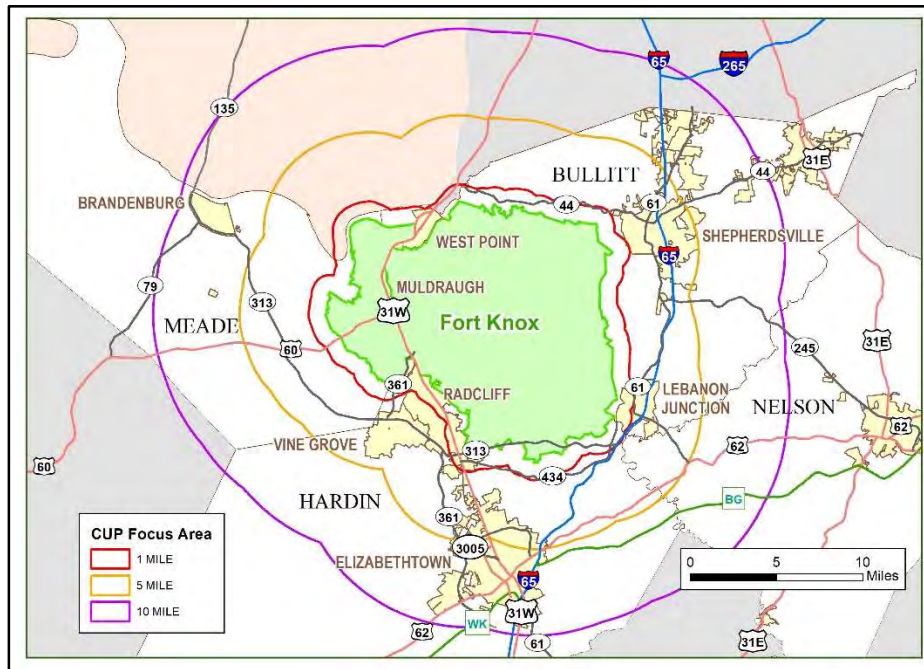


I Region and Community Profiles

The study area, as originally defined, encompassed parts of both Indiana and Kentucky. The focus of this study, however, are the portions of Bullitt, Hardin, Meade, and Nelson Counties that lie within the study area. While other counties do fall within the ten-mile study buffer, Breckinridge, LaRue, and Jefferson (Louisville Metro) in Kentucky and Harrison County Indiana; it was decided during the initial study planning phase to concentrate on the aforementioned counties that share a more extensive relationship with Fort Knox. Their physical location, integrated transportation, communication, utility networks and local governance reflect that they both absorb and contribute the most impact in relation to Fort Knox's presence.

Map 2 Study Area



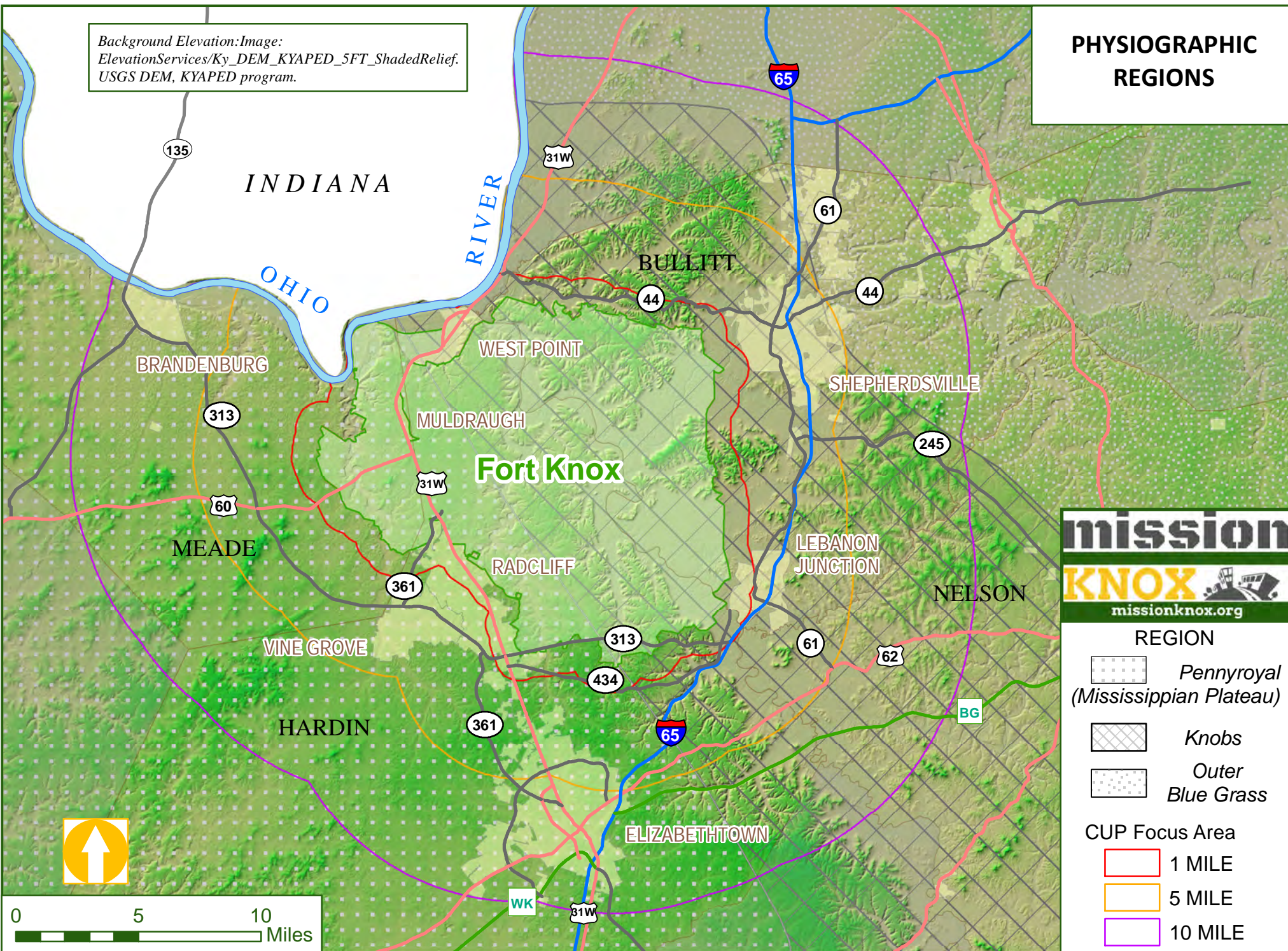
The entirety of Fort Knox lies within Bullitt, Hardin, and Meade Counties. Nelson County, while not conterminous, does lie along some aerial approaches to the main ranges of the installation. It also shares directly in the potential development corridors that potentially could affect the military's missions. There are 15 incorporated cities in Bullitt, Hardin, and Meade Counties within the study area. They have additional planning units and governing bodies that contribute to any policies that can play a role in any compatible use planning.

Geography & Environment

The study area lies along the southern boundary of the Ohio River in central Kentucky. It is unique in that for its compact size it straddles three of the six physiographic regions of Kentucky. Meade and the majority of Hardin County lie within the Pennyroyal (Mississippi Plateau) region with its predominate feature being the karst topography. See Map 3 Physiographic Regions.

PHYSIOGRAPHIC REGIONS

Background Elevation Image:
ElevationServices/Ky_DEM_KYAPED_5FT_ShadedRelief.
USGS DEM, KYAPED program.



MAP 3 - PHYSIOGRAPHIC REGIONS

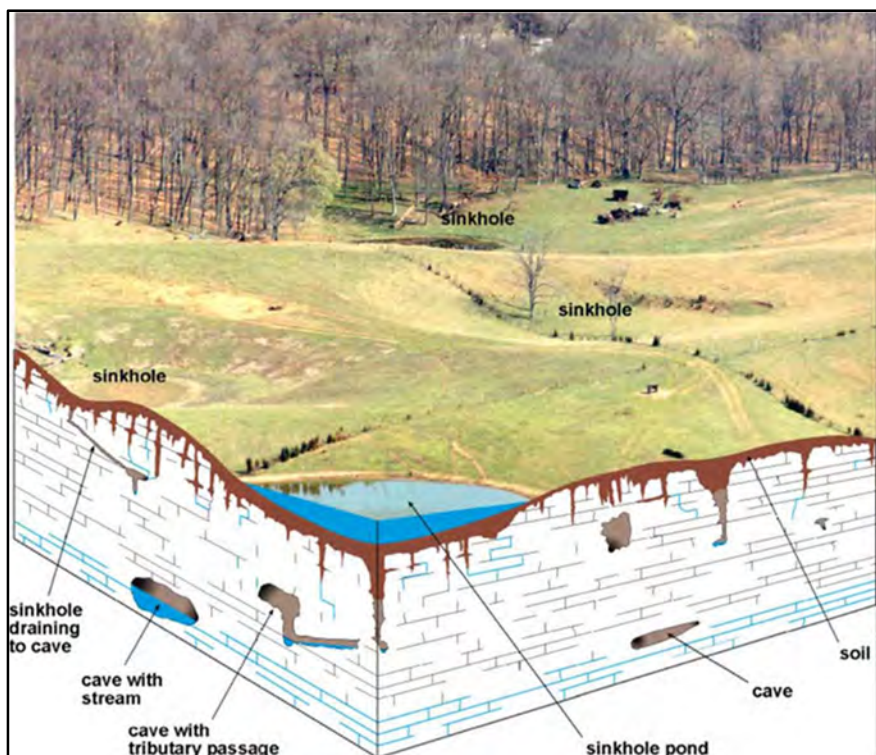


Figure 9 Karst Landform System, Kentucky Geologic Survey.

This karst area creates many issues with construction and various types of land use in general and must be accounted for in any development. The north-eastern strip of Hardin, the southwest area of Bullitt, and the eastern half of Nelson Counties lie within the Knobs region. Extending south from the Ohio River this area is known for its steep sloped hills that rise from the river plains. A primary concern is landslides and subsidence. Thus, these areas of steep slopes are prohibitive of most development although the river valleys have allowed formation a transportation corridor that has seen much residential development supplanting agriculture over the years. The western portions of Bullitt and Nelson Counties lie in the Outer Bluegrass region. This area

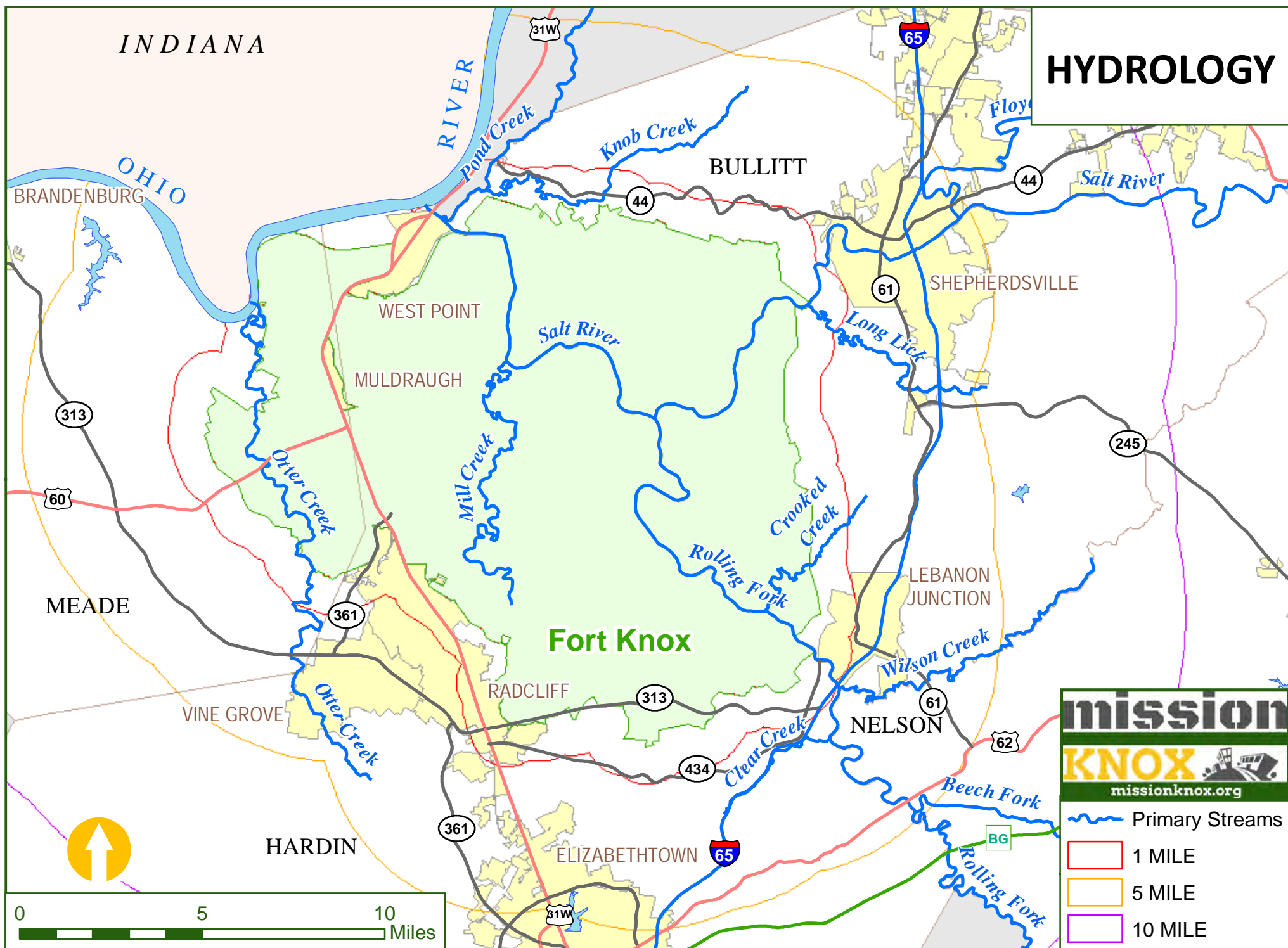
contains flat to rolling areas of land prone to development but primarily falls outside of the study area.

The study area is bisected by numerous streams that lie in the Ohio Valley. Predominate is the Salt River, Rolling Fork, Otter Creek, Wilson Creek and Beech Fork. See Map 4. These valleys create regular problems with flooding. The result is that flooding is the most common disaster in the state and certainly within the study area. Over development in areas that are now understood as alluvial flood plains present ongoing issues. The need to restrict further development in the flood plains are necessary for protection of both human investment and prevention of environmental degradation.



Figure 10 Ohio River Flood, West Point, KY. Photo Credit: WDRB Media 2018.

The varied landforms also provide unique habitats for both flora and fauna. Protected species, wetlands, forests, and streams all need to be considered in planning for and implementing development. This applies both on and off post. These issues are highlighted and explained in detail in Section III – Compatibility Issues.



MAP 4 - HYDROLOGY

Government

County governments provide the foundation of local policy making and implementation in Kentucky. With a long history of local control over land use affairs the County serves as the focus of issues with regards to any planning of land use, infrastructure, or other adaptation of the environment to its people. In part, due to their historic nature and timeframe of establishment, Kentucky has 120 Counties. This is the third greatest number in the United States. This can present issues with multiple policies within small geographic areas. County government is based on a representative “fiscal court” that has magistrates allocated based upon equal population districts. Each county may have between three and eight based upon Kentucky’s statutes. To elect the body each magistrate represents their respective district. While an alternative “commissioner” form of government is available whereby the representatives reside within their district but are elected by voters county-wide; most choose to retain the historic magisterial method. The fiscal court is led by a “Judge / Executive” who is elected by a county-wide vote. The title of “Judge” is a carryover from days when the fiscal courts did have some limited judicial powers and functions. All the counties within the study area retain the magisterial form of government.¹

Kentucky statutes allow for three forms of city governance, mayor-council, commission, or city manager.² Within the CUP study focus area, the cities of interest are all of the mayor-council form.

¹ Only 13 Counties have adopted a commissioner form of government vs. 105 with magisterial. However, 24% of Kentuckians live in a County with this form of government per 2020 Census. Hardin County adopted this form in 2004 but reversed the decision in 2008. See Kentucky’s Dept. for Local Government

Within the scope of this plan and its focus on land use issues finds cities may maintain a separate governance over some affairs although they are still subservient to the county, they are a part of in other respects. County ordinances are applied county-wide including within cities unless state law provides otherwise, or a city has more stringent standards.³ Cities and Counties can work together to create joint boards to manage various entities. These may include parks and recreation facilities, land use and zoning, building codes, or floodplain management. They may also create so called “special districts” that have oversight of their respective policies such as air boards, transit authorities, housing authorities, industrial development authorities, agricultural districts, community improvement districts, and sanitation districts, water, districts, area planning commissions, or watershed conservancy districts. Interlocal agreements may also be implemented between counties and cities involving roads.⁴

Table 1 Units of Government

STUDY AREA UNITS OF GOVERNMENT			
Bullitt County	Judge/Executive	Fiscal Court	4 Magistrates
Lebanon Junction	Mayor	Council	6 Members
Shepherdsville	Mayor	Council	6 Members
Hardin County	Judge/Executive	Fiscal Court	8 Magistrates
Elizabethtown	Mayor	Council	6 Members
Radcliff	Mayor	Council	6 Members
Vine Grove	Mayor	Council	6 Members
West Point	Mayor	Council	6 Members
Meade County	Judge/Executive	Fiscal Court	6 Magistrates
Brandenburg	Mayor	Council	6 Members
Muldraugh	Mayor	Council	6 Members
Nelson County	Judge/Executive	Fiscal Court	5 Magistrates

[https://kydlgweb.ky.gov/Counties/16_CountyList.cfm]. Note this excludes Louisville/Jefferson County Metro and Lexington-Fayette Urban County governments which are each a special Council form of government. Their inclusion puts 43% of Kentuckians in a non-magisterial form of government.

Counties and Cities

The region's cities and counties together comprise a mix of small urban and rural jurisdictions that overall is vibrant and growing. A brief synopsis of each is presented as follows:

Bullitt County

Bullitt County was founded in 1796, and named after Alexander Scott Bullitt, Kentucky's first Lieutenant Governor. Even prior to its' official founding, Bullitt's Lick, a historic salt lick within the county, drew many settlers to the area. The extraction and processing salt works built here created what is considered to be Kentucky's first industry.⁵ Today, Bullitt County is home to a thriving alcohol tourism industry, including the Bullitt County Wine & Whiskey Trail. This Trail features six locations within nine miles of each other, including the Jim Beam American Outpost and four local wineries.⁶ The growth of transportation and logistics has dominated recently. The proximity to the UPS World Hub and I-65 have given rise to numerous warehouse and distribution centers such as Amazon which is currently the largest employer in the county.

