | x | x |   |
| 210250# | City of Melbourne      | Campbell      | x | x | x | x |
| 210275# | City of Mentor         | Campbell      | x |   | x | x |
| 210295# | City of Monterey       | Owen          |   |   | x |   |
| 210039# | City of Newport        | Campbell      | x | x | x |   |
| 210186# | Owen County            | Owen          |   |   | x |   |
| 210187# | Pendleton County       | Pendleton     | x |   | x |   |
| 210047# | City of Prestonville   | Carroll       |   |   | x |   |
| 210389# | City of Ryland Heights | Kenton        |   |   | x |   |
| 210048# | City of Sanders        | Carroll       |   |   | x |   |
| 210040# | City of Silver Grove   | Campbell      | x | x | x | x |
| 210276# | City of Southgate      | Campbell      | x |   | x | x |
| 210079# | City of Sparta         | Owen/Gallatin |   |   | x |   |
| 210246# | City of Taylor Mill    | Kenton        |   |   | x |   |
| 210270# | City of Union          | Boone         |   |   | x |   |
| 210456# | City of Villa Hills    | Kenton        |   |   | x |   |

|         |                    |          |   |  |   |   |
|---------|--------------------|----------|---|--|---|---|
| 210379# | City of Walton     | Boone    |   |  | x |   |
| 210080# | City of Warsaw     | Gallatin |   |  | x |   |
| 210041# | City of Wilder     | Campbell |   |  | x |   |
| 210318# | City of Woodlawn   | Campbell | x |  | x | x |
| 210049# | City of Worthville | Carroll  |   |  | x |   |

#### JURISDICTIONS NOT PARTICIPATING IN NFIP

| CID            | Community Name             | County          | Init FIRM Identified | Curr Eff Map Date | Sanction Date | Reason for Not Participating              |
|----------------|----------------------------|-----------------|----------------------|-------------------|---------------|-------------------------------------------|
| 210441#        | City of Corinth            | Grant           | 8/5/2010             | 8/5/2010          | 8/5/2011      | Very limited section in SFHA, no interest |
| <i>*absent</i> | <i>City of Crestview</i>   | <i>Campbell</i> |                      | 3/3/2014          |               | No SFHA                                   |
| 210442#        | City of Crittenden         | Grant           | 8/5/2010             | 8/5/2010          | 8/5/2011      | No SFHA                                   |
| 210443#        | City of Dry Ridge          | Grant           | 8/5/2010             | 8/5/2010          | 8/5/2011      | No SFHA                                   |
| 210453#        | City of Elsmere            | Kenton          | 3/16/2009            | 5/16/2013         | 3/16/2010     | Very limited section in SFHA, no interest |
| 210407#        | City of Fairview           | Kenton          | 3/16/2009            | 5/16/2013         | 3/16/2010     | Very limited section in SFHA, no interest |
| 210454#        | City of Fort Mitchell      | Kenton          | 3/16/2009            | 5/16/2013         | 3/16/2010     | No SFHA                                   |
| 210390#        | City of Highland Heights   | Campbell        | 9/30/2004            | 3/3/2014          | 9/30/2005     | No SFHA                                   |
| <i>*absent</i> | <i>City of Kenton Vale</i> | <i>Kenton</i>   |                      | 5/16/2013         |               | No SFHA                                   |
| 210455#        | City of Lakeside Park      | Kenton          | 3/16/2009            | 5/16/2013         | 3/16/2010     | No SFHA                                   |
| <i>*absent</i> | <i>City of Owenton</i>     | <i>Owen</i>     |                      | 6/2/2011          |               | No SFHA                                   |
| <i>*absent</i> | <i>City of Park Hills</i>  | <i>Kenton</i>   |                      | 5/16/2013         |               | No SFHA                                   |
| 210444#        | City of Williamstown       | Grant           | 8/5/2010             | 6/18/2013         | 8/5/2011      | Limited section in SFHA, no interest      |

The NKADD encourages all jurisdictions to pursue NFIP compliance. A few jurisdictions have addressed their deficiencies and made the necessary steps to become compliant. However, there are still some communities that decline to participate in the program for various reasons; a few communities have no floodplains. We will continue to bring the subject of compliance up regularly with these communities and provide support during the process if they choose to pursue compliance.

#### II. Political Willpower

Most residents of the jurisdictions have a general knowledge about the potential hazards that their community faces. However, residents have had little or sporadic education concerning actions that increase or decrease the community's vulnerability to certain hazards. Education concerning mitigation strategies and potential losses will be a key factor for all jurisdictions in the planning area.

Because of the history with natural disasters in the past few years, it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies. Jurisdictions have faithfully attended and participated in the mitigation planning process, largely due to the fact that the region has been widely affected by these natural disasters.

III. Existing Professional Staff Departments

Committee members also reviewed the existing capabilities of the governmental agencies based upon the existing Professional Staff Departments that are currently available to each jurisdiction, either as department supported and staffed by the jurisdiction, or by contract with an outside agency. The following chart provides a summary of the existing professional staff for each jurisdiction. “YES” indicates that the department exists and is solely supported by the jurisdiction, “NO” indicates that the department does not exist, and “SHARED” indicates that the department exists but is shared with other jurisdictions.



CAPABILITIES ASSESSMENT - EXISTING PROFESSIONAL STAFF DEPARTMENTS

| Jurisdiction             | Board Of Education | Building Inspections | Clerk Of Courts | Emergency Management | County / City Treasurer | County Judge Executive/Mayor | Health Department | Road Department | Sheriff Department | Police Department | PVA (Tax Assessment) | Social Services | Utilities Department | Fire Department |
|--------------------------|--------------------|----------------------|-----------------|----------------------|-------------------------|------------------------------|-------------------|-----------------|--------------------|-------------------|----------------------|-----------------|----------------------|-----------------|
| <b>Boone County</b>      | YES                | YES                  | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | NO                | YES                  | YES             | YES                  | YES             |
| City of Florence         | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | YES             | YES                  | YES             |
| City of Union            | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | SHARED             | NO                | SHARED               | YES             | YES                  | YES             |
| City of Walton           | YES                | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | SHARED             | NO                | SHARED               | YES             | YES                  | YES             |
| <b>Campbell County</b>   | YES                | YES                  | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | YES               | YES                  | YES             | NO                   | YES             |
| City of Alexandria       | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Bellevue         | YES                | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | SHARED          |
| City of California       | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Cold Spring      | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | SHARED          |
| City of Crestview        | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Dayton           | YES                | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | SHARED          |
| City of Ft Thomas        | YES                | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Highland Heights | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Melbourne        | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | NO                | SHARED               | NO              | NO                   | YES             |
| City of Mentor           | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Newport          | YES                | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Silver Grove     | YES                | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Southgate        | YES                | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |

| Jurisdiction           | Board Of Education | Building Inspections | Clerk Of Courts | Emergency Management | County / City Treasurer | County Judge Executive/Mayor | Health Department | Road Department | Sheriff Department | Police Department | PVA (Tax Assessment) | Social Services | Utilities Department | Fire Department |
|------------------------|--------------------|----------------------|-----------------|----------------------|-------------------------|------------------------------|-------------------|-----------------|--------------------|-------------------|----------------------|-----------------|----------------------|-----------------|
| City of Wilder         | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Woodlawn       | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | YES             |
| <b>Carroll County</b>  | YES                | YES                  | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | NO                | YES                  | YES             | NO                   | SHARED          |
| City of Carrollton     | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | YES             | YES                  | YES             |
| City of Ghent          | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Prestonville   | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Sanders        | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Worthville     | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| <b>Gallatin County</b> | YES                | NO                   | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | NO                | YES                  | YES             | YES                  | SHARED          |
| City of Glencoe        | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Sparta         | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Warsaw         | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| <b>Grant County</b>    | YES                | YES                  | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | NO                | YES                  | YES             | NO                   | SHARED          |
| City of Corinth        | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | YES                  | YES             |
| City of Crittenden     | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | YES                  | YES             |
| City of Dry Ridge      | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | YES                  | YES             |
| City of Williamstown   | YES                | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | YES                  | YES             |
| <b>Kenton County</b>   | YES                | YES                  | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | YES               | YES                  | YES             | NO                   | SHARED          |
| City of Bromley        | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | YES             |

| Jurisdiction             | Board Of Education | Building Inspections | Clerk Of Courts | Emergency Management | County / City Treasurer | County Judge Executive/Mayor | Health Department | Road Department | Sheriff Department | Police Department | PVA (Tax Assessment) | Social Services | Utilities Department | Fire Department |
|--------------------------|--------------------|----------------------|-----------------|----------------------|-------------------------|------------------------------|-------------------|-----------------|--------------------|-------------------|----------------------|-----------------|----------------------|-----------------|
| City of Covington        | YES                | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Crescent Springs | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | SHARED            | SHARED               | NO              | NO                   | SHARED          |
| City of Crestview Hills  | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Edgewood         | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Elsmere          | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Erlanger         | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | YES             | NO                   | YES             |
| City of Fairview         | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Ft. Mitchell     | YES                | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Ft. Wright       | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | YES             | NO                   | YES             |
| City of Independence     | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Kenton Vale      | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Lakeside Park    | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | YES             | NO                   | YES             |
| City of Ludlow           | YES                | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Park Hills       | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |
| City of Ryland Heights   | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | YES             | NO                   | YES             |
| City of Taylor Mill      | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | YES             |

| Jurisdiction            | Board Of Education | Building Inspections | Clerk Of Courts | Emergency Management | County / City Treasurer | County Judge Executive/Mayor | Health Department | Road Department | Sheriff Department | Police Department | PVA (Tax Assessment) | Social Services | Utilities Department | Fire Department |
|-------------------------|--------------------|----------------------|-----------------|----------------------|-------------------------|------------------------------|-------------------|-----------------|--------------------|-------------------|----------------------|-----------------|----------------------|-----------------|
| City of Villa Hills     | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | YES             | NO                 | YES               | SHARED               | NO              | NO                   | SHARED          |
| <b>Owen County</b>      | YES                | YES                  | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | NO                | YES                  | YES             | NO                   | SHARED          |
| City of Gratz           | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Monterey        | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | NO                | SHARED               | NO              | NO                   | SHARED          |
| City of Owenton         | SHARED             | YES                  | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | YES                  | YES             |
| <b>Pendleton County</b> | YES                | NO                   | YES             | YES                  | YES                     | YES                          | SHARED            | YES             | YES                | NO                | YES                  | YES             | NO                   | SHARED          |
| City of Butler          | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | YES                  | YES             |
| City of Falmouth        | SHARED             | NO                   | SHARED          | SHARED               | YES                     | YES                          | SHARED            | NO              | NO                 | YES               | SHARED               | NO              | YES                  | YES             |

Local Mitigation committee members were directly involved in summarizing and analyzing the duties of each department. During the public input and committee meetings, it was determined that the implementation of mitigation actions would depend greatly on the capabilities of the departments of each jurisdiction.

