

# APPENDIX M-1

## *Indirect and Cumulative Technical Report*

**Clarification Note for Central Alternative 1:**

Central Alternatives 1A and 1B as described in the DEIS/FEIS are physically the same alternative. The only difference between them is that Central Alternative 1A would include tolls on both the new I-69 bridge and on the US 41 bridge. Central Alternative 1B would only include tolls on the new I-69 bridge. Any reference in this document to Central Alternative 1 applies to both Central Alternative 1A and Central Alternative 1B.

This document was completed before the development of Central Alternative 1B Modified (Selected); therefore, the alternative is not included in the document. Applicable information regarding Central Alternative 1B Modified (Selected) is provided in the FEIS.

ORX

69

# INDIRECT AND CUMULATIVE TECHNICAL MEMORANDUM

I-69 OHIO RIVER CROSSING PROJECT  
Evansville, IN and Henderson, KY





# OHIO RIVER CROSSING

## Indirect and Cumulative Technical Report

I-69 Ohio River Crossing Project  
Evansville, IN and Henderson, KY

Prepared by:  
HNTB



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## **APPENDIX**

Appendix A: Local Planning Agency Interview Summary Notes

# CHAPTER 1 – INTRODUCTION

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This technical memorandum evaluates indirect effects and cumulative impacts to resources as part of the Draft Environmental Impact Statement (DEIS) for the I-69 Ohio River Crossing (ORX) project in the Evansville, IN and Henderson, KY area. The project area extends from I-69 (formerly I-164) in Indiana on the south side of Evansville (i.e., northern terminus) across the Ohio River to I-69 (formerly Edward T. Breathitt Pennyryle Parkway) at the KY 425 interchange southeast of Henderson, KY (i.e., southern terminus). The indirect and cumulative analyses evaluated three project alternatives: West Alternative 1, West Alternative 2, and Central Alternative 1 as described in Chapter 2 of this report.

The Code of Federal Regulations Title 40 defines indirect effects and cumulative impacts as follows:

- “Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to the induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems.” (40 CFR § 1508.8)
- “Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (40 CFR § 1508.7)

The methodologies for analyzing indirect effects and cumulative impacts of the I-69 ORX project are in accordance with the *AASHTO Practitioner’s Handbook 12 - Assessing Indirect Effects and Cumulative Impacts under NEPA* (Center for Environmental Excellence by AASHTO 2011). This guidance document is intended to be consistent with FHWA, state Department of Transportation (DOT) and National Cooperative Highway Research Program (NCHRP) reports.

Specific analysis methodologies are provided below under the respective indirect and cumulative chapters.



## CHAPTER 2 – PROJECT DESCRIPTION

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This chapter presents the history of the I-69 ORX project. It also introduces the process for preparing a DEIS and describes the three alternatives evaluated both in this document and in the DEIS.

### 2.1 PROJECT BACKGROUND

The Federal Highway Administration (FHWA), Indiana Department of Transportation (INDOT), and Kentucky Transportation Cabinet (KYTC) issued a revised Notice of Intent (NOI) in the *Federal Register* on February 13, 2017 for the preparation of an Environmental Impact Statement (EIS) for the I-69 Ohio River Crossing (ORX) project in the Evansville, IN and Henderson, KY area, which is part of the National I-69 Corridor that extends between Mexico and Canada. An NOI was previously issued for the project on May 10, 2001. Under that NOI, a Draft Environmental Impact Statement (DEIS) was completed in 2004, but the project was subsequently suspended in 2005.

For the new DEIS that is being prepared for the I-69 ORX project, the project area extends from I-69 (formerly I-164) in Indiana on the south side of Evansville (i.e., northern terminus) across the Ohio River to I-69 (formerly Edward T. Breathitt Pennyryle Parkway) at the KY 425 interchange southeast of Henderson, KY (i.e., southern terminus) (**Figure 2.1-1**). The section of Edward T. Breathitt Pennyryle Parkway between KY 351 and KY 425 that was not re-designated as I-69 was recently re-designated as US 41. The western limit of the project area is parallel to and extends a maximum of about 2,000 feet west of US 41. The eastern limit of the project area extends about 1,500 feet to 3.4 miles east of US 41. Currently, I-69 does not cross the Ohio River and the only cross-river access between Evansville and Henderson is via US 41, which is classified as a principal arterial and does not meet current interstate design standards. One of the first steps in the EIS process for the I-69 ORX project was the scoping phase which included the development of the project's purpose and need. As a result of this analysis, the following project needs have been identified:

- Lack of National I-69 Corridor system linkage
- High cost of maintaining cross river mobility on existing facilities
- Unacceptable levels of service for cross-river traffic
- High-crash locations in the I-69/US 41 corridor

Based on these needs, the project's purpose is:

- Provide cross-river system linkage and connectivity between I-69 in Indiana and I-69 in Kentucky that is compatible with the National I-69 Corridor
- Develop a solution to address long-term cross-river mobility
- Provide a cross-river connection that reduces traffic congestion and delay
- Improve safety for cross-river traffic

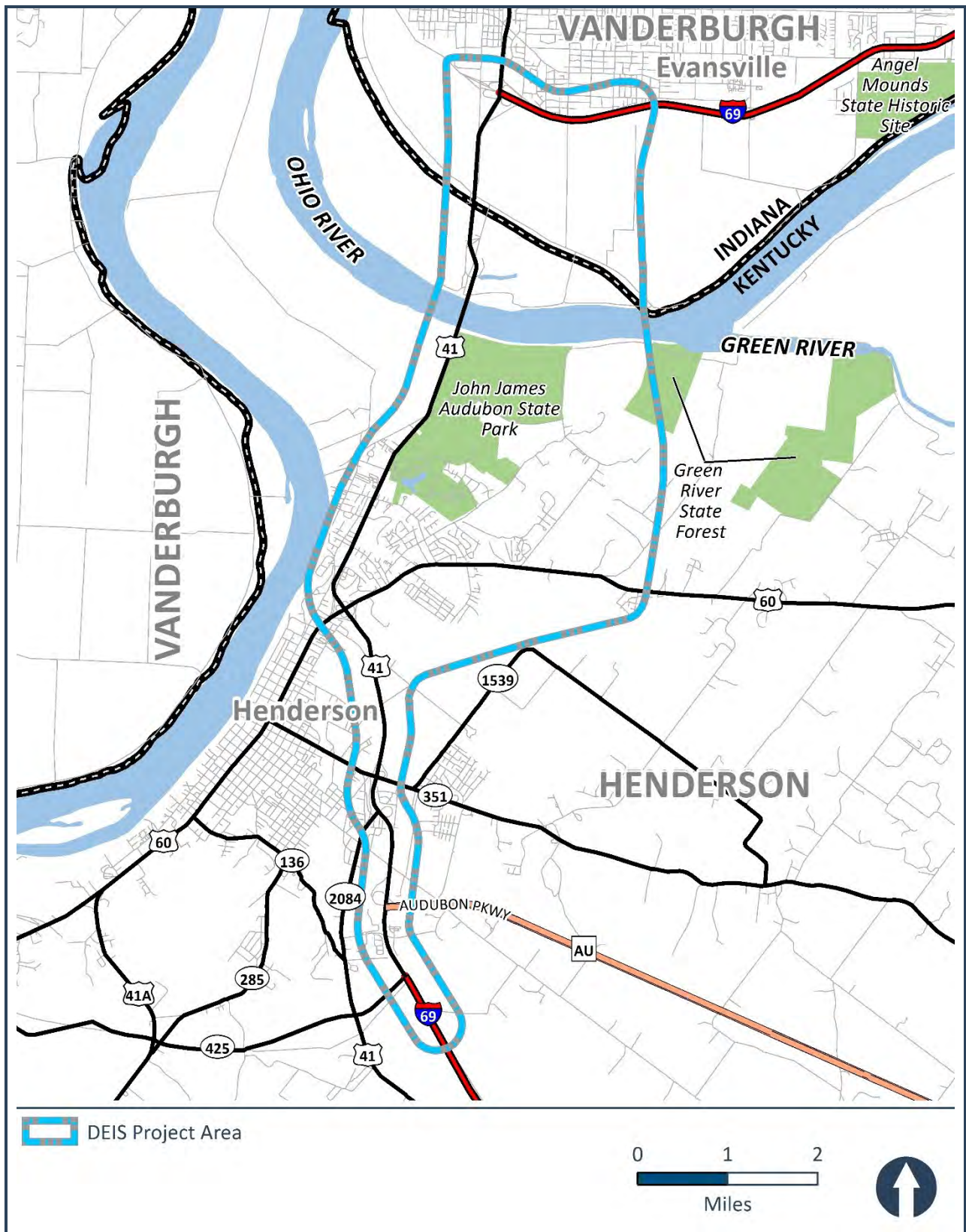


Figure 2.1-1. DEIS Project Area



Based on the project's purpose and need, an initial range of alternatives was developed, evaluated, and screened using secondary source and windshield survey data, and input from the public and federal, state, and local agencies. Because the range of alternatives was developed based on conceptual designs, they were referred to as corridors. Each corridor was evaluated on the degree to which it meets the purpose and need; its potential social, environmental, and economic impacts; and its conceptual cost. In addition to the No Build Alternative, the following five corridors were developed based on alternatives previously presented in the 2004 *Interstate 69 Henderson, Kentucky to Evansville, Indiana Draft Environmental Impact Statement* (INDOT, and KYTC 2004) and the 2014 *I-69 Feasibility Study, Henderson, Kentucky, SIU #4, Final* (KYTC 2014).

- West Corridor 1 (Based on Alternative 7 from the 2014 Feasibility Study)
- West Corridor 2 (Based on Corridors F and G from the 2004 DEIS and Alternatives 5 and 6 from the 2014 Feasibility Study)
- Central Corridor 1 (Based on Alternative 1a from the 2014 Feasibility Study)
- Central Corridor 2 (Based on the Preferred Alternative 2 from the 2004 DEIS)
- East Corridor (Based on Alternative 3 from the 2004 DEIS)

The results of the evaluation of these corridors were presented in a *Screening Report* (INDOT and KYTC 2017d) completed on July 28, 2017 that recommended three corridors — West Corridor 1, West Corridor 2, and Central Corridor 1 — be carried forward for more detailed evaluation in the DEIS, in addition to the No Build Alternative. In the *Screening Report*, for West Corridors 1 and 2, it was assumed that both US 41 bridges would be taken out of service for vehicular use and the new I-69 bridge would have six lanes. For Central Corridor 1, it was assumed that both US 41 bridges would remain open and the new I-69 bridge would have four lanes. However, the report stated that the future use of the existing US 41 bridges and corresponding number of lanes on the new I-69 bridge for each corridor would be subject to further evaluation.

Following the *Screening Report*, preliminary designs were developed within these corridors based on public and agency input, assessment of potential environmental and right-of-way impacts, and results of a traffic analysis. Follow-on studies were conducted regarding the location and configuration of interchanges, the disposition of and long-term maintenance costs for the existing US 41 bridges, and tolling scenarios with resulting traffic patterns. This included the development, evaluation, and screening of the following three different US 41 and I-69 bridge scenarios for each of the three corridors.

- Build a six-lane I-69 bridge for all cross-river traffic and remove both US 41 bridges from vehicular use.
- Build a four-lane I-69 bridge and retain one US 41 bridge for local traffic.
- Build a four-lane I-69 bridge and retain both US 41 bridges for local traffic.

The results from this next level of evaluation of the project corridors were presented in a *Screening Report Supplement* (INDOT and KYTC 2018), dated January 2018. The *Screening Report Supplement* identified the best bridge scenario for each corridor and the following alternatives to be carried

forward for detailed evaluation in the DEIS and this Indirect and Cumulative Technical Memorandum.

- No Build Alternative: required by the National Environmental Policy Act of 1969 (NEPA) to serve as a baseline for comparison
- West Alternative 1: four lanes on the new I-69 bridge and retain one of the existing US 41 bridges
- West Alternative 2: six lanes on the new I-69 bridge and take both existing US 41 bridges out of service
- Central Alternative 1: four lanes on the new I-69 bridge and retain one of the existing US 41 bridges

Following the *Screening Report Supplement*, it was determined that the northbound US 41 bridge would be retained and the southbound US 41 bridge would be removed for West Alternative 1 and Central Alternative 1 and both bridges would be removed for West Alternative 2. The three DEIS build alternatives are shown in **Figure 2.2-1** and described in greater detail in the following sections.

Consistent with the Evansville Metropolitan Planning Organization's (EMPO) fiscally-constrained Metropolitan Transportation Plan, tolling I-69 will be a key part of the financing for this project. The toll policy will define toll rates for different vehicle types and will be developed with the federally required financial plan prior to construction. The NEPA process will not determine the toll policy but will evaluate, and document in the DEIS, the environmental consequences associated with tolling being a part of the project.

The DEIS evaluates potential impacts that would result from the placement of tolls on both the I-69 bridge and the remaining northbound US 41 bridge. This would provide a "reasonable worst case" in terms of potential impacts associated with increased traffic volumes on I-69. For purposes of evaluation, it was assumed that toll rates would be similar to the Louisville, KY metropolitan area bridges for the I-65 and KY 841/SR 265 Ohio River Crossings (i.e., \$2.00 for cars, \$5.00 for medium trucks, and \$10 for large trucks). Both projects are located in metropolitan areas within the same geographical region and have comparable total costs.

## 2.2 ALTERNATIVES

### 2.2.1 WEST ALTERNATIVE 1

West Alternative 1 would include a new I-69 bridge approximately 5,400 feet long over the Ohio River and associated floodway that would be located approximately 70 feet west of the existing southbound US 41 bridge. The new bridge would include four lanes, with the capacity to expand to six lanes in the future, if needed, by restriping the lanes on the bridge; therefore, it would not require additional right-of-way or major construction. The rest of the alternative would also include four lanes but without the capacity to expand to six lanes by restriping lanes. The northbound US 41 bridge would be retained and the southbound US 41 bridge would be



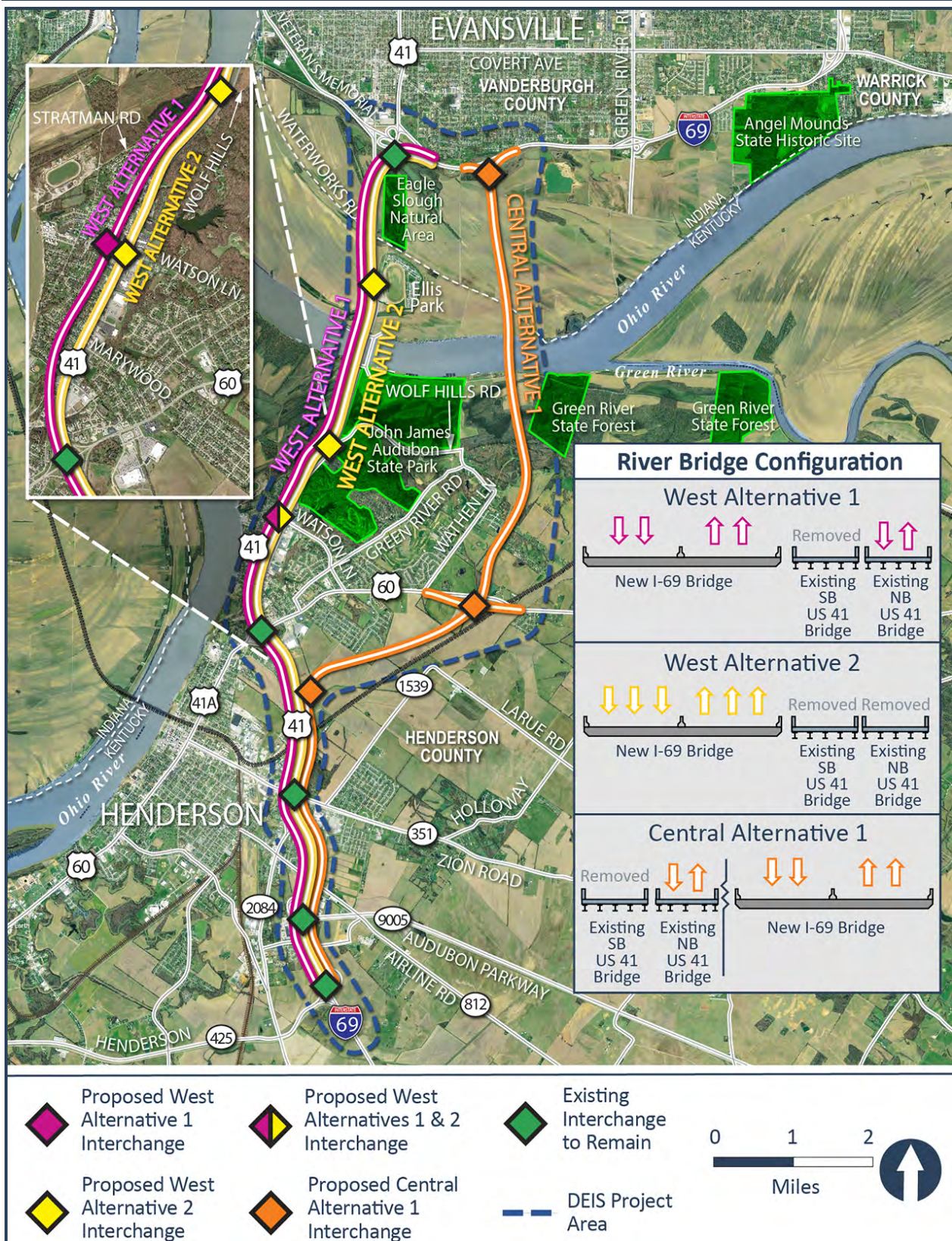


Figure 2.2-1. DEIS Alternatives



removed. The US 41 bridge that would be retained, which has two lanes, would be converted from a one-way bridge to a two-way bridge for local traffic. Most of West Alternative 1 would use rural design standards, including a grass median; however, through Henderson, it would use urban design standards and include a narrower median with a concrete barrier. West Alternative 1 would begin on existing I-69 in Indiana just east of the US 41 interchange and become the through movement for I-69. Connections to US 41 to the north and Veterans Memorial Parkway to the west would be provided. The alternative would include a bridge to carry I-69 over Waterworks Road and Nugent Drive while local access to Waterworks Road and Ellis Park would be maintained by US 41.

