Chapter 1, Part I: Introduction

Purpose of the Hazard Mitigation Plan

This revision of the Jackson Purchase Hazard Mitigation (JPHM) Plan is the result of a multi-jurisdictional planning process. It is a product of a partnership created by the Kentucky Department of Emergency Management and the Purchase Area Development District (PADD) through a Mitigation Planning Grant award from the Federal Emergency Management Agency (FEMA).

The purpose of this revision is to further the existing plan's objectives of reducing casualties and property damage caused by natural hazards and encourage the jurisdictions of the Purchase Region to consider natural hazards in all planning and development decisions. The various phases of the update process often occurred in conjunction with other phases. Each phase was constantly revisited to reflect changes that occurred and new information obtained from stakeholders. A brief overview of each of the above phases follows.

1. **Review 2012 JPHM Plan.**
   The 2012 plan was revisited by the Jackson Purchase Hazard Mitigation Council (JPHMC), PADD Staff, and Local Mitigation Planning Teams (MPTs) to identify areas requiring significant updating. It served as the blueprint for development of the 2018 JPHM Plan. Also, the FEMA crosswalk was reviewed to identify weak points from the previous plan to be addressed in the update and revision.

2. **Encourage stakeholder participation during the planning process.**
   Stakeholder participation was encouraged throughout the planning process. All jurisdictions clearly recognized the importance of participation by hazard mitigation stakeholders. Consequently, throughout the planning process, over 200 stakeholders participated in the three JPHMC meetings and 16 local MPT meetings.

3. **Update the "Identifying Hazards" and "Profiles of Hazard Events Sections" of the 2012 Plan and each county chapter.**
   Due to a number of significant events having occurred since the 2012 plan, hazard areas were carefully reviewed to ensure completeness.

4. **Update the "Risk Assessment" Section [Specifically the "Assessing Vulnerability by Jurisdiction" and "Estimating Potential Losses" Subsections] of the 2012 JPHM Plan.** Advancements in data resolution and availability associated with risk assessments are constantly evolving. The HAZUS results generated by the Mid-America Earthquake Center in 2008 to support the NLE were incorporated as an Appendix to the plan. All census-derived data and analysis in the 2012 plan were updated with 2010 U.S. Census Bureau 2011-2015 American Community Survey 5 Year Estimate data. Data from the 2010 Census was utilized in instances where American Community Survey information was not available. All flood plain data was updated, reviewed,

and analyzed using the 2016 FEMA Revised Flood Hazard data/maps, and most recent digital aerial imagery to include at-risk structure point extraction by the PADD Staff.

5. **Update the "Mitigation Strategies" Section of the 2012 JPHM Plan.**
   Stakeholders provided information which was reflected in the updated Mitigation Strategy. The 2018 update presented an opportunity to review the Mitigation Strategy using the information gained through the multiple hazard occurrences that the Purchase Region has over the past five years. The actions presented for each county in this 2018 update represent an entirely new set of actions (and subsequent prioritization) when compared to the 2012 JPHM Plan's actions: The actions for each county within the 2012 JPHM all were non-evaluable process and aspirational actions (e.g., educate about the importance of participation in the NFIP). Consequently, the action list for each county in this 2018 update replaces completely the lists used in 2012/2013.

6. **Update of the "Plan Monitoring" and "Maintenance" Sections of the 2012 JPHM Plan.** These topics were assessed to ensure the 2018 plan would have the flexibility to identify strengths and weakness and provide the capacity to quickly react and adjust accordingly.

7. **Integrate Stakeholder Input.**
   Stakeholder meetings provided opportunities for mitigation partners region-wide to provide mitigation activity information, identify needs, and express concerns. Information obtained regarding existing data, projects, relationships, and activities in the field of hazard identification and hazard mitigation were incorporated into this plan.

8. **Develop a Comprehensive Update of the 2012 JPHM Plan as the 2018 JPHM Plan.**
   Every section was evaluated, updated, and improved via a thorough review of the 2012 plan and the County Annexes. The constant change surrounding hazard mitigation activities throughout the region and the subsequent data it produces was considered.

The implementation strategy is that this plan continues to serve as the initial focal point for the Natural Hazard Mitigation activities of individuals, organizations, local governments, and private industry for the region. Further, the plan provides a frame of reference for the consideration of mitigation projects in the future.

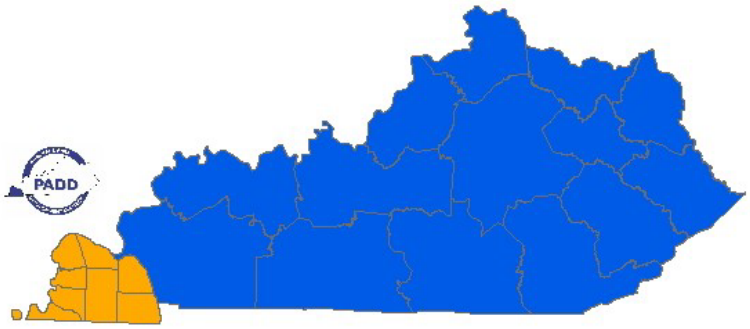
About Area Development Districts

Area Development Districts (ADD) of Kentucky are a product of federal funding by the Appalachian Regional Development Act and the Public Work and Economic Development Act of 1965. The PADD was organized as a nonprofit corporation in 1969 and became one of fifteen such Local Development Districts in Kentucky. Kentucky Revised Statute 147, adopted in 1972, formalized the Area Development Districts as a part of local and state government, but not as a branch of either. ADDs should be thought of as partnerships of local units of government. The PADD has no authority over the activities of any of its member jurisdictions. As required by legislation, the PADD is governed by a Board of Directors composed of 51% elected officials. This includes the judge-executive of each county, and the mayor of each county seat. The remaining members represent other municipalities, labor, low-income families, industry, finance, utilities, the aged, business, minorities, emergency services, women, and education.

The ADD's staff is made up of professionals with a wide range of backgrounds in such areas as economic development, human services, management, planning and mapping services. By sharing the expertise found at the ADD level, local governments are collectively able to have the professional staff that many counties and cities could not afford otherwise.

1.:1.2 General Description of the Planning Area

Figure 1.1 Location of the Purchase Region



MAP OF KENTUCKY
Showing the
Purchase Area Development District

The PADD operates in the eight western counties of Kentucky. Andrew Jackson and Governor Isaac Shelby negotiated the purchase of this territory from the Chickasaw Indians in 1818. Hence, it has been known as the Jackson Purchase. Clockwise from the west, it is bounded by the Mississippi River, Ohio River, Tennessee River (Kentucky Lake), and the State of Tennessee. It includes the lowest elevations in the state.

The PADD operates from its centrally located office in Mayfield, Kentucky. The three major cities in the Purchase are: Paducah (25,001), Murray (18,515), and Mayfield (10,101) based on 2015 ACS 5-Year Population Estimates. There are an additional 15 incorporated municipalities in the

region. The area is characterized by rolling farmland and dense, temperate, mixed hardwood forest. Consequently, farming and forestry are important parts of the regional economy.

Figure 1.2 Detailed Map of the Jackson Purchase Region

As is true for the rest of the state, roads form the backbone of an inter-modal transportation system serving the area.

- The Purchase Parkway (Future I-69) bisects the Purchase at a forty-five degree angle, from Calvert City in the northeast, to Fulton in the southwest.

- Interstate 24 passes through the northeast quarter of the Purchase, crossing Marshall County and exiting the State midway across McCracken County at Paducah.

- KY 121/KY 80 mirrors the Parkway, running from Wickliffe in the northwest to Murray in the southeast, where it intersects US 641, the north-south route from Calvert City, through Murray and on to Tennessee.

- KY 94 is an east-west link from Murray to Hickman, as is KY 58/402 from Hardin to Columbus across the center of the area.

- US 45 bisects the Purchase from Paducah in the north to Fulton in the south.

- US 60 completes the task of I-24, crossing the north of the region, and linking Paducah with Wickliffe. In Wickliffe, US 60 meets US 51, which then heads southbound to Fulton after crossing the Ohio River out of Cairo, Illinois.

Barkley Regional Airport is located in the City of Paducah is the only airport offering commercial flights. It is served by United Express Airlines and has an Instrument Landing System (ILS). The existence of the ILS was critical to the selection of the facility as a location for a Kentucky National Guard Armory. There are paved General Aviation (GA) airfields at Fulton, Murray, Mayfield, and Gilbertsville.

Reaches of three of the nation's primary inland waterways, surround the area on three sides. River ports on the Mississippi, Ohio, and Tennessee Rivers provide road/rail water transshipment nodes and are an essential part of the region's economy.

The Burlington Northern Santa Fe, Canadian National, Paducah and Louisville, and CSX railroads provide freight service to the area. AMTRAK offers two trains a day through its station located in the City of Fulton.

The population residing in the Purchase Region is 196,579 spread over an area of 2,395 square miles. Following is a brief description of each county's and each city's setting, size, population, and organization of government.

Ballard County, population 8,256, is located in the far-western part of Kentucky. It is bordered on the north by the Ohio River and on the west by the Mississippi River. The county is 254 square miles in size and is governed by a Judge Executive and five Magistrates

- The City of Barlow, a Class 6 city, is located in western Ballard County and has a population of 675. It is located where KY 1105 intersects US 60. It is governed by a Mayor and four City Commissioners.

- The City of Kevil, a Class 6 city, sits astride the intersection of KY 473 and US 60, in east central Ballard County. Its population is approximately 521. It is governed by a Mayor and six City Commissioners

- The City of LaCenter, a Class 5 city, sits in the center of Ballard County. It is located at the intersection of US 60, KY 358, and KY 802. The population is 1080. It is governed by a Mayor and a six-member City Council.

- The City of Wickliffe, a Class 5 city, has a population of 705. Wickliffe is the county seat of Ballard County and is located on the intersection of US 51 and US 60 and the Mississippi River. It is governed by a Mayor and a six- member City Council.

Calloway County, population 38,106 (over 386 square miles), is located in the southeast portion of the Purchase Area. It is bordered to the east by Kentucky Lake (the Tennessee River), to the south by Tennessee, and to the north by Marshall County. It is governed by a Judge Executive and four Magistrates (who are called "Squires").

- The City of Hazel, a Class 6 city, is located in the southeast corner of Calloway County and the Purchase Region. It is situated at the point where US 641 enters Tennessee. The population is 505. It is governed by a Mayor and four Trustees.

- The City of Murray, a Class 3 city, has a population of 18,515. It serves as the Calloway County seat. The city is located at the junction of US 641 and KY 94. Murray is governed by a Mayor and a twelve- member City Council.

Carlisle County, population 4,984 (over 192 square miles), is located in the west-central portion of the Purchase Area. To the north lies Ballard County, to the west the Mississippi River, to the east is Graves County, and to the south is Hickman County. It is governed by a Judge Executive and three Magistrates.

- The City of Arlington, a Class 6 city, has a population of 380. The city is located in the south of Carlisle County at the intersection of US 51 and KY 80. It is governed by a Mayor and four Trustees.

- The City of Bardwell, a Class 5 city, has a population of 760. It serves as the county seat. The city is centrally located at the intersection of US 51 and US 62. It is governed by a Mayor and a six-member council.

Fulton County, population 6,422 (over 209 square miles), is located in the southwestern portion of the Purchase Area and the State. Tennessee borders it to the south, the Mississippi River to the west, and Hickman County to the north and east. The county seat is the City of Hickman. It is governed by a Judge Executive and four Magistrates.

- The City of Fulton, a Class 4 city, has a population of 2,592. It is located on the border with Tennessee and the junction of US 51, US 45, and the Purchase Parkway. It is governed by a Mayor and four City Commissioners.

- The City of Hickman, a Class 4 city, has a population of 2,385.It is located in the western part of the county along the bluffs of the Mississippi River. It is governed by a Mayor and four City Commissioners.

Graves County, the largest of the Purchase counties in area, at 555 square miles, is also considered the heart of the area. It has a population of 37,502. It is governed by a Judge Executive and three Magistrates.

- The City of Mayfield, a Class 3 city, has a population of 10,101. It serves as the county seat. It is located near the center of the County at the junction of the Purchase Parkway, US 45, and KY 80. It is governed by a Mayor and a ten- member City Council.

- The City of Wingo, a Class 6 city, has a population of 790. It sits astride US 45 and the intersection of KY 303 with the Purchase Parkway. It is governed by a Mayor and four City Commissioners.

Hickman County is also a western county bordering the Mississippi River. It has 244 square miles and a population of 4,720. The county seat is Clinton. It is governed by a Judge Executive and three Magistrates.

- The City of Clinton, a Class 5 city, has a population of 1,293. It serves as the county seat. It is located in the center of Hickman County, at the junction of US 51 and KY68. It is governed by a Mayor and a six- member council.

- The City of Columbus, a Class 5 (legacy) city, has a population of 156. It sits on the bluffs of the Mississippi River and is governed by a Mayor and a four-member City Council.

Marshall County has a population of 31,181 (across 304 square miles). It is bordered by the Ohio River to the north, the Kentucky Lake to the east, and Calloway County to the south. It is governed by a Judge Executive and three Magistrates (called "Squires").

- The City of Benton, a Class 4 city, has a population of 4,379. It serves as the seat of Marshall County. It lies on the East Fork of the Clark's River, which runs near the center of the county. It is governed by a Mayor and six-member City Council.

- The City of Calvert City, a Class 4 city, has a population of 2,543. It is an industrial town on the banks of the Ohio. It is governed by a Mayor and a six-member City Council.

- Hardin, a Class 5 city, has a small town population of 625. It is located in the south-central part of the county at the intersection of KY 80 and US 641. It is governed by a Mayor and six-member council.

McCracken County has a population of 65,408 over an area of 251 square miles. It sits in the north-central part of the Purchase Area region. At 251 people per square mile, it is by far the most densely populated county in the Purchase Area. McCracken County and its "queen" city, Paducah, are situated on the Ohio River, which forms its northern border. It is governed by a Judge Executive and three Commissioners.

- The City of Paducah, a Class 2 city, has a population of 25,001. It serves as the seat of McCracken County. It is located on the Ohio River below the mouth of the Tennessee River. It is served by I-24, US 45, US 60, and US 62; Barkley Regional airport; and two railroads. It is governed by a Mayor and four City Commissioners.

1:1.3 Plan Organization

The PADD established the JPHMC. This established council guided the development of the plan through broad-based and diverse community participation activities, focused at the county and city levels. Although there are many similarities among the eight counties of the Purchase Region, it is their differences that have driven the focus and organization of this plan. Consequently, in addition to the regional portion of the plan, organized as shown below, there is an Annex for each county.

The regional portion of the plan is necessarily general. A regional government or regional authority does not exist. As previously mentioned, the PADD is a planning organization without authority, but with staff resources that are beyond the means of most counties. In addition, the PADD is not the only regional organization operating in the region. The Kentucky Transportation Cabinet's District 1, Kentucky State Police Post 1, the Department of Emergency Management, and The Four Rivers Basin Team are some of the organizations that have planning, development or coordination mandates in the area. Cooperation among and between these organizations is voluntary not mandatory. Fortunately, that cooperation does exist. The purpose of the regional portion of the plan is to address those goals, objectives, and strategies that cut across county boundaries.

The county Annexes are intended to serve as standalone plans. The hazards, risks, goals, and strategies are tailored to each county's needs and priorities. The purpose of the Annexes is to focus each county's limited fiscal and personnel resources, and to give them ownership and responsibility for the plan, its maintenance, and its revision. In addition, it is intended that the county Annexes may serve to support or augment other planning documents like comprehensive plans, economic development plans, or emergency operations plans.

The JPHM Plan is organized into the following six sections:

- *Introduction*
- *Prerequisites – Adoption by Governing Bodies*
- *A Description of the Planning Process*
- *Risk Assessment*
- *Mitigation Strategies*
- *Plan Maintenance Procedure*

After the above mentioned six sections of the general Regional Plan follows the individual *County Annexes*, which will be subdivided similarly to this Regional Plan, starting with Section 3.3 (Risk Assessment). In other words, the formats and content of the individual *County Annexes* mirrors the format and content of this Regional Plan. For regulatory purposes, any regulation addressed in this general Regional Plan will also be addressed in the individual *County Annexes*.

The JPHM Plan has been developed in accordance with the current rules and regulations governing regional mitigation plans. The plan shall 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,October30,2000).

Finally, two appendices are attached to this plan:
Appendix 1: All Weather Events January 1, 1950 – March 31, 2017
Appendix 2: (Excerpts from) Mid- America Earthquake Center Report 08-02

1:2 Prerequisites

1:2.1 Adoption by the Local Governing Body

On June 27, 2012, the JPHMC recommended approval of the JPHM Plan. This action is reflected in the meeting minutes. A resolution for adoption of the JPHM Plan will be brought before the PADD Board of Directors adopting on July 16, 2012.

Table 1.1 Multi-Jurisdictional Plan Adoption

Copies of adoption resolutions passed by each jurisdiction will be attached to this document.

Jurisdiction	Date of Resolution
Ballard County Fiscal Court	
City of Barlow	
City of Kevil	
City of LaCenter	
City of Wickliffe	
Calloway County Fiscal Court	
City of Hazel	
City of Murray	
Carlisle County Fiscal Court	
City of Arlington	
City of Bardwell	
Fulton County Fiscal Court	
City of Fulton	
City of Hickman	
Graves County Fiscal Court	
City of Mayfield	
City of Wingo	
Hickman County Fiscal Court	
City of Clinton	
City of Columbus	
Marshall County Fiscal Court	
City of Benton	
City of Calvert City	
City of Hardin	
McCracken County Fiscal Court	
City of Paducah	

Sample Resolution #

WHEREAS the (City/County) of____has experienced damage from severe thunderstorms (lightning, hail, wind, or tornadoes) and flooding on many occasions in the past century, resulting in property loss, loss of life, economic hardships, and threats to public health & safety and the potential for similar loss from an earthquake;

WHEREAS the Jackson Purchase Hazard Mitigation Plan (the Plan) has been updated and revised after more than one year of research and work by the staff of the Purchase Area Development District (PADD), the members of the Jackson Purchase Hazard Mitigation Council (the Council), and the representatives of the community;

WHEREAS the Plan recommends hazard mitigation actions that will protect the people and property affected by the natural hazards that face the PADD; and

WHEREAS public meetings were held as required by law.

NOW THEREFORE BE IT RESOLVED by the (mayor/judge) and the (city council/county commissioners) of the (city/county) that:

The Plan has hereby adopted as an official plan of the Purchase counties and the jurisdictions within: Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, and McCracken.

The respective (city/county) officials identified in the strategy of the Plan are hereby directed to implement the recommended actions assigned to them. These officials will report yearly on their activities, accomplishments, and progress to the Council.

The Council will provide annual progress reports on the status of implementation of the Plan to the (mayor/judge) and the (city council/county commissioners) of the (city/county). This report shall be submitted to the (city/county) in November of each year.

Passed by the (city council/fiscal court) of (city/county), this the _____ day of_, 2018.

_____
Name of Mayor/Judge/Executive

1:2.2 Multi-Jurisdictional Participation

Participation from each jurisdiction occurred through the PADD Board of Directors, the Jackson Purchase Hazard Mitigation Committee (JPHMC), and the county-based Mitigation Planning Teams (MPTs). These groups of people represent many aspects of the Purchase Region.

PADD Physical Planning Department initiated the update and revision of the plan process in accordance with the FEMA Getting Started How-to-Guide and steps taken to update the Commonwealth's Plan. Each jurisdiction, city and county, in the Purchase Region was invited to appoint a representative to serve on the JPHMC. Recommendations were made to mayors and county judge-executives on whom to appoint, in order to have a council with a broad variety of backgrounds and experience. Council members include a county judge-executive, mayors, city council members, city engineers, E-911 coordinators, county directors of emergency management, street superintendents, fire chiefs, police chiefs, planning and zoning members, and public works operators. The first council meeting included an overview of 44CFR 201.6 requirements and the requirements for the plan revision and update.

Subcommittees or MPTs were formed for each county, from the JPHMC to include knowledgeable individuals from every jurisdiction and included interested citizens. The judge-executive or his designee serving as the MPT Chair. MPTs provided input on refining the risk assessment and mitigation strategy elements before consideration by the full council. MPT members encouraged public participation, by extending personal invitations.

A meeting notice was placed on the PADD website and PADD newsletter. A hardcopy and electronic notices were sent to interested parties in the region prior to each council meeting. A jurisdiction was deemed to be a participant in the planning process if they met two criteria:

- A representative attended JPHMC meetings
- Participated in MPT meetings.

Everyone that attended meetings was permitted to participate in the planning process; however and where relevant, each jurisdiction had one vote regardless of the number of representatives present. All Class 6 cities and nonparticipating cities could be represented by its county.

1:2.3 Multi-Jurisdictional Planning Participation

Jackson Purchase Hazard Mitigation Council Stakeholders

Chairman – Greg Terry, Carlisle County Judge/Executive

Ballard County Fiscal Court	Todd Cooper, County Judge/Executive
Ballard Co EM Director	Travis Holder
City of Barlow	Mayor Jo Wilfong
City of Kevil	Mayor Charles Burnley
City of LaCenter	Mayor Jamie Hack
City of Wickliffe	Mayor George Lane
Ballard Co/City of Kevil	Clyde Elrod

Calloway County Fiscal Court	Larry Elkins, County Judge/Executive
City of Murray	Mayor Jack Rose
Calloway County Deputy J/E	Bill Marcum
Calloway County EM Director	William Call
Murray Calloway Co EDC	Mark Manning
Calloway County Citizen	Sue Outland
Murray GIS Manager	Chris Lamm
City of Hazel	Mayor Kerry Vasseur
Murray Public Works	Tom Kutcher
Murray Public Works	James Oakley
Murray Fire Chief	Eric Pologruto
Calloway County Citizen	Gary Cooper
Aux Communications	Josh Kerr
Murray Fire Dept	Matthew Tinsley
Calloway Co Sheriff Office	Richard Steen
Murray Calloway Co EMS	Mark Bernet
Calloway Co Health Dept	Stephanie Hays
Calloway Co Health Dept	Amy Ferguson
Briggs & Stratton	Clint Stone
Calloway Co EMS	Robert Trenhelm
Calloway Co J/E Office	A.J. Bokeno
Calloway Co LEPC	Kate Lochte
Murray Calloway Co Airport	Johnny Parker
Air-Evac	Gallen Jones
Murray CVB	Erin Carrico
Vanderbilt Chemical	Adam Nance
Calloway Co Sheriff Office	Nathan Baird
Calloway Co Fire & Rescue	Thomas Morgan
Calloway County Citizen	Joe Bolin

Carlisle County Fiscal Court ..... Greg Terry, County Judge/Executive
Carlisle County EM Director ..... Josh Glover
Carlisle Co Finance Officer ..... Carissa Viniard
City of Arlington ..... Mayor Bobby McGee
City of Bardwell ..... Mayor Phillip King
Carlisle County Citizen ..... Bill Fraser
Carlisle County Citizen ..... Nancy Henley

Fulton County Fiscal Court ..... Jim Martin, County Judge/Executive
City of Fulton..... Mayor David Prater
City of Hickman ..... Mayor David Lattus
Fulton County Citizen ..... Tommy Hodges
Fulton Co Transit Auth ..... Kenney Etherton
Fulton County EM Director ..... Hugh Caldwell
Fulton Fire Dept..... Mike Gunn, Fire Chief
Fulton Police Dept ..... William Steven
City of Hickman..... James Gray, City Manager
Fulton Co EM..... J.L. Atwell
Fulton County Citizen..... James Butts
Hickman Fulton Co Riverport..... Greg Curlin
Fulton Co Economic Development ..... Wendy Puckett

Graves County Fiscal Court..... Jesse Perry, County Judge/Executive
City of Mayfield ..... Mayor Teresa Rochetti-Cantrell
City of Wingo..... Mayor Charles Shelby
Graves Co EM Director ..... Davant Ramage
Graves Co Health Dept ..... Noel Coplen
Mayfield Police Dept ..... Nathan Kent, Police Chief
Mayfield Fire Dept ..... Jeremy Creason, Fire Chief
Mayfield Police Dept ..... Wes Kimbler
Mayfield City Clerk ..... Tammie Johnson
Graves Co Citizen ..... Kenneth “Pete” Galloway
Graves Co Health Dept ..... Kathy Gifford
Hickman County Fiscal Court ..... Kenny Wilson, County Judge/Executive
City of Clinton ..... Mayor Phyllis Campbell
City of Columbus..... Mayor Kay Ferguson
Hickman Co EM Director ..... Justin Jackson
Hickman Co Road Dept ..... Shad Byassee
Hickman Co EM..... Scott Smith
Hickman Co Citizen ..... Howard Dillard

Marshall County.....Kevin Neal, County Judge/Executive
Deputy Judge/Executive .....Brad Warning
Marshall County EM Director .....Curt Curtner
Marshall County EM .....Darlene Lyn
Marshall Co Health Dept.....Jennifer Brown
Marshall Co Health Dept .....Wendy Rose
Marshall Co Health Dept .....Joanna Colson
City of Benton .....Mayor Rita Dotson
City of Benton.....Lois Cunningham
Benton Fire Dept .....Harry Green, Fire Chief
City of Calvert City .....Mayor Lynn Jones
City of Calvert City.....John Ward, City Administrator
City of Hardin.....Mayor Randall Scott
North Marshall Water District .....Bobby Gifford

McCracken County.....Bob Leeper, County Judge/Executive
City of Paducah .....Mayor Brandi Harless
McCracken Co EM Director .....Jerome Mansfield
McCracken Co Road Supervisor .....Randy Williams
McCracken Co Building Inspection.....David Flowers
Paducah Fire Dept .....Steve Kyle, Fire Chief
Paducah Engineering Dept.....Eric Hickman
Paducah Emergency Communications .....Ed McManus
Paducah Planning Dept .....Adam Schull
McCracken Co Citizen .....Arthur Boykin
McCracken Co Citizen .....Francis Hamilton
McCracken Co Citizen .....Bill Bartleman
McCracken Co Citizen .....Pam Wright
McCracken Co Citizen .....Lee King
Paducah McCracken Co JSA .....Jeff Thompson

State & Regional Participants
KYEM Region I .....Jeremy Blansett
UKY-HMGP.....Nick Grinstead
National Weather Service .....Rick Shanklin
KY Division of Water .....Shannon McCleary
WKCTC Security & Safety .....David Wallace
Kentucky Transportation Cabinet .....Brad Turner
Barkley Regional Airport .....Richard Roof

The PADD Board of Directors make decisions, establish partnerships, and define goals and objectives for the Purchase Region. Their meetings are held the 3rd Monday of each month at the office of the PADD. These meetings are open to the public and the local media is advised of these meetings.

Table 1.2 PADD Board of Directors, the jurisdictions they represent and their position within the community

Purchase Area Development District BOARD OF DIRECTORS		
Officers	Mayor Teresa Rochetti-Cantrell Arthur Boykin Kenny Wilson Greg Terry	Chairman Vice-Chairman Secretary Treasurer
Ballard County	Todd Cooper Mayor George Lane Mr. Clyde Elrod	County Judge/Executive Mayor of Wickliffe Citizen Member
Calloway County	Larry Elkins Jack Rose Joseph Bolin Mark Manning Sue Outland	County Judge/Executive Mayor of Murray Citizen Member Citizen Member Citizen Member
Carlisle County	Greg Terry Bill Fraser Nancy Henley	County Judge/Executive Citizen Member Citizen Member
Fulton County	Jim Martin David Prater Wendy Puckett Perry Turner	County Judge/Executive Mayor of Fulton Citizen Member Citizen Member
Graves County	Jesse Perry Teresa Cantrell Charles Shelby Kenneth Galloway Tammie Johnson George Hurd	County Judge/Executive Mayor of Mayfield Mayor of Wingo Citizen Member Citizen Member Citizen Member
Hickman County	Kenny Wilson Mayor Phyllis Campbell Howard Dillard Judy Stevens	County Judge/Executive Mayor of Clinton Citizen Member Citizen Member
Marshall County	Kevin Neal Mayor Rita Dotson John Ward Brad Warning	County Judge/Executive Mayor of Benton Designee for Mayor of Calvert City Citizen Member

Purchase Area Development District BOARD OF DIRECTORS		
McCracken County	Bob Leeper Brandi Harless Arthur Boykin Frances Hamilton Pam Wright Ms. Lee King Bill Bartleman	County Judge/Executive Mayor of Paducah Citizen Member Citizen Member Citizen Member Citizen Member Citizen Member

Active staff participants in the hazard mitigation planning process at the PADD include the following: Mark Davis, Associate Director for Physical Planning Director, Stacey Courtney, Transportation Planner, James Smith, GIS Manager, Kim Toon, Administrative Assistant, Mary Anne Medlock, Special Projects Coordinator.