The following information summarizes the duties and responsibilities of the professional staff departments listed in the chart above.

The **Board of Education** is responsible for the operation of the school system and is also elected at large by the people. Local funds usually maintain the buildings and provide some funds for capital projects while state funds pay, to a great extent, salaries and costs for purchasing textbooks and supplies.

The **Building Inspections Department** enforces the State Building Code, the National Flood Insurance Program, the Community Rating System, and other applicable local codes through a program of inspection and permitting.

The **PVA, Clerk of Courts** and the **Sheriff** are elected every four years. The PVA is responsible for the valuation of property for tax purposes. The Clerk of Court is custodian of the court system in each county and that office is financed completely by the State of Kentucky. The Sheriff operates on a budget approved annually by the commissioners or magistrates of each county. The sheriff is responsible for the collection of taxes and enforcement of state and local laws.

The **Police Departments** are responsible for the enforcement of local and state laws in their jurisdictions.

The **Road Departments** are responsible for the maintenance and care of public roadways.

The **Utilities Departments** are responsible for providing water, gas, electric and sewer services to the public.

The **Emergency Management** office is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events. The formation of an emergency management office in each county is mandated under Kentucky Revised Statutes

The **County or City Treasurer** is responsible for the oversight and management of the County's budget and fiscal programs, including the administration of state and federal grants.

The **Mayor or County Judge** of each jurisdiction is responsible for the oversight of the daily operations of County and City government. Enforcement of County and City policies and regulations are their responsibility.

The **Health Department** and **Social Services** have separate boards that are appointed by the commissioners. Hiring of employees in these departments may be approved, if in accordance with state personnel policies, by the commissioners. These agencies protect the public health and provide social services in the areas of medical care and governmental social programs to families displaced from home or job.

Of the above-listed departments, the following have been assigned specifically delegated responsibilities to carry out mitigation activities or hazard control tasks: **Emergency Management, Road Department, and Building Inspections**. Each department has been involved in the development of this mitigation plan by participating in the local mitigation committees. The committees with these staff were able to identify gaps, weaknesses or opportunities for enhancement with existing mitigation programs. The **Utilities**, which mostly operate as independent entities with boards that sometimes include local officials, will also play a big role in hazard mitigation in the coming years. Enhanced cooperation and coordination between all agencies will be paramount to reducing loss from various hazard events.

For the most part, it was determined that most of these departments are short-staffed, and fulfill multiple duties within their departments. All jurisdictions are limited in funding and resources for hiring additional staff. Each department staff member is adequately trained and funded to accomplish their current workloads. Increase in work activities will increase the need for additional staff to effectively perform tasks.

As a result of staffing and funding issues, the NKADD becomes the primary resource of technical assistance. NKADD staff are professional staff trained in planning, GIS/GPS, fiscal management and project development. The ADD is the regional planning agency that provides extended services and technical assistance to all jurisdictions in the planning area.

#### SUMMARY OF FINDINGS

Expansion and improvement of existing authorities, policies, programs, and resources to reduce potential losses depend upon the local jurisdictions staff and financial resources.

After reviewing the above summary tables, the local committees recognize that the county governments supply the majority services and professional departments that are responsible for implementing, maintaining and enforcing mitigation activities. Boone, Campbell and Kenton counties have more resources and capabilities at this time than the remaining counties. The five remaining counties in the Northern Kentucky region are generally equal in their ability to enforce and implement mitigation strategies. Mitigation planning committees are organized at the county level to include all jurisdictions in the county for this reason. Cities in the Northern Kentucky region depend largely upon the county government to support and combine resources to perform projects that improve the quality of life for residents. These projects include mitigation projects and activities.

For these reasons, the mitigation committees have concluded from the capability assessment a key aspect of this plan that will greatly affect the prioritization and implementation of mitigation actions is each City and County's participation and support. All city jurisdictions depend on the County jurisdictions to assist with policies, authorities, and funding issues to implement projects. Counties have the greatest resources to implement mitigation goals and objectives and insure success in the implementation of actions. Therefore, the mitigation committees have agreed through this planning process that the goals, objectives and actions need to be prioritized and implemented primarily at the county level. Counties have a vested interest in the success of the cities in their jurisdictions, and have the ability to provide resources that otherwise would not be available. City jurisdictions have the authority to implement mitigation actions on their own in the future if their capabilities expand and the opportunity exists.

Due to the limitations described above, Mitigation committees were established on the county level. They were established to not only create the mitigation plan, but to fill in the gaps and enhance the capabilities of all jurisdictions to implement mitigation strategies that will reduce potential losses identified in the risk assessment.

In addition to local participation from each jurisdiction, the NKADD staff has provided the professional assistance in GIS and plan development to fill in the gaps and enhance the local jurisdictions capability to implement mitigation strategies that will reduce potential losses that in the risk assessment.



### 3.4.2 LOCAL HAZARD MITIGATION GOALS

Northern Kentucky staff and the county mitigation committees analyzed the loss estimates in the risk assessment to establish goals and objectives for loss reduction based upon that analysis. The mitigation committees in each county established these goals. These goals and objectives will be the blueprint for development of specific actions that will reduce the jurisdictions potential losses as identified in the risk assessment.

**Mitigation Goals** were designed to be general guidelines of what is to be achieved. These goals are for long-term and represent the overall vision of the mitigation plan.

**Objectives** define the strategies and implementation steps to attain the identified goals. These objectives are specific, measurable, and have a defined completion. The Goals and Objectives were established and combined to make a complete list of goals and objectives for jurisdictions in the planning region to adopt.

The local mitigation committees met to review and analyze the risk assessment studies for each identified hazard. The following goals and objectives were determined to have the greatest benefit in hazard reduction in the Northern Kentucky region.

**GOAL 1: TO REDUCE LOSS OF LIFE, INJURY, AND DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD EVENTS THAT COULD RESULT IN LOSS OF LIFE OR INJURY.**

#### Purpose of Goal in Relation to the Risk Analysis

During the review of the risk analysis, committee members determined that one of the greatest vulnerabilities is the affects that natural hazards have in disrupting essential services to the general public. For example, during a flood event, the most likely damages are the destruction of roadways and bridges caused by washouts, undercutting and stream debris. Debris from tornados, severe wind storms, severe thunderstorms, earthquakes, and winter storms can interrupt needed utility services, as well as transportation roads for emergency first responders. Therefore, the following objectives were formulated as a result of this goal.

**OBJECTIVE 1.1: MINIMIZE THE DISRUPTION TO AND ENHANCE RAPID RESTORATION OF SYSTEMS AND SERVICES.**

**OBJECTIVE 1.2: MINIMIZE THE DISRUPTION AND ENHANCE RAPID RESTORATION OF UTILITY SYSTEMS. ~~ASSURE~~ ENSURE THAT ALL EMERGENCY FACILITIES HAVE TEMPORARY BACKUP POWER CAPABILITIES.**

**OBJECTIVE 1.3: MINIMIZE THE DAMAGES TO GROUNDWATER AND THE ENVIRONMENT AS A RESULT OF DAMAGES CAUSED BY HAZARDS.**

**OBJECTIVE 1.4: MINIMIZE DAMAGE TO ROADS, BRIDGES, CULVERTS AND OTHER INFRASTRUCTURE THROUGH RELOCATION, REBUILDING AND OTHER MEANS IN ORDER TO REDUCE DAMAGE FROM NATURAL HAZARD EVENTS.**

**GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE POPULATIONS, BUILDINGS AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.**

#### Purpose of Goal in Relation to the Risk Analysis

During the review of the risk analysis, committee members determined several structures and critical facilities that will need to have specific mitigation actions taken in order to be effective in reducing the vulnerability. During the risk assessment, structures have been identified as being in a particular hazard area, many of which are critical facilities. Structures need to be removed from the hazard area completely or built to appropriate standards to reduce the potential losses. Each jurisdiction needs to consider

mitigation actions that will reduce the number of these structures that are located in hazard areas, especially critical facilities.

***OBJECTIVE 2.1: REDUCE THE NUMBERS OF CRITICAL INFRASTRUCTURE AND FACILITIES IN IDENTIFIED HAZARD AREAS.***

***OBJECTIVE 2.2: MINIMIZE RISK TO VULNERABLE POPULATIONS THROUGH THE CONSTRUCTION OF COMMUNITY SHELTERS.***

**GOAL 3: ENHANCE EXISTING OR DESIGN NEW JURISDICTIONAL POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.**

**Purpose of Goal in Relation to the Risk Analysis**

During the evaluation of the risk assessment and the documentation in the capability assessment, it was determined that the potential losses to the identified risks may be reduced by county and city policies that will regulate future development in hazard areas. The capability assessment identifies the lacking existing authorities, policies, programs and resources that can reduce the potential losses in each city and county. Enforcement of existing policies may reduce the number of existing and future structures that are built in flood hazard areas. Policies that regulate and guide the development of future infrastructure such as transportation, lifeline utilities, and essential facilities will drastically reduce the vulnerability of these facilities. Therefore, the following objectives have been developed.

***OBJECTIVE 3.1: ENFORCE AND ENHANCE EXISTING POLICIES AND AUTHORITIES.***

***OBJECTIVE 3.2: DEVELOP NEW POLICIES SUCH AS ORDINANCES AND BUILDING CODES THAT WILL REQUIRE NEW STRUCTURES MEET STANDARDS FOR HAZARD AREAS.***

***OBJECTIVE 3.3: INTEGRATE HAZARD MITIGATION PLAN INTO OTHER COMMUNITY PLANS.***

***OBJECTIVE 3.4: ENCOURAGE POLICIES AND PROGRAMS THAT PREVENT SLIPS, SLIDES AND EROSION ON SLOPES AND LAND, PARTICULARLY WHERE ROADS AND VULNERABLE POPULATIONS ARE CONCERNED.***

**GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.**

**Purpose of Goal in Relation to the Risk Analysis**

During the evaluation of the risk assessment, it was determined that in order to reduce the number of structures in hazard areas, the general public needs to be aware of the potential risks and high potential risk areas. Policies of the local governments can be developed, however, education will ensure those policies are effective to reduce the number of existing and future structures in hazard areas. Public awareness can serve two major points in the mitigation strategies. In an education capacity, the seriousness of the potential for disaster and damages can be communicated. The risk assessment clearly defines areas for potential disaster. The more the citizenry knows about the potential, the more likely they are to take appropriate steps in securing their property and protecting their families against the dangers that are associated with the identified hazards. The risk assessment identifies the fact that severe thunderstorms, tornados, and severe winter storms may occur at any place in the region and affect any jurisdiction. Simply educating the public of when and how to evacuate the hazard areas may reduce the potential for loss of life. Therefore, the following objectives have been developed.