Lebanon Junction

Lebanon Junction grew up around the L & N Railroad, with a terminal built on the site in 1892. The town was incorporated in 1895. After this, the town prospered, and was Bullitt County's largest city until the 1970 Census. It still has the railroad (CSX) and now I-65 keeping it on major north-south transportation routes. It lies within two miles of Fort Knox's largest weapons range, Yano.



Figure 11 Bullitt County Courthouse = Source: The Bullitt County History Museum.

Shepherdsville

Founded in 1793, Shepherdsville is located on the Salt River. It serves as the County Seat. Historically, it benefited from the salt trade and from the presence of a mineral water spa. Shepherdsville, like the county around it, has industrialized to an extent in more modern times.⁷ It has experienced tremendous growth almost tripling in population since 1990. Just south of Louisville and with three exits off I-65; it is predicted to keep growing at a rapid pace.

Hardin County

Hardin County was founded in 1793 and is a transportation hub in the center of the state. Hardin is the most populous county in the study area by a significant amount and contains the two largest cities in Elizabethtown and Radcliff. In addition to major highways and railroad, Hardin County is also home to a regional healthcare system, an advanced manufacturing sector, and a thriving agricultural sector.⁸



Figure 12 Hardin County Government Building - Source: LTADD.

Elizabethtown

Elizabethtown, the seat of Hardin County, was founded in 1797; and named for the wife of Colonel Andrew Hynes. During the day, the average population doubles with an influx of workers and other visitors. The city is located on Interstate 65, and has a regional airport, Addington Field and is 45 minutes from Louisville International Airport.

Radcliff

The City of Radcliff is a changing community with a diverse population. Located in northern Hardin County adjacent to the Fort Knox Army Installation, it serves as the gateway city to Fort Knox. Given Radcliff's size and proximity to Fort Knox, mitigation and compatibility efforts here are crucial. The newest city in the study area, it was incorporated in 1956, it came into existence due to Fort Knox. Continued development increases the vital role it plays in Fort Knox's future existence.

Vine Grove

Growing up around the Illinois Central Railroad, Vine Grove maintains its small-town convenience. The advent of the railroad allowed businesses to locate themselves to take advantage of the passenger and shipping traffic that the railroad provided. Vine Grove was incorporated in 1897. Subsequent to the 2005 BRAC, Vine Grove has had a housing boom. A 60% population increase since 2000 has created challenges and opportunities for the community.

West Point

West Point is a northern Hardin County town on the Ohio River at the mouth of the Salt River. Founded in 1796, it has had a military presence dating back to the Civil War. West Point was the home of Fort Knox's predecessor, Camp Young which was first established in 1903.⁹ Laying up against Fort Knox's northern boundary and astride US 31W, West Point plays a continued role in Fort Knox's future.

Meade County

Formed in 1824, Meade County is located on the Ohio River. It has the most river frontage of any county in the state. Long an area of agriculture, it has grown more economically diverse over the years. First beginning in the 1950's with the construction of the Olin-Matheson Chemical Plant and now with the building of Nucor Steel along the Ohio River. Today, Meade County is heavily tied to Fort Knox through its location, transportation network, retirees, and workforce.



Figure 13 Meade County Courthouse - Source: LTADD.

Brandenburg

Brandenburg, the county seat, has long been tied to the Ohio River. It was located on the river as the site for a ferry landing. Today a river front park serves to host community events. A bridge across the Ohio River still serves to connect the area to I-64. The new KY 313 extension provides an improved, alternate route to go north and west from Fort Knox bypassing Louisville.

Muldraugh

Muldraugh was named after Muldraugh Hill, a dominant ridge a predominant geomorphic feature dividing the Knobs from the Pennyroyal regions. At the top of the hill coming up from the Ohio River along the Louisville and Nashville Turnpike it was long a stopping point for traffic. While the Muldraugh Post Office was established in 1874, it wasn't incorporated until 1952. Muldraugh is distinctive being an enclave of Fort Knox, and as such, ensuring compatibility between Muldraugh and Fort Knox is vital.

Nelson County

Founded in 1785, Nelson County sits astride both the Knobs and Blue Grass regions. Known internationally for the bourbon industry, it has grown in population rapidly; increasing 25% between 2000 and 2020 per the U.S. Census. It is not as directly influenced as the other counties by Fort Knox but its location, workforce, and transportation links play a definite role.



Figure 14 Nelson County Courthouse - Source: Nelson County Government.

Growth & Change

Regionally, all four counties are continuing to grow in overall population. The following portions of the study will look at population, residential, and transportation growth and their respective issues. This growth has and will continue to impact the compatibility between the communities within these counties and Fort Knox. As these counties continue to grow, the potential the growth near the installation increases. Ensuring that all parties have clear planning and open

communication is vital to making sure that expansion is directed in such a fashion as to enable Fort Knox to continue to perform its vital mission. This must be balanced with the evolution the surrounding area will experience with the societal and economic changes that accompany that progression.

Just as with national changes, the area continues to become more urban with denser population clusters. The larger cities have experienced the greatest population growth. Slow growth, to decline in many cases, are reflective of the smaller cities populations. The continued generation of subdivisions consume what was once open land and the expansion of infrastructure both supports and then escalates this pattern. This must be understood and accounted for apropos future development in the study area.

Local Planning Agencies

It is important to understand the existing planning environment in the study area. Some implementation strategies developed need to be carried out by the correct, most equipped agency or group. In some cases, they may need to be carried out by multiple organizations. Thus, it's critical to understand the relationships between the various organizations of the region. Zoning is an area with high potential for changes to be made to improve compatibility. One of the most effective ways to prevent non-compatible uses in areas close to the post would be to zone those areas in such a way that new construction is automatically either disallowed or restricted in design or type.

Planning agencies in Kentucky are set up as a "Planning Commission" under Kentucky Revised Statute (KRS) Chapter 100. They may be established as an individual city, county, joint city county, or as groups of counties and cities in a regional format.¹⁰ The study area is covered by ten separate commissions as illustrated in Table 2. They can regulate a number of components of land use that may include: building permits, cell tower siting, subdivision regulations, boards of adjustment, zoning regulations, et al.

In Kentucky, the state sets the building codes. The Department of Housing, Buildings, and Construction is the responsible agency. In 2019, they adopted the 2018 *Kentucky Building Code*, and *Kentucky Residential Code*, 2nd Editions. The Codes are based on the 2015 versions of *International Building Code*, and the *International Residential Code for One- and Two- Family Dwellings* respectively. There are also Kentucky specific amendments to those to those codes.¹¹ The Kentucky Residential Code regulates one and two family

residential structures and townhomes, while the Kentucky Building Code regulates all other building types.

The Kentucky Building Code is a "mini/maxi" code. This means that it is statewide, mandatory, and uniform. No local government is allowed to adopt or enforce any other building code applying to commercial construction.¹² The Kentucky Residential Code is also a "mini/maxi" code, and as such, local governments are not allowed to adopt or enforce any other building code that would apply to one or two family dwellings or townhomes.¹³ In Kentucky, responsibilities for inspections are split between the Department of Housing, Buildings, and Construction and local governments. Sections 104.15 and 104.16 of the 2018 Kentucky Building Code lay out this split of responsibilities.¹⁴

Table 2 Planning Agencies

STUDY AREA PLANNING AGENCIES	
Bullitt County	County Joint Planning Commission
Lebanon Junction	
Shepherdsville	
Hardin County	Planning & Development Commission
Elizabethtown	Planning Commission
Radcliff	Planning Commission
Vine Grove	Planning & Zoning Commission
West Point	Planning & Zoning Commission
Meade County	Planning Commission
Brandenburg	Planning & Zoning Commission
Muldraugh	Planning & Zoning Commission
Nelson County	City-County Joint Planning Commission

Regional Planning Agencies

In addition to the county and city specific planning agencies, there are other bodies that cover the study area and guide planning efforts on a more regional basis. These are touched on briefly in this section.

Kentuckiana Regional Planning and Development Agency

The Kentuckiana Regional Planning and Development Agency (KIPDA) is a regional agency that works with the Federal, State, and Local governments on a variety of issues across the policy spectrum. It serves six Kentucky counties: Bullitt, in the study area, Henry, Jefferson, Oldham, Shelby, and Spencer, and also Clark and Floyd Counties in Indiana.

KIPDA provides several planning services for their region. Included are regional planning, review and technical services, and transportation related services. KIPDA also coordinates services for those 60 years of age and older as part of the Area Agency of Aging and Independent Living program. KIPDA also does regional reviews for almost all applications for federal/and or state funds that are made by Kentucky governments or organizations in their service area.¹⁵

Lincoln Trail Area Development District

The Lincoln Trail Area Development District (LTADD) is, like KIPDA, another of the 15 Area Development Districts statewide. The LTADD region consists of eight counties: Breckinridge, Grayson, Hardin, LaRue, Marion, Meade, Nelson, and Washington.

The organization and management goal of LTADD is to assist local units of government in provision of optimal services to citizens by enhancing

and strengthening their public management and administration capabilities. This vision is encompassed in the statewide ADD's mission statement, *"To bring those local, civic and governmental leaders together to accomplish those objectives that could not be achieved by the governments acting separately."* LTADD has various councils, committees, and departments to meet the needs of the region. The primary ADD planning functions are carried out through groups such as the Radcliff-Elizabethtown Metropolitan Planning Organization, the Regional Transportation & Highway Safety Committee, Water Management Council, and the Regional Planning Council.¹⁶

Transportation Planning Organizations

In the study area, there are three regional transportation planning organizations. Bullitt County is covered by the Louisville Urban Area Metropolitan Planning Organization (MPO), under the umbrella of KIPDA. The Radcliff-Elizabethtown Metropolitan Planning Organization (REMPO), LTADD serving as the host organization, is responsible for Hardin and Meade Counties. Finally, the Regional Transportation and Highway Safety Committee manages the transportation of Nelson County. This Committee is also resident at LTADD.

Table 3 Transportation Planning

STUDY AREA REGIONAL TRANSPORTATION PLANNING ORGANIZATION		
	Organization Name	Residing Agency
Bullitt County	Louisville Urban Area MPO	Kentuckinan Regional Planning & Development Agency
Hardin County	Radcliff-Elizabethtown MPO	Lincoln Trail Area Development Agency
Meade County		
Nelson County	Regional Transportation Committee	Lincoln Trail Area Development Agency

The MPO's were established via the Federal Surface Transportation Assistance Act of 1973. Requiring the formation of a MPO for urbanized areas of a population exceeding 50,000, *"MPOs were created in order to ensure that existing and future expenditures for transportation projects and programs are based on a comprehensive, cooperative, and continuing (3-C) planning process. Federal funding for transportation projects and programs are channeled through this planning process."*¹⁷

The Regional Transportation and Highway Safety Committee is set up at the ADD's through a partnership with the Kentucky Transportation Cabinet (KYTC) to assist rural counties in transportation planning. In particular, inclusion in the statewide transportation planning process. This process helps the local governments prioritize projects and coordinate a more regional approach to expensive transportation infrastructure.

Knox Regional Development Alliance

The Knox Regional Development Alliance (KRDA) is a public private partnership that is focused on promoting and protecting Fort Knox in

order to increase its economic impact. The Alliance focus areas include the retention of existing missions, addition of new missions, developing more public-public and public-private partnerships, facilitating and advocating for more support for soldiers and their families, and generally expanding defense contractor business in the region.¹⁸

Population and Housing

The issue of residential need versus the impact of its geographic location will be required to be addressed by policy makers on a continuing basis. The need for affordable housing for residents in the study area is reflected across the United States as policies regarding environment, density, transportation, and community preferences all play a role in the policy decisions of local governments. Balancing needed residential development against those residents being affected by various mission requirements such as noise, overflights, ambient light restrictions, dust, or other ramifications must be factored into any development plans or policies.

The study area has revealed steady growth over the years, the result of many factors. Historically a transportation hub located on main north/south routes, it has also benefited from the existence of Fort Knox and proximity to the large metropolitan area of Louisville. Later years provided the addition of the east/west connector parkways, and the upsurge of rail traffic due the advent of containerized cargo and the expansion of the Panama Canal. The four-county study area has experienced a compound annual growth rate of 1.8% in population since 1930. This exceeds the national (1.1%) and state (0.6%) growth rates for the same period. See Table 4. The region more than doubled its population in the first 30 years reviewed and again in the next 40 years.

The population growth of the individual governing bodies in the study area are provided in Table . Overall, the populations of the individual jurisdictions have grown enormously. Bullitt County is 9 times larger, Hardin - 5 times, Meade -3.5 and Nelson - 3 times larger over the

Chart 1 Study Area Population Growth Rates – US Census (Table 4)

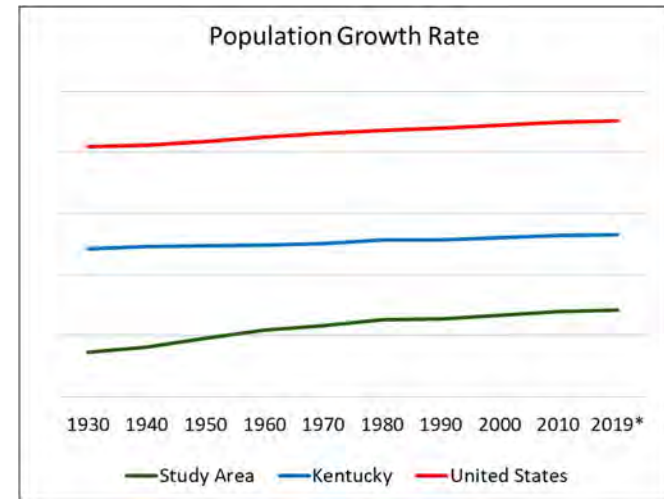
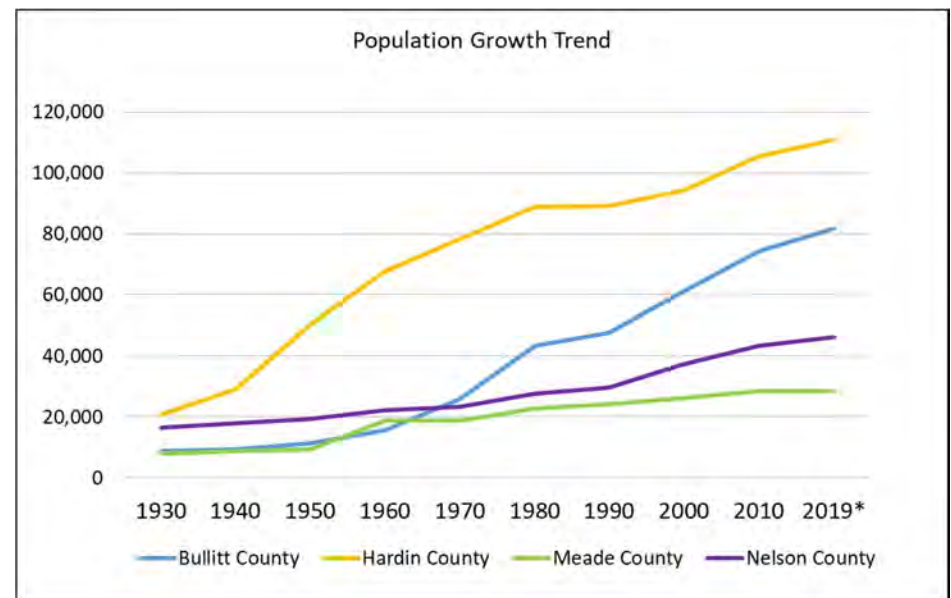


Chart 2 County Population Growth Trend – US Census (Table 5)



timeframe reviewed. See Chart 2. Of note is the growth of denser, urban areas. The cities, in particular the larger ones, have grown in

Table 4 Population Growth

STUDY AREA POPULATION										
	1930	1940	1950	1960	1970	1980	1990	2000	2010	2019*
Study Area	54,374	65,450	90,604	124,621	146,784	182,701	190,687	219,236	251,901	267,439
Kentucky	2,614,589	2,845,627	2,944,806	3,038,156	3,218,706	3,660,777	3,685,296	4,041,769	4,339,367	4,467,673
United States	123,202,624	132,164,569	151,325,798	179,323,175	203,211,926	226,545,805	248,709,873	281,421,906	308,745,538	328,239,523

U.S. Census, Decennial Census and 2019 ACS estimates.

Table 5 Study Area Population

STUDY AREA POPULATION											
		1930	1940	1950	1960	1970	1980	1990	2000	2010	2019*
Bullitt County		8,868	9,511	11,349	15,726	26,090	43,346	47,567	61,236	74,319	81,676
	Lebanon Junction	1,267	1,141	1,243	1,527	1,571	1,581	1,741	1,801	1,813	1,962
	Shepherdsville	633	762	943	1,525	2,769	4,454	4,805	8,334	11,222	12,442
Hardin County		20,913	29,108	50,312	67,789	78,421	88,917	89,240	94,174	105,543	110,958
	Elizabethtown	2,590	3,667	5,807	9,641	11,748	15,380	18,167	22,542	28,531	30,289
	Radcliff**	n/a			3,384	8,426	14,656	19,772	21,961	21,688	22,914
	Vine Grove	523	822	1,252	2,435	2,987	3,648	3,586	4,169	4,520	6,439
	West Point	697	992	1,669	1,957	1,741	1,339	1,216	1,100	797	876
Meade County		8,042	8,827	9,422	18,938	18,796	22,854	24,170	26,349	28,602	28,572
	Brandenburg	484	561	755	1,542	1,637	1,831	1,857	2,049	2,643	2,877
	Muldraugh***	n/a			1,743	1,773	1,752	1,376	1,298	947	986
Nelson County		16,551	18,004	19,521	22,168	23,477	27,584	29,710	37,477	43,437	46,233
STUDY AREA TOTALS		54,374	65,450	90,604	124,621	146,784	182,701	190,687	219,236	251,901	267,439

U.S. Census, Decennial Census and *2019 ACS estimates.

** Incorporated 1956

*** Incorporated 1952

area and population as a percentage of their counties. Shepherdsville has grown 20 times in size from 7% in 1930 of Bullitt County to over 15% of its current population. In Hardin County, Elizabethtown from 12% to over 27% of the county's population, and Radcliff from not existing until 1956 to being almost 21% of the total population in 2019. The question then arises; where do all these people live? They are obviously not evenly distributed throughout the region and the result finds most within the study area. This plays a large roll in understanding the issues that may or do present compatible use conflicts.