Table 1.3 National Flood Insurance Program Participation by Jurisdiction

Jurisdiction	Floodplain Management Ordinance	SFHA in Jurisdictional Limits	Comments	City Class
Ballard County	X	X		
City of Barlow			No mapped SFHA	6
City of Kevil			No mapped SFHA	6
City of La Center		X	SFHA mapped in 2009, NFIP under consideration	5
City of Wickliffe	X	X		5
Calloway County	X	X		
City of Murray	X	X		3
City of Hazel			No mapped SFHA	6
Carlisle County	X	X		
City of Bardwell	X	X		5
City of Arlington	X	X		6
Fulton County	X	X		
City of Fulton	X	X		4
City of Hickman	X	X		4
Graves County	X	X		
City of Mayfield	X	X		3
City of Wingo		X		6
Hickman County		X	Mapped SFHA, non-participant	
City of Clinton	X	X		5
City of Columbus			No mapped SFHA	5
Marshall County	X	X		
City of Benton	X	X		4
City of Calvert City	X	X		4
City of Hardin	X	X		5
McCracken County	X	X		
City of Paducah	X	X		2

Information from the FEMA Community Status Book as of 6-13-17

1:3 The Planning Process

1:3.1 Open Public Involvement

Open public involvement was integrated into the plan and made both public and private stakeholders aware of the planning process for the JPHM Plan. The local level Mitigation Planning Teams (MPTs) created opportunities for participation in various PADD, city, and county meetings throughout the planning process. Each judge-executive and mayor was also provided a copy of the draft plan to review. Each MPT was chaired by the judge-executive of each county. If the judge-executive did not chair an MPT, the county emergency manager served as his proxy. Public officials from each jurisdiction participated in the planning process through the JPHMC. All regional council and local MPT meetings were open to the public.

The PADD staff made contact with neighboring communities through the surrounding ADDs. The JPHM Plan coordinators at the adjoining ADDs were contacted for advice and materials used in the planning process. Public service announcements afforded neighboring communities the opportunity to participate.

Local MPT meetings were conducted to serve as a forum for the discussion of natural hazards that affect the Purchase Region and the conceptualization of mitigation measures. Comments from each MPT were tabulated and used to determine the hazards that affect each county and the cities therein, prioritize the threat, risk, and measures that could be taken to mitigate the hazards for the county Annexes in the JPHM Plan. The results resemble those hazards listed in the county emergency operations plans that were used as a source of local hazard information.

1:3.2 Opportunity for Public Comment

Opportunity for public comment was provided to the citizens of the Purchase Region in three ways: through the JPHMC, through MPTs advertising public meetings for plan draft and final draft reviews, and through the PADD website and placement of plan drafts in city and county offices. A draft plan has been posted at http://www.purchaseadd.org/. The final draft will also be posted and maintained on this site after and upon FEMA approval.

JPHMC and MPT meetings were held at locations suitable for the public. Community members were encouraged to attend these meetings and to participate in the planning process.

Special advertised public meetings were held for the public to review and comment on the draft and final version of the plan. The first public input meeting was held following the completion of the first draft after a review by the regional council. Other public meetings were held following a draft submission to the State Hazard Mitigation Officer. Final public meetings were held prior to plan approval. Notice for each public meeting was included in a press release that contained a link to all meeting materials. The PADD blog and social media resources were also utilized to make

information available and solicit input. The press release notice included the following media firms: The Murray Ledger & Times (Kentucky & Tennessee circulation), The Paducah Sun (Kentucky & Illinois circulation), The Mayfield Messenger, The Current (Kentucky & Tennessee circulation), The Hickman County Gazette, The Carlisle County News, Ballard County Advance Yeoman, Calvert City Lake News and the Marshall County Tribune Courier. These newspapers were selected to ensure circulation throughout the Purchase and surrounding regions.

Public comment was solicited through online via Constant Contact (http://survey.constantcontact.com/survey/a07ees4nxvoj9em14xh/_tmp/questions) that was distributed to the PADD's regional distribution list as well as local media. In an effort to increase awareness of this planning effort, staff was interviewed by WPSD Local 6 (the local NBC television) affiliate and the online survey was again promoted as part of this process.

Citizen participation was also solicited through the PADD website. JPHMC meeting notices as well as meeting summaries were placed on the PADD website. Drafts of each section of the mitigation plan were also placed on the website and made available for the public to download. Comment sheets with contact information for the PADD staff were included with all copies available for public review. Drafts of the plan were also sent to each judge-executive and mayor for their review.

The PADD staff and the JPHMC reviewed comments received from the public to determine their impact on the mitigation plan.

1:3.3 Opportunity for Public/Private Participation

Participation in the planning process was open to the general public, planning agencies, neighboring communities, non-profit agencies and private interests. A notice of the public meetings was published in newspapers and broadcast on local radio stations approximately one week prior to each JPHMC meeting.

The PADD staff was responsible for informing each jurisdiction of the new requirements and impacts the mitigation plan would have on their community. The PADD staff reviewed each jurisdiction to identify non-profit as well as other government agencies that might be affected by the mitigation plan. These individuals or groups were invited to attend the regional council and MPT meetings.

In addition to providing a press release and link to materials to local media, the PADD staff made contact with neighboring communities through the surrounding ADDs. The hazard mitigation plan coordinators at the surrounding ADDs were contacted for advice and materials used in the planning process.

Rick Shanklin, of the National Weather Service, addressed the JPHMC on August 8, 2017. He provided an overview of the NOAA Storm Events Database, procedures for submitting local data

for inclusion in this database, and weather trends throughout the Purchase Region. A discussion followed regarding the increase in extreme rain events which has resulted in issues related to flash flooding over the last 60 years. Then, the discussion evolved into manmade contributing factors to flash flooding.

Representatives from the Graves and Marshall County Health Departments took part in this planning process to ensure that the public health impact of a disaster was considered in this process. Specifically, preparing first responders with the proper immunizations and the public health impact of flooded septic tanks was reviewed.

The West Kentucky Community & Technical College Manager of Security & Safety participated in this planning process. Staff discussed related measures included in the Student Handbook and Crisis Manual for the campus. With WKCTC personnel.

There were few, if any, private sector participants in this process even though they were afforded the opportunity. In this region, the prevalent thought is that emergency response is the responsibility of the public sector. The private sector is represented on the PADD Board of Directors, and also participates on the Four Rivers Basin Team.

The Kentucky Transportation Cabinet Emergency Management Coordinator attended the March 16, 2017 Regional Meeting. PADD Physical Planning staff attended all regional meetings and local MPT meetings.

The PADD staff was responsible for educating, training, and informing the committee members and participants about the mitigation planning goals and for notifying them of meetings as needed.

1:3.4 Review and Incorporation of Existing Plans, Studies, Reports, and Technical Information

Existing plans, studies, reports and technical information was researched by the PADD staff in order to determine any relevance to hazard mitigation planning. Resources were found containing information on natural hazards, historical damage from natural hazards, vulnerable areas and assets, mitigation actions and mitigation projects. The following items were reviewed in the preparation of this plan:

- *County Emergency Operations Plans (EOP)*
  Ballard County Emergency Operations Plan Calloway County Emergency Operations Plan Carlisle County Emergency Operations Plan Fulton County Emergency Operations Plan Graves County Emergency Operations Plan Hickman County Emergency Operations Plan Marshall County Emergency Operations Plan McCracken 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 hazard analysis and hazard maps. They include 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.

  On March 16, 2017 PADD and UK-HMGP staff discussed this planning process with the Emergency Management personnel in each Purchase county. The following Directors were present: William Call (Calloway County), Greg Terry (Carlisle County), Mike Gunn (Fulton County), Davant Ramage (Graves County), Kenny Wilson (Hickman County), Curt Curtner (Marshall County) and Jerome Mansfield (McCracken County). In addition Jeremy Blansett was present to represent Region I of the Kentucky Office of Emergency Management.

- *Disaster Mitigation Planning Documents* (Calloway County and McCracken County)
  These documents were prepared by Western Kentucky University and Murray State University with Disaster Mitigation Award #04-69-04980. These planning documents include flood insurance rate maps (FIRM) and HAZUS reports for likely earthquake scenarios. These documents were useful in providing flood plain maps for counties that do not participate in the NFIP.

- *Most Recent Purchase ADD Comprehensive Economic Development Strategy*
  The PADD Comprehensive Economic Development Strategy (CEDS) is prepared and maintained by the PADD. It includes maps and exhaustive lists of information and action plans in areas including the following:

  Information Scan of the Area, Area Organizations and Governance, Transportation, Natural Resources and Physical Environment, Human Resources, Public Protection, Economy, Infrastructure and Services, Health Services, Housing

  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 JPHM Plan.

- *Local Comprehensive plans*
  Comprehensive plans from the region's local planning commissions were reviewed by the PADD staff during the planning process. The following jurisdictions had comprehensive plans that were used in the hazard mitigation planning process:

  - City of Benton, 2007
  - City of Calvert City, 2007
  - City of Fulton, 2015
  - City of Hickman, 2017
  - City of Mayfield, 2000
  - City of Murray, 2009
  - City of Paducah, 2012
  - McCracken County, 2010

- *Kentucky Agricultural Emergency Management Plan*
  These plans were created by the Kentucky Department of Agriculture. The plans reference food, safety, animal emergencies, and environmental emergencies in addition to natural hazards. Agriculture is the largest economic segment in the Purchase Region and these plans provided information on natural hazards related to agriculture. Because only hazards that affect the safety, life and property in the Purchase Region, no strategies were developed relating to agriculture.

  The Office of the State Veterinarian (OSV) is the contact for livestock and poultry emergency response to Foreign Animal Disease outbreaks and natural disasters of flood, tornadoes or earthquakes. The Kentucky response plan identifies that each county has an Emergency Operating Center (EOC).

- *Disaster Preparedness Plan for the Purchase Area Agency on Aging*
  The Purchase ADD houses the Disaster Preparedness Plan for the Purchase Area Agency on Aging. This plan serves a vulnerable elderly population, including those dependent on in-home services and in nursing homes. This plan provided information on critical facilities information found in the plan and identifying vulnerable populations.

- *Purchase ADD Water Management Plan*
  The Purchase Water Management Plan is prepared and maintained by the PADD Water Management Council. It includes information about area water resources, water lines, and wastewater. It includes an infrastructure inventory and plans and projects for counties and cities.

- *Purchase ADD Regional Transportation Plan*
  The Purchase Regional Transportation Plan is created and maintained by the Purchase Regional Transportation committee. It includes a list of identified transportation projects, major traffic and freight generators, airports, rail facilities, riverports, and other transportation infrastructure assets. This information is available for review at the PADD or the PADD website. It should be noted that the importance of transporting resources via air in the event of a natural disaster is particularly relevant to the Purchase Region because the area is access on three sides by structures over major rivers.

Table 1.4 is a summary of relevant planning documents and Authorities for the Jurisdictions in the PADD.

Table 1.4

Jurisdiction	Floodplain Management Ordinance	CRS & FMA Plans	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Code	Comprehensive Plan	Capital Improvement Plan	Stormwater Management Plan	CERT Team	NWS StormReady Program	Local Economic Development	Regional Economic Development	City Class
Ballard	X							X		X		X	X	
Barlow								X				X	X	6
Kevil								X				X	X	6
La Center					X		X	X				X	X	5
Wickliffe	X							X				X	X	5
Calloway	X		X	X						X	X	X	X	
Murray	X		X	X	X		X		X		MSU	X	X	3
Hazel												X	X	6
Carlisle	X									X	X	X	X	
Bardwell	X											X	X	5
Arlington	X											X	X	6
Fulton	X									X		X	X	
Fulton	X		X	X	X		X	X				X	X	4
Hickman	X		X		X		X					X	X	4
Graves	X									X		X	X	
Mayfield	X		X	X	X		X		X			X	X	3
Wingo												X	X	6
Hickman										X		X	X	
Clinton	X											X	X	5
Columbus													X	5
Marshall	X				X	X				X	X	X	X	
Benton	X		X				X					X	X	4
Calvert City	X		X	X	X		X	X	X			X	X	4
Hardin	X											X	X	5
McCracken	X		X	X	X	X	X			X	X	X	X	
Paducah	X		X	X	X		X	X	X			X	X	2

1:3.5 Documentation of the Planning Process

The mitigation planning process included public involvement in the task of developing the risk assessment, mitigation strategies, and plan maintenance, and the process of plan adoption in each jurisdiction.

Public participation for the purpose of this plan is defined as an opportunity for each jurisdiction and the citizens of that community to participate in the planning process. Opportunities for public participation were offered through JPHMC and MPT meetings as well as public meetings. Each of these meetings provided opportunity for input in the development of the risk assessment, mitigation strategies, and plan maintenance. All PADD meetings and all JPHMC meetings were open to the public. All public meetings were advertised in advance. All such meetings are posted on the PADD website. A press release was issued to the media outlets listed below for all activities.

Purchase Region Media Contacts

Ballard County Newspaper	
The Advanced-Yeoman - Weekly *Kentucky Publishing Inc. Newspaper Group* PO Box 817, LaCenter, KY 42056 Phone: 270-908-2001 Fax: 270-665-9466	Editor: Teresa Ann Pearson Email: advanceyeoman@gmail.com Website: http://www.kynews.com/co_yeoman.htm Advertising Deadline: Tuesday AM
Calloway County Newspaper	
Murray Ledger & Times – Daily 1001 Whitnell Ave PO Box 1040, Murray, KY 42071 Phone: 270-753-1916 Fax: 270-753-1927	Editor: Hawkins Teague Email: editor@murrayledger.com Website: www.murrayledger.com Advertising Deadline: Two days Prior
Carlisle County Newspaper	
Carlisle County News – Weekly *Kentucky Publishing Inc, Newspaper Group* PO Box 301, Bardwell, KY 42023 Phone: 270-442-7389 Fax: 270-642-2843	Editor: Kate Prince Email: kpikate@gmail.com www.ky-news.com News Deadline: Tuesday, at Noon
Graves County Newspaper	
Mayfield Messenger – Daily PO Box 709 201 North 8th Street, Mayfield, KY 42066 Phone: 270-247-1515 Fax: 270-247-6336	Editor: Tom Berry Email: tom.berry@mayfield-messenger.com News email box: news@mayfield-messenger.com Advertising Deadline: Two Day Prior, Noon

Hickman County Newspaper	
Hickman County Times – Weekly P.O. Box 237, Clinton, KY 42031 Phone: (270) 653-4040	Editor: Gaye Bencini Email: gaye@thehctimes.com Website: www.thehctimes.com Advertising Deadline: Thursday

Marshall County Newspapers	
The Lake News – Weekly 86A Commercial Blvd, Benton, KY 42025 Phone: (270) 527-3162 Fax: 270-527-4567	Editor: Loyd Ford Email: editor@tribunecourier.com or Website: www.tribunecourier.com
Marshall Times – Weekly *Kentucky Publishing Inc. Newspaper Group* 1540 McCracken Blvd, Paducah, KY 42001 Phone: (270) 442-7389 Fax: 270-442-7389	Editor: Kate Prince Email: kpikate@gmail.com Website: www.ky-news.com/co_marshall.htm Advertising Deadline: Thursday, AM
Tribune-Courier – Weekly 86A Commercial Blvd, Benton, KY 42025 Phone: 270-527-3162 Fax: 270-527-4567	Editor: Venita Fritz Email: editor@tribunecourier.com or Website: www.tribunecourier.com
Regional Newspapers	
The Current – Weekly *Magic Valley Publishing* PO Box 1200 304 East State Line, Fulton, KY 42041 Phone: 270-472-1121 Fax: 270-472-1129	Editor: Benita Fuzzell Email: leadernews@bellsouth.net Website: www.fultonleader.com Advertising Deadline: Monday, Noon Ad Email Contact: leaderads@bellsouth.net
Paducah Sun PO Box 2300, Paducah, KY 42002 Phone: 270-575-8600 Public Notices: 270-575-8700 Fax: 270-443-7465 Chief Executive Editor: Steve Wilson Email: swilson@paducahsun.com Website: www.paducahsun.com	Advertising Deadlines Publication Day……Deadline Sunday……Wednesday @4:00 Monday……Thursday @ Noon Tuesday……Thursday @ 4:00 Wednesday……Friday @ 4:00 Thursday……Tuesday @ 4:00 Friday……Wednesday @ 4:00
West Kentucky News – Weekly *Kentucky Publishing Inc. Newspaper Group* 1540 McCracken Blvd, Paducah, KY 42001 Phone: (270) 442-7389 Fax: (270) 442-7389	Editor: Greg LeNeave Email: kpilayout@gmail.com Website: www.ky-news.com Advertising Deadline: Thursday, AM
Blogs and Websites	
West Kentucky Star *Bristol Broadcasting Radio Group* PO Box 2397, Paducah, KY 42002 www.westkentuckystar.com Phone: 270-444-6397 news@wkyx.com	West Kentucky Journal Mary Potter, Editor Mary's Office Phone: 270-653-3312 Ivan Phone: 270-207-8744 editor@westkyjournal.com www.westkyjournal.com
Area Radio and Television Stations	
WBCE-AM - Christian Format P.O. Box 128 - 1136 Barlow Road Wickliffe, KY 42087 Phone: 270-335-5171 Fax: 270-335-5172 wbcellc@brtc.net	WKMS-FM Box 2018, University Station Murray, KY 42071 Phone: (270) 809-4359 *Sounds Good* each weekday from 11 - 1 news@wkms.org
WSJP-WNBS 1500 Diuguid Road	WKZT P.O. Box 1380 – 8807

Murray, KY 42071 Phone: (270) 753-2400 nealbradley@gmail.com	St. Rt. 166 E., Fulton, KY 42041 Phone: (270) 472-0405
WYMC-AM 197 WYMC Road, P.O. Box V, Mayfield, KY 42066 Phone: (270) 247-1430 *Breakfast Show* each weekday morning radio@wymcradio.com	WCBL-AM & FM P.O. Box 387 - 1039 Eggner's Ferry Rd. Benton, KY 42025 Phone: (270) 527-3102 *Breakfast Show* each weekday morning wcbl@bellsouth.net
WPAD-AM & WDDJ-FM P.O. Box 450 Paducah, KY 42002 Phone: (270) 442-8231 lbarrett@wpsdtv.com	WPSD-TV 100 Television Lane P.O. Box 1197 Paducah, KY 42002 Phone: (270) 415-1900 bevans@wpsdtv.com
Radio Networks	
Bristol Broadcasting PO Box 2397 6000 WKYX/WKYQ Road Paducah, Kentucky 42003 Phone: (270) 554-8255 news@wkyx.com Network Stations: Today's Country 93.3 FM WKYQ Classic Country 102.1 FM Willie Hot Hits Electric 96.9 FM WDDJ Classic Rock 94.7 FM WQQR News Talk 94.3 FM WKYX News Talk 570 AM WKYX News Talk 1320 AM WNGO	**Withers Broadcasting** 1700 North 8th Street Paducah, KY 42001 Phone 270-538-5251 Fax: 270-415-0599 (send press releases) Shane Hook Cell: 270-559-7881 shook@withersradio.net Network Stations: 105.5 The Cat 106.7 WZZL *AM 920 WMOK – Daily Coffee Break* 95.9 WGKY

Jackson Purchase Hazard Mitigation Council Members

Each jurisdiction within the PADD was asked to designate a representative(s) to participate in the regional mitigation planning process. All persons in attendance participated in the meeting with each jurisdiction having one vote. Staff reported to the PADD Board of Directors on a regular basis regarding the status of this planning process. As part of each report staff encouraged those present to attend meetings and participate in the planning process.

Meeting Documentation

Summaries of meetings were kept by the PADD staff. Throughout these meetings, the hazards were identified, analyzed, and prioritized by the likelihood how each threat could affect the Purchase Region. Council members adopted the HAZUS definition of a critical facility and identified those critical facilities in their jurisdiction. All components of the Risk Assessment were developed using the best available data in the Purchase Region. GIS resources and public input were used to identify hazards that affect the PADD. The PADD staff compiled this information to identify hazards and the JPHMC and MPTs reviewed the definitions and discussed their occurrence in the region. Members also participated in identifying goals, objective, and strategies for each hazard that affects the region. The JPHMC developed and approved a plan maintenance schedule for the JPHM Plan.

Multi-Jurisdictional Participation and Planning Process

Each jurisdiction participated in the planning process through involvement in the JPHMC and MPTs meetings. Opportunities were also presented at public meetings held prior to a draft submission and final draft submission. For those jurisdictions that did not participate in the mitigation planning meetings, the county appointment represented them in any decisions that were made in the planning process as stated in the bylaws.

Purchase Area Development District Planning Staff Activities

- James Smith, GIS Manager, provided assistance in developing maps and projects for the plan.
- Mark Davis, Physical Planning Director, facilitated meetings, coordinated overall activities, participated in the plan development process, provided direction to the staff, edited drafts of the plan and secured resources.
- Stacey Courtney, PADD Regional Transportation Planner, participated in the plan development process, attended JPHMC and MPT meetings, edited drafts of the plan and conducted research.
- Travis West, Intern, conducted research, assisted with development of GIS resources.
- Mary Anne Medlock, Special Projects Coordinator, assisted with proofing, editing, formatting and production of the final plan.
- Kim Toon, Administrative Assistant, provided secretarial services including typing, proof reading and keeping records of meetings.

1:4 Risk Assessment

All Components of this Risk Assessment were reviewed and updated using the best available data in the Purchase Region: GIS resources and public input were used to identify which hazards, of those listed below, affect the region. The PADD staff compiled this information to identify hazards and the JPHMC reviewed the definitions and discussed their occurrence in and impact on the region. This review, the resulting prioritization, and risk assessment, is contained in the pages that immediately follow.

Further, the MPTs for each county reviewed and prioritized these Hazards from the perspective of how they impacted their jurisdictions. The resulting prioritization and risk assessments are contained in the county annexes.

1:4.1 Identifying Hazards

FEMA recognizes many forms of natural hazards. Major natural hazards that may occur include:

- Geologic hazards
  - Tsunami
  - Volcano
  - Earthquake
  - Land Subsidence/Karst Topography
  - Landslide
- Weather generated hazards
  - Avalanche
  - Hurricane
  - Severe Thunderstorm
  - Hailstorm
  - Windstorm/Microburst
  - Severe Winter storm
  - Tornado
- Wildfire
- Flooding
  - Flashfloods
  - General Flooding
  - Coastal
  - Riverine
- Urban
- Climatological
  - Drought
  - Extreme Heat
- Failure of Man-made structures from the impact of natural forces
  - Dam Failure
  - Levee/flood Wall Failure

Natural Hazards Not Addressed by the Regional Plan

One goal of the planning process was to identify hazards that significantly impact the Purchase Region and eliminate from consideration those natural hazards that do not. This determination does not preclude the plan from including these hazards in future updates of the JPHM Plan if new information warrants such an action.

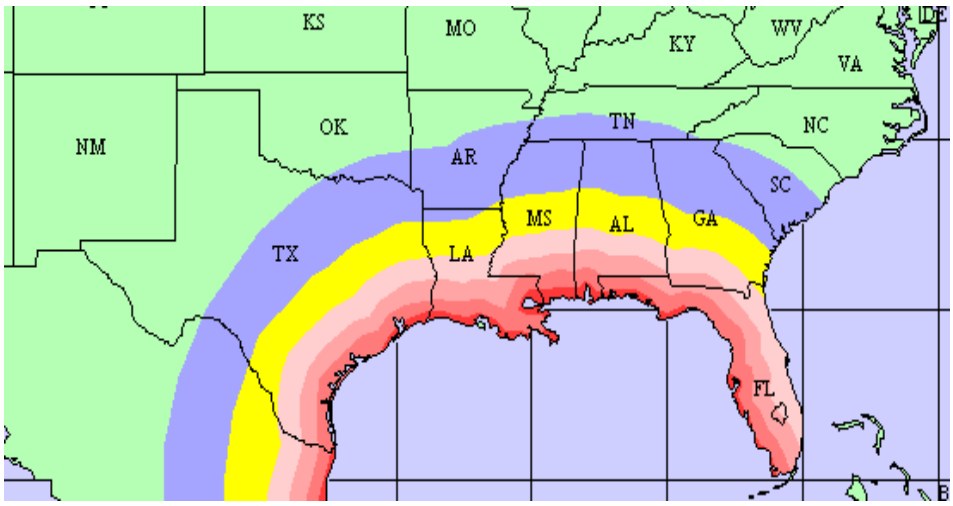
For some of the hazards below, such as Avalanche, Hurricane, Tsunami, Volcano, and Coastal Flooding the geographic setting of the Purchase Region precludes their occurrence. Others occur in the region but are either relatively limited in their geographic extent, their impact, or both.

- **Avalanche**
  The combination of low topography and moderate climate of the PADD is not capable of producing conditions for the formation of avalanches. No historical events have been recorded in the Purchase Region. Avalanches will not be addressed in the plan.

- **Hurricane/Tsunami/Coastal Flooding**
  The PADD is approximately 500 miles from both the Gulf of Mexico and the Atlantic Ocean coasts (see hurricane maps following). This distance from the coast(s) precludes inundation from tsunamis. Tsunamis will not be addressed in this plan.

  The immediate effects of hurricanes and coastal flooding do not impact the Purchase Region; therefore, these two hazards will not be addressed in the plan. The remnants of a hurricane, or tropical depression are sets of weather/climate conditions that can produce severe thunderstorms and flooding when they track over the Purchase Region. Severe thunderstorms, and the hazardous conditions they can spawn such as micro-bursts, hail, and tornadoes, are addressed in the plan.

Figure 1.3 CAT 4 HURRICANE (144mph) FORWARD SPEED: 14mph

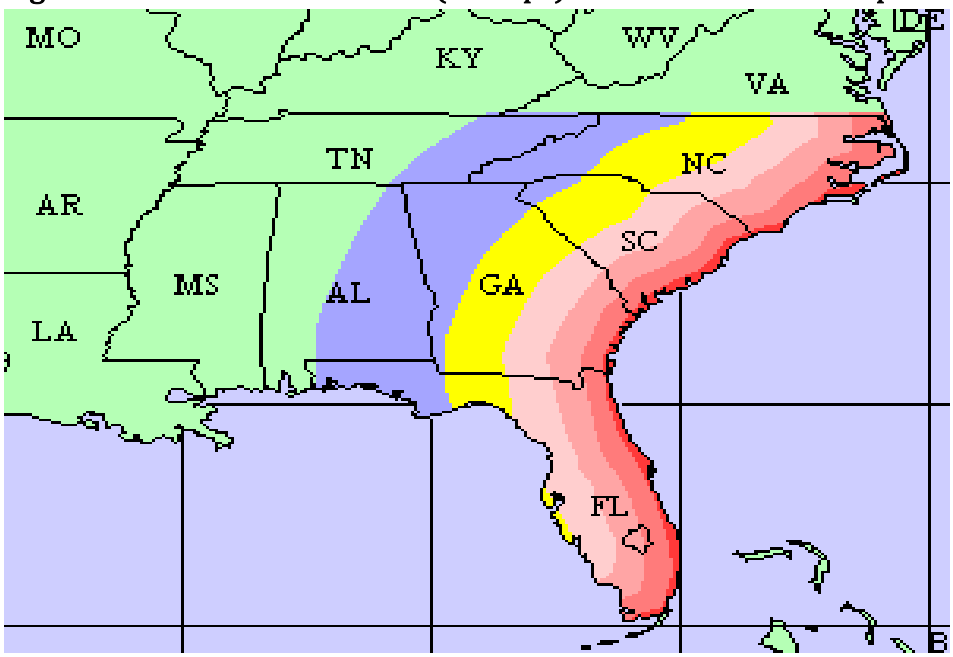


EXTENT OF INLAND WINDS – GULF COAST

>34Kt(39mph) >50Kt(58mph) >64kt(74mph) >80Kt(92mph) >95Kt(109mph) >110kt(127mph)

Source: http://www.floridadisaster.org/hurricane_aware/

Figure 1.4 CAT 4 HURRICANE (144 mph) FORWARD SPEED: 14 mph

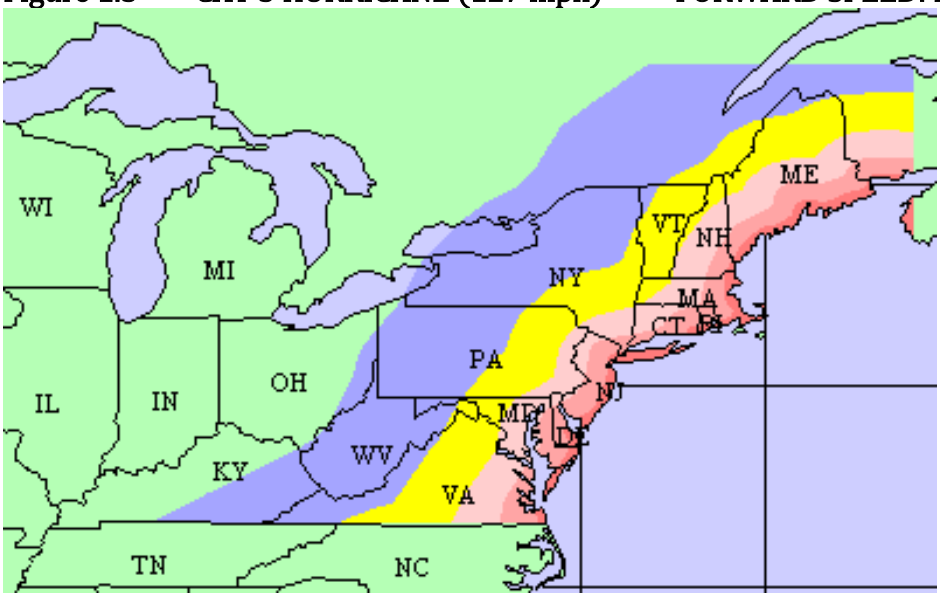


EXTENT OF INLAND WINDS – SOUTHEAST COAST

>34Kt(39mph) >50Kt(58mph) >64kt(74mph) >80Kt(92mph) >95Kt(109mph) >110kt(127mph)

Source: http://www.floridadisaster.org/hurricane_aware/

Figure 1.5 CAT 3 HURRICANE (127 mph) FORWARD SPEED: 23 mph



Source: http://www.floridadisaster.org/hurricane_aware/

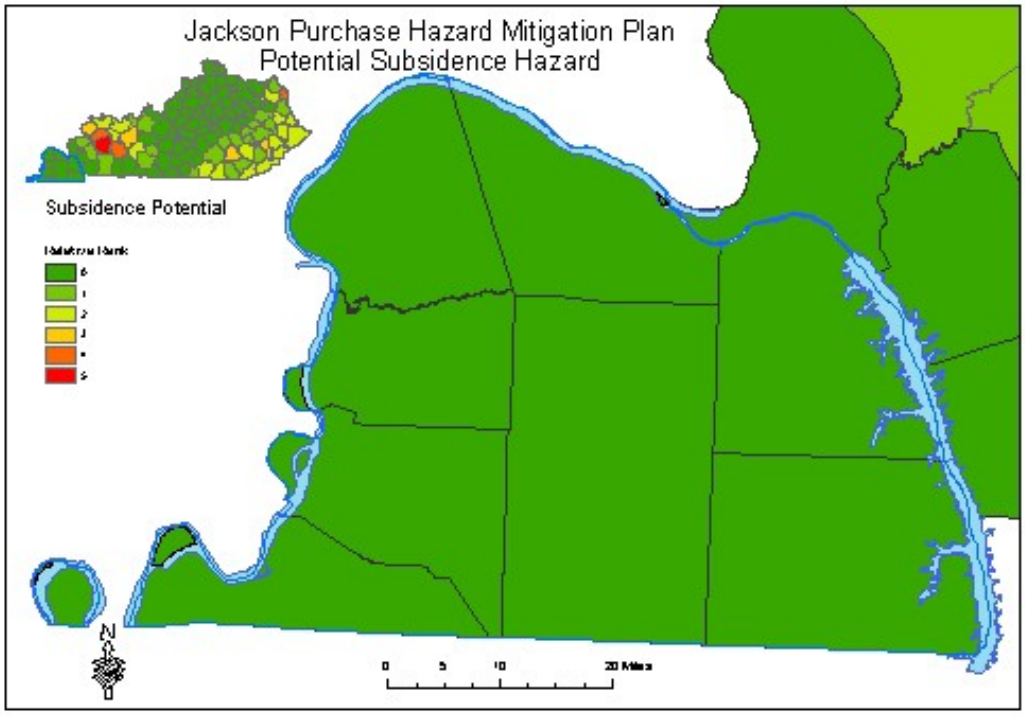
- **Volcano**
  Over the past 200 years, there have been approximately 50 volcanoes in the United States that have erupted at least one time. Volcanoes are a very destructive natural hazard that can produce costly property damage and loss of life. The active volcanoes in North America are located in California, Oregon, Washington, Alaska, Hawaii, Mexico, Canada and the Caribbean Islands. There are no active volcanoes within 1,000 miles of the jurisdictions in the PADD. Volcanoes are not considered to be a threat to the Purchase Region and will not be addressed in the plan.