In Kentucky, the alternative would include a bridge to carry I-69 over Stratman Road, with local access to Stratman Road and Wolf Hills Road provided by US 41 and the local bridge. The alternative would continue south and run parallel to and approximately one block west of US 41 and the Henderson commercial strip. There would be no changes to US 41 through this area. An interchange would be constructed at Watson Lane to provide highway access to the commercial strip and adjacent residential areas. An overpass (no interchange) would be provided at Barker Road to maintain connection to residential areas west of the alternative. A local access road with a sidewalk would be provided on the west side of the alternative between Barker Road and Atkinson Park. The alternative would then continue south and tie into the existing four-lane, fully-controlled access section of US 41 south of the US 60 interchange. The US 60 interchange would be modified to provide connections to and from existing US 41, US 60, and I-69. US 41 (formerly named the Edward T. Breathitt Pennyrile Parkway) south of US 60 to KY 425, where I-69 in Kentucky currently ends, would be modernized to meet interstate standards through improvements to ramps and merge areas. The total length of West Alternative 1 is 11.1 miles, which includes 2.9 miles of existing US 41.

### **2.2.2 WEST ALTERNATIVE 2**

As with West Alternative 1, West Alternative 2 would include a new I-69 bridge approximately 5,400 feet long over the Ohio River and associated floodway that would be located approximately 70 feet west of the existing southbound US 41 bridge. The new I-69 bridge for West Alternative 2 would include six lanes and both of the existing US 41 bridges would be removed. The sections of the alternative north of the new bridge to Waterworks Road and south of the new bridge to US 60 would also be six lanes. South of US 60, the alternative would transition from six lanes to the existing four lanes on US 41. Most of West Alternative 2 would use rural design standards, including a grass median; however, through Henderson, it would use urban design standards and include a narrower median with a concrete barrier. Similar to West Alternative 1, West Alternative 2 would begin on existing I-69 in Indiana just east of the US 41 interchange and become the through movement for I-69. Connections to US 41 to the north and Veterans Memorial Parkway to the west would be provided. From the US 41/I-69 interchange to Ellis Park, the alternative would follow the existing US 41 alignment. An overpass bridge would carry Waterworks Road over I-69 and an interchange would be provided at Ellis Park.

In Kentucky, the alternative would follow existing US 41 through the Henderson commercial strip, with local access provided via a reconstructed US 41, which would function as a frontage

road, located adjacent to and east of the alternative. The reconstructed US 41 would include two lanes plus a center two-way left turn lane and a new sidewalk on the east side. There are currently no sidewalks along US 41 in this area. An interchange would be provided at Stratman Road/Wolf Hills Road and at Watson Lane. At the Watson Lane interchange, US 41 would be relocated approximately 300 feet to the east to provide adequate spacing between the interchange and the US 41/Watson Lane intersection. An overpass (no interchange) would be provided at Rettig Road to maintain connection to residential areas west of the alternative. In addition, a shared-use path would be provided on the west side of the new interstate. The alternative would continue south, within the US 41 corridor, to the existing US 60 interchange, which would be modified to provide connections to and from existing US 41, US 60, and I-69. The existing four-lane section of US 41 (formerly named the Edward T. Breathitt Pennyrile Parkway) south of US 60 to KY 425, where I-69 in Kentucky currently ends, would be modernized to meet interstate standards through improvements to ramps and merge areas. The total length of West Alternative 2 is 11.0 miles, which includes 2.9 miles of existing US 41.

### **2.2.3 CENTRAL ALTERNATIVE 1**

Central Alternative 1 would include a new I-69 bridge approximately 7,600 feet long over the Ohio River and associated floodway, located approximately 1.5 miles east of the existing US 41 bridges. The new I-69 bridge would include four lanes, with the capacity to expand to six lanes in the future, if needed, by restriping the lanes on the bridge; therefore, it would not require additional right-of-way or major construction. The rest of the alternative would also include four lanes but without the capacity to expand to six lanes by restriping lanes. The northbound US 41 bridge would be retained and the southbound US 41 bridge would be removed. The northbound US 41 bridge that would be retained, which has two lanes, would be converted from a one-way bridge to a two-way bridge for local traffic. There would be no changes to US 41 through the commercial strip. Central Alternative 1 would use rural design standards and include a depressed grass median outside of the bridge limits.

Central Alternative 1 begins at existing I-69 in Indiana, approximately 1 mile east of the US 41 interchange. The alternative would continue south across the Ohio River just west of a gas transmission line. It would remain just west of the gas transmission line near Green River State Forest, then turn southwest where an overpass would be provided to carry the access road for the gas transmission line over the alternative. The alternative would continue south to US 60 where an interchange would be provided. As part of the US 60 interchange, US 60 would be relocated approximately 400 feet south, which would require a new bridge over the CSX Railroad east of the interchange. The alternative would continue southwest and connect with US 41 via an interchange approximately 1 mile south of the US 60 interchange. From the alternative's interchange with US 41 to KY 425, the existing four-lane US 41 would be modernized to meet interstate standards through improvements to ramps and merge areas. The total length of Central Alternative 1 is 11.2 miles, which includes 2.8 miles of existing US 41.



## CHAPTER 3 – INDIRECT IMPACTS

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### 3.1 METHODOLOGY AND STUDY AREA

Indirect impacts are evaluated based on the potential for induced land development resulting from the implementation of the project. This includes project-induced development of land from increased transportation accessibility that could generate indirect impacts on natural resources and historic properties.

The evaluation of indirect impacts was based on an assessment of local trend data, land use plans, development regulations, and natural and historic resource inventories. Phone interviews were also conducted with representatives from the following local planning agencies to confirm local trends and plans, and to discuss the potential for induced development and indirect impacts to resources. Summaries of these phone interviews are in [Appendix A](#).

- Evansville-Vanderburgh County Area Plan Commission
- Henderson City-County Planning Commission
- Evansville Metropolitan Planning Organization

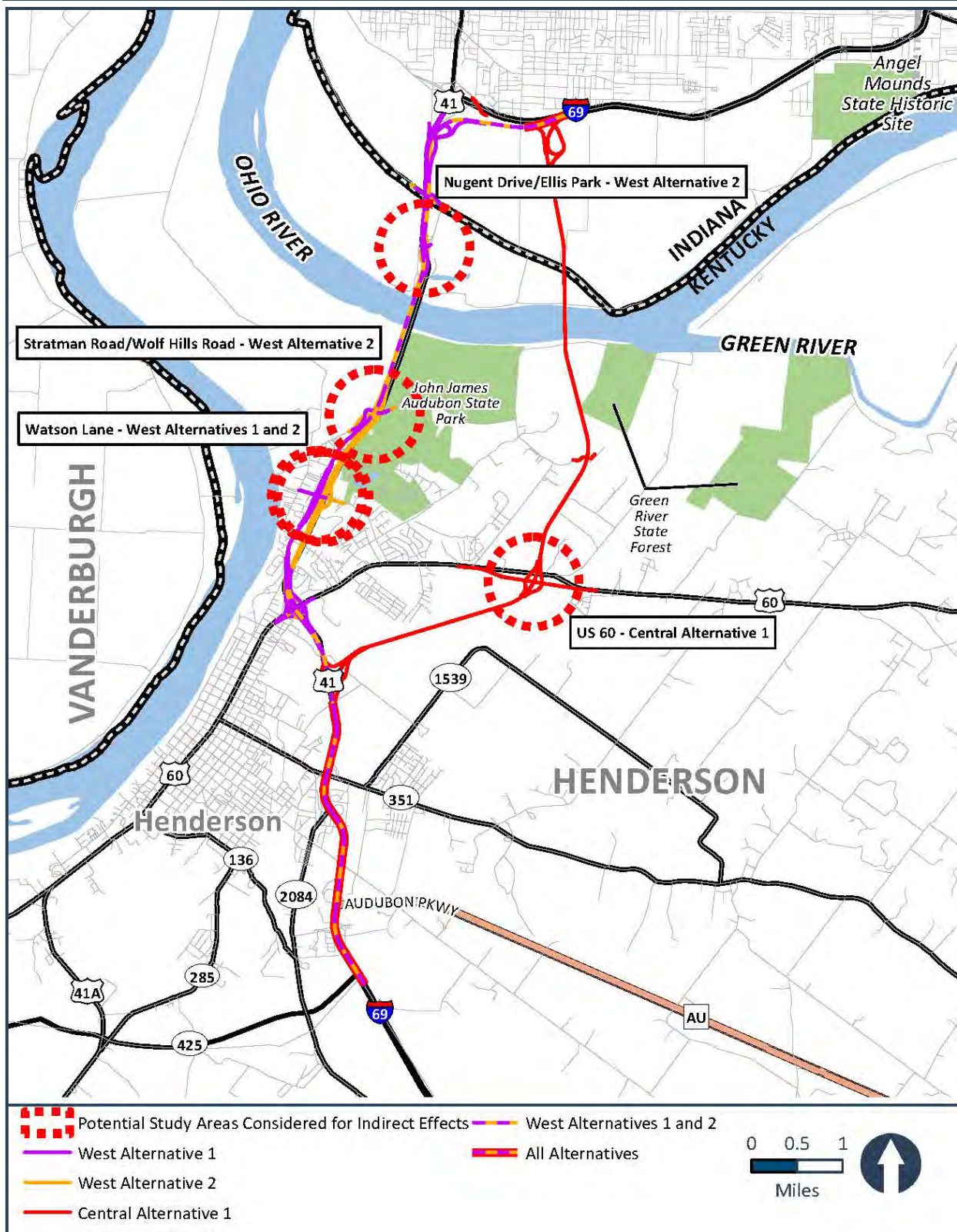
The timeframe for the indirect impacts analysis is 2040, which is consistent with population and employment forecasts in the Metropolitan Transportation Plan 2040 (EMPO 2016).

The indirect impacts study areas included a 0.5-mile radius around proposed new freeway service interchanges with roadways that have no or partial access control and available land for development. Available land is comprised of vacant or undeveloped land, which are those areas that is zoned/planned for agricultural or other undeveloped land uses. The 0.5-mile radius study area is supported by previous studies conducted regarding development around rural interchanges (Hartgen 1992). It is also based on a review of project area conditions, land use plans and zoning, and phone interviews conducted with local officials. These study areas capture the areas that are likely to experience indirect impacts as a result of improved transportation accessibility from the project.

The following study areas, as shown on [Figure 3.1-1](#), were evaluated to determine if the increased accessibility from the new interchanges would induce development and indirectly affect natural and historic resources:

- Watson Lane – West Alternative 1 and 2
- Nugent Drive/Ellis Park – West Alternative 2
- Stratman Road/Wolf Hills Road – West Alternative 2
- US 60 – Central Alternative 1

Existing interchange locations that would be reconstructed as part of the project were excluded from this analysis. Access to the properties surrounding these interchanges would not change



**Figure 3.1-1. Potential Study Areas Considered for Indirect Impacts**

and the volume of traffic using the interchange is predicted to change only modestly (less than 20 percent in all cases). Interviews with local planning officials agreed that the project could make some areas with planned development around existing interchanges more attractive to development, but the project would not have a substantial effect on properties around existing interchanges. In addition, system interchanges between full access-controlled highways were not considered in the evaluation for indirect impacts due to a lack of access to the surrounding properties. The four new interchanges were evaluated.

The indirect impacts study areas that were determined to have potential for induced growth were reviewed for the presence of wetlands, streams, forests, aboveground historic resources, and farmland using windshield surveys, secondary source data, available GIS data layers, and project specific resource data.

The primary data sources for the indirect impacts analysis were:

- Existing and planned land use and zoning: Henderson County and Vanderburgh County
- Wetlands: National Wetland Inventory, 2015; *Waters of the U.S. Technical Report I-69 Ohio River Crossing Project* (INDOT and KYTC 2017c)
- Streams: National Hydrography Dataset, 2015; *Waters of the U.S. Technical Report I-69 Ohio River Crossing Project* (INDOT and KYTC 2017c)
- Forest: National Land Cover Dataset developed by Multi-Resolution Land Characteristics Consortium (MRLC), 2011
- Historic: National Register of Historic Places Database, 2014; *I-69 ORX History/Architecture Survey for Henderson, Henderson County, Kentucky Volumes 1 and 2* (INDOT and KYTC 2017a); *I-69 ORX Phase I History/Architecture Survey for Evansville, Vanderburgh County, Indiana* (INDOT and KYTC 2017b).
- Farmland: Land use from Vanderburgh County and Henderson County, 2010 and 2015

These natural and historic resources were selected for the indirect impact analysis due to their prevalence within the project area and their likelihood of being indirectly impacted, in addition to direct impacts. During the initial public and agency coordination process (i.e., scoping), no comments were received about including other resources of concern in the analysis of indirect impacts. Indirect impacts to floodways were not included in the analysis because it was assumed that induced development would not occur within these areas due to existing flood ordinances and restrictions to construction in a floodway. Floodways were identified using the latest Federal Emergency Management Agency (FEMA) maps. Wetlands, streams, forests, aboveground historic resources, and farmland were assumed to be impacted by future induced development and considered indirect impacts if the following criteria were met:

- The resource is located within the indirect impacts study areas around a new interchange.
- The resource is located within an undeveloped area that is zoned/planned for agricultural or other undeveloped land uses.

- The resource is in an area that does not have development restrictions such as floodway, Zone A floodplain, easement or state-owned land.

Areas that are currently developed or undeveloped and zoned/planned for development were not evaluated for indirect impacts to resources since these areas are already committed for development.

The following subsections summarize the indirect impacts analysis process, which is in accordance with the steps outlined in the AASHTO Practitioner's Handbook:

- Step 1: Assess the Potential for Increased Accessibility
- Step 2: Assess the Potential for Induced Growth
- Step 3: Assess the Potential for Impacts to Sensitive Resources
- Step 4: Assess Potential Minimization and Mitigation Measures

### 3.2 STEP 1: ASSESS THE POTENTIAL FOR INCREASED ACCESSIBILITY

This step reviews the project alternatives and determines if the alternatives would increase accessibility to lands in the project area. Increased accessibility is the starting point for the indirect impacts analysis because it is essential for a transportation project to induce growth.

For the project, all build alternatives have the potential to increase accessibility within certain areas by constructing new interchanges that intersect with roadways that have limited or partial access control requirements in place. These intersecting roads provide access to adjacent properties, which is essential for development to occur.

**Table 3.2-1** summarizes the proposed new interchanges by alternative and their potential to increase access to surrounding properties. West Alternative 1 proposes one new interchange at Watson Lane in Henderson and West Alternative 2 proposes new interchanges at Watson Lane, Nugent Drive/Ellis Park and Stratman Road/Wolf Hills Road. The new interchanges proposed for the West Alternatives would increase access because the existing access from US 41 would be replaced by an interchange, concentrating access at the interchange. This results in reduced direct access for some properties and increased access for properties closest to the interchange.

Central Alternative 1 would construct a new interchange where the alignment crosses US 60 on the east side of Henderson. This new interchange would increase access to surrounding properties by providing a new direct access point that would connect with a roadway that permits driveway and street intersections at-grade.

Since all the new interchanges would increase access, all study areas were advanced to the next step to determine if the increased accessibility would induce development.



**Table 3.2-1. New Interchanges by Alternative**

ALTERNATIVE	INTERCHANGE STUDY AREA	ACCESS CONTROL ON INTERSECTING ROADWAY <sup>1</sup>	INCREASED ACCESS	ADVANCE TO NEXT STEP FOR ADDITIONAL ANALYSIS?
West Alternative 1	Watson Lane	Access by permit	Yes	Yes
West Alternative 2	Watson Lane	Access by permit	Yes	Yes
	Nugent Drive/Ellis Park	Access by permit	Yes	Yes
	Stratman Road/Wolf Hills Road	Access by permit	Yes	Yes
Central Alternative 1	US 60	Access by permit	Yes	Yes

<sup>1</sup> Access by permit is the most permissive access control and allows frequent driveways and intersecting roadways. Partial access control means at-grade driveways and intersecting roadways are permitted at certain intervals.

### 3.3 STEP 2: ASSESS THE POTENTIAL FOR INDUCED GROWTH

This section assesses the potential for the increased accessibility of the project alternatives to induce development within the 0.5-mile study areas around new interchanges. For a transportation project, induced growth can be exhibited in several ways including changes in the type, amount, location, and pace of growth.

Research has shown that improved transportation accessibility alone is not enough to induce development. According to a 2012 Transportation Research Board (TRB) report, *Interactions Between Transportation Capacity, Economic Systems, and Land Use*, transportation projects with supportive non-transportation local factors are most likely to create positive economic development outcomes. On the other hand, transportation projects that lack local supporting factors will inhibit economic development (TRB 2012). Based on this research, the availability of land and three local factors were considered in this analysis step to determine the likelihood of a project's induced development potential:

- Availability of land (i.e., vacant/undeveloped land that is not encumbered by floodway, state or local parks or other designations that would preclude the development of land)
- Supportive non-transportation local factors
  - Local government development policies and regulations (i.e., zoning, planned land use)
  - Infrastructure (i.e., availability of sewer and water service, extent of local road network)
  - Local economic conditions (i.e., growth trends, market demand, financial incentives)

**Table 3.3-1** summarizes the potential for induced development at each new interchange proposed under the project alternatives. The increased accessibility of the new interchanges along with other supporting non-transportation factors were considered to determine the potential for induced development at each new interchange.



