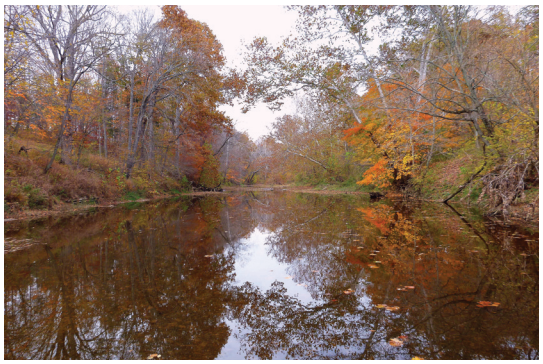
Jennings County, Indiana • Des. No. 1173374 • December 2013

US 50 NORTH VERNON BYPASS - EAST ENVIRONMENTAL ASSESSMENT



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Indiana Department of Transportation

County Jennings Route U.S. 50 Des. No. 1173374

FHWA-Indiana Environmental Document

CATEGORICAL EXCLUSION / ENVIRONMENTAL ASSESSMENT FORM

GENERAL PROJECT INFORMATION

Road No./County:	**U.S. 50 North Vernon Bypass – East, Jennings County**
Designation Number:	**1173374**
Project Description/Termini:	**This project will construct the eastern half of a northern bypass around North Vernon. The new roadway will start at SR 3 north of North Vernon and connect to existing U.S. 50 east of town.**

After completing this form, I conclude that this project qualifies for the following type of Categorical Exclusion (FHWA must review/approve if Level 4 CE):

	Categorical Exclusion, Level 2 – The proposed action meets the criteria for Categorical Exclusion Manual Level 2 - table 1, CE Level Thresholds. Required Signatories: ESM (Environmental Scoping Manager)
	Categorical Exclusion, Level 3 – The proposed action meets the criteria for Categorical Exclusion Manual Level 3 - table 1, CE Level Thresholds. Required Signatories: ESM, ES (Environmental Services Division)
	Categorical Exclusion, Level 4 – The proposed action meets the criteria for Categorical Exclusion Manual Level 4 - table 1, CE Level Thresholds. Required Signatories: ESM, ES, FHWA
X	**Environmental Assessment (EA)** – EAs require a separate FONSI. Additional research and documentation is necessary to determine the effects on the environment. Required Signatories: ES, FHWA

Note: For documents prepared by or for Environmental Services Division, it is not necessary for the ESM of the district in which the project is located to release for public involvement or sign for approval.

Approval _____ _____ _____ 12/2/2013
ESM Signature Date ES Signature Date

_____ 12/2/2013
FHWA Signature Date

Release for Public Involvement

_____ _____ _____ 12/2/2013
ESM Initials Date ES Initials Date

Certification of Public Involvement _____ _____
Office of Public Involvement Date

Note: Do not approve until after Section 106 public involvement and all other environmental requirements have been satisfied.

INDOT ES/District Env.
Reviewer Signature: _____ Date: _____

Name and Organization of CE/EA Preparer: Dan Prevost, AICP-CTP, Parsons

Project name: U.S. 50 North Vernon Bypass – East Date: December 2, 2013

U.S. 50 NORTH VERNON BYPASS – EAST PROJECT
ENVIRONMENTAL ASSESSMENT

City of North Vernon, Jennings County, Indiana
Designation Number 1173374

Prepared for:

Indiana Department of Transportation
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December 2013

EXECUTIVE SUMMARY

The *Indiana 2013-2035 Future Transportation Needs Report* (INDOT, 2013a) lists U.S. 50 across the state, including Jennings County, as a Statewide Mobility Corridor. These roadways carry long distances trips, heavier commercial vehicle flows and warrant upper level design standards, such as multiple travel lanes, railroad and highway grade separations, and bypasses of congested areas (INDOT, 2006). While INDOT no longer explicitly identifies projects in their long range plan, the U.S. 50 North Vernon Bypass project was included in both the 2002 and 2007 plans and complies with the current plan's identification of U.S. 50 as a Statewide Mobility Corridor. The *Jennings County Comprehensive Plan* (Jennings County Area Plan Commission, 1994) recommends that U.S. 50 be relocated as a four-lane northern bypass around North Vernon.

In 2008, INDOT published the *U.S. 50 North Vernon Corridor Planning and Environmental Assessment Study* (INDOT, 2008b), which documented capacity and safety deficiencies in and around the City of North Vernon and along the U.S. 50 corridor from U.S. 31 in Jackson County to Butlerville in Jennings County. That study proposed a new alignment roadway to replace existing U.S. 50 for the full length of the project limits. Due to budget constraints, the project was scaled back and divided into two segments: (1) a series of spot improvements on existing U.S. 50 from U.S. 31 to CR 15 W to address localized safety and capacity issues and (2) a new bypass around North Vernon to the north side of the city. The budget available for the latter project was insufficient for the full bypass, so INDOT identified a portion of the bypass, from its western terminus near CR 400 W to SR 3, which could be constructed with the available funds and would have independent utility. The spot improvements and the first phase of the bypass were developed, evaluated, and designed under a previous contract, with several of the improvements under construction already. In Fall 2011, as the first phase of the bypass was completing the design phase, INDOT identified the additional funding needed to complete the full bypass and initiated the U.S. 50 North Vernon Bypass – East ("East Bypass") project.

As outlined in the purpose and need section in Chapter 2, the primary purpose for the project is to provide a cost-effective solution that will improve congestion, safety, and accessibility, as well as maintain consistency with the above mentioned statewide and regional transportation plans.

The study area for this project begins at the eastern terminus of U.S. 50 North Vernon Bypass – West ("West Bypass") at SR 3 between CR 300 N and CR 350 N on the north side of North Vernon, and reconnects with existing U.S. 50 east of North Vernon. (The West Bypass is currently under construction and scheduled to be open in December 2013.) As there are several potentially viable locations to reconnect to existing U.S. 50, the eastern terminus of the project was defined as occurring somewhere between the existing U.S. 50 bridge over the Vernon Fork of the Muscatatuck River and CR 425 E. The study area is wide enough to allow for the consideration of a range of alignments and potential eastern termini, ensuring that relevant social, economic, and environmental resources are identified and can be addressed.

Alignments were developed through an iterative process that included input from the design team, resource agencies, local officials, and the public. A total of 20 alignments were evaluated

during this process that considered transportation, engineering, cost, and social, economic, and environmental impacts to identify the best alternatives. This document evaluates a No-Build Alternative, and two design alternatives that were carried forward from the screening process: Alternative 6D (Preferred Alternative) and Alternative 4NB2. A summary of the quantifiable potential impacts and the estimated project costs for both alternatives are shown in the table below and discussed throughout the document.

TABLE ES-1: POTENTIAL IMPACTS

Category	Unit	Alternative 6D (Preferred Alternative)	Alternative 4NB2
Right-of-Way	Acres	144	185
Residential Relocations	Number	13	17
Business Relocations	Number	1	3
Wetlands (Total)	Acres	16.36	24.7
Forested	Acres	6.85	10.8
Emergent	Acres	9.51	13.9
Streams (Total)	LF	2,956	5,731
Ephemeral	LF	2,546	4,238
Intermittent	LF	0	1,128
Perennial	LF	410	365
Core Forest	Acres	4.7	31.0
Indiana Bat Habitat	Acres	42.1	49.8
Farmland	Acres	51.6	90.9
Historic Properties	Number	2	2
Noise	Impacted Receivers	0	0
Cost (Total)	Dollars	$20,455,900[(1)]	$42,308,000
Construction	Dollars	$14,930,900	$28,125,000
Right-of-Way	Dollars	$2,200,000	$5,000,000
Utility Relocation	Dollars	$750,000	$4,500,000
Railroad	Dollars	$75,000	$325,000
Environmental Mitigation	Dollars	$2,500,000	$4,358,000

(1) Costs for Alternative 6D reflect refinements made through Stage 1 plans. As described in Chapter 3, at the time it was selected as the Preferred Alternative, the estimated cost was $28,030,000. It is likely that the cost of Alternative 4NB2 could also be reduced through similar efforts.

Alternative 6D has been selected as the Preferred Alternative because it best meets the project's purpose and need, as well as achieves the following:

- Aligns with INDOT's long-term goals for the U.S. 50 corridor by completing a bypass around North Vernon.
- Provides an efficient connection with existing U.S. 50 to facilitate use of the new roadway.
- Supports the planning and economic development goals of North Vernon and Jennings County.
- Provides the best balance between construction cost and access.
- Minimizes impacts to residences and businesses.
- Minimizes impacts to wetlands and streams.
- Received broad support from the community and agency stakeholders.