- **Land Subsidence/Karst**
  Land subsidence occurs when large amounts of ground water have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rock falls in on itself. Land subsidence can occur unnoticed because it covers large areas rather than in a small spot, like a sinkhole.

  Mine subsidence resulting from subsurface mineral extraction is a major geologic hazard in Kentucky. Coal mine subsidence normally begins when the pillars of coal and the roof supports that were left in the mine can no longer support the bedrock above the mine. Conflicts result between the surface development of urban and suburban areas and the subsurface development of the mineral resources. While no dollar amount has yet been fixed on the annual loss to Kentucky resulting from ground subsidence, serious damages to highways, public buildings, businesses, private homes and water supplies have been documented. There are no Purchase counties located in the Western Kentucky Coal Field. No

significant historical events of land subsidence have been recorded. Land subsidence poses a minimal threat to those counties and will not be addressed in the plan.

Figure 1.6 Relative Risk of Subsidence

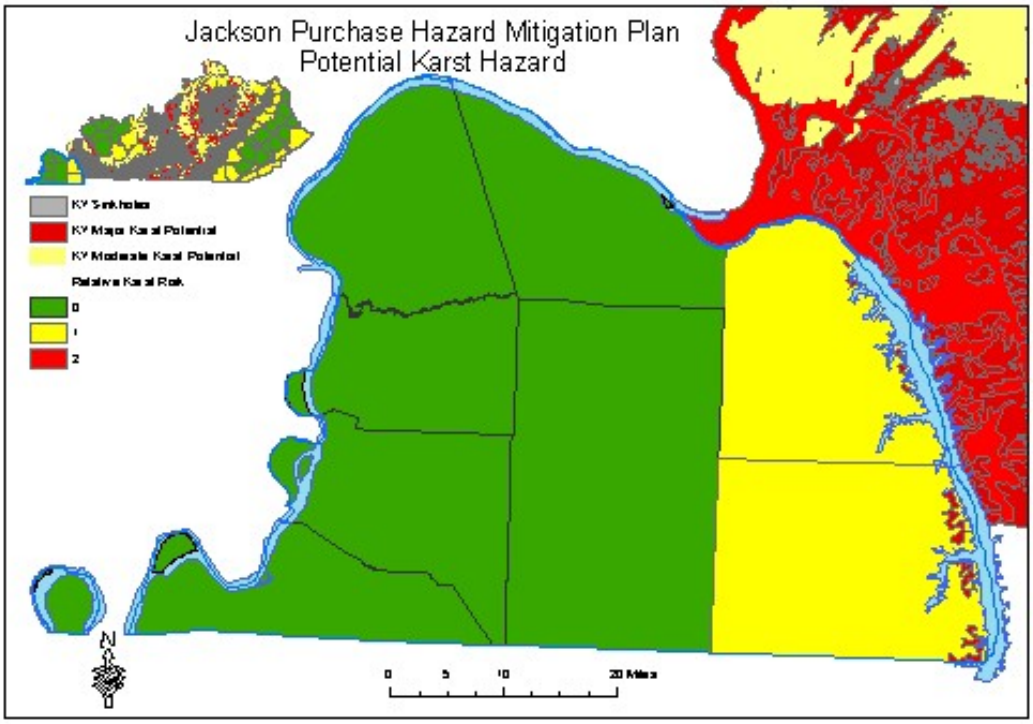


Source: Adapted from Kentucky State Hazard Mitigation Plan

Karst landscapes and aquifers form when water dissolves limestone, gypsum and other rocks. The surface expression of karst includes sinkholes, sinking streams and springs. Kentucky is one of the world's most famous karst areas. About 38 percent of the state has sinkholes that are recognizable on topographic maps, and 25 percent has obvious and well-developed karst features.

During the formation of karst terrain, water percolating underground enlarges subsurface flow paths by dissolving the rock. As some subsurface flow paths are enlarged over time, water movement in the aquifer changes character from one where ground water flow was initially through small, scattered openings in the rock to one where most flow is concentrated in a few well developed conduits. As the flow paths continue to enlarge, caves may be formed and the ground water table may drop below the level of surface streams. Surface streams may then begin to lose water to the subsurface. As more of the surface water is diverted underground, surface streams and stream valleys become a less conspicuous feature of the land surface and are replaced by closed basins. Funnels or circular depressions called sinkholes often develop at places in the low points of these closed basins. Like subsidence, Karst topography presents a limited risk to the Purchase Region and is not addressed in the plan.

Figure 1.7 Relative Risk of Karst Hazard



Source: Adapted from Kentucky State Hazard Mitigation Plan

Natural Hazards Addressed by the Regional Plan

The JPHM Plan considers natural hazards where a historical record of damage to people and property exists or where the JPHMC recognized the potential for such damage to occur. Table 1.5 and those that follow are purposely meant to support the rationale used by the JPHMC to consider some hazards and not others. The JPHMC and the PADD has no legal authority to initiate projects or formulate binding strategies/plans.

The JPHMC and the local level MPTs are in agreement on the identification of hazards affecting the region. No local jurisdiction felt compelled to fight back in a hazard because it was excluded. There are several instances, wildfire, "river erosion", and landslides for instance where the hazard is not region wide but has been included in the plan. The more detailed Hazard Profiles and risk assessments for each identified hazard are in each participating county's portion of this plan.

Table 1.5 Hazards Identified and Reasons for Identification

Hazard	How Identified	Why Identified
Tornado	* Review of past disaster damage * Review of FEMA hazard maps * Public Input	* Several past occurrences * Hazard maps show all jurisdictions affected
Flood **Flash Flood** **River Erosion**	* Review of past disaster damage (FEMA & National Climatic Data Center) * Local Emergency Management * Public Input * Review of FIRM maps	* Affects the region frequently * Maps show many flood prone areas * Public identified several regions not mapped affected by flooding * Repetitive flooding has led to the deposit of enormous amounts of silt in Kentucky's Mississippi River ports
Thunderstorm Wind **Hail**	* Review of past disaster damage * Public Input * Review of past occurrences from National Climatic Data Center	* Many events in the past * Widespread: affects all jurisdictions * High wind zone
Earthquake	* Review of Ground Motion Maps * Review of the New Madrid and Wabash Seismic Zone Maps * Public Input	* Proximity to New Madrid/Wabash Seismic Zones * Historic accounts of 1812 disaster. * Potential for destructive impact in some jurisdictions
Winter Storm / Ice Storm	* Review of past disaster damage * Review of past occurrences from National Climatic Data Center * Public Input * Local Emergency Management/KYTC	* Several past occurrences * Variety of events including snow/ ice * Can affect all jurisdictions
Excessive Heat / Drought	* Review of past disaster damage * Public Input * Review of Palmer Drought Severity Index	* Losses have occurred in past * Large impact of agriculture on the region
Dam Failure	* Review of High Risk Dams in the region * Corps of Engineers Input	* Potential for flooding * Number of High Risk dams in region
Wildfire	* Review of State Mitigation Plan * Public Input	* Potential for loss at Wildland/urban interface, * Increased fuel supply due to ice storm damage

1:4.2 Profiling Regional Hazard Events

The JPHMC identified these hazards based on, historical evidence gathered from the Kentucky State Climatology Center, the National Center for Environmental Information (NCEI), FEMA's Hazard Mapping website, the Kentucky State Hazard Mitigation Plan and the Kentucky Geological Survey. The PADD staff gathered GIS information and historical data to provide to the council and MPTs. There are some limitations to the best available GIS and historical data pertaining to hazards. However, the JPHMC and subcommittees identified what hazards affected the region based on past experiences. Information collected throughout the planning process by means of public input was a pertinent resource to the plan. Because the purpose of this plan is to identify hazards that present a threat to the safety of life and property, only moderate and high risk hazards will be fully addressed in this plan.

Summary of Hazard Profiles

Several overall conclusions can be drawn from the information gathered in the Hazard Profiles. Based on historical frequency and past disaster damages, several hazards stand out as more significant threats to the Purchase region, while several others appear to be less significant.

According to frequency and damage figures, Flooding, Tornadoes and Thunderstorm Wind stand out as the most significant threats to the region. Winter Storms and Hail events are also significant hazards that threaten the region. Earthquake is a hazard rated by committee members as one of the biggest potential threats. There is very little historical data on actual damages to analyze the threat and considerable debate as to the severity of the resultant damage even for the "worst case scenario". Drought, Dam Failure, and Landslide are hazards that are possible threats to portions of the region or regional economy, yet historic frequency and damage data do not suggest that these are among the most significant. Wildfires, more specifically brushfires, have occurred however the only damages documented for these events amount to $10,000 in property damage.

Table 1.6 is a summary of past Declared Disasters as provided by FEMA for the Purchase Region. Throughout our plan, we will refer to this table as we profile our hazard events. This table is limited to providing information only related to declared disasters on the county level and does not list each jurisdiction.

Table 1.6 Presidential Disaster Declarations that Affected PADD Counties

DR#	Declaration Date	Disaster Type	Total Declared Counties	Declared Counties	Counties Declared for Public Assistance and Individual Assistance	Counties Declared for Public Assistance Only	County	DH Approved Funding	IFG Approved
381	5/11/1973	Severe Storms, Flooding	5	Ballard, Carlisle, Fulton, Hickman, McCracken	Ballard, Carlisle, Fulton, Hickman, McCracken	0			
461	3/29/1975	Severe Storms, Flooding	17	Ballard, Calloway, Fulton, Graves, Hickman, Marshall, McCracken	Ballard, Calloway, Fulton, Graves, Hickman, Marshall, McCracken	0			
821	2/24/1989	Severe Storms, Flooding	67	Ballard, Carlisle, Graves, Hickman, Marshall, McCracken	Ballard, Carlisle, Graves, Hickman, Marshall, McCracken	0			
1089	1/13/1996	Blizzard	120	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall	0	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken,			
1163	3/4/1997	Flooding	101	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken	Ballard, Carlisle, Fulton, Hickman, Marshall, McCracken	Calloway	McCracken	$137,084.85	
1802	10/9/2008	Severe Wind Storm	36	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken	0	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken,			

DR#	Declaration Date	Disaster Type	Total Declared Counties	Declared Counties	Counties Declared for Public Assistance and Individual Assistance	Counties Declared for Public Assistance Only	County	DH Approved Funding	IFG Approved
3302	1/28/2009	Severe Wind Storm	114	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken	0	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken,			
1818	2/5/2009	Severe Winter Storm, Flooding	117	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken	0	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken			
1976	5/4/2011	Severe Storms, Tornadoes, Flooding	22	Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, Marshall, McCracken		Calloway			
4057	3/6/2012	Severe Storms, Tornadoes, Straight-line Winds, Flooding	1	Ballard		Ballard			
4216	4/30/2015	Severe Winter Storms, Snowstorms, Flooding, Landslides, Mudslides	3	Ballard, Marshall, McCracken		Ballard, Marshall, McCracken			
4218	5/12/2015	Severe Winter Storms, Snowstorms, Flooding, Landslides, Mudslides	3	Calloway, Fulton, Marshall		Calloway, Fulton, Marshall			
4278	8/26/2016	Severe Storms, Tornadoes, Flooding, Landslides, Mudslides	2	Calloway, Marshall		Calloway, Marshall			

Source:https://www.fema.gov/disasters?field_state_tid_selective=49&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=20&=GO

The discussion of the Natural Hazard Profiles will follow the order of the revised prioritization summarized from the Risk Assessment listed in Table 1.7. The County Hazard Profiles in the county Annexes will be in accordance to MPT prioritization. Hazard priorities have been re-ordered from the 2012 plan to reflect revised priorities for the 2018 plan.

Table 1.7 Regional Hazard Summary Table

PLAN VERSION	2017	2012
HIGH RISK HAZARDS	TORNADO FLOOD/FLASH FLOOD THUNDERSTORM WIND EARTHQUAKE WINTER STORM/ICE STORM	TORNADO FLOOD SEVERE THUNDERSTORM EARTHQUAKE WINTER STORM
MODERATE RISK HAZARDS	HAIL EXCESSIVE HEAT DROUGHT	HAILSTORM WILDFIRE
LOW RISK HAZARDS	WILDFIRE DAM FAILURE	EXCESSIVE HEAT/ DROUGHT DAM FAILURE

SOURCE: JPHMC, PADD Board, Public Input Survey, 2017

Tornado

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. It is most often generated by a thunderstorm when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly and upper level winds, especially the jet stream runs at an angle relative to the prevailing surface winds. These conditions occur with regularity over the Purchase Region in the spring, but as evidenced recently, can occur at any time of the year. Tornadoes are often accompanied by large hail and damage is most often the result of the high wind velocity and wind-blown debris. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction. They have the power to uproot trees, structures, and turn harmless objects into deadly flying debris.

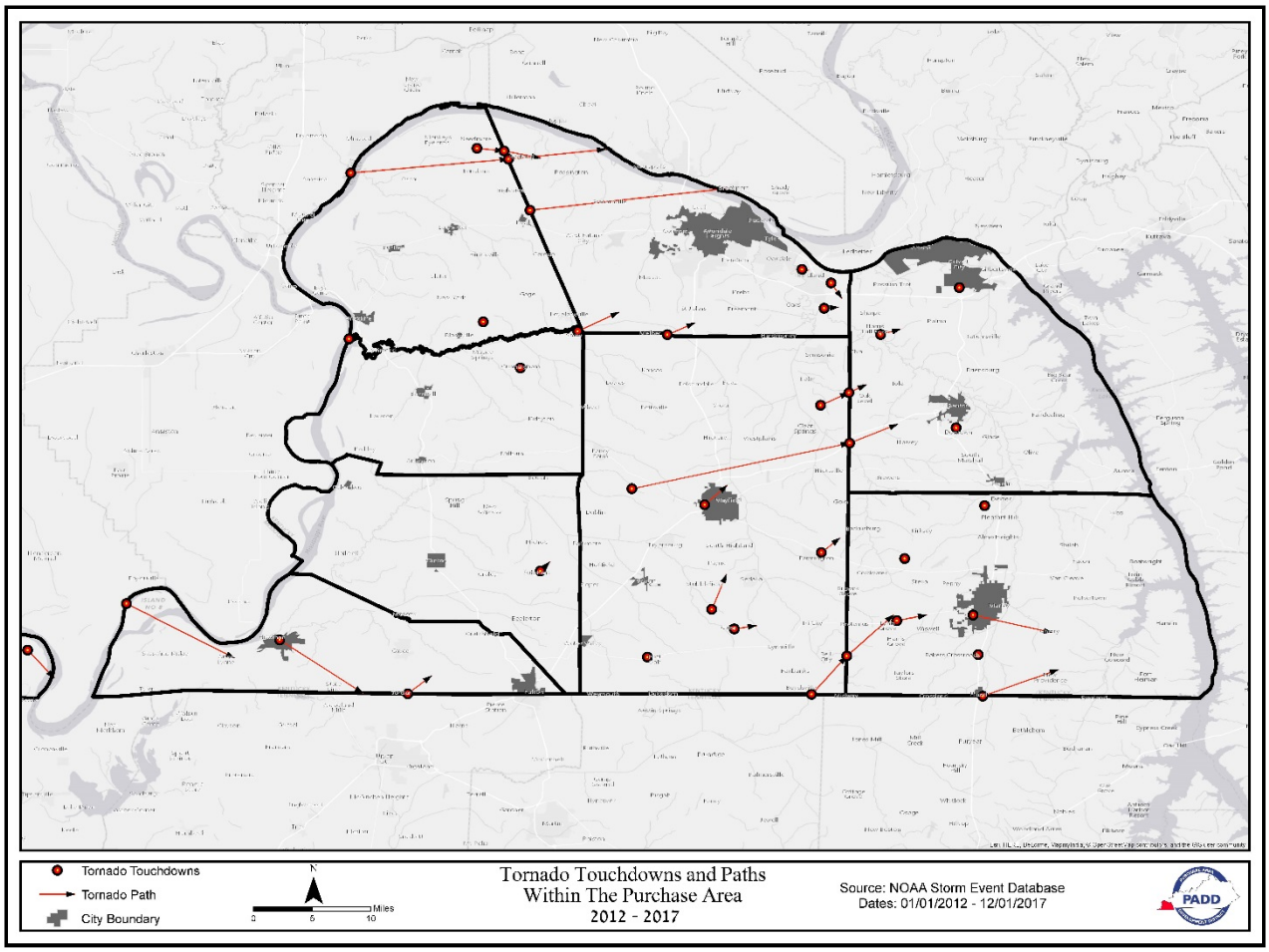
Most tornadoes aren't very wide and touch down only briefly. However, a highly destructive tornado may carve a path over a mile wide and several miles long. Tornadoes typically cause the most damage to lightly or poorly built structures, such as residential homes. An average of 800-1000 tornadoes are reported nationwide and they are more likely to occur during the spring and early summer months. Tornadoes can occur at any time of the day, but are more likely to form in the late afternoon or early evening.

In 2007 the Enhanced Fujita (EF) Scale was introduced to better reflect wind speed and the amount of damage produced by tornadoes. It replaced the Fujita-Pearson Scale that defined every tornado on record in the United States since 1950. EF rankings are assigned after a tornado event has occurred and the National Weather Service has inspected the damage.

Table 1.8 The Enhanced Fujita Tornado Measurement Scale

Scale	Estimated Wind Speed	Typical Damage
EF0	65-85 mph	Light Damage - Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; signboards damaged.
EF1	86 – 110 mph	Moderate Damage - Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	111 – 135 mph	Considerable Damage - Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light object missiles generated; cars lifted off ground and thrown.
EF3	136 – 165 mph	Severe Damage - Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
EF4	166 – 200 mph	Devastating Damage - Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
EF5	>200 mph	Incredible Damage - Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Figure 1.8 Tornado Touchdowns and Paths in the Purchase Region



Source: NOAA Storm Events Database 2012-2017

SUMMARY AND CONCLUSIONS OF TORNADO PROFILE

From January 1, 2012 through March 31, 2017 there have been 38 occurrences of tornadoes in Purchase counties reported by the NCEI. These occurrences resulted in zero deaths, injured 17 people and totaled over $6,926,000 in reported personal property damage. Information from the above tables and map related to Tornadoes can be used to define the frequency of tornado events and the impact of these events. Data on tornado event magnitude is provided in the form of the Enhanced Fujita Scale as shown on Table 1.8.

Table 1.9 Tornadoes by County
January 1, 2012 – March 31, 2017

County	Number	Dead/Injured	Value of Property Damage	Value of Crop Damage
Ballard County	4	0/0	$205.0K	$ 0
Calloway County	7	0/0	$217.0K	$ 0
Carlisle County	1	0/0	$200.0K	$ 0
Fulton County	4	0/0	$1.29M	$ 0
Graves County	8	0/11	$4.107M	$ 0
Hickman County	1	0/0	$2.0K	$ 0
Marshall County	5	0/0	$172.0K	$ 0
McCracken County	8	0/6	$733.0K	$ 0
Purchase Region	38	0/17	$6.926M	$ 0

Source: NOAA, NCEI, Storm Events Database

The number of Tornado Events per county were rolled together for the region. The region experienced 38 reported Events over a 5.25 year period, or a better than 100% probability of a Tornado event somewhere in the Purchase Region in any given year. Common sense would dictate that the conditions that generated a Tornado event in one county could have generated a Tornado Event in another. Indeed several tornadoes have paths that track across multiple counties. During this period both, the largest number of tornados occurred in Graves and McCracken Counties, with eight recorded events each or 1.6 events per year. From a regional perspective the cost of a Tornado Event could be calculated as:

- 38 events over 5.25 years = 7.2 events per year
- $6,926,000 divided by 38 events = $182,342 in property damage per event
- $182,342 x 7.2 events per year = $1,312,863.

Of critical concern to the JPHMC, and the main contributing factor in their consideration of risks and vulnerability, is the human cost of Tornado Events. The cost and frequency for each county will be discussed in the individuals chapters of this plan.

Flooding

During the 20th century, floods were the number one natural disaster in the United States in terms of number of lives lost and property damaged. The NFIP defines a flood as a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from: overflow of inland or tidal waters, unusual and rapid accumulation or runoff of surface waters from any source, a mudflow, or a collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood.

The severity of flooding is determined by the following: rainfall intensity and duration - large amount over a short time can result in flash flooding, small amounts may cause flooding where the soil is saturated, small amounts may cause flooding if concentrated in an area of impermeable surfaces; topography and ground cover – water runoff is greater in areas with steep slopes and little vegetation. Frequency of inundation depends on the climate, soil, and channel slope. In regions without extended periods of below-freezing temperatures, floods usually occur in the season of highest precipitation.

Flooding in Kentucky can be classified under two categories: flash flooding and river basin flooding. Flash flooding usually occurs within minutes or hours of heavy amounts of rainfall. It can be from a dam or levee failure, or from a sudden release of water held by an ice jam. Most flash flooding is caused by slow-moving thunderstorms in a restricted watershed or by heavy rains associated with hurricanes and tropical storms. Flash flooding can happen any time of the year, but it is most prevalent in the spring and summer months. Flash flooding occurs throughout Kentucky. It is most prevalent in eastern Kentucky, where steep terrain—combined with typical dendritic drainage—patterns, have the effect of funneling too much water through too little space.

Flash flooding is the most common form of flooding in the Purchase Region. The cause, once again being too much rain water, delivered in too short of time. However, rather than steep slopes and narrow valleys channeling and concentrating the runoff from heavy rains, the runoff is too great in volume for the region's characteristic low lying, meandering streams, to carry away. This slow drainage is often exacerbated by stream blockages of tree limbs and trunks, which form effective check dams and barrages.

River basin flooding is common among Kentucky's major streams and bodies of water during the winter and early spring months. The major bodies of water in the Purchase Region are: the Ohio River (Marshall, McCracken and Ballard), the Mississippi River (Ballard, Carlisle, Hickman and Fulton) and the Tennessee River/Kentucky Lake (McCracken, Calloway and Marshall). These rivers delivered catastrophic flooding to the area in the past, most memorably in 1937, but have since been contained, if not controlled by levees, floodwalls and dams. The potential failure of these structures, especially those that are aging is more of a concern in the region than the direct effects of flooding.

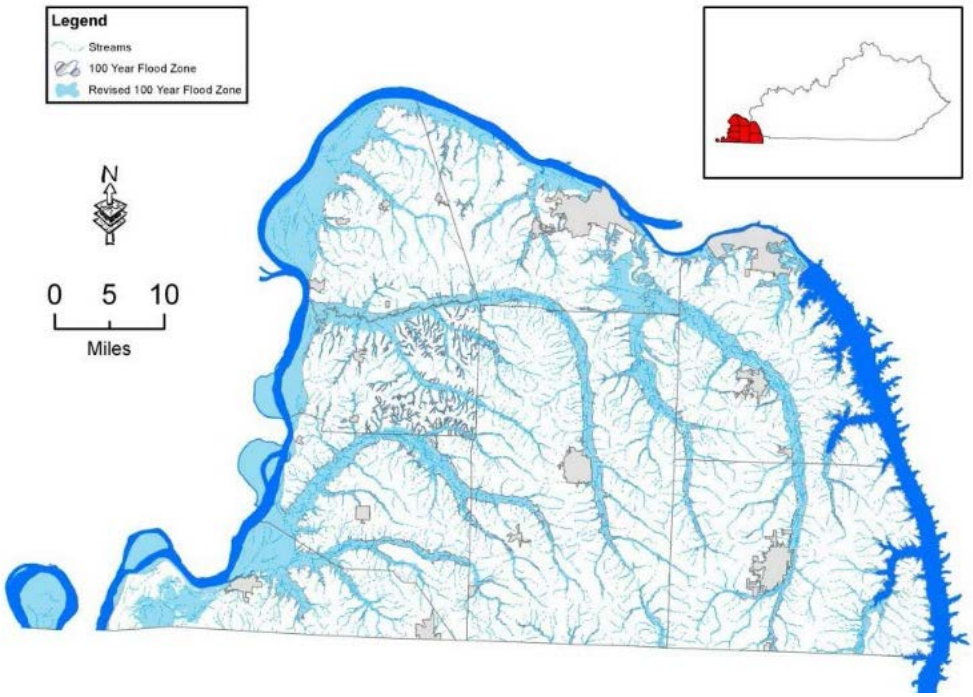
A third type of flooding that happens periodically is urban flooding. Urban flooding occurs where man-made development has obstructed the natural flow of water and/or decreased the ability of natural groundcover to absorb and retain surface water runoff.

Periodic flooding of land adjacent to rivers, streams and shorelines is natural and can be expected to take place at fairly regular intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

A floodplain is the lowland area adjacent to a river, lake or ocean. Floodplains are designated by the frequency of the flood that is large enough to cover them. Another way of expressing the flood frequency is the chance of occurrence in a given year. A 100-Year Flood event as determined by FEMA is a flood event of a magnitude expected to be equaled or exceeded once on the average during any 100-year period. The term "100-year flood" is misleading. It is not the flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1- percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance.

Figure 1.9 below depicts a composite of the 100-Year Flood Plains of the eight counties comprising the Purchase Region. It overlays the incorporated cities in the region. A larger scale map for each county is included in its chapter.

Figure 1.9 100-Year Flood Plains of the Purchase Region



All eight counties in the region have mapped flood hazard areas. All but Hickman County participate in the NFIP. Although Hickman is not an NFIP participant, the county seat, Clinton, does participate.

Table 1.10 Purchase Region Flood Hazard Vulnerable Assets

County	Estimated Number of Residential Structures In Flood Hazard Areas		
	Number of Structures in County	Percentage of Structures in Flood Hazard Area	Number of Structures in Flood Hazard Area
Ballard	3,889	3.7%	147
Calloway	18,237	0.5%	101
Carlisle	2,426	3.2%	80
Fulton	3,360	7.8%	268
Graves	16,753	2.2%	361
Hickman	2,335	8.3%	147
Marshall	15,898	2.8%	444
McCracken	31,342	2.5%	768
Total	**94,240**	**2.5%**	**2,316**

Sources: U.S Census Bureau 2011-2015 American Community Survey 5 Year Estimates
PADD GIS Database

SUMMARY AND CONCLUSIONS OF FLOODING PROFILE

From January 1, 2012 through March 31, 2017, there have been 97 occurrences of flooding in Purchase counties reported by the NCEI. These occurrences totaled over $5,868,000 in reported personal property damage killing one person.