**Table 3.3-1. Induced Development Potential by New Interchange Study Area**

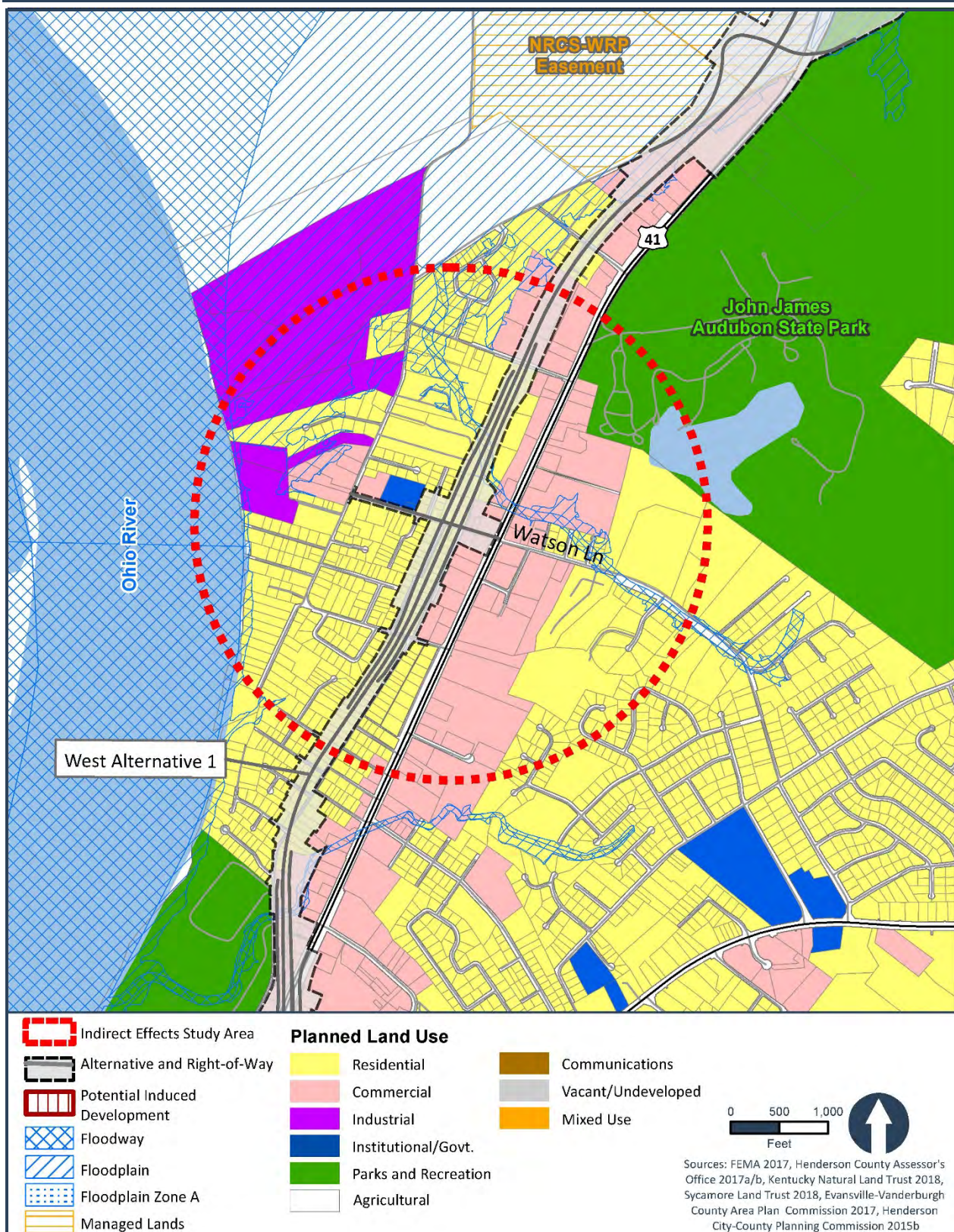
ALTERNATIVE	INTERCHANGE STUDY AREA	AVAILABLE LAND	PRESENCE OF SUPPORTIVE NON-TRANSPORTATION FACTORS	OVERALL POTENTIAL FOR INDUCED DEVELOPMENT <sup>1</sup>	ADVANCE TO NEXT STEP FOR ADDITIONAL ANALYSIS?
West Alt. 1	Watson Lane	0	Yes	No	No
West Alt. 2	Watson Lane	0	Yes	No	No
	Nugent Drive/Ellis Park	0	Yes	No	No
	Stratman Road/Wolf Hills Road	3 acres	Yes	No	No
Central Alt.1	US 60	115 acres	Yes	Yes	Yes

The following sections discuss each new interchange study area in greater detail.

### **3.3.1 WATSON LANE INTERCHANGE**

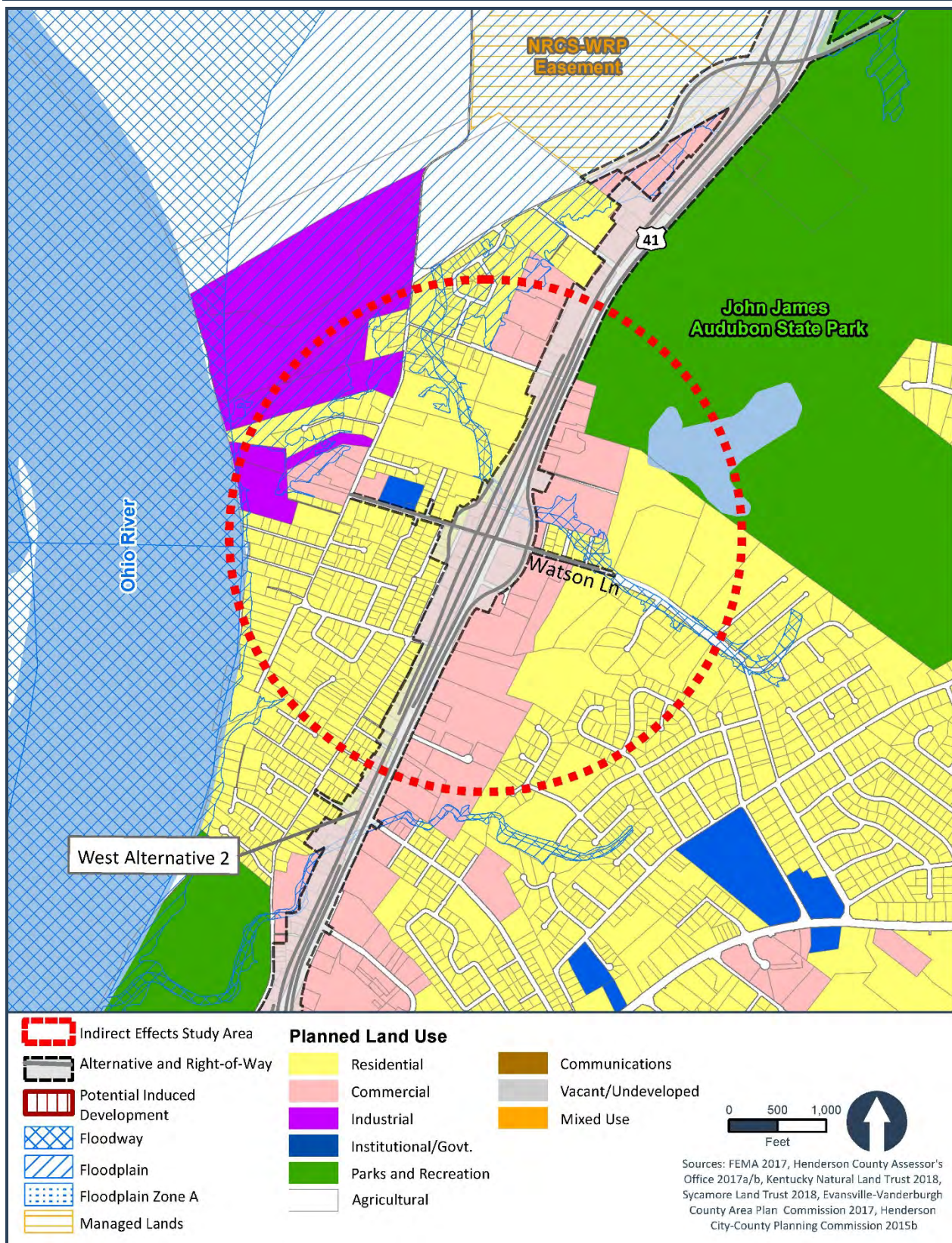
**Figure 3.3-1** and **Figure 3.3-2** show the interchange study areas for the Watson Lane interchange under the West Alternatives. The study areas, which are nearly identical, include the existing US 41 business corridor and existing residential neighborhoods to the east and west of the business corridor. The planned land use for the study areas is nearly identical to the existing land use since it is an established area of the community. Under both West Alternatives, Watson Lane is a proposed new interchange that would provide access to the US 41 business corridor in the City of Henderson from the interstate.

Under West Alternative 1, the alternative's alignment and Watson Lane interchange are located to the west of the existing business district and would preserve most existing commercial land on both the east and west sides of US 41. The Watson Lane interchange under West Alternative 1 may increase the attractiveness of land surrounding the interchange, spurring redevelopment that may concentrate or intensify commercial development around the proposed interchange. This potential redevelopment would most likely occur on the east side of West Alternative 1 since the west side contains a mature residential neighborhood that is not likely to change based on feedback from local planning officials. In addition, some vacant parcels are present to the east of the commercial uses along the US 41 corridor, which could become attractive to commercial development because of the new Watson Lane interchange. Under West Alternative 2, redevelopment associated with the Watson Lane interchange would be similar to West Alternative 1.



**Figure 3.3-1. Watson Lane Interchange Indirect Study Area – West Alternative 1**





**Figure 3.3-2. Watson Lane Interchange Indirect Study Area – West Alternative 2**



Several supportive non-transportation factors are present in this area that could facilitate redevelopment including available sewer and water services and a mature transportation network. The area also has experienced some recent investments to businesses along the corridor, demonstrating a market for redevelopment. The magnitude of redevelopment within the study area would be limited by the availability of land since the area is already developed and has established land use patterns. The Watson Lane interchange interchanges are not likely to induce development under both West Alternatives because the land within the study area is already developed and/or zoned for development and would not impact sensitive resources. As a result, this interchange is not recommended to advance to the next step for additional analysis.

### **3.3.2 NUGENT DRIVE/ELLIS PARK INTERCHANGE**

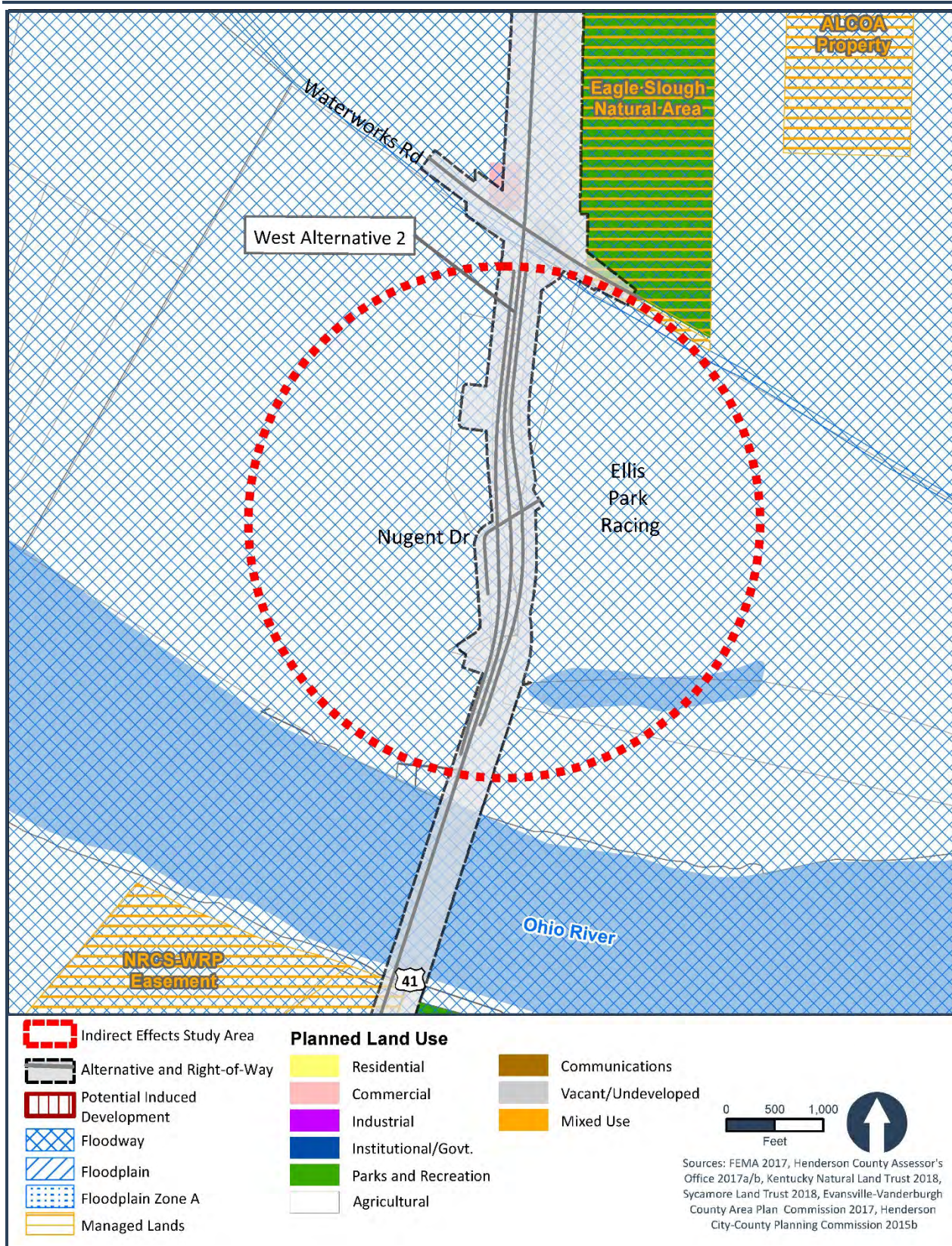
The Nugent Drive/Ellis Park interchange study area is shown on **Figure 3.3-3**. The study area is just north of the Ohio River and includes the Ellis Park racetrack surrounded by agricultural land. Under West Alternative 2, a new interchange would be constructed at Nugent Drive/Ellis Park.

The land within the interchange study area is planned and zoned for agriculture and is within the floodway of the Ohio River. According to input from local officials, development is not planned or anticipated in this area from the project alternatives because the floodway increases development restrictions in this area. Construction within the floodway requires detailed hydrologic studies and permitting with the Kentucky Division of Water, Federal Emergency Management Agency (FEMA), and the City of Henderson, as the Local Floodplain Coordinator administering FEMA's National Flood Insurance Program (NFIP). Additionally, the City of Henderson and the Henderson County Ordinances prohibit encroachments, including fill, new construction, substantial improvements and other developments within the floodway that would result in an increase in flood levels. For this reason, the area's agricultural zoning classification is not likely to change as a result of the new interchange. Based on the floodway restrictions and input from local officials this interchange study area is not likely to induce development and was not recommended to advance to the next step for additional analysis.

### **3.3.3 STRATMAN ROAD/WOLF HILLS ROAD INTERCHANGE**

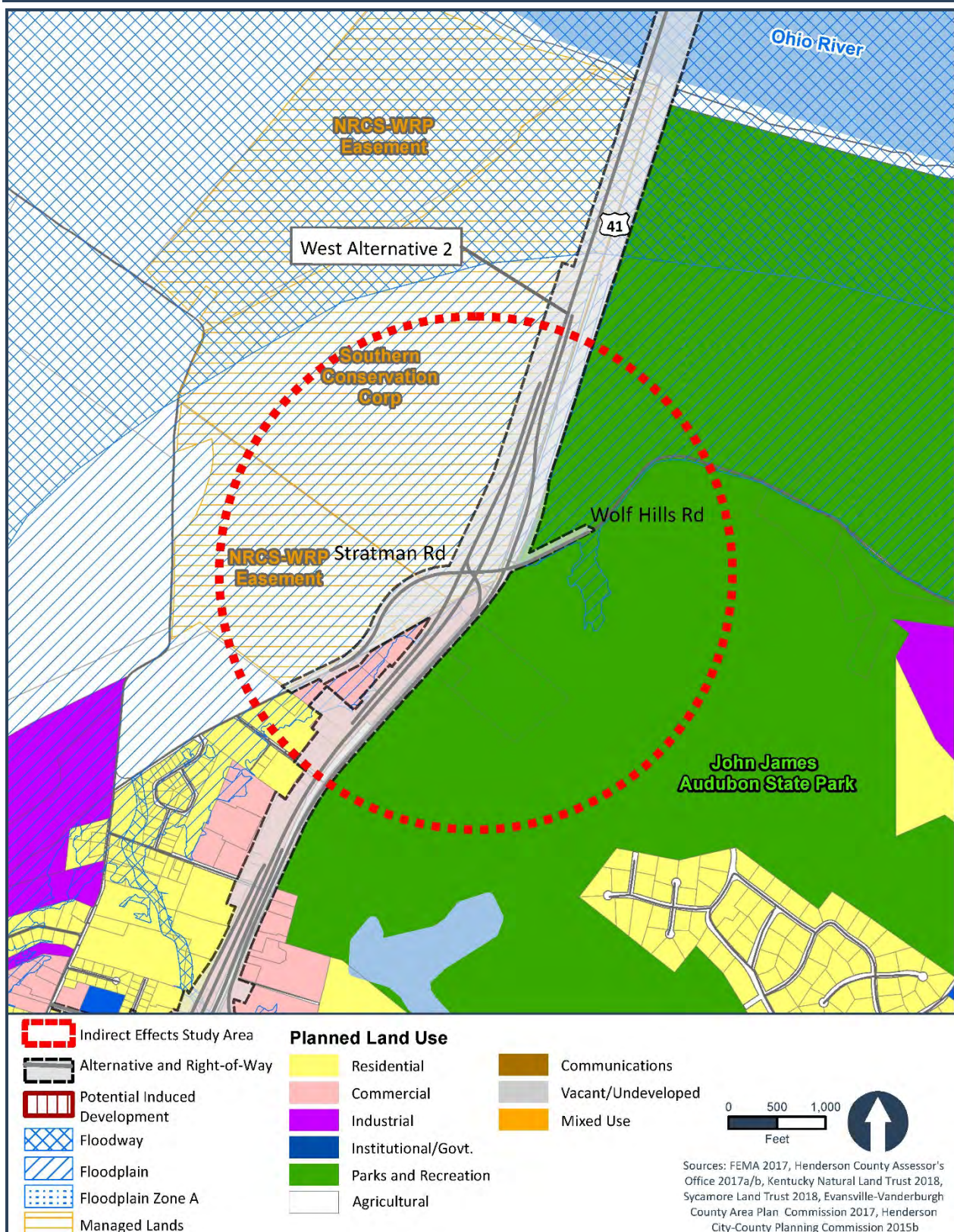
A new interchange at Stratman Road/Wolf Hills Road would be constructed under West Alternative 2. The interchange study area is shown on **Figure 3.3-4**. Even though the new interchange would increase access, the area is not likely to experience induced development due to a lack of available land that could be developed. The total acreage within the study is approximately 502 acres of which approximately 3 acres is available land subject to potential induced development. The development potential of the study area is constrained by John James Audubon State Park to the east of the alternative and the presence of a USDA Natural Resources Conservation Service-Wetland Reserve Program (NRCS-WRP) easement and Southern Conservation Corp. land to the west of the alternative, all of which occupy approximately 499 acres of the study area. In addition, the proposed right-of-way for the alternative would occupy currently zoned commercial land that fronts US 41, eliminating space for commercial redevelopment. Based on the development restrictions, this interchange study area was not recommended to advance to the next step for additional analysis.