***OBJECTIVE 4.1: EDUCATE THE PUBLIC ABOUT HAZARDS PREVALENT IN THEIR JURISDICTIONS.***

**Goal 5: Increase the technical capabilities of local jurisdictions to reduce potential losses.**

**Purpose of Goal in Relation to the Risk Area**

Reducing potential losses in identified hazard areas depends largely on the ability of the community to communicate, plan, and implement modern technologies to reduce potential losses. During review of the risk assessment, committee members determined that hazards simply will occur and some hazards will occur more often than others. Improving each jurisdiction's technical capabilities will provide the necessary equipment to effectively communicate the hazard risks to the general public, communicate with key critical services including emergency personnel, as well as locate potential losses and damages using modern technology. The hazard profile and risk assessment sections of this plan identify how future updates and information collection will be included using modern technologies. The development of this data will help to reduce damages to existing and future buildings by enhancing the ability to identify risks and hazard locations. Enhancing each jurisdiction's technical capability may be to simply insure that all repetitive loss properties are identified, placed in a database and mapped. Developing such technical capability with databases can be costly and time consuming. This type of project will require grant funding and has the potential to require outside assistance to jurisdictions from the Area Development District for its implementation. Regardless of the cost and time required to implement this strategy, mitigation committees have agreed that the data collected will provide them with invaluable information and will be a primary strategy in mitigating multiple hazards. Therefore, the following objectives have been developed.

***OBJECTIVE 5.1: IMPROVE EACH JURISDICTIONS CAPABILITY TO IDENTIFY AND MAP VULNERABLE STRUCTURES AND CRITICAL FACILITIES IN HAZARD AREAS.***

***OBJECTIVE 5.2: INCREASE THE JURISDICTIONS ABILITY TO COMMUNICATE AND DIRECT EMERGENCY SERVICES AND RESOURCES TO THE APPROPRIATE HAZARD AREAS.***

**GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNERABLE TO HAZARDS.**

**Purpose of Goal in Relation to the Risk Area**

Even though this goal does not directly reduce potential damages, this goal will increase the jurisdictions capability to effectively manage major emergencies more effectively. During the review of the capability assessment in concert with the vulnerabilities, mitigation committee members and public input identified the need for support for the limited professional staff. This is due to the inability of local jurisdictions to hire and maintain revenue to keep professional staff on hand. This goal will help to increase the capabilities and resources of the local jurisdictions.

***OBJECTIVE 6.1: TRAIN VOLUNTEERS AND STAFF TO SUPPORT AND IMPLEMENT MITIGATION ACTIVITIES THAT WILL ENHANCE THE RESPONSE CAPABILITIES OF THE LOCAL JURISDICTIONS.***

### **3.4.3 IDENTIFICATION AND ANALYSIS OF MITIGATION MEASURES**

This section identifies, evaluates, and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard identified in the Risk Assessment, with particular emphasis on new and existing buildings and infrastructure. These actions are based on the evaluation of the risk assessment and in compliance with the mitigation goals and objectives in section 3.4.1.

The following is a list and description of the mitigation actions and techniques that have been considered by the mitigation committees. The available mitigation options were:

#### **1. Prevention**

Preventative activities are intended the impact from a disaster event. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and Zoning
- Open space preservation
- Floodplain regulations
- Stormwater management
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine / fault zone setbacks

## 2. Property Protection

Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

- Relocation
- Critical facilities protection
- Retrofitting (i.e., windproofing, floodproofing, seismic design standards, etc.)
- Insurance
- Safe rooms

## 3. Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards upon the environment through measures such as preserving or restoring natural areas to enhance their mitigation functions. Such areas include floodplains, wetlands and dunes. Parks, recreation or conservation agencies and organizations often implement these measures. Examples include:

- Floodplain protection
- Riparian buffers
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

## 4. Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Levees / dikes / floodwalls / seawalls
- Diversions / Detention / Retention
- Channel modification
- Storm sewers

## 5. Emergency Services

Although not typically considered a “mitigation technique,” emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Back-up power sources, Generators
- Evacuation planning and management
- Sandbagging for flood protection
- Installing shutters for wind protection

## 6. Public Information and Awareness

Public Information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children education
- Hazard expositions

Mitigation Goals and Objectives were established by the Mitigation Committees. A comprehensive list of actions and projects were identified through the mitigation committees. The mitigation actions chosen by the committees and jurisdictions at this time were chosen and defined largely based upon the limited capabilities of our jurisdictions given their geographical location and fiscal capabilities. Mitigation committees chose projects that would be effective, and potentially fundable with help of outside sources. Also, accomplishing the technical actions as outlined will allow each jurisdiction to evaluate, define, and implement future mitigation actions in future updates of this plan that will reduce potential losses.

The following section lists the goals and objectives as stated in section 3.4.1. Each Mitigation Action section is described in the following manner:

| <b>Mitigation Action Plan Structure and Criteria</b> |                                                                                                                                                                            |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jurisdiction(s)                                      | These identify the jurisdictions adopting the action.                                                                                                                      |
| Category of the Action                               | Categories for Actions are classified as Prevention, Property Protection, Natural Resource Protection, Structural Projects Emergency Services, Public Education, Awareness |
| Hazard(s) Mitigated                                  | List the Hazard or Hazards that the action is designed to mitigate.                                                                                                        |
| Estimated Costs                                      | The cost to implement the action. This amount is an estimate.                                                                                                              |
| Funding Method                                       | Describes the potential ways to fund the action.                                                                                                                           |

**GOAL 1: TO REDUCE LOSS OF LIFE, INJURY, AND DISRUPTIONS TO ESSENTIAL PUBLIC SERVICES AND INFRASTRUCTURE BY REDUCING THE VULNERABILITY TO CRITICAL FACILITIES DURING HAZARD EVENTS THAT COULD RESULT IN LOSS OF LIFE OR INJURY.**

**OBJECTIVE 1.1: MINIMIZE THE DISRUPTION TO AND ENHANCE RAPID RESTORATION OF SYSTEMS AND SERVICES.**

**Action 1.1.1: Remove debris from streams that cause damages to bridges, culverts, and transportation facilities.**

**Benefits:** Natural and man-made activities generate a variety of debris that includes but is not limited to, trees and vegetative matter, building construction material, appliances, personal property, mud, and sediment deposits. The quantity and of type of debris generated from any particular disaster will be a function of the location and kind of event experienced, as well as its magnitude, duration and intensity. This action will reduce the damages to existing and future facilities caused by debris that can block the flow of water in streams thus increasing flooding and pressure buildup.

**Jurisdiction(s):** All; especially in Pendleton County and along Fourmile Creek in Campbell County  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** Flood  
**Estimated Costs:** high  
**Funding Method(s):** Local Funds, Prevention Grants & Natural Resources Grants

**Action 1.1.2: Develop a coordinated, sustained interagency debris removal plan.**

**Benefits:** Debris from tornados, severe thunderstorms, earthquakes, and winter storms can damage needed utility services, as well as block transportation facilities such as roads and bridges for emergency first responders. Debris generated from Natural Hazards may cause damages to existing structures if not properly mitigated before and after a natural disaster. Debris generated from public and private property may increase damages to other structures if not properly mitigated. The recommended components of a debris removal plan are:

1. Develop a Proposed Command Structure
2. Pre-Designate Staging and Dumping Sites
3. Pre-Qualify Contractors to be used.
4. Identify Specialized Equipment Needs
5. Provide for Recycling of Materials
6. Debris removal from public and private properties.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention / Property Protection  
**Hazard(s) Mitigated:** All Hazards  
**Estimated Costs:** high  
**Funding Method(s)** Pre-Disaster Mitigation Grants, Local Match, & Flood Control Grants

**OBJECTIVE 1.2: MINIMIZE THE DISRUPTION AND ENHANCE RAPID RESTORATION OF UTILITY SYSTEMS. ~~ASSURE~~ ENSURE THAT ALL EMERGENCY FACILITIES HAVE TEMPORARY BACKUP POWER CAPABILITIES.**

**Action 1.2.1: Trim trees and debris away from overhead power lines and roads.**



**Benefits:** Removing or trimming trees and obstructions as well as removing debris away from utilities and infrastructure would greatly reduce the potential losses to utility lines, roads and structures. During winter storms that involve a great deal of ice buildup, trees tend to fall onto overhead power lines causing significant power outages, as well as dollar losses sustained by the local jurisdictions and utility companies. Additionally, with the number of ash trees dying due to the Invasive species, the Emerald Ash Borer, it is important to be proactive in removing dead trees from powerlines and roadways.

|                             |                                                                 |
|-----------------------------|-----------------------------------------------------------------|
| <b>Jurisdiction(s):</b>     | All, and utilities with overhead lines                          |
| <b>Category of Action:</b>  | Prevention                                                      |
| <b>Hazard(s) Mitigated:</b> | Severe Thunderstorms, Severe Winter Storms, Tornadoes, Flooding |
| <b>Estimated Costs</b>      | high                                                            |
| <b>Funding Method</b>       | Local Funds                                                     |

**Action 1.2.2: Encourage all critical facilities, including utilities and planning agencies, to acquire temporary or fixed backup power capabilities.**

**Benefits:** In the event that power and utilities are lost, generators allow critical facilities to remain operational in order to continue to offer needed services to the jurisdictions. Fire Departments, Emergency Operations Centers and dispatch centers, GIS information agencies, hospitals, water treatment and pump stations and emergency shelters and schools, which can be used as shelters, are examples of critical facilities important during a disaster event. Though this action does not reduce the number or types of existing buildings in the hazard area, it allows these facilities to function during a hazard event.

|                             |                                         |
|-----------------------------|-----------------------------------------|
| <b>Jurisdiction(s):</b>     | All                                     |
| <b>Category of Action:</b>  | Emergency Services                      |
| <b>Hazard(s) Mitigated:</b> | All                                     |
| <b>Estimated Costs</b>      | moderate                                |
| <b>Funding Method</b>       | Emergency Service Grants, Local Sources |

**Action 1.2.3: Encourage residents to have the ability to be self-sufficient for up to 72 hours in the event there is a loss of utility services.**

**Benefits:** During the evaluation of the risk assessment, it was determined that several structures are at risk from various hazards. The local mitigation committees recognized that it is the responsibility of local governments and individuals to mitigate against the effects of disasters. Homeowners that take precautions and are prepared to endure a disaster will significantly reduce the effects of natural hazards upon them and their family. Local mitigation committees stressed the importance of the individual's responsibility to be prepared and mitigate damages and effects of the damages from hazards.

|                                |                                |
|--------------------------------|--------------------------------|
| <b>Jurisdiction(s):</b>        | All                            |
| <b>Category of the Action:</b> | Prevention                     |
| <b>Hazard(s) Mitigated:</b>    | All                            |
| <b>Estimated Costs:</b>        | low                            |
| <b>Funding Method(s)</b>       | Prevention Grants, Local Funds |

**Action 1.2.4: Place new utilities underground where feasible.**

**Benefits:** Placing utilities underground protects from damage from wind and debris.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** high  
**Funding Method(s)** Prevention Grants, Local Funds

**Action 1.2.5: Encourage fuel sources/suppliers to have back-up power.**

**Benefits:** While it is important for critical facilities and other infrastructure noted in Action 1.2.2 to have backup power capabilities, it does little good if there is no fuel for emergency vehicles and generators. Thus, it is important to encourage fuel sources and suppliers to also have back-up power to increase the resiliency of the entire area.