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(All maps are located in Appendix A)

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LIST OF ABBREVIATIONS

AC	Affected Community
ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act of 1978
AL	Architectural Location
APE	Area of Potential Effect
ARPA	Archaeological Resources Protection Act of 1979
asl	above sea level
B&O	Baltimore & Ohio
BMP	Best Management Practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAC	Community Advisory Committee
CERCLA	Comprehensive Environmental Response and Liability Act
CFO	Confined Feeding Operation
CFR	Code of Federal Regulations
CIF	Construction in a Floodway
COC	Community of Comparison
CR	County Road
CSRS	Conceptual Stage Relocation Study
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted Decibel
DHPA	IDNR Division of Historic Preservation and Archaeology
EA	Environmental Assessment
EJ	Environmental Justice
EMS	Emergency Medical Services
ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FCR	Fire cracked rock
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act of 1981
HHEI	Headwater Habitat Evaluation Index
HPR	Historic Properties Report
IAC	Indiana Administrative Code
ICF	Index of Crash Frequency
IDEM	Indiana Department of Environmental Management
IDM	Indiana Design Manual
IDNR	Indiana Department of Natural Resources
IDNR-F&W	IDNR Division of Fish and Wildlife
IGS	Indiana Geological Survey

INDOT	Indiana Department of Transportation
INSTIP	Indiana Statewide Transportation Improvement Program
Leq(h)	Hourly Equivalent Sound Level
LOS	Level of Service
LUST	Leaking Underground Storage Tank
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSAT	Mobile Source Air Toxic
MUTC	Muscatatuck Urban Training Center
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OHWM	Ordinary high water mark
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
PSS	Palustrine Scrub-Shrub Wetland
QHEI	Qualitative Habitat Evaluation Index
RACM	Regulated asbestos-containing material
RCRA	Resource Conservation and Recovery Act
RFE	Regulatory Flood Elevation
RPZ	Runway Protection Zone
SHPO	State Historic Preservation Officer
SR	State Route
SSA	Sole Source Aquifer
TES	Threatened and Endangered Species
TIP	Transportation Improvement Program
TNM	FHWA Traffic Noise Model
TP	Transportation Plan
UNT	Unnamed Tributary
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank

CHAPTER 1: INTRODUCTION

This Environmental Assessment (EA) document was prepared by Parsons on behalf of the Indiana Department of Transportation (INDOT) and the Federal Highway Administration (FHWA). The purpose of the document is to evaluate the potential social, economic, and environmental impacts of the proposed U.S. 50 North Vernon Bypass – East Project in North Vernon, Jennings County, Indiana. It has been written and distributed in accordance with the following:

- National Environmental Policy Act (NEPA) of 1969
- FHWA Technical Advisory T6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987)
- *Procedural Manual for Preparing Environmental Documents* (INDOT, 2008a)
- *INDOT Public Involvement Policies and Procedures Manual* (INDOT, 2012)

In 2008, INDOT published a Preliminary Alternatives Screening Report for U.S. 50 in Jennings and Jackson Counties and the City of North Vernon. For analysis and evaluation purposes, the study was divided into two sections—a western section from U.S. 31 in Jackson County eastward to Jennings County Road (CR) 575 W, and an eastern section from CR 575 W eastward to near the Jennings/Ripley County line. The eastern section study investigated bypass alternatives around North Vernon and recommended two alternatives for further consideration.

In 2010, Parsons began work on an EA to further refine the two bypass alternatives advanced out of the Preliminary Alternatives Screening Report. Due to budget constraints, INDOT scaled back the bypass portion of the project to include only the western half of the bypass described in the Screening Report. That project, known as U.S. 50 North Vernon Bypass – West ("West Bypass"), is currently under construction and expected to be open to traffic by the end of 2013. The West Bypass begins west of North Vernon, near the intersection of existing U.S. 50 and CR 400 W. From there, the new roadway travels northeast and terminates at State Route (SR) 3 on the north side of North Vernon, about 1000 feet south of CR 350 N. The approximate length of the roadway is 4.5 miles. This new roadway would help alleviate some of the operational concerns created by commercial truck traffic by creating a new, more efficient access to the industrial areas of North Vernon.

In the spring of 2012, after INDOT reprioritized funds and committed funds to the project, Parsons and INDOT began the planning phase to complete the North Vernon bypass. Known as U.S. 50 North Vernon Bypass – East ("East Bypass"), this project begins at SR 3 at the terminus of the West Bypass project, and reconnects with existing U.S. 50 east of North Vernon. As there are several potentially viable locations to reconnect to existing U.S. 50, the eastern terminus of the project was defined as occurring somewhere between the existing U.S. 50 bridge over the Vernon Fork of the Muscatatuck River and CR 425 E.

While two lanes are sufficient to effectively carry traffic in this corridor for the foreseeable future, in accordance with its designation as a Statewide Mobility Corridor, INDOT plans to acquire sufficient right-of-way for a future four-lane roadway. The two-lane roadway

constructed as part of this project would serve as the westbound lanes of that roadway. Through most of the corridor, a 300-foot wide right-of-way would be acquired, allowing for construction of the eastbound lanes in the future. This is the same approach that was used for the West Bypass project. The impacts described in this document are based on use of the full right-of-way corridor.

CHAPTER 2: PURPOSE AND NEED FOR ACTION

The purpose and need statement sets the foundation for the Environmental Assessment. The statement identifies specific transportation problems (needs) that the project would address and describes the desired outcomes or goals (purposes) of the project. There are four core problems that this project would address:

1. Congestion. Traffic volumes on U.S. 50 and SR 3/SR 7 in North Vernon are projected to increase by 1% to 3.3% annually. The greatest increase in traffic will be on the segment of SR 3/SR 7 north of U.S. 50 to the SR 3/SR 7 split near CR 200 N. By 2030, this segment is expected to handle a daily volume of 37,000 vehicles and have an unacceptable Level of Service (LOS). This is a heavily used corridor due to the fact that SR 3/SR 7 has the only overpass within North Vernon across the busy CSX railroad that runs east-west through town. Prior to the opening of the western half of the bypass (anticipated in December 2013), SR 3/SR 7 was the only route for truck traffic originating/terminating at the industrial areas north of town. By 2030, increased volume will cause U.S. 50 to operate at or below the minimally acceptable LOS (D) from the west side of North Vernon to the Vernon Fork of the Muscatatuck River on the east side of town. All of the signalized intersections along U.S. 50 in the project area (Norris Avenue, SR 3/SR 7 and Madison Avenue/5th Street) will experience an unacceptable LOS in 2030. For example, the U.S. 50 intersection with SR 3/SR 7 currently has an average delay of 25 seconds during peak travel times. This delay will increase to over 2 minutes (129 seconds) by 2030. Three of the four SR 3/SR 7 signalized intersections (at U.S. 50 [LOS F], at Franklin Street [LOS E], and at the SR 3/SR 7 split [LOS E]) will also experience unacceptable LOS in 2030. The fourth intersection (at Poplar Street [LOS D]), will be minimally acceptable (Brown and Nunnally, 2009).

2. Safety. In the *U.S. 50 North Vernon Corridor Planning and Environmental Assessment Study*, a metric called the index of crash frequency (ICF) was used to identify road segments and intersections with increased risks for motor vehicle crashes. The ICF takes into account the type of traffic control present at intersections (traffic lights, stop signs, etc.) and the roadway classification (urban or rural, number of lanes, access control, etc.). Calculations of ICF reveal that the urban segment of U.S. 50 through North Vernon is a high crash segment. Within this segment, the intersection of U.S. 50 with SR3/SR7 has a relatively high ICF, and was flagged as a high crash location.

3. Accessibility. New employment, land use planning and economic development requires an improved transportation network to meet accessibility demands. The majority of retail and commercial developments in the area are concentrated along SR 3 and SR 7 on North Vernon's north side. Seven of the county's largest employers are also located in this same area. They include Lowe's Distribution Center (730 employees), Dave O'Mara Contractor, Inc. (400 employees), North Vernon Industry Corp. (315 employees), Hilex Poly Co. LLC (275 employees), Metaldyne (176 employees), Martinrea (145 employees), and Decatur Plastic Products (144 employees). Six of the seven industrial development sites being marketed by Jennings County and private developers are located east of SR 3 on the city's north and northeast sides: Aspley Site, Burbrinik Site, City of North Vernon Site, Montrow

Site, North Vernon Industrial Park, and North Vernon Municipal Airport Site (Jennings County Economic Development Commission, 2013). The Indiana National Guard has developed the Muscatatuck Urban Training Center (MUTC) to the east of North Vernon as an urban training center for both civilian first responders and military personnel. The MUTC utilizes the Jennings County Fairgrounds and the North Vernon Airport as staging areas and additional training grounds. MUTC commonly hosts exercises for several hundred personnel. Larger exercises, such as "Vibrant Response" held in August 2012, have included more than 5,000 personnel operating at MUTC and the staging areas. Connections between these areas are currently serviced only by the narrow county road network.

4. Planning. Improvements to U.S. 50 are necessary to maintain consistency with statewide and regional transportation plans. The *Indiana 2013-2035 Future Transportation Needs Report* (INDOT, 2013a) lists U.S. 50 across the state, including Jennings County, as a Statewide Mobility Corridor. These roadways carry long distances trips, heavier commercial vehicle flows and warrant upper level design standards, such as multiple travel lanes, railroad and highway grade separations, and bypasses of congested areas (INDOT, 2006). While INDOT no longer explicitly identifies projects in their long range plan, the U.S. 50 North Vernon Bypass project was included in both the 2002 and 2007 plans and complies with the current plan's identification of U.S. 50 as a Statewide Mobility Corridor. The *Jennings County Comprehensive Plan* (Jennings County Area Plan Commission, 1994) recommends that U.S. 50 be relocated as a four-lane northern bypass around North Vernon.