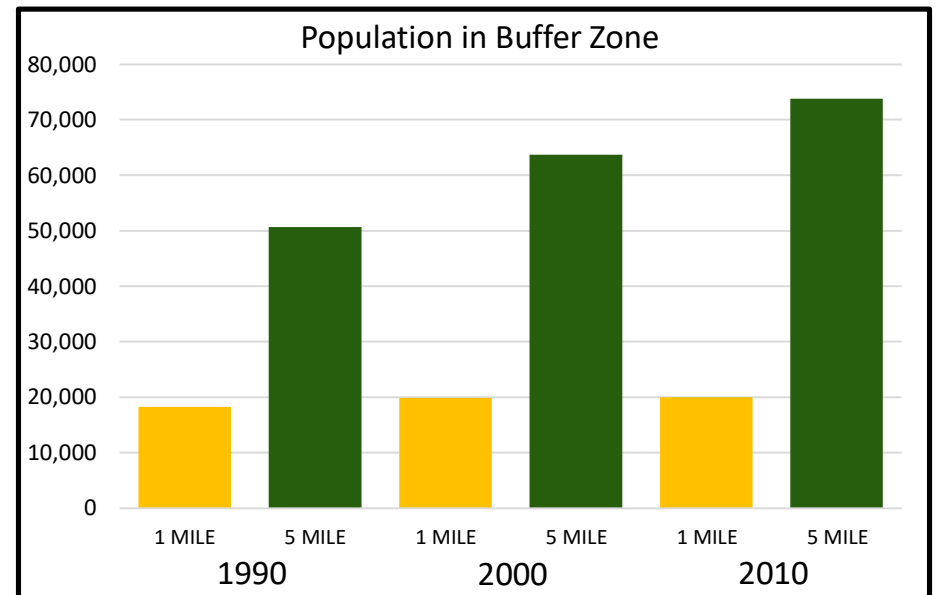
Going back to our focus area buffers of one and five miles, Table 4 shows the populations in each. The growth rate in the one-mile buffer was just over 9% however, in the five mile it increased by almost 46%. See Chart 3.

Table 4 Decennial Populations by Buffer Zone

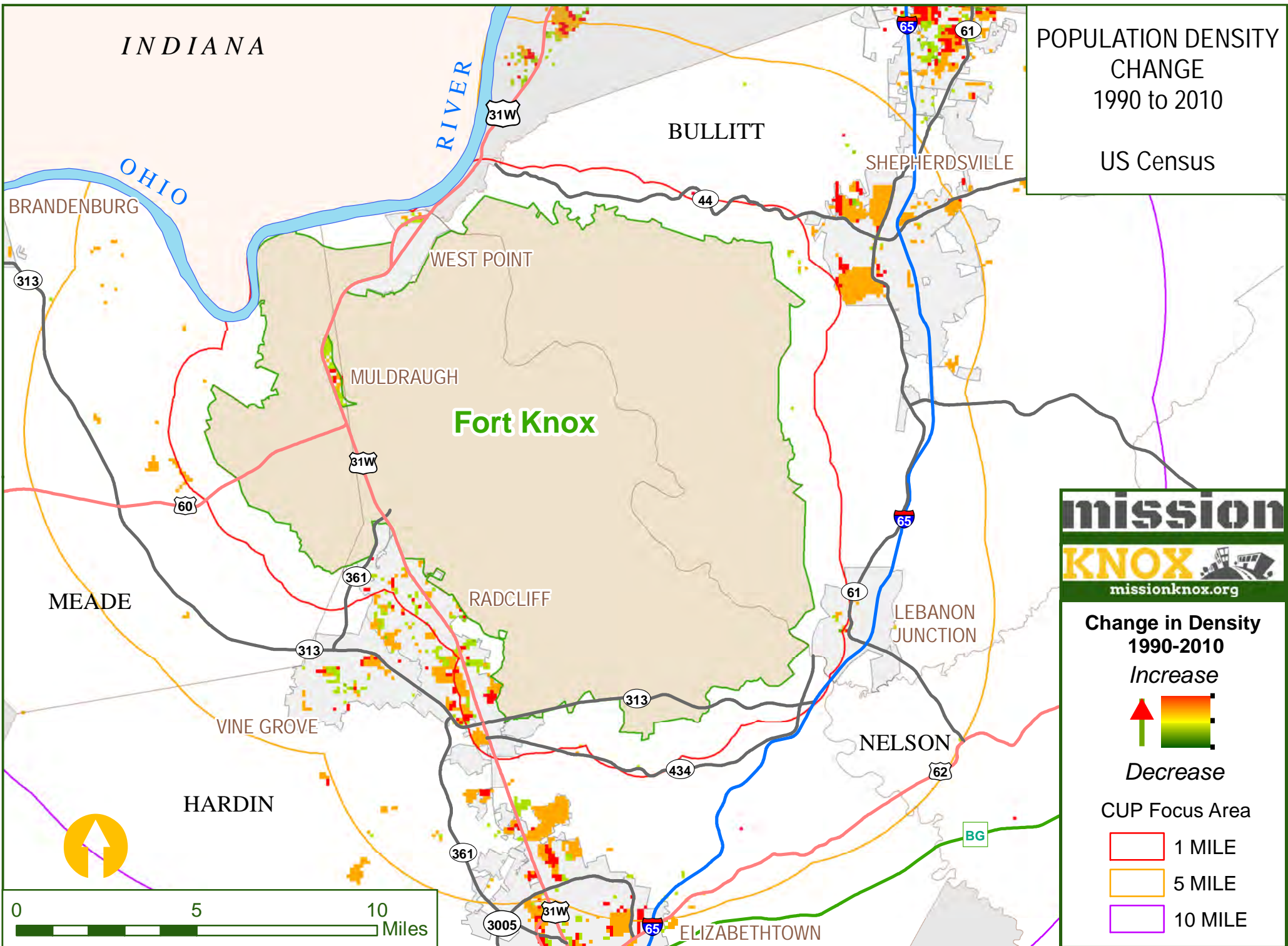
DECENNIAL POPULATIONS BY BUFFER ZONE						
(city totals are included in county totals)	1990		2000		2010	
	1 MILE	5 MILE	1 MILE	5 MILE	1 MILE	5 MILE
Bullitt County	2,715	12,868	2,864	17,124	2,536	21,653
Lebanon Junction	868	873	798	999	791	1,022
Shepherdsville		4,805		8,294		11,128
Hardin County	13,405	25,254	14,374	30,671	15,126	34,527
Elizabethtown		2,570		5,280		7,090
Radcliff	10,455	9,317	11,590	10,400	11,845	9,840
Vine Grove		3,586		4,168		4,520
West Point	1,216		1,099		921	
Meade County	2,027	5,341	2,595	8,258	2,323	10,536
Brandenburg						
Muldraugh	1,306		1,214		947	
Nelson County		570		581		477
Jefferson County	113	6,648	0	7,066	0	6,575
Total Study Area	18,260	50,681	19,833	63,700	19,985	73,768

Source: U.S. Census, Decennial Census. Selection method block polygon centroid withing buffer zone.

Chart 3 Population in Buffer Zone



To attempt to focus in on areas with the most growth a comparison was done between the 1990 and 2010 Census. Due to the change of block boundaries between Census a direct comparison is not possible (Appendix B – Data Sources and Issues, Census Block Data.). To determine the change, each block population was divided by its area to obtain the population density. The layer for each Census year was then converted to a rasterized dataset with a set pixel size based on this density value. This allowed calculations to be performed on the datasets to determine the deltas which are presented in Map 5. The results illustrate areas of increased population density, thus growth during the timeframe.



MAP 5 - POPULATION DENSITY CHANGE, 1990-2010

Parcels

An additional way to understand the growth within the study area is a review of the number of parcels in each buffer zone. An increase in parcel count, which reflects the subdividing of existing parcels can primarily be presumed to result in increased residential usage. Again, because the boundaries are not concurrent, the centroid selection method is used. Table 5 shows increases in the one-mile buffer for both Hardin (11%) and Meade (36%). Note the decrease in Bullitt's number which is unusual. That would indicate an aggregation of parcels between 2007 and 2019. In a visual comparison of the two datasets there is some evidence of that. Several instances of property owners perhaps acquiring adjacent parcels to increase their overall lot size are noted. Other cases appear to be ongoing cleanup of the dataset over time.²

More growth, however, is evident in looking out to the five-mile buffer. New subdivisions have been created in Bullitt, Hardin, and Meade Counties over the time frame. Looking along the installation boundary itself, we see an increase of parcels that are contiguous. Table 6 reveals increases in parcels in this area "up against the fence." The Radcliff increase is in the Southern Heights subdivision adjacent to the Fort Knox boundary.

² A brief background on the parcel data used in this study. This data is controlled by the individual County Property Valuation Administrators (PVA) in Kentucky. Most of the datasets were originally created in the early 2000's by digitizing existing hardcopy parcel aerial image maps by prison labor directed by the Kentucky Revenue Cabinet. The original data is thus based on sketches of property lines and typically not actual

Table 5 Parcel Counts

PARCEL COUNTS						
	2005*/2007**		2019		% CHANGE	
	1 Mile	5 Mile	1 Mile	5 Mile	1 Mile	5 Mile
Bullitt County*	1,616	10,668	1,575	11,708	-3%	10%
Hardin County**	5,239	19,045	5,793	22,702	11%	19%
Meade County*	948	7,139	1,290	7,309	36%	2%
Nelson County**	na	306	na	325	na	6%

Sources: County PVA Offices. Based on centroid selection method.

File dates: Bullitt, Apr. 26, 2007 & Dec. 2, 2019

Hardin, Feb. 25, 2005 & Oct. 23, 2019

Meade, Oct 31, 2007 & Oct. 23, 2019

Nelson, Jul.19, 2005 & Mar. 11, 2019

Table 6 Contiguous Parcel Counts

CONTIGUOUS PARCEL COUNTS			
	2005*/2007**	2019	% CHANGE
Bullitt County*	119	111	-6.7%
Hardin County**	285	323	13.3%
Radcliff	132	158	19.7%
West Point	20	20	0.0%
Meade County*	159	165	3.8%
Muldraugh	90	89	-1.1%
Nelson County**	na	na	na

Sources: County PVA Offices. Parcels within 100ft of reservation boundary. County total includes respective city.

meets and bounds calls. For our study purposes this suffices but overall quality would be a concern for any ownership determination. Over time it is presumed that the quality of the data will improve. Thus, the Bullitt County "aggregation" may be partially attributed to a refinement of the data over the twelve year difference in the datasets.

Housing Units

Continuing to look at where growth is occurring, the use of housing unit and building permit data was collected and evaluated. The U.S. Census collects data on housing at the block level for the Decennial Census and some information with the American Community Survey (ACS) in the interim years. Table 7 Housing Units by Buffer Zone, provides a look at the number of housing units in each buffer zone. Note the county numbers include their respective cities. An overall perspective of the growth trend is portrayed in Chart 4 Housing Units in Buffer Zone. In the 20 years between 1990 and 2010 there was a tremendous growth. In the one-mile buffer, Hardin County lead the way with 15% increase in houses. The City of Radcliff had 663 of these or 75% of Hardin County's total. Factoring in the net loss of housing units in West Point, only 292 were added outside of Radcliff's corporate limits. The housing units where this population lived showed similar change. Growing by 13% in the one-mile buffer and 58% for the five-mile zone.

Chart 4 Housing Units in Buffer Zone

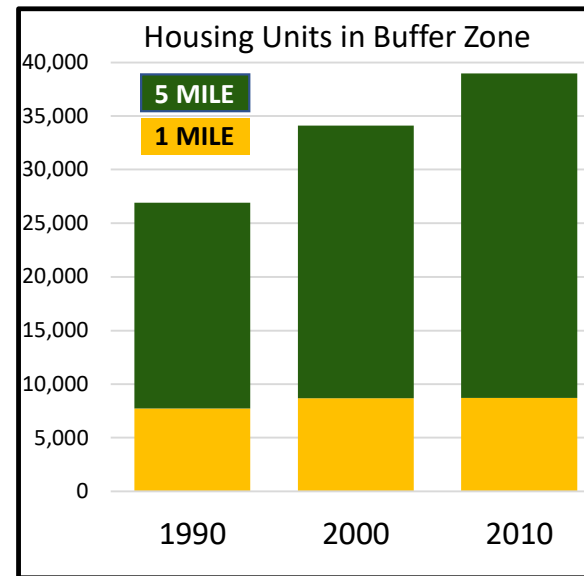


Table 7 Housing Units by Buffer Zone

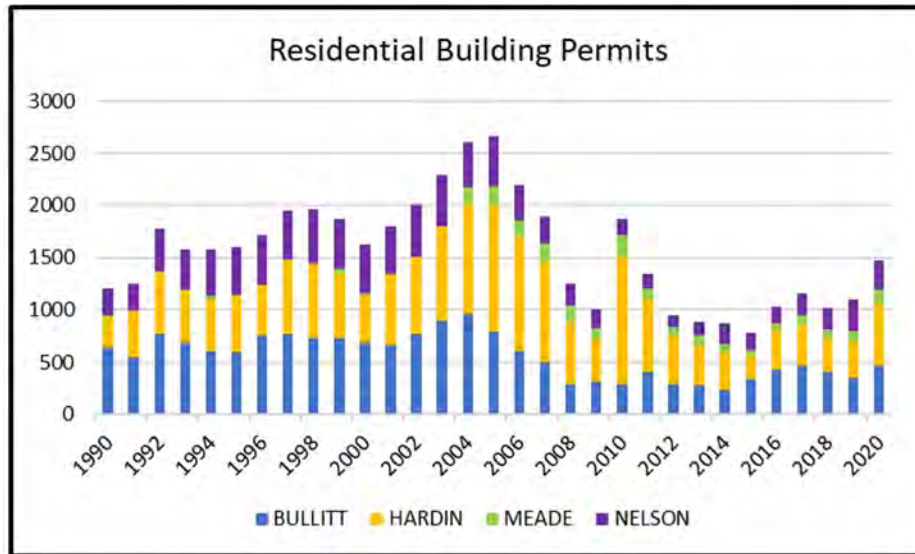
DECENNIAL HOUSING UNITS BY BUFFER ZONE						
(city totals are included in county totals)	1990		2000		2010	
	1 MILE	5 MILE	1 MILE	5 MILE	1 MILE	5 MILE
Bullitt County	931	4675	1092	6766	1039	8596
Lebanon Junction	331	354	332	420	342	442
Shepherdsville		1803		3388		4440
Hardin County	5737	9787	6432	12502	6620	14497
Elizabethtown		993		2194		3104
Radcliff	4507	3744	5171	4333	5170	4320
Vine Grove		1430		1778		1880
West Point	560		565		488	
Meade County	998	2063	1164	3217	1060	4147
Brandenburg						
Muldraugh	713		604		539	
Nelson County		216		235		220
Jefferson County	77	2443	0	2727	0	2798
Total Study Area	7,743	19,184	8,688	25,447	8,719	30,258

Source: U.S. Census, Decennial Census. Selection method block polygon centroid withing buffer zone.

Building Permits

The growth of housing can be more accurately portrayed by quantifying residential building permits.

Chart 5 Residential Building Permits - Census



U.S. Census Bureau, New Private Housing Structures.

Hardin County saw 1,209 private houses permitted in 2010 after the Great Recession of 2007-2009. The recession resulted in an overall downturn in new construction and a depression of house prices throughout the country. A previous peak of 1,221 occurred in 2005 prior to the downturn. Meade County's high was also in 2010 at 216. Bullitt County's previous high was 2004 with 954 permits issued. Nelson County's high of 525 occurred back in 1998 and after the 489 permits issued in 2005 has seen an overall drop-off. The year 2005 total of 2,669 permits remains the high value for the study area.¹⁹

In order to focus on where these permits are actually being constructed, we use data provided from the various county and city permitting agencies (See Table 9 Residential Building Permits by Year.) There are several gaps in the data due to various reporting mechanisms. Some years are supported and validated with numerous published media accounts. See Appendix B – Data Sources and Issues for more information. While there remain gaps in the data it is possible to determine specific trends and areas of growth Map 6 Residential Building Permits, illustrates the permits as they fall within the one and five mile buffers of the focus area. Some of these are individual houses, others are clustered, typically part of larger, planned developments. The breakout of these permits in the buffer zones is provided in Table 8.