**Jurisdiction:** All  
**Category of the Action:** Emergency Services  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** moderate  
**Funding Method(s)** private

**OBJECTIVE 1.3: MINIMIZE THE DAMAGES TO GROUNDWATER AND THE ENVIRONMENT AS A RESULT OF DAMAGES CAUSED BY HAZARDS.**

**Action 1.3.1: Develop and continue to improve a Stormwater Management Plan that reduces flooding, erosion, and damage caused to the environment.**

**Benefit:** Many of the problems that arise from flooding are due to the lack of proper stormwater facilities and drainage. Stormwater management plans will identify the best placement and construction of stormwater drainage facilities that will reduce the amount of flooding and lessen potential damages as a result of flooding.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** Flooding  
**Estimated Costs:** n/a  
**Funding Method(s)** Pre-Disaster Mitigation Funds, HMGP Funds, Local Matches, Flood Control Grants

**OBJECTIVE 1.4: MINIMIZE DAMAGE TO ROADS, BRIDGES, CULVERTS AND OTHER INFRASTRUCTURE THROUGH RELOCATION, REBUILDING AND OTHER MEANS IN ORDER TO REDUCE DAMAGE FROM NATURAL HAZARD EVENTS.**

**Action 1.4.1: Develop policies and a plan for reducing or eliminating damage to roads and culverts from natural hazards, particularly flooding.**

**Benefit:** There are many roads, bridges, culverts and other infrastructure that are older and can no longer handle the amount of water that pass over, through or around them. Developing plans to replace, move, or strengthen this infrastructure will be beneficial in mitigating future loss from hazards, particularly due to an inundation of water.

|                                |                                                                                |
|--------------------------------|--------------------------------------------------------------------------------|
| <b>Jurisdiction(s):</b>        | All                                                                            |
| <b>Category of the Action:</b> | Prevention/Structural Projects                                                 |
| <b>Hazard(s) Mitigated:</b>    | Flooding, Dam Failure                                                          |
| <b>Estimated Costs:</b>        | n/a                                                                            |
| <b>Funding Method(s)</b>       | Pre-Disaster Mitigation Funds, HMGP Funds, Local Matches, Flood Control Grants |

**Action 1.4.2: Develop and implement plans to clear dead or vulnerable trees from near roads and power lines.**

**Benefit:** The invasive species, Emerald Ash Borer, has killed a vast majority of the ash trees in the NKADD region. There are millions of these trees that are dead and will become more susceptible to falling as they rot. Ash trees are large and could damage structures within several dozen feet of them if they fall. There are many ash trees near power lines and roads that utilities and many road crews have been proactive in cutting these hazards down. It is a costly and time-consuming undertaking, so developing plans will be beneficial in the long run. There are other invasive species that are harmful to trees that could potentially invade our region as well.

|                                |                                                          |
|--------------------------------|----------------------------------------------------------|
| <b>Jurisdiction(s):</b>        | All                                                      |
| <b>Category of the Action:</b> | Prevention                                               |
| <b>Hazard(s) Mitigated:</b>    | Invasive Species, Wind                                   |
| <b>Estimated Costs:</b>        | n/a                                                      |
| <b>Funding Method(s)</b>       | Pre-Disaster Mitigation Funds, HMGP Funds, Local Matches |

**GOAL 2: PROTECT EACH JURISDICTION'S MOST VULNERABLE POPULATIONS, BUILDINGS AND CRITICAL FACILITIES THROUGH THE IMPLEMENTATION OF COST-EFFECTIVE AND TECHNICALLY FEASIBLE MITIGATION PROJECTS.**

**OBJECTIVE 2.1: REDUCE THE NUMBERS OF CRITICAL INFRASTRUCTURE AND FACILITIES IN IDENTIFIED HAZARD AREAS.**

**Action 2.1.1: Adopt recognized building code standards for the State of Kentucky for each jurisdiction within the region and encourage the use of adoption of property and maintenance codes.**

**Benefits:** The International Building Code represents minimum standards that must be met by the private sector construction industry to safeguard public health and safety. It incorporates resistance to natural disasters, fire protection, and security of building systems into its construction codes. Costs for jurisdictions to adopt are minimal. Costs of compliance will be borne by the construction industry and are expected to be minimal. Most jurisdictions reference and follow the building codes set by the State of Kentucky, which are similar but sometimes more strict than the International Building Code.

|                                |                     |
|--------------------------------|---------------------|
| <b>Jurisdiction(s)</b>         | All                 |
| <b>Category of the Action:</b> | Property Protection |
| <b>Hazard(s) Mitigated:</b>    | All Hazards         |
| <b>Estimated Costs:</b>        | n/a                 |
| <b>Funding Method(s)</b>       | Local Government    |

**Action 2.1.2: Direct that development and installation of new critical facilities be out of hazard areas. Also relocate any critical facilities currently in special flood hazard area above that area.**

**Benefits:** The Local Mitigation committees determined the most effective way for jurisdictions to mitigate any potential losses to future buildings is to guide development away from the hazard areas, especially flood hazard and landslide hazard areas. Kenton County’s Emergency Management Center is located within the floodplain. It was determined that relocating the facility outside of the floodplain would be a high priority in hazard mitigation and its ability to maintain communications in the event of flood. There are a few other critical facilities in the region that are in hazard areas, which will be a priority to find funding to assist moving them to safer locations.

**Jurisdictions:** All; specifically relocate fire stations in Mentor, Melbourne, Silver Grove and Camp Springs  
**Category of the Action:** Property Protection/Emergency Services  
**Hazard(s) Mitigated:** Flooding, Landslide  
**Estimated Costs:** n/a  
**Funding Method(s)** local funds, HMGP, PDM, flood control grant

**OBJECTIVE 2.2: MINIMIZE RISK TO VULNERABLE POPULATIONS THROUGH THE CONSTRUCTION OF COMMUNITY SHELTERS.**

**Action 2.2.1: Build severe weather shelters for vulnerable populations, including but not limited to tornado safe rooms.**

**Benefits:** The primary mission of local government and emergency services is to protect their citizens in times of hazards and disasters. To that end, providing safe shelters for people to wait out severe weather and other hazards would be very beneficial. Particularly in tornado-prone areas like our region.

**Jurisdictions:** All  
**Category of the Action:** Emergency Services  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** moderate  
**Funding Method(s)** local funds, HMGP, PDM

**GOAL 3: ENHANCE EXISTING OR DESIGN NEW JURISDICTIONAL POLICIES THAT WILL REDUCE THE POTENTIAL DAMAGING EFFECTS OF HAZARDS WITHOUT HINDERING OTHER COMMUNITY GOALS.**

**OBJECTIVE 3.1: ENFORCE AND ENHANCE EXISTING POLICIES AND AUTHORITIES.**

**Action 3.1.1: Adopt and maintain current FIRMs (Flood Insurance Rate Maps) and local flood protection ordinances.**

**Benefits:** Enforcement of existing policies is relatively low in cost, and reaps great benefits in reducing potential losses.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention, Awareness  
**Hazard(s) Mitigated:** Flood  
**Estimated Costs:** minimal  
**Funding Method(s):** Local Revenue

**Action 3.1.2: Encourage participation in the Risk MAP program.**

**Benefits:** The Risk MAP program is a FEMA program provides guidelines and requirements for NFIP flood risk analysis and addresses the performance of flood mitigation projects and other related activities. Communities that participate in the NFIP and Risk MAP are communities that are actively working towards flood mitigation and prevention.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention, Awareness  
**Hazard(s) Mitigated:** Flood  
**Estimated Costs:** minimal  
**Funding Method(s):** Local Revenue

**OBJECTIVE 3.2: DEVELOP NEW POLICIES SUCH AS ORDINANCES AND BUILDING CODES THAT WILL REQUIRE NEW STRUCTURES MEET STANDARDS FOR HAZARD AREAS.**

**Action 3.2.1: Improve the enforcement of current building codes to include mitigation objectives.**

**Benefits:** Building codes that are currently in place will be enhanced by including mitigation activities where applicable and feasible. Any cost of these activities will primarily be borne by the individual or construction developer during projects, and will likely be minimal.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention, Awareness  
**Hazard(s) Mitigated:** All Hazards  
**Estimated Costs:** minimal  
**Funding Method(s):** Developers, Property owners

**Action 3.2.2: Develop and continue with zoning and land use ordinances that will regulate development in hazard areas. (this will only apply to jurisdictions that currently undertake land use planning and zoning activities)**

**Benefits:** Development and continuation of zoning and land use regulations will allow the local jurisdiction to regulate the type of development in hazard areas. Regulation of development is a proven way to reduce potential losses without posing a financial strain on the jurisdiction.

**Jurisdiction(s):** Boone, Campbell, Gallatin, Grant, Kenton, & Pendleton  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** All Hazards  
**Estimated Costs:** minimal  
**Funding Method(s):** Local Revenue

**Action 3.2.3: Eliminate repetitive loss structures through property acquisition.**

**Benefits:** Development of zoning and land use regulations will allow the local jurisdiction to regulate the type of development in hazard areas. Regulation of development is a proven way to reduce potential losses without posing a financial strain on the jurisdiction.