**Figure 3.3-3. Nugent Drive/Ellis Park Interchange Indirect Study Area – West Alternative 2**





**Figure 3.3-4. Stratman Road/Wolf Hills Road Interchange Indirect Study Area – West Alternative 2**

### 3.3.4 US 60 INTERCHANGE

The US 60 interchange study area is shown in **Figure 3.3-5**. The study area currently includes agricultural lands, two historic sites (McClain House and Baskett House) and a planned residential subdivision called Eagle Ridge that has an approved site plan. The increased access provided by the new interchange in combination with other supportive factors is likely to increase the attractiveness of land within the study area and facilitate the development of highway-serving commercial uses such as gas stations, retail stores, restaurants, and other commercial uses.

The City of Henderson has supportive growth policies for this area since the local land use plan designates portions of land around the proposed interchange for future commercial development. According to local officials, this planned commercial development was in response to a new I-69/US 60 interchange proposed on the east side of Henderson in the *I-69 Feasibility Study* for Henderson County (KYTC 2014, Seboe 2017). The area also has supportive infrastructure since public water is available in this area and nearby sewer service could be extended to serve new development. Also, driveways and local streets are permitted along US 60, which would provide access to adjacent land from the interchange.

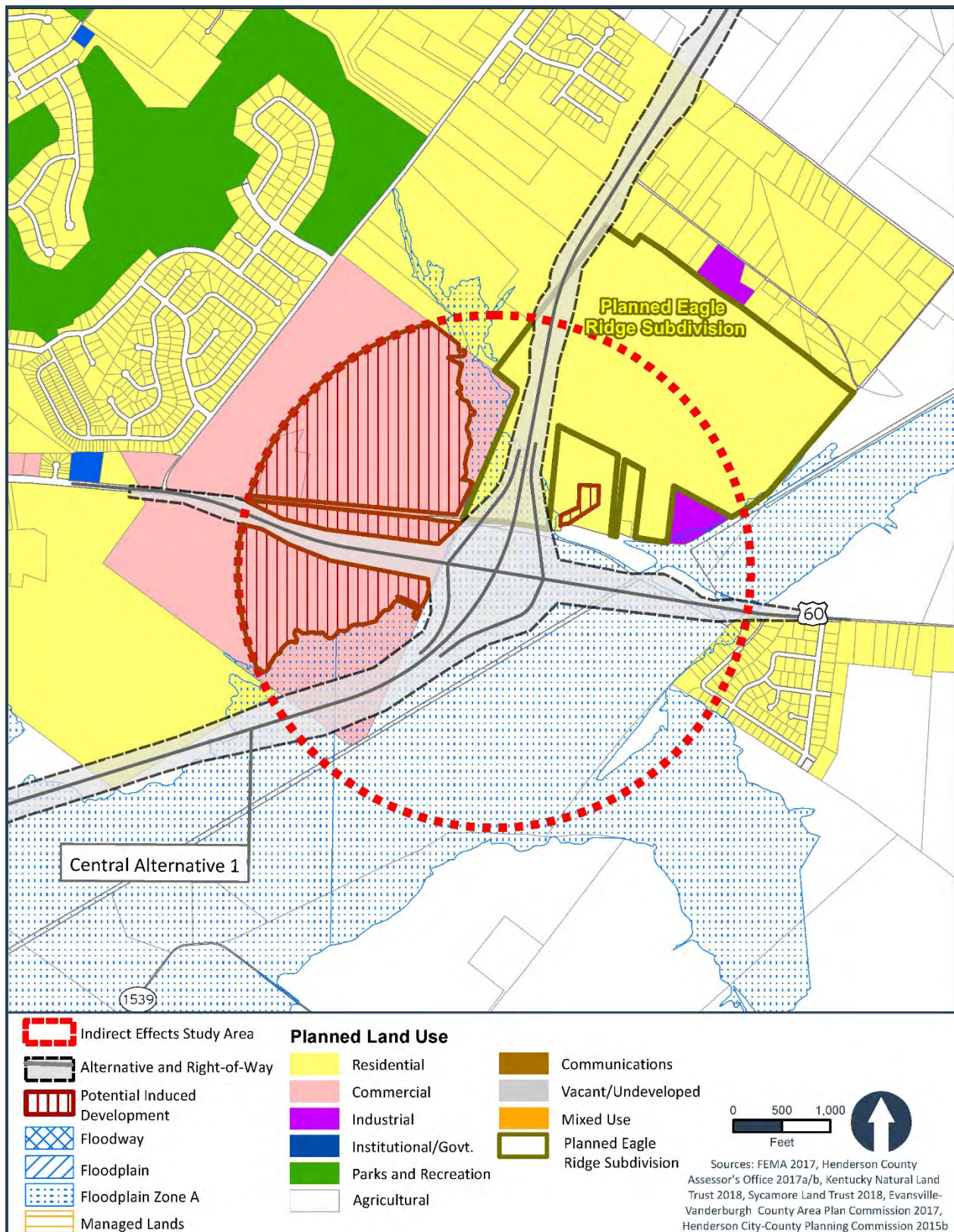
**Figure 3.3-5** shows the areas assumed to be affected by induced growth. The total acreage within the study is approximately 502.4 acres of which 115 acres is available land subject to potential induced development. The remaining 387 acres is located within the Zone A floodplain<sup>1</sup>.

Induced commercial development would most likely occur in the northwest and southwest quadrants of the interchange consistent with the local land use plan that anticipated commercial development around the proposed interchange in these quadrants. Some commercial development could be induced in the northeast quadrant, but most of the land in this quadrant is already planned for the Eagle Ridge subdivision. According to local officials, a master plan amendment and zoning change could occur (pending local approvals) if there is demand for commercial development in this area. Zone A floodplain occupies the southeast quadrant of the interchange as well as portions of the northwest and southwest quadrants. For the purposes of this analysis, it is assumed the Zone A floodplain areas would not be developed within the study area due to restrictions which prohibit encroachments, including fill, new construction, substantial improvements and other developments within the floodway that would result in an increase in flood levels. This was confirmed with local officials who stated the floodplain would hinder development in this area.

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<sup>1</sup> Zone A floodplain is not based on a detailed hydraulic study but approximates the limits of the 1 percent annual chance flood event (i.e., the 100-year floodplain). Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. To build in this area, a property owner would need to undertake detailed hydrologic studies and go through a permitting process that would involve the Kentucky Division of Water, FEMA and the City of Henderson, as the Local Floodplain Coordinator administering FEMA's National Flood Insurance Program (NFIP).





**Figure 3.3-5. US 60 Interchange Indirect Study Area – Central Alternative 1**

Based on the availability of land and the presence of supportive non-transportation factors, the US 60 interchange is likely to experience induced development and was recommended to advance to the next step to determine if that growth could indirectly impact sensitive resources.

### **3.4 STEP 3: ASSESS THE POTENTIAL FOR IMPACTS TO SENSITIVE RESOURCES**

This section identifies indirect impacts to sensitive resources (wetlands, streams, forests, farmland and aboveground historic resources) within the 0.5-mile study area around the proposed US 60 interchange. Indirect impacts to the resources were determined through a GIS analysis that placed the resources over the parcels that could experience induced development within the interchange study area and calculated the impact to the resources. The analysis is shown on **Figure 3.5-1**.

Induced development from the US 60 interchange under Central Alternative 1 could generate indirect impacts to these resources, as shown in **Table 3.4-1**. Within the 0.5-mile study area, up to 100 acres of farmland could be indirectly impacted. Forest land (9 acres), wetlands (3 acres) and streams (1,274 linear feet) could also be indirectly affected by induced development within the study area. In addition, the two historic properties, the McClain House and the Baskett House, could be susceptible to induced development if the property owners were to sell their land and/or homes for development in the future. No local, state, or federal regulations prevent the alteration and/or demolition of historic properties by private land owners. The magnitude of this impact is uncertain since the historic homes could remain in place even if the surrounding areas are developed.

**Table 3.4-1. Indirect Impacts to Resources from Induced Development**

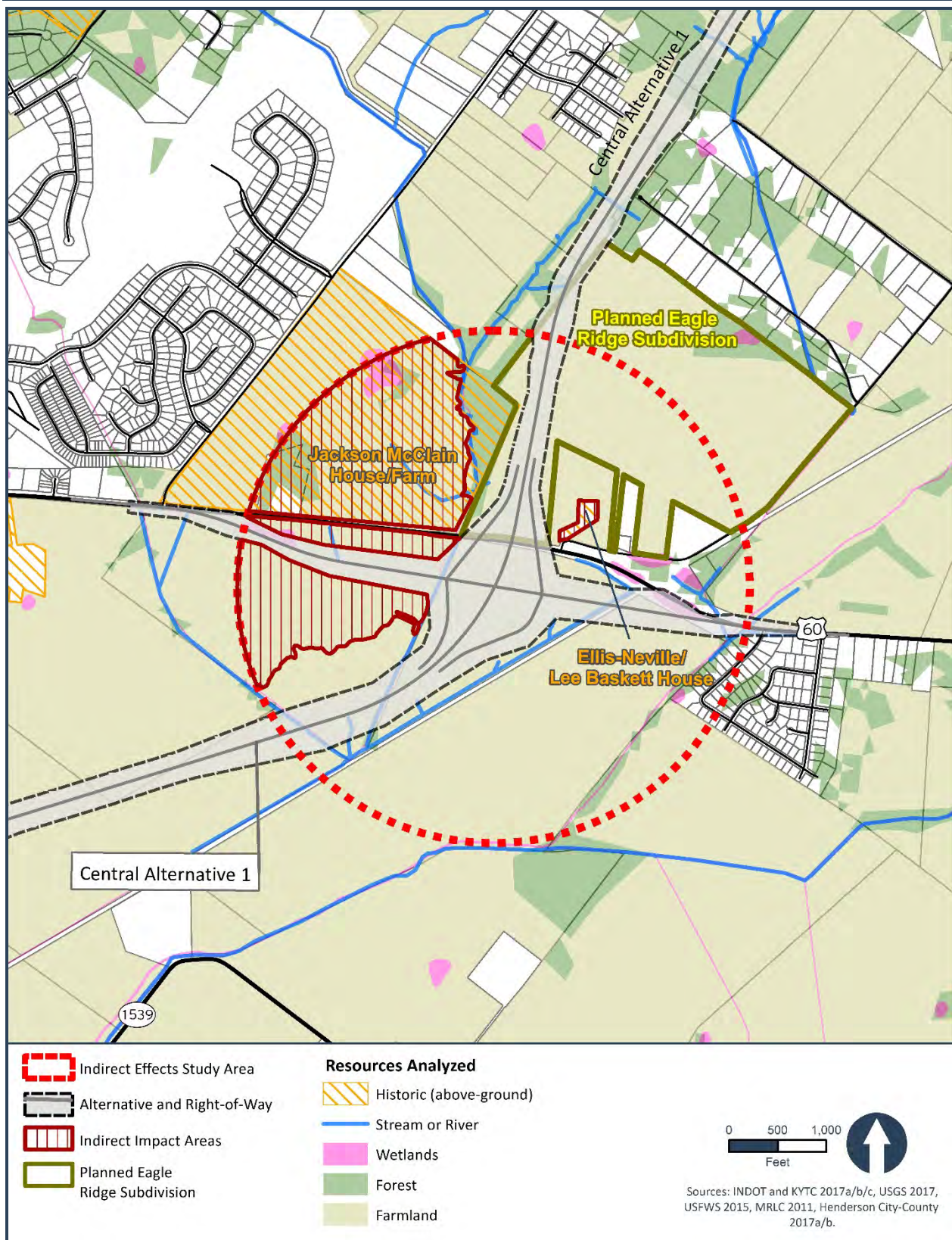
ALTERNATIVE	INTERCHANGE STUDY AREA	WETLANDS (ACRES)	STREAMS (LINEAR FEET)	FORESTS (ACRES)	FARMLAND (ACRES)	HISTORIC (PROPERTIES)	ADVANCE TO NEXT STEP FOR ADDITIONAL ANALYSIS?
Central Alternative 1	US 60	3	1,274	9	100	2	Yes

### **3.5 STEP 4: ASSESS POTENTIAL MINIMIZATION AND MITIGATION MEASURES**

The potential indirect impacts to sensitive resources within the US 60 interchange study area (Central Alternative 1) can be minimized by local, state, and federal regulations that are intended to manage growth and protect resources.

Local governments in Kentucky have the authority to regulate the use and development of land using a range of growth management tools that promote the orderly development of communities. These tools can be used to direct and manage potential induced development from the project in a manner that minimizes impacts to wetlands, streams, farmlands, and forests and is consistent with local growth policies and regulations.





**Figure 3.5-1. US 60 Interchange – Central Alternative 1 – Indirect Impacts to Resources**



The Henderson City-County Area Planning Commission uses a planned land use map to guide development decisions. The planned land use map is officially adopted by the community as part of its *Henderson City-County Comprehensive Plan* (Henderson City-County Area Plan Commission 2015a). In general, the areas that could experience induced development are consistent with Henderson's planned land use map.

Induced development would need to comply with local zoning and subdivision regulations for the City of Henderson and Henderson County. These ordinances are used to direct the location, amount and type of development that is permitted within the community. This helps to direct urban uses that are adjacent to existing developed areas that have public sewer and water services available. It also helps preserve contiguous large tracts of land for agricultural use outside the urban boundaries.

Although there are no specific local regulations to protect historic resources in Henderson from private development, the *Henderson City-County Comprehensive Plan* (Henderson City-County Area Plan Commission 2015) stresses the importance of preserving historic resources and states that the preservation of historic resources is important to the community's potential as a tourist destination and regional economic development efforts. The City and County have largely relied on public education to encourage preservation of historic resources through a list of historic survey sites maintained by the Kentucky Heritage Council and NRHP Designation.

The U.S. Army Corps of Engineers (USACE) and the Kentucky Division of Water (KDOW) protect and regulate wetlands and water bodies through Section 404 of the Clean Water Act and the Kentucky 401 Water Quality Certification process. Any development within the US 60 interchange study area that would impact regulated wetlands or streams would require a permit. As part of the permit process, measures to avoid, minimize, and mitigate impacts would be required.

## CHAPTER 4 – CUMULATIVE IMPACTS

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### 4.1 METHODOLOGY AND STUDY AREA

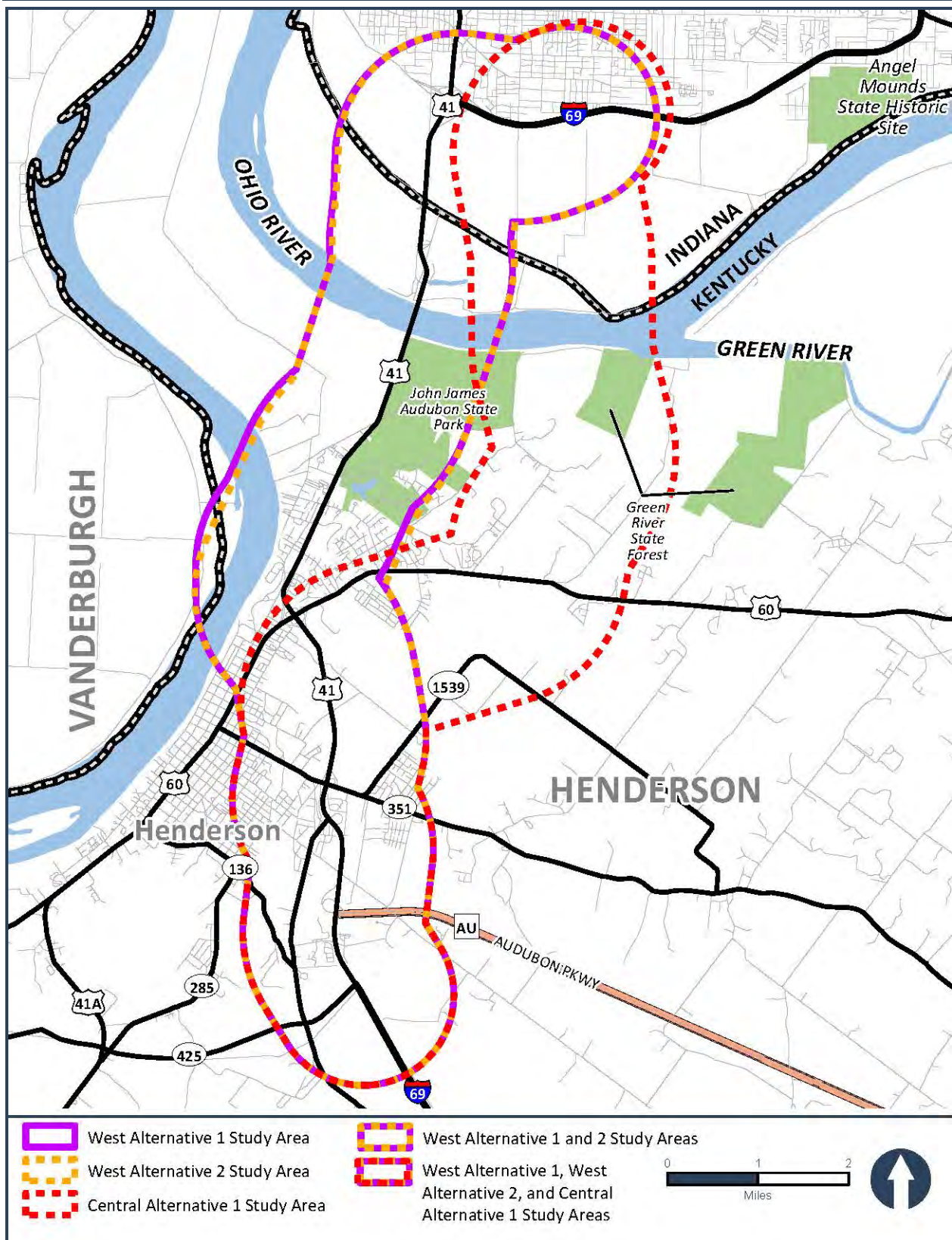
This section describes the potential for cumulative impacts resulting from the direct and indirect impacts of the I-69 ORX project in combination with other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.