Table 8 Residential Building Permits by Buffer Zone

RESIDENTIAL BUILDING PERMITS IN BUFFER ZONES (2010-2019)			
	1 MILE BUFFER	2-5 MILE BUFFER	TOTAL
Bullitt County	62	285	347
Lebanon Junction	5	12	17
Shepherdsville	1	583	584
Hardin County	62	629	691
Elizabethtown	n/a	329	329
Radcliff*	50	22	72
Vine Grove	n/a	662	662
West Point	nda	n/a	nda
Meade County	93	399	492
Brandenburg	n/a	n/a	n/a
Muldraugh	4	n/a	4
Nelson County	n/a	3	3
TOTAL	277	2924	3201

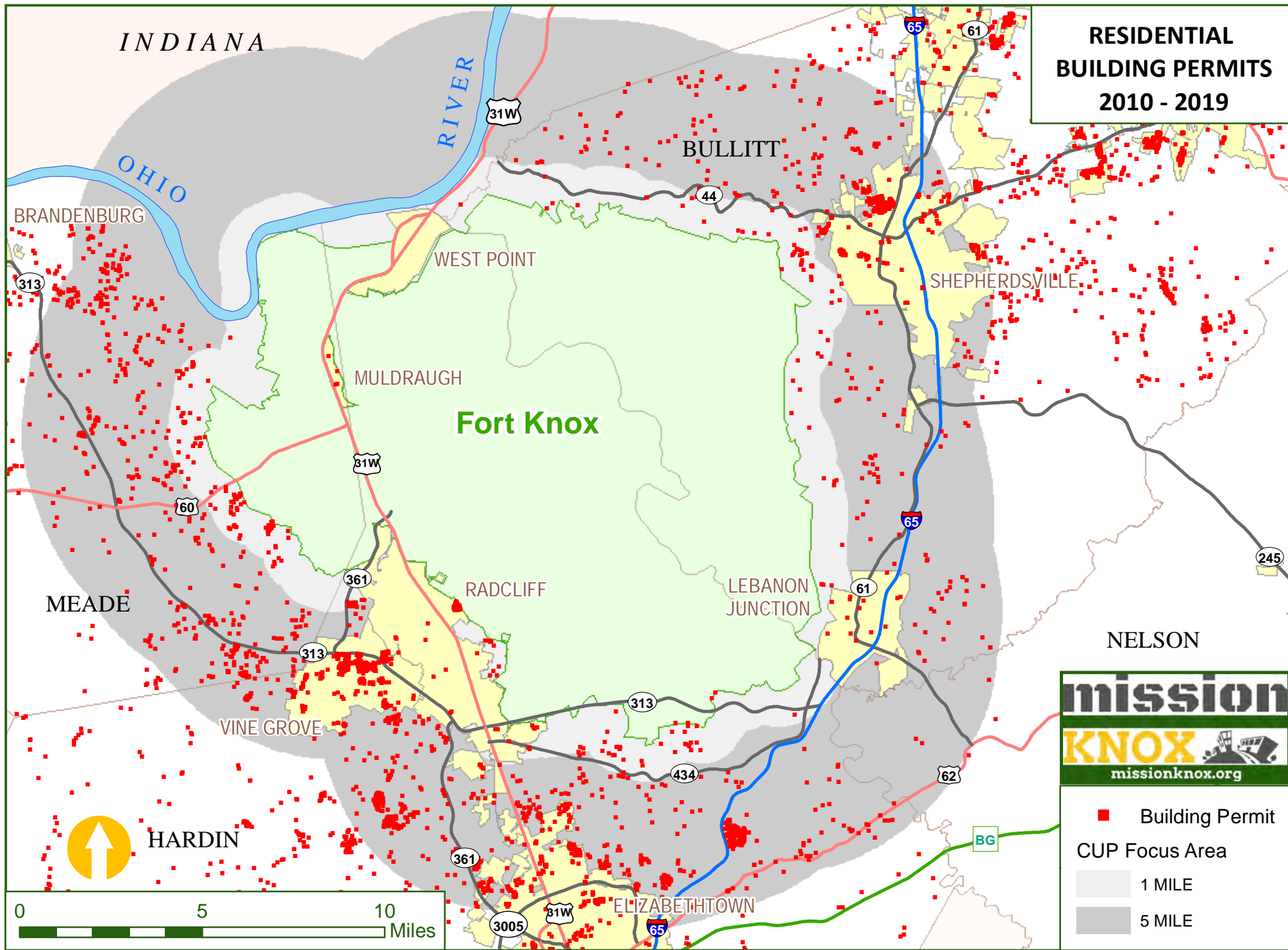
Primary Source: Respective City/County Permitting Agencies. See Appendix B, Data Sources and Issues. nda – no data available, *Official data only available for 2017-2019.

Table 9 Residential Building Permits by Year

RESIDENTIAL BUILDING PERMITS BY YEAR (2010-2019)											
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bullitt County	<i>nda</i>	288	235	276	294	249	365	461	462	408	365
Lebanon Junction	<i>nda</i>	3	2	1	0	1	0	0	0	6	4
Shepherdsville	<i>nda</i>	73	59	72	60	48	56	70	84	51	44
Hardin County*	169	327	152	159	160	126	138	161	194	188	198
Elizabethtown	<i>nda</i>	150	86	66	85	75	52	67	113	85	71
Radcliff**	69	420	179	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	11	28	21	23
Vine Grove	69	139	52	61	51	40	48	44	63	42	53
West Point	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>
Meade County	<i>nda</i>	93	106	89	100	93	88	99	97	97	129
Brandenburg	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>	<i>nda</i>
Muldraugh	<i>nda</i>	2	0	0	1	1	0	0	0	0	0
Nelson County	148	144	120	114	164	178	149	153	194	191	276

Primary Source: *Respective City/County Permitting Agencies*. See Appendix B, Data Sources and Issues.

nda – no data available, * For 2009 Single-Family only. ** Official data only available for 2017-2019. Years 2009-2011, 2016 from The News-Enterprise.



MAP 6 - RESIDENTIAL BUILDING PERMITS - 2010-2019

Land Use

In looking at the current land use the focus will be on the one-mile buffer with some attention paid to areas of concern in the five-mile zone. See Map 7 Land Use - One Mile Buffer.

Bullitt County

The **Bullitt County Joint Planning Commission** (BCJPC) administers zoning, subdivision, building permits among other functions for the county and its eight incorporated cities. Two of which, Shepherdsville and Lebanon Junction are within the study area. BCJPC shares the longest common boundary of any planning unit, over 20 miles. Physical encroachment and noise are primary concerns.

The one-mile buffer consists of steep knobs and flat valleys, many of which lay in the 100-year flood plain. There have been many efforts towards land conservation in this area which benefits the compatible use concept. Several hundred acres were preserved through the ACUB program. The comprehensive plan's future land use goals promote two large areas for conservation along the eastern boundary. Through the comprehensive plan, BCJPC recognizes the impact Fort Knox creates with regard to land use.²⁰

While currently most of the land in the buffer is zoned for Agriculture, there has been an increase of residential development over the years. Pressures for residential development are an ongoing issue. Location adjacent to I-65, a new interchange, Exit 114, and tracts of farmland available are just some elements that can contribute to non-compatible growth. In the future land use plan, there are four large areas of Low

Density and two Medium Density Residential areas. There were 71 residential building permits issued between 2010 and 2019 in the one-mile buffer.

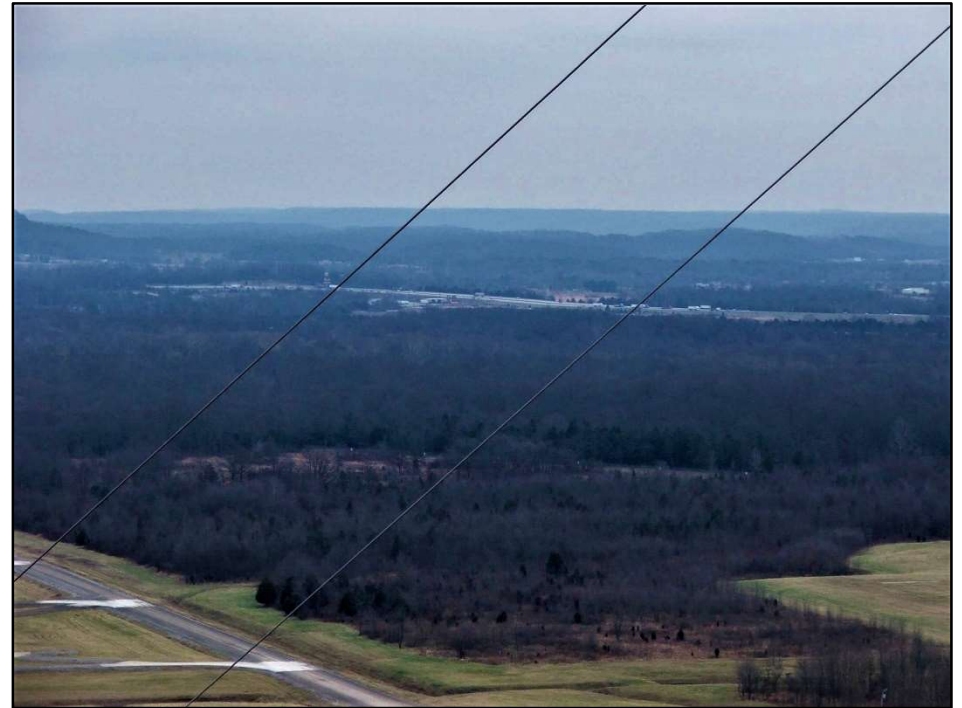
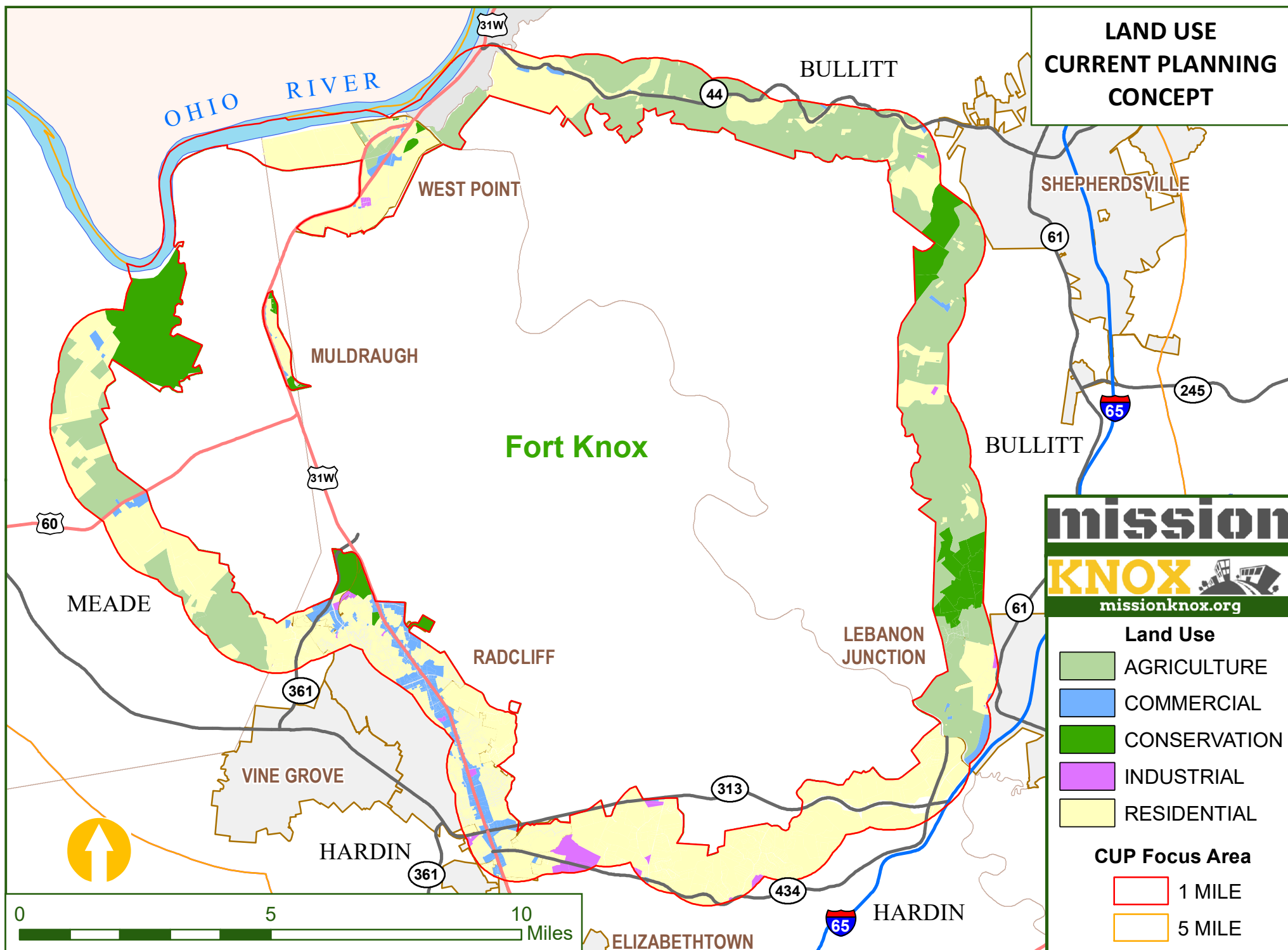


Figure 15 Yano Range tower looking east to Lebanon Junction & Exit 105, I-65. Source: Fort Knox, Directorate of Public Works, Environmental Management Division, c. 2007

The proximity of the Yano range and its expansion will increase the noise factor. One training NOE flight path follows the reservation boundary along this perimeter. Almost the entire buffer falls under the 2018 Noise Study's Large Caliber zones and some areas in the Small Caliber zones. This is recognized in part by BCJPC as they reflected it in their current comprehensive plan noise contours from the 2008 JLUS.²¹



MAP 7 - LAND USE - CURRENT PLANNING CONCEPT

They express the concern that:

“Exposure to noise within this area is severe and development within this area should be limited to activates such as industrial, manufacturing, transportation and resource production. Residential within the Noise II Zone should be prohibited.”²²



Figure 16 A. Home in Bullitt County, Newton Farm Rd, adjacent to Yano Range.
Source: Fort Knox Garrison Command, Directorate of Public Works, Environmental Management Division, c. 2007.

It could be an issue however between “should be” and “will be”. Three residential building permits have been issued in areas covered by Small Arms, 87 dB “Zone II” and eight more in the CDNL 62-70 Large Caliber,

listed as “Zone II” on the 2008 JLUS maps. This is an area that will be further addressed in the implementation section.

Of particular concern are the areas adjacent to Yano Range, future home of the DAGIR facility. In some cases, homes are built in this area that are subject to additional increases in noise and vibration levels. See Figure 16 and Figure 17. This is discussed more in depth in Section II & III.



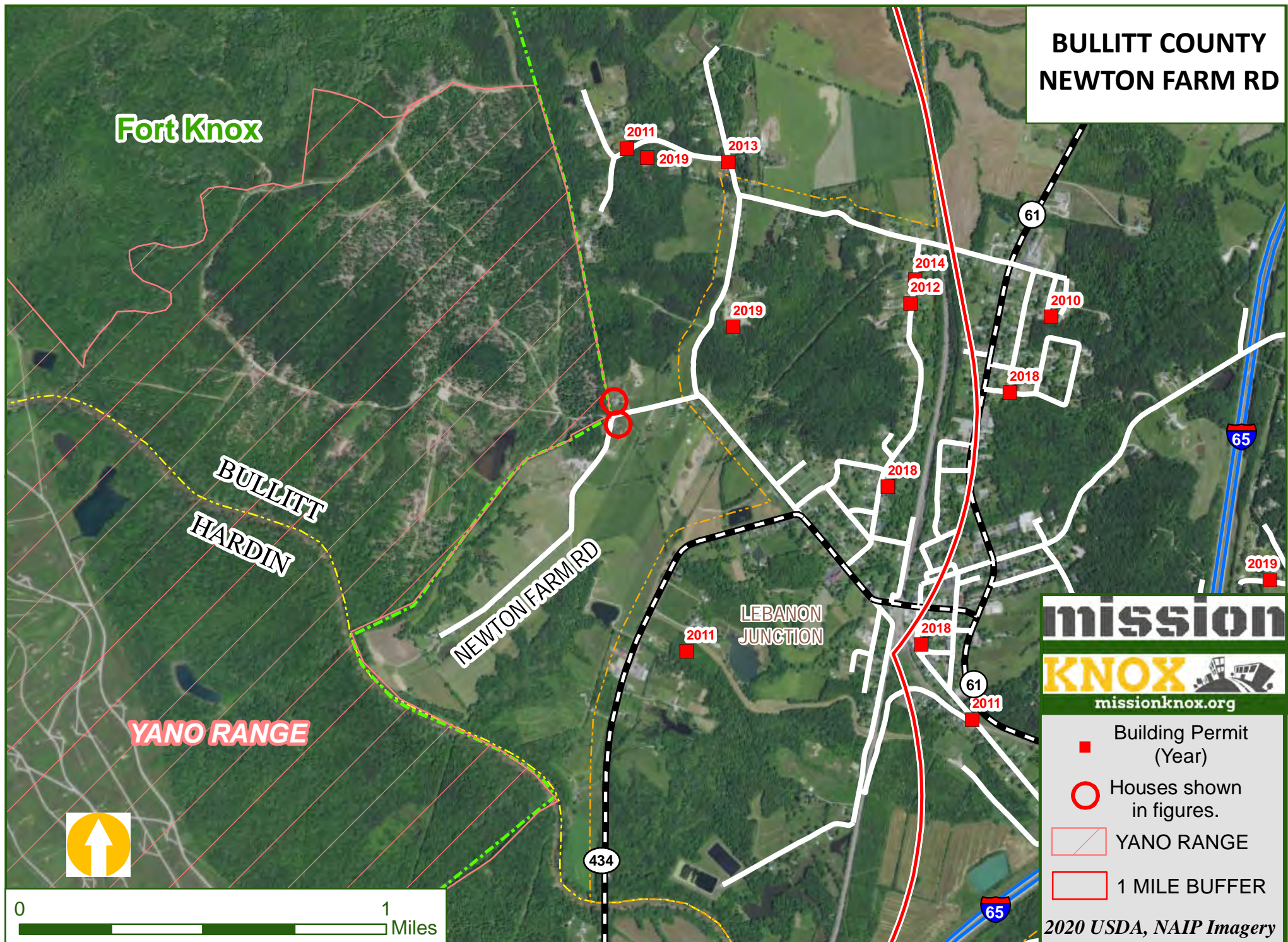
Figure 17 B. Home in Bullitt County, Newton Farm Rd, adjacent to Yano Range.
Source: Fort Knox Garrison Command, Directorate of Public Works, Environmental Management Division, c. 2007.

This highlighted area, along Newton Farm Rd., Does have a connecting gate used on occasion by facilities management. It has numerous notice and warning signs demonstrating potential hazards in the area. This can be seen in Figure 18 images and Map 8.



Figure 18 Fort Knox Gate, Newton Farm Rd., Source: LTADD c. 2007.

BULLITT COUNTY NEWTON FARM RD



MAP 8 - BULLITT COUNTY - NEWTON FARM RD

Hardin County

There are five separate planning agencies with jurisdiction within the five-mile zone and of those, three have coverage inside the one-mile buffer. This entails dealing with numerous policy makers with regards to any concerns in their relationships with Fort Knox.

Hardin County Planning and Development Commission (HCPDC) covers the greatest land area inside both the one- and five-mile perimeters. They break the county up into several planning areas of which two fall within the one mile.