The purpose of this project is to seek a cost-effective solution to the four documented transportation problems in the U.S. 50/North Vernon area. Alternatives will be evaluated on how well they improve upon the existing deficiencies defined above. Specifically, alternatives must:

1. Reduce congestion along U.S. 50 and SR 3/SR 7 around the north and east sides of North Vernon.
2. Provide a safer transportation facility for both truck and passenger vehicles around the north and east sides of North Vernon.
3. Provide an efficient transportation link between the existing and growing industrial area on the north side of North Vernon to U.S. 50 east of town.
4. Support State and local transportation planning.

Besides the four driving factors above, the alternatives will be judged on how well they meet the following non-transportation goals:

- Minimize impacts to environmental and cultural resources.
- Minimize social and economic impacts due to right-of-way acquisition and relocations.
- Support local community needs and interests.
- Provide a transportation facility consistent with local development plans.

CHAPTER 3: ALTERNATIVES CONSIDERED

The Project Team developed and applied a systematic approach to the development and screening of alternatives with the goal of efficiently identifying a Preferred Alternative that met the project's purpose and need. During the course of the process, the Project Team evaluated more than 20 alternatives and held dozens of meetings with stakeholders.

This chapter provides a summary of the alternatives development process, the factors considered in the screening of alternatives, the role of the stakeholders in the decision-making process, and the project's Preferred Alternative. The process can be divided into four primary stages, depicted in Figure 1 below.

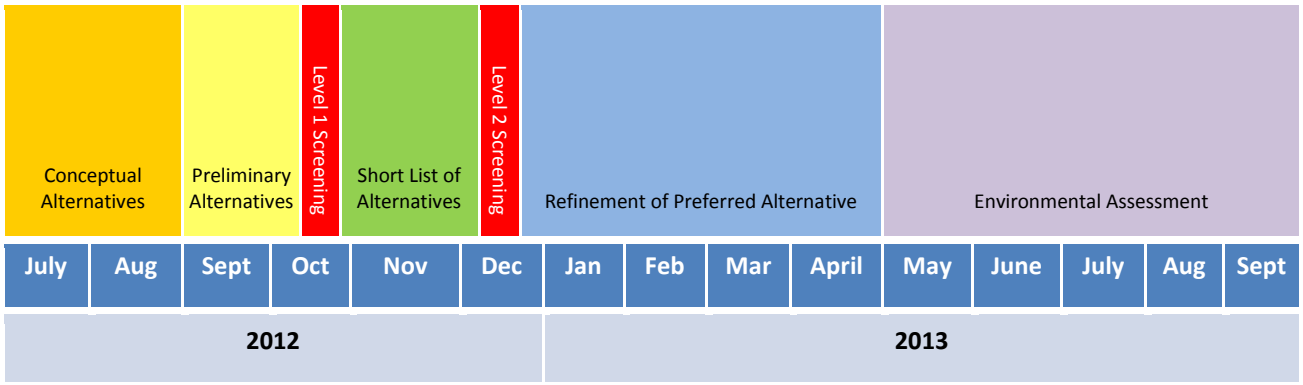


FIGURE 1: ALTERNATIVES DEVELOPMENT AND EVALUATION OVERVIEW

3.1 PREVIOUS STUDIES AND PROJECTS

A bypass in North Vernon has been under consideration at least as far back as the early 1990s. In 1992, INDOT prepared a *U.S. 50 Corridor Analysis* investigating the feasibility of improvements to U.S. 50 from U.S. 31 through North Vernon to the eastern city limits. The study concluded that there were no existing "serious safety or capacity problems" at that time, but that INDOT should periodically monitor the corridor to determine if problems were developing.

The *Indiana 2013-2035 Future Transportation Needs Report* (INDOT, 2013a) identified U.S. 50, across the state, as a Statewide Mobility Corridor. As described in Chapter 2, Statewide Mobility Corridors are intended to carry large through volumes of traffic, including heavy commercial vehicle flows, and should typically provide:

- A multi-lane, divided roadway;
- Partial access control, at minimum;
- Railroad and highway grade separations; and
- A bypass route around congested areas.

In line with these goals, the 2008 *Preliminary Alternatives Screening Report* (INDOT, 2008b) evaluated improvements to U.S. 50 from U.S. 31 in Jackson County to near the Jennings/Ripley County line. That study recommended, among other measures, the further study of two alignments for a bypass around the north side of North Vernon, shown in Figure 2 below.

Due to budget constraints, INDOT later scaled back the bypass to include only the western half of the bypass envisioned in the Screening Report. The West Bypass project began with the two

general alignment options identified and conducted detailed environmental and engineering analyses to identify the best alternative for the section of the bypass from the west side of North Vernon to SR 3. A total of 14 alternative segments and two eastern termini were evaluated. The selected alternative, which includes corridors S2 Modified, M2, and N6-Modified, will begin at CR 400 W; provide intersections at CR 150 N/O&M Avenue, CR 200 N, and SR 7; and terminate at SR 3, approximately 1,200 feet south of CR 350 N. Construction of this roadway began in March 2012, and the roadway is anticipated to be open to traffic by December 2013 (see Figure 2 below, or Appendix A, Map 3). Additional details regarding the development of this section of the bypass can be found in the Environmental Assessment document available at http://www.in.gov/indot/projects/2428.htm.

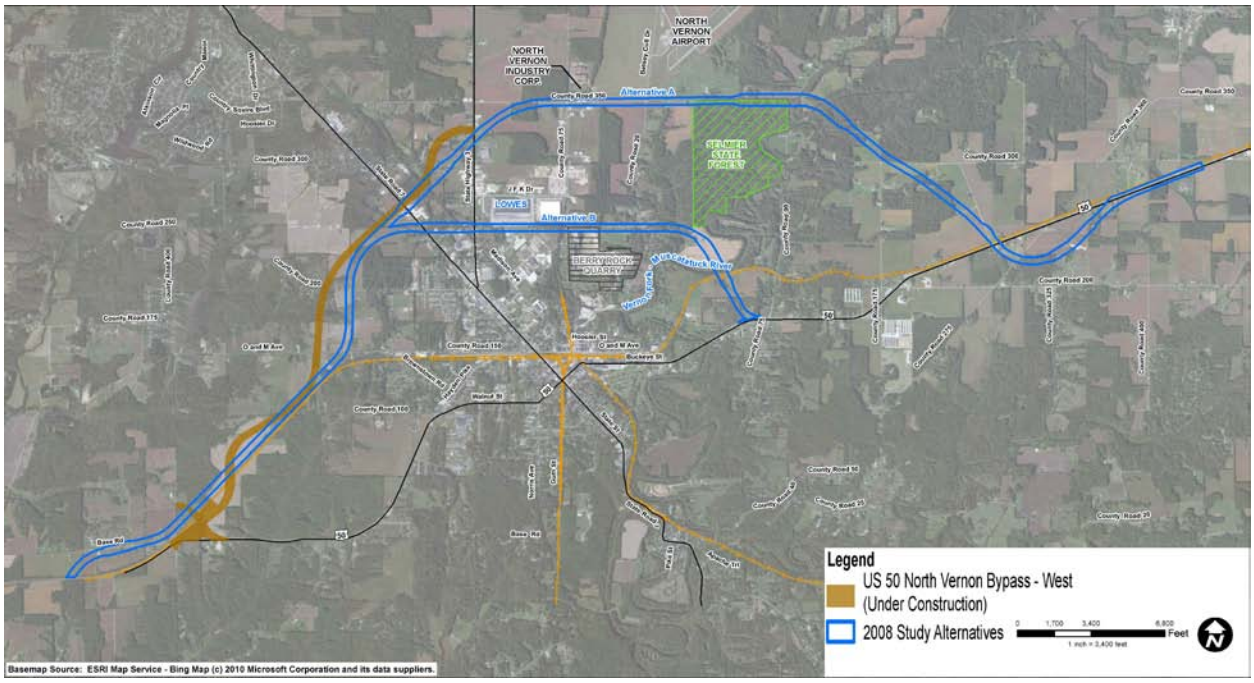


FIGURE 2: 2008 STUDY ALTERNATIVES & THE U.S. 50 NORTH VERNON - WEST BYPASS PROJECT (CURRENTLY UNDER CONSTRUCTION)

3.2 DESIGN STANDARDS AND KEY DESIGN PARAMETERS

The Indiana Design Manual (IDM) provides standards for the design of roadways and bridges on the state highway network. The design of this project will conform, to the extent practicable, to those standards. Any proposed elements that do not meet those standards would require approval through INDOT's Design Exception process. As a Rural Principal Arterial, the proposed bypass would be designed based on the standards provided in 53-2 of the IDM (provided in Appendix K, pages 1-4). Level 1 Design Criteria Checklists for the bypass and intersecting roadways are also provided in Appendix K (pages 5-9).

During the early stages of alternatives development, a handful of parameters play a primary role in determining the alignment and footprint of feasible alternatives: number of lanes, design speed, and access control.

As described above, Statewide Mobility Corridors are generally envisioned as multi-lane facilities. During the development of the west section of the bypass, INDOT determined that

two lanes were sufficient to effectively carry traffic in the corridor for the foreseeable future. However, to accommodate the long range plans for the corridor, INDOT plans to acquire sufficient right-of-way for a future four-lane roadway. The same approach is being utilized on the east section of the bypass. The two-lane roadway constructed as part of this project would serve as the westbound lanes of the future four-lane roadway (See Figure 3). Through most of the corridor, a 300-foot wide right-of-way would be acquired, allowing for construction of the eastbound lanes in the future. The impacts described in this document are based on use of the full right-of-way corridor.