The study area for cumulative impacts includes a 1-mile buffer from the centerline of the project alternatives (2-miles total), as shown on **Figure 4.1-1**. Due to the proximity of the centerlines for the West Alternatives, these study areas are almost identical.

The following resources are included in the cumulative impacts evaluation: wetlands, streams, forests, managed lands, aboveground historic resources, and farmland. These resources were selected based on the prevalence of these resources within the study areas and the results of the direct and indirect impact analyses for resources documented under **Chapter 4** of the DEIS. During the initial public and agency coordination process (i.e., scoping), no comments were received about including other resources of concern in the analysis of cumulative impacts.

These resources were identified and mapped within the cumulative impacts study areas based on available secondary source data, aerial photography and GIS files including:

- Wetlands: National Wetland Inventory, 2015; *I-69 Ohio River Crossing Project Waters of the U.S. Technical Report* (INDOT and KYTC 2017c).
- Historic: National Register of Historic Places Database, 2014; *I-69 ORX History/Architecture Survey for Henderson, Henderson County, Kentucky Volumes 1 and 2* (INDOT and KYTC 2017a); *I-69 ORX Phase I History/Architecture Survey for Evansville, Vanderburgh County, Indiana* (INDOT and KYTC 2017b).
- Streams: National Hydrography Dataset, 2015; *I-69 Ohio River Crossing Project Waters of the U.S. Technical Report* (INDOT and KYTC 2017c).
- Forest: National Land Cover Dataset developed by Multi-Resolution Land Characteristics Consortium (MRLC), 2001 and 2011.
- Farmland: Land use data from Vanderburgh County and Henderson County, 2010 and 2015; Google Earth Historical Imagery, 1998-2016.
- Managed Lands: Sites identified from Henderson County Assessor's Office, Sycamore Land Trust, and Kentucky Natural Lands Trust.



**Figure 4.1-1. Cumulative Impacts Study Areas**

As part of the analysis of cumulative impacts, the regional and local historic trends associated with the presence and condition of these resources was determined. Also, the analysis included the identification of other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions, and the estimation of their impacts to the designated resources within the cumulative impacts study areas. The timeframe for identifying past projects was the year 2000 or later. The timeframe for future development was 2040, which is consistent with the Metropolitan Transportation Plan 2040 (EMPO 2016). Impacts to resources from these past, present, and future projects were calculated and compared to the project's direct and indirect impacts to understand the overall impact to resources within the study areas.

The following subsections summarize the cumulative impacts analysis in accordance with the steps outlined in the *AASHTO Practitioner's Handbook 12 - Assessing Indirect Effects and Cumulative Impacts under NEPA*:

- Step 1: Describe Resource Conditions and Trends
- Step 2: Summarize Effects of the Proposed Action on Key Resources
- Step 3: Describe Other Actions and Their Effects on Key Resources
- Step 4: Estimate Combined Effects on Key Resources
- Step 5: Consider Minimization and Mitigation

#### **4.1.1 STEP 1: DESCRIBE RESOURCE CONDITIONS AND TRENDS**

This section describes the current conditions and trends of each resource being evaluated for cumulative impacts to establish baseline conditions for the resources within the study areas. **Table 4.1-1** summarizes the total amount of existing resources present within the cumulative impacts study areas. The following subsections describe the existing conditions and trends for each resource in greater detail.

**Table 4.1-1. Existing Resource Totals by Cumulative Impacts Study Area**

RESOURCE	WEST ALTERNATIVE 1	WEST ALTERNATIVE 2	CENTRAL ALTERNATIVE 1
Wetlands (acres)	1,385	1,371	1,172
Streams (linear feet) <sup>1</sup>	399,986	394,103	370,775
Forests (acres)	2,602	2,591	2,187
Managed Lands (acres)	852	852	334
Historic Properties (number) <sup>2</sup>	13	13	12
Farmland (acres)	6,517	6,442	8,326

<sup>1</sup> The Ohio River accounts for 23,346 linear feet of West Alternative 1 study area, 22,646 linear feet of West Alternative 2 study area and 10,562 linear feet of Central Alternative 1 study area.

<sup>2</sup> The study area for Central Alternative 1 contains 10 historic properties. The two historic US 41 bridges over the Ohio River were added to the total because the alternative incorporates the bridges.



## WETLANDS

Wetlands throughout the states of Indiana and Kentucky have historically been drained and filled by farming practices and urban development. In Indiana, it is estimated that the state had approximately 5.6 million acres of wetlands prior to settlement. As of the mid 1980s, the best estimates indicated that only 813,000 acres of wetland remained in the state (Indiana Department of Natural Resources 1996). In Kentucky, it is estimated that the state originally had 1.6 million acres of wetlands prior to settlement. By 1992, the state's remaining acreage was estimated to be between 387,000 acres and 650,000 acres (U.S. Geological Survey 1996).

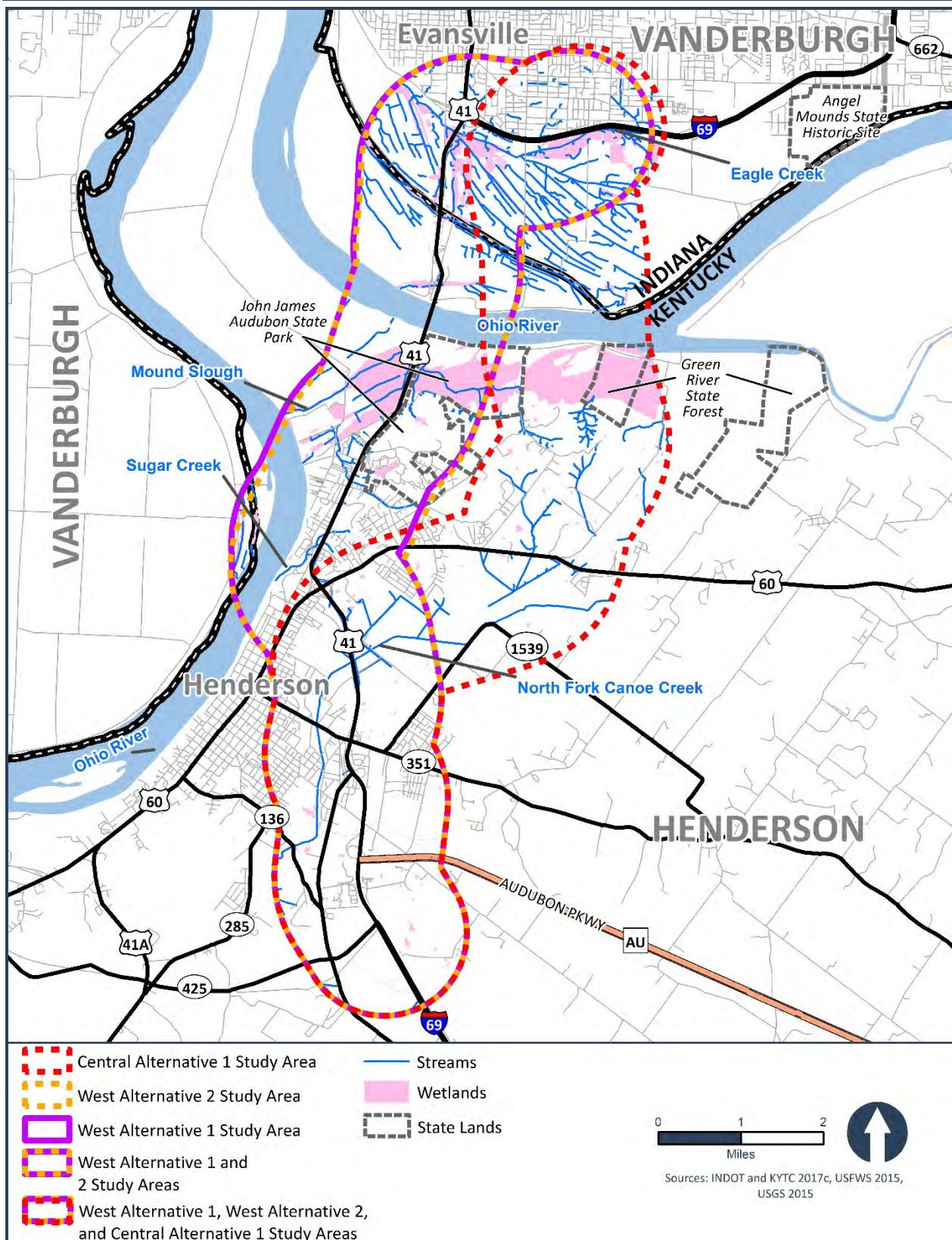
Wetlands in the study areas are shown on **Figure 4.1-2**. The study areas for West Alternatives 1 and 2 each encompass nearly 1,400 acres of wetland and the study area for Central Alternative 1 contains nearly 1,200 acres of wetland. Most of the wetlands in the study areas are associated with the Ohio River floodplain (USFWS 2015). These wetlands are typical of large river floodplains, such as bottomland hardwood wetlands or herbaceous and scrub-shrub wetlands that had been previously cleared or disturbed by agriculture and/or other development.

The two largest concentrations of wetlands are located within the Ohio River floodway to the south of I-69 in Vanderburgh County and to the south of the Ohio River in Henderson County. A large portion of these wetlands are preserved by conservation land trusts, Natural Resource Conservation Service (NRCS) WRP easements, U.S. Army Corps of Engineers (USACE) and Indiana Department of Environmental Management (IDEM) wetland mitigation sites, Green River State Forest, and John James Audubon State Park. In 2016, the 650-acre Audubon Wetlands were purchased and absorbed into Audubon State Park. This substantially increased the number of permanently protected wetlands in the study area. The proposed Green River National Wildlife Refuge, located along the Ohio River in Henderson County, would also help maintain wetland resources in the study areas. Other smaller wetlands are dispersed throughout the study areas.

## STREAMS

**Figure 4.1-2** shows the streams that are located within the study areas. All three study areas cross the Ohio River and are entirely located within the Ohio River watershed. According to the Ohio River Valley Water Sanitation Commission, nonpoint source pollution from both urban and agricultural areas and abandoned mines is a large contributor to degraded water quality of the river. Several point source pollution issues, such as combined sewer overflows, also exist along the Ohio River with 580 permitted discharges (ORANSCO 2016).

Tributary watersheds that are located within the study areas include the Highland-Pigeon Creek watershed in Indiana and the Canoe Creek watershed in Kentucky. According to the *Watershed Management Plan for Highland-Pigeon Watershed*, this watershed has experienced historic stream degradation due to agricultural drainage systems and the construction of the Wabash and Erie canals (IDEM 2003). Permitted discharges include municipal wastewater treatment plants, industrial discharges, and combined sewer overflows. Major nonpoint sources of pollutants to the watershed are row crop agriculture and urban runoff (IDEM 2003).



**Figure 4.1-2. Existing Wetlands and Streams – Cumulative Impacts Study Areas**

According to the *Canoe Creek Watershed Health Report*, the watershed has an overall “D” rating for the health of the watershed (KDEP 2010). North Fork Canoe Creek, which crosses all study areas, was found by the Health Report to have lower levels of total suspended solids when compared to other tributaries in the Canoe Creek watershed and some areas were found to be suitable for fish and aquatic insect species. However, *E. coli* levels exceeded standards safe for swimming.

Including the Ohio River, the study areas for West Alternatives 1 and 2 each encompass nearly 400,000 linear feet of streams and the study area for Central Alternative 1 contains about 370,000 linear feet of streams. The largest concentration of tributary streams within the study areas is just north of the Ohio River and south of I-69 in Vanderburgh County. Several smaller tributaries to the Ohio River are found throughout the study areas including Eagle Creek, Mound Slough, Sugar Creek, and the multiple tributaries to North Fork Canoe Creek. These streams play an important role in the region’s ecological and drainage systems by conveying floodwaters, providing aquatic habitats, and creating recreational amenities.

Most of the stream channels identified in the study areas are ephemeral, meaning the streams only flow briefly during and following a period of rainfall. Seven perennial streams with continuous flow are present in the study areas, including Eagle Creek and North Fork Canoe Creek, and five intermittent streams such as Mound Slough and Sugar Creek that flow for only weeks or months each year are also present.

Most of the streams in the study areas have been channelized, ditched, leveed, cleared or have other man-made disturbance that alter their natural character and hydrology (INDOT and KYTC, 2005). The following streams within the study areas are impaired: Ohio River, Eagle Creek, North Fork Canoe Creek, and an unnamed tributary to Eagle Creek (IDEM, 2017) (KDEP, 2014).

State and federal regulations play a key role in protecting streams and rivers in the study areas. The USACE, under Section 404 of the Clean Water Act, regulates the discharge of dredged or fill material into waters of the U.S. (WOTUS), including streams. Additionally, Section 401 of the Clean Water Act provides the state(s) authority to issue certification that proposed dredge and fill activities within streams will not violate applicable state water quality standards. Local ordinances such as the Henderson Erosion and Sediment Control Ordinance Under Chapter 7, Article VI, also help to reduce runoff from construction sites and protect water quality in streams. Local conservation efforts and state-owned lands such as conservation land trusts and easements provide permanently protected natural areas that benefit streams and contribute to the region’s water quality.

## FORESTS

The study areas for the West Alternatives each contain about 2,600 acres of forests and the study area for Central Alternative 1 contains nearly 2,200 acres of forests. Forests are shown on [Figure 4.1-3](#). The forests within the study areas are made up of deciduous and mixed deciduous forests. Within the study areas, forests are primarily found to the south of the Ohio River with large areas of forest associated with John James Audubon State Park, Green River State Forest and Eagle Slough Natural Area. Additional concentrations of forest occur to the south of Evansville along



the existing section of I-69. Smaller patches of forest are present throughout the more urbanized zones within the study areas.

From 2001 to 2011, forest land cover decreased by about 29 acres within the West Alternatives study areas and 30 acres in the Central Alternative 1 study area (MRLC, 2001). Future land use plans for both Henderson and Vanderburgh County indicate that, while small forested strips and sections will likely be developed over time, larger forests associated with protected parks and natural areas such as the Audubon State Park and Green River State Forest will remain as forest. Lands associated with conservation easements such as Eagle Slough Natural Area help to preserve forest resources in the study areas.

In addition, the U.S. Fish and Wildlife Service completed a Supplemental Environmental Assessment for the creation of Green River National Wildlife Refuge in 2010 (U.S. Fish and Wildlife Service, 2010). This document acknowledged the proposed I-69 project and alternatives under evaluation at that time. The EA indicated that the biological opinion evaluated the effects of Alternative #2 of the new I-69 on the federally endangered Indiana bat and concurred with FHWA's "no effect" determination for the American burying beetle and "not likely to adversely affect" determinations for the gray bat and fat pocketbook." Additionally, the EA mentions "the Kentucky Field Office determined that the proposed I-69 construction was not likely to jeopardize the continued existence of the Indiana bat".

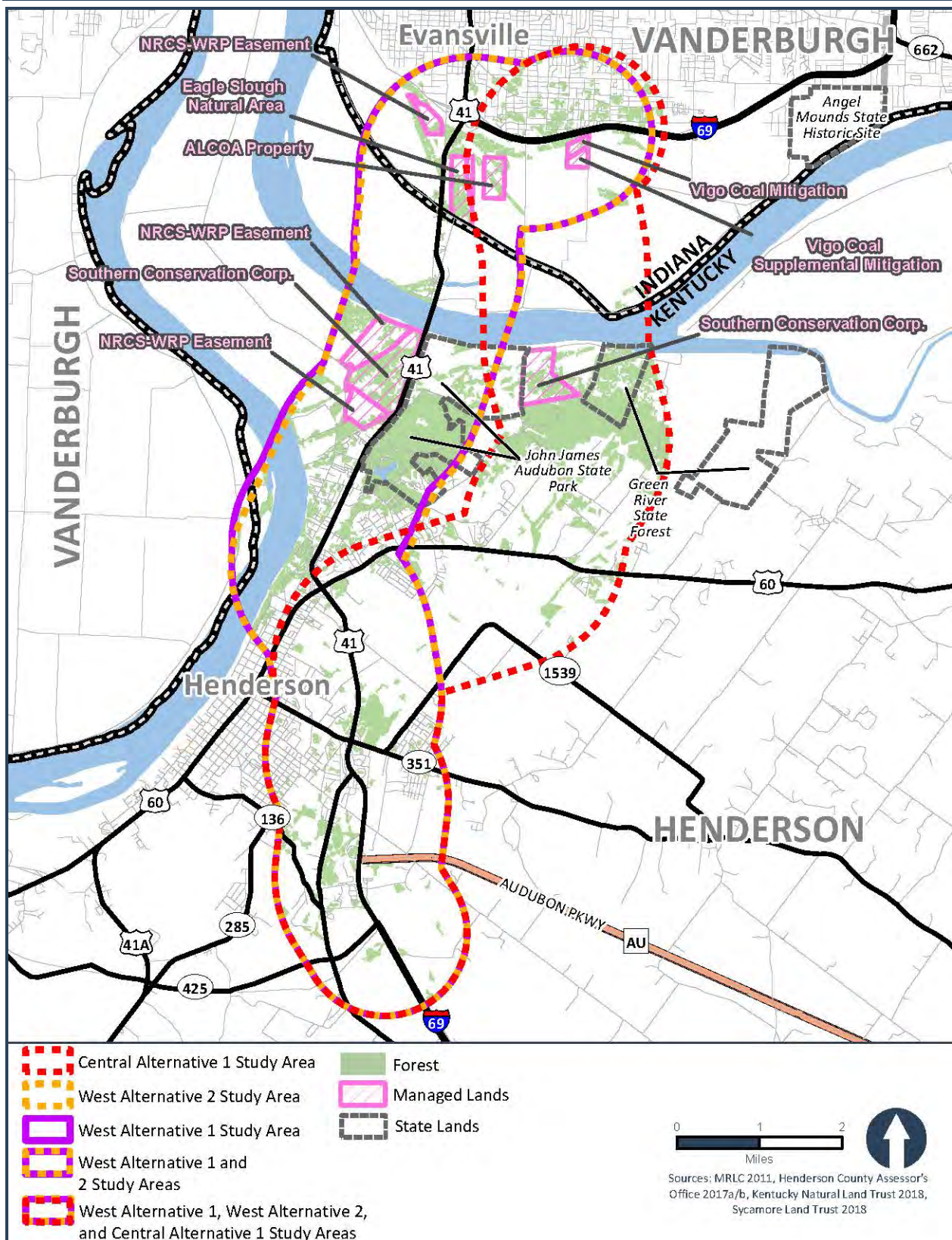
The proposed refuge, located on the south bank along the Ohio River in Henderson County, KY, would contain three units with most of the lands on the south side of the river. The purpose of the refuge would be to restore bottomland hardwood forested wetland habitats to benefit migratory waterfowl and shore birds. All three project alternatives bisect the Green River National Wildlife Refuge. Although no funding has been allocated for the purchase of refuge lands, the proposal demonstrates the importance of this area to conservation efforts.