Table 1.11 Flooding by County
January 1, 2012 – March 31, 2017

County	Number	Dead/Injured	Value of Property Damage	Value of Crop Damage
Ballard County	9	1/0	$250.0K	$ 0
Calloway County	17	0/0	$138.0K	$ 0
Carlisle County	12	0/0	$10.0K	$ 0
Fulton County	6	0/0	$50.0K	$ 0
Graves County	13	0/0	$0	$ 0
Hickman County	7	0/0	$40.0K	$ 0
Marshall County	9	0/0	$2.45M	$ 0
McCracken County	24	0/0	$2.93M	$ 0
Purchase Region	**97**	**1/0**	**$ 5.868M**	**$ 0**

Source NOAA, NCEI, Storm Events Database

Information from Table 1.11 related to flooding can be used to define the frequency of Flood Events and the impact of these events. The number of Flood Events per county were rolled together for the region. The Purchase Region experienced 97 Reported Events over a 5.25 year period, which divides out to 18.5 Reported Flooding Events per year, a better than 100% probability of a Flood event somewhere in the region in any given year. Common sense would dictate that the conditions that generated a flood event in one county could have generated a flood event in another. The county which recorded the most frequent flooding was McCracken County with 24 events over 5.25 years or slightly more than 4.5 five per year. From a regional perspective the cost of a Flood Event could be calculated as:

- $5,868,000 divided by 97 events = $60,495 per event.
- $60,495 times 18.5 events/year = $3,270 per year

The cost and frequency for each county will be discussed in the individual county Annexes of this plan. Repetitive loss properties have been identified in the region. This information has been provided to county- and city-level emergency managers and planners. They will be addressed in the county Annexes, but Privacy Act considerations will prevail over specific identification of properties in this plan.

Thunderstorm Wind

A thunderstorm is formed from a combination of moisture, rapidly rising, warm air, or a force capable of lifting air, such as the meeting of a warm and cold front, a sea breeze, or a mountain. Thunderstorms can produce tornadoes, large hail and heavy rain which can cause flash flooding. The National Weather Service considers a thunderstorm as severe if it develops one-inch hail or 58 mph winds. Straight line winds during thunderstorms can exceed 100 miles per hour and are responsible for wind damage associated with thunderstorms. One type of straight-line wind, the downburst, can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation.

Thunderstorms affect relatively small area when compared with winter storms, as the average storm is 15 miles in diameter and lasts an average of 30 minutes. All thunderstorms are dangerous and capable of threatening life and property in localized areas. Every thunderstorm produces lightning, which results from the buildup and discharge of electrical energy between positively and negatively charged areas.

Thunderstorms are quite frequent in the Purchase Region. They can produce damage, injuries, or fatalities. Numerous recorded severe thunderstorms have produce high winds, lightning, and hail, in the county. Many of these thunderstorms have caused property or crop damage. These storms, although relatively short in duration when compared to other weather events, are often long lived enough to track across the entire county before dissipating their energy or exiting the region.

SUMMARY AND CONCLUSIONS OF THUNDERSTORM WIND PROFILE

From January 1, 2012 through March 31, 2017, there have been 175 occurrences of Thunderstorm Wind events in Purchase counties reported by the NCEI. These occurrences totaled over $4,564,000 in reported personal property damage and resulted in one death & two injuries.

Table 1.12 Thunderstorm Wind Data by County
January 1, 2012 – March 31, 2017

County	Number	Dead/ Injured	Value of Property Damage	Value of Crop Damage
Ballard County	21	0/0	$601.0K	$ 0
Calloway County	34	0/0	$1.034M	$1.0K
Carlisle County	9	0/0	$61.0K	$ 0
Fulton County	5	0/0	$59.0K	$ 0
Graves County	35	1/0	$852.0K	$ 0
Hickman County	9	0/0	$180.0K	$ 10K
Marshall County	29	0/2	$650.0K	$ 0
McCracken County	33	0/0	$1.127M	$ 0
Purchase Region	**175**	**1/2**	**$ 4.564M**	**$ 11K**

Source NOAA, NCEI, Storm Events Database

Information from Table 1.12 can be used to define the frequency of Thunderstorm Wind Events and the impact of these events throughout the region. Data on Thunderstorm Wind event magnitude in the form of peak wind speeds is provided in the individual county sections of this plan.

The number of events per county, were rolled together for the region. The Purchase Region as a whole experienced 174 Reported Events over a 5.25 year period, which divides out to 33.3 reported Thunderstorm Wind Events per year, or a better than 100% probability of a Storm event somewhere in the purchase area in any given year. Common sense would dictate that the conditions that generated a Thunderstorm Wind Event in one county could have generated an Event in another. The county which recorded the most frequent Thunderstorm Wind Events was Graves with 35 events over 5.25 years or almost 6.5 events per year. From a regional perspective the cost of a Thunderstorm Wind Event could be calculated as:

- $4,564,000 divided by 175 events = $26,080 per event.
- $26,080 times 33.3 events/year = $868,464 per year.

Of critical concern to the JPHMC and the main contributing factor in their consideration of risks and vulnerability, is the potential human cost of Thunderstorm Wind Events.

Earthquake

An earthquake is a geologic event that involves movement or shaking of the earth's crust. Earthquakes are usually caused by the release of stresses accumulated as a result of the rupture of rocks along borders of the earth's ten tectonic plates. Earthquakes can affect hundreds of thousands of square kilometers, causing damage to property, resulting in loss of life and injury, and disrupting the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends on the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site and regional geology. Earthquakes may also cause landslides and liquefaction. Landslides are the down-slope movement of soil and rock in mountainous regions and along hillsides. Liquefaction occurs when the ground soil loses the ability to resist shear and flows much like quick sand. When liquefaction occurs, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale. It is a twelve-level scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, with an "I" corresponding to imperceptible (instrumental) events, "IV" corresponding to moderate (felt by people awake), to "XII" for catastrophic (total destruction).

Figure 1.10 Scenario Fault Location for the State of Kentucky

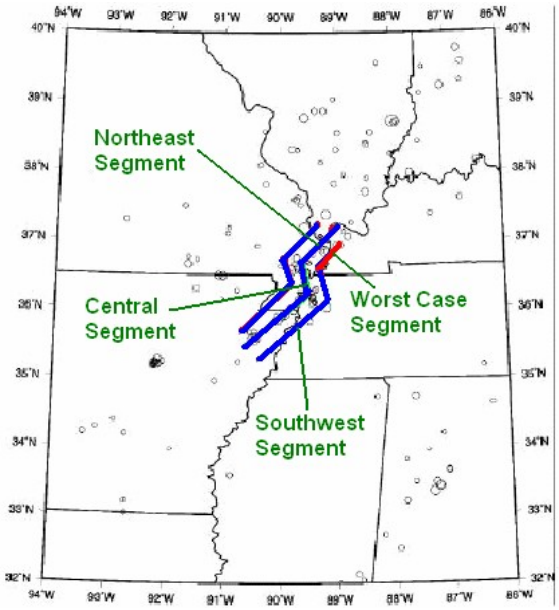


Table 1.13 Modified Mercalli Intensity Scale for Earthquakes Compared to the Richter Scale

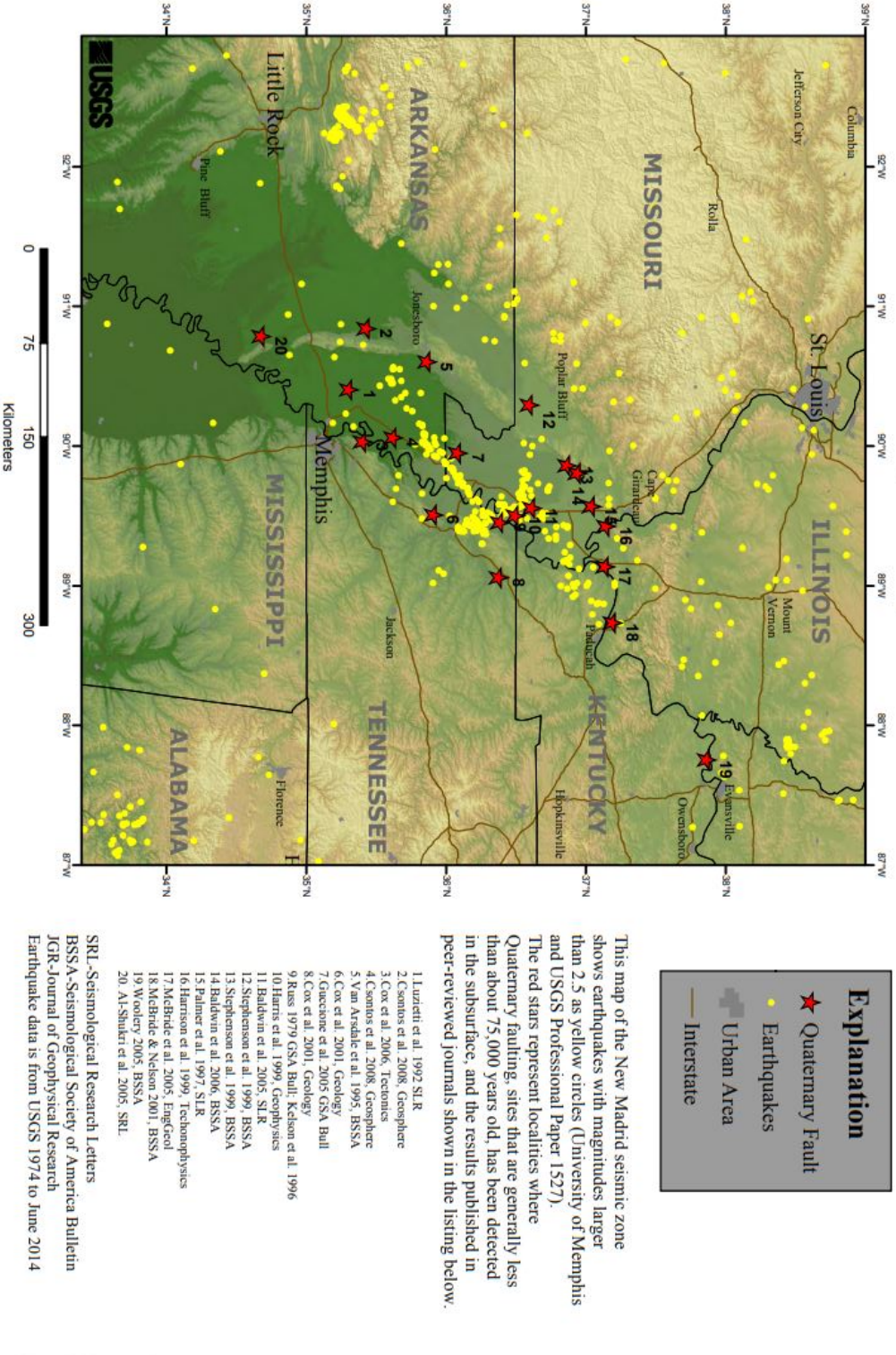
Scale	Intensity	Description of Effects	Maximum Acceleration (mm/sec)	Richter Scale
I	Instrumental	Detected only on seismographs	<10	
II	Feeble	Some people feel it	<25	<4.2
III	Slight	Felt by people resting; like a truck rumbling by	<50	
IV	Moderate	Felt by people walking	<100	
V	Slightly Strong	Sleepers awake; church bells ring	<250	<4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	<500	<5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls	<1000	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	<2500	
IX	Ruinous	Some houses collapse; ground cracks; pipes break	<5000	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7500	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	<9800	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>9800	>8.1

Source: https://earthquake.usgs.gov/learn/topics/mercalli.php

Kentucky has not experienced an earthquake of major proportions since 1812, but this hazard poses great danger to the Purchase Region of the state. The region is included in a large area of relatively diffuse, low rate seismicity. Principal areas of activity include the New Madrid Seismic Zone and Wabash Valley Seismic Zone.

Earthquakes do occur throughout the entire region. Due to the relatively low rate of seismicity, ground cover, deep soil, etc, most fault within the region aren't even mapped. Even the precise location of faults within the New Madrid Seismic Zone is subject to debate.

Figure 1.11 New Madrid Seismic Zone – Quaternary Fault Localities



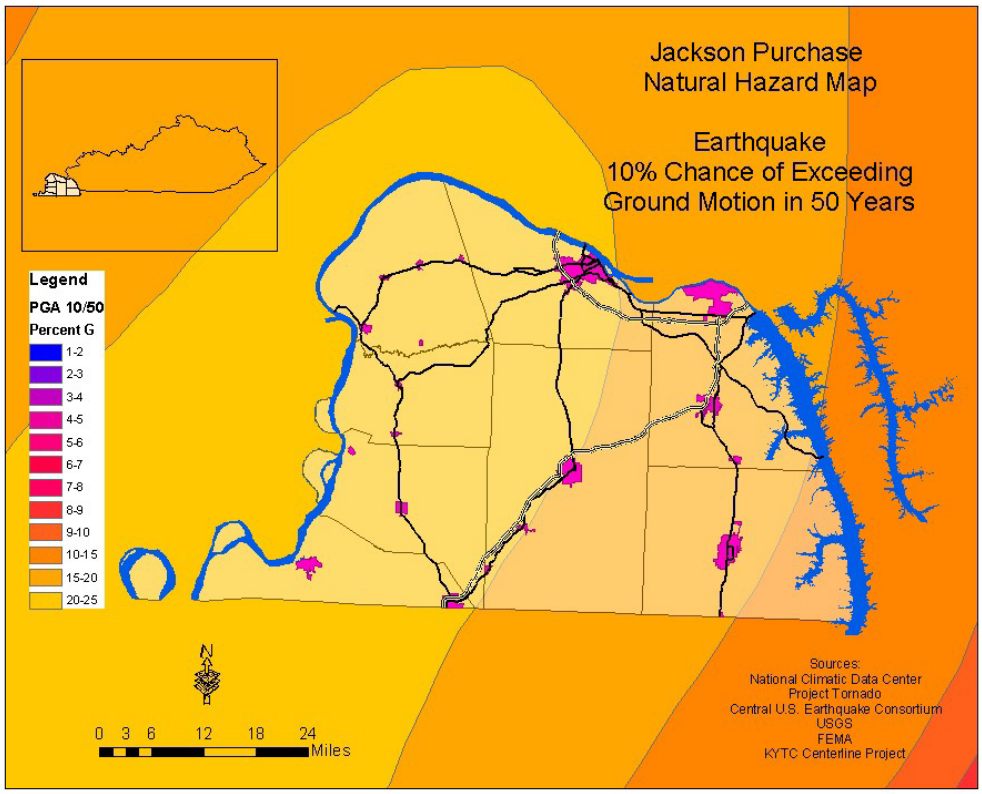
The New Madrid Seismic Zone and the Wabash Seismic Zone make Western Kentucky a high seismic risk zone. An earthquake on the scale of the New Madrid Quakes of 1811-1812, VII or VIII magnitude, has the potential to produce serious damage and significant casualties. Seismic historians put the magnitude of the New Madrid quake as high as XI or XII on the Mercalli Scale above, or 8.1 plus on the Richter Scale.

The fact that there is no historical record of damages does not diminish the potential catastrophic damage that a major New Madrid (or Wabash) earthquake could cause, a fact recognized by the JPHMC and MPTs. Paleo seismic (geologic) studies conducted over the last few years have shown that sequences of earthquakes of comparable size to that in 1811-1812 have occurred at least twice before, in approximately 900 and 1450 AD. This implies a recurrence interval of about 500 years. The occurrence of large earthquakes (magnitude greater than 7) every 500 years, documented from paleo liquefaction evidence, and the huge affected area from the large earthquakes in 1811-1812 clearly indicate that the New Madrid region has high seismic hazard.

If we use the data on historical seismicity combined with the new information on recurrence of large earthquakes and make the same assumptions that go into the National Seismic Hazard maps, we would estimate a 25-40% chance of a magnitude 6.0 and greater earthquake in the next 50 years and about a 7-10% probability of a repeat of the 1811-1812 earthquakes in the same time period. However, it is very important to note that these estimates alone do not include information about where the earthquakes might occur and therefore what shaking might affect any given location.

More useful are the estimates of the likely amount of ground shaking that can be expected, contained in the National Seismic Hazard maps. The ground shaking estimate accounts for both the likely ranges of recurrence intervals and locations. Due to the relatively low rate of seismicity, ground cover, deep soil, etc, most faults within the region aren't even mapped. Even the precise location of faults within the New Madrid Seismic Zone are subject to debate. No one knows what causes New Madrid earthquakes. However, there are ideas that are being researched. Although there is great uncertainty regarding the cause of earthquakes, scientists generally do agree on what happens when they do occur, that is, the likely levels of ground shaking associated with the waves earthquakes emit. These levels are reflected in the National Seismic Hazard Maps, which represent the products of a long consensus building process. These maps also account for the uncertainties in our understanding.

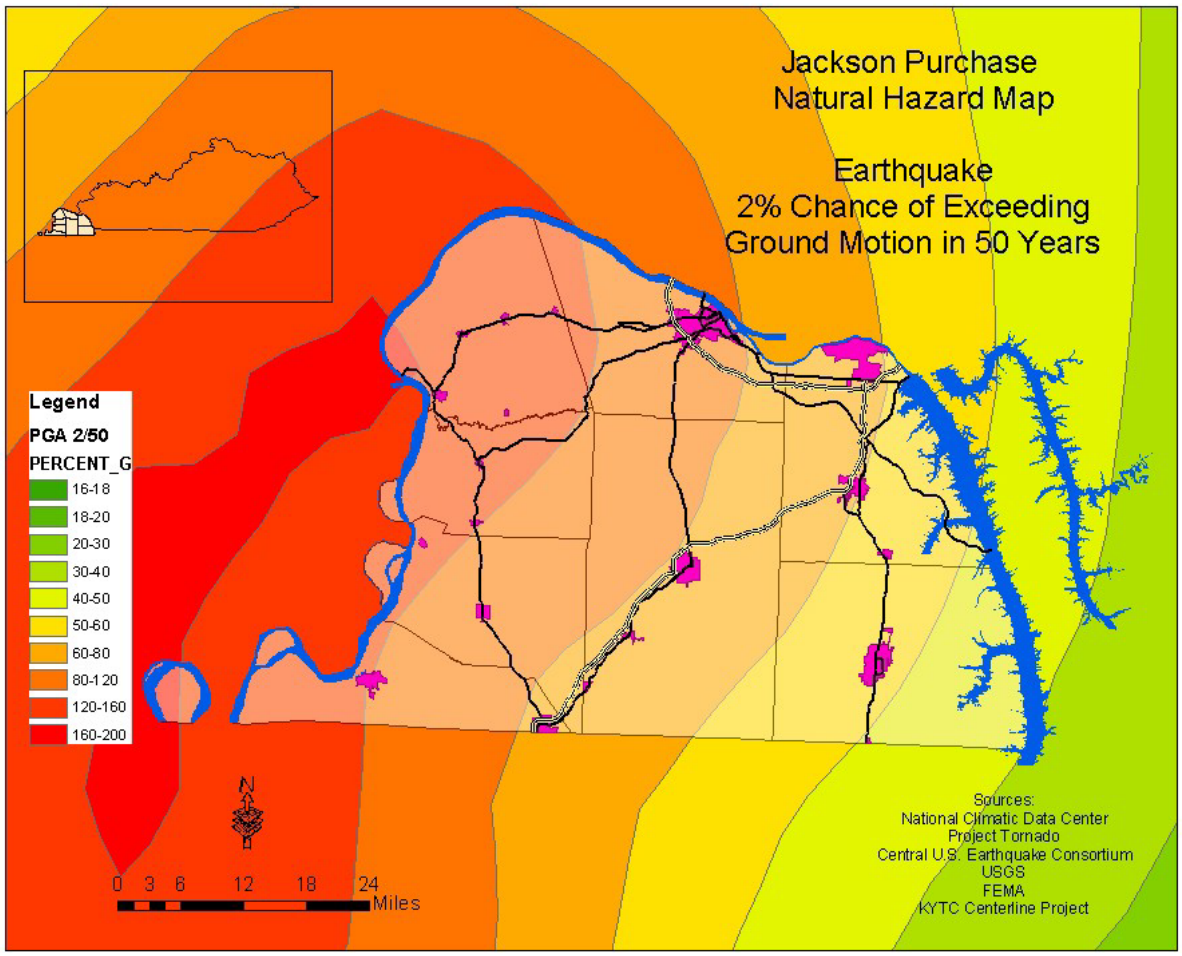
Figure 1.12 Earthquake: 10% of Exceeding Ground Motion in 50 Years



HOW TO READ THIS HAZARD MAP: Figure 1.12 above represents bands of ground motion that have a 10% probability of being generated or exceeded over a 50-year time period. Consequently roughly 85% of the purchase Region has a 10% probability of experiencing a ground motion of, or exceeding, 15-20% of G, in a 50-year period. That does not mean it will happen in fifty years, as one could look at the data and just as correctly assume that there is a 90% probability that the region will not experience this level of ground motion during a given 50-year period. It should be noted that 20% of G is an acceleration of 73 inches/second/second.

Carrying ground motion analysis to the extreme, the map below shows the potential ground motions generated by another 1811 New Madrid Quake, AKA the "big one". It represents a 2% probability that these percentages of PGA will be exceeded in a 50-year period (and a 98% probability that they will not). Although the map appears similar to that above, the potential ground motions certainly are not, equaling or exceeding 1G (368 inches/second/second) throughout more than 50% of the Purchase Region.

Figure 1.13 Earthquake: 2% Chance of Exceeding Ground Motion in 50 Years



SUMMARY AND CONCLUSIONS OF EARTHQUAKE HAZARD PROFILE

Low magnitude earthquakes occur constantly in the New Madrid Seismic Zone. Depending on the depth and magnitude, some of the stronger tremors, 3 and above, are felt throughout the entire region. Damages amount to the rare instance of a picture being knocked off a wall or items shaken from shelves.

The potential for an earthquake of catastrophic proportions is not open to debate. Historic and geologic evidence are proof however, the probability of such an event in any given time frame is open to interpretation and the effects are still a matter of discussion. Included as Appendix 2 to this plan are excerpts from Mid-America Earthquake Center Report 08-02 "Impact of Earthquakes on the Central USA". This report is the result of a FEMA funded Project completed under the management of the U.S. Army Corps of Engineers.

"The NMSZ scenario for the State of Kentucky consists of a magnitude 7.7 (Mw7.7) earthquake along the northeast extension of the presumed eastern fault line in the New Madrid fault system. The ground motions used to represent this seismic event were developed by the U.S. Geological Survey (USGS) for the middle fault in the proposed New Madrid Seismic Zone (NMSZ). Each fault line is presumed to consist of three fault segments; northeastern, central, and southwestern. This scenario, the worst case event for Kentucky, employs an event in the northeast segment of the eastern fault." The location of this scenario event is illustrated in Figure 1.13.

"This earthquake impact assessment includes all 120 counties in the State of Kentucky. Kentucky is approximately 40,400 square miles and is bordered by Indiana and Ohio to the north, Tennessee to the south, West Virginia and Virginia to the east, and Illinois and Missouri to the west. For the purposes of this analysis, 25 critical counties have been identified in the western portion of the state where shaking is anticipated to be most intense. These 25 counties are the focus of much of the damage assessment included within this document". Purchase counties included as critical counties are listed below: Ballard, Calloway, Carlisle, Fulton, Graves, Hickman, McCracken, and Marshall.

"Within the State of Kentucky, nearly 29,000 buildings experience complete damage, which are included in the nearly 53,000 at least moderately damaged buildings. While this is roughly 2% of all Kentucky buildings, many of these collapsed structures are concentrated in the western counties. As with previous state scenarios, residential buildings experience the greatest amount of damage. Nearly 98% of all building collapses occur to residential structures. In addition, about 94% of all at least moderate damage occurs in the 25 critical counties for Kentucky."

More detailed data from the scenario's results are included in the Appendix 2.

Winter Storm / Ice Storm

Winter Storms can produce an array of hazardous weather conditions that include heavy snow, freezing rain, sleet, high winds, and extreme cold. Ice Storms occur when freezing rain accumulates on surfaces and the ground. When a quarter-inch or more of ice builds up, severe impacts can result. Winter storms are fueled by strong temperature gradients and an active upper-level cold jet stream. An Ice Storm can develop when warmer air above the freezing mark above the ground moves over subfreezing air near the ground. Snow aloft falls through the warmer air and melts into rain, then the rain droplets fall into the subfreezing air and freeze upon contact creating a glaze of ice. Winter and Ice storms can paralyze a community by shutting down normal everyday operations. Accumulating snow and ice can result in downed trees and power lines and may block transportation routes or make them hazardous. Heavy snow can lead to the collapse of weak roofs or unstable structures. Often, the loss of electricity results in the loss of heat in some homes and buildings. This presents a threat to human life, especially the elderly population.

The level of impact Winter Storms have is greatly determined by a community's ability to manage and control the affect; for example, the rapid mobilization of snow removal equipment. Because winter storms are sporadic in western Kentucky, many communities cannot afford the expensive equipment and maintenance of snow removal. This increases the potential damage a Winter Storm may cause. Depending on the severity of Ice Storms, impacts can persist for days. If more than a half-inch of accumulation occurs and damage is widespread, it can take a while to remove trees and repair power lines. This can result in a loss of electricity and heat for several days. Because severe winter storms are sporadic in western Kentucky, many communities cannot justify expense/maintenance of snow removal equipment. Even though Kentucky has a mild, temperate climate, 58 winter storms have been recorded in the Purchase Region over the past 5.25 years. Of the 18 Presidential Disaster Declarations that have included the Purchase Region, 6 have been for Winter Storms, or severe weather generated during the winter season.

SUMMARY AND CONCLUSIONS OF WINTER STORMS / ICE STORMS PROFILE

From January 1, 2012 through March 31, 2017, there have been 58 occurrences of Winter Storms and one Ice Storm the in Purchase counties reported by the NCEI. The Winter Storm events totaled over $268,000 in reported personal property damage and one death. There were no reported damages from the single Ice Storm Event.

Table 1.14 Winter Storm / Ice Storm Data by County
January 1, 2012 – March 31, 2017

County	Number	Dead/Injured	Value of Property Damage	Value of Crop Damage
Ballard County	8	0/0	$50.0K	$0
Calloway County	7 / 1	0/0	$0 / 0	$0
Carlisle County	8	0/0	$70.0K	$0
Fulton County	7	1/0	$0	$0
Graves County	7	0/0	$48.0K	$0
Hickman County	7	0/0	$0	$0
Marshall County	6	0/0	$50.0K	$0
McCracken County	8	0/0	$50.0K	$0
Purchase Region	**58 /1**	**1/0**	**268.0K**	**$ 0K**

Source NOAA, NCEI, Storm Events Database

Information from Table 1.14 can be used to define the frequency of Winter Storm /Ice Storm Events and the impact of these events throughout the region. Data on the magnitude of these type Events is provided in the individual county sections of this plan.

The number of Events per county, were rolled together for the region. The Purchase Region experienced 58 reported Winter Storm Events over a 5.25 year period, and only one Ice Storm Event. The Winter Storm divides out to approximately 11 Reported Winter Storm Events per year, a better than 100% probability of a storm event somewhere in the Purchase Area in any given year. Eight was the highest number of events in a county and that occurred in three counties: Ballard, Carlisle, and McCracken. From a regional perspective the cost of a Winter Storm Event could be calculated as:

- $268,000 divided by 58 events = $4,621 average damage per event
- $4,621 times 11 events/year = $50,831 average per year

Ice Storm Events, such as the one in 2009, have had a major impact on the region in the past; however, for this reporting period this specific type of event has had no impact. Calloway County is the only county to have a reported ice event during this planning update period. It occurred on December 8, 2013 and there are no reported monetary damages. While Ice Storm Events have decreased during the 5.25 year updated period, due to the 2009 Ice Storm producing significant damage to the entire Purchase Region, such events are considered a significant risk. The cost and frequency for each county will be discussed in the individual county portions of this plan.

Hail

Hail is one of four types of precipitation that falls from the sky. It's also the most dangerous, damaging type, occurring during severe storms. If hail measuring larger than ¾ inches in diameter falls during a thunderstorm, it is classified as severe weather. Sometimes damaging winds accompany this type of storm as well. According to the National Oceanic and Atmospheric Administration, hail causes over one billion dollars of damage in the United States.

TORO Hailstorm Intensity Scale

The Torro Hailstorm Intensity Scale was introduced by Jonathan Webb of Oxford, England, in 1986 as a means of categorizing hailstorms. The scale extends from H0 to H10 (See Table 1.15) with its increments of intensity or damage potential related to hail size, texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind.

An indication of equivalent hail kinetic energy ranges (in joules per square meter) has now been added to the first six increments on the scale, and this may be derived from radar reflectivity or from hail pads. The International Hailstorm Intensity Scale recognizes that hail size alone is insufficient to accurately categorize the intensity and damage potential of a hailstorm, especially towards the lower end of the scale. For example, without additional information, an event in which hail of up to walnut size is reported (hail size code 3: hail diameter of 21-30 mm) would be graded as a hailstorm with a minimum intensity of H2-3. Additional information, such as the ground wind speed or the nature of the damage the hail caused, would help to clarify the intensity of the event. For example, a fall of walnut-sized hail with little or no wind may scar fruit and sever the stems of crops but would not break vertical glass and so would be ranked H2-3. However, if accompanied by strong winds, the same hail may smash many windows in a house and dent the bodywork of a car, and so be graded an intensity as high as H5.