**Jurisdiction(s):** Boone, Campbell, Carroll, Gallatin, Kenton, & Pendleton; especially along Ohio River in Campbell County  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** Flooding

**Estimated Costs:** moderate  
**Funding Method(s):** HMGP, PDM, other grant sources, local funds

**Action 3.2.4: Conduct pre-disaster mitigation activities for residential structures in the floodway.**

**Benefits:** While it is important to have plans and policies in place that enforce floodplain activity, there are many residential structures that have been in place before floodplain policies were enacted. As flood events continue to worsen, it is important to assess and conduct pre-disaster mitigation activities for these structures.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** Flooding  
**Estimated Costs:** moderate  
**Funding Method(s):** HMGP, PDM, other grant sources, local funds

**OBJECTIVE 3.3: INTEGRATE HAZARD MITIGATION PLAN INTO OTHER COMMUNITY PLANS.**

**Action 3.3.1: Continue to reference the Hazard Mitigation Plan in other plans and grant applications.**

**Benefits:** Continuing to revisit the Hazard Mitigation Plan in between updates and to make it a part of other plans and policies is important for communities to truly mitigate their hazard risks and to become resilient.

**Jurisdiction(s):** All  
**Category of the Action:** All  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** low  
**Funding Method(s):** HMGP, PDM, other grant sources, local funds

**Action 3.3.2: Encourage communities, developers, and other organizations to consult the hazard mitigation plan for future developments, capital improvement programs, and other actions that have community-wide impacts**

**Benefits:** Making others, not only the public, but decision makers aware of the hazard mitigation plan and the different policies and plans that it can affect is important. Hazard Mitigation works best when all stakeholders are involved and invested.

**Jurisdiction(s):** All  
**Category of the Action:** Education and Awareness  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** low  
**Funding Method(s):** HMGP, PDM, other grant sources, local funds

**Action 3.3.3: Encourage communities to participate in the Community Rating System (CRS).**

**Benefits:** The Community Rating System is a program that encourages communities to commit to various flood mitigation measures and in return lowers resident's flood insurance rates.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** Floods



**Estimated Costs:** low  
**Funding Method(s):** local funds

***OBJECTIVE 3.4: ENCOURAGE POLICIES AND PROGRAMS THAT PREVENT SLIPS, SLIDES AND EROSION ON SLOPES AND LAND, PARTICULARLY WHERE ROADS AND VULNERABLE POPULATIONS ARE CONCERNED.***

**Action 3.4.1: Encourage communities to coordinate with KYTC, County road departments, and utilities in order to create policies and plans that prevent slips, slides and other land erosion problems that affect roadways. Examples of this include but are not limited to improving drainage systems, culverts, and road re-location.**

**Benefits:** Coordination between agencies to protect infrastructure from slips, slides and erosion will mitigate loss from hazard events, but also protect populations near the vulnerable infrastructure from being isolated during emergencies or prevented from reaching employment.

**Jurisdiction(s):** All  
**Category of the Action:** Prevention  
**Hazard(s) Mitigated:** Landslides, erosion  
**Estimated Costs:** high  
**Funding Method(s):** local funds, HMGP, PDM, other grants

***GOAL 4: PROTECT PUBLIC HEALTH, SAFETY AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.***

***OBJECTIVE 4.1: EDUCATE THE PUBLIC ABOUT HAZARDS PREVALENT IN THEIR JURISDICTIONS.***

**Action 4.1.1: Educate residents of the location of hazard areas by providing maps and hazard information.**

**Benefits:** Educating residents about the locations of hazard area will result in the reduction of the potential losses when the property owner taking the appropriate precautions to avoid or minimize exposure to known hazards.

**Jurisdiction(s):** All  
**Category of the Action:** Awareness  
**Hazard(s) Mitigated:** All Hazards  
**Estimated Costs:** minimal  
**Funding Method(s):** Local Revenues, Prevention Grants

**Action 4.1.2: Educate the public about early warning systems and promote the use of NOAA “All Hazards” radios, and outdoor warning sirens for early warning and post event information.**

**Benefits:** NOAA Weather Radio is a nationwide network of radio stations broadcasting continuous weather information direct from nearby National Weather Service offices. These stations broadcast warnings, as well as post event information for all types of hazards, both natural and man-made. These broadcasts are generated 7 days per week, 24 hours per day. NOAA radios are a single source for the most comprehensive weather and emergency information available to the public. These warnings provide people time to react and take preventative measures before dangerous weather or other hazard conditions strike their area.

NOAA weather radios will bring awareness to the public regarding all hazards. Outdoor Warning sirens will alert citizens in the vicinity to take shelter.

**Jurisdictions:** All  
**Category:** Awareness  
**Hazards Mitigated:** All  
**Estimated Costs:** minimal  
**Funding Method:** local funds

**Action 4.1.3: Educate the public about the Floodplain Ordinance.**

**Benefits:** Making residents aware of Floodplain dangers and regulations will reduce the likelihood that structures will be built in flood hazard areas.

**Jurisdiction(s):** Boone, Campbell, Carroll, Gallatin, Grant, Kenton, Owen, Pendleton  
**Category of Action:** Prevention  
**Hazard(s) Mitigated:** Floods  
**Estimated Costs:** minimal  
**Funding Method:** local funds

**Action 4.1.4: Educate citizens about evacuation plans, policies, and procedures for all hazards.**

**Benefits:** Counties currently have evacuation plans included in the Emergency Operations Plan. This action will develop more detailed, refined evacuation procedures for specific hazard areas, especially flooding and landslide hazards. This action will help protect the public health and safety by having plans in place to assist those people threatened by various emergency conditions evacuate to safety in a timely manner. The plans to be developed will include a determination of the conditions under which evacuation may be necessary, a clear chain of command, specific evacuation routes, plans and procedures for different types of emergencies and geographic areas and provisions for assisting those with disabilities.

**Jurisdiction(s):** All  
**Category of Action:** Prevention  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** minimal  
**Funding Method:** grants, local funds

**Action 4.1.5: Educate the public about measures that can be taken to reduce damages caused by natural hazards to homes and personal property.**

**Benefits:** By making residents aware of specific steps they can take to protect their homes and property individuals would be able to prepare their homes for a hazard, homes that were prepared would have a greater chance of withstanding an event, thereby sustaining less damage.

**Jurisdiction(s):** All  
**Category of Action:** Prevention  
**Hazard(s) Mitigated:** All  
**Estimated Costs:** minimal  
**Funding Method:** grants, local funds

**Action 4.1.6: Encourage community resilience by educating residents about 72-hour emergency plans and kits.**

**Benefits:** By making residents aware of 72-hour emergency plans and kits, how to prepare, and what to include in the kits, communities can make their residents much more resilient and therefore encourage quicker recovery from disasters.

|                             |                     |
|-----------------------------|---------------------|
| <b>Jurisdiction(s):</b>     | All                 |
| <b>Category of Action:</b>  | Prevention          |
| <b>Hazard(s) Mitigated:</b> | All                 |
| <b>Estimated Costs</b>      | minimal             |
| <b>Funding Method:</b>      | grants, local funds |

**GOAL 5: INCREASE THE TECHNICAL CAPABILITIES OF LOCAL JURISDICTIONS TO REDUCE POTENTIAL LOSSES.**

**OBJECTIVE 5.1: IMPROVE EACH JURISDICTIONS CAPABILITY TO IDENTIFY AND MAP VULNERABLE STRUCTURES AND CRITICAL FACILITIES IN HAZARD AREAS.**

**Action 5.1.1: Create and maintain a GIS database inventory of all critical facilities and structures in each hazard area.**

**Benefits:** During the risk assessment, several structures and facilities were identified as being in hazard areas. However, data on each of those structures and facilities is very limited. Creating and maintaining a database will allow more detailed information to be collected on type, value, personnel, elevation, and construction materials of each facility. This data can be incorporated into a GIS database. This data would provide a geographic link to other information such as parcel data maintained by the county Property Valuation Administrator (PVA) office.

|                             |                                      |
|-----------------------------|--------------------------------------|
| <b>Jurisdictions:</b>       | All                                  |
| <b>Category of Action:</b>  | Prevention/Awareness                 |
| <b>Hazard(s) Mitigated:</b> | All Hazards                          |
| <b>Estimated Costs</b>      | minimal                              |
| <b>Funding Method</b>       | Pre-Disaster Mitigation, local funds |

**Action 5.1.2: Update local mapping system capabilities including hardware and software.**

**Benefits:** A GIS database is not useful if some jurisdictions cannot use it if they lack the necessary hardware or software. Such hardware or software would allow some smaller jurisdictions to utilize data specific to them and become more prepared prior to hazard events.

|                             |                                      |
|-----------------------------|--------------------------------------|
| <b>Jurisdictions:</b>       | All                                  |
| <b>Category of Action:</b>  | Prevention/Awareness                 |
| <b>Hazard(s) Mitigated:</b> | All Hazards                          |
| <b>Estimated Costs</b>      | minimal                              |
| <b>Funding Method</b>       | Pre-Disaster Mitigation, local funds |

**OBJECTIVE 5.2: INCREASE THE JURISDICTIONS ABILITY TO COMMUNICATE AND DIRECT EMERGENCY SERVICES AND RESOURCES TO THE APPROPRIATE HAZARD AREAS.**

**Action 5.2.1: Upgrade Emergency Services communication equipment and general technology and create redundancy.**

**Benefit(s):** This action will not reduce the risk, but it will have 2 important benefits. First, the communications equipment would facilitate communications among responders from different agencies, utilizing different types and frequencies of radios. Second, it would provide for a direct communication from the Emergency Operations Center that controls resources to the responders at the scene of a disaster. Thirdly, creating redundancy would protect the system in case of failure and ensure continuity of operation.

|                             |                                                                                                      |
|-----------------------------|------------------------------------------------------------------------------------------------------|
| <b>Jurisdiction(s):</b>     | All                                                                                                  |
| <b>Category of Action:</b>  | Emergency Services                                                                                   |
| <b>Hazard(s) Mitigated:</b> | All Hazards                                                                                          |
| <b>Estimated Costs</b>      | Very high (\$35 million)                                                                             |
| <b>Funding Method:</b>      | Homeland Security Grants, First Responder, Grants, FEMA Fire Act Grants, CDBG Disaster Relief Grants |

**Action 5.2.2: Design and Implement a protection program for critical information systems and infrastructure and ensure survivability of the region's communication system. (Ex. E-911 dispatch, communications, etc.)**