## MANAGED LANDS

Several properties were identified in the study areas that are managed for conservation as shown on [Figure 4.1-3](#). The study areas for West Alternatives 1 and 2 each contain about 850 acres of managed lands and the study area for Central Alternative 1 contains 334 acres of managed lands. These properties, although not protected by Section 4(f), have easements or controlling agreements that protect their use. Examples of managed lands include Imperiled Bat Conservation Fund (IBCF) properties, NRCS WRP easements, Eagle Slough Natural Area, and Vigo Coal Wetland Mitigation Sites.

The Imperiled Bat Conservation Fund (IBCF) was established in 2009 and aims to use a combination of grant, mitigation, and federal discretionary funding to focus resources on bat, forest, and at-risk terrestrial species conservation (KNLT, 2018). Eagle Slough Natural Area was acquired by the Sycamore Land Trust in 2012 with the vision to preserve the beauty, health, and diversity of southern Indiana's natural landscape (Sycamore Land Trust 2018). Other managed lands in the cumulative impacts study areas are protected through various easements and agreements.





**Figure 4.1-3. Existing Forests and Managed Lands – Cumulative Impacts Study Areas**

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## HISTORIC RESOURCES

The Kentucky Heritage Council lists 526 historic sites in the City of Henderson, with 12 on the National Register of Historic Places (NRHP) and 20 listed as meeting criteria for inclusion on the NRHP (Henderson City-County Planning Commission 2015). NRHP listed or eligible properties within the study areas are shown on [Figure 4.1-4](#). These historic resources “help to document the early beginnings of the area and serve as reminders of the community’s heritage and tradition” (Henderson City-County Planning Commission 2015a).

Aboveground historic resources within the study areas, as shown on [Figure 4.1-4](#), are all found within Henderson County. The study areas for West Alternatives each contain 13 historic resources that are listed on or eligible for the NRHP. The study area for Central Alternative 1 contains 12 historic properties. Properties within the Area of Potential Effect (APE) for the project were identified as the result of in-depth studies and consultation with consulting parties including the State Historic Preservation Officers for both Kentucky and Indiana. Properties within the study area for cumulative impacts but outside of the APE are based on the existing NRHP listed and eligible properties identified by the Kentucky Heritage Council.

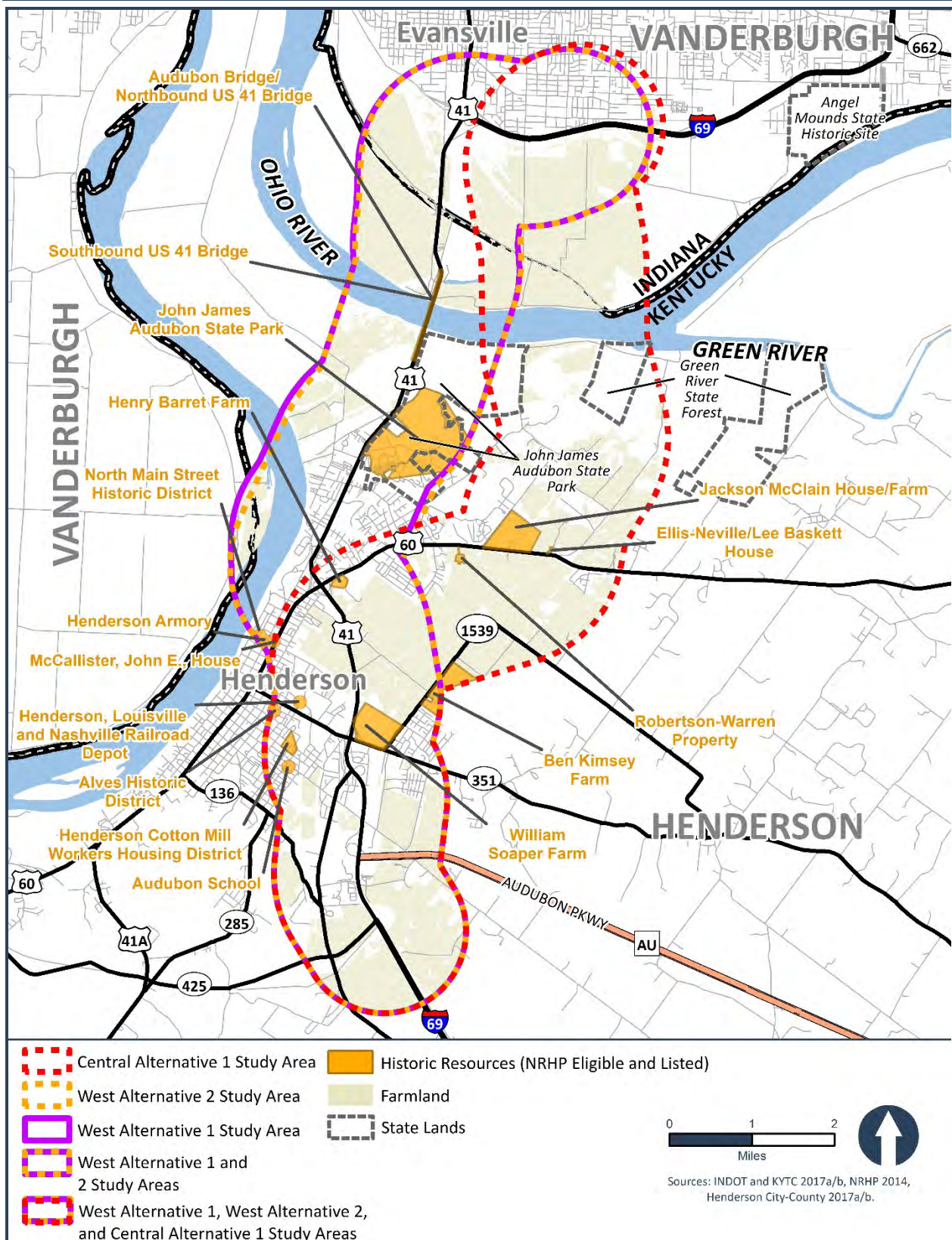
Historic resources in the study areas include several farmsteads, two historic cantilevered truss bridges over the Ohio River, John James Audubon State Park, a train depot, armory, school and a federal style residential structure. In addition, the City of Henderson has three historic districts on the NRHP within the West Alternatives study areas. The North Main Street Historic District encompasses the private residential properties along the west side of the 500 block and the east and west sides of the 600 and 700 blocks of North Main Street. Within the older part of Henderson is the Henderson Cotton Mill Workers Housing District roughly bounded by Washington Street, Letcher Street, Powell Street and Rankin Avenue. The Alves Historic District encompasses a concentration of residences that began to develop at the end of the Civil War focused along Center Street just east of downtown Henderson.

Few resources within the study areas remain from the early settlement of Henderson County, KY and Vanderburgh County, IN and no pre-nineteenth century resources were identified during the project’s aboveground historic resource evaluation (INDOT and KYTC 2017 a and b). Many of the historic farmsteads in the study areas have been subdivided and developed into other uses since the mid-twentieth century; but, many farms in the county outside of Henderson’s city limits to the east, south, and west remain intact. As described in the project’s Historic Properties Reports, the four historic farmsteads within the study areas have lost buildings or acreage.

## FARMLAND

The study areas for West Alternative 1 and West Alternative 2 contain about 6,500 acres and 6,400 acres of farmland, respectively. The study area for Central Alternative 1 contains approximately 8,300 acres. Farmland is shown on [Figure 4.1-4](#) on the prior page. The majority of the existing farmland is in the eastern portion of the study areas in Henderson County and outside the City of Henderson boundary. Also, farmland is present to the north and south of the Ohio River.





**Figure 4.1-4. Existing Historic and Farmland Resources - Cumulative Impacts Study Areas**



Agriculture is very important to the economies of Vanderburgh County and Henderson County. According to the USDA 2012 Census of Agriculture, Vanderburgh County ranks 79<sup>th</sup> of the 92 counties in Indiana for the total value of agricultural products sold (\$36.1M) (USDA 2012b). Henderson County ranks 18<sup>th</sup> of the 120 counties in Kentucky for the total value of agricultural products sold (\$78.6M) (USDA 2012a). The majority of the farms in both counties are in crop production, led by corn, soybeans, wheat, and hay.

Historical trends show the acres of farmland have decreased in Henderson County from 264,785 acres at its peak in 1944 to 195,706 acres in 2007, a decrease of approximately 26 percent (USDA 2012c). Between 2007 and 2012, the number of farms in Vanderburgh County declined by 18 percent, although the total farm acreage increased by six percent (USDA 2012b). Development pressure in Henderson County resulted in a nine and ten percent decrease in the number of and total land occupied by farms, respectively, between 2007 and 2012. However, the total market value of products sold in both counties has increased by 11 percent over the same period (2007 – 2012).

The Henderson City-County Comprehensive Plan notes that in recent years an increasing amount of land has been subdivided into lots for residential use in the unincorporated areas of the county under current agricultural zoning. This type of residential development threatens the viability of other agricultural lands as conflicts often arise when concentrated residential uses are established next to farms (Henderson City-County Planning Commission 2015a).

Indiana and Kentucky both have programs to protect farms, including tax incentives, right to farm laws, and other voluntary state programs such as conservation easements. Vanderburgh and Henderson counties further protect farms through agricultural zoning. Additionally, the Henderson City-County Comprehensive Plan calls for discouraging urban development in areas with prime farmland soils or active farming areas (Henderson City-County Planning Commission 2015).

#### **4.1.2 STEP 2: SUMMARIZE EFFECTS OF THE PROPOSED ACTION ON KEY RESOURCES**

The project's direct impacts and indirect effects to resources being considered for cumulative impacts are summarized in **Table 4.1-2**

**Table 4.1-2. Project-Related Direct and Indirect Impacts to Resources by Study Area**

RESOURCE	WEST ALTERNATIVE 1	WEST ALTERNATIVE 2	CENTRAL ALTERNATIVE 1
<b>Wetlands (acres)</b>			
Study area total	1,385	1,371	1,172
Direct impact	55	35	18
Indirect Impact	0	0	3
Total project impacts	55	35	21
Percent of total	4	3	2
<b>Streams (linear feet)</b>			
Study area total <sup>1</sup>	399,986	394,103	370,775
Direct impact	23,475	21,152	18,327
Indirect Impact	0	0	1,274
Total project impact	23,475	21,152	19,601
Percent of total	6	5	5
<b>Forests (acres)</b>			
Study area total	2,602	2,591	2,187
Direct impact	97	71	46
Indirect Impact	0	0	9
Total project impact	97	71	55
Percent of total	4	3	3
<b>Managed Lands (acres)</b>			
Study area total	852	852	334
Direct impact	55	57	1
Indirect Impact	0	0	0
Total project impact	55	57	1
Percent of total	6	7	<1
<b>Historic Properties (number of properties)</b>			
Study area total <sup>2</sup>	13	13	12
Direct impact	2 (US 41 SB and NB bridge)	2 (US 41 SB and NB bridges)	2 (US 41 SB and NB bridge)
Indirect Impact	0	0	2 (McClain House and Baskett House)
Total project impact	2	2	4
Percent of total	15	15	33
<b>Farmland (acres)</b>			
Study area total	6,517	6,442	8,326
Direct impact	183	169	348
Indirect Impact	0	0	100
Total project impact	183	169	448
Percent of total	3	3	5

<sup>1</sup> The Ohio River accounts for 23,346 linear feet of West Alternative 1 study area, 22,646 linear feet of West Alternative 2 study area and 10,562 linear feet of Central Alternative 1 study area.

<sup>2</sup> The study area for Central Alternative 1 contains 10 historic properties. The two historic US 41 bridges over the Ohio River were added to the total because the alternative incorporates the bridges.



#### 4.1.3 STEP 3: DESCRIBE OTHER ACTIONS AND THEIR EFFECTS ON KEY RESOURCES

This section identifies other non-project-related past, present and reasonably foreseeable future actions in the study areas (both public and private actions) and estimates the impacts of those other projects on the resources under evaluation for cumulative impacts. **Table 4.1-3** lists the other projects and **Figure 4.1-5** shows the location of the other projects.

The past, present and reasonably foreseeable projects were identified through coordination with local planning officials, identification of subdivision and development plans and a review of historic aerial photos. Past developments that have occurred since 2000 were identified and their impacts to the designated resources estimated. Current development projects (projects under construction) were researched, but none were identified within the study areas at the time of this analysis. Future developments include any projects that have been recently submitted to and/or approved by the local planning departments. In addition, undeveloped areas that are currently zoned for development are considered potential future development areas for the analysis. Also, areas with approved site plans and/or subdivisions that have not been developed, and are still under agricultural zoning, are included as future development. Vacant parcels zoned for development within existing developed areas and/or subdivisions that have already been disturbed in preparation for development were not included as future development.

For transportation projects, INDOT's STIP FY 2016-2019, KYTC's STIP FY 2017-2020, and EMPO's TIP FY 2016-2019 were reviewed along with the Henderson City-County Comprehensive Plan and the Evansville-Vanderburgh County Comprehensive Plan to identify any future transportation projects that are planned within the study areas (INDOT 2017, KYTC 2018, EMPO 2017, Henderson City-County Planning Commission 2015a, Evansville-Vanderburgh County Area Plan Commission 2016). Only transportation projects that are planned for widening or major reconstruction are included in this analysis. No past or present transportation projects were identified within the analysis timeframe.

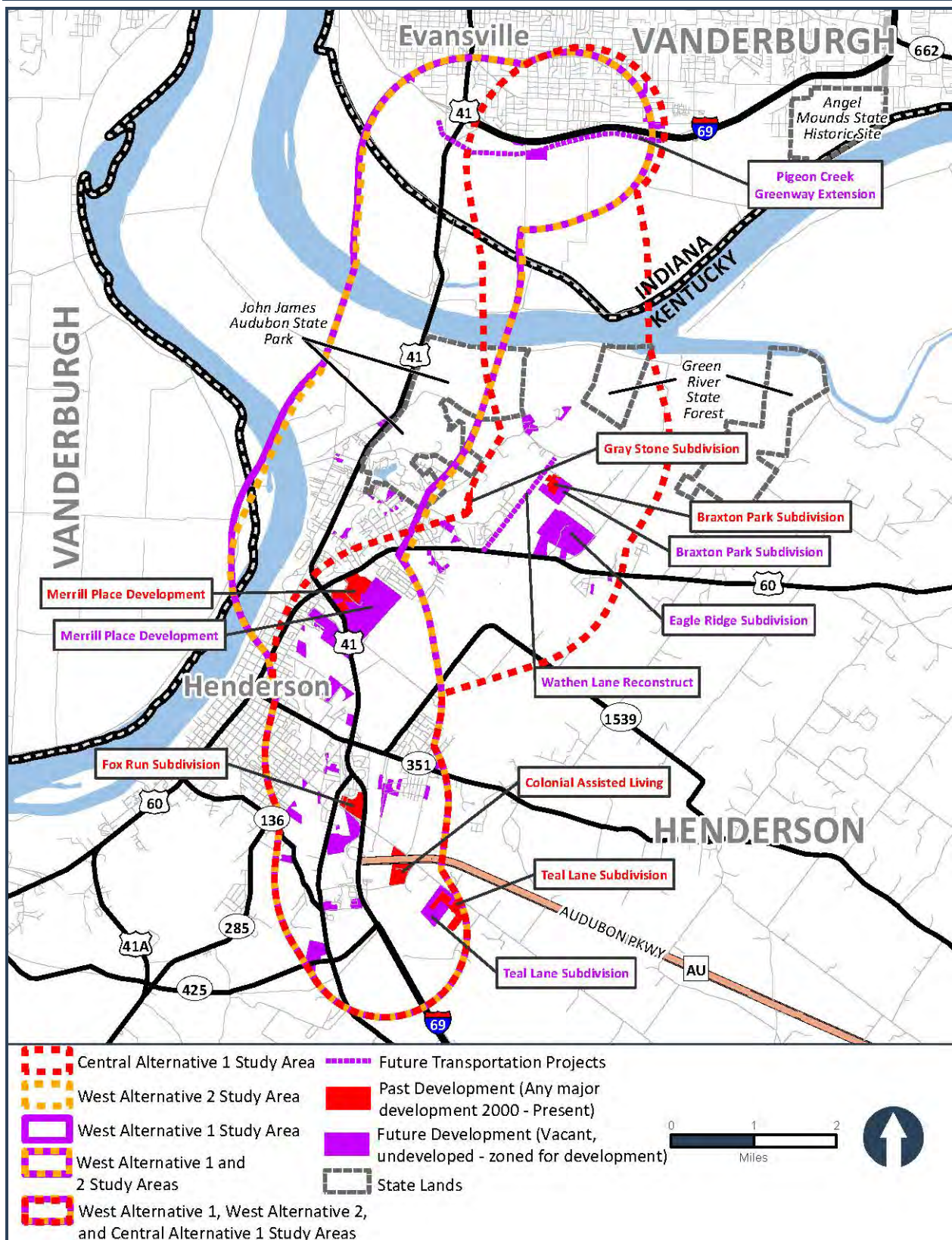
Resource impacts could only be calculated for residential and commercial development projects. Impacts related to transportation projects could not be calculated because the right-of-way for those projects has not been determined or is not available. **Table 4.1-3** lists resources that are adjacent to transportation projects and would be vulnerable if the other transportation projects affected resources outside their existing right-of-way.