However, evidence indicates that maximum hailstone size is the most important parameter relating to structural damage, especially towards the more severe end of the scale. It must be noted that hailstone shapes are also an important feature, especially as the "effective" diameter of non-spheroidal specimens should ideally be an average of the co-ordinates. Spiked or jagged hail can also increase some aspects of damage.

Table 1.15

H	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Size codes are presented in Table 1.15. The Size Code is the maximum reported size code accepted as consistent with other reports and evidence.

Table 1.16

Size code	Maximum Diameter mm	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > Soft ball
9	91-100	Grapefruit
10	>100	Melon

SUMMARY AND CONCLUSIONS OF HAIL PROFILE

From January 1, 2012 through March 31, 2017, there have been 75 occurrences of Hail Events in the Purchase Region reported by NCEI. These occurrences totaled $15,000 in reported personal property damage. Data on Hail event magnitude in the form of hailstone diameter, is provided in the individual county sections of this plan.

Table 1.17 Hail Data by County
January 1, 2012 – March 31, 2017

County	Number	Dead/Injured	Value of Property Damage	Value of Crop Damage
Ballard County	2	0/0	$0	$0
Calloway County	25	0/0	$0	$0
Carlisle County	5	0/0	$0	$0
Fulton County	1	1/0	$0	$0
Graves County	18	0/0	$15K	$0
Hickman County	3	0/0	$0	$0
Marshall County	12	0/0	$0	$0
McCracken County	9	0/0	$0	$0
Purchase Region	**75**	**1/0**	**$15K**	**$ 0**

Source NOAA, NCEI, Storm Events Database

The Purchase Region experienced 75 Reported Hail Events over a 5.25 year period, which divides out to 14.3 Reported Hail Events per year or a better than 100% probability of a Hail Event in any given year. Common sense would dictate that the conditions that generated a Hail Event in one county could have generated a Hail Event in another. The county which recorded the most frequent Hail Events was Calloway County, with 25 events over 5.25 years, or 3.4 events per year. From a regional perspective the cost of a Hail Event could be calculated as:

- $15,000 divided by 75 events = $200 per event.
- $200 times 14.3 events/year = $2,860 average damage per year.

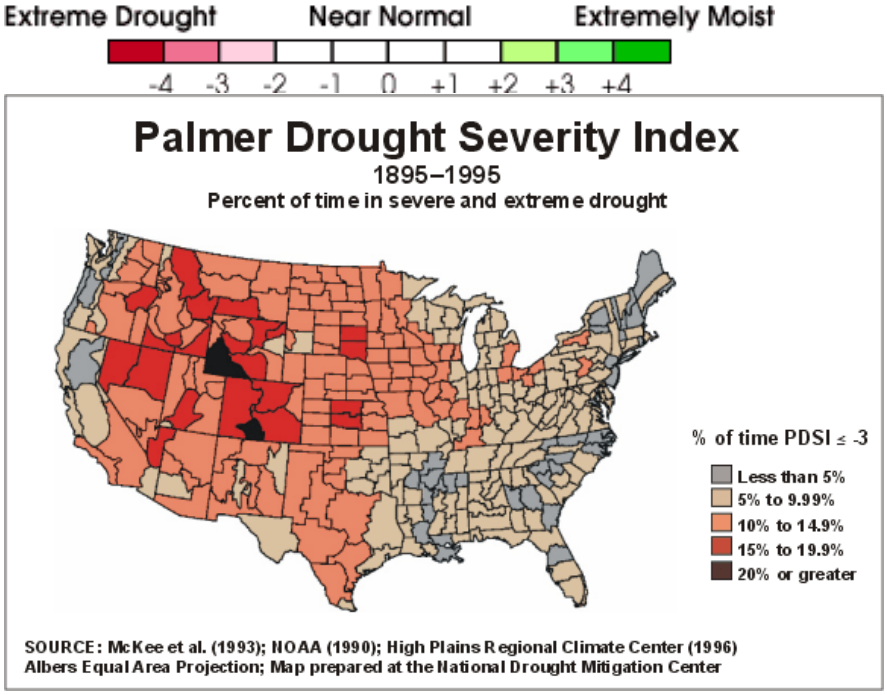
Hail Events can cause human injuries and even death. Fortunately, the human cost in the Purchase region has been low, no deaths or recorded injuries. The property damage amounts are largely accounted for by damage to roofs and to automobiles.

Excessive Heat / Drought

Excessive heat is defined as temperatures that hover 10 degrees or more above the average high temperatures for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. Droughts occur when a long period passes without substantial rainfall.

The Palmer Drought Severity Index (PDSI) is used to show the relative dryness or wetness in an area and indicates prolonged and abnormal moisture deficiency or excess. The PDSI is used for evaluating the scope, severity and frequency of prolonged periods of abnormally wet or dry weather (see Figure 1.12). The PDSI scale follows below.

Figure 1.14 Palmer Drought Severity Index



In the 100-year map for 1895 to 1995, the Western climate zone in Kentucky had a severe drought PDSI rating of greater than or equal to -3, 10% to 14.9% of the time.

Drought conditions can cause significant crop damage, but there is little property damage from excessive heat. Occurrences of drought and excessive heat in the region, these hazards present a threat not only to the agriculture of the region, but to the aged, and chronically ill population.

SUMMARY AND CONCLUSIONS OF EXCESSIVE HEAT / DROUGHT PROFILE

From January 1, 2012 to March 31, 2017, there were 90 recorded cases of Drought and 24 recorded cases of Excessive Heat in the Purchase Region. Information from the above table can be used to define the frequency of Drought Events and the impact of these events throughout the region.

Table 1.18 Excessive Heat/Drought Data by County
January 1, 2012 – March 31, 2017

County	Number	Dead/Injured	Value of Property Damage	Value of Crop Damage
Ballard County	11/3	0/0	$0	$0
Calloway County	13/3	0/0	$0	$0
Carlisle County	11/3	0/0	$0	$0
Fulton County	11/3	0/0	$0	$0
Graves County	11/3	0/0	$0	$0
Hickman County	11/3	0/0	$0	$0
Marshall County	11/3	0/0	$0	$0
McCracken County	11/3	0/0	$0	$0
Purchase Region	**90/24**	**0/0**	**$0**	**$0**

Source NOAA, NCEI, Storm Events Database

Drought Events were regional in nature and extent. The region experienced 90 Reported Drought Events over a 5.25 year period, which divides out to 17 Reported Drought Events per year, or a better than 100% probability of a Drought event somewhere in the Purchase Area in any given year. Common sense would dictate that the conditions that generated a Drought in one county could have generated a Drought Event in another. There were no deaths, injuries, property damage or crop damage reported during this period.

Of critical concern to the JPHMC, and the main contributing factor in their consideration of risks and vulnerability, is the human cost of Excessive Heat.

Wildfire

A wildfire is an uncontrollable burning of grasslands, brush or woodlands. The potential for wildfire depends on surface fuel characteristics, weather conditions, recent climate conditions, and topography and fire behavior. There are three different types of wildfire classes:

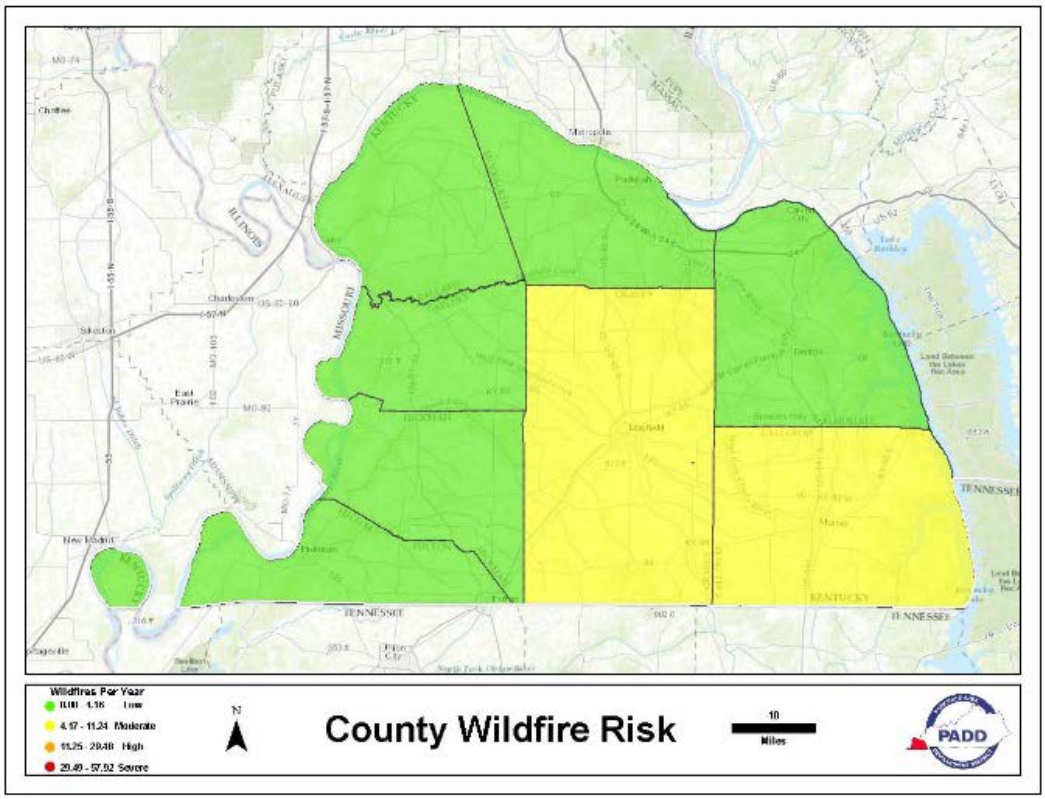
- *Surface fires* are the most common type. These fires burn along the forest floor moving slowly and will damage and kill trees.
- *Ground fires* are usually started by lightening. These fires burn on or below the forest floor.
- *Crown fires* are spread quickly by wind. These fires will move quickly by jumping along tree tops.
    - *Spotting* can be produced by crown fires as well as wind and topography conditions. Large burning embers are thrown ahead of the main fire. Once spotting begins, the fire will be very difficult to control.

Kentucky has two defined wildfire seasons: in the spring, February 15 – April 30 and in the fall, October 1 – December 15. These two seasons are separated by periods of higher moisture and colder, less conducive fire weather. When leaves begin to fall from deciduous hardwood trees a thick litter layer forms in wooded areas creating a fuel source for rapidly expanding wildfires. Also, during the fall season, or periods of drought, tall grasses can become very flammable. It is possible for wildfires to occur outside the defined fire seasons during prolonged periods of drought.

Specific outdoor burning laws have been established to lessen the wildfire occurrence during these fire seasons. Kentucky Revised Statute 149.400 prohibits outdoor burning during the defined fire seasons between 6 am and 6 pm unless at a distance of at least 150 feet from woodlands or brushland. In Kentucky, wildfire risks are compounded by the state's extremely high arson rate. Sixty-two percent of Kentucky's wildfires are deliberately set by arsonists.

The biggest threat of wildfires in Kentucky exists in the eastern part of the state. In western Kentucky, specifically the Purchase Region, wildfires are less common. The 2013 State Hazard Mitigation Plan utilized a county risk assessment model to calculate county-level risk. This model was created using the *Average Annual Loss* data for each county. The average annual loss is calculated by multiplying each county's annual rate of occurrence by the average losses (See the 2013 State Hazard Mitigation Plan for more information.) This data was then joined to a county map for display purposes. The Purchase counties are seen in Figure 1.15. Based on this model the Purchase counties are at a moderate to low risk of wildfire occurrences.

Figure 1.15 County Wildfire Risk



Source: United States Department of Agriculture, United States Forestry Service

SUMMARY AND CONCLUSIONS FOR WILDFIRE PROFILE

From January 1, 2012 through March 31, 2017, there have been zero occurrences of Wildfire Events reported in the Purchase Region by the NCEI. In a search of the NCEI Storm Events Database there are only 11 reported events for the entire region. These recorded events occurred between February 1996 and January 2006. The last and only recorded event in the region occurred on February 20, 2004. These figures do not include and should not be construed to be the limit of the cost of brushfire suppression in the Purchase Region. Local volunteer fire departments and fulltime paid departments spend considerable time and resources in suppressing brushfires. Rather these figures serve to indicate the relatively low historical threat of large Wildfire Events in the region.

SUMMARY AND CONCLUSIONS FOR WILDFIRE PROFILE

From January 1, 2012 through March 31, 2017, there have been zero occurrences of Wildfire Events reported in the Purchase Region by the NCEI. In a search of the NCEI Storm Events Database there are only 11 events recorded for the entire region. These recorded events occurred between February 1996 and January 2006. Eleven events divided by 21 years (1996 – 2017) = 0.52 reported events per year, or a 52% probability that such an event will occur in any given year.

The NCEI Database indicates $0.00 in property or crop damages reported; however, the Event Details: Episode Narrative gives an indication of acres burned for some of the bigger outbreaks. In the 1996 event it is recorded that most fires were 20 acres or less, but a larger event near Symsonia (Graves County) burned about 100 acres. The Events from 2004 indicated a grass and woods fire in Calloway County burned 20 acres and a field fire in Marshall County burned 25 acres. In 2005, a few miles southeast of Benton (Marshall County), a field fire consumed 125 acres. The last Event on record occurred in 2006. A 300-acre grass and brush fire in western McCracken County, near Grahamville, burned. The complete history of wildfire events in the Purchase Region can be reviewed in Appendix 1.

With limited historic data for damages to support wildfire as a hazard in the Purchase, does not mean that there have not been instances of brush fires that had or will have the potential to grow out of control, especially during periods of drought events. These figures do not include and should not be construed to be the limit of the cost of brushfire suppression in the Purchase Region. Rather these figures serve to indicate the relatively low historical threat of large Wildfire Events in the region. Local volunteer fire departments and fulltime paid departments spend considerable time and resources in suppressing brushfires.

According to information found in the 2013 State Hazard Mitigation Plan, using the county risk assessment model, The Purchase counties of Graves and Calloway are considered to be at moderate risk and Ballard, Carlisle, Hickman, Fulton, McCracken and Marshall Counties are low risk. The total loss in the region $1,153.00 with average annualized losses at $46.00. It is therefore included as a Hazard in the risk assessment, albeit a low risk, but a risk that needs to be continually assessed and planned for and perhaps anticipated.

Dam Failure

There is no historical occurrence of damage or injury due to a dam failure in the Purchase Region. However, dam failure is considered a hazard. There are approximately 80,000 regulated dams in the United States. In Kentucky the Division of Water regulate 81 dams in the region. Dams are classified based on the evaluation of damage possible downstream. The FEMA guide to dam classifications is listed in Table 1.13.

Table 1.19 FEMA Dam Classification

Classification	Description
Class A (Low)	No loss of human life is expected and damage will only occur to the dam owner's property.
Class B (Moderate/Significant)	Loss of human life is not probable, but economic loss, environmental damage, and/or disruption of lifeline facilities can be expected.
Class C (High)	Loss on one or more human life is expected. Economic loss, environmental damage, and/or disruption of lifeline facilities can be expected but are not necessary for this classification.

Source: FEMA 333;
Federal Guidelines for Dam Safety Hazard Potential Classification System for Dams

Table 1.20 Dam Classification by County

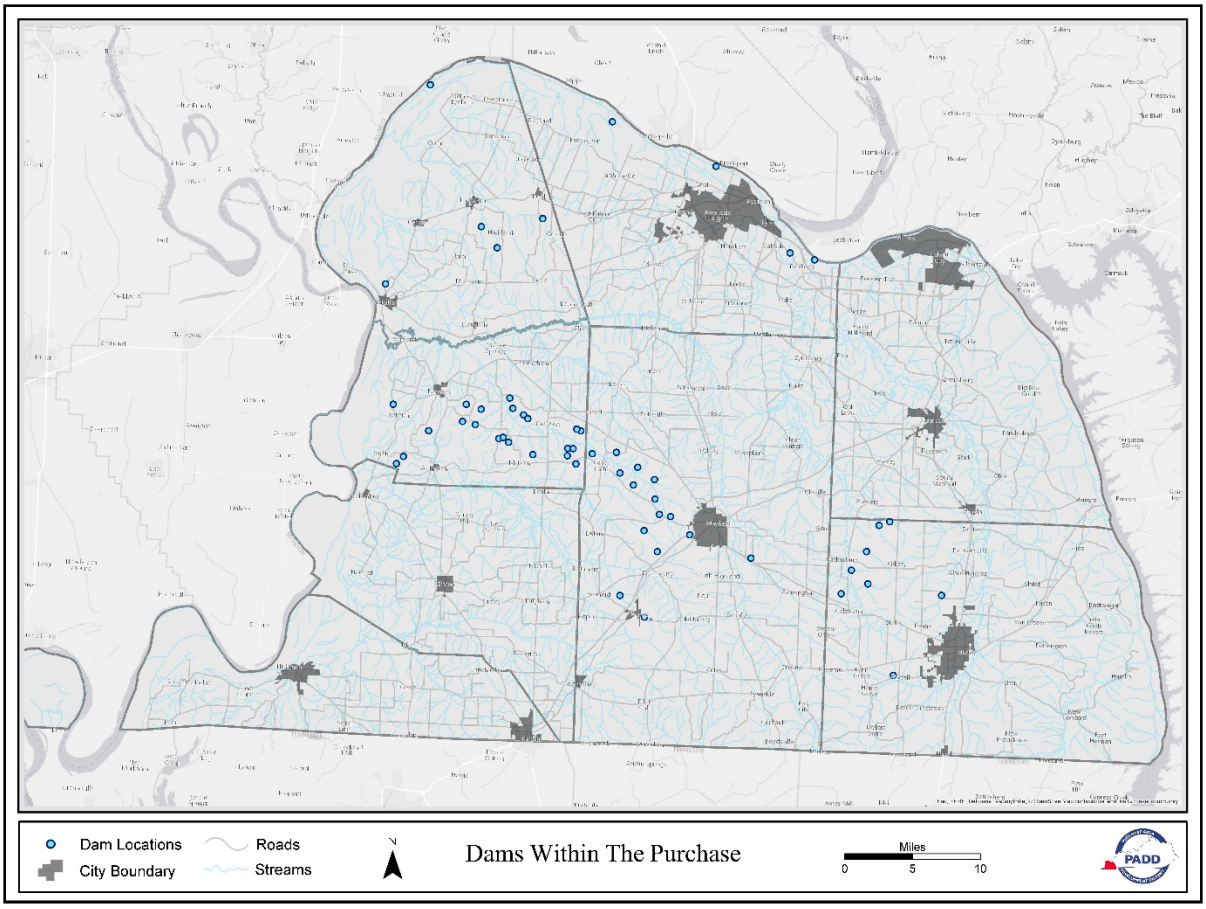
Table 1.20 lists the existing dams in the area by classification. The Purchase Region has 81 dams, 66 evaluated as Class A and six evaluated as Class B and nine Class C.

County	Class A (low)	Class B (moderate)	Class C (high)
Ballard	3	1	0
Calloway	7	1	0
Carlisle	22	0	1
Graves	23	2	6
Hickman	5	1	0
Marshall	3	1	2
McCracken	3	0	0
Purchase Region	**66**	**6**	**9**

The only new dam planned for the Purchase Region is the structure currently under construction near Oldstead, Illinois which adjoins Ballard County on the Kentucky side of the Ohio River. This dam is a Unites States Army Corps of Engineers project and Ballard County has no jurisdiction on construction or operation of this structure.

Not included in this list are the two large dams, Kentucky Dam and Barkley Dam which impound the Tennessee and Cumberland Rivers respectively. Both the Tennessee Valley Authority (TVA), (Kentucky Dam) and the Corps of Engineers (Barkley Dam) were invited to attend JPHMC Meetings, and asked to provide inundation maps for catastrophic failure of dams they managed. The inundation maps have not been made available.

Figure 1.16 Purchase Region Dam Location Map



Source: includes both Kentucky Regulated and United States Army Corps of Engineers Managed Dams. Level Descriptions are obtained from the USDA Release 60.

SUMMARY AND CONCLUSIONS FOR DAM FAILURE HAZARD PROFILE

There is no historical occurrence of damage or injury due to a dam failure in the Purchase Region. However, the best data available for this plan indicates that the failure of either of the two major dams, Barkley Dam on the Cumberland River or, Kentucky Dam on the Tennessee River, would totally inundate the 100 year flood plains for those rivers. Posing at least the same risk detailed in the Risk Assessment portions of the Annexes for the downstream counties of Marshall, McCracken and Ballard, and to some extent Carlisle Hickman and Fulton.

1:4.3 Assessing Vulnerability: Identifying Assets

Kentucky's ADDs should be thought of as partnerships of local units of government. The objective of the JPHM Plan is to encourage the various jurisdictions in the Purchase Region to consider natural hazards in all planning and development decisions for the future. The PADD has no authority over the activities of any of its member jurisdictions. It has served as the initial focal point and forum respectively, for coordinating the hazard mitigation activities of individuals, organizations, local governments, and private industry. The authority and ability to implement hazard mitigation activities resides in the county and city governments.

The effort to identify assets and formulate mitigation goals and develop mitigation activities has been focused at the jurisdictional rather than at the regional level. The Identification of Assets and Assessment of Vulnerability and Analysis of Development Trends are all addressed in detail in each county Annex to the plan. The county Annexes are intended to virtually serve as standalone plans. The hazards, risks, goals and strategies of are tailored to each county's needs and priorities. The purpose of the annexes is to focus each county's limited fiscal and personnel resources, and to give them ownership and responsibility for the plan, its maintenance and its revision. In addition it is intended that the county Annexes may serve to support or augment other planning documents like comprehensive plans, economic development plans or emergency operations plans.

What follows is a regional summary to provide an overview of the more specific data included in the county Annexes of this plan.

HIGH RISK HAZARDS	FLOOD/FLASH FLOOD THUNDERSTORM WIND EARTHQUAKE WINTER STORM/ICE STORM
MODERATE RISK HAZARDS	HAIL EXCESSIVE HEAT / DROUGHT
LOW RISK HAZARDS	WILDFIRE DAM FAILURE

In terms of the human toll in dead and injured, Tornadoes rank as the Purchase Region's most costly natural hazard. Excessive Heat is another natural hazard that has directly resulted in the death of residents in the region, and ranks second as a cause of injuries, followed by Flooding and by Thunderstorm Wind. The human cost of a major earthquake in the region is a matter of conjecture. Each of these hazards put at risk the entire population of the Purchase Region. Additional information on potential earthquake losses, can be found in Appendix 2. Property damage figures used throughout this plan are necessarily general. Figures in Table 1.15 have been taken from U.S. Census Bureau Mitigation Plan.

Table 1.21 Flood Hazard Vulnerable Residential Structures by County

County	Number of Residential Structures			Total Property Value		Number of People		
	Structures in County*	Structures in Hazard Area**	% in Hazard Area**	Total Value in County***	Value in Hazard Area**	Residents*	Residents in Hazard Area**	% in Hazard Area**
Ballard	3,889	147	3.7%	$545,949,576	$18,016,336	8,256	305	3.7%
Calloway	18,237	101	0.5%	$2,355,178,011	$9,420,712	38,106	229	0.6%
Carlisle	2,426	80	3.2%	$234,857,047	$751,543	4,984	199	4%
Fulton	3,360	268	7.8%	$277,810,192	$21,669,195	6,422	450	7%
Graves	16,753	361	2.2%	$1,886,576,304	$41,504,679	37,502	1,013	2.7
Hickman	2,335	147	6.3%	$265,028,387	$16,696,788	4,720	189	4.0%
Marshall	15,898	444	2.8%	$2,457,186,169	$68,801,213	31,181	1,871	6.0%
McCracken	31,342	768	2.5%	$5,111,587,459	$127,789,686	65,408	2,158	3.3%
Total	**94,240**	**2,818**	**2.9%**	**$13,134,173,145**	**$304,650,152**	**196,579**	**6,733**	**3.2%**

*Sources: * U.S Census Bureau 2011-2015 American Community Survey 5 Year Estimates,*
*** PADD GIS Database, HAZUS, ***Kentucky Revenue Cabinet*

In terms of known property damage, Hail damage should perhaps be taken with a grain of salt. Certainly the amount of damage sustained over the years is significant, but hail damage is, for the most part, not catastrophic, perhaps only in the rare case that the integrity of a roof is compromised followed by torrential rains.

Consequently, other hazards with lower actual property damage figures rate as a higher risk in the view of the JPHMC. The impact of Winter Storms for instance is deemed higher due to the factors of overall economic and social cost of the disruption of the transportation infrastructure caused by severe winter conditions.

Once again the wild card in the assessment of property damage is the Earthquake threat, which can only be estimated. Referring to the results of a Wabash Valley 7.0 Earthquake Scenario (IX or Ruinous on the Mercalli Scale), 7% of the building inventory on the region could receive at least moderate damage. More detailed analysis is available in Appendix 2. The property vulnerability or damage exposure to the hazards of Tornado, Thunderstorm Wind and Earthquake is equal in to the property value for each county as the hazards are not limited to a particular geographic region

<u>Impact & Frequency</u>
The impact and frequency of each hazard is identified in each hazard profile in the previous section through impact and frequency tables and graphs. Impact is addressed further in the charts and narrative discussions found in the county asset vulnerability sections of this plan.

Identification of Assets

The county sections of this plan identify what can be affected by each hazard considered for the Purchase Region. The Hazards are addressed in the order in which they were prioritized by the MPTs of each county. The information to complete the county Sections was collected from a variety of sources including the local government provided insurance replacement values for Critical Facilities when available, imagery/Flood Plain GIS layer derived data, the NCEI, and the Kentucky Revenue Cabinet. The information was collected, mapped and summarized by the PADD staff and reviewed and analyzed by the JPHMC for inclusion in the plan.

MPT members for each jurisdiction reviewed the county level information to determine the vulnerability in each community. Maps were created by the PADD staff to illustrate the location areas in counties and local jurisdictions for identified Flood Hazard, Landslide and Wildfire threat areas.

For the other hazards identified in the plan, JPHMC members determined tornados, thunderstorm wind, earthquakes, and winter storms have the potential affect anything within each jurisdiction depending on the path of the hazard event. These hazards and their occurrence are not limited to any particular area based on past historical events and documentation as provided in the hazard profiles for the hazards. These hazards can affect any jurisdiction at any time making every asset of each jurisdiction vulnerable. Because these hazards make all jurisdictions and their assets vulnerable, only maps specific to flooding hazard, wildfire hazard, and landslide hazard areas were created.

Critical Facilities and Infrastructure

For the purpose of this plan, the JPHMC adopted the definitions of the FEMA HAZUS Loss Estimation Model according to FEMA publication 386-1, version 1.0, and pages 3-9 that states the following definitions of critical facilities and infrastructure. HAZUS separates critical facilities into five categories based on their loss potential. It was determined by the JPHMC that Hazardous Materials Facilities were not a critical facility as long as the existing hazardous materials were kept secure. For the purpose of this plan, all of the following elements are considered critical facilities except Hazardous Materials Facilities.

FEMA Critical Facilities Definitions

- Transportation Facilities include airways – airports, heliports; highways – bridges, tunnels, roadbeds, overpasses, transfer centers; railways – track segments, tunnels, bridges, rail yards, depots; waterways – canals, locks, seaports, ferries, harbors, docks, and piers.

- Lifeline Utility Systems such as potable water, wastewater, oil, natural gas, electric power and communication systems.

- Essential Facilities are essential to the health and welfare of the whole population and are especially important following hazard events. Consider not only their structural integrity and content value, but also the effects on the interruption of their functions because the vulnerability is based on the service they provide rather than simply their physical aspects. Essential Facilities include hospitals and other medical facilities, police and fire stations, emergency operations systems, evacuation shelters, schools, and health and human services to the PADD.

- High Potential Loss Facilities are facilities that would have a high loss associated with them, both physical and economical, such as nuclear power plants, dams, and military installations.

- Hazardous Materials Facilities include facilities housing industrial/hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins. (Note: Not considered in this Plan)

Critical Facilities Estimated Replacement Value Methodology

Due to a software compatibility problem between FEMA's HAZUS Program, ESRI's Arc and MS Windows, PADD staff was unable to generate complete critical facilities values for the region. FEMA and KYEM have acknowledged this issue and have committed to resolving this problem however this process will not be complete before the region plan expires.

As a result, staff has supplemented updated HAZUS information when available with local data to establish the estimated value of critical facilities. As a last result, data generated during the 2012 update cycle has been utilized to complete tables. For purposes of the update to the 2018 JPHM Plan, this combination of data sources constitutes the best data available.

PADD staff used a combination of GIS data sources and local GIS data layers to build maps of the critical facilities and infrastructure for each jurisdiction found in the hazard area. Because most of the critical facilities are located throughout the counties, estimates were done on a county basis.