**Benefits:** Each jurisdiction relies on its information and communication systems infrastructure. Loss of critical information and communication systems and infrastructure would result in major impacts and interruptions to all emergency responders, road crews, and emergency management officials responding to a hazard event. This action will enhance a jurisdiction's ability to avoid a disastrous event to critical information and communication systems infrastructure, thus minimizing the impacts and interruptions to city services and emergency response capabilities. This action will assess weaknesses and strengths and design a program that will reduce the losses to the information systems and facilities that direct emergency services.

|                            |                                                      |
|----------------------------|------------------------------------------------------|
| <b>Jurisdictions:</b>      | All                                                  |
| <b>Category of Action</b>  | Emergency Services                                   |
| <b>Hazard(s) Mitigated</b> | All Hazards                                          |
| <b>Estimated Costs</b>     | moderate                                             |
| <b>Funding Method</b>      | Pre-Disaster Mitigation, CDBG Disaster Relief Grants |

**Action 5.2.3: Expand warning and notification systems such as outdoor warning sirens and NOAA/All-Hazard/weather radios.**

**Benefits:** Early warning systems provide a means to quickly provide advance warning to the public of the onset severe weather.

|                            |                                                      |
|----------------------------|------------------------------------------------------|
| <b>Jurisdictions:</b>      | All                                                  |
| <b>Category of Action</b>  | Emergency Services                                   |
| <b>Hazard(s) Mitigated</b> | Thunderstorms/Severe Wind, Tornados                  |
| <b>Estimated Costs</b>     | moderate                                             |
| <b>Funding Method</b>      | Pre-Disaster Mitigation, CDBG Disaster Relief Grants |

**Action 5.2.4: To ensure continuity of operation at Emergency Operations Centers, implement infrastructure and technology improvements.**

**Benefits:** During a disaster, Emergency Operations Centers are the center of the recovery effort. Improvements to technology and infrastructure are necessary to ensure continuity of services and operations.

|                            |                                                      |
|----------------------------|------------------------------------------------------|
| <b>Jurisdictions:</b>      | All                                                  |
| <b>Category of Action</b>  | Emergency Services                                   |
| <b>Hazard(s) Mitigated</b> | All                                                  |
| <b>Estimated Costs</b>     | High                                                 |
| <b>Funding Method</b>      | Pre-Disaster Mitigation, CDBG Disaster Relief Grants |

**Action 5.2.5: Encourage the use of the Integrated Public Alert and Warning System (IPAWS), social media, and other mass notification tools.**

**Benefits:** During a disaster, timely and accurate information disseminated to as many people as possible is vital. Mass notification tools, with the increasing usage of smart phones and smart devices, are one of the best and easiest ways to providing information to many people at once.

|                            |                                                      |
|----------------------------|------------------------------------------------------|
| <b>Jurisdictions:</b>      | All                                                  |
| <b>Category of Action</b>  | Emergency Services                                   |
| <b>Hazard(s) Mitigated</b> | All                                                  |
| <b>Estimated Costs</b>     | High                                                 |
| <b>Funding Method</b>      | Pre-Disaster Mitigation, CDBG Disaster Relief Grants |

**GOAL 6: BUILD LOCAL SUPPORT AND COMMITMENT TO CONTINUOUSLY BECOME LESS VULNERABLE TO HAZARDS.**

**OBJECTIVE 6.1: TRAIN VOLUNTEERS AND STAFF TO SUPPORT AND IMPLEMENT MITIGATION ACTIVITIES THAT WILL ENHANCE THE RESPONSE CAPABILITIES OF THE LOCAL JURISDICTIONS.**

**Action 6.1.1: Recruit and Train volunteers to serve on Citizen Corps, CERT, American Red Cross and other volunteer programs.**

**Benefit(s):** These volunteers will be called upon to supplement existing professional staff in the delivery of emergency related services. These volunteers will deliver emergency preparedness presentations, maintain a database of disaster relief resources, support public safety officials with evacuations and staffing for relief centers, and aid in damage assessment teams.

|                            |                         |
|----------------------------|-------------------------|
| <b>Jurisdiction(s):</b>    | All                     |
| <b>Category of Action</b>  | Prevention              |
| <b>Hazard(s) Mitigated</b> | All                     |
| <b>Estimated Costs</b>     | moderate                |
| <b>Funding Method</b>      | Pre-Disaster Mitigation |

**Action 6.1.2: Encourage more coordination between jurisdictions on hazard mitigation issues.**

**Benefit(s):** A theme in these actions, committees stressed the coordination and cooperation between agencies is key to mitigating losses and being prepared to recover from disasters.

|                            |            |
|----------------------------|------------|
| <b>Jurisdiction(s):</b>    | All        |
| <b>Category of Action</b>  | Prevention |
| <b>Hazard(s) Mitigated</b> | All        |

|                        |                         |
|------------------------|-------------------------|
| <b>Estimated Costs</b> | moderate                |
| <b>Funding Method</b>  | Pre-Disaster Mitigation |

**Action 6.1.3: Train staff and disaster responders for hazard events, ensuring responders are qualified. Specifically, require NIMS training.**

**Benefit(s):** Properly trained staff and volunteers are vital to disaster and mitigation issues, training programs like NIMS ensure that staff and responders have had appropriate training.

|                            |                         |
|----------------------------|-------------------------|
| <b>Jurisdiction(s):</b>    | All                     |
| <b>Category of Action</b>  | Prevention/Education    |
| <b>Hazard(s) Mitigated</b> | All                     |
| <b>Estimated Costs</b>     | moderate                |
| <b>Funding Method</b>      | Pre-Disaster Mitigation |

#### **Funding Issues**

All actions of the mitigation plan have been formulated based on the review and evaluation of the Hazard Profiles and Risk Assessment review by the local mitigation committees. Implementation of actions by the local government will depend heavily on the local fiscal resources and funding opportunities available to the jurisdictions to implement the action. Each county's available resources and needs are vastly different as is their ability to cover the costs of these actions.

### **3.4.4 IMPLEMENTATION OF MITIGATION MEASURES**

The Local Hazard Mitigation Planning Committee members were responsible for prioritizing actions for their county jurisdiction, for reviewing the capabilities of each jurisdiction and to describe implementation and administration activities with each action.

Mitigation Committees prioritized each action based on the effect on the overall risk to life and property, ease of implementation/technical feasibility, community support, funding availability. Each of these items were rated using a scale of Very High, High, Moderate, Low and Very Low. Throughout the implementation of these projects, the mitigation committees will continually review all mitigation actions in regards to these criteria. The committees used a scoring system of Very High to Low, with projects that have a greater potential for implementation based on the above factors receiving a higher score than those with less potential for success.

Very High means that all four factors – overall risk to life and property, ease of implementation/technical feasibility, community support, and funding availability - were deemed met by the committee members who ranked the Mitigation Actions. High means that three factors were met; although different members may have not all thought the same three factors were met. Moderate means that two factors were met, low means that one was met, and very low means that none were met. No mitigation action was ranked as very low. Using the above criteria, committees in each jurisdiction evaluated each action and determined the jurisdictions priorities for mitigation actions for each county. Mitigation actions were reviewed and prioritized for implementation. During the capability assessment, it was determined that many city jurisdictions do not have the fiscal resources or personnel to insure mitigation implementation and effectiveness and rely on the county jurisdiction.

The following charts show the implementation plan and priorities for each county. The cities within each county are assumed included for their respective counties. These charts illustrate the actions considered and the benefit



review of these actions. Committee members also determined the timeline it would take to complete the action and the agency responsible based on this review.

| <b>Mitigation Action</b>                                                                                                           | <b>Action Number</b> | <b>Jurisdictions</b> | <b>Effect on Risk Reduction</b> | <b>Ease of Implementation</b> | <b>Community Support</b> | <b>Benefit / Cost Ratio</b> | <b>Overall Priority</b> | <b>Status Since Previous Plan</b> |
|------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|---------------------------------|-------------------------------|--------------------------|-----------------------------|-------------------------|-----------------------------------|
| Remove debris from streams that cause damages to bridges and transportation facilities                                             | 1.1.1                | All                  | Very High                       | Difficult                     | High                     | Moderate                    | Very High               | Deferred                          |
| Develop a coordinated, sustained interagency debris removal plan.                                                                  | 1.1.2                | All                  | High                            | Difficult                     | High                     | Moderate                    | Very High               | Deferred                          |
| Trim trees and debris away from overhead power lines.                                                                              | 1.2.1                | All                  | Very High                       | Somewhat Difficult            | High                     | High                        | High                    | On-going                          |
| Encourage all emergency facilities to acquire temporary backup power capabilities.                                                 | 1.2.2                | All                  | High                            | Difficult                     | Very High                | Moderate                    | Very High               | On-going                          |
| Encourage residents to have the ability to be self-sufficient for up to 96 hours in the event there is a loss of utility services. | 1.2.3                | All                  | Very High                       | Easy                          | High                     | High                        | High                    | On-going                          |
| Place new utilities underground where feasible.                                                                                    | 1.2.4                | All                  | Moderate                        | Difficult                     | Moderate                 | Moderate                    | Medium                  | On-going                          |
| Develop a Stormwater Management Plan that reduces flooding, erosion, and damage caused to the environment.                         | 1.3.1                | All                  | High                            | Somewhat Difficult            | Moderate                 | High                        | Very High               | Deferred                          |

|                                                                                                                                                                                           |       |                                                             |           |          |          |          |           |                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------|-----------|----------|----------|----------|-----------|--------------------------|
| Develop policies and a plan for reducing or eliminating damage to roads and culverts from natural hazards, particularly flooding.                                                         | 1.4.1 | All                                                         | High      | Moderate | Moderate | High     | Very High | New                      |
| Adopt recognized building code standards such as the State of KY Building Code standards for each jurisdiction within the region.                                                         | 2.1.1 | All                                                         | High      | Moderate | Moderate | High     | Very High | Modified - new standards |
| Direct that Development and installation of new critical facilities be out of hazard areas. Also relocate any critical facilities currently in special flood hazard area above that area. | 2.1.2 | All                                                         | Very High | Moderate | High     | High     | Very High | On-going                 |
| Build severe weather shelters for vulnerable communities, including but not limited to tornado safe rooms.                                                                                | 2.2.1 | All                                                         | Moderate  | Moderate | Moderate | Moderate | High      | New                      |
| Enforce the County National Flood Insurance Program ordinances.                                                                                                                           | 3.1.1 | Boone, Campbell, Carroll, Gallatin, Kenton, Owen, Pendleton | Very High | Moderate | Moderate | High     | Very High | On-going                 |
| Improve the enforcement of current building codes to include mitigation objectives.                                                                                                       | 3.2.1 | All                                                         | Very High | Moderate | Moderate | High     | Very High | Deferred                 |
| Develop zoning and land use ordinances that will regulate development in hazard areas.                                                                                                    | 3.2.2 | Boone, Campbell, Gallatin, Grant, Pendleton                 | Very High | Moderate | Moderate | High     | Very High | On-going                 |