**Table 4.1-3. List of Other Past, Present<sup>1</sup> and Reasonably Foreseeable Future Projects**

TIME	CUMULATIVE STUDY AREA	OTHER PROJECT(S)	GENERAL LOCATION	COUNTY	POTENTIAL RESOURCE IMPACTS
Past	Central Alternative 1	Braxton Park Subdivision	Wathen Lane and Braxton Park Drive	Henderson	Forests, farmland
	West Alternatives and Central Alternative 1	Fox Run Subdivision	Airline Rd and Dove Trail Drive	Henderson	No known impacts
	West Alternatives and Central Alternative 1	Merrill Place Subdivision	US 60 and Barrett Blvd	Henderson	Wetlands, farmland, forest
	Central Alternative 1	Gray Stone Subdivision	Green River Road and Woodspoint Drive	Henderson	Farmland
	West Alternatives and Central Alternative 1	Teal Lane Subdivision	Teal Lane and Airline Road	Henderson	Farmland
	West Alternatives and Central Alternative 1	Colonial Assisted Living	Adams Lane	Henderson	Farmland, wetlands
Future	West Alternatives and Central Alternative 1	Merrill Place Subdivision	Barrett Boulevard	Henderson	Wetlands, farmland, forest
	Central Alternative 1	Eagle Ridge Subdivision	US 60 and KY 414	Henderson	Forest, farmland, wetlands
	West Alternatives and Central Alternative 1	Ongoing urban development on vacant parcels zoned for development (excludes existing subdivisions)	Throughout study area	Henderson and Vanderburgh	Forests, farmland, wetlands, streams
	Central Alternative 1	Wathen Lane reconstruction	Wathen Lane from US 60 to Henderson city limits	Henderson	Impacts unknown; project is adjacent to streams, historic resources and, farmland resources
	West Alternatives and Central Alternative 1	Pigeon Creek Greenway, new dedicated pedestrian and bicycle path	South of I-69 from Kentucky Avenue to Angel Mounds	Vanderburgh	Project to be constructed within I-69 right-of-way.

<sup>1</sup> At the time of the cumulative impacts analysis, no present projects (under construction) were identified.





**Figure 4.1-5. Other Past, Present, and Reasonably Foreseeable Future Projects**

**Table 4.1-4** shows the estimated impacts to resources from other non-project-related past, present, and reasonably foreseeable future actions in the study areas.

**Table 4.1-4. Resource Impacts from Other Past, Present, and Future Projects by Study Area**

RESOURCE	WEST ALTERNATIVE 1	WEST ALTERNATIVE 2	CENTRAL ALTERNATIVE 1
<b>Wetlands (acres)</b>			
Total study area	1,385	1,371	1,172
Other Past, present, future projects	23	23	24
Percent of total	2	2	2
<b>Streams (linear feet)</b>			
Total study area <sup>1</sup>	399,986	394,103	370,775
Other Past, present, future projects	13,244	13,372	13,202
Percent of total	3	3	4
<b>Forests (acres)</b>			
Total study area	2,602	2,591	2,187
Other Past, present, future projects	72	74	98
Percent of total	3	3	4
<b>Managed lands (acres)</b>			
Total study area	852	852	334
Other Past, present, future projects	0	0	0
Percent of total	0	0	0
<b>Historic properties (number)</b>			
Total study area <sup>2</sup>	13	13	12
Other Past, present, future projects	0	0	0
Percent of total	0	0	0
<b>Farmland (acres)</b>			
Total study area	6,517	6,442	8,326
Other Past, present, future projects	459	460	625
Percent of total	7	7	8

<sup>1</sup> The Ohio River accounts for 23,346 linear feet of West Alternative 1 study area, 22,646 linear feet of West Alternative 2 study area and 10,562 linear feet of Central Alternative 1 study area.

<sup>2</sup> The study area for Central Alternative 1 contains 10 historic properties. The two historic US 41 bridges over the Ohio River were added to the total because the alternative incorporates the bridges.

Wetland impacts from other projects for the West Alternatives and Central Alternative 1 are 23 acres and 24 acres, respectively. This accounts for approximately two percent of the total wetland acres in each study area. For streams, other projects could impact over 13,000 linear feet of streams in each study area, accounting for about four percent of all streams in each study area. Other projects in the West Alternatives study areas could impact over 70 acres of forest, accounting for about three percent of the total forest resource in the study areas. Other projects in the Central Alternative 1 study area are estimated to impact 98 acres of forest, or four percent of the total

forest acres in the study area. Potential impacts to farmland from other projects would be greatest under the Central Alternative 1 study area, accounting for 625 acres, or eight percent of the total resource in the study area. Farmland would also be impacted by other projects under the West Alternatives, accounting for about 460 acres, or seven percent of the resource in those study areas. No impacts to managed lands are anticipated from other projects within the study areas since these resources are generally protected from development and primarily located within the Ohio River floodway where development is restricted by local ordinance. Also, no impacts to historic resources were identified from other projects within the analysis timeframe in the study areas.

#### **4.1.4 STEP 4: ESTIMATE COMBINED EFFECTS ON KEY RESOURCES**

This section considers the information presented in the prior steps to determine the aggregate impact on each resource from past, present, and reasonably foreseeable future actions of other projects, plus the incremental impacts (direct and indirect) of the project. **Table 4.1-5** summarizes the resource impacts.

##### **WETLANDS**

The study areas for the West Alternatives each contain nearly 1,400 acres of existing wetlands and Central Alternative 1 contains about 1,200 acres of wetlands. Direct impacts to wetlands from the project are 55 acres (West Alternative 1), 35 acres (West Alternative 2) and 18 acres (Central Alternative 1). An additional 3 acres of wetlands could be indirectly affected under Central Alternative 1 from project-induced development associated with new access created by the US 60 interchange. In addition, wetlands could also be impacted by other past, present, and/or reasonably foreseeable future projects taking place in the study areas ranging from 23 acres (West Alternative study areas) to 24 acres (Central Alternative 1 study area).

Potential impacts from other development, when combined with the anticipated direct and indirect impacts from the project could impact about 6 percent of the wetlands in the West Alternative 1 study area and about 4 percent of the wetlands in the West Alternative 2 and Central Alternative 1 study areas.

Based on the cumulative impacts provided in **Table 4.1-5**, and public and agency input, the extent of the wetland impacts would not reach a level of concern that would warrant special avoidance, minimization, and/or mitigation measures other than those proposed in Section 4.1.5. The impacts represent a relatively small portion of the total wetlands in the study area and existing federal and state regulations are in place to help avoid and minimize potential impacts to wetlands. In compliance with the Section 404 and Section 401 permitting processes, the project's direct wetland impact would be mitigated through compensatory mitigation and replaced at the appropriate mitigation ratios. Also, other projects in the study area would be required to comply with these same regulations and obtain permits from the applicable agencies that require projects to avoid and minimize impacts to wetlands to the maximum extent practical. Furthermore, the larger wetland complexes located within the Ohio River floodway, which are the focus of several conservation and restoration efforts, are not expected to be impacted by other development projects since this area is largely under permanent protection by John James Audubon State Park, Green River State Forest, conservation land trusts, NRCS WRP easements, and USACE and IDEM



wetland mitigation sites. The planned Green River National Wildlife Refuge in Henderson County would provide additional protection for wetlands along the Ohio River once it is implemented. Also, the river corridor is not planned for development since this area is subject to regular flooding.

## STREAMS

The study areas for West Alternative 1, West Alternative 2, and Central Alternative 1 each contain a total of 399,986, 394,103 and 370,775 linear feet of streams, respectively. Direct impacts to streams from the project are 23,475 linear feet (West Alternative 1), 21,152 linear feet (West Alternative 2) and 18,327 linear feet (Central Alternative 1). An additional 1,274 linear feet of streams could be indirectly affected under Central Alternative 1 from project-induced development. Potential impacts to streams from other past, present, and future development within the West Alternative 1, West Alternative 2 and Central Alternative 1 study areas are 13,244

**Table 4.1-5. Cumulative Impacts to Resources by Alternative**

RESOURCE	WEST ALTERNATIVE 1		WEST ALTERNATIVE 2		CENTRAL ALTERNATIVE 1	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
<b>Wetlands (acres)</b>						
Study area total	1,385	100	1,371	100	1,172	100
Direct impact	55	4	35	3	18	2
Indirect Impact	0	0	0	0	3	<1
Other past, present, future projects	23	2	23	2	24	2
Total cumulative impact	78	6	58	4	45	4
<b>Streams (linear feet)</b>						
Study area total <sup>1</sup>	399,986	100	394,103	100	370,775	100
Direct impact	23,475	6	21,152	5	18,327	5
Indirect Impact	0	0	0	0	1,274	<1
Other past, present, future projects	13,244	3	13,372	3	13,202	4
Total cumulative impact	36,719	9	34,524	9	32,803	9
<b>Forests (acres)</b>						
Study area total	2,602	100	2,591	100	2,187	100
Direct impact	97	4	71	3	46	2
Indirect Impact	0	0	0	0	9	<1
Other past, present, future projects	72	3	74	3	98	4
Total cumulative impact	169	6	145	6	153	7
<b>Managed lands (acres)</b>						
Study area total	852	100	852	100	334	100
Direct impact	55	6	57	7	1	<1
Indirect Impact	0	0	0	0	0	0
Other past, present, future projects	0	0	0	0	0	0
Total cumulative impact	55	6	57	7	1	<1
<b>Historic Properties (number)</b>						
Study area total <sup>2</sup>	13	100	13	100	12	100

RESOURCE	WEST ALTERNATIVE 1		WEST ALTERNATIVE 2		CENTRAL ALTERNATIVE 1	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Direct impact	2 (US 41 SB and NB bridge)	15	2 (US 41 SB and NB bridges)	15	2 (US 41 SB and NB bridge)	17
Indirect Impact	0	0	0	0	2 (McClain House and Baskett House)	17
Other past, present, future projects	0	0	0	0	0	0
Total cumulative impact	2	8	2	15	4	33
<b>Farmland (acres)</b>						
Study area total	6,517	100	6,442	100	8,326	100
Direct impact	183	3	169	3	348	4
Indirect Impact	0	0	0	0	100	1
Other past, present, future projects	459	7	460	7	625	8
Total cumulative impact	642	10	629	10	1,073	13

<sup>1</sup> The Ohio River accounts for 23,346 linear feet of West Alternative 1 study area, 22,646 linear feet of West Alternative 2 study area and 10,562 linear feet of Central Alternative 1 study area.

<sup>2</sup> The study area for Central Alternative 1 contains 10 historic properties. The two historic US 41 bridges over the Ohio River were added to the total because the alternative incorporates the bridges.

linear feet, 13,372 linear feet and 13,202 linear feet, respectively. These impacts result in a potential cumulative impact to streams ranging from 32,803 linear feet to 36,719 linear feet and account for about 9 percent of the total linear feet of streams in each study area.

Based on the cumulative impacts provided in [Section 4.1.2](#), and public and agency input, the extent of the stream impacts would not reach a level of concern that would warrant special avoidance, minimization, and/or mitigation measures other than those proposed in [Section 4.1.5](#). The impacts represent a relatively small portion of the total linear feet of streams in the study areas and existing federal and state regulations are in place to help avoid, minimize or mitigate potential impacts to streams and water quality. The project would mitigate unavoidable stream impacts in coordination with regulatory agencies through the Section 404 and Section 401 permitting processes. Other projects in the study areas would also need to comply with these regulations for any dredge or fill activities in regulated streams. In addition, the project would need to comply with NPDES for stream discharges, which is administered by the states through IDEM Rule 5 and KPDES permits. These permits would also help manage impacts from other projects in the study areas since nearly all construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more are required to obtain permits and prepare a Stormwater Pollution Prevention Plan (SWPP) to minimize erosion and sedimentation during construction.

## FORESTS

The study areas for the West Alternatives each contain about 2,600 acres of existing forest land and the study area for Central Alternative 1 contains about 2,200 acres of existing forest. Forest land would be directly impacted by all project alternatives, ranging from 46 acres to 97 acres. In addition, 9 acres of forests could be indirectly affected by project-induced development under Central Alternative 1. Forests would also be affected by other past, present, and reasonably foreseeable future projects in the cumulative impacts study areas. Other projects could impact

over 70 acres of forests in each of the West Alternative study areas and 98 acres of forest in the Central Alternative 1 study area.

The aggregate impacts for West Alternative 1, West Alternative 2, and Central Alternative 1 are 169 acres, 15 acres and 153 acres, respectively, within the cumulative impacts study areas. This accounts for about 6 percent of the total forest cover for each West Alternative study area and about 7 percent for the Central Alternative 1 study area.

Based on the cumulative impacts provided in **Section 4.1.2**, and public and agency input, the extent of the forest impacts would not reach a level of concern that would warrant special avoidance, minimization, and/or mitigation measures other than those proposed in Section 4.1.5. The forest impacts represent a relatively small portion of the total forest in the study areas. Plus, the larger contiguous forested areas located to the north and south of the Ohio River, which are the focus of several conservation and restoration efforts, are expected to remain intact since development is not expected to occur in this area due to the Ohio River floodway where development is restricted due to regular flooding. Also, a substantial portion of the forests in this area are permanently protected by John James Audubon State Park, Green River State Forest, conservation land trusts, NRCS WRP easements, and USACE and IDEM wetland mitigation sites. Also, the proposed Green River National Wildlife Refuge would provide additional protection to forests along the Ohio River.

#### MANAGED LANDS

No impacts from other past, present, or reasonably foreseeable projects or indirect impacts from this project are expected for managed lands. As a result, no cumulative impacts are anticipated to managed lands.

#### HISTORIC PROPERTIES

The study areas for West Alternatives 1 and 2 each contain 13 historic resources that are listed on or eligible for the NRHP. The study area for Central Alternative 1 contains 12 historic properties including the two US 41 bridges, which are outside the study area boundaries. West Alternatives 1 and 2 and Central Alternative 1 would result in direct adverse effects to both of the US 41 bridges. The West Alternatives are not expected to indirectly impact historic resources. Future induced commercial development anticipated from the US 60 interchange under Central Alternative 1 could indirectly impact the McClain House and the Baskett House, as described under the indirect effects section. Although the historic home could remain in place, commercial development around the property would affect its rural setting and diminish the integrity of the historic property. Since no state or local ordinances or laws protect historic properties from private development, these resources can be vulnerable to development within the study area.

Based on the cumulative impacts provided in **Section 4.1.2**, and public and agency input, the extent of impacts to aboveground historic properties would not reach a level of concern that would warrant special avoidance, minimization, and/or mitigation measures other than those proposed in Section 4.1.5. The project's direct and indirect impacts would adversely affect historic properties in the study area; however, no known historic properties have been or would be impacted by any past, present, and/or reasonably foreseeable future projects within the



timeframe of this analysis. Mitigation measures for direct and indirect impacts are presented in the draft Memorandum of Agreement (MOA) in Appendix L-3 of the DEIS.

#### **FARMLAND**

The study areas for West Alternative 1, West Alternative 2, and Central Alternative 1 each contain a total of 6,517 acres, 6,442 acres and 8,326 acres of farmland. Farmland would be directly impacted by all project alternatives, ranging from 183 acres for West Alternative 1, 169 acres for West Alternative 2, and 348 acres for Central Alternative 1. In addition, 100 acres of farmland could be indirectly affected by project-induced development under Central Alternative 1. Other past, present, and/or reasonably foreseeable projects could contribute to a cumulative impact on farmland resources in the study area. Potential farmland impacts from other projects is estimated at about 460 acres for each West Alternative study area and 625 acres for the Central Alternative 1 study area. Most of these impacts would occur in areas that are planned for development in accordance with Henderson's plans such as the Eagle Ridge and Merrill Place subdivisions where undeveloped portions of those developments are still farmed.

The aggregate farmland impacts for West Alternative 1, West Alternative 2, and Central Alternative 1 are 642 acres, 629 acres and 1,073 acres, respectively, within the study areas. Central Alternative 1 would have the largest aggregate farmland impacts accounting for 13 percent of the total resource in the study area. The cumulative impact to farmland under the West Alternatives would account for about 10 percent of the existing farmland in the study areas.

Based on the cumulative impacts provided in **Section 4.1.2**, and public and agency input, the extent of the farmland impacts would not reach a level of concern that would warrant special avoidance, minimization, and/or mitigation measures other than those proposed in Section 4.1.5. The amount of farmland impacted in the study areas is not considered substantial due to the extensive amount of farmland available within the study areas and region.

#### **4.1.5 STEP 5: CONSIDER MINIMIZATION AND MITIGATION**

##### **WETLANDS**

The cumulative impact to wetlands would be minimized and avoided with existing state and federal regulations that manage development activity in wetlands. USACE, under Section 404 of the CWA, regulates the discharge of dredged or fill material into WOTUS, including wetlands. Section 404 requires the avoidance, minimization, and compensation for unavoidable impacts to wetlands. Concurrently, a Section 401 certification (or waiver) is required for any discharge regulated under Section 404. The Indiana Department of Environmental Management (IDEM) administers Section 401 Water Quality Certification (401 WQC) for water quality impacts to WOTUS. Isolated wetlands (those wetlands not regulated under the federal CWA) are regulated under Indiana's State Isolated Wetlands law. Impacts to isolated wetlands require a state Isolated Wetland Permit from IDEM.

KDOW, Water Quality Certification Section, administers the Section 401 Water Quality Certification Program for the Commonwealth of Kentucky. KDOW does not have an isolated wetland permit as discussed above for IDEM.

Besides regulations promulgated through the federal CWA, Executive Order 11990, Protection of Wetlands, mandates that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural values. This executive order applies to any federal action, including projects receiving federal funds, such as transportation projects.

Local governments also recognize the importance of wetland preservation. Local policies help guide development to avoid and minimize impacts to wetlands. The Henderson City-County Comprehensive Plan aims to “[p]rotect the integrity of wetlands by discouraging development in these areas” (Henderson City-County Planning Commission 2015a). The Evansville-Vanderburgh County Comprehensive Plan has similar policies to “[e]nsure in the subdivision and site planning process that natural areas (wooded areas, stream corridors, wetlands, etc.) are preserved and/or minimize the impacts on these resources” (Evansville-Vanderburgh County Area Plan Commission 2016).