One of the great success stories of compatible use in the region has been the creation of the KY 313 Corridor. See Map 9. Specifically designed to protect the land along the southern boundary of Fort Knox, the Corridor was established in 1995. Zoned R-3, Residential Estate, it has minimum lot sizes of 10 acres to assist in preventing dense residential development. Regulations in place require any plats created for development to have the following statement:

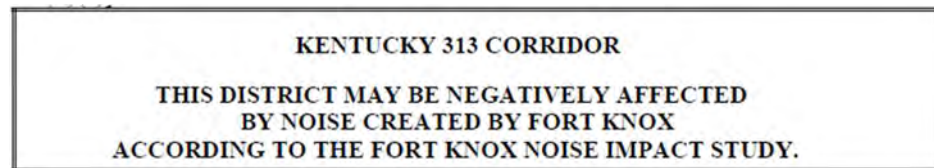


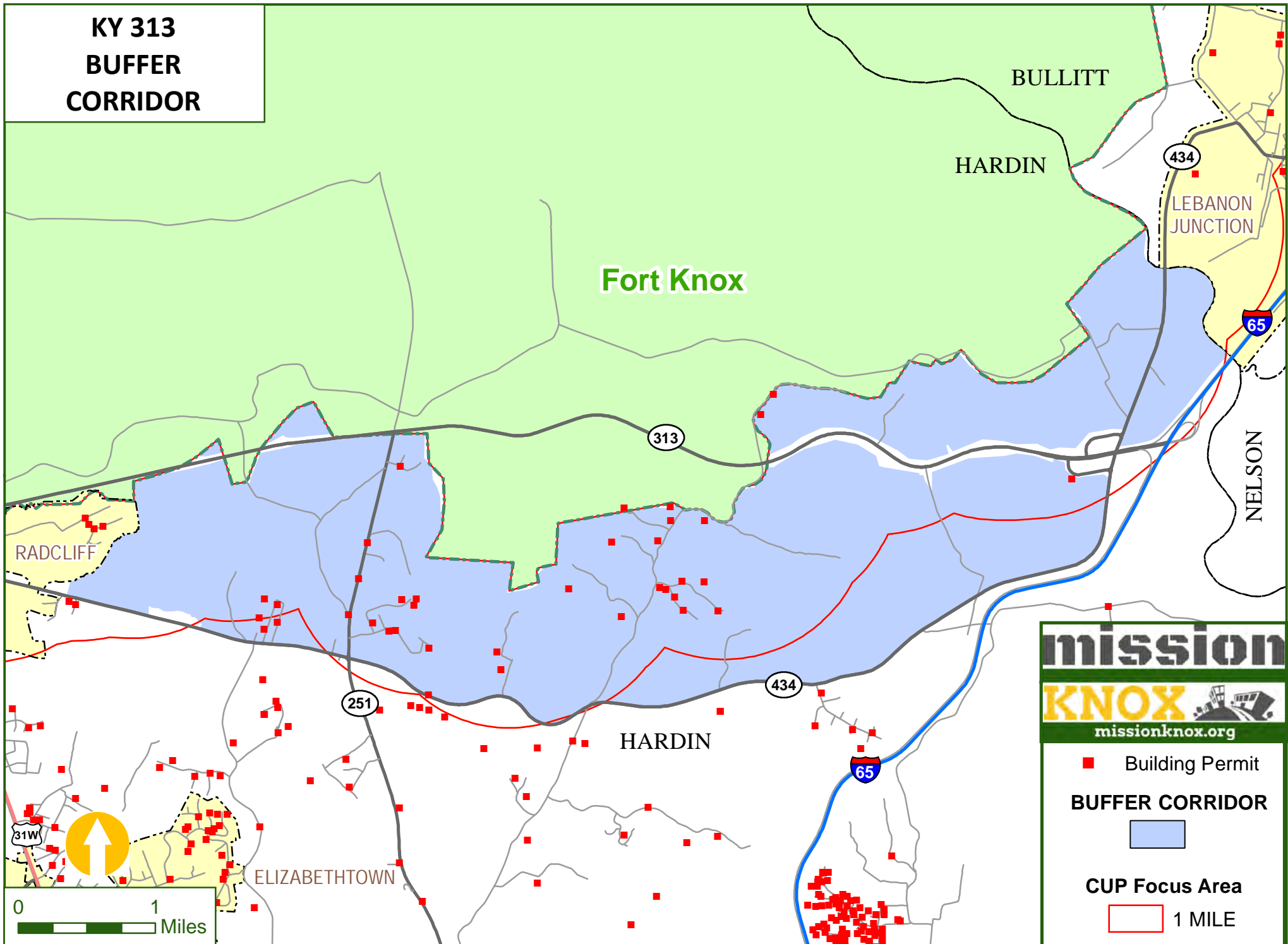
Figure 11 Plat Requirement Notice, HCPDC Zoning Ordinance 11-3, KY 313 Corridor

There have been 38 residences permitted since 2009. Containing over 12 sq miles It currently has an average parcel size of 10.823 acres for the 771 parcels within.

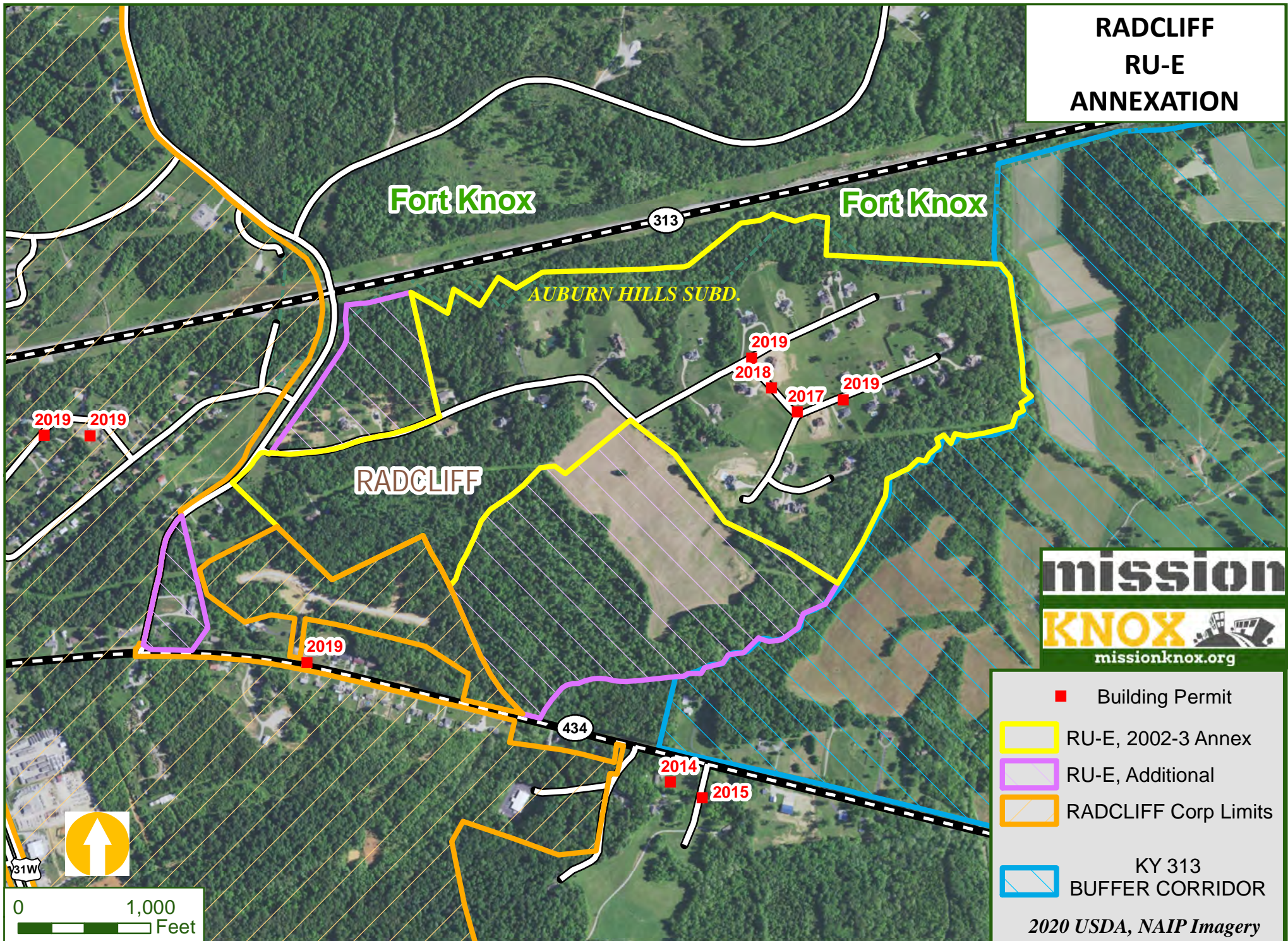
To continue its development being compatible use, it has been supported by Fort Knox Garrison Command. Numerous letters of support and other communications over the years in have been helpful in support of comprehensive plan updates and legal challenges to this designation.

One threat to the Corridor is annexation by the City of Radcliff. This creates a different body of control thus rules for zoning and the potential for denser residential development. As an example, annexations in 2002 and 2003 allowed subdivisions of a lot size down to 2.5 acres to be created in the area east of South Boundary Road. The zoning Residential-Estate Zone (RU-E) classification was created in 2001.²³ Its currently only known application is the approximately 300 acres from these annexations known as Ashburn Hills Estates now adjacent to the Corridor. See Map 10. Its exact growth rate is unknown, however, four housing permits have been issued since 2017. The total permits issued since annexation is unknown due to incomplete permit data. A comparison of E911 address data between 2009 and 2020

**KY 313
BUFFER
CORRIDOR**



RADCLIFF RU-E ANNEXATION



MAP 10 - RADCLIFF RU-E ANNEXATION

indicates 35 residential units built here since 2009. The 2019 Comprehensive Plan suggest that there is no growth of additional RU-E zones but additional annexations along KY 313 could bring this denser type of residential development.²⁴



Figure 12 RU-E Zone Home. Source: Radcliff Comprehensive Plan 2019.

Additional concerns in the KY 313 Buffer are existing and potential residences in the Cartwright Estates area at the south end of Yano Range. See Map 11. This area lies entirely in the 100-year floodplain along the Rolling Fork. There is an access gate for facilities management at the end of Stewart Road into the range area. The area has been flooded several times (See Figure 24) and is at great risk to noise exposure as described in Section II.



Figure 19 Stewart Road Access Gate. Source: LTADD c.2007.



Figure 20 Stewart Road Gate Signage. Source: LTADD c.2007



Figure 21 Residence on Cartwright Est. Rd. Source: LTADD c. 2007.



Figure 22 Elevated Residence on Cartwright Est. Rd. Source: LTADD c. 2007.



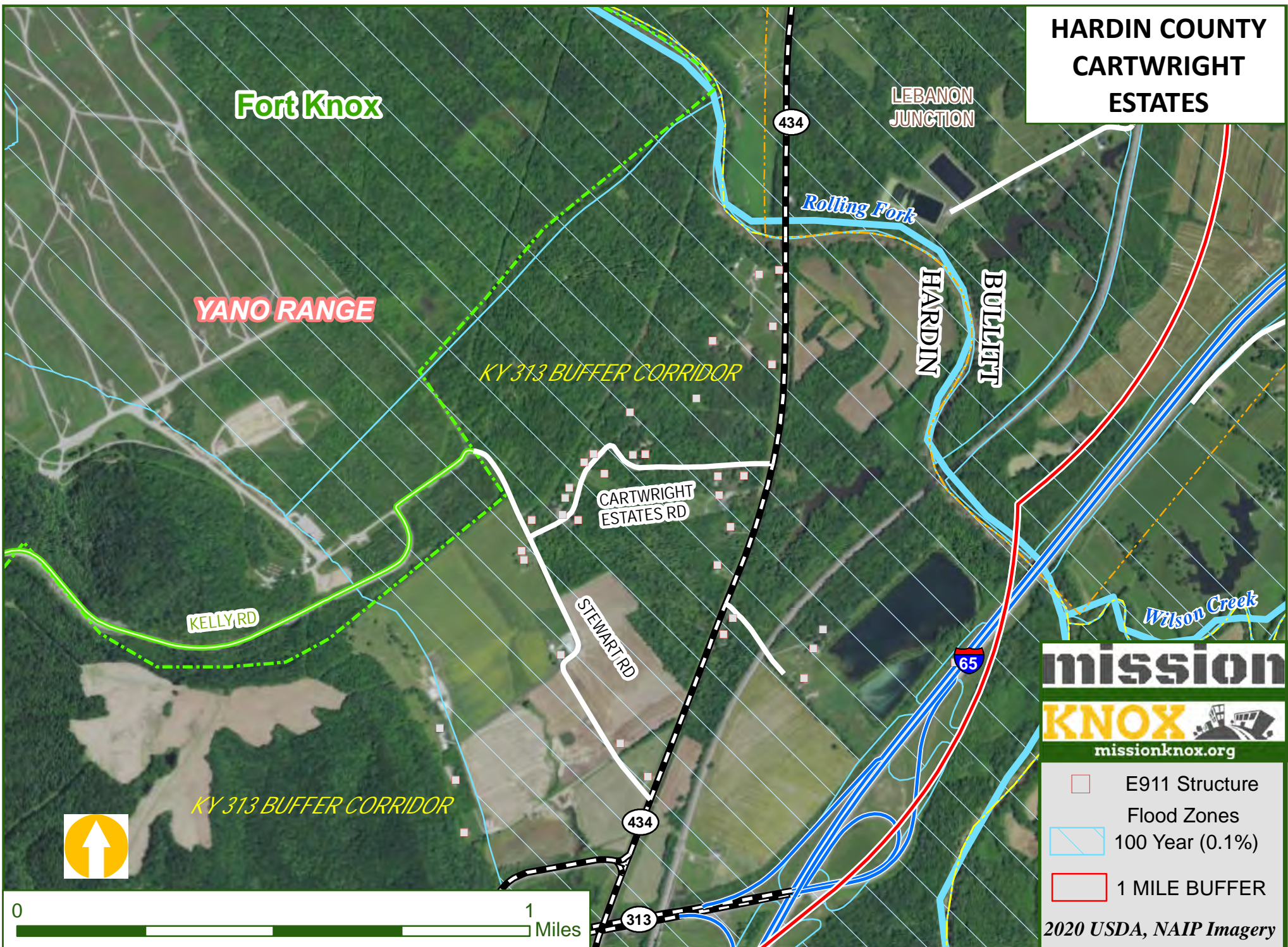
Figure 23 Utilities raised out of Floodplain. Source: LTADD c. 2007.

These residences are along Cartwright Estates Rd. The flood plain requires additional measures be taken such as raising structures and utilities.

The sign on the post in Figure 24 shows the levels of flooding for 1978, 1989, and 1997. This photo location is approximately ½ mile from the river gauge. The official high crest was 69 ft on February 17, 1989. This placed the bridge road surface on KY 434 where the gauge is located 3.5 ft underwater.²⁵



Figure 24 Flood Elevations. Source: LTADD c. 2007.



MAP 11 - HARDIN COUNTY - CARTWRIGHT ESTATES

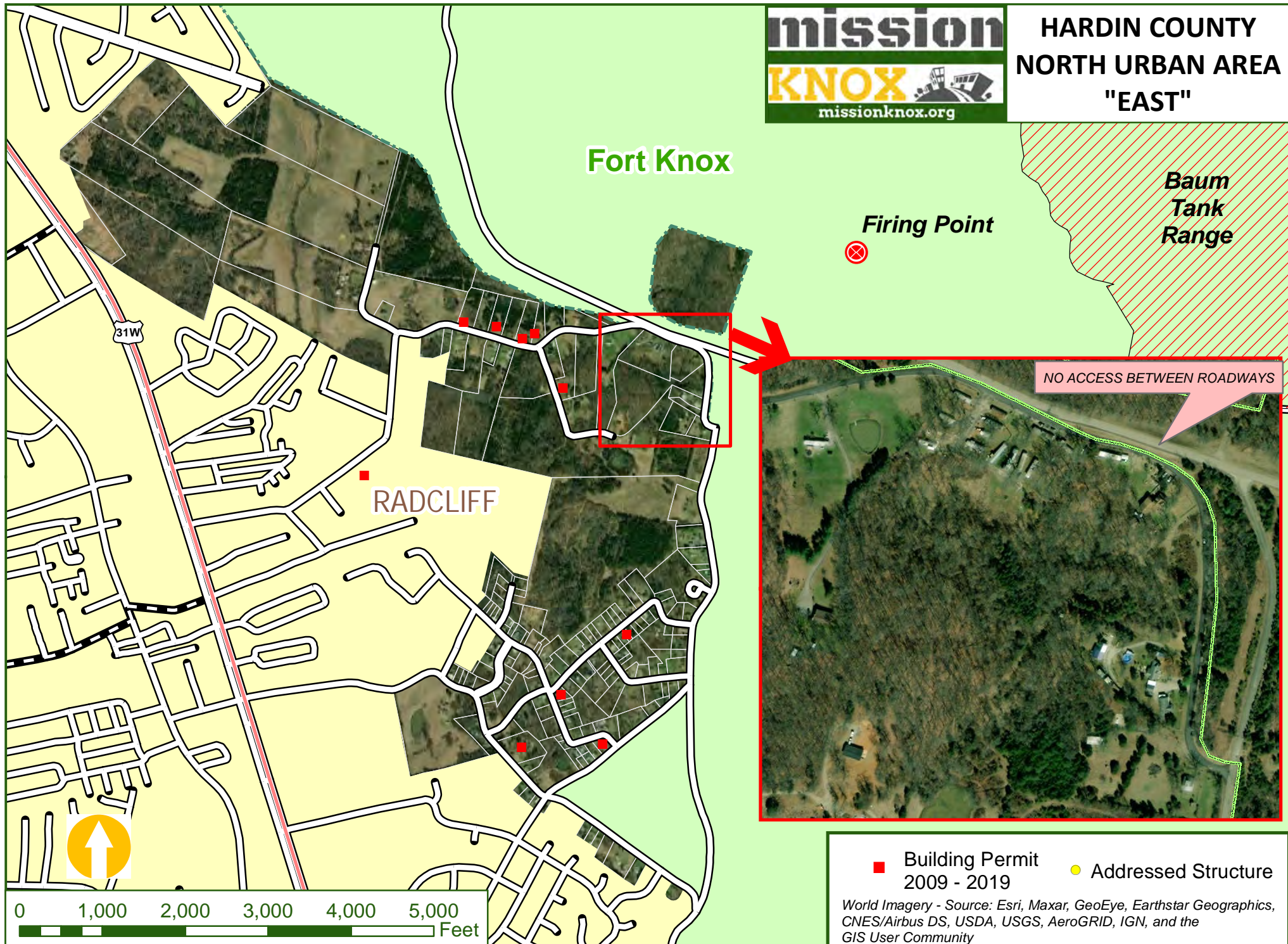
Hardin County has two additional areas that lay contiguous to the installation boundary thus within the one-mile buffer. Both are designated as part of the North Urban Area. This area in its entirety represents the primary growth area that remains in HCPDC jurisdiction in and around the primary cities of Elizabethtown, Radcliff, and Vine Grove. Of concern for this study, are these two sections that are between the post boundaries and Radcliff and Vine Grove. Primarily zoned R-1, Urban Residential Zone, they have thus far not been annexed.