|                                                                                                                                                                                                            |       |                                                                                                       |          |          |           |           |           |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------|----------|----------|-----------|-----------|-----------|----------|
| Eliminate repetitive loss structures through property acquisition.                                                                                                                                         | 3.2.3 | Boone, Campbell, Carroll, Gallatin, Kenton, Pendleton. Especially along Ohio River in Campbell County | High     | Moderate | Moderate  | Moderate  | Medium    | On-going |
| Continue to reference the Hazard Mitigation Plan in other plans and grant applications.                                                                                                                    | 3.3.1 | All                                                                                                   | Low      | Easy     | Moderate  | High      | High      | New      |
| Encourage communities, developers, and other organizations to consult the hazard mitigation plan for future developments, capital improvement programs, and other actions that have community-wide impacts | 3.3.2 | All                                                                                                   | Moderate | Easy     | Moderate  | High      | High      | New      |
| Encourage communities to coordinate with KYTC and County road departments in order to create policies and plans that prevent slips, slides and other land erosion problems that affect roadways.           | 3.4.1 | All                                                                                                   | High     | Moderate | High      | High      | Very High | New      |
| Educate residents of the location of Hazard areas by providing maps and hazard information.                                                                                                                | 4.1.1 | All                                                                                                   | High     | Easy     | Very High | Very High | Very High | On-going |

|                                                                                                                                                                           |       |     |           |          |           |           |           |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|-----------|----------|-----------|-----------|-----------|----------|
| Educate the public about early warning systems and promote the use of NOAA "All Hazards" radios, and outdoor warning sirens for early warning and post event information. | 4.1.2 | All | High      | Easy     | Very High | Very High | Very High | On-going |
| Educate the public about the Floodplain Ordinance.                                                                                                                        | 4.1.3 | All | High      | Easy     | Very High | Very High | Very High | On-going |
| Educate citizens about evacuation plans, policies, and procedures for all hazards.                                                                                        | 4.1.4 | All | High      | Easy     | Very High | Very High | Very High | On-going |
| Educate the public about measures that can be taken to reduce damage to personal property caused by natural hazards.                                                      | 4.1.5 | All | High      | Easy     | Very High | Very High | Very High | On-going |
| Encourage community resilience by educating residents about 72-hour emergency plans and kits.                                                                             | 4.1.6 | All | High      | Easy     | High      | High      | Very High | New      |
| Create a GIS database inventory of all critical facilities and structures in each hazard area.                                                                            | 5.1.1 | All | High      | Moderate | Very High | Very High | Very High | On-going |
| Update local mapping system capabilities including hardware and software.                                                                                                 | 5.1.2 | All | Very High | Easy     | Very High | High      | High      | New      |

|                                                                                                                                                              |       |     |           |                |          |          |           |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|-----------|----------------|----------|----------|-----------|----------|
| Upgrade the Emergency Services communication equipment and create redundancy                                                                                 | 5.2.1 | All | Very High | Very Difficult | Moderate | Moderate | High      | On-going |
| Design and Implement a protection program for critical information systems and infrastructure and ensure survivability of the region's communication system. | 5.2.2 | All | High      | Difficult      | Moderate | Moderate | Very High | On-going |
| Expand warning and notification systems such as outdoor warning sirens and NOAA radios.                                                                      | 5.2.3 | All | Moderate  | Difficult      | Moderate | Moderate | High      | On-going |
| To ensure continuity of operation at Emergency Operations Centers, implement infrastructure and technology improvements.                                     | 5.2.4 | All | High      | Difficult      | Moderate | High     | High      | On-going |
| Encourage the use of the Integrated Public Alert and Warning System (IPAWS) and other mass notification tools.                                               | 5.2.5 | All | High      | Difficult      | Moderate | High     | Very High | New      |
| Recruit and Train volunteers to serve on Citizen Corps and other volunteer programs.                                                                         | 6.1.1 | All | High      | Moderate       | High     | Moderate | Medium    | On-going |
| Encourage more coordination between jurisdictions on hazard mitigation issues.                                                                               | 6.1.2 | All | High      | Moderate       | High     | High     | High      | New      |



After reviewing the mitigation actions for overall cost-benefit and effectiveness in reducing the overall risk to life and property, the mitigation committees in each county developed an implementation timeline and assigned implementation responsibilities to the appropriate agency that would be most knowledgeable and capable of implementing the actions. It is important to note that funding sources for each action were identified in the action listing in section 3.4.2. Implementation of these actions is dependent on the financial resources and fiscal capabilities of each jurisdiction. Each jurisdiction should pursue outside funding from outside sources from Federal and State agencies, and delay in funding awards may result in delay of implementation of mitigation actions.

The mitigation committees will guide and monitor hazard mitigation concepts and activities and implement within general capabilities of government operations and look to develop partnerships with organizations and agencies within the planning area. Partnerships have been created through this planning effort between cities, counties and independent agencies to implement mitigation actions. In addition, mitigation actions will utilize local resources in each jurisdiction to ease plan implementation, including involvement and input from citizens.

Therefore, the following charts describe the overall priority based upon the cost-benefit review of each action, the implementation timeline, and the agency responsible for each action items.

| <b>Mitigation Action</b>                                                                                                           | <b>Action Number</b> | <b>Jurisdictions</b> | <b>Overall Priority</b> | <b>Recommended Timeline</b> | <b>Agency Responsibility</b>                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|-------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------|
| Remove debris from streams that cause damages to bridges, culverts and transportation facilities                                   | 1.1.1                | All                  | Very High               | Annually                    | Public Works, Solid Waste, US Army Corps of Engineers, KY Division of Water, KY Transportation Cabinet |
| Develop a coordinated, sustained interagency debris removal plan.                                                                  | 1.1.2                | All                  | Very High               | 1 Year                      | Solid Waste / Emergency Management                                                                     |
| Trim trees and debris away from overhead power lines.                                                                              | 1.2.1                | All                  | High                    | Continual                   | Utility Companies                                                                                      |
| Encourage all emergency facilities to acquire temporary backup power capabilities.                                                 | 1.2.2                | All                  | Very High               | Continual                   | Emergency Management                                                                                   |
| Encourage residents to have the ability to be self-sufficient for up to 72 hours in the event there is a loss of utility services. | 1.2.3                | All                  | High                    | Continual                   | Emergency Management, American Red Cross                                                               |
| Encourage that new utilities be placed underground where feasible.                                                                 | 1.2.4                | All                  | Medium                  | Continual                   | Building & Zoning Departments                                                                          |
| Develop a Stormwater Management Plan that reduces flooding, erosion, and damage caused to the environment.                         | 1.3.1                | All                  | Very High               | 2 Years                     | Local Governments or Agency with Authority                                                             |

| <b>Mitigation Action</b>                                                                                                                   | <b>Action Number</b> | <b>Jurisdictions</b>                                                                  | <b>Overall Priority</b> | <b>Recommended Timeline</b> | <b>Agency Responsibility</b>                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|-------------------------|-----------------------------|---------------------------------------------------------------------------------|
| Develop policies and a plan for reducing or eliminating damage to roads and culverts from natural hazards, particularly flooding.          | 1.4.1                | All.<br>Especially Pendleton County and Fourmile Creek in Campbell County.            | Very High               | 1 Year                      | Road Departments                                                                |
| Adopt recognized building code standards such as the State of KY Building Code standards for each jurisdiction within the region.          | 2.1.1                | All                                                                                   | Very High               | 1 Year                      | Building & Zoning Departments,<br>Floodplain Coordinators                       |
| Direct that Development and installation of new critical facilities be out of hazard areas. Also relocate critical facilities out of SFHA. | 2.1.2                | All.<br>Especially fire stations in Mentor, Melbourne, Silver Grove and Camp Springs. | Very High               | Continual                   | Local Governments,<br>Building & Zoning Departments,<br>Floodplain Coordinators |
| Build severe weather shelters for vulnerable communities, including but not limited to tornado safe rooms.                                 | 2.2.1                | All                                                                                   | High                    |                             |                                                                                 |
| Enforce the County National Flood Insurance Program ordinances.                                                                            | 3.1.1                | Boone, Campbell, Carroll, Gallatin, Kenton, Owen, Pendleton                           | Very High               | Continual                   | Building & Zoning Departments,<br>Floodplain Coordinators                       |
| Improve the enforcement of current building codes to include mitigation objectives.                                                        | 3.2.1                | All                                                                                   | Very High               | Continual                   | Building & Zoning Departments                                                   |
| Develop zoning and land use ordinances that will regulate development in hazard areas.                                                     | 3.2.2                | Boone, Campbell, Gallatin, Grant, Pendleton                                           | Very High               | Continual                   | Building & Zoning Departments                                                   |
|                                                                                                                                            |                      |                                                                                       |                         |                             |                                                                                 |

| <b>Mitigation Action</b>                                                                                                                                                                                   | <b>Action Number</b> | <b>Jurisdictions</b>                                                                         | <b>Overall Priority</b> | <b>Recommended Timeline</b> | <b>Agency Responsibility</b>               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------|-------------------------|-----------------------------|--------------------------------------------|
| Eliminate repetitive loss structures through property acquisition.                                                                                                                                         | 3.2.3                | All.<br>Especially in California, Mentor, Melbourne, Silver Grove and uninc. Campbell County | Medium                  | Continual                   | Local Governments, Floodplain coordinators |
| Continue to reference the Hazard Mitigation Plan in other plans and grant applications.                                                                                                                    | 3.3.1                | All                                                                                          | High                    | Continual                   | multiple                                   |
| Encourage communities, developers, and other organizations to consult the hazard mitigation plan for future developments, capital improvement programs, and other actions that have community-wide impacts | 3.3.2                | All                                                                                          | High                    | Continual                   | multiple                                   |
| Encourage communities to coordinate with KYTC and County road departments in order to create policies and plans that prevent slips, slides and other land erosion problems that affect roadways.           | 3.4.1                | All                                                                                          | Very High               | Continual                   | multiple                                   |
| Educate residents of the location of Hazard areas by providing maps and hazard information.                                                                                                                | 4.1.1                | All                                                                                          | Very High               | Continual                   | multiple                                   |
| Educate the public about early warning systems and promote the use of NOAA "All Hazards" radios, and outdoor warning sirens for early warning and post event information.                                  | 4.1.2                | All                                                                                          | Very High               | Continual                   | multiple                                   |
| Educate the public about the Floodplain Ordinance.                                                                                                                                                         | 4.1.3                | All                                                                                          | Very High               | Continual                   | multiple                                   |