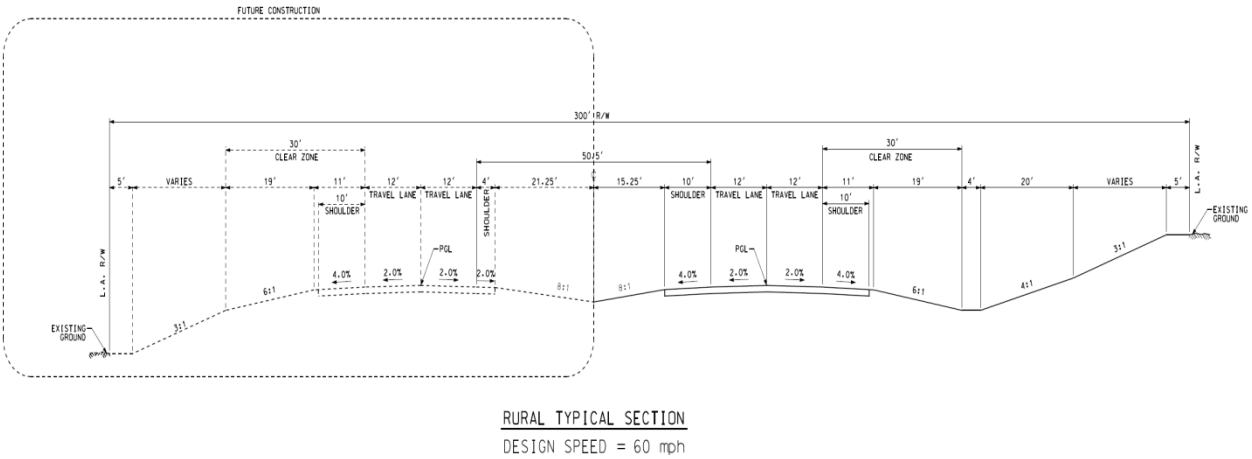


FIGURE 3: PROPOSED TYPICAL CROSS-SECTION

Outside of the North Vernon area, existing U.S. 50 is signed for 55 mph. For continuity and to facilitate the high-speed movement desired for Statewide Mobility Corridors, the new roadway would utilize a design speed of 60 mph and be signed for 55 mph. This parameter defines elements such as curve radii, shoulder widths, and maximum grades.

Access control is the regulation of access, through the limitation of public access rights to and from properties abutting the highway facility. Higher level roadways typically have greater levels of control on the type and location of access points that are allowed. As with the west section of the bypass, the east section would be "limited access," meaning that only a limited number of access points would be provided, typically only at public roads. Private drives would typically be either terminated or provided access via a service road.

3.3 TERMINI AND ALIGNMENT CONSIDERATIONS

In the initial stages of the project, the goal is to identify all reasonable alternatives that would meet the project's purpose and need. Typically, alternatives are developed based on secondary sources (aerial photos, previous studies, etc.) and limited field reviews. It is neither practical nor efficient to study in detail every element and impact of an alternative at this point; the goal is to quickly focus in on those that provide the greatest potential. The sections below discus some of the planning-level factors considered early in the alternative development process.

Western Terminus

The west section of the bypass, when complete, will terminate at SR 3, approximately 1,200 feet south of CR 350 N. In determining the appropriate location to "start" the east section of the bypass, the Project Team considered locations along SR 3 from CR 250 N to CR 350 N.

However, requiring all vehicles continuing across SR 3 to make two turns – one on to SR 3 and a second back onto the bypass – would create delay for through traffic and increase congestion on SR 3 in the overlap section. One of the primary purposes of the project is to facilitate through movement; such an approach would run contrary to that. Additionally, most alternate locations would either require the acquisition of one or more businesses or require the removal of a county road from the network. As a result, the proposed intersection of the west section of the bypass with SR 3 was selected as the appropriate location to begin the project.

Eastern Terminus

The eastern terminus of the bypass presents a range of options. One of the primary project goals is to remove traffic from the urbanized area of North Vernon; therefore a terminus outside that area was preferred. With the alignment of the Vernon Fork of the Muscatatuck River and its proximity to North Vernon, the Project Team selected the existing U.S. 50 bridge over the river as the western limit for this terminus. Heading east from this point, existing U.S. 50 becomes more rural in nature, allowing greater flexibility in how and where the new roadway could tie in. The eastern limit for this terminus has a greater range of options, with the limiting factors being existing county roads, the CSX railroad tracks, and the construction and right-of-way costs associated with increasing the project's length. Based on these factors, an area west of CR 280 E was selected as the western terminus for the project.

Land Use Constraints

A goal of the project is to minimize the new roadway's impact on social, economic, and environmental resources in the community. During the Conceptual Alternative development phase, several environmental/community resources were considered in an effort to minimize impacts:

- Existing residences and businesses
- Selmier State Forest – contains quality forest habitat; hiking trails are Section 4(f) resources
- North Vernon Airport – a transportation and economic resource to the community
- St. Anne's Golf Course – a Section 4(f) resource
- Large utility infrastructure – substations and transmission lines can be expensive to relocate
- Vernon Fork of the Muscatatuck River – a perpendicular crossing minimizes impact and costs
- CSX Railroad – a perpendicular crossing minimizes impact and costs

Section 4(f) resources include historic sites and publicly owned parks, recreation areas and wildlife and waterfowl refuges. Impacts to them must be avoided unless there is no prudent and feasible alternative to doing so.

3.4 CONCEPTUAL ALTERNATIVES

The Project Team used the recommendations of the 2008 *Preliminary Alternatives Screening Report* (INDOT, 2008b) as a starting point for the Conceptual Alternatives. Alternative A from the 2008 study, shown in Map 3, was directly carried forward. While the western terminus of the project precluded the direct incorporation of Alternative B from the 2008 study, the eastern portion of that alignment was incorporated. These alternatives were combined with concepts

developed by the Project Team based additional analysis of the corridor to develop the five initial alignments shown in Map 4.

Stakeholder Involvement: Community Advisory Committee Meeting #1 (August 21, 2012)

The Project Team held its first meeting with the Community Advisory Committee (CAC), a group composed of local officials, State and Federal agency representatives, and key corridor stakeholders, to introduce them to the project, its goals and methodology, and the preliminary list of alternatives. At the meeting, the team presented five alignments developed to date and solicited comments and recommendations from the group. Comments included:

- Preferences regarding intersection locations
- Concern regarding the proximity of the alignment to the City's drinking water intake
- The need to account for runway protection zones (RPZs)
- Impacts to existing businesses
- Maintaining access for existing businesses

Map 4 depicts the five alternatives shown at the meeting. Materials presented to the CAC and a summary of their comments is provided in Appendix B (pages 11-45).

Based on input received at the CAC meeting, two additional alignments east of Selmier State Forest, Alternatives 6 and 7, were developed to minimize impacts to forest habitat. These alternatives are shown in below in Figure 4 (also Map 5 in Appendix A).

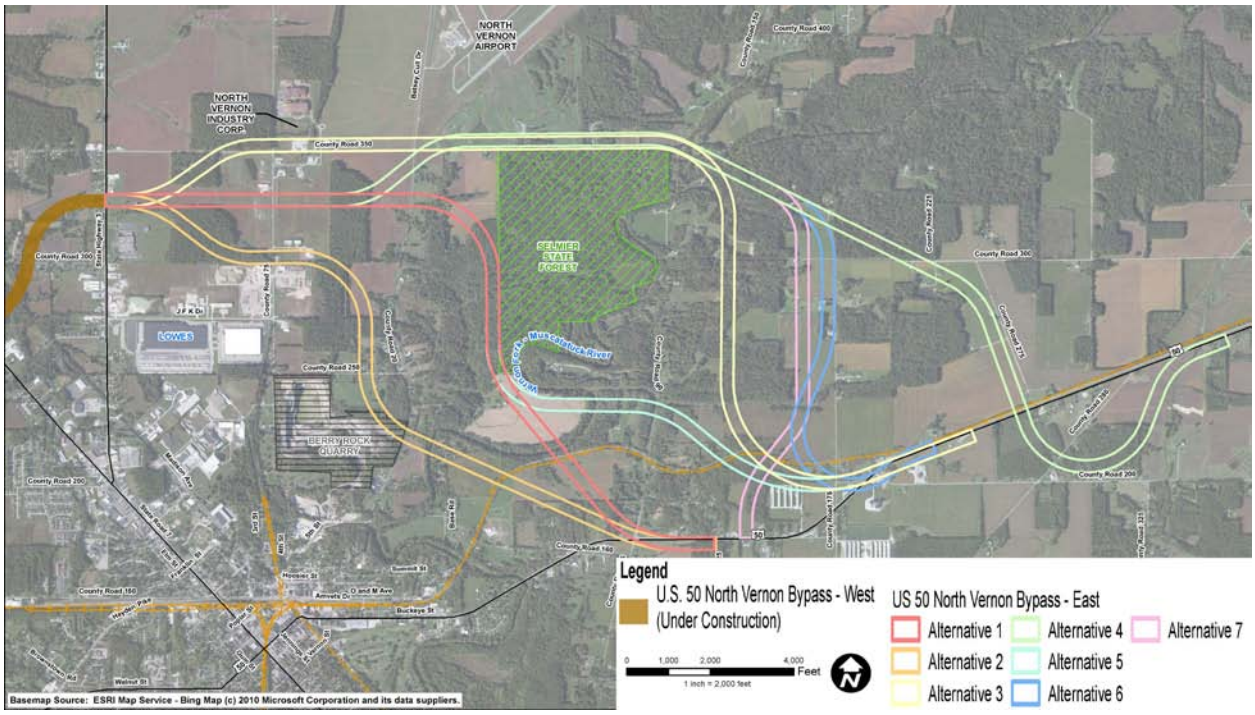


FIGURE 4: CONCEPTUAL ALTERNATIVES 1 THROUGH 7

Project Team Alternatives Workshop (August 27, 2012)

The Project Team held an internal Alternatives Workshop with representatives from the consultant team and a range of INDOT departments. Key discussion items include:

- Impacts to utilities
- Access locations
- Avoidance of impacts to Section 4(f) resources and endangered species habitat
- Alignment modifications

Minutes of the meeting are provided in Appendix B (pages 305-307).