The eastern area adjoins Fort Knox on the east and Radcliff on the south. See Map 12. It has approximately 178 parcels of which 10 are undeveloped and in excess of 20 acres each. There are currently 196 addressed structures which include several clusters of mobile homes. This is an increase of almost 40 structures since 2009 per E911 data. Nine building permits were issued since 2009 of which 7 were mobile homes per HCPDC. The northern end lies at the current terminus of Lincoln Boulevard and the southern end of the area is accessed by South Boundary Road.

The western area is contained by the boundary with Meade County and the Cities of Radcliff and Vine Grove. See Map 13. It is split across the one- and five-mile buffer. Within the one mile there are 104 parcels of which 6 are greater than 20 acres, with one being over 90 acres. There are currently 89 residential addresses up from 75 in 2009 per E911 data. There were 17 residential building permits issued since 2009 per HCPDC. This area straddles the new KY 361 / Bullion Boulevard with direct access to the Chaffee Gate entrance to Fort Knox.

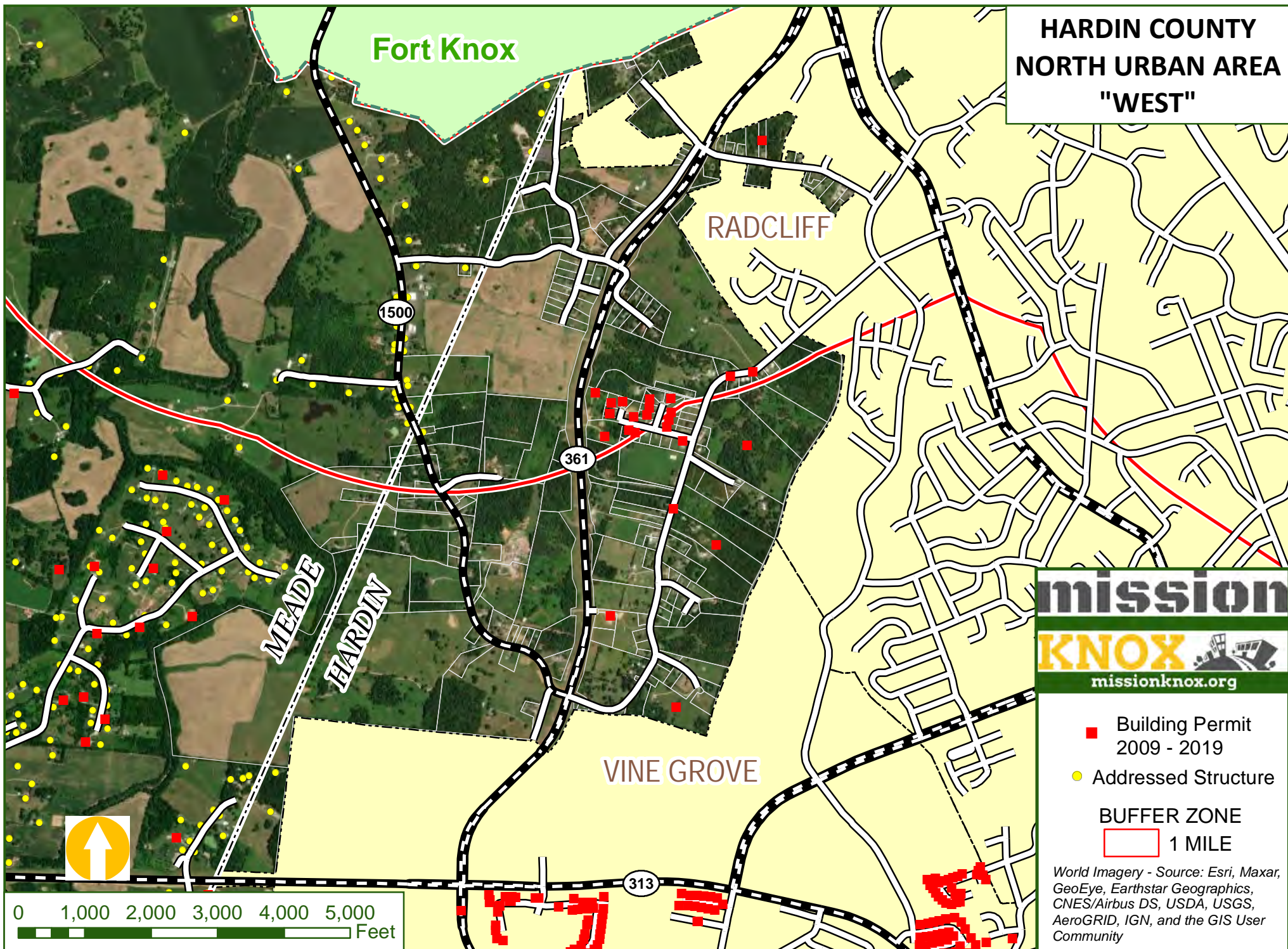
Both these areas have potential for dense residential development and should be considered at risk for that outcome.

To the west of the City of West Point there is a portion of unincorporated land that falls under HCPDC purview. See Map 15 West Point Zoning. There are 20 residential addresses on 34 parcels all zoned R-2, Rural Residential. The entire area lies within the Ohio River's 100-year flood plain and it is mainly used for agriculture. It is bordered by Fort Knox along the south and lies entirely within the one-mile buffer.



■ Building Permit 2009 - 2019 ● Addressed Structure

World Imagery - Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



MAP 13 - HARDIN COUNTY, NORTH URBAN AREA, WEST

Radcliff Planning Commission (RPC) has jurisdiction over the incorporated City of Radcliff. A majority of the city lies within the one-mile buffer and most of the remainder within two miles with a small section extending down US 31W to approximately three miles from the post boundary.

Radcliff has 17 separate zoning classifications. Ten of these directly involve residential and one other, a Planned Unit Development (PUD) relates to mix uses including residential.

New, dense residential development continues to occur adjacent to the post boundary. The Southern Heights Subdivision serves as an example. See Map 14. Available data records 31 single-family houses permitted between 2017-2019. Many of these lots share a common boundary with Fort Knox. Since 2012, 70 houses have been added to this subdivision per E911 data.

Feedback from the Commission also expressed concern for the Auburn Hills subdivision referenced previously. See Map 10. They recommend noise level reduction features in construction in this area of up to 30 dB be incorporated. In general concerns for noise and the understanding of the various noise contour locations from Fort Knox's studies were expressed.²⁶ These are dealt with in more detail in Section III – Compatibility Issues.

West Point Planning & Zoning Commission (WPPZC) provides land use policy oversight for the City of West Point along the northern boundary of Fort Knox. The city has 10 zoning categories of which 5 are residential. The entirety of the city falls within the one-mile buffer and 70% lays within the 100-year flood plain. The greatest part of the city is

comprised of undeveloped Single-Family, Low Density (R-1) zoning adjacent to the Fort Knox boundary. Most of this area is heavily wooded and split between the flood plain or steeply sloped areas. No new residential construction permits were reported for the time frame requested. See Map 15.

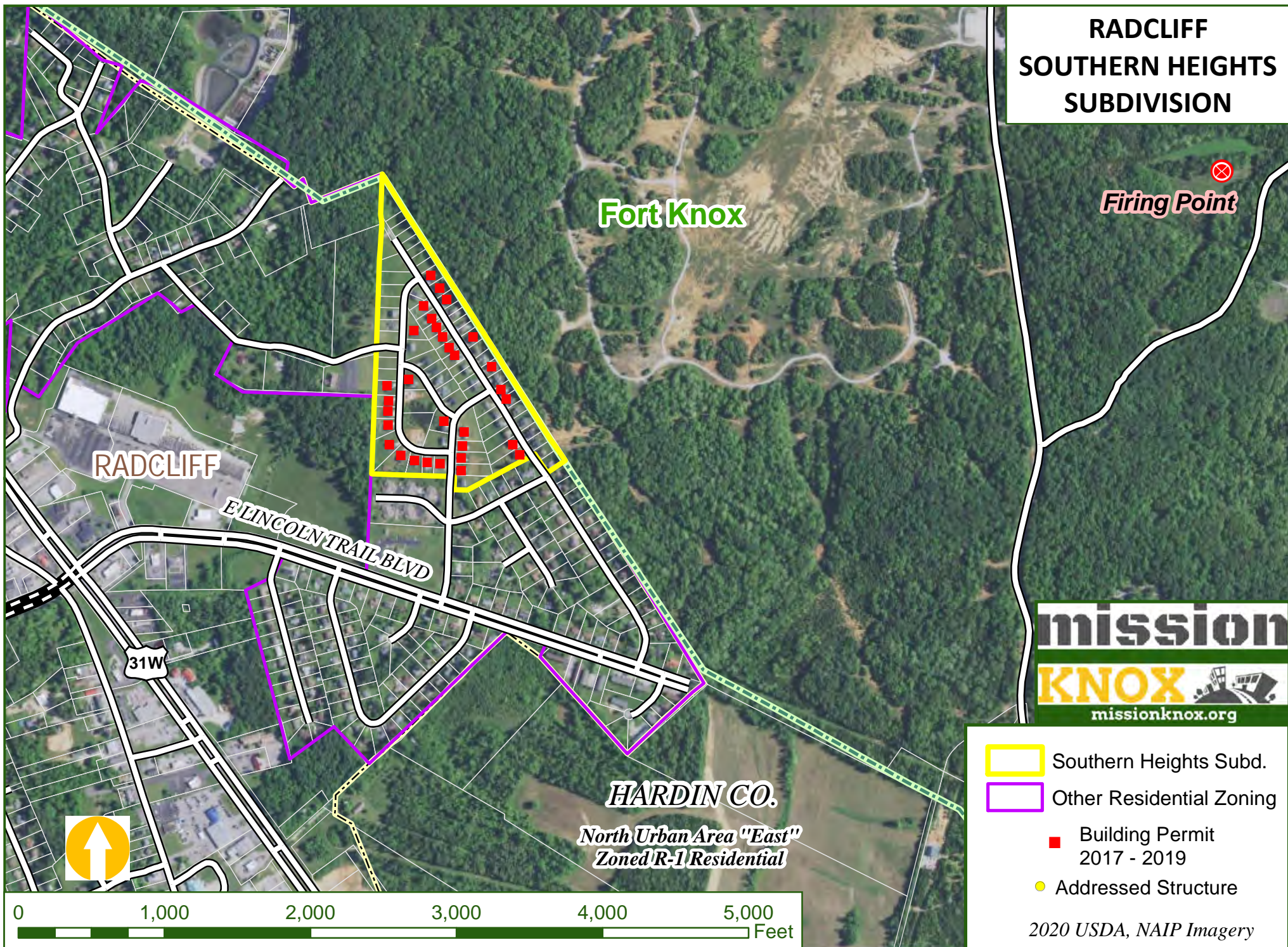
Of note are some goals from the current Comprehensive Plan:
Land Use Objectives

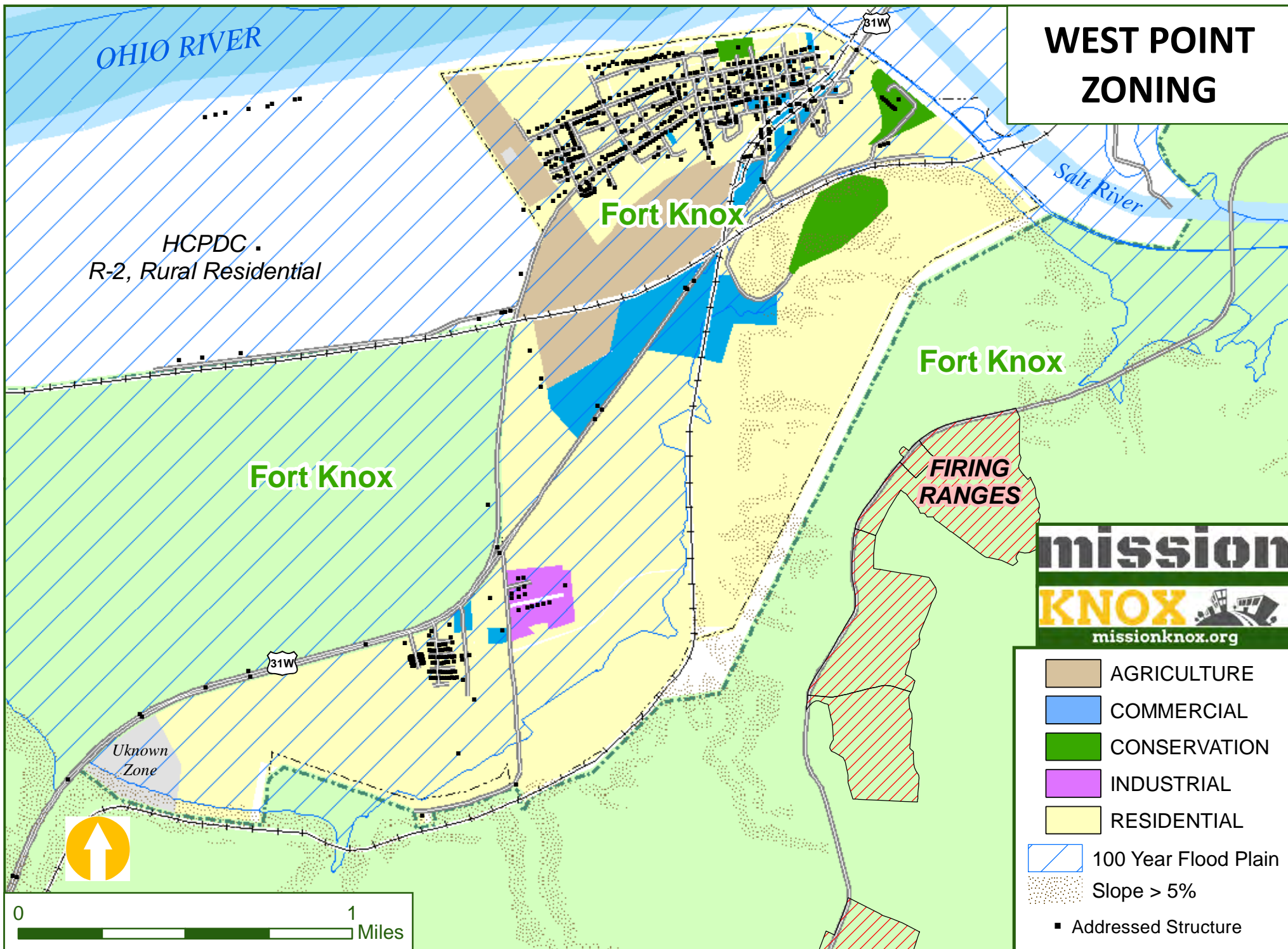
5. Encourage creative development in areas designated as flood prone, where preventative measures are taken. Discourage development in areas in excess of fifteen (15) percent slope or other sensitive areas such as sinkholes or areas with unsuitable soil types.²⁷

In general, this would preclude growth in the existing R-1 areas on the south of US 31W. Considerations could be made for infill development and improvement of existing housing stock. This provided for in their "Housing" goals. However, a concern is Objective 1:

Promote obtaining land out of the flood plain to develop an area of high quality housing to raise the average quality.²⁸

Because they are landlocked by Fort Knox and the existing flood plains it could be considered an unattainable objective.





MAP 15 - WEST POINT ZONING

Meade

Meade County Planning Commission (MCPC) serves the unincorporated areas of Meade County. The focus here is the western boundary of Fort Knox. Meade County maintains 11 zoning classifications, 4 of those residential.

A primary concern is residential development along the US 60 corridor and its feeder routes. Large tracts of agricultural lands are being subdivided and converted to residential. E911 data reveals 829 residential addresses in the one-mile buffer in 2019. Since 2010 there have been 93 residential permits issued inside this buffer. A comparison of PVA parcel data shows several new subdivisions platted in this area between 2007 and 2019. Map 16 shows the KY 1882 Corridor to highlight this concern.

In their 2013 comprehensive plan, consideration is expressed for the need to notify, through subdivision plats, the existence and issues of living adjacent to Fort Knox. Research has not yet shown this to have been implemented.²⁹ The same section on future land use encourages dense residential development in this area.

Residential growth closer to Fort Knox and Brandenburg should be more compact and urban in nature while other areas of residential growth should be more rural.³⁰

Also noted in the Future Land Use Plan the following:

In order to foster a relationship for the future that embraces both the developmental goals of Fort Knox and citizens of

Meade County this plan will encourage county-wide notice of the proximity of any residential properties to an active military installation as well as active agricultural or industrial operations. This may be implemented in various manners including the county's subdivision regulations. The purpose of such a notice serves to advise prospective residents of Meade County that they are located near an active military installation, industrial activity, or agricultural operation. Additionally, the notice would advise on the potential impacts and implications of such proximity and that such activity could include certain levels of noise, vibration, smoke, dust, mechanical and/or agricultural odors and other physical collateral effects associated with these types of activities.³¹

Concerns could be raised that “compact” i.e. denser residential development closer to Fort Knox could create compatibility issues. The plan’s “Scenario 3 – Ft. Knox Expansion” as laid out, has elements that could be considered non-compatible with the overall sustainability of Fort Knox. The concern for management of this scenario is raised.