| <b>Mitigation Action</b>                                                                                                                                     | <b>Action Number</b> | <b>Jurisdictions</b> | <b>Overall Priority</b> | <b>Recommended Timeline</b> | <b>Agency Responsibility</b>                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|-------------------------|-----------------------------|------------------------------------------------|
| Educate citizens about evacuation plans, policies, and procedures for all hazards.                                                                           | 4.1.4                | All                  | Very High               | Continual                   | Emergency Management                           |
| Educate the public about measures that can be taken to reduce damage to personal property caused by natural hazards.                                         | 4.1.5                | All                  | Very High               | Continual                   | multiple                                       |
| Encourage community resilience by educating residents about 72-hour emergency plans and kits.                                                                | 4.1.6                | All                  | Very High               | Continual                   | Emergency Management / American Red Cross      |
| Create a GIS database inventory of all critical facilities and structures in each hazard area.                                                               | 5.1.1                | All                  | Very High               | Continual                   | multiple                                       |
| Update local mapping system capabilities including hardware and software.                                                                                    | 5.1.2                | All                  | High                    | Continual                   | multiple                                       |
| Upgrade the Emergency Services communication equipment and create redundancy                                                                                 | 5.2.1                | All                  | High                    | Continual                   | Emergency Management / First Response Agencies |
| Design and Implement a protection program for critical information systems and infrastructure and ensure survivability of the region's communication system. | 5.2.2                | All                  | Very High               | Continual                   | Emergency Management                           |
| Expand warning and notification systems such as outdoor warning sirens and NOAA radios.                                                                      | 5.2.3                | All                  | High                    | Continual                   | Emergency Management                           |
| To ensure continuity of operation at EOCs, implement infrastructure and technology improvements.                                                             | 5.2.4                | All                  | High                    | Continual                   | Emergency Management                           |
| Encourage the use of the Integrated Public Alert and Warning System (IPAWS) and other mass notification tools.                                               | 5.2.5                | All                  | Very High               | Continual                   | multiple                                       |

| Mitigation Action                                                                    | Action Number | Jurisdictions | Overall Priority | Recommended Timeline | Agency Responsibility |
|--------------------------------------------------------------------------------------|---------------|---------------|------------------|----------------------|-----------------------|
| Recruit and Train volunteers to serve on Citizen Corps and other volunteer programs. | 6.1.1         | All           | Medium           | Continual            | Emergency Management  |
| Encourage more coordination between jurisdictions on hazard mitigation issues.       | 6.1.2         | All           | High             | Continual            | multiple              |

### 3.4.5 MULTI-JURISDICTIONAL STRATEGY

This plan includes action items specific to each jurisdiction in the planning area requesting FEMA approval of the plan. These actions are based on the risks identified in the risk assessment and in accordance with the regional mitigation strategy. As identified in section 3.3.3, the cities have joined with the county jurisdictions in mitigation actions in order to insure that mitigation actions are cost-effective, environmentally sound, and technically feasible. As action items have been defined for each county and city jurisdiction to implement together, this allows for program funding to be used collectively and efficiently to meet the mitigation goals. The charts previously seen in this section illustrate and explain the action items being considered and implemented for each jurisdiction.

The mitigation committees will also work together with other agencies to implement mitigation actions where feasible on a regional level that will include all jurisdictions.

As the regional entity responsible for the Hazard Mitigation Plan for the Northern Kentucky region, the NKADD has several recommendations regarding Mitigation Actions that the local committees did not include in their own rankings of mitigation actions. The NKADD will recommend the following projects to the local jurisdictions during Plan Maintenance each year. The NKADD will update and amend the plan as necessary if a local jurisdiction chooses to move forward with one of the below mitigation actions or another mitigation action of their choosing.

- Review construction plans for all bridges to determine their susceptibility to collapse and retrofiting bridges with issues. (Earthquake)
- Design and orient infrastructure to deter erosion and accretion. (Landslide, Flood)
- Prevent erosion with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabrics. (Landslide, Flood)
- Require more trees be preserved and planted in landscape designs to reduce the amount of stormwater runoff. (Landslide, Flood)
- Increase drainage or absorption capacities with detention and retention basins, relief drains, spillways, drain widening/dredging/rerouting, debris removal, extra culverts, dike setbacks, and flood gates or pumps. (Flood, Dam Failure)
- Raise utilities above expected flood levels. (Flood)
- Install catch-fall nets for rocks at steep slopes near roadways. (Landslide)
- Apply soil stabilization measures, such as planting soil stabilizing vegetation on steep, publicly-owned slopes. (Landslide, Flood)
- Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure, critical facilities and other important structures. (Lightning)
- Install and maintaining surge protection on critical electronic equipment. (Lightning)
- Incorporate hazard mitigation principles into all aspects of public-funded buildings. (All hazards)

## 3.5 PLAN MAINTENANCE PROCEDURES

The Northern Kentucky Mitigation Committees have developed a method to ensure that regular review and update of the Hazard Mitigation Plan occurs. The Northern Kentucky Regional Mitigation Committee that consists of members from each jurisdiction included in this plan as well as representatives from each county mitigation committee. The Northern Kentucky Regional Committee plan to meet in June of every year to review and evaluate the Mitigation Plan and activities associated with Plan. The committee will be responsible for monitoring and evaluating the progress of the mitigation strategies set forth in the Plan. During review of the Plan, the committee will review each goal and objective to determine their relevance and effectiveness in light of changes within the county, state or federal policies, and to insure they are addressing current development trends. The regional committee will also accept the recommendations from the local committees concerning the risk assessment portion of the plan to determine if the information needs to be updated or modified.

### 3.5.1 MONITORING, EVALUATING & UPDATING THE PLAN

The NKADD staff focused on how the core of the procedures worked and created viable alternatives for the ongoing and more efficient maintenance of the plan update. The table below displays the basic components of the original plan maintenance procedures and outlines the problems encountered with each. In addition, the table briefly explains an alternate approach for each procedure.

| Plan Maintenance Procedures |                                                                                                                                                                                                                                                             |                                                     |                                                                                                                                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             | From the Original Plan                                                                                                                                                                                                                                      | Implementation Problems                             | Changes                                                                                                                                                                                                                                                                         |
| 1                           | Meet in June of every year                                                                                                                                                                                                                                  | No meetings were held due to no business to conduct | Meet only if there is business to conduct                                                                                                                                                                                                                                       |
| 2                           | Regional committee will be responsible for monitoring and evaluating the progress of the mitigation strategies set forth in the Plan                                                                                                                        | Only done at plan updates so far                    | Once a year, an evaluation of the status of this Plan will be posted on the Hazard Mitigation Page on the NKADD website. The evaluation will include information on the usage of the plan, the Committee's activities, and hazard mitigation projects in progress or completed. |
| 3                           | During review of the Plan, the committee will review each goal and objective to determine their relevance and effectiveness in light of changes within the county, state or federal policies, and to insure they are addressing current development trends. |                                                     | none                                                                                                                                                                                                                                                                            |



|    |                                                                                                                                                                                                                                               |  |                                  |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------|
| 4  | The committee will also accept the recommendations from the local committees concerning the risk assessment portion of the plan to determine if the information needs to be updated or modified.                                              |  | none                             |
| 5  | The county Emergency Management Director for each county will be responsible for working with the Local mitigation committees and organizing meetings as needed in order to evaluate the Plan and activities on the county level.             |  | NKADD staff will help coordinate |
| 6  | The county Emergency Management Director will be responsible for plan progress and updates to the Northern Kentucky Regional Mitigation Committee.                                                                                            |  | None                             |
| 7  | The agencies responsible for the various implementation actions will report on the status of their projects and will include identifying which implementation processes worked well, any difficulties encountered, and if any actions failed. |  | None                             |
| 8  | The Emergency Management Director for each county will make recommendations to the committee regarding which strategies should be revised based on the findings of the local mitigation committees.                                           |  | None                             |
| 9  | NKADD staff will be available to assist the committees on a limited basis pending funding for such activities.                                                                                                                                |  | None                             |
| 10 | The NKADD staff will assist with project implementation as funding is available.                                                                                                                                                              |  | None                             |

|    |                                                                                                                                                                                                                        |                                                                          |                                                                                                                                                                                                        |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | The Northern Kentucky Regional Mitigation Plan will be thoroughly updated and resubmitted to the State Hazard Mitigation Officer for approval by 2010.                                                                 | Plan did not expire until 2011. Did not have approval by plan expiration | Devote more staff time and resources to completing the next update by plan expiration, which has been done. Current plan expires August 2017, and NKADD staff is on track to have it approved by then. |
| 12 | Updates to data contained in the <i>Risk Assessment</i> section shall be made at any time during those five years if deemed necessary by the committees and do not require the Plan to re-approved at the state level. |                                                                          | None                                                                                                                                                                                                   |
| 13 | Prior to any updates to the <i>Mitigation Strategy</i> the proposed changes will be presented at an open public meeting to allow opportunity for public comment.                                                       |                                                                          | None                                                                                                                                                                                                   |

### 3.5.2 IMPLEMENTATION THROUGH EXISTING PROGRAMS

Each of the jurisdictions in the Northern Kentucky Region utilize a variety of authorities, policies and programs to guide and control development. These authorities, policies and programs identified in this plan vary by jurisdiction. After each jurisdiction officially adopts the Hazard Mitigation Plan, these existing mechanisms will integrate hazard mitigation strategies as they are applicable to the authority, policy, and program.

Upon adoption of this plan, local jurisdictions accept the responsibility to implement the strategies and actions of this plan in concert with all other community development plans and activities where applicable within the recommended timelines provided that the financial and technical resources are available.

### 3.5.3 CONTINUED PUBLIC INVOLVEMENT

The Northern Kentucky Regional Mitigation Committee is dedicated to continuing public involvement with the Mitigation plan and activities that will be implemented. The Plan has been created with considerable input from the local committees and citizens of each jurisdiction, and the goal is to provide opportunities on a regular basis to facilitate the continued involvement.

The Regional Mitigation Committee will plan to meet once per year. These meetings will be open to the public and notices of meeting dates will be posted on the websites of participating jurisdictions. In addition to continued meetings, the Hazard Mitigation Plan will be kept on file at the NKADD and each Emergency Management Office. The Plan will be made available for public review. The NKADD website will contain information on how to obtain and review copies of the plan and any proposed changes to the plan. In addition this site will contain other pertinent information regarding Hazard Mitigation planning.

## APPENDIX A: SURVEY