3.5 PRELIMINARY ALTERNATIVES AND LEVEL 1 SCREENING

While reviewing the alternatives during the CAC meeting and the Alternatives Workshop, it was clear that there were opportunities to mix-and-match sections of alternatives with other alternatives. To facilitate this, the alternatives were each broken into two pieces, a numbered section and a lettered one. In this way alternatives could be optimized by taking the better sections of two alternatives and combining them. Not all lettered and numbered sections worked with each other due to differences in their termini. However, the change had the effect of increasing the number of possible alternatives from seven to sixteen. With this reorganization of the alternatives, the Project Team began using the term "Preliminary Alternatives" to describe them. These alternatives are shown in Map 6.

Stakeholder Involvement: Public Information Meeting (September 6, 2012)

The purpose of the public information meeting was to introduce the broader public to the project and to provide them the opportunity to comment on the alternatives currently proposed. Comments were received regarding impacts to private property, Deer Creek Campground, and farmland; noise; roadway connections; and the bypass' potential effect on local development patterns.

Stakeholder Involvement: North Vernon Airport/St. Anne's Golf Course (September 10, 2012)

The purpose of this meeting was to obtain a better understanding of the airport's existing and planned operations and to understand the concerns of the golf course operator. Airport representatives provided information regarding RPZ requirements and how conflicts could be minimized. Based on this meeting, Alternative 4 was shifted slightly south in order to keep it out of the RPZ. At this meeting, the airport also described their long range plans to extend the main runway by 1,000 feet to the northeast, potentially cutting off CR 450 N to traffic. With Alternatives A, B, and C, the Project Team had considered the possibility of eliminating the connection of CR 150 E to CR 350 N. Under existing conditions, residents north of that location could use CR 450 N to connect to the west side of the airport. However, if both CR 350 N and CR 450 N were impassable, the length of the detour would be more than 4 miles. Based on this concern, INDOT determined that a connection must be maintained via CR 350 N from CR 150 E to the west side of the airport.

Depending on the alignment of Alternative 4, the golf course could lose a strip of property up to 300 feet wide along CR 350 N. This would impact 2-3 holes of the golf course and potentially impact the maintenance barn. Golf course representatives indicated that they were confident that they could reconfigure the course to replace the holes within the existing site. Also discussed were options for how to maintain the golf course's entrance.

Minutes of the meeting are provided in Appendix B (pages 308-309). Chapter 6 Section 4(f) and Section 6(f) Resources further discusses the potential impacts to St. Anne's Golf Course.

Because of the complexities associated with Alternative 4 and its potential impact on the airport, golf course, state forest, and local roadway connectivity, the Project Team developed three versions of the alternative – 4N, 4M, and 4S – where the letter designation reflected the alternative's location in reference to existing CR 350 N (see Map 7). Alternative 4N located the bypass primarily on the north side of CR 350 N; Alternative 4M located the bypass within the existing alignment of CR 350 N; and Alternative 4S located the bypass on the south side of CR 350 N. Each option presented different impacts to resources and required different approaches to accommodating local traffic.

Resource Agency Meeting #1 (October 5, 2012)

The purpose of this meeting was to brief the agencies on the project's activities to date, the alternatives under consideration, and the process by which INDOT planned to identify the Preferred Alternative. A matrix of estimated impacts for each of the Preliminary Alternatives was provided to the agencies. Minutes of this meeting are provided in Appendix B (pages 310-312).

Based on the input received from the public, local officials, agencies, and the Project Team's analysis, the alternatives were reviewed and screened with the goal of reducing the number of alternatives to be carried forward for additional evaluation. Note that for the purposes of this screening, the three Alternative 4 options were considered together as not enough detail was available at the time to define all elements of each option. Table 1 provides a summary of the evaluation and decision regarding each alternative.

TABLE 1: PRELIMINARY ALTERNATIVES SCREENING EVALUATION

Alternative	Evaluation	Decision
1	Impacts to both emergent and forested wetland east of CR 75 W; impacts to core forest adjacent to Selmier State Forest; challenging terrain adjacent to Selmier State Forest	Eliminated
2	Impacts to Indiana bat habitat/wetlands; impacts to existing businesses; impacts to residences	Eliminated
3	Impacts to businesses on CR 350 N; impacts to electrical substation; conflict with airport RPZ; impacts to residences on CR 350 N.	Eliminated
4	Impacts to emergent and forested wetland east of CR 75 W; depending on option selected, may have impacts to golf course and/or state forest; potential impacts to residences on CR 350 N.	Carried Forward
5	Impacts to emergent and forested wetland east of CR 75 W; challenging terrain near Woods Branch; skewed crossing of Woods Branch	Eliminated
6	Impacts to emergent and forested wetland east of CR 75 W	Carried Forward
7	Impacts to Indiana bat habitat/wetlands; impacts to existing businesses; impacts to core forest adjacent to Selmier State Forest; challenging terrain adjacent to Selmier State Forest	Eliminated
A	Challenging terrain; impacts to residences and businesses at tie-in to existing U.S. 50	Eliminated
B	Core forest impacts; impacts to residences on CR 175 E; impacts to residences and businesses at tie-in to existing U.S. 50	Carried Forward
C	Core forest impacts; impacts to residences; difficult tie-in to existing U.S. 50 due to railroad; length of alternative increases cost	Eliminated
D	Impacts to quarry; impacts to residences on Base Road and near Deer Creek Road; potential karst impacts	Carried Forward
E	Potentially expensive bridge over railroad and river; impacts to residences near Deer Creek Road; only pairs with eliminated alternatives	Merged with Alternative F; Eliminated
F	Impacts to residences; impacts to businesses at tie-in to existing U.S. 50; challenging terrain at river crossing; skewed crossing of railroad; only pairs with eliminated alternatives	Merged with Alternative E; Eliminated
G	Impacts to residences; impacts to businesses at tie-in to existing U.S. 50; challenging terrain at river crossing; skewed crossing of railroad; only pairs with eliminated alternatives	Eliminated

During the screening process, the Project Team identified that the single bridge over the railroad and the river featured in Alternative E warranted further evaluation. A portion of Alternative F was used to connect Alternatives 6 and E and form a complete alternative, designated Alternative 6F/E (see Map 8). As the Project Team developed additional

information regarding this bridge location, it was determined that, due to the elevation differences between the two banks of the river and the need to provide adequate clearance of the railroad tracks, the bridge would need to be approximately 80 feet above the river, substantially increasing the cost compared to other alternatives. For this reason, Alternative 6F/E was eliminated from further consideration, leaving alternative 4B and 6D as those carried forward.

3.6 SHORT LIST OF ALTERNATIVES

With the general alignment options reduced to two, design efforts were directed at refining the details of alternatives such as vertical profile, intersection and access locations, and alignment modifications to minimize environmental impacts.

Alternative 4 Modifications

In November 2012, the North Vernon Airport began landing C-130 military aircraft, which require a larger RPZ. The alignments for all Alternative 4 options were shifted south to accommodate the larger RPZ. In the area where Alternative 4 parallels CR 350 N, modifications were made to the typical cross section in order to minimize impacts on the two Section 4(f) resources (golf course and state forest). The grass median proposed for the future four-lane roadway was replaced with a concrete median barrier, allowing the typical right-of-way width to be reduced from 300 feet to 175 feet.

Plans to provide access to properties along CR 350 N were developed for each of the Alternative 4 options. In several cases this required the addition of service roads or even overpasses. Members of the Project Team met with many of the residential property owners in the area and coordinated with representatives of the golf course and state forest to identify their preferences for access. Graphics showing the proposed roadway alignment and local access are provided in Appendix B (pages 223-225).

Alternatives B1 and B2

During this phase, the Project Team identified an opportunity to reduce segmentation of several large parcels and reduce the number of curves in the alignment by shifting the alignment of Alternative 2 about 500 feet to the west through its north-south section. The alignment of Alternative B2 was also modified slightly at its northern end to accommodate changes to Alternative 4. This created Alternatives B1 and B2, as shown in Map 9.

Alternative 4 Connection to Existing U.S. 50

The proximity of existing U.S. 50 and the CSX railroad tracks, combined with the county road network in the area, creates challenges for connecting the bypass to existing U.S. 50. The proposed configuration, shown in Figure 5, requires a long curving bridge over both the railroad and existing U.S. 50. Several county roads would be terminated, and a new connection for U.S. 50 would be constructed within the Rose Acres Farm property.