Facilities Critical to the Entire Region

The JPHMC recognized that certain facilities, regardless of the level of jurisdictional ownership or control, are critical to the region as a whole. These "Regional" Critical Facilities are:

Transportation Facilities:

- Barkley Regional Airport
- Kyle-Oakley Airport (Murray)
- Mayfield-Graves County Airport
- Virgil Craven Memorial Airport (Fulton)
- Kentucky Dam Village State Resort Park Airport
- Dorena-Hickman Ferry
- Highway U.S. 51 Ohio River Bridge Wickliffe to Cairo
- Highway U.S. 45 Ohio River Bridge Paducah to Brookport
- Highway KY 80 Tennessee River Bridge from Aurora to Fenton
- Highway U.S. 60 Tennessee River Bridge at Ledbetter
- Highway U.S. 62 Tennessee River Bridge at Gilbertsville/Kentucky Dam
- Interstate 24 Ohio River and Tennessee River Crossings
- All I-24 overpasses and bridges
- All Purchase Parkway (future I-69) overpasses and bridges
- Railroad bridges over the Tennessee, and Ohio Rivers

Essential Facilities:

- Baptist Health Hospital-Paducah
- Jackson Purchase Medical Center-Mayfield
- Lourdes Hospital-Paducah
- Murray Calloway County Hospital-Murray
- Marshall County Hospital

High Potential Loss Facilities:

- Kentucky Dam-Gilbertsville
- Shawnee Power Plant-East Paducah
- US Department of Energy Campus-West Paducah
- Murray State University-Murray
- West Kentucky Community and Technical College

Types and Numbers of Buildings: Earthquake and Severe Weather Hazards

Severe Weather Hazards and Earthquakes have been determined to potentially affect anything within each jurisdiction depending on the path of the hazard event. These hazards and their occurrences are not limited to any particular area based on past historical events and documentation is provided in the hazard profiles.

Table 1.22 lists the total number of residential structures vulnerable to these hazards. This table represent residential structures only and was derived from 2010 Census data. Due to data limitations, the numbers of other types of structures was not available at the time of this plan. Future updates of the plan will include numbers of other types of structures as data becomes available.

Table 1.22 Purchase Region Severe Weather/Earthquake Hazard Vulnerable Assets

County	Number of Residential Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Ballard	3,889	3,889	100%
Calloway	18,065	18,065	100%
Carlisle	2,426	2,426	100%
Fulton	3,360	3,360	100%
Graves	16,753	16,753	100%
Hickman	2,335	2,335	100%
Marshall	15,898	15,898	100%
McCracken	31,342	31,342	100%
Total	**94,240**	**94,240**	**100%**

Sources: U.S Census Bureau 2011-2015 American Community Survey 5 Year Estimates

Critical Facilities and Infrastructure at Risk: Severe Weather and Earthquake Hazards

Using the HAZUS MH definition for critical facilities and infrastructure, the PADD staff identified types and numbers of critical facilities and infrastructure that are vulnerable to Tornados, Thunderstorm Wind, Winter Storm, and Earthquakes in the Purchase Region.

Table 1.23 Purchase Region Critical Facilities & Infrastructure Severe Weather and Earthquake

Type of Facility	Facility Name	Current Replacement Value
Airport	Barkley Regional Airport (Paducah)	$94,000,000
Airport	Kyle-Oakley Airport (Murray)	$2,000,000
Airport	Mayfield-Graves County Airport	$2,750,000
Airport	Virgil Craven Memorial Airport, Fulton	
Airport	Kentucky Dam Village State Park Airport, Gilbertsville	
Ferry	Dorena-Hickman Ferry, Hickman	
Bridge	Highway U.S. 51 Ohio River	$150,000,000
Bridge	Highway U.S. 45 Ohio River	$165,000,000
Bridge	Highway KY 80 Tennessee River	$125,000,000
Bridge	Highway U.S. 60 Tennessee River	$125,000,000
Bridge	Highway U.S. 62 Tennessee River Bridge	$125,000,000
Bridge	RR Bridges over the Tennessee, and Ohio Rivers	
Bridge	Interstate 24 Ohio River and Tennessee River	$250,000,000
Bridge	All I-24 overpasses and bridges	
Bridge	All Purchase Parkway overpasses and bridges	
Hospital	Baptist Health Hospital, Paducah	$736,200,000
Hospital	Lourdes Hospital, Paducah	$118,000,000
Hospital	Jackson Purchase Medical Center, Mayfield	$65,000,000
Hospital	Murray Calloway County Hospital, Murray	$55,000,000
Hospital	Marshall County Hospital, Benton	$39,000,000
Dam/Hydroelectric	Kentucky Dam-Gilbertsville	
Power Plant	Shawnee Power Plant-West Paducah	
Other	US Department of Energy Campus-West Paducah	
University	Murray State University	$1,175,000,000
University	West Kentucky Community & Technical College	

Critical Facilities and Infrastructure at Risk: Flooding

The PADD GIS staff produced tables which provide an accurate estimate the number of residential structures and Critical Facilities that are vulnerable to flooding. Imagery coverage flown in 2010 was overlaid with the FEMA Flood Hazard Area Maps revised in 2009. GPS structure points, overlain with the Flood Hazard Areas were the primary source of at risk data, and for all counties the PADD's data and Water Information System data base were used to determine at risk Critical Facilities.

Table 1.24 summarizes the numbers of structures in the Flood Hazard area for each county. These figures by default are also applicable to the vulnerability of structures to Dam Failure.

Table 1.24 Purchase Region Flood Hazard Vulnerable Assets

County	Estimated Number of Residential Structures In Flood Hazard Areas		
	Number of Structures in County	Percentage of Structures in Flood Hazard Area	Number of Structures in Flood Hazard Area
Ballard	3,889	3.7%	147
Calloway	18,237	0.5%	101
Carlisle	2,426	3.2%	80
Fulton	3,360	7.8%	268
Graves	16,753	2.2%	361
Hickman	2,335	8.3%	147
Marshall	15,898	2.8%	444
McCracken	31,342	2.5%	768
Total	**94,240**	**2.5%**	**2,316**

Sources: U.S Census Bureau 2011-2015 American Community Survey 5 Year Estimates
PADD GIS Database

Table 1.25 lists the regional critical facilities and infrastructure in the identified flood hazard areas for the Purchase Region. All of these facilities are engineered to be unaffected by 100 year flooding.

Table 1.25 Purchase Region Critical Facilities & Infrastructure: Flood Vulnerability

Type of Facility	Facility Name	Replacement $$
Bridge	Highway U.S. 51 Ohio River	$150,000,000
Bridge	Highway U.S. 45 Ohio River	$165,000,000
Bridge	Highway KY 80 Tennessee River	$125,000,000
Bridge	Highway U.S. 60 Tennessee River	$125,000,000
Bridge	Highway U.S. 62 Tennessee River Bridge	$125,000,000
Bridge	RR Bridges over the Tennessee, and Ohio Rivers	
Bridge	Interstate 24 Ohio River and Tennessee River	$250,000,000
Bridge	All I-24 overpasses and bridges	
Bridge	All Purchase Parkway overpasses and bridges	
Ferry	Dorena-Hickman Ferry	
Dam/Hydroelectric	Kentucky Dam-Gilbertsville	

Types and Numbers of Buildings: Wildfire Hazard

Table 1.26 represents the Wildland/Urban Interface Wildfire Risk for residential structures only, and was derived from 2011-2015 American Community Survey. Due to data limitations, the numbers of other types of structures was not available at the time of this plan. Future updates of the plan will include numbers of other types of structures as data becomes available.

Table 1.26 Purchase Region Wildland/Urban Interface Wildfire Risk

County	Number of Residential Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Ballard	3,889	72	1.9
Calloway	18,237	153	0.8
Carlisle	2,426	5	0.2
Fulton	3,360	6	0.2
Graves	16,753	156	0.9
Hickman	2,335	5	0.2
Marshall	15,898	168	1.1
McCracken	31,342	148	0.5
Total	**94,240**	**713**	**0.8%**

Sources: U.S. Census Bureau 2011-2015 American Community Survey 5 Year Estimate, Purchase Area Development District GIS Database

Critical Facilities and Infrastructure at Risk in the Wildland/Urban Interface

None of the Regional Critical Facilities are affected by the Wildfire Hazard. For vulnerability of Critical Facilities in each jurisdiction, see the appropriate county Annex.

Future Development: Types and Numbers of Future Buildings, Critical Facilities, and Infrastructure

The Purchase Region is expected to grow very slowly in population over the next ten years, and in some counties not at all. There will likely be little increase in the number of residential structures, or critical facilities and infrastructure. The Flood Plain Management ordnances will restrict building of residential structures in mapped flood prone areas. There are no significant changes in land use anticipated for the region and it should remain primarily rural/agricultural. Should land use changes occur, they will be included in future updates of the plan where applicable.

Table 1.27 Census Projections for the Purchase Region of Kentucky

County	Census 2000	Census 2010	Census 2015	Census Projection				
				2020	2025	2030	2035	2040
Kentucky	4,041,769	4,339,367	4,425,092	4,533,464	4,634,415	4,726,382	4,808,682	4,886,381
Ballard	8,286	8,249	8,212	8,164	8,097	8,005	7,906	7,780
Calloway	34,177	37,191	38,343	39,328	40,487	41,687	42,604	43,503
Carlisle	5,351	4,874	5,036	4,737	4,604	4,450	4,298	4,139
Fulton	7,752	6,238	6,528	5,726	5,252	4,789	4,349	3,939
Graves	37,028	37,421	37,433	37,883	38,243	38,483	38,657	38,788
Hickman	5,262	4,612	4,767	4,349	4,077	3,803	3,563	3,306
Marshall	30,125	31,101	32,301	31,149	31,060	30,830	30,347	29,980
McCracken	65,514	65,018	66,188	65,317	65,487	65,376	64,918	64,273
Purchase	**193,495**	**195,819**	**195,313**	**196,653**	**197,307**	**197,423**	**196,732**	**195,708**

Source: U.S. Census Bureau, http://www.ksdc.louisville.edu/data-downloads/projections/ 2017

New Residential Structures – Tornado, Earthquake, Thunderstorm Wind, Winter Storm

The PADD staff calculated the estimated future residential structure growth by multiplying the existing number of residential structures by the expected growth rate for each county. Results of these calculations are represented in the following table. These numbers would represent the approximate number of future residential structures vulnerable to tornadoes, earthquakes, thunderstorm wind, and winter storms.

Table 1.28 Estimated Future Structure Growth for the Purchase Region

County	Estimated Housing Units (2015)	Estimated % Household Growth Rate (2025)	Estimated Future Growth	Median Structure Value	Estimated Value of Future Growth
Ballard	3883	0.79%	31	$101,800	$3,155,800
Calloway	18,537	7.20%	1335	$119,900	$160,066,500
Carlisle	2437	-6.53%	-159	$77,200	*
Fulton	3,359	-15.81%	-531	$61,000	*
Graves	16,741	2.79%	467	$92,900	$43,384,300
Hickman	2,338	-8.68%	-203	$68,400	*
McCracken	31,544	2.04%	643	$111,600	$71,758,800
Marshall	15,982	1.45%	232	$124,400	$28,860,800
Purchase	**94,821**	**2.01%**	**1906**		

* Projected Negative Growth Rate

Source: EHHGR - Kentucky State Data Center (Vintage 2016)

EHU - US Census Bureau, Population Division (June 2017)

MSU - American Community Survey 5- Year Estimates (2011-2015)

The PADD staff and JPHMC members discussed potential increase in numbers of vulnerable critical facilities, industry and infrastructure; however, there was no consensus for making a reliable calculation. In future updates, involvement from the local planning process may assist in estimating the increase of critical facilities and infrastructure based on projected population growth.

In summary, JPHMC members have estimated the numbers of existing residential structures that are located in hazard areas. Future updates of this plan may include actual point data for building locations which will revise the vulnerability figures downward. Better data may result in a better estimate of growth and future buildings for each county, and the region as a whole, that will allow a more accurate assessment of vulnerable assets.

This information was used to determine mitigation strategies and actions to help reduce potential losses from hazard events.

1:4.4 Assessing Vulnerability: Estimating Potential Losses

Tornado, Earthquake, Thunderstorm Wind, Winter Storm

This information was used to determine mitigation strategies and actions to help reduce potential losses from hazard events. Assessing Vulnerability: Estimating Potential Dollar Losses. The total valuation of adjusted property as provided by the Kentucky Department of Revenue was used to estimate the potential dollar loss for all vulnerable structures for the following hazards: Tornado, Thunderstorm Wind including Hail, Winter Storm, and Earthquake.

Table 1.29 summarizes the total value of adjusted property as provided by the Kentucky Department of Revenue, and the population for each county as provided by 2011-2015 American Community Survey information. These values were used to determine potential dollar losses and the number of people at risk in each county and all their jurisdictions, for those hazards that have no defined area: tornado, thunderstorm wind, winter storm, and earthquake.

Table 1.29 Total Value of Adjusted Property for the Purchase Region

County	County Square Miles	Population 2011-2015 ACS	Total Property Value 2016($)
Ballard	273.70	8,256	545,949,576
Calloway	412.50	38,106	2,355,178,011
Carlisle	199.10	4,984	234,857,047
Fulton	230.70	6,422	277,810,192
Graves	556.00	37,502	1,886,576,304
Hickman	253.20	4,720	265,028,387
Marshall	340.00	31,181	2,457,186,169
McCracken	268.30	65,408	5,111,587,459
Purchas Region	**2,433.5**	**196,579**	**13,134,173,145**

Source: Kentucky State Hazard Mitigation Plan. 2011-2015 American Community Survey 5 Year Estimate, Kentucky Revenue Cabinet, Year Estimate, Kentucky Revenue Cabinet, https://revenue.ky.gov/Property/Pages/default.aspx

Critical Facilities and Infrastructure for Severe Weather and Earthquakes

Table 1.30 summarizes the potential dollar loss of the vulnerable Regional Critical Facilities and infrastructure to the non-geospecific hazards of Severe Weather and Earthquakes for the Purchase Region. Additional information on potential earthquake losses, especially for in-ground infrastructure can be found in the Appendix 2.

Table 1.30 Purchase Region Critical Facilities & Infrastructure

Type of Facility	Facility Name	Replacement Cost
Airport	Barkley Regional Airport (Paducah)	$94,000,000
Airport	Kyle-Oakley Airport (Murray)	$2,000,000
Airport	Mayfield-Graves County Airport	$2,750,000
Airport	Virgil Craven Memorial Airport, Fulton	
Airport	Kentucky Dam Village State Park Airport, Gilbertsville	
Ferry	Dorena-Hickman Ferry, Hickman	
Bridge	Highway U.S. 51 Ohio River	$150,000,000
Bridge	Highway U.S. 45 Ohio River	$165,000,000
Bridge	Highway KY 80 Tennessee River	$125,000,000
Bridge	Highway U.S. 60 Tennessee River	$125,000,000
Bridge	Highway U.S. 62 Tennessee River Bridge	$125,000,000
Bridge	RR Bridges over the Tennessee, and Ohio Rivers	
Bridge	Interstate 24 Ohio River and Tennessee River	$250,000,000
Bridge	All I-24 overpasses and bridges	
Bridge	All Purchase Parkway overpasses and bridges	
Hospital	Baptist Health Hospital, Paducah	$736,200,000
Hospital	Lourdes Hospital, Paducah	$118,000,000
Hospital	Jackson Purchase Medical Center, Mayfield	$65,000,000
Hospital	Murray Calloway County Hospital, Murray	$55,000,000
Hospital	Marshall County Hospital, Benton	$39,000,000
Dam/Hydroelectric	Kentucky Dam-Gilbertsville	
Power Plant	Shawnee Power Plant-West Paducah	
Other	US Department of Energy Campus-West Paducah	
University	Murray State University	$1,175,000,000
University	West Kentucky Community & Technical College	
TOTAL		**$3,187,950,000**

Sources: When available local data was used and all other values were determined using HAZUS MH. The numbers of water treatment facilities are derived from Kentucky Infrastructure Authority, Water Resource Information System data and the costs were calculated based on standard planning costs.

Flood

After the vulnerability maps were created for the flood hazard areas, the cost associated with replacing those structures was evaluated. It was the determination of the PADD staff that the best way to estimate the potential dollar loss associated with the flood hazard areas was to use the median structure value as identified by the 2010 Census. Table 1.31 depicts the median residential structure value used to determine the value of structures located in flood hazard

areas (Table 1.32) and the average number of people per household according to 2010 Census information.

Table 1.31 Value of Residential Structures in Hazard Area

Jurisdiction	Median Structure Value*	People per Household**
Ballard County	$43,175	2.41
Calloway County	$119,900	2.35
Carlisle County	$77,200	2.39
Fulton County	$61,000	2.25
Graves County	$92,90000	2.49
Hickman County	$68,400	2.28
McCracken County	$124,400	2.38
Marshall County	$111,600	2.42

** U.S Census Bureau 2011-2015 American Community Survey 5 Year Estimates*
*** 2010 Census*

Table 1.32 Flood Hazard Vulnerable Residential Structures by County

County	Number of Residential Structures			Total Property Value		Number of People		
	Structures in County*	Structures in Hazard Area**	% in Hazard Area**	Total Value in County***	Value in Hazard Area**	Residents*	Residents in Hazard Area**	% in Hazard Area**
Ballard	3,889	147	3.7%	$545,949,576	$18,016,336	8,256	305	3.7%
Calloway	18,237	101	0.5%	$2,355,178,011	$9,420,712	38,106	229	0.6%
Carlisle	2,426	80	3.2%	$234,857,047	$751,543	4,984	199	4%
Fulton	3,360	268	7.8%	$277,810,192	$21,669,195	6,422	450	7%
Graves	16,753	361	2.2%	$1,886,576,304	$41,504,679	37,502	1,013	2.7
Hickman	2,335	147	6.3%	$265,028,387	$16,696,788	4,720	189	4.0%
Marshall	15,898	444	2.8%	$2,457,186,169	$68,801,213	31,181	1,871	6.0%
McCracken	31,342	768	2.5%	$5,111,587,459	$127,789,686	65,408	2,158	3.3%
Total	**94,240**	**2,818**	**2.9%**	**$13,134,173,145**	**$304,650,152**	**196,579**	**6,733**	**3.2%**

*Sources: * U.S Census Bureau 2011-2015 American Community Survey 5 Year Estimates,*
*** PADD GIS Database, HAZUS & PVA information, ***Kentucky Revenue Cabinet and PVA data.*

Critical Facilities and Infrastructure

Table 1.33 lists the Regional Critical Facilities and infrastructure in the identified special flood hazard areas for the Purchase Region. All of these facilities are engineered to be unaffected by 100 year flooding. In recent episodes, only the elevated road approaching the U.S. 51 Bridge was affected by the high water, e.g. closed by high water. The actual bridge approaches were not affected, and the bridge opened to traffic as soon as the highway was cleared, inspected and necessary repairs effected.

Table 1.33 Purchase Region Critical Facilities & Infrastructure, Flood Vulnerability

Type of Facility	Facility Name	Replacement $$
Bridge	Highway U.S. 51 Ohio River	$150,000,000
Bridge	Highway U.S. 45 Ohio River	$165,000,000
Bridge	Highway KY 80 Tennessee River	$125,000,000
Bridge	Highway U.S. 60 Tennessee River	$125,000,000
Bridge	Highway U.S. 62 Tennessee River Bridge	$125,000,000
Bridge	Railroad Bridges over Tennessee and Ohio Rivers	
Bridge	Interstate 24 Ohio River and Tennessee River	$250,000,000
Ferry	Dorena-Hickman Ferry	
Dam/Hydroelectric	Kentucky Dam-Gilbertsville	
TOTAL		**$1,315,000,000**

Wildfire

According to the State Hazard Mitigation Plan, a majority of the region is considered a low risk with two areas in the moderate category. Table 1.34 summarize the potential dollar losses associated with structures in the State assessed Wildfire Hazard areas for the Purchase Region and was derived from American Community Survey data, HAZUS data base and other sources as noted.

Table 1.34 Purchase County Wildland /Urban Interface Wildfire Risk

County	Number of Residential Structures		
	Structures in County	Structures in Hazard Area	% in Hazard Area
Ballard*	3,885	72	1.85%
Calloway	18,065	153	8.37%
Carlisle	2,441	5	1.96%
Fulton	3,372	6	1.91%
Graves	16,777	156	9.32%
Hickman	2,342	5	2.07%
Marshall	15,748	168	13.04%
McCracken	31,079	148	4.71%
Total	**93,709**	**8,186**	**10%**

Sources: American Community Survey 2011-2015 Five Year Estimate, 2010 Census, State Hazard Mitigation Plan, HAZUS, PADD GIS Database, Combined Calculations of Census and PVA data

1:4.5 Assessing Vulnerability: Analyzing Development Trends

The Purchase Region grew 1.4% in population between 2000 and 2010 compared to a growth of 7.4% for the state of Kentucky. McCracken County is projected to exhibit low (1.0%) growth between 2010 and 2020.

The Purchase Region is primarily rural in nature. Most residential development occurs on property that fronts primary and secondary roads. The region could expect a modest increase in residential development over the next ten years to accommodate the additional 834 individuals expected to reside in the Purchase Region. Essential facilities and services will also be expected to increase to accommodate the population increase.

Table 1.35 represent population trends in the Purchase Region as report by the Kentucky State Data Center using Census information.

Table 1.35 Population Projections for the Purchase Region

County	Census 2000	Census 2010	Census 2015	Census Projections				
				2020	2025	2030	2035	2040
Kentucky	4,041,769	4,339,367	4,425,092	4,533,464	4,634,415	4,726,382	5,808,682	4,886,381
Ballard	8,286	8,249	8,212	8,164	8,097	8,005	7,906	7,780
Calloway	34,177	37,191	38,343	39,328	40,487	41,687	42,604	43,503
Carlisle	5,351	4,874	5,036	4,737	4,604	4,450	4,298	4,139
Fulton	7,752	6,238	6,528	5,726	5,252	4,789	4,349	3,939
Graves	37,028	37,421	37,433	37,883	38,243	38,483	38,657	38,788
Hickman	5,262	4,612	4,767	4,349	4,077	3,803	3,563	3,306
Marshall	30,125	31,101	32,301	31,149	31,060	30,830	33,886	29,980
McCracken	65,514	65,018	66,188	65,317	65,487	65,376	64,918	64,273
Purchase	**193,495**	**195,819**	**195,313**	**196,653**	**197,307**	**197,423**	**196,732**	**195,708**

Source: U.S. Census Bureau, http://www.ksdc.louisville.edu/data-downloads/projections/ 2017

Land Use

The Purchase Region is primarily rural in nature. Farmland is the principal land use in the region. Land use for commercial purposes is primarily concentrated in the downtown areas of incorporated cities. Industrial development takes place primarily in the industrial parks located throughout the Purchase Region.

The Purchase Region also makes use of the land for recreation and greenspace. Most of the jurisdictions in the region have a city/county parks for recreational purposes. As previously stated, farming is the most prevalent land use in the region. Table 1.36 is a summary of the farmland located in the Purchase Region and the land use for those acres.

Table 1.36 Total Farmland Located in Purchase Region

County	Number of Farms	Land in Farms(acres)	Avg. Farm Size(acres)
Ballard	408	107,186	263
Calloway	821	176,076	214
Carlisle	325	98,620	303
Fulton	178	83,382	468
Graves	1,442	291,813	202
Hickman	298	141,131	474
Marshall	719	94,879	132
McCracken	447	67,192	150
Total	**4,638**	**1,060,279**	**276**

Source: U.S. Department of Agriculture, National Agricultural Statistics Service 2012 Census of Agriculture http://www.nass.usda.gov:8080/census/Pull_Data_Census

Economic and Social Growth Trends

The economy in the Purchase Region is experiencing trends similar to those of the state averages, both in growth and decline. There have been new businesses and industries to open in the region, but in turn there have been layoffs and closures within the market. The fastest growing sectors of the local economy in the Purchase Region were services and manufacturing. However, agriculture proves to be a vital part of the economy, as a whole. The changes, both hazard related and non-hazard related, that affect farming greatly impact the Purchase Region. Hazards such as hail, flooding, tornadoes, and high wind damage crops and have an effect on the economy of the region.

Social growth trends also play an important role in the economy of the Purchase region. Median income and housing characteristics of the region are valuable tools in analyzing these growth trends. Table 1.37 and 1.38 describe the median income and housing characteristics for the Purchase Region. This information was retrieved from the Kentucky State Data Center Census 2000 information.

Little to no population growth (0.4%) is expected to occur in the Purchase Region between 2010 and 2020. In the remaining counties of the Purchase Region, development is not likely to occur in flood regions identified in each jurisdiction because these conditions generally occur on an annual basis. Calloway County is expected to grow the most, with a projected increase in population of 5.7%. This is largely due to the increasing retirement population attracted to Calloway County, its proximity to Kentucky & Barkley Lakes and growth at Murray State University. There continues to be a steady growth in service organizations throughout the Purchase Region and this trend is expected to continue.

There are no significant changes anticipated in land use for any county in the region. Should land use changes occur, they will be included in future updates of the plan where applicable. Industrial expansion that takes place will be in existing industrial parks, such as the Purchase Area Regional Industrial Park, which have property available that is not located in floodplains.

Table 1.37 2010 Census and ACS 2011-2015 Median Household Income

	Median Household Income		
Area	**2010 Census***	**ACS 2011-2015****	**Percent Change**
Kentucky	**$42,302**	$43,740	**3.3 %**
Ballard	**$39,995**	$42,240	**5.3**
Calloway	**$34,947**	$37,034	**5.6**
Carlisle	**$35,853**	$38,829	**7.7**
Fulton	**$27,524**	$28,359	**2.9**
Graves	**$34,550**	$39,530	**12.6**
Hickman	**$37,045**	$41,218	**10.1**
Marshall	**$41,891**	$45,212	**7.3**
McCracken	$40,976	$44,067	7.0

*Source: *2010 data http://www.thinkkentucky.com/edis/cmnty/QuickFacts.aspx?cw=096, Kentucky State Data Center; **U.S. Census Bureau, 2011-2015 American Community Survey 5 Year Estimate*

Table 1.38 2010 Census: Selected Housing Characteristics for the Purchase Region

Subject	Ballard	Calloway	Carlisle	Fulton	Graves	Hickman	Marshall	McCracken
Total Housing Units*	3,889	18,237	2,426	3,360	16,753	2,335	15,898	31,342
Occupied Housing Units*	3,288	14,834	2,059	2,568	14,390	1,973	12,602	27,514
Vacant Housing Units*	601	3,403	367	792	2,363	362	3,296	3,828
Seasonal Use Units**	547	5,654	353	144	1442	290	1,426	1,678
Mobile Homes*	657	2,306	500	205	2,220	360	2,966	2,988
Owner- occupied*	2,678	9,355	2,059	2,568	14,390	1,470	9,813	18,511
Renter- occupied*	610	5,479	367	792	2,363	503	2,789	9,003
Household Size – Owner*	2.42	2.49	2.34	2.51	2.63	2.26	2.50	2.46
Household Size – Renter*	2.73	2.09	2.58	2.07	2.37	2.39	2.18	2.06
Median House Value – Owner Occupied*	$101,800	$119,900	$77,200	$61,000	$92,900	$68,400	$111,600	$124,400

*Source * U.S. Census Bureau, 2011-2015 American Community Survey 5 Year Estimate*
***2010 Census Updates; http://ksdc.louisville.edu/1census.html*

1:4.6 Multi-Jurisdictional Risk Assessment

Table 1.39 is a summary assessment of the hazards that are a risk to the entire Purchase Region. This summary includes all hazards that affect the region. All jurisdictions were determined vulnerable to tornadoes, thunderstorm wind, earthquakes, and winter storm because those hazards are not geographically limited to a particular jurisdiction.

Table 1.39 Risk Assessment Summary

Hazards	Occur?	Casualties	Damage	Threat	Jurisdiction
	Yes/No	I=Injury F= Fatality	S=Structural I=Infrastructure C=Crop	Rank "Yes" 1-X	
Tornado	yes	I, F	S, I, C	1	Regional
Flood	yes	I, F	S, I	2	Regional
Windstorm	yes	I	S, I, C	3	Regional
Earthquake	yes			4	Regional
Severe Winter Storm	yes	I	I	5	Regional
Hailstorm	yes	I	S, C	6	Regional
Wildfire	yes		C	7	Regional
Drought/Heat	yes	I, F	C	8	Regional
Dam Failure	no			9	Regional
Landslide	yes		I		County
Erosion/Deposition	yes		I		County
Non-Occurring Hazards					
Avalanche	no			-	
Coastal Erosion	no			-	
Coastal Storm	no			-	
Expansive Soils	no			-	
Land Subsidence	no			-	
Tsunami	no			-	
Volcano	no			-	
		High Risk	Moderate Risk	Low Risk	No Risk

Table 1.40 includes the hazards that affect the Purchase Region listed by county jurisdictions they directly affect, the potential dollar losses from those hazards for residential structures in each county, and the potential dollar losses from those hazards for critical facilities in each county. Table 1.41 summarizes the potential dollar losses for critical facilities for each hazard type.

The structure vulnerability to Severe Weather and Earthquake hazards was equal to the total Property Value in each county because the hazards are not limited to a particular geographic region.

McCracken County has the greatest residential structure vulnerability to flooding with a potential $95,539,200 in losses. Marshall County had the greatest potential for damage to critical facilities by flooding, $36,795,647.