The continued preservation of land by conservation land trusts, NRCS WRP easements, USACE and IDEM wetland mitigation sites, will also reduce cumulative impacts to wetlands through easements or controlling agreements that protect their use. Plus, Green River State Forest and John James Audubon State Park permanently protect wetlands under state-ownership. Implementation of the proposed Green River National Wildlife Refuge would further protect wetlands and water resources in the study areas.

#### **STREAMS**

A large portion of the study area streams are north of the Ohio River, where the existing floodplain and floodway would limit the likelihood of development and associated impacts to streams. Additionally, existing Section 401 and 404 requirements of the CWA would limit impacts to streams from development.

USACE, under Section 404 of the CWA, regulates the discharge of dredged or fill material into WOTUS, including streams. The Section 404 process requires the avoidance, minimization and compensation for unavoidable impacts to streams. Additionally, Section 401 of the CWA provides the state(s) authority to issue certification that proposed dredge and fill activities within streams will not violate applicable state water quality standards.

Point sources of pollution have been highly regulated through the CWA and the National Pollutant Discharge Elimination System (NPDES). State and local regulations help to further avoid and minimize stream impacts from non-point pollution. Indiana’s “Rule 5”, 327 IAC 15-5, and Kentucky Pollution Discharge Elimination System (KPDES), 401 KAR 5:055, requires that the contractor develop a construction plan for stormwater discharges from construction activities of one acre or greater. An erosion control plan and stormwater pollution prevention plan (SWPPP) must be developed. Best management practices (BMPs) will be used in the construction of this project to minimize impacts of erosion. Erosion and sediment control measures are typically put in place as a first step in construction and maintained throughout construction.

Indiana Rule 5 and KPDES, requires contractors to provide a spill response plan, which among other requirements include communication protocols to ensure proper and timely notification of nearby public drinking water supplies in the event of a spill. Local municipal and county codes further regulate drainage and stormwater management on development sites.

#### **FOREST**

The Henderson City-County Area Planning Commission can help to minimize impacts to forests through the subdivision and site plan review process for new development. They can also use their local land use plan and zoning ordinances to direct development away from natural areas that contain forests. The preservation of natural areas through state and local efforts and conservation land trusts is an effective way to ensure the highest quality forests remain intact within the study area. Many conservation organization efforts are already active in this area including Eagle Slough Natural Area and Southern Conservation Corp. Furthermore, the Indiana Department of Natural Resources requires mitigation for construction in a forested floodway under the Construction in a Floodway permit process.

#### **MANAGED LANDS**

No minimization or mitigation strategies are required since no cumulative impact is anticipated to managed lands.

#### **HISTORIC PROPERTIES**

Federal law, through Section 106 of the Historic Preservation Act, helps protect properties that are eligible for or listed in the NRHP. Section 106 requires sponsors of federally funded projects to consult with the State Historic Preservation Officer, as well as other consulting parties. However, these laws do not always apply to privately initiated actions that could affect historic resources where neither federal nor state permits/approvals are required.

No specific local regulations are available to protect historic resources in Henderson from private development and state or local sponsored projects. The Henderson City-County Comprehensive Plan (Henderson City-County Area Plan Commission 2015a) supports the preservation of historic resources and recognizes the role resources play in tourism and regional economic development efforts.

#### **FARMLAND**

Indiana and Kentucky both have programs to encourage the preservation of farms, including tax incentives, right to farm laws, and other voluntary state programs such as conservation easements. In addition, the federal Farmland Protection Policy Act (FPPA) per subtitle I of Title XV, Section 1539-1549 helps to minimize farmland impacts from federally-funded projects through the use of the farmland conversion impact rating form. This score is used as an indicator for the project sponsor to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level.

Mitigation of cumulative impacts on farmland is ultimately determined by local governments through land use plans and zoning ordinances. Development of farmland zoned for agriculture



would require a change in zoning and permits from local governments. Both the Evansville-Vanderburgh County Comprehensive Plan and the Henderson City-County Comprehensive Plan propose that rural land remain in agricultural uses.

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# APPENDIX A

Indirect and Cumulative Impacts

Local Planning Agency Interviews

Summary Notes



## MEETING NOTES

**Date:** February 9, 2018

**Time:** 10 to 11 a.m. CT

**Meeting:** Land use interview with Henderson City-County Planning Commission

**Location:** Phone interview

**Attendees:**

**Brian Bishop, HCCPC– Director**

**Claudia Wayne, HCCPC – Asst. Director**

**Ray Nix, HCCPC**

**Carolyn Seboe, HNTB**

**Chris Meador, HNTB**

**Mike Hammond, HNTB**

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**Purpose:** Discuss indirect and cumulative effects with local experts

A phone interview was arranged with the Henderson City-County Plan Commission (HCCPC), to discuss recent development trends and the potential for indirect and cumulative effects for the I-69 ORX project area. Carolyn first provided an overview of the NEPA process, the indirect and cumulative effects analyses, and the preliminary alternatives under consideration. Next, the group discussed trends in development and the potential for induced development around the project area. The following summarizes the key points made during the call by the HCCPC staff.

HCCPC staff provided an overview of existing trends in development for the city and county of Henderson. The commercial corridor along US 41 on the north side of the city has been experiencing an uptick of new development recently with new small retail centers and chain restaurants. To the east of US 41, residential growth has occurred primarily between Second Street and US 60 in areas where water and sewer have been extended to new subdivisions. Industrial development has and will likely continue to be developed in southwest Henderson near Borax Drive and the Riverport.



HCCPC staff discussed areas where potential induced growth could occur because of the I-69 project alternatives:

Ellis Park Area (West Alternatives 1 & 2)

- No changes anticipated for Ellis Park area
- Development is restricted in this area due to floodplain and floodway designations.
- No anticipated induced growth from project alternatives.

US 41 Commercial Corridor (all alternatives)

- West Alternative 1 – Anticipate this alternative could facilitate some development between US 41 and I-69 depending on how much land will be available after the freeway is constructed. The development to the east of this alternative is likely to remain commercial with a similar character to existing conditions. There is potential for some of the development along this corridor to concentrate around the proposed Watson Lane interchange. Some existing uses along this corridor have outdated structures that could be redeveloped. Uncertain how the bridge scenarios would impact development, with local traffic continuing to use the local bridge.
- West Alternative 2 – Anticipate this alternative could facilitate commercial growth on the east side of US 41. There are several properties that are ripe for redevelopment and this alternative would generate a lot of vehicular traffic to the corridor. 40,000 vehicles per day travel through this corridor currently. New development would remain commercial, similar to existing commercial land use types.
- Central Alternative 1 – HCCPC staff are concerned this alternative would turn the US 41 corridor into a “ghost town.” This alternative would bypass Henderson. Although there would still be local traffic along US 41, non-local traffic would have no reason to travel to or through the area and utilize businesses. The existing commercial along US 41 would struggle and some businesses may move to the new US 60 interchange for Central Alternative 1. Since the alternative would eliminate a section of US 41 to the south of US 60, it would require a circuitous route for people coming from the south (on I-69) to access the Henderson business community. The alternative also would not be convenient for people traveling I-69 from the north to access the US 41 commercial corridor. People are not likely to take US 60 west to US 41.

New Interchange at US 60 (Central Alternative 1)

- This area would likely see development around the interchange due to the alternative.





- The development potential of this area increases under Central Alternative 1.
- Existing floodplain would hinder development in some areas around the interchange unless the project alters the floodplain boundary.
- The area is currently planned for commercial (northwest quad) and residential (northeast quad) uses around the proposed interchange.
- If no interchange, then development character would be neighborhood commercial; under Central Alternative 1 the development will be highway-serving commercial such as gas stations, fast food restaurants, commercial businesses typical to interchange locations.
- The planned residential area in the northeast quad would likely occur in this area with or without the project, but the planned residential areas around interchange would likely convert to commercial uses under Center Alternative 1.
- The area is currently zoned Agriculture, but a zoning change is likely because the land use plan for Henderson shows this area is planned for development.
- If there is demand for commercial in the area planned for residential uses, a comprehensive plan amendment and zoning change could occur.
- The two existing historic houses (McClain and Baskett) would likely remain and development would occur around those homes; however, no local regulations would stop the conversion of these sites to other uses. They are privately owned residences that could be sold to a developer.
- The area is currently served by county water and private septic systems. No public sewer service is available currently. Sewer could be extended in the future to serve development in this area since municipal sewer lines are near. Sewer already serves a nearby residential subdivision.

#### New Connector Road Interchange south of US 60 (Central Alternative 1)

- This area has an approved master plan to the south of US 60 and east of US 41 (Merrill Place Subdivision). A Walmart and Lowes are existing commercial uses.
- The master plan includes a mix of commercial and residential uses with commercial uses to the west, transitioning into multi-family residential and then single family to the east.
- Central Alternative 1 would go right through the area and change the master plan.
- If the proposed connector road permits local access, then the alternative may increase the pace of the commercial development in this area. if the connector road is just a ramp, then it would not spur development.
- Development would remain commercial especially if local access is provided.
- A historic cemetery is the only resource of concern in this area.



- West 1 and 2 alternatives would not change this area. The recently approved health building site would be developed as planned.

Southern Project Area (all alternatives)

- This area is planned for commercial development.
- Growth has not happened in this area yet, but the zoning and infrastructure is in place including sewer and water.
- The project alternatives are not likely to have a substantial impact on development in this area, it would remain commercial. But the project could increase the potential for some commercial development along this corridor.
- Floodplain hinders development along Airline Parkway.
- The Henderson bypass along SR 425 was recently rezoned for industrial development, the I-69 project could help spur this development with improved interstate access and may make it more appealing for businesses.
- The area along SR 2084 is also another area that could see development.

No other major projects planned; no concerns about cumulative impacts to resources.

The HCCPC staff feel that they have adequate regulations and tools in place to manage potential induced growth. The staff feel the community has been preparing for the project for a while, now it is just a matter of where the eventual alignment will go.

*Notes prepared by Carolyn Seboe, HNTB*



## MEETING NOTES

**Date:** February 8, 2018

**Time:** 2 to 3 p.m. CT

**Meeting:** Land use interview with Evansville-Vanderburgh County Area Plan Commission

**Location:** Phone interview

**Attendees:**

**Blaine Oliver, EVCAPC – Assistant Director/Planner**

**John Ansbro, EVCAPC – Senior Planner**

**Carolyn Seboe, HNTB**

**Chris Meador, HNTB**

**Mike Hammond, HNTB**

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### **Purpose: Discuss indirect and cumulative effects with local experts**

A phone interview was conducted with the Evansville-Vanderburgh County Area Plan Commission to discuss recent development trends and the potential for indirect and cumulative effects surrounding the Evansville portion of the I-69 ORX project area. First, an overview of the NEPA process, the indirect and cumulative effects analyses and the preliminary alternatives under consideration was discussed. Next, the group discussed trends in development and the potential for induced development around the project.

The EVAPC comprehensive plan shows where growth is likely to occur in the community. A long-standing growth area in the county is the northeast corner, where growth has declined slightly since the housing market crash. Since then the county has seen more infill development in the city. Infill is encouraged by the comprehensive plan.

The following summarizes the discussion that occurred regarding potential locations where induced development may or may not occur:





- Green River Road Interchange
  - This is an existing interchange along I-69 to the east of the I-69 ORX project area.
  - This area could see induced development because of the I-69 project to the north of the interstate. Development to the south of the interstate is restricted by floodplain.
  - The likely use in this area is commercial.
  - A commercial development is already platted, but the development has been slow to attract tenants. (Michael Feldbush is the developer.)
  - The EVAPC representatives felt that Central Alternative 1 would likely accelerate the timing of development in the area around Green River Road while also increasing the likelihood of highway-oriented uses (gas, fast-food).
  - Current zoning is C4 or C2, which allows highway oriented commercial uses.
  - The existing infrastructure in this area could handle any increased traffic due to potential induced development, and sewer and water is available.
  - No natural resources would be impacted by development to the north of the interstate.
  - No change to agricultural area to the east of Green River corridor from project. Comprehensive plan anticipates all agricultural areas within the city boundary will be developed. This area is low and will require fill. After better sites fill up, these more marginal sites will eventually develop. Planned for residential.
- Kentucky Avenue (Northwest of I-69/US 41 interchange)
  - Another potential development site noted by the local planners is a former commercial area along W. Kentucky Avenue, just north of I-69/Veterans Memorial Parkway interchange with US 41.
  - The area contains a vacant former K-Mart store; the area has been in decline as the demand for commercial space has dissipated in this area.
  - EVAPC staff feel that Central Alternative 1 would likely divert traffic away from the Kentucky Avenue area and reduce the likelihood of development. Whereas, the West Alternatives could help facilitate redevelopment if local access is improved. The bridge scenarios between the two west alternatives would not make a difference.
  - Access to the Kentucky Avenue area will be a key driver of development as currently it is not easily accessible from the interstate and US 41.
  - The Kentucky Avenue area has strong development attributes (commercial zoning, water, sewer, available lands).
  - EVAPC staff foresee this area developing in the next 5-10 years as the neighborhood just north (Glenwood School neighborhood) continues to redevelop. There is a new



residential subdivision, sewer line work and investment in the community. This could expand south into the Kentucky Ave area.

- Given the access issues to Kentucky Ave from the highway, and the neighborhood investment taking place to the north, this area is more likely to redevelop as a neighborhood commercial district instead of a highway oriented commercial area or a big-box retail area. No market for regional commercial district here.
- If the I-69 project includes improvements to local access, then the potential for highway oriented commercial would increase.
- No specific subarea plans are in place for this area.
- No anticipated impacts to natural resources from redevelopment of this area.
- Area south of I-69 to Ohio River
  - The area south of I-69 in Vanderburgh County is precluded from development due to floodplain regulations.
  - EVAPC representatives do not anticipate development south of the interstate in Vanderburgh County. This area would remain agricultural.
- Downtown Evansville
  - Downtown Evansville currently has a straight shot along Veterans Memorial Pkwy from I-69.
  - If this access was diminished or becomes more circuitous, it could have a negative effect on downtown.

The EVAPC staff discussed development that has been spurred from the construction of I-69 to the north. The portions of I-69 that have already been constructed on the eastern side of Vanderburgh County did see development near the I-69 interchange with the Lloyd Expressway. The Lloyd Expressway area has seen development such as hotels, restaurants, health care, and other commercial typical for highway interchanges.

The EVAPC staff felt that they have adequate regulations in place to manage any induced growth from the project. EVAPC zoning and subdivision regulations are in-place and regularly enforced. They are working to update zoning and other development regulations as needed.

#### General Project Comments/Concerns

- Pigeon Creek Greenway extension – When the highway was built on the levee, a shared use agreement was provided that allows a trail to be constructed in the highway right of way. The extension of the greenway would travel along the south side of the highway and reach Angel



Mounds, and points beyond. It is part of a regional trail plan. The I-69 project's alternatives could impact the future implementation of the trail depending on how the bridges are constructed. The south side of the highway is the preferred location for the greenway since it is off road and serves a recreational purpose. The greenway extension is currently not funded. (Carolyn stated that the project engineers said the I-69 alternatives and bridges would not preclude the extension of the greenway.)

- Eagle Slough – This area has open water and hardwood resources. Avoid impacts.
- Wetlands – Present on south side of I-69 project area.
- Bicycle connections – A bicycle connection between Evansville and Henderson should be considered. There is a large river between the two communities and a connection should be planned in conjunction with the highway project; otherwise it is not going to happen.
- Levee certification – They want to make sure that the I-69 alternatives would not impact the existing levee certification through the Army Corp of Engineers.

*Notes prepared by Carolyn Seboe, HNTB*





## MEETING NOTES

**Date:** February 12, 2018

**Time:** 2 to 3 p.m. CT

**Meeting:** Land use interview with Evansville MPO (EMPO)

**Location:** Phone interview

**Attendees:**

Seyed Shokouhzadeh, EMPO – Exec. Dir.

Matt Schriefer, EMPO – Planner

Pam Drach, EMPO – Deputy Dir.

Carolyn Seboe, HNTB

Chris Meador, HNTB

Mike Hammond, HNTB

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**Purpose:** Discuss indirect and cumulative effects with local experts

A phone interview was arranged with the EMPO to discuss recent trends and the potential for indirect and cumulative effects for the I-69 ORX project area. Carolyn first provided an overview of the NEPA process, the indirect and cumulative effects analyses and the preliminary alternatives under consideration. Next, the group discussed trends in development and the potential for induced development around the project area. The following summarizes the key points made during the call by the EMPO staff.

The EMPO staff provided an overview of existing trends in development for the three-county region. The area has seen stagnant population in recent years. The Evansville/Vanderburgh County area has seen slow population growth, while Henderson County has experienced a slight decline. The fastest growing area in the region is Warrick County along the eastern border of Vanderburgh County. Employment growth has been relatively flat in the region, with the main growth occurring in the southwest portion of Warrick County due to the healthcare industry and associated development. They expect to continue to see minimal employment growth in Henderson County. Some minimal growth along US 41 commercial



district in Henderson may occur. Industrial growth in Henderson is occurring/anticipated at the river port.

With regards to potential for induced development and changes, the EMPO staff said they agree with the results of the traffic analysis model completed by Stantec for the project area. The EMPO staff said that the local communities' planned land uses are reasonable and make sense.

No other major projects planned that could contribute to cumulative impacts to resources in project area.

EMPO planners noted a concern about surrounding both Audubon State Park and the Eagle Slough area with a highway on one side and interstate on the other side (under Central Alternative 1).

*Notes prepared by Carolyn Seboe, HNTB*



## PHONE CALL NOTES

**Date:** October 31, 2017

**Time:** 9:50 a.m. to 10 a.m. CT

**Location:** Phone call

**Attendees:** Brian Bishop (HCCPC-Director), Carolyn Seboe (HNTB)

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Carolyn Seboe spoke with Brian Bishop on the telephone to understand the rationale for the planned commercial land uses on the east side of Henderson to the north and south of US 60. According to Brian Bishop, during the community's future land use planning process in 2015 they felt it was appropriate to show this area as commercial in response to former I-69 plans that anticipated an interchange in this area with a 4-lane US 60. Also, there is a residential master plan already approved in this area. According to Brian, the existing historic homes in this area would likely remain in place.

*Notes prepared by Carolyn Seboe, HNTB*