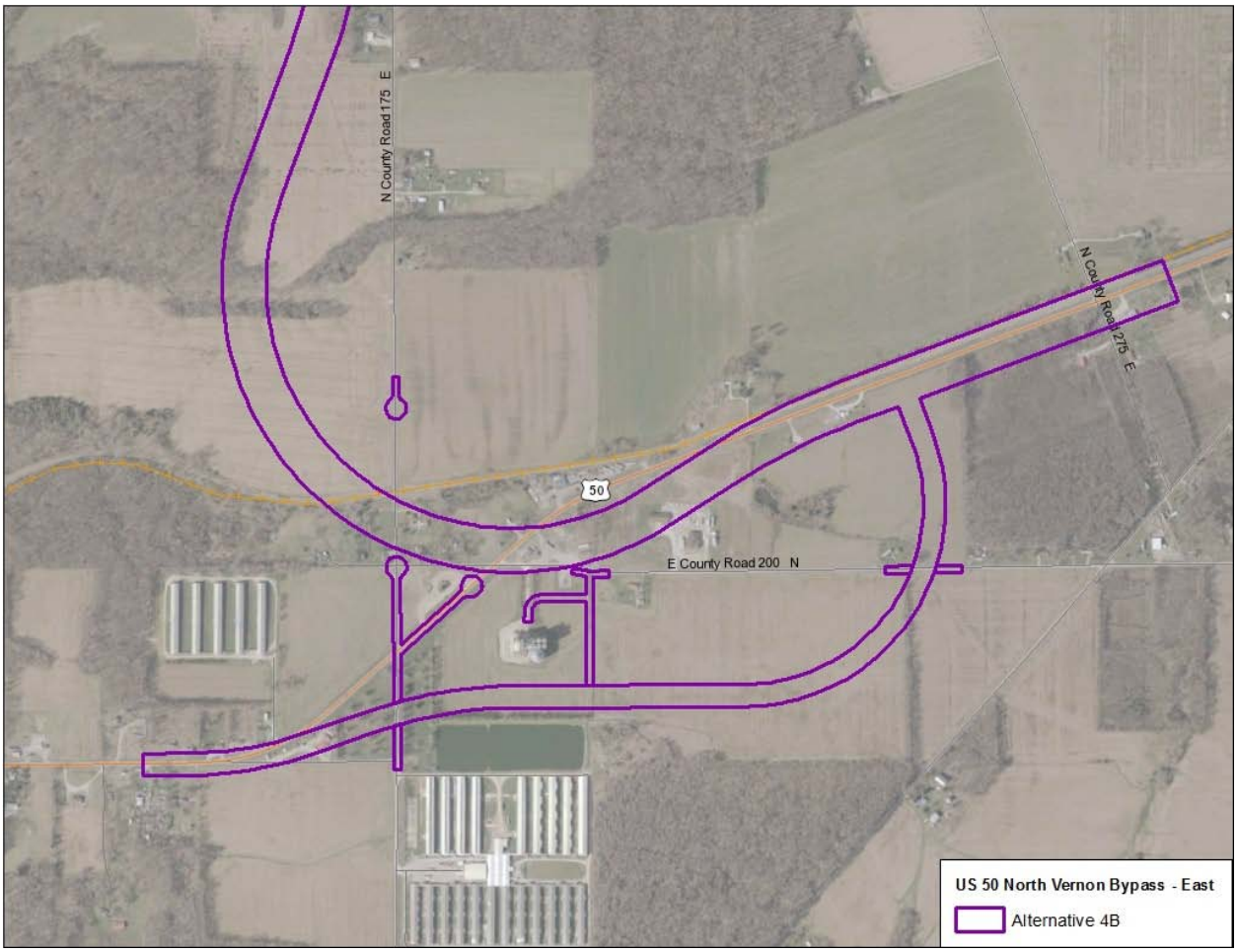


FIGURE 5: ALTERNATIVE 4 CONNECTION TO U.S. 50

Alternative 6D Modifications

The alignment of Alternative 6D was modified in the curve area just east of CR 75 W in order to reduce impacts to the forested wetland, both in terms of wetland impact and core forest segmentation. Where the alternative crosses CR 20 W, the alignment was shifted slightly south in order to avoid the terrain and stream impacts associated with a creek valley. Finally, the ROW width was widened in several areas to account for cut and fill requirements at the quarry and in the area approaching the railroad bridge.

Alternative 6D Connection to Existing U.S. 50

The connection of Alternative 6D to existing U.S. 50 is more straightforward than Alternative 4B because the railroad is farther from the tie-in location and there are fewer county roads in the area. As shown in Map 8, Alternative 6D would connect to existing U.S. 50 near the existing U.S. 50/Deer Creek Road intersection. In order to provide the bypass with a "through connection" (i.e., no turns to remain on U.S. 50), existing U.S. 50 would be realigned near CR 160 N and connect to the bypass via a T-intersection.

Intersection Locations

Locating intersections on a new roadway such as this requires striking a balance between providing a high-speed route for through traffic, while accommodating local access needs and economic development goals. Early in the project, the City of North Vernon, the Jennings County Economic Development Corporation, and the project's CAC indicated support for an intersection at CR 75 W in the heart of the planned industrial park; Alternatives 4B and 6D were both planned with an intersection at this location. Based on access requirements discussed above, it was also necessary to include an intersection on Alternative 4B at CR 150 E. Other potential intersection locations identified by the Project Team include:

- Alternative 4B and CR 20 W: this intersection would provide improved access to the North Vernon Airport and areas of planned industrial development.
- Alternative 6D and CR 20 W: this intersection would provide increased access to downtown North Vernon and for local residents.
- Alternative 4B and CR 300 N: this intersection would provide access for local residents and potentially provide an alternate route for access to MUTC to the east.

Before making any decisions regarding these intersection locations, the Project Team consulted with the CAC to gain their input (see below).

Stakeholder Involvement: Community Advisory Committee Meeting #2 (November 19, 2012)

The purpose of this meeting was to update the CAC on the project's progress and to gather input on the design and screening of the Short List of Alternatives. A copy of the presentation can be found in Appendix B (pages 216-233) and provides a summary of all the issues discussed. The following comments were received regarding the alternatives:

- Suggestion to shift the Alternative 4B connection to U.S. 50 further east to allow for a single bridge over the railroad and existing U.S. 50 and to minimize impacts to the local roadway network. The Project Team indicated that grade issues associated with the railroad limit where the bridge can be reasonably located. Alternative C featured a connection further to the east, but was eliminated due to impact and cost factors.
- Several members felt that Alternative 4B provided a more "natural" bypass and would result in more land being located inside the bypass. Others felt that either would meet the project's goals.
- There was general consensus that an intersection at CR 75 W was appropriate for both alternatives.
- For Alternative 4B, the group supported the inclusion of an intersection at CR 20 W to provide better access to the airport, development areas, and the areas to the east (State Forest, golf course, St. Anne's community).
- For Alternative 6D, there was general consensus that, due to the importance of CR 20 W as a connector between downtown and areas to the north, it should remain open across the bypass. However, the group also agreed that it was not a desirable location for an intersection as it would potentially draw even more traffic to CR 20 W. The preference was for inclusion of an overpass (bypass over CR 20 W).
- For Alternative 4B, the group agreed that providing an intersection at CR 300 N would improve access for MUTC. It was noted, however, that CR 300 N is not a very wide road

and may require improvement if it becomes a primary access point for MUTC. One suggestion was to only provide access to the east, since properties to the west of the bypass in this area have good access via Deer Creek Road.

Minutes of the meeting are provided in Appendix B (pages 213-215).

Resource Agency Meeting #2 (November 29, 2012)

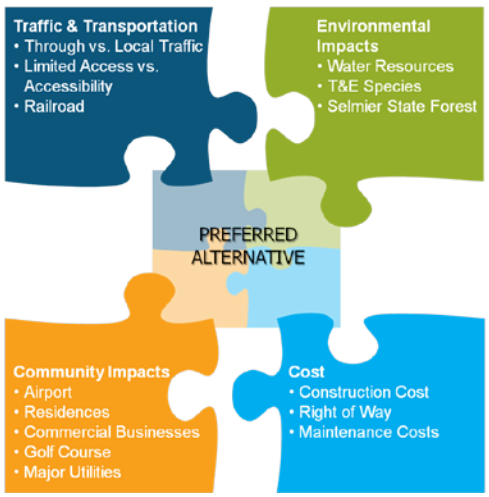
The purpose of the meeting was to update the agencies on the progress of the alternatives analysis and environmental surveys. A matrix identifying the impacts of each alternative was provided and reviewed with the group. Regarding the alternatives, the primary point of discussion regarded the potential impacts to Section 4(f) resources associated with the Alternative 4 options (4N, 4M, and 4S). Based on the Project Team's prior coordination with the golf course operators, it was anticipated that the impacts associated with any of the options could likely be restored to its current level of function through a reconfiguration of the golf course. Similarly, the impacts to the hiking trails and parking areas in the state forest under Alternative 4M or 4S could likely be mitigated through on-site improvements. Further coordination with the golf course operator and IDNR would be required to determine the extent of the impacts under Section 4(f) if these alternatives were pursued further.