Table 1.40 Hazard Risk Summary: Potential Residential Structure Losses

Jurisdiction	Flood	All Severe Weather and Earthquakes	Landslides	Wildfires
Ballard County	$14,964,600	$395,900,200	NA*	$7,329,600
Calloway County	$12,109,900	$2,186,616,300	NA*	$18,344,700
Carlisle County	$6,176,000	$187,287,200	NA*	$386,000
Fulton County	$16,348,000	$204,960,000	$4,087,000	$3,660,000
Graves County	$33,536,900	$1,556,353,700	NA	$14,492,400
Hickman County	$10,054,800	$159,714,000	NA*	NA*
Marshall County	$49,550,400	$1,774,216,800	NA*	$18,748,800
McCracken County	$95,539,200	$3,898,944,800	NA*	$18,411,200
Purchase Region	**$238,279,800**	**$10,363,993,000**	**$4,087,000**	**$81,372,700**

** MPT did not rate as a local risk hazard.*

Table 1.41 Hazard Risk Summary: Potential Critical Facility Losses

Jurisdiction	Flood	All Severe Weather and Earthquakes	Landslides	Wildfires
Ballard County	$185,426,585	$277,370,842	NA*	$4,575,200
Calloway County	$22,183,550	$846,519,507	NA*	$150,615
Carlisle County	$181,895,000	$278,430,000	NA*	$0
Fulton County	$187,585,959	$443,255,228	$87,014,480	$0
Graves County	$137,550,000	$1,121,998,800	NA*	$4,000,000
Hickman County	$55,275,000	$186,655,000	NA*	NA*
Marshall County	$36,795,647	$1,005,178,247	NA*	$286,374,932
McCracken County	$26,769,418	$1,659,969,179	NA*	$239,458,953
Purchase Region	**$833,481,159**	**$5,819,376,803**	**$87,014,480**	**$534,559,700**

** MPT did not rate as a local risk hazard.*

1:5 Mitigation Strategy

1:5.1 Capability Assessment

Mitigation strategies were developed in response to the hazard profiles and vulnerability of the assets in each jurisdiction. These strategies provide each jurisdiction with a blueprint for reducing potential losses identified in the risk assessment. These strategies are based on existing authorities, policies, programs, resources, and the ability to expand on and improve the existing tools.

The capability assessment has been divided into three sections:

(A) Existing Authorities, Policies, Programs, and Resources
(B) Existing Governmental Structure
(C) Existing Professional Staff Departments

The purpose of the capability assessment is to identify potential hazard mitigation opportunities available to each jurisdiction through daily operations as a local unit of government. This assessment will highlight the positive measures already in place in the jurisdiction as well as identify weaknesses that could increase vulnerability in a jurisdiction. The capability assessment serves as the foundation for an effective hazard mitigation strategy by establishing goals and objectives for jurisdictions.

(A) Existing Authorities, Policies, Programs, and Resources

The PADD staff, along with JPHMC members, evaluated existing authorities, policies, programs, and resources in each jurisdiction. Table 1.42 is a summary of each jurisdiction and the current status of these authorities. Local committee members evaluated this information to determine what goals, objectives, and actions would be necessary to effectively mitigate the vulnerability of a jurisdiction and what resources they currently have that can be used to implement the mitigation strategies identified in this plan.

Table 1.42 Existing Authorities, Policies, Programs, and Resources in the Purchase Region

Jurisdiction	Floodplain Management Ordinance	CRS & FMA Plans	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Code	Comprehensive Plan	Capital Improvement Plan	Stormwater Management Plan	CERT Team	NWS StormReady Program	Local Economic Development	Regional Economic Development	City Class
Ballard County	X							X		X		X	X	
City of Barlow								X				X	X	6
City of Kevil								X				X	X	6
City of La Center					X		X	X				X	X	5
City of Wickliffe	X							X				X	X	5
Calloway County	X		X	X						X	X	X	X	
City of Murray	X		X	X	X		X		X			X	X	3
City of Hazel												X	X	6
Carlisle County	X									X	X	X	X	
City of Bardwell	X											X	X	5
City of Arlington	X											X	X	6
Fulton County	X									X		X	X	
City of Fulton	X		X	X	X		X	X				X	X	4
City of Hickman	X		X		X		X					X	X	4
Graves County	X									X		X	X	
City of Mayfield	X		X	X	X		X		X			X	X	3
City Wingo												X	X	6
Hickman County										X	X	X	X	
City of Clinton	X											X	X	5
City of Columbus													X	5
Marshall County	X				X	X				X	X	X	X	
City of Benton	X		X				X					X	X	4
City of Calvert City	X		X	X	X		X	X	X			X	X	4
City of Hardin	X											X	X	5
McCracken County	X		X	X	X	X	X			X	X	X	X	
City of Paducah	X		X	X	X		X	X	X			X	X	2

All jurisdictions are members of the PADD. Services are provided by the district in GIS/GPS, economic development, community development, aging services, workforce development, and fiscal management. McCracken County and Marshall County are exceptional in that they have their own GIS Consortiums which provide GIS and GPS professional service to the county and member jurisdictions.

The existing authorities, policies, and programs are further explained in relation to the existing governmental structure and powers of the local jurisdiction. It is the responsibility of each local jurisdiction to develop, enact, and enforce the above referenced authorities and programs.

(B) Existing Governmental Structure

Tables 1.43 (county government) and 1.44 (city government) summarize the governmental structure for each jurisdiction in the PADD. Each jurisdiction is responsible for the implementation of mitigation strategies in their community. These governmental structures were reviewed by the JPHMC to determine the capability of implementing and enforcing existing and future authorities, policies, programs, and resources.

Table 1.43 County Government Structure in the Purchase Region

County	Type of Government
Ballard County	Judge/Executive and 5 magistrates
Calloway County	Judge/Executive and 4 magistrates
Carlisle County	Judge/Executive and 3 magistrates
Fulton County	Judge/Executive and 4 magistrates
Graves County	Judge/Executive and 3 commissioners
Hickman County	Judge/Executive and 3 magistrates
Marshall County	Judge/Executive and 3 commissioners
McCracken County	Judge/Executive and 3 commissioners

Table 1.44 Governmental Structure and Class of Incorporated Cities

City	Class	County	Type of Government
City of Barlow	6	Ballard	Mayor and 4 commissioners
City of Kevil	6	Ballard	Mayor and 6 council members
City of La Center	5	Ballard	Mayor and 4 commissioners
City of Wickliffe	5	Ballard	Mayor and 6 council members
City of Murray	3	Calloway	Mayor and 12 council members
City Hazel	6	Calloway	Mayor and 6 council members
City of Bardwell	5	Carlisle	Mayor and 6 council members
City of Arlington	6	Carlisle	Mayor and 4 commissioners
City of Hickman	4	Fulton	Mayor and 4 commissioners
City of Fulton	4	Fulton	Mayor and 4 commissioners
City of Mayfield	3	Graves	Mayor and 10 council members
City of Wingo	6	Graves	Mayor and 4 commissioners
City of Clinton	5	Hickman	Mayor and 6 council members
City of Columbus	5	Hickman	Mayor and 6 council members
City of Benton	4	Marshall	Mayor and 6 council members
City of Calvert City	4	Marshall	Mayor and 6 council members
City of Hardin	5	Marshall	Mayor and 6 council members
City of Paducah	2	McCracken	Mayor and 4 commissioners

Legal Authority of Local Jurisdictions

There are many tools available to local governments in Kentucky that may help them implement mitigation programs, policies and actions. Any hazard mitigation program can utilize any or all of the five types of government powers granted by the State of Kentucky: Regulation; Acquisition; Taxation; Spending, and Education.

Regulation

- Police Power: Local governments have been granted broad regulatory powers in their jurisdictions. Kentucky Revised Statutes grant the general police power to local governments, allowing them to enact and enforce ordinances and laws that define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety and welfare of the citizens of their jurisdiction. The general police power also has the ability to define and abate nuisance ordinances, including those related to public health.

- Jurisdictions can include hazard mitigation requirements in their ordinances as protection of public health, safety and welfare. They may also use this power to enforce nuisance ordinances identifying nuisances that threaten the general health and safety of the public.

- Building Codes and Inspection: The construction and rehabilitation of homes, business and other structures according to standards that will make the structures more resistant to the impact of natural hazards is a big part of mitigation activity in a jurisdiction. These standards can be enforced in a jurisdiction through building codes. Through the adoption and enforcement of building codes in each jurisdiction, it can be assured that mitigation strategies are in place for the planning area.

- Land Use: Local governments can control the use of land in the jurisdiction through regulatory powers granted to them by the State of Kentucky. Jurisdictions can control certain aspects of development under these powers. The amount and type of growth in a jurisdiction can greatly affect the vulnerability of the community in the event of a natural hazard. Land use powers include the power to enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls, as well as the power to engage in planning.

    - Acquisition**:** The State of Kentucky Revised Statutes allows for jurisdictions to acquire property for public purpose. Acquisition can be a useful tool for mitigation goals in that property in hazard prone areas may be acquired so that future development is prohibited in a hazardous area.

    - Taxation**:** Local governments have been given the power to levy taxes and special assignments by the State of Kentucky. Taxation extends beyond the collection of revenue and can provide the means by which the community develops in the future.

    - Spending**:** Local governments have also been given the power to make expenditures on behalf of the public in their interest. Hazard mitigation principles should be incorporated in the spending decisions made by the local government in a jurisdiction.

- Education**:** Although most residents in a jurisdiction have some knowledge of the natural hazards that potentially threaten their community, most of them have had little formal education about what they as individuals can do to reduce their vulnerability to a natural hazard event. Education involving mitigation strategies and potential vulnerability will be essential for all jurisdictions in the planning area.

(C) Existing Professional Staff Departments

Members of JPHMC reviewed their existing capabilities based on the current professional staff departments of the jurisdictions participating. During the public input meetings, participants determined that the implementation of mitigation strategies and projects would depend on the capability of that department in each jurisdiction. Table 1.45 indicates the professional staffs available.

Table 1.45 Capabilities Assessment: Existing Professional Staff Departments

Jurisdiction	Board of Education	Building Inspectors	Court Clerk	Emergency Management	County/City Treasurer	Mayor /County Judge/Executive	Health Department	Road Department	Sheriff Department	City Police Department	PVA (Tax Assessment)	Social Services	Utilities Department
Ballard County	X		X	X	X	X	X	X	X		X	X	X
Wickliffe				X	X	X							X
Barlow				X	X	X							X
Kevil				X	X	X							X
LaCenter				X	X	X							X
Calloway County	X		X	X	X	X	X	X	X		X	X	X
Murray	X	X		X	X	X		X		X			X
Hazel				X	X	X							X
Carlisle County	X	X	X	X	X	X	X	X	X		X	X	X
Bardwell		X		X	X	X		X		X			X
Arlington		X		X	X	X		X					X
Fulton County	X		X	X	X	X	X	X	X		X	X	X
HIckman				X	X	X		X		X			X
Fulton	X			X	X	X		X		X			X
Graves County	X		X	X	X	X	X	X	X		X	X	X
Mayfield	X	X		X	X	X		X		X			X
Wingo				X	X	X							X
Hickman County	X		X	X	X	X	X	X	X		X	X	X
Clinton				X	X	X				X			X
Columbus				X	X	X							X
Marshall County	X	X	X	X	X	X	X	X	X		X	X	X
Benton		X		X	X	X		X		X			X
Calvert City		X		X	X	X		X		X			X
Hardin				X	X	X							X
McCracken County	X	X	X	X	X	X	X	X	X		X	X	X
Paducah	X	X		X	X	X		X		X			X

The following definitions summarize the duties and responsibilities of the professional staff departments listed in Table 1.45.

The **Board of Education** maintains the operations of the county school system. This board is elected at large by the people of the community. County funds usually maintain the buildings and provide for other capital projects. State funds usually pay for salaries and the purchase of textbooks and supplies.

The **Building Inspectors** are responsible for enforcing the State Building Code, the National Flood Insurance Program, the Community Rating System, and other applicable local codes. These items are enforced through an inspection and permitting program.

The **PVA, Court Clerk,** and **Sheriff** are elected every four years by the citizens in the county. The PVA is responsible for the valuation of property for tax purposes. The Court Clerk is the custodian of the court system in each county. This office is financed through the State of Kentucky. The Sheriff operates on a budget approved annually by the magistrates (fiscal court) of each county and is responsible for the enforcement of state and local laws.

The **City Police Departments** are responsible for enforcing local and state laws in their designated jurisdiction.

The **Road Departments** are responsible for the care and maintenance of the public roadways in their designated jurisdiction.

The **Utility Departments** are responsible for providing water, gas, electric and sewer services to the public.

The **Emergency Management Service** is responsible for the mitigation, preparedness, response and recovery operations for both natural and man-made disasters. The formation of an emergency management office in each county is mandated under the Kentucky Revised Statutes.

The **County/City Treasurers** are responsible for the management of the budget and fiscal programs for their jurisdiction. This also includes the administration of state and federal grants.

The **Mayor or County Judge/Executive** is responsible for overseeing the daily operations of county or city government in their respective jurisdictions. They are also responsible for the enforcement of county/city policies and regulations.
The **Health Departments** and **Social Services** have separate boards appointed by commissioners. Employment in these departments is approved by the commissioners with state personnel policies applying. These agencies protect and promote public health and provide social services for medical care and governmental social programs for displaced families.

The **Emergency Management, Road Department, Building Inspectors, and Utilities Department** have been identified as the specific departments that will be responsible for carrying out mitigation activities. Each of these departments has been involved in the hazard mitigation planning process by participating in the JPHMC meetings.

It has been determined by the committee that each of these departments have limited available staff that are responsible for multiple duties within their departments. All jurisdictions have limited funding resources available to hire additional staff. Each staff member is adequately trained to accomplish their current work load. Increase in work activities, including hazard mitigation activities, will increase the need for additional staff to effectively perform tasks.

The PADD, as a regional planning agency, has become a primary resource for technical assistance for all jurisdictions in the region. The PADD staff are trained in planning, GIS/GPS, financial management and project developmen

SUMMARY: Capability Assessment

The available staff and financial resources of the departments in each jurisdiction determine the ability for expansion and improvement of existing authorities, policies, programs, and resources to reduce potential losses. Each county in the PADD has equal ability to enforce and implement mitigation strategies.

The capability of cities in the Purchase Region varies so communities often work cooperatively with county government to perform projects that improve the quality of life for residents, including mitigation projects and activities. Because counties have more resources available to implement mitigation activities, it has been suggested that the goals and objectives be prioritized at a county level. City jurisdictions will have the opportunity at any given time to implement mitigation activities if their capabilities expand and the opportunity exists.

The jurisdictions that have participated in the mitigation planning process are identified in this plan. In addition to local participation, the PADD staff has provided professional assistance in GIS and plan development to help enhance the ability of the local jurisdictions to implement mitigation activities. Based on the above information, the Local Hazard Mitigation Goals, Objectives and Actions were compiled at a county level, taking city jurisdiction public input into consideration.

1:5.2 Regional Hazard Mitigation Goals

Representatives of all the eligible jurisdictions, state agencies, other regional and local boards and organizations, participated in the JPHMC and the development of the regional portion of the plan. Because a regional authority does not exist, the realization of the goals and objectives of the JPHM Plan depends on the support and cooperation of all the participants.

This is especially true in that the regional goals and objectives affect all jurisdictions in the Purchase Region, damage to or destruction of, the Regional Critical Facilities identified in the plan affect all jurisdictions in the region. The strategies and mitigation projects that will involve these facilities require the participation of all the jurisdictions in the region and will require the cooperation and assistance of other jurisdictions and entities such as hospital boards, airport boards, neighboring and region wide, and the assistance of regional organizations such as the PADD, the Kentucky State Police, KYTC District One, Purchase Area Health Department, The U.S. Army Corps of Engineers, TVA, to plan, and implement hazard mitigation projects.

These goals and objectives were determined to concur with existing community goals and the goals set forth by the Kentucky State Hazard Mitigation Plan. An update is provided in parentheses beside the relevant objectives identified in order to meet the goals.

Mitigation Goals – The mitigation goals were set to be general, long-term guidelines for hazard mitigation in the jurisdictions.

Mitigation Objectives – The mitigation objectives define the strategies and process of implementation to achieve the identified goals. The objectives are specific, measurable, and have a defined completion.

The following goals and objectives were determined to be regional in scope and contribute to hazard loss reduction in the Purchase Region, within the Charter of the PADD, and according to the JPHMC as it is currently constituted. They are listed in order of priority for the High Risk Hazards for the region as identified and prioritized by the JPHMC.

Goal 1: Improve early warning/and notification of Jackson Purchase Area citizens to reduce the risk of injuries or fatalities from Tornados and Severe Weather.

Purpose of Goal in Relation to the Risk Analysis: Reducing the vulnerability of the populace of the Purchase Region to injury and potential fatalities caused by Tornados and Severe Weather events is the number one priority of the JPHMC. It has been determined that the best way to achieve this goal is to reduce the exposure of individuals to the direct effects of severe weather; lightening, hail, severe cold, high winds and collateral; blowing debris, falling trees, impassable roads.

The following objectives have been developed as a result of this goal:

1.1: Improve early warning of impending severe weather events.

1.2: Support projects to Increase the availability of adequate shelters from the direct and indirect effects of severe weather events.

Goal 2: Improve the survivability, minimize damages to critical facilities, infrastructure, and private property during flood events by reducing their vulnerability to hazards.

Purpose of Goal in Relation to the Risk Analysis: The damage of critical facilities and infrastructure during a flood event can be detrimental to a jurisdiction. In general, during a flood event, roadways can be impassable, bridges damaged, structures inundated and utility services knocked out. These types of damages hinder emergency first responders from being able to render aid to those in need and compound the effects of the flooding.

The following objectives have been developed as a result of this goal:

2.1 Provide support to the accomplishment of Planning, engineering, design and execution of the restoration of the Paducah Floodwall.

2.2 Increase control over development in the floodplain to ensure lives and property are not at risk to future flood conditions.

2.3 Enhance the resistance of critical facility and transportation structures against flooding.

2.4 Encourage consideration of the various highway vulnerability studies in the Kentucky Highway Plans particularly the vulnerability of bridge approaches to flooding and earthquake.

2.5 More accurately determine Flood Prone Areas. Request through FEMA, updated Flood Insurance Rate Maps Document all damage causing flash flooding as it occurs.

2.6 Address identified “Repetitive Loss” properties. Continue to monitor and evaluate the vulnerability of repetitive loss properties at the county and city level to determine if mitigation action is warranted. Take mitigation action elevation, acquisition or other as required.

Goal 3: Protect public health and safety by increasing public awareness of natural hazards that affect the Purchase Region and by fostering a sense of responsibility within the public for mitigating risks associated with those natural hazards.

Purpose of Goal in Relation to the Risk Analysis: The general public in each jurisdiction needs to be aware of the threat and high risks areas associated with the natural hazards that affect the Purchase Region. Through public education, individuals may realize the nature and extent of potential hazards and act upon this realization by taking steps to secure their property and protect their families against the risks of natural hazards.

The following objectives have been developed as a result of this goal:

3.1 Educate the public on potential natural hazards that affect their jurisdiction.
3.2 Increase public understanding and support of the hazard mitigation process.
3.3 Educate the public on how they can take personal responsibility for their own health, safety and property protection.
3.4 Coordinate with State Agencies and Programs such as Homeland Security to Conduct CERT Training and seek resources to conduct this training.

Goal 4: Continue to analyze the earthquake threat to the region posed by the New Madrid and Wabash Seismic Zones.

Purpose of Goal in Relation to the Risk Area: Develop a better understanding of the threats posed by the Wabash Seismic Zone and the New Madrid Seismic zone. Determine the types of construction at risk and the survivability of utility systems especially brittle water and waste water systems.

The following objectives have been developed as a result of this goal:

4.1 Request agencies such as the Kentucky Geological Survey and the University of KY to conduct/expand further studies into seismicity, soils and ground shaking potential within the region.
4.2 Develop a spatially accurate structure point data bases from which to extract precise point locations and structure footprints for buildings and other critical facilities.

4.3 Support the identification, development, and acquisition of alternative sources of potable water.
4.4 Encourage county and city planners to identify emergency water supply points in their emergency action plans and mark these locations for public recognition

Goal 5: Efficiently make use of public and private funds to increase the capabilities of local jurisdictions to reduce potential losses associated with hazard events.

Purpose of Goal in Relation to the Risk Area: Potential losses can be reduced in a jurisdiction by their ability to effectively plan, fund and implement mitigation projects. Efficiently use public or private money to improve communication, planning, and implementation capabilities for the county and city critical facilities can reduce the impact the cost of Hazard Mitigation.

The following objectives have been developed as a result of this goal:

5.1 Promote inter-agency and inter-local cooperation for the use of funds for mitigation activities.

5.2 Identify, review and monitor and map vulnerable structures, critical facilities, and risk prone areas.

5.3 Encourage jurisdictions to use the Department Emergency Management standardized form to document hazard damages, repair and recovery costs for future use in cost-benefit analysis.

Goal 6: Support and participate in regional hazard mitigation planning.

Purpose of Goal in Relation to the Risk Area: Continue the Mitigation Planning process and update the JPHM as required.

6.1 Establish a permanent JPHMC under the aegis of one of the Regional organizations dealing with similar problems and issues, either the Regional Director of Emergency Management, The Four River's Basin Team, or the Purchase Area Development District

6.2 Develop a regional high resolution, spatially accurate imagery data base from which to extract precise locations and structure footprints for buildings and other critical facilities.

6.3 Adopt an All-Hazard Week public awareness campaign to include earthquake, flood, tornados and severe storms.

1:5.3 Identification and Analysis of Mitigation Measures

For the purpose of this plan, only high and moderate risk hazards will be addressed in this section. Those hazards include severe thunderstorm, flood, hailstorm, tornado, and earthquake. The intention of this section is to identify, evaluate, and analyze a range of mitigation actions that will help reduce the potential effects of hazard events identified in the risk assessment in the plan. These actions were derived based on the analysis of the risk assessment and support the goals and objectives identified in the plan.

The goals and objectives for hazard mitigation in the JPHM Plan were developed on a multi-jurisdictional basis. The mitigation activities defined for each goal and objective were largely based on the fact that there is no regional authority empowered to make decisions, allocate funds or sign contracts. The jurisdictions must all work together.

The role of the PADD is to provide technical expertise, advice, encouragement, and through persuasion get communities to do things that left on their own that might not otherwise accomplish or even consider. No specific regional projects are included in this plan. All specific projects are at the county level and included in their respective annexes.

The following list describes the potential loss reduction mitigation actions and techniques identified for the mitigation of hazard events. These actions and objectives were determined to have the greatest influence on hazard loss reduction in the Purchase Region. They are listed in order of priority accordance with the High Risk Hazards for the region as identified and prioritized by the JPHMC.

General Actions:

- Prevention activities are designed to keep current problems from getting worse and to eliminate the possibility of future problems. Prevention activities reduce a jurisdiction's vulnerability to hazard events. This type of activity is especially effective in hazard prone areas where development has not occurred. Prevention activities include the following:
  - Planning and Zoning
  - Floodplain regulations
  - Stormwater management
  - Building codes
  - Capital improvement programs
  - Open space preservation
  - Dam inspection and monitoring

- Property protection activities are designed to adapt existing structures to withstand natural hazards or to remove structures away from hazard prone areas. Property protection activities include the following:
  - Acquisition
  - Relocation
  - Foundation elevation
  - Insurance – flood and homeowner's
  - Retrofitting (includes activities such as wind-proofing, flood-proofing, and seismic design standards)

- Structural projects lessen the impact of a natural hazard by changing the natural progression of the hazard. These types of projects are usually designed by engineers. Structural projects include the following:
  - Storm sewers
  - Floodwalls
  - Highway Projects
  - Retention Basins
  - Reservoirs
  - Dams
  - Levees
  - Dredging
  - Minor flood control projects
  - Culvert resizing
  - Retaining walls
  - Safe rooms
- Emergency services minimize the impact that a natural hazard has on the residents of a jurisdiction. Usually, actions are taken by emergency response services immediately before, during, or in response to a hazard event. Emergency service activities include the following:
  - Warning systems: sirens / automated calling system
  - Evacuation planning and management
  - Sandbagging for flood protection
  - Emergency response services
  - Protection of critical facilities
  - Emergency generators
  - Specifically replace aged generator at County EOC.

- Public information and awareness activities are used to educate the residents of a jurisdiction about the potential hazards that affect their area, hazard prone areas, and mitigation strategies they can take part in to protect themselves and their property. Public information and awareness activities include the following:
  - Public speaking events
  - Outreach projects
  - Availability of hazard maps
  - School programs
  - Library materials
  - Hazard Awareness Weeks
  - Real estate disclosure
  - Storm Ready Community Program
  - Firewise Community Program
  - CERT Teams and CERT Training
  - Citizens Corps Organizations

- Natural resource protection activities include those that minimize hazard losses and preserve or restore the functions of natural systems. Natural resource protection actions include the following:
  - Sediment and erosion control
  - Stream corridor restoration
  - Watershed management
  - Forest and vegetation management
  - Wetlands preservation and management

The hazard specific mitigation activities defined for each goal and objective are listed by priority of risk. They constitute a wish, more or less, as there is no regional authority with the charter or resources to oversee the planning, implementation, or execution of all these activities. It is intended that these potential activities serve as a guideline or framework for the mitigation activities of the jurisdictions which participate in the plan's revision and update.

In addition, it should be noted that there are regional organizations that conduct one or more of these activities under the aegis of their organization's authority, charter, resources and/or objectives.

Table 1.46 Purchase Region County Hazard Summary Table

HIGH RISK HAZARDS	TORNADO FLOOD THUNDERSTORM WIND EARTHQUAKE WINTER STORM/ICE STORM
MODERATE RISK HAZARDS	HAIL WILDFIRE
LOW RISK HAZARDS	EXTREME HEAT/DROUGHT DAM FAILURE

Source: JPHMC, PADD Board, Public Input Survey

Tornado Mitigation Activities: Promote public education to individuals, businesses, and schools for hazard events that may include the following.

- Develop a plan of action for a tornado event – include home, work, school, and outdoor situations.
- Have tornado drills on a regular basis
- Encourage all households to maintain a disaster supply kit:
  - A 3-day supply of water (1 gallon per person per day)
  - Non-perishable food items
  - One change of clothing and shoes per person
  - One blanket or sleeping bag per person
  - A first-aid kit, including all prescription medicines
  - A battery-powered NOAA weather radio with warning alarm and extra batteries
  - A flashlight and extra batteries
  - Special items for infants, elderly or disabled individuals
- Listen to the latest forecasts, especially when planning outdoor activities.
- Publicize multi-media access to tornado watches and warnings.
- Inspect designated tornado shelters for compliance with building codes to ensure their ability to withstand high winds.
- Install warning systems that are not completely dependent upon electricity.
- Pursue programs to provide or subsidize the provision of weather radios to low income populations.
- Evaluate the need for tornado safe rooms, particularly for mobile home parks.
- Analyze the shelter requirements for temporary residents/visitors to the elder care facilities.
- Evaluate the need for tornado safe rooms, particularly for mobile home parks.
- Initiate mobile home anchoring program
- Build tornado safe room where deemed necessary.
- Ensure all critical facilities have a backup source of power – generators
- Train, equip and maintain Storm Spotter cadre

Flood Mitigation Activities: Promote public education to individuals, businesses, and schools for hazard events that may include the following.

- Enforce City and County Floodplain Ordnances
- Participation in the NFIP
- Promote the purchase flood insurance.
- Construct a levee or flood wall
- Elevate the lowest floor level of existing structures above the floodplain
- Elevate flood prone roads
- When feasible, relocate structures out of the floodplain
- Acquire and demolish structures in the floodplain
- Provide openings in foundation walls to allow water to flow in and out
- Install backflow valves to drains, toilets, and other sewer connections
- Maintain ditches and storm water drainage systems
- Ensure all critical facilities have a backup source of power – generators
- Sedimentation control (dredging)
- Wetland restoration
- Stream re-alignment
- Increase culvert cross section
- Dredge existing channels to maintain current depths and flows
- Identification and removal of stream blockages of tree limbs and trunks forming effective check dams and barrages, and resulting in the pooling of water during flood events
- Continue the program/work to plan, engineer, design and execute restoration of the Paducah Floodwall.
- Work to enroll all eligible jurisdictions in the NFIP.

Thunderstorm Wind /Hail Mitigation Activities: Promote public education to individuals, businesses, and schools for hazard events that may include the following.

- Listen to the latest forecasts, especially when planning outdoor activities
- Keep a NOAA weather radio with extra batteries nearby to listen for weather updates.
- Listen especially for severe thunderstorm watches and warnings.
- Practice lightning safety.
  - Outdoor activities should not take place when lightning is present.
  - Fully enclosed vehicles and large permanent buildings provide safe havens from lightning.
- Pursue programs to provide or subsidize the provision of weather radios to low income populations.
- Promote trimming of tree limbs and debris, particularly in areas close to critical facilities and infrastructure such as power lines.
- Ensure all critical facilities have a backup source of power - generators

Earthquake Mitigation Activities: Promote public education to individuals, businesses, and schools for hazard events that may include the following.