The majority of residential, commercial, and recreational development is focused between US 60, KY 313 and Hardin County. Development is currently occurring in this area due to the expansion at Fort Knox.³²

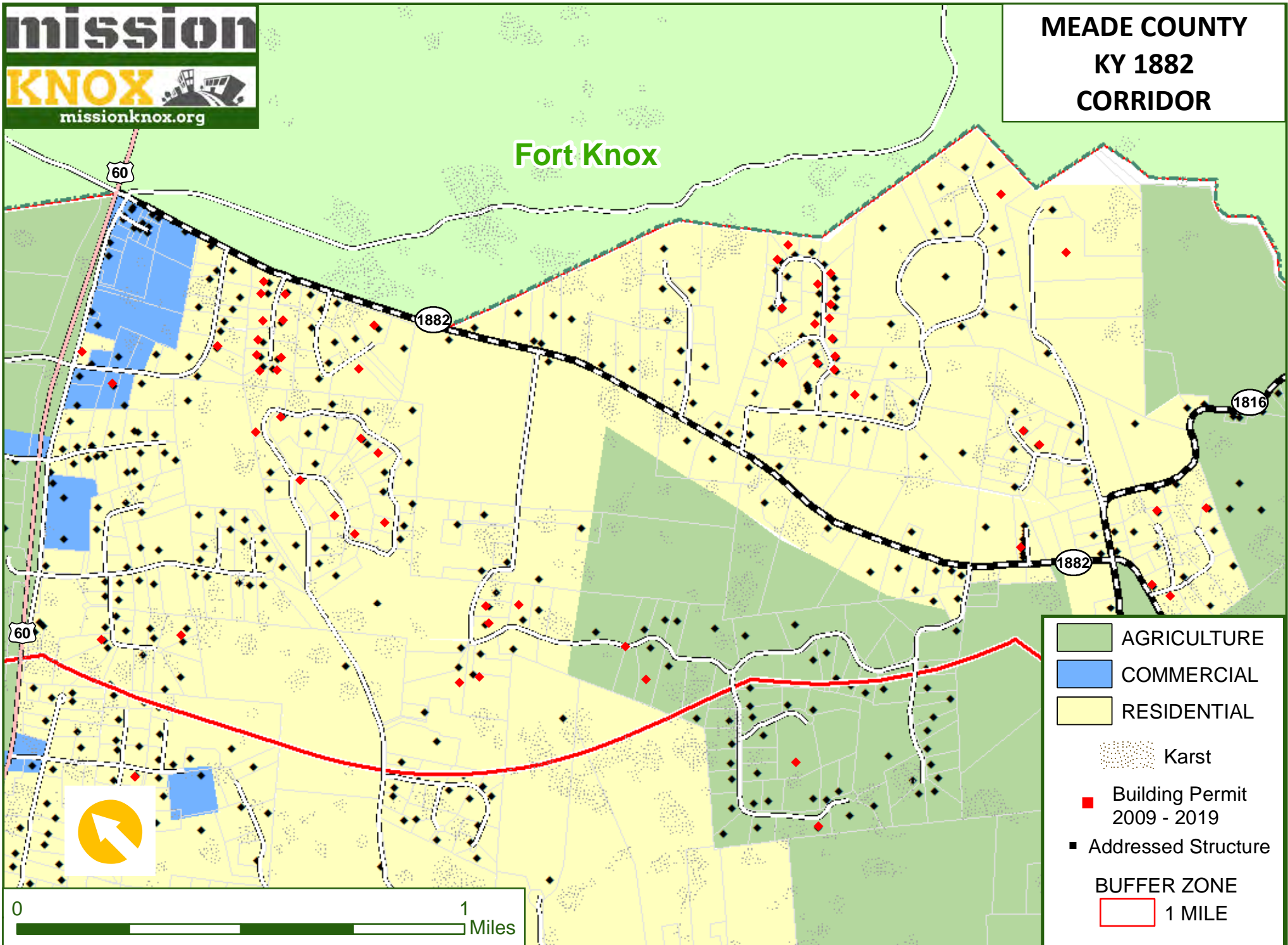
The need to implement policies prior to this occurring should be of primary focus.

A large section of this area (over 2,200 acres) is protected by Otter Creek Park, managed by the Kentucky Department of Fish and Wildlife

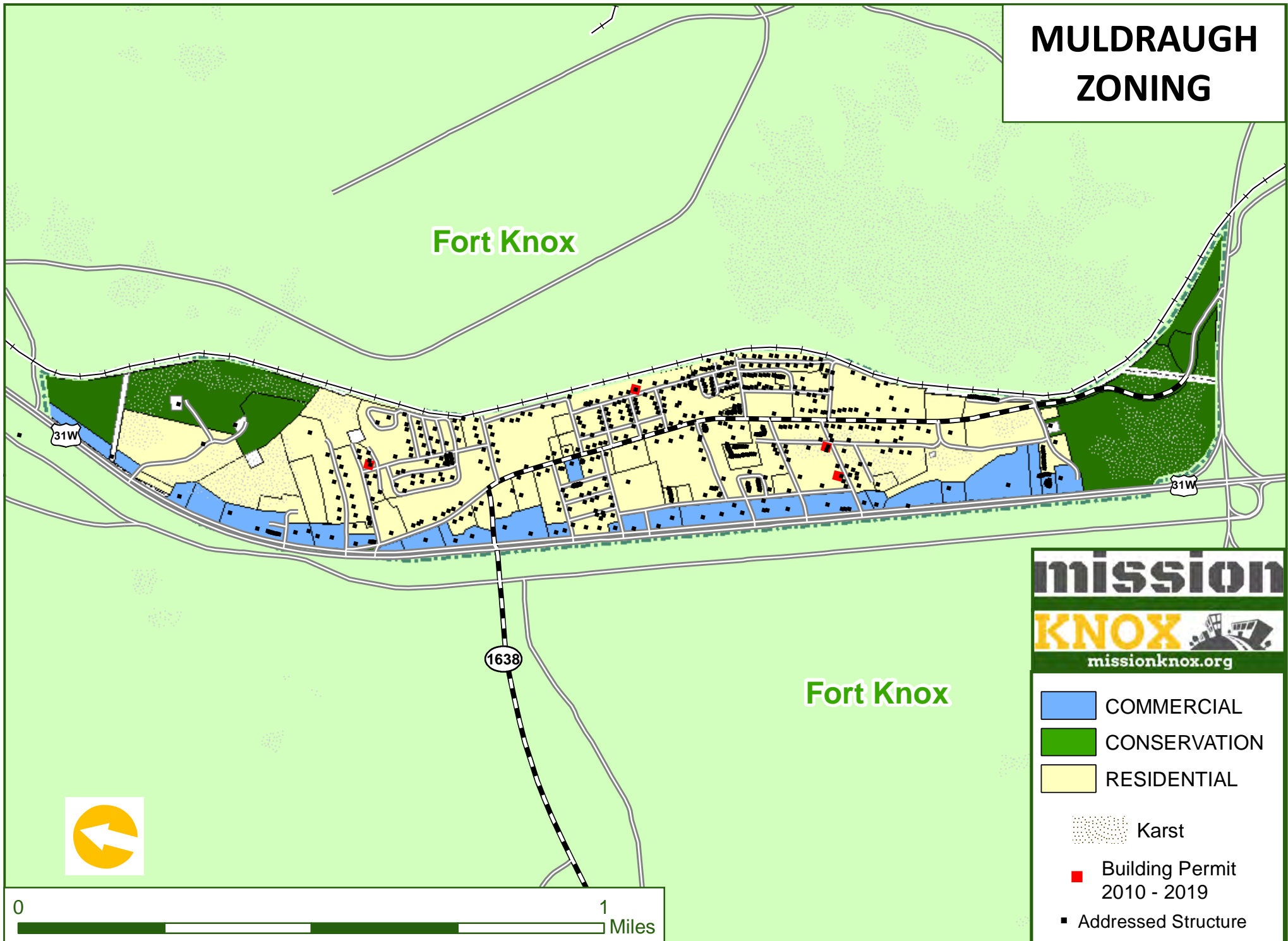
Resources. However, concern of future subdivision of the many large agricultural tracts that remain along the Post boundary is of concern. The predominate karst landforms of this area should also be of concern due the potential instability of the soils in this area.

Muldraugh Planning & Zoning Commission (MPZC) oversees the city policies for their unique situation. As an island in the Fort Knox reservation, they have no ability for growth through land acquisition. Infill is the only measure to increase or improve housing stock. Four of their 10 zoning classifications are residential. The vast majority of the land area is zoned residential. Since 2010, there have been only 4 residential building permits issued. Typical of the region there are large areas of sinkholes in the city that consume land area that is undevelopable for structures. See Map 17.

**MEADE COUNTY
 KY 1882
 CORRIDOR**



MULDRAUGH ZONING



MAP 17 - MULDRAUGH ZONING

Nelson

The Nelson County **Joint City-County Planning Commission** (JCCPC) was established in 1970 to serve all of the county and its four incorporated cities. No part of Nelson County lies within the one-mile buffer. They maintain 19 zoning districts of which 8 are residential plus an additional 2 special districts for manufactured housing.

The concern from a compatible use standpoint is potentially noise and light pollution concerns. The Large Caliber LUPZ and Fort Knox Airway route cross over the western end of Nelson County in the five-mile buffer zone.

The area is almost entirely zoned Agricultural (A-1) and is also classified as a “Naturally Sensitive Area”. Large sections are also in the 100-year flood plain of the Rolling Fork and its tributaries. The area also has steep slopes common with the Knobs region and various protected wetlands and wildlife management areas.

Currently the future land use plan “...*emphasizes limited growth and development within the Rural and Naturally Sensitive Areas to protect the integrity and character of these unique areas. Management and protection of these areas are vital to preserving the rural character and unique resources...*”³³ The current densities for residential use are one dwelling per 5 acres. Since 2009 only 3 residential building permits have been issued within the five-mile buffer zone.

Transportation

Existing Highway Network

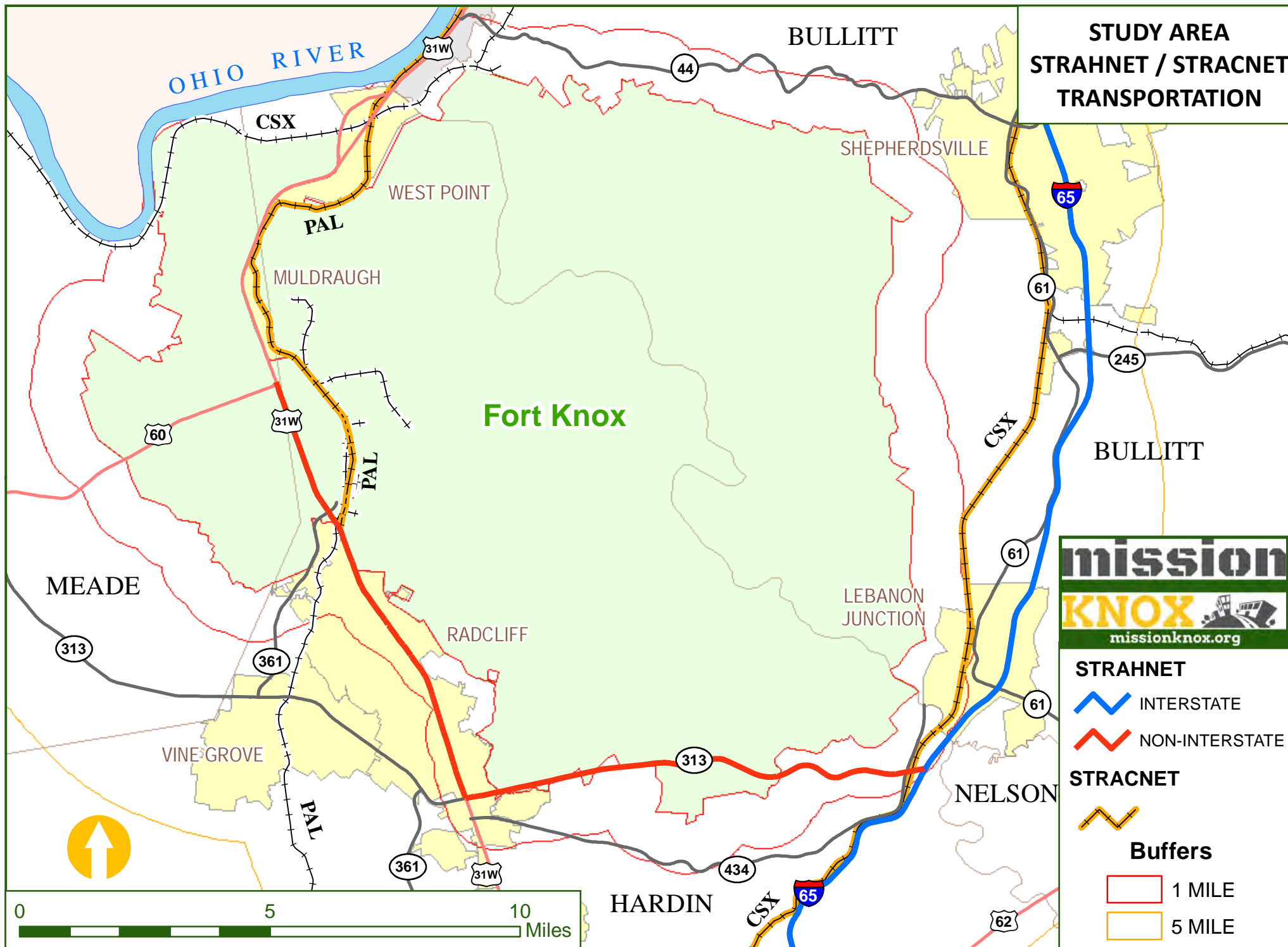
The study area is serviced by a strong system of roadways including several Strategic Highway Network (STRAHNET) roadways. I-65 is an integral part of STRAHNET and runs north-south just to the east of Fort Knox. KY 313 connects with I-65 and extends along the southern boundary of the reservation intersecting US 31W to complete the STRAHNET connection. US 31W provides access to the main gates onto the reservation at Wilson Road, Bullion Boulevard, and Brandenburg Station Road. US 31W runs north-south through the western side of Fort Knox bisecting the cantonment area. KY 313 continues west and north around Fort Knox to Brandenburg. There it crosses the Ohio River terminating into IN 135. See Map 18.

In addition to the STRAHNET network, Fort Knox is served by several other roadways. The most significant of these roadways are US 60, which runs east-west through the western side of post. KY 44, which runs east-west along the northern boundary of Fort Knox, is a more rural connector between US 31W and I-65. The Kentucky Transportation Cabinet (KYTC) has recently designated two corridors in the study area as “Regionally Impactful Corridors”. The first, KY 245, which begins in Nelson County at US 150 in Bardstown and follows northwest to interchange with I-65 in Bullitt County. KY 3005, also known as Ring Road, provides a bypass around Elizabethtown in Hardin County, currently beginning at the Western Kentucky Parkway and ending near I-65 on US 62.³⁴

Rail Network

There are two private rail operators in the study area. The Paducah and Louisville Railway (PAL), which is a Class II railroad and short line partner of the other - CSX Transportation. PAL provides mainline service via spurs at Cecilia, Elizabethtown, Vine Grove, Fort Knox, and into yards in Louisville. CSX has tracks to the north and east of Fort Knox. Running out of Louisville through the Ohio Valley to connections in Henderson, Kentucky it provides service to industries along the Ohio River in Meade County. Going south from Louisville, their primary line between the gulf ports and Chicago, passes just to the east of Fort Knox through Bullitt and Hardin Counties.

DoD has designated the Strategic Rail Corridor Network (STRACNET), a network of rail corridors that are considered important to national defense. STRACNET main lines include the PAL line providing access to Fort Knox. The CSX main line to the east of Fort Knox is also part of this network.³⁵ See Map 18.



MAP 18 - STRAHNET / STRACNET TRANSPORTATION

Air Facilities

Addington Field, located in Elizabethtown, has a lighted, paved runway that is 100' by 6001' long. It averages 50 operations a day; 30% is general transient aviation, 40% local general aviation, 10% air taxi service, and 20% military aviation. The airport has also recently installed a precision runway approach aid known as an Instrument Landing System (ILS).³⁶³⁷

Louisville International Airport aka Standiford Field provides commercial passenger and freight flight service. It is home to UPS Worldport, and numerous passenger and cargo airlines.³⁸ It also serves as home of the 123rd Airlift Wing of the Kentucky National Air Guard.³⁹

Fort Knox Access Gates

Fort Knox has three primary gates that provide ingress and egress movements for the post. See Map 19. They are referred to as Brandenburg Station Road Gate, Chaffee Gate at Bullion Boulevard, and Wilson Road Gate. A fourth gate, the Chaffee Avenue Gate, once provided full access for the post prior to the gate at Bullion Boulevard being reconstructed. It now only serves as an exit from the post. One other gate was recently reopened in 2021, the Patton Museum Gate, but it does not provide access to the post, only to the museum facilities. Checkpoints are established at each entry gate for security purposes. These checkpoints cause delays, as identification is required before entry onto the post is permitted. Peak hour traffic volumes at the gates vary significantly, as daily activities and events on the Fort Knox post fluctuate. The following discussion describes the existing characteristics for each gate approach.

The northern-most gate, at Brandenburg Station Road, is accessed from US 31W via the Brandenburg Station Road interchange. The roadway leading to this gate is a two-lane road that crosses over a railroad bridge. At the gate, the roadway widens to four lanes, allowing for two commercial vehicle checkpoints and two regular vehicle checkpoint lanes. All commercial traffic must enter the Fort Knox post through this gate.

The second gate, Chaffee Gate at Bullion Boulevard, has been recently reconstructed and is accessed from the US 31W interchange at Bullion Boulevard. This gate facility has the largest capacity of all the gates, with two inbound and outbound lanes from US 31W to its entrance. At approximately 600 feet from the gate, the two inbound lanes widen to four checkpoint lanes.

The Wilson Road Gate is the southern-most entrance point into Fort Knox, located at the boundary with Radcliff. Traffic entering and exiting this gate utilizes North Wilson Road. The approach to this gate has one inbound and one outbound lane. Four checkpoint lanes exist at this gate. It is important to note that not all checkpoint lanes are open at all times of the day. From field observation, it was observed that only during times of peak congestion at the gates are all the checkpoint lanes open. For peak period analysis throughout this study, however, it was assumed that all checkpoint lanes for all gates would be open.



Transportation Change & Growth

Base Realignment and Closure (BRAC) in 2005, created dramatic changes for Fort Knox and the study region, perhaps the most notable being the relocation of the armor school. However, with this loss, Fort Knox has since gained the presence of the Human Resources Command (HRC), which serves the entire United States Army. This addition brought a significant influx of civilian jobs in addition to those military training facilities that remained on post. These changes highlighted the ongoing need for an efficient transportation system to serve the installation. Map 20 illustrates the projects described in this section.

To meet these challenges and enhance the future missions of Fort Knox, the Commonwealth of Kentucky, local governments, and other stakeholders worked together to address many BRAC related transportation issues. At that time, KY 313 terminated at Knox Avenue in Vine Grove. It has since been extended to the City of Brandenburg. This extension provides much easier access to Meade County residents that work on Fort Knox.

Another major improvement that was constructed post BRAC was KY 361 (Patriot Parkway) which runs from a Single Point Urban Interchange at the US 31W Bypass in Elizabethtown to KY 313 in Radcliff. This new route serves as an alternative to US 31W between Elizabethtown and Radcliff. A further connection of the KY 361 route was the extension of Bullion Boulevard from US 31W near Fort Knox's Bullion Boulevard main gate to KY 313, just to the north of Vine Grove. As was desired by the BRAC Task Force, this series of new construction segments created a direct travel link between Fort Knox's main gate and the installation's largest municipal neighbor of Elizabethtown. These new routes have

provided safer and more efficient access to Fort Knox from surrounding environs.