The Frank Selmier House, located within the state forest property (described in more detail in Chapter 4, Cultural Resources), however, presented more substantial issues. Because the boundary of the Section 4(f) resource extended up to CR 350 N to include the stone gate structures located adjacent to the road, any alternative that would impact the stone gate structures would cause an adverse effect under Section 106 of the National Historic Preservation Act (NHPA) and result in "use" under Section 4(f). Both Alternatives 4M and 4S would impact these stone gate structures. Because there is at least one reasonable and prudent alternative that would not cause a use of a Section 4(f) property (both Alternatives 4N and 6D would qualify), Alternatives 4M and 4S had to be dropped from further consideration.

Minutes of the meeting and copies of the presentation and impact matrix are provided in Appendix B (pages 313-314).

3.7 LEVEL 2 SCREENING – SELECTION OF THE PREFERRED ALTERNATIVE

Selection of the Preferred Alternative required consideration of a range of factors including how well the alternative addressed the project's purpose and need, the context and intensity of impacts to community and environmental resources, and the cost of construction, right-of-way, and mitigation. Such an evaluation involves both quantitative (e.g., acres of wetland impact or number of relocations) and qualitative (e.g., community cohesion or accessibility) evaluations. To facilitate the evaluation, a decision matrix, shown in Figure 4, evaluating all relevant factors was prepared for review by the Project Team and INDOT decision makers.



As shown in the decision matrix (Figure 6 below), Alternative 6D outperforms Alternative 4B in a strong majority of the measures considered. Based on this analysis, the Project Team recommended and INDOT approved the selection of Alternative 6D as the Preferred Alternative for the project. This decision was announced to the public on December 17, 2012 through a press release, an announcement on the project website, and via INDOT's Facebook page. Copies of the press release and resulting newspaper article are provided in Appendix B (pages 243-244; pages 267-268). See Chapter 7 for a full description of the Preferred Alternative.

FIGURE 6: PREFERRED ALTERNATIVE DECISION MATRIX

	Alternative performs better under this criterion
	No substantial difference between alternatives

TRANSPORTATION/PLANNING		
6D	**4NB2**	
		Muscatatuck Urban Training Center (MUTC)
		MUTC officials have indicated that either alternative is acceptable and a substantial improvement over existing. However, they have indicated that Alternative 4NB2 is better than Alternative 6D.
		Economic Development/Long Range Planning
		City and County officials have indicated that Alternative 4NB2 better fits with their vision of what a bypass should be, and there is a perception that it would better support long-term economic development. Jennings County is currently in the process of updating its comprehensive plan. Our understanding is that either alternative is compatible with the plan being discussed. Areas identified for economic development would be served equally or nearly equally by either alternative.
		North Vernon Airport
		The North Vernon Airport (OVO) plays a key role in both MUTC operations and the economic development plans for the community. Alternative 4NB2 provides the opportunity for an intersection at CR 20 W, which would provide a very easy connection to the airport. Alternative 6D would provide an intersection at CR 75 W, approximately ½-mile to the west, requiring two additional turns to access the airport from the bypass.
		St. Anne's Community
		Under Alternative 6D, CR 350 N would be unaffected, providing the St. Anne's community with the same type of access they have today. However, in order to access the bypass, they would do so at CR 75 W, requiring them to interact with commercial traffic from the industrial park. On the other hand, under Alternative 4NB2, the community's only long-term access would require use of the bypass.

IMPACTS		
6D	**4NB2**	
		Wetlands
		Alternative 4NB2: 24.7 acres (10.8 forested/13.9 emergent) Alternative 6D: 17.3 acres (7.8 forested/9.5 emergent)
		Streams
		Alternative 4NB2: 6,805 LF (5,223 ephemeral/1,227 intermittent/355 perennial) Alternative 6D: 3,256 LF (2,835 ephemeral/ 0 intermittent/ 421 perennial)

		Core Forest
		Alternative 4NB2: 31.1 acres (8.4 cleared/22.7 converted) Alternative 6D: 4.7 acres (1.8 cleared/2.9 converted)
		Indiana Bat Habitat
		Alternative 4NB2: 49.7 acres (19.5 high quality/18.6 medium/11.6 low) Alternative 6D: 37.0 acres (12.8 high quality/4.2 medium/20.0 low)
		Section 4(f)
		Alternative 4NB2: *Potential Section 4(f) issue* (Golf Course and State Forest) Alternative 6D: none
		Karst
		Alternative 4NB2: Low (likely presence, none identified to date) Alternative 6D: Moderate (known presence, investigation forthcoming)
		Drinking Water Supply
		Both alternatives are upstream of the City's drinking water supply intake. Both would require engineering controls to mitigate the risk. However, Alternative 4NB2 would provide for a slightly longer response time.
		Right-of-Way Quality/Segmentation
		Alternative 4NB2 would severely segment two large properties and result in impacts that are difficult to mitigate in another area (Rusty Fields property; Biehle Farm; CR 350 residences). Alternative 6D would have one such impact (Apsley Farm).
SCHEDULE RISKS		
6D	**4NB2**	
		Federal Aviation Administration (FAA) Review
		Due to the proximity of Alternative 4NB2 to the airports Runway Protection Zone (RPZ), a more detailed review would be required by the FAA. Additionally, if an intersection is provided at CR 20 W, improvements within the RPZ would be required.
		U.S. Fish and Wildlife Service (USFWS) Section 7 Consultation (Endangered Species Act)
		USFWS has not made any firm determination as to the likelihood of requiring formal consultation for either alternative. However, due to the larger impacts associated with Alternative 4NB2, that alternative is more likely than Alternative 6D to result in formal consultation.
		Right-of-Way Acquisition – Number of Parcels
		Alternative 4NB2: 90 parcels Alternative 6D: 58 parcels
		Right-of-Way Acquisition – Unique Parcels
		Alternative 4NB2: 2 (Golf Course and Selmier State Forest) Alternative 6D: 1 (Quarry)
PROJECT COSTS		
6D	**4NB2**	
		Utilities
		Substantially longer timeframe for relocation due to number of crossings under Alternative 4NB2.

	Bridges
	Alternative 4NB2: Tributary of Muscatatuck River Muscatatuck River (curve and skew) CSX Railroad (curve and skew) Alternative 6D: Muscatatuck River (tangent and perpendicular) CSX Railroad (tangent and perpendicular)
	Waterway Structures
	Alternative 4NB2: 3 large culverts Alternative 6D: 1 large culvert
	Karst
	Alternative 6D would require additional engineering measures to avoid/mitigate for karst features.
	Earthwork
	Under Alternative 6D, providing a grade separation at CR 20 W would require substantial fill (regardless of which road was over/under). Alternative 4B would provide a better balance of earthwork.
	Environmental Mitigation
	Alternative 4NB2 would require approximately 20 acres more wetland mitigation and potentially 40 acres more Indiana bat habitat mitigation than Alternative 6D.
	Total Cost

	4NB2	6D
Construction	$28,125,000	$19,650,000
Right-of-Way	$5,000,000	$3,500,000
Utilities	$4,500,000	$2,000,000
Railroad	$325,000	$75,000
Mitigation	$4,358,000	$2,805,000
TOTAL	**$42,308,000**	**$28,030,000**

Note: The costs above are preliminary and based on the information available at the time the alternatives were evaluated. Updated cost information for the Preferred Alternative is provided in Chapter 3.

3.8 REFINEMENTS TO PREFERRED ALTERNATIVE

Following selection of Alternative 6D as the Preferred Alternative, the Project Team continued to refine its design in an effort to minimize impacts, reduce costs, and address comments raised during the development process. The sections below describe the most substantial of these changes.

Location of Connection to Existing U.S. 50

As shown in Figure 7 below, Alternative 6D originally was planned to connect to existing U.S. 50 near its intersection with Deer Creek Road. However, the connection would not be fully complete until approximately 0.25 mile beyond Deer Creek Road. Through a series of minor alignment adjustments starting near the proposed bridge over the Vernon Fork of the Muscatatuck River, the bypass could be completely tied-in to U.S. 50 prior to Deer Creek Road. This modification provided the following benefits:

- Reduced the number of residential relocations by approximately 4 residences
- Eliminated 0.25 mile of roadway construction, reducing costs
- Avoided another reconstruction of the Deer Creek Road intersection, which was recently reconstructed with full turn lanes.

Existing U.S. 50 – CR 160 N – CR 175 N Intersection

As shown in Map 10, existing U.S. 50 would be realigned beginning just south of its intersection with CR 160 N/CR 175 N in order to create a T-intersection with the bypass. The existing intersection does not meet design standards for skew (the angle at which roads intersect). Under the Preferred Alternative, this intersection would be reconstructed as a 4-legged, roundabout-type intersection, which would address the skew issue (roundabouts can include greater skew than traditional intersections) and provide a safer intersection (roundabouts are safer than 2-way stop-controlled intersections). Traffic from each approaching roadway would yield to traffic in the roundabout. While the majority of trucks on U.S. 50 are anticipated to use the bypass instead of coming through town, the roundabout has been designed with a turning radius, and other elements such as mountable curbs, sufficient to accommodate all types of trucks.