- Support, encourage, and lobby for the continuing study of the threat of ground shaking from the Wabash and New Madrid Seismic Zones.
- Evaluate public critical facilities and infrastructure to determine their resistance to ground movement.
- Replacement of brittle water and waste water infrastructure specifically cast iron pipe, asbestos cement pipe, and vitreous clay pipe.
- Ensure that all homes and other structures are secured to their foundations.
- Enforce existing seismic building standards (current building code)
- Promote public education to individuals and families, business, and schools for hazard events that may include the following:
- Identify "safe places" in structures that are vulnerable during an earthquake. A safe place might include space under a sturdy table or desk against an interior wall. Stay away from windows.
- Practice the "drop and cover" technique in each identified safe place. Drop, duck your head between your knees, and cover the back of your neck with your hands. Practice makes this process an automatic response in the event of an earthquake.
- Develop an action plan for an earthquake event – include home, work, school, and outdoor situations.
    - Secure heavy furniture to walls. Brace or anchor high or top-heavy objects.
    - Purchase earthquake insurance if available.
    - Install strong latches on all cabinet doors. This will prevent them from spilling their contents in the event of an earthquake.
    - Secure items on shelves or bookcases that might fall and cause injury during an earthquake. Move large or heavy items to lower or bottom shelves.
    - Store breakable or glass items in cabinets with latches.
    - Brace overhead light fixtures.
    - Secure water heater to wall studs.
    - Install flexible pipe fittings. These fittings are less likely to break.
- Consider earthquake resistant engineering for all critical transportation access/chokepoint structures such as bridges and viaducts.

Winter Storm Mitigation Activities: Promote public education to individuals, businesses, and schools for hazard events that may include the following.

- Make sure critical facilities have a backup source of heat
- Provide public education as to the safe use of back up heat sources
- Promote trimming of tree limbs and debris, particularly in areas close to critical facilities and infrastructure such as power lines.
- Evaluate subdivision regulations for inclusion of underground utilities for new development
- Promote public education to individuals and families, business, and schools for winter Storm Events and include the following:
  - Insulate the walls and attic of structures
  - Caulk and weather-strip doors and windows
  - Allow water to slowly drip from faucets to prevent pipes from freezing
  - Check the antifreeze and battery in vehicles
  - Stay off snow or ice covered roads if possible
  - Keep a supply of non-perishable food and water
- Ensure all critical facilities have a backup source of power - generators

Wildfire Mitigation Activities: Promote public education to individuals and families, business, and schools for hazard events that may include the following.

- Each community to strive to be a "Firewise" Community.
- Promote public education to individuals and families, business, and schools for Wildfire Threat include the following:
  - Proper storage of flammables or Class Shingles or tin on roofs or Masonry construction
  - Remove plants with resins, waxes, or oils from landscaping
  - Remove dead branches
  - Reduce the amount of fuel around homes
- Aggressively reduce available fuels in the vicinity of critical facilities
- Amnesty programs for hazardous materials/storage vessels
- Tire amnesty programs
- Removal of potential fuels from the vicinity of Critical Facilities.
- Pursue the acquisition of equipment and training to rapidly respond to brush fires to mitigate their becoming wildfires.
- Impose burn bans, as required on the county level.

Excessive Heat and Drought Mitigation Activities: Promote public education to individuals and families, business, and schools for hazard events that may include the following.

- Programs focused on at risk populations, Senior Citizens, very young children
- Air conditioner/fan loan or subsidized purchase program
- Identification of cooling shelters.
- Replacement of brittle water and waste water infrastructure specifically cast iron pipe

Dam Failure Mitigation Activities: Promote public education to individuals and families, business, and schools for hazard events that may include the following.

- Access and analyze USACE and TVA inundation maps or models for the projected downstream impact of the catastrophic failure of the Kentucky Dam and Barkley Dam.
- Assess the structures at risk to inundation.
- Continue to participate in the Kentucky Division of Water monitoring program for the identified dams in each county.

1:5.4 Implementation of Mitigation Measures

The purpose of this section is to provide a road map on how the mitigation actions identified will be prioritized, implemented, and administered in the Purchase Region.

All jurisdictions will adopt the JPHM Plan by September 2018. Each county in the PADD has equal ability to enforce and implement mitigation strategies. The smaller cities in the region depend greatly upon the county government, and the PADD for support and combine resources to perform projects that improve the quality of life for residents, including mitigation projects and activities.

Because counties have more resources available to implement mitigation activities, it has been suggested that the goals and objectives be prioritized at a county level. City jurisdictions will have the opportunity at any given time to implement mitigation activities if their capabilities expand and the opportunity exists.

The jurisdictions that have participated in the mitigation planning process are explained in this plan. In addition to local participation, the PADD staff has provided professional assistance in GIS and plan development to help enhance the ability of the local jurisdictions to implement mitigation activities.

Funding: The jurisdictions of the PADD will attempt to utilize the following funding sources in implementing goals, objectives and actions when possible: the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), the Pre-Disaster Mitigation Program (PDM), Hazard Mitigation Technical Assistance Programs (HMTAP), the National Earthquake Technical Assistance Program, the Wind/ Water Technical Assistance Program, and local funding.

Project Prioritization: Counties and cities will maintain the list of set goals, objectives, and actions that have been identified in this plan. These items were prioritized based on a set of criteria located in the FEMA Multi-Hazard Mitigation Planning Guidance that includes social, technical, administrative, political, legal, economic, and environmental factors (STAPLE+E) within the county jurisdictions.

Each action was given a high, medium, or low priority based on those criteria. The mitigation actions with the highest priority were the most cost effective and most compatible with the jurisdiction's social and cultural values. The PADD staff reviewed each jurisdiction's priorities annually to ensure that they were properly prioritized. The designated council representative from each jurisdiction will be responsible for maintaining this list.
The STAPLE+E criteria guidelines for action prioritization that were given to the council members in order to analyze their actions were as follows:

Table 1.47 STAPLE+E Criteria Explanation

S - Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
T – Technical	Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political	Mitigation actions can truly be successful if all stakeholders have been offered and opportunity to participate in the planning process and if there is public support for the action.
L – Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economic	Budget constraints can significantly deter the implementation of mitigation actions. It is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.
E - Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

Related, it is relevant to note that the prioritization strategy (i.e., the use of STAPLE+E) did not deviate from the action prioritization strategy used in the 2012 JPHM Plan: It, too, relied upon STAPLE+E to prioritize each county's mitigation actions. However, the 2012 JPHM Plan relied upon actions that were quotidian, process-focused, and aspirational. How STAPLE+E is used for such actions differs significantly for how it is used for actions emphasizing projects. Each county's mitigation actions from the 2012 JPHM Plan were replaced with new actions. The generally unevaluable, quotidian, process-focused, aspirational actions that characterized the 2012 JPHM Plan have been reproduced in the above section (1:5.3) and in a table within each county's annex entitled "Process Mitigation Actions…": Such actions still are worthy of inclusion and planning consideration; they are simply unevaluable, and their prioritization should be considered uniform.

1:6 Plan Maintenance Procedure

1:6.1 Monitoring, Evaluating, and Updating the Plan

The JPHMC is a task specific committee, not a mandated or full time standing committee. Its sole purpose was the forging of the initial 2006 plan and was reconstituted to conduct the 2012 and 2018 update and review. It has fulfilled those functions.

The PADD has no authority over the activities of any of its member jurisdictions. It is therefore incumbent upon the jurisdictions participating in the plan to monitor and execute the programs and activities designated by them in their separate annexes. The final objective and action of this planning process therefore is to recommend a procedure for the maintenance of this plan.

Plan Monitoring

The county emergency managers will include a review of the JPHM Plan as an agenda item for at least one Local Emergency Planning Council (LEPC) meeting each year. The topic and discussions will be reflected in the minutes.

Plan Evaluation

The county EMs will evaluate the plan annually as part of training/exercise/ evaluation activities of the Kentucky Emergency Managers (KYEM) Regional Office. The KYEM will schedule an evaluation once a year as one of their quarterly training requirements. It is essential that a representative of either the KYEM Mitigation Officer or the University of Kentucky Mitigation Program Staff participate in this training/evaluation/exercise in order to provide updates on the status of mitigation projects, grant applications, letters of intent or plan revisions. The West Kentucky Emergency Managers Association (WKEMA) will be the responsible agency to request state level participation.

During this evaluation each goal and objective in the county Annexes will be reviewed using the following or, similar criteria:

- Relevance and effectiveness in light of changes and any new developments including presidential declarations;
- Whether planned actions address current and expected conditions;
- Whether the nature or magnitude of risks have changed;
- Availability of current or expected resources for implementing the actions.

Plan Update

The PADD may be responsible for facilitating the update and revision of the plan (as required by law) at the next five-year point. The jurisdictions participating in this plan have the right to update the plan following a federally-declared disaster involving counties within the Purchase Region and at any other time they feel an update is required to meet a mitigation need, or support a project application.

The PADD staff will be available to assist participating jurisdictions on a limited basis pending funding for such activities. The PADD staff may be used as a resource to help obtain funding for both administrative and mitigation activities as outlined in the plan.

Ad Hoc Monitoring/Evaluation/Update

Individual jurisdictions, or any group of jurisdictions, could and should review their mitigation plans with any Notice of Funds Availability (NOFA) from the State Mitigation Office. This presents an excellent opportunity, especially when representatives of the State's Mitigation Office and/or project and program monitoring team from the University of Kentucky, travel to the Purchase Region to provide information and technical assistance for the drafting of Letter of Intent for Mitigation Projects.

1:6.2 Implementation through Existing Programs

Each jurisdiction in the PADD utilizes a variety of authorities, policies and programs for the administration and development of the jurisdiction. After each jurisdiction officially adopts the JPHM Plan, hazard mitigation strategies will be integrated into them where the jurisdiction determines they are applicable.

Upon the adoption of the JPHM Plan, jurisdictions will address hazard mitigation activities when considering planning and land use regulations. Many of the actions listed in the plan address how jurisdictions will enhance and enforce existing policies as well as develop new policies that take mitigation of hazard events into consideration. The county emergency manager (EM) will be responsible for supervising and reviewing the development of these new policies and will provide technical assistance in implementing these requirements.

By adopting the JPHM Plan, each jurisdiction accepts the responsibility of implementing the strategies and actions identified in the plan. They will also be responsible for integrating hazard mitigation strategies into community development plans and activities where applicable.

Below, the plan will elaborate that the Purchase Region operates under unique local governance restrictions that prevents and/or provides disincentives to pursuing a significant degree of planning. However, where the Purchase Region jurisdictions do have the ability and the incentive to develop comprehensive plans and other such plans, the JPHM Plan can be integrated into such plans. Any incorporation should occur during the periodic update of relevant plans where applicable.

Planning at the Local Level in Kentucky

The following information is included to convey acknowledgment of the many types of plans, ordinances, and day-to-day operations that have been, could be, or, perhaps more relevantly, should be included in the jurisdictions of the Purchase Region. However, as aforementioned, many jurisdictions will not possess such planning mechanisms or processes. This is not to say that the jurisdictions normatively are justified in not possessing such planning, or that the inclusion of better planning should not be a goal towards which most jurisdictions in the Purchase Region ascribe. Simply, the Purchase Region does recognize the following common planning mechanisms and processes, and does acknowledge that, if they exist within one of the region's jurisdictions, the JPHM Plan could well be integrated into such mechanisms and processes.

Land Use

Local governments can control the use of land in the jurisdiction through regulatory powers granted to them by the State of Kentucky. Jurisdictions can control certain aspects of development under these powers. The amount and type of growth in a jurisdiction can greatly affect the vulnerability of the community in the event of a natural hazard. Land use powers include: the power to enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls, as well as the power to engage in planning. KRS 100 establishes a comprehensive scheme for land

use control by local governments. The regulation of land use pursuant to KRS Chapter 100 is permissive, but in counties with a population of 300,000, establishment of a countywide planning unit is mandatory. None of the eight counties of the PADD meet this population requirement.

If a local government elects to control land use within its jurisdiction, it must first establish the planning unit. Three types of planning units are permitted: independent, joint city-county, and groups of counties (KRS 100.113). These units have the authority to perform a number of duties related to planning including: making studies of the area; determine objectives; developing or adopting plans for the purpose of achieving those objectives; and developing and recommending policies, ordinances and administrative means to implement plans.

If available within a Purchase Region jurisdiction, the JPHM Plan would likely use some of these same planning units in its development and contribute some of its planning units to any development and update of land use ordinances.

Zoning

Zoning is another method of land use control available to local governments. Zoning may be utilized to promote health, safety, morals, or the general welfare of the community. More specifically zoning may be used to: protect natural resources; protect specific areas of the planning unit which need special protection; prevent loss of life, health, or property from fire, flood or other dangers (KRS 100.201).

If such ordinances exist within a Purchase Region jurisdiction, the JPHM Plan would be integrated by aiding in the development of zoning to promote safety, particularly from flooding.

Floodplain Management Plans and Ordinances

The state and federal governments can play a significant role in helping communities develop and implement floodplain management programs and encourage the effective use of mitigation strategies. However the individual jurisdictions carry the final responsibility to plan for and manage their floodplains. Floodplains in their natural or relatively undisturbed state are important water resource areas. They serve three main purposes: natural water storage and conveyance, water quality maintenance, and ground water recharge. Unsuitable development can destroy their value and cause havoc on the environmental stability of an area.

In Purchase Region jurisdictions that have floodplain management plans and/or ordinances, such information contained therein would be integrated into the JPHM Plan. Conversely, the plan would be an obvious resource to be integrated into and with any new development of or updating of floodplain management plans and/or ordinances: The JPHM Plan would inform: the locations of floodplains throughout the jurisdictions; the impact of flooding throughout the jurisdictions; the location and values of property, which would be especially relevant in locating severe/repetitive loss property; the identification, location, and values of critical facilities, the expectation of costliness from any one particular flood; etc. Ideally, the floodplain management plan and/or

ordinances and JPHM Plan would operate in tandem, the resources both informing each other and the recommendations in one influencing the recommendations in another. Further, the information from the floodplain management plan and/or ordinances would be integrated into any mitigation strategies and actions as such plans/ordinances would help define what is most cost-effective, provides the most safety given a unique situation, and is, subsequently, most feasible.

Acquisition

The State of Kentucky legislation allows for jurisdictions to acquire property for public purpose. Acquisition can be a useful tool for mitigation goals in that property in hazard prone areas may be acquired so that future development is prohibited in a hazardous area.

Acquisitions are already integrated into the JPHM Plan. Conversely, the plan, through the planning process, would identify where acquisition provides the best and most cost-effective option for mitigation of hazards.

Day to Day Operations

- The state and local road departments are responsible for the care and maintenance of the public roadways in their designated jurisdiction.

- The utility departments are responsible for providing water, gas, electric and sewer services to the public.

- The EM is responsible for the mitigation, preparedness response, and recovery operations for both natural and man- made disasters. The formation of an EM Office in each county is mandated under the Kentucky Revised Statutes. In addition the KYEM has encouraged counties to form Local Emergency Planning Councils (LEPC), several of which were the main action organizations for the revision of their county's Annex.

- The county/city treasurers are responsible for the management of the budget and fiscal programs for their jurisdiction. This also includes the administration of state and federal grants.

- The mayor or county judge-executive is responsible for overseeing the daily operations of county or city government in their respective jurisdictions. They are also responsible for the enforcement of county/city policies and regulations.

- The health departments and social services have separate boards appointed by commissioners. Employment in these departments is approved by the commissioners with state personnel policies applying. These agencies protect and promote public health and provide social services for medical care and governmental social programs for displaced families.

- The EM, road department, building inspectors, and utilities departments are functionally the specific departments that will be responsible for carrying out mitigation activities. Each of

these departments has been involved in the hazard mitigation planning process by participating in the JPHMC or MPT meetings.

Thus, the JPHM Plan has been and will continue to be integrated into the day-to-day operations of the Purchase Region jurisdictions' local governance: The same public and stakeholders involved in the implementation of mitigation activities contributed and will continue to contribute to the planning process itself.

Planning in the Purchase Region

Given the unique nature of local governance within many of Purchase Region's jurisdictions, there exists little obvious incentive to perform much formal planning, period.

The reality is that there are 16 jurisdictions where a formal planning/zoning entity does not exist. The departments that would be responsible for the planning for mitigation and the implementation of mitigation actions often consist of one person. This person works for his/her local jurisdiction, which often consists only of a full-time city clerk, a part-time mayor, and a once-a-month city council implementation of actions that would generally keep communities safe, healthy, and functional simply does not require significant formal planning beyond planning for the difficult-to-predict and likely devastating hazards about which the JPHM Plan addresses.
The following table below, then, lists all of the jurisdictions covered under this JPHM Plan accompanied by the types of formal planning/ordinances that each jurisdiction possesses and into which the plan could be (and will be) integrated via the mechanisms described above. Those 16 jurisdictions described above as not having any formal planning and/or zoning entity are:

- Ballard County
- City of Barlow (in Ballard County)
- City of Kevil (in Ballard County)
- City of LaCenter (in Ballard County)
- City of Wickliffe (in Ballard County)
- City of Hazel (in Calloway County)
- City of Arlington (in Carlisle County)
- City of Bardwell (in Carlisle County)
- Fulton County
- Graves County
- City of Wingo (in Graves County)
- Hickman County
- City of Clinton (in Hickman County)
- City of Columbus (in Hickman County)
- Marshall County
- City of Hardin (in Marshall County)

Table 1.48 Existing Authorities, Policies, Programs, and Resources in the Purchase Region

Jurisdiction	Floodplain Management Ordinance	CRS & FMA Plans	Zoning Regulations	Subdivision Regulations	Land Development Plans	Fire Prevention Code	Comprehensive Plan	Capital Improvement Plan	Stormwater Management Plan	CERT Team	NWS StormReady Program	Local Economic Development	Regional Economic Development	City Class
Ballard County	X							X		X		X	X	
City of Barlow								X				X	X	6
City of Kevil								X				X	X	6
City of La Center					X		X	X				X	X	5
City of Wickliffe	X							X				X	X	5
Calloway County	X		X	X						X	X	X	X	
City of Murray	X		X	X	X		X		X			X	X	3
City of Hazel												X	X	6
Carlisle County	X									X	X	X	X	
City of Bardwell	X											X	X	5
City of Arlington	X											X	X	6
Fulton County	X									X		X	X	
City of Fulton	X		X	X	X		X	X				X	X	4
City of Hickman	X		X		X		X					X	X	4
Graves County	X									X		X	X	
City of Mayfield	X		X	X	X		X		X			X	X	3
City of Wingo	X											X	X	6
Hickman County										X	X	X	X	
City of Clinton	X											X	X	5
City of Columbus													X	5
Marshall County	X				X	X				X	X	X	X	
City of Benton	X		X				X					X	X	4
City of Calvert City	X		X	X	X		X	X	X			X	X	4
City of Hardin	X											X	X	5
McCracken County	X		X	X	X	X	X			X	X	X	X	
City of Paducah	X		X	X	X		X	X	X			X	X	2

For the jurisdictions that do have some form of planning and zoning or are fortunate enough to have a planning or engineering department, let it be reiterated that the strategies and projects of the plan are and will continue to be integrated into their formal plans, both in terms of short-term and long-term planning.

As evidence of the commitment of all of the Purchase Region jurisdictions to, generally, the goals inherent in hazard mitigation, and, implicitly, to the integration of such goals, strategies, and actions into any formal planning, ordinances, et al., the following spreadsheet is presented below.

It conveys, via a snapshot in time, the variety of applications for hazard mitigation actions put forward by the Purchase Region jurisdictions which participate in this plan.

The following table also conveys progress in local mitigation actions: It is telling that the last presidential disaster declaration to fund a mitigation action for any of the counties or cities within the Purchase region was DR-1976, that was declared in 2011. With the exception of DR-4217 financing the current multi-jurisdictional, multi-hazard mitigation plan update, DR-1976 and its financing of four (4) generator projects represents the progress of mitigation activity since 2013's multi-jurisdictional, multi-hazard mitigation plan update was approved.

Table 1.49 HMGP Applications Submitted by Jackson Purchase Region

Disaster	Jurisdiction	Project Type	Total Funds Requested	Status
1163	**City of Wickliffe**	**Acquisition**	**$58,768.00**	**Awarded**
1310	**Ballard County**	**Seismic Retrofit**	**Unknown (Closed)**	**Awarded**
1310	**Ballard County**	**Seismic Retrofit**	**Unknown (Closed)**	**Awarded**
1310	**Ballard County**	**Warning System**	**$35,483.00**	**Awarded**
1454	**City of Murray**	**Detention Basin**	**$787,954.00**	**Awarded**
1454	**City of Wickliffe**	**Lift Station**	**$439,687.00**	**Awarded**
1746	Fulton County	Notification System	$16,000.00	LOI Submitted to KYEM; not selected by SHMT
1757	Carlisle County	Sirens	$165,879.00	LOI Submitted to KYEM; not selected by SHMT
1757	Fulton County	Notification System	$12,250.00	LOI Submitted to KYEM; not selected by SHMT
1757	City of Fulton	Bank Stabilization	$300,000.00	LOI Submitted to KYEM; BCA information not returned from subapplicant - proposal closed
1818	City of Bardwell	Elevation/Build New Wells	$400,000.00	LOI Submitted to KYEM; determined to be ineligible
1818	City of Murray	Construction - Safe Room	$10,800,000.00	LOI Submitted to KYEM; BCA information not returned from subapplicant - proposal closed
1818	City of Calvert City	Redundant Water Line	$1,325,000.00	Ineligible; sent letter
1818	City of Calvert City	Redundant Water Line	$929,000.00	Ineligible; sent letter
1818	City of Murray	Redundant Communications	$34,259.00	Ineligible; sent letter
1818	Ballard County Fiscal Court	Other - Initiative	$60,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Murray-Calloway County Hospital	Other - Initiative	$34,259.44	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Calloway County Fiscal Court	Warning Siren	$256,405.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Ballard County Fiscal Court	Warning Siren	$146,136.00	LOI Submitted to KYEM; not selected by SHMT; sent letter

Disaster	Jurisdiction	Project Type	Total Funds Requested	Status
1818	Ballard County	Generator: Family Life Center	$75,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Wickliffe	Generator	$ 48,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Bardwell	Generator: Water Treatment Plant	$ 55,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Bardwell	Generator: Water Treatment Plant	$ 35,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Bardwell	Generator: Baptist Church	$ 59,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Barlow	Generator: WTP	$ 55,983.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Calloway County	Generator	$ 46,938.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Fulton County	Generator: Shelters	$ 160,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Fulton	Generator: PW	$ 50,620.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Fulton	Generator: Maintenance Garage	$ 46,340.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Fulton	Generator: Critical Facility at Lagoon	$ 32,121.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Fulton	Generator: Sewer Lift Station	$ 44,251.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Fulton	Generator: PW Lift Station	$ 45,153.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Kevil	Generator	$ 70,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of LaCenter	Generator	$ 136,500.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of LaCenter	Generator	$ 47,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Marshall County Health Department	Generator	$ 24,800.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Marshall County Health Department	Generator	$ 31,750.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Marshall County Health Department	Generator	$ 6,460.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Murray - Calloway County Hospiatl	Generator	$ 385,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Murray State University	Generator	$ 65,200.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Murray-Calloway County Hospital	Generator	$ 46,700.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Murray-Calloway County Hospital	Generator	$ 127,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter

Disaster	Jurisdiction	Project Type	Total Funds Requested	Status
1818	Murray-Calloway County Hospital	Generator	$ 134,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Paducah Public Schools	Generator	$ 89,800.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Paducah Water	Generator	$ 26,500.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Paducah Water	Generator	$ 68,300.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	Paducah Water	Generator	$ 91,600.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Wickliffe	Generator	$ 50,940.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818	City of Wingo	Generator	$ 35,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1818-0023	Paducah Water	Construction – Safe Room	$122,000.00	Application submitted to FEMA
1818-0047	**Ballard County**	**Generator - EOC**	**$54,450.00**	**Awarded**
1818-0048	**Fulton**	**Generator - Fulton**	**$28,412.00**	**Awarded**
1818-0043	Marshall Co	Safe Room	$1,535,450.00	Withdrawn
1818-0013	**Marshall Co**	**Generator - EOC/Court House**	**$57,762.00**	**Awarded**
1818-0023	Paducah Water	Safe Room	$140,000.00	Application submitted to FEMA
1818-0018	**Murray State University**	**Generator - EOC**	**$93,000**	**Awarded**
1818-0020	**Murray State University**	**Generator -2MSU/WKMS**	**$72,735.00**	**Awarded**
1818-0022	**Mayfield Fire Station #1**	**Generator**	**$99,066.00**	**Awarded**
1818-0051	**City of Barlow**	**Generator**	**$50,227.00**	**Awarded**
1818-0095	**Ballard Co**	**3 Generators Project**	**$162,500.00**	**Awarded**
1818-0093	**City of Calvert City**	**Acquisition**	**$375,000.00**	**Awarded**
1818-0078	**Carlisle County**	**Generator**	**$115,200.00**	**Awarded**
1818-0157	**City of Hardin**	**Generator**	**$52,343.00**	**Awarded**
1818-0152	**City of Hickman**	**Generator**	**$57,624.00**	**Awarded**
1818-0002	**Purchase ADD**	**Plan Update**	**$81,598.00**	**Awarded**
1855	Ballard Co. Fiscal Court	Drainage	$ 20,256.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1855	City of Bardwell	Generator	$ 47,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1855	City of Hickman	Generator	$ 286,783.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1855	McCracken County Fiscal Court	Siren	$ 48,400.00	LOI Submitted to KYEM; not selected by SHMT; sent letter

Disaster	Jurisdiction	Project Type	Total Funds Requested	Status
1855	Jonathan Creek Water District	Generator	$ 50,945.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1912/1925	Jackson Purchase Energy Corp	Construction	$ 186,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1912/1925	Carlisle County Fiscal Court	Soil Stabilization Project	$329,287.00	Selected to move forward to BCA/Application
1912/1925	City of Calvert City	Civic Center Construction	$ 177,000.00	Selected to move forward to BCA/Application
1912/1925	McCracken County Fiscal Court	McCracken Co (2) Safe Rooms w/ Generators	$ 725,000.00	LOI Submitted to KYEM; not selected by SHMT; sent letter
1912-0013	**Fulton County Fiscal Court**	**Fulton Co. Generator Project**	**$ 88,093.00**	**Awarded**
1912-0014	**Marshall County Fiscal Court**	**Marshall County Generators (2), Water Treatment**	**$116,649.00**	**Awarded**
1912-0026	Marshall County Fiscal Court	Acquisition/Demolition	Unknown	Unknown
1912-0033	**McCracken County Fiscal Court**	**Substantial Damage Acquisition/Demolition**	**$654,949.00**	**Awarded**
1976-0001	**City of Arlington**	**Generator Project**	**$46,051.00**	**Awarded**
1976-0005	**City of Paducah**	**Fire Station Generator**	**$99,830.00**	**Awarded**
1976-0008	**City of Hickman**	**City of Hickman Water Treatment Plant Generator**	**$139,254.00**	**Awarded**
1976-0016	**Hickman County Fiscal Court**	**Hickman-Fulton County RECC Generator**	**$27,560.00**	**Awarded**
Unspecified	Marshall County Fiscal Court	Communications Antenna Replacement	In Development	In Development
	Awarded (Estimate)		**$3,794,195.00**	
	At FEMA		**$317,240.00**	
	LOI approved		**$696,287.00**	

Public Climate of Support

Virtually all residents have a basic knowledge of what natural hazards are most prevalent in their areas and the potential impact they can have. The gap comes in the form of education regarding mitigation measures that can be put in place by both local governments and residents. Education concerning mitigation strategies and potential losses will be a key factor for all jurisdictions in the planning area. In light of recent natural hazard events and the excessive impact they have had on the Purchase Region, the political climate supports and is proactive concerning hazard mitigation measures.

1:6.3 Continued Public Involvement

The JPHM Plan has been created with considerable input from each jurisdiction. A goal of the regional council is to provide ample opportunity for continued public involvement in hazard mitigation planning and activities. In order to do so it is proposed that the LEPCs, the WEKMA and the KYEM Regional Office periodically (perhaps at a minimum once a year) review the JPHM Plan, particularly the individual county Annexes at a meeting open to the public.

The county EMs will ensure that copies of the JPHM Plan is available at all public libraries as well as each of the county judge-executive and mayor offices for public review during regular business hours. These copies will contain contact information for PADD staff and the county EM where the public can document their concerns or changes regarding the mitigation plan.

A complete copy of the JPHM Plan will be available on the PADD's website (www.purchaseadd.org).

Individual Project Progress Report

From: County Emergency Manager
To: Elected Officials
Subject: **Annual Report Status of Mitigation Projects**
Date:
Project Title:
Status of Project:
Problems/Obstacles & Proposed Corrective Actions:
Name of Reporter:
Address:
Email Address:
Phone Number:

Send to: County Emergency Manager

Local Mitigation Strategy Annual Report

From: County Emergency Manager
To: Elected Officials
Subject: **Annual Report Status of Mitigation Projects**
Date:

This report is prepared to inform locally elected officials in the Purchase Region of the progress being made to make our community more disaster-resistant. The following briefly summarizes the status of existing projects presently being developed and identifies new projects expected to be undertaken in the upcoming year.

Existing Projects:			
Project Title	**Purpose of Project**	**Status of Completion**	**Obstacles/Problems/Solutions**

New Projects:				
Project Title	**Purpose of Project**	**Funding Source(s)**	**Anticipated Problems or Solutions**	**Start Date / End Date**