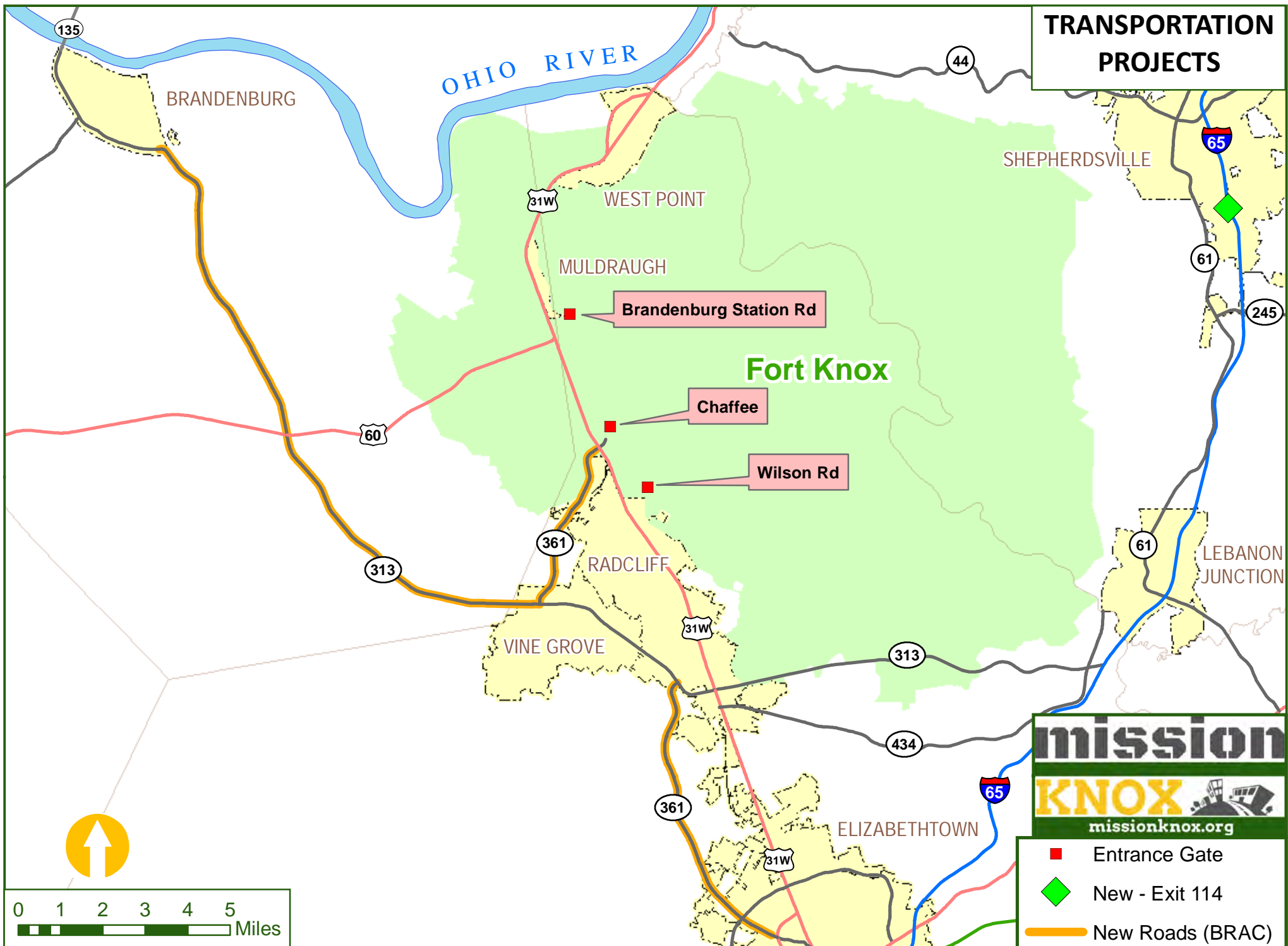
There were several other minor improvements as part of the BRAC transportation planning process. These included operational improvements to US 31W as well as improvements to North Wilson Road in Radcliff, which leads to Wilson Gate at Fort Knox. An access management study in 2012, as well as a series of Reduced Conflict U-Turns (RCUTS), in 2020, have helped to improve traffic flow and safety along US 31W.

In 2021, a 31W accessibility and connectivity study recommended several upgrades that would impact travel to and from Fort Knox. Directional median U-turns at 14 intersections on 31W between Elizabethtown and Fort Knox and a new ramp from 31W to North Wilson Road, which leads directly to Wilson Gate at Fort Knox. These roadway improvements are intended to improve safety and reduce travel times along the US 31W corridor.

Recently, a new interchange was constructed on I-65 in Bullitt County known as Exit 114. Along with the new interchange, a new east-west crossroad (KY 3538) was constructed that connects with KY 61 west of I-65. The new interchange was constructed to serve the growing commercial development in the area.

Existing and Future Traffic Flow

AADT (Annual Average Daily Traffic) traffic counts are often a useful way of illustrating growth in traffic volumes in one location over a



specific timeframe. However, with the Covid-19 pandemic, *“travel on all roads and streets changed by -25.5% (-72.9 billion vehicle miles) for May 2020 as compared with May 2019.”* Additionally, data shows that travel continued to remain low and had not returned to 2019 levels through January of 2021.⁴⁰ Since KYTC only collects some station data triennially, this also added to the difficulty of showing accurate traffic volume changes in the study area that were not affected by pandemic-influenced data. Due to this drastic and unanticipated change in traffic volumes beginning with the pandemic in 2020 and continuing into 2021, it is difficult to predict the near future volumes. Map 21 helps visualize the following information.

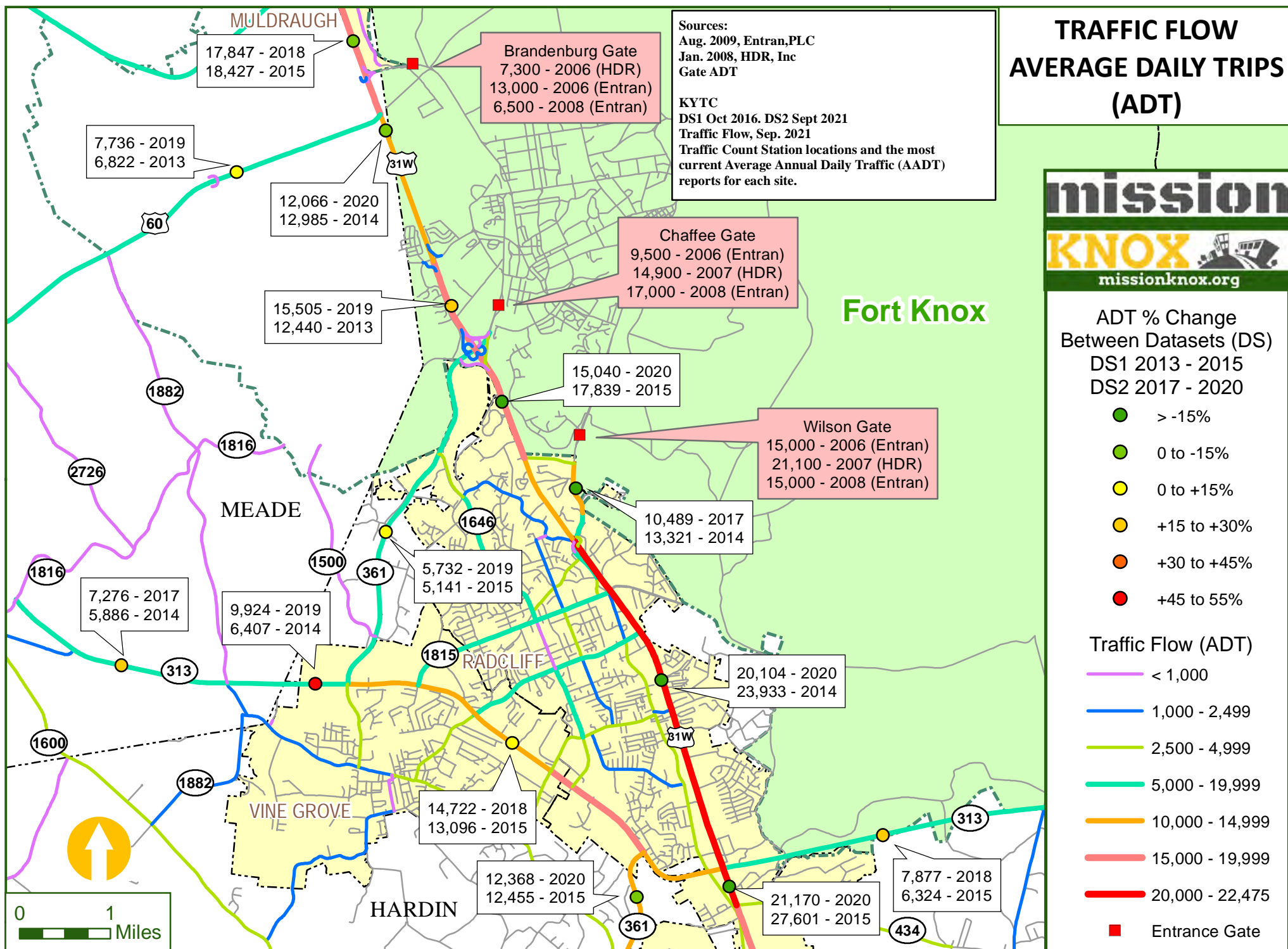
KY 361 was opened from US 31W Bypass in Elizabethtown to KY 313 in 2014 providing additional access paralleling US 31W. This was part of the 2005 BRAC funding outcome. Continuing from KY 313 in Vine Grove to Chaffee Gate at Fort Knox, the northernmost segment of KY 361 provides this direct access bypassing congestion on US 31W through Radcliff. The southern section of this roadway was KY 1500 with a count of 3,035 ADT in 2011. The growth of over 2,700 trips shows increased usage along this new alignment. This is even more dramatic with consideration given that the remaining portion of KY 1500 has seen a decrease to just 140 ADT.

Drops in the ADT for US 31W from KY 313 up to KY 361 through Radcliff reveal drops in ADT. As mentioned previously the issue of Covid-19 is likely a contributing factor. Thus, it is difficult to determine the trend without additional data. The fact that KY 361 went from zero in 2013 to over 12,000 in 2015 between Elizabethtown and KY 313 obviously is a contributing factor.

In looking at ADT and congestion at Fort Knox’s gates we lacked current data to contribute greatly to any analysis. The data available is from two studies done in 2008 and 2009 and there are some conflicts with the numbers contained in each study. Nonetheless the data is presented on Map 21 to assist in conveying the traffic flow through the checkpoints with the available data.

The 2008 HDR study collected gate data in November 2007 via visual counts.⁴¹ It was a study looking at the overall Fort Knox traffic situation and contained a proposed improvement plan for post roads. One project involved a South Boundary Road upgrade with access to the Wilson Road gate connecting to KY 313 just to the east of its intersection with US 31W. This was by far the largest proposed project at \$28 million in 2008.⁴² Additional efforts towards this were done in 2011 but to date this proposal sits idle.

The 2009 Entran study’s data was from 2006 and 2008. The source of this data is not noted.⁴³ It is believed to be partially sourced from a previous study also done by Entran in July 2007. The recommendations from this 2009 study included projects since come to fruition including the KY 313 extension west from KY 1500 and the construction of KY 361 then known as E2RC.⁴⁴ It also noted the South Boundary Road project to provide additional access and presented three options, but no dollar figure was given.⁴⁵

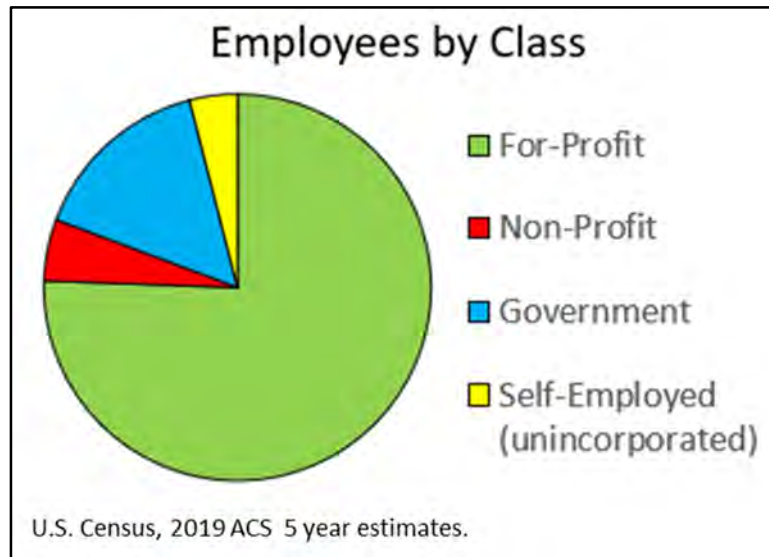


MAP 21 - TRAFFIC FLOW

Economic & Labor Profile

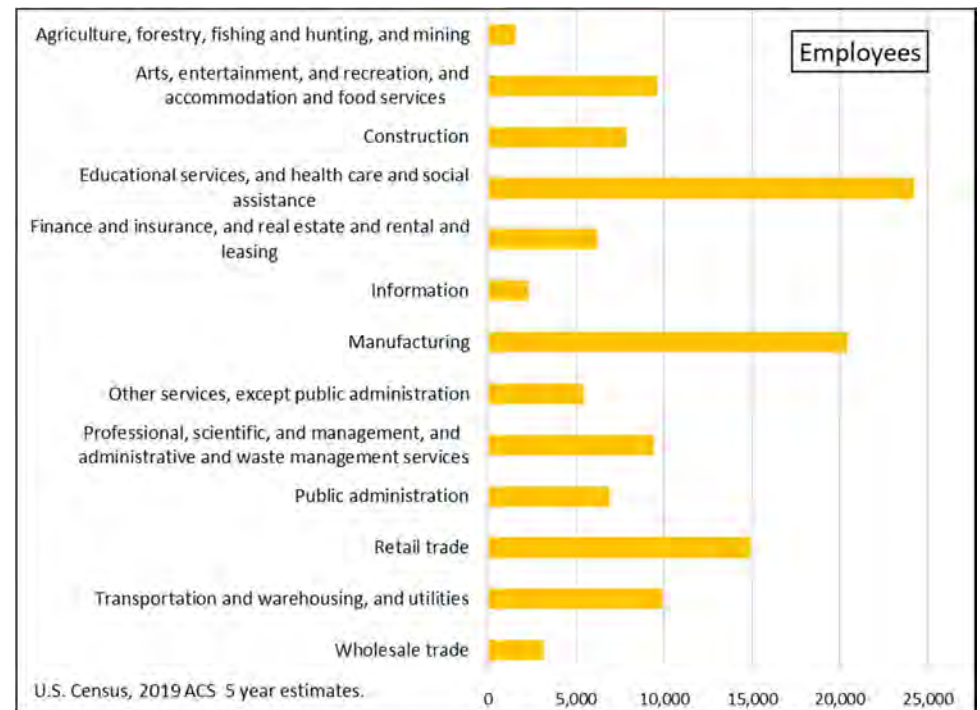
The study area has a diverse economy. The counties that comprise it have a total of 121,817 civilian workers earning over \$5.8 billion in aggregate over the 12 months measured.³ The workers are employed across sectors, with 92,031 in private for-profits, 6,277 in non-profits, 18,650 in government and an additional 4,859 in unincorporated self-employment.

Chart 6 Study Area Employees by Classification



³ In looking at the numbers it should be noted these are based on pre-Covid, 2019 U.S. Census Bureau's American Community Survey numbers. It is expected over the long-

Table 10 Study Area Employees by Civilian Sector



The civilian employees are balanced across many sectors with Education and Healthcare being predominant at 20% with manufacturing next at 17%.

In looking at incomes the study area tends to trend higher than Kentucky but lower compared to nationally. Median household incomes are all much higher than Kentucky but tend to trail nationally with Bullitt at 125% of the state and 101% of the U.S. All counties mean household incomes exceed the state but fall behind nationally.

term there will be an associated downturn in several categories due to the impacts of the pandemic.

Family per capita incomes follow a similar path. Only Meade, which is just 1% less than the state's, is lower. However, again nationally they all fall behind with Meade at 82% of the national income. Overall median earnings for workers exceed the state's earning level. Bullitt and Nelson being above the national median and Hardin and Meade falling just below. A large factor that comes into play is the cost of living.

The Bureau of Economic Analysis creates many datasets to track costs of products between geographics. In looking at Regional Price Parities (RPP) we can compare Kentucky's living costs to the United States as a whole and to other selected states described as follows.

*RPP "Allows comparisons of buying power across the 50 states and the District of Columbia, or from one metro area to another, for a given year. Price levels are expressed as a percentage of the overall national level."*⁴⁶

The data shows that the study area compares very favorably to other parts of the county. See Table 11. The costs for all items and especially rents are much cheaper than nationally or for the other states chosen for comparison. In the Elizabethtown-Fort Knox Metropolitan Statistical Area (MSA) rents are 29% less than the national average.⁴

⁴ The United States baseline value is essentially a factor of 100 but this can vary slightly because of how the data is aggregated.

Table 11 Regional Price Parities

REGIONAL PRICE PARITIES				
	All items	Goods	Services: Rents	Services: Other
United States	100	99.2	101.4	100
California	116.4	104.9	153.6	108.3
Georgia	93.2	96.8	82.6	96.7
Kentucky	87.4	94.8	67.7	90.6
Elizabethtown-Fort Knox, KY MSA *	86.5	92.7	71.9	90.1
Louisville/Jefferson County, KY-IN MSA**	89.6	96.6	74.9	90.5
Virginia	101.3	98.9	107.4	100.1

Bureau of Economic Analysis, Last updated: December 15, 2020-- new statistics for 2019.

* - Hardin, Meade & LaRue Counties

** - Jefferson, Bullitt, Henry, Oldham, Shelby, Spencer, and Trimble Counties in Kentucky, Clark, Floyd, Harrison, Scott, and Washington in Indiana.

The sectors of the study area economy cross a broad range as previously mentioned. The standby of agriculture still remains a factor but changes at least partially due to its geographic location, transportation network, and low energy costs that create many of these opportunities. Automotive parts and related industries, logistics, warehousing, and distribution, and distilled spirits are all demonstrating recent growth. Major investments continue to occur such as the \$1.7 billion NUCOR steel plant in Meade County, continued logistic growth in Bullitt County, several distilleries expanding production and warehousing, and the potential of the Glendale Megasite all portend future growth in the region that must be monitored for compatible use issues related to Fort Knox.