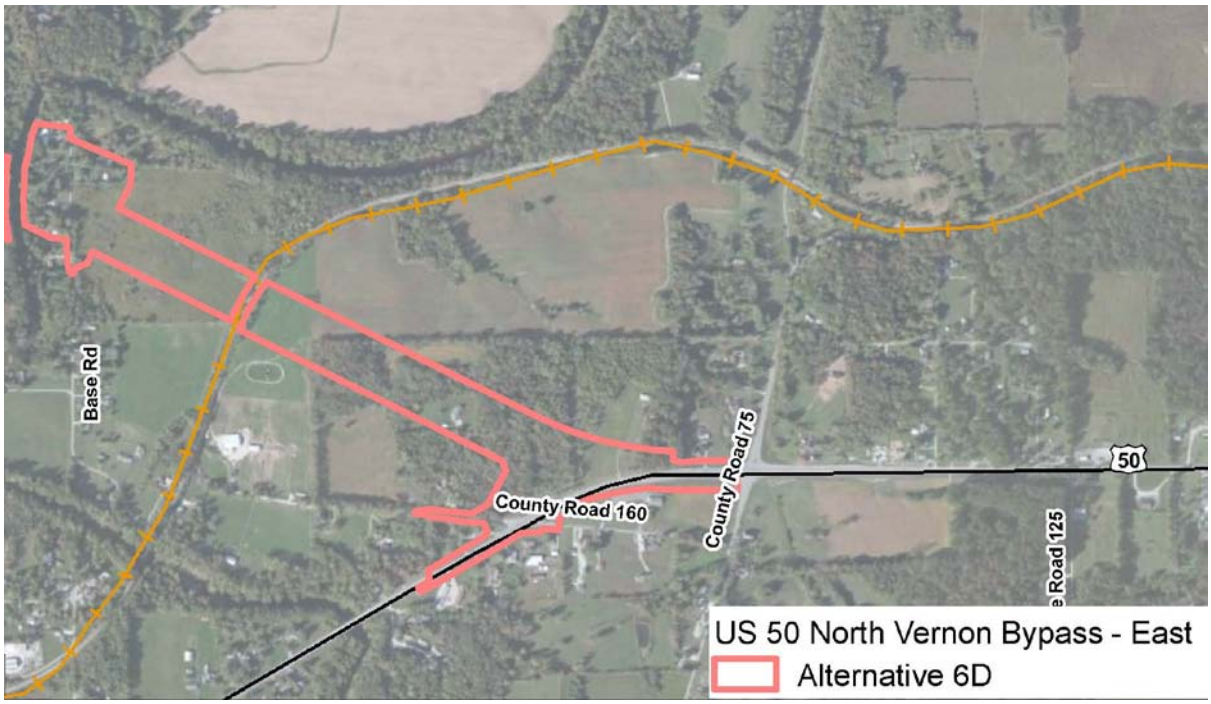


FIGURE 7: ALTERNATIVE 6D CONNECTION TO U.S. 50

North Vernon Water Intake Protection

North Vernon Water, which provides drinking water to customers in North Vernon, uses the Vernon Fork of the Muscatatuck River as its sole source of water. The intake point is located at the low-head dam near CR 20 W, approximately 2,500 feet downstream from the proposed bridge carrying the bypass over the river. During the alternatives development process, concerns were raised by the utility and the City about the possibility of contamination of the drinking water supply if an accident occurred on or near the bridge that resulted in the spilling of chemical or other pollutants. It was estimated that, depending on flow conditions in the river, a contaminant entering the river at the proposed bridge location could reach the water intake in less than 10 minutes. While the risk of contamination would be highly variable depending on the nature of the pollutant and flow conditions, the concern was sufficient that INDOT agreed it was appropriate to provide measures to mitigate this risk.

The Project Team reviewed measures that had been utilized elsewhere in Indiana and throughout the United States to address similar situations and identified two general approaches. The first option would involve the construction of a large detention basin on one or both sides of the river. All runoff from the roadway in the area would be directed into a catchment system that would direct the water to the detention basin at a single inlet. Water entering the basin would be routed through a zigzagging ditch system that would delay the time it takes for the water to reach the outlet. The basin would be lined with an impermeable layer such as clay to prevent any pollutants from reaching the river through infiltration. Dirt would be placed on top of the impermeable layer, and the basin would be planted with grass.

For this project, the system was designed to provide a minimum 30 minute time of travel for the water. Under typical conditions, the outlet from the detention basin would empty into the Vernon Fork of the Muscatatuck River. However, the outlet would be equipped with a valve that, in case of an incident, could be closed, stopping the water in the basin from reaching the river. To be effective, this system would require that emergency responders be trained to identify a contamination risk and act to close the valve. This system would have little effect on the quality of runoff from typical roadway operations. If an incident occurred and the detention system was used to capture a contaminant that could not be released into the river, the water – and potentially the soil down to the impermeable layer – would need to be removed and disposed of in a suitable manner.

The second option evaluated would capture the roadway runoff in the same way as described above but would carry it in a ditch or pipe to a point below the City's drinking water intake. Runoff from the west side of the bridge would be directed into a ditch running south along the east side of CR 20 W. As runoff approaches the sharp bend in the roadway, near the parking area adjacent to the dam, it would enter a pipe that outlets into the existing ditch immediately south of the parking area. That ditch outlets into the river immediately below the dam (and the drinking water intake). On the east side of the bridge, the runoff would be collected into a pipe running down the west side of Base Road. Where Base Road bends sharply to the east, the pipe would continue south, outletting into the river. This system would require little maintenance beyond ensuring that the ditch and pipes remained clear. In the event of an incident, no action would be required on the part of emergency response personnel. All runoff from the roadway,

during all conditions, would be outlet to the river below the City's drinking water intake location.

The Project Team evaluated these alternatives based on effectiveness, potential impacts, and both construction and maintenance costs. The team also consulted with the City of North Vernon and North Vernon Water. Each agreed that the ditch/pipe option was preferred, and INDOT selected this option to be incorporated into the Preferred Alternative. Additional detail regarding the design and evaluation of the two options is included in Appendix K (pages 46-58).

3.9 PROJECT COST

As the design of the Preferred Alternative has continued, the Project Team has refined the project's estimated cost. While the design has not been finalized, the values provided in Table 2 are based on the Stage 1 plans, submitted to INDOT in May 2013 and provide a better estimate of what the final project cost would be. Note that the costs for Alternative 4NB2 have not been revised since December 2012, when Alternative 6D was identified as the Preferred Alternative. It is likely that its estimated cost could also be reduced through similar design efforts.

TABLE 2: ESTIMATED PROJECT COSTS

Cost Category	Alternative 6D (Preferred Alternative)[1]	Alternative 4NB2
Construction	$14,930,900	$28,125,000
Right-of-Way	$2,200,000	$5,000,000
Utility Relocation	$750,000	$4,500,000
Railroad	$75,000	$325,000
Environmental Mitigation	$2,500,000	$4,358,000
TOTAL COST	**$20,455,900**	**$42,308,000**

(1) Costs for Alternative 6D reflect refinements made through Stage 1 plans. As described in Chapter 3, at the time it was selected as the Preferred Alternative, the estimated cost was $28,030,000. It is likely that the cost of Alternative 4NB2 could also be reduced through similar efforts.

CHAPTER 4: ENVIRONMENTAL RESOURCES, IMPACTS, AND MITIGATION

This chapter provides an in-depth analysis of the social, economic, and environmental features of the study area, in order to determine the potential impacts of the proposed project. Each section includes the methodology for the assessment and the environmental consequences for each studied alternative, as well as agency coordination and mitigation measures where applicable. Sources of information include field surveys, public and agency input, literature reviews, and GIS data.

4.1 SOCIAL IMPACTS

4.1.1 Relocations

The purpose of this section is to determine the potential effects of relocations of residences and businesses on the community. In situations where the number of relocations is substantial or the availability of replacement property is limited, a project could have an effect on the real estate market in the community.

Methodology

A property was considered to be displaced either if it was located within the proposed bypass right-of-way or if feasible access could not be maintained post-construction. GIS analysis and field surveys were conducted to determine which properties would be impacted. The Jennings County Assessor's Office website was utilized to determine property value, year of construction, exterior finish, and number of stories for each residential acquisition. The information below for Alternative 6D is from the Conceptual Stage Relocation Study (CSRS), which was approved by INDOT on June 10, 2013 and is in Appendix J. Alternative 4NB2 was not included in the CSRS and was only studied as far as the number of potential relocations.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would not result in the relocation of any residences or businesses.

Alternative 6D (Preferred Alternative)

Residential

Implementation of Alternative 6D would result in the acquisition of thirteen residences located on SR 3, CR 250 North, N Base Road, and at the eastern terminus of the bypass on CR 175 N and U.S. 50. Ten of the thirteen acquisitions are located on N Base Road. These one-story homes were constructed between 1940 and 1992 and range in value between $24,000 and $77,000. The home on CR 250 North is a one-story home that was constructed in 1958 and is valued at $97,500. The one-story home on CR 175 N was constructed in 2003 and is valued at $245,200.

The home on SR 3 is located on property currently owned by the State of Indiana. The property and residence on which it sits was purchased by INDOT during the right-of-way process for the

West Bypass project. It was anticipated that if it was to be constructed that the East Bypass would continue directly across SR 3. Because at the time it was not known when (or if) the East Bypass project would be constructed, there was concern that new development could occur on the site. Therefore, INDOT purchased the property to protect this future corridor. While the property has already been purchased and the residence relocated, INDOT considers the impact to be the result of this project. This determination was made subsequent to the selection of the Preferred Alternative; as a result, the relocation values presented in Chapter 3 do not reflect this relocation. Likewise, since the relocation has already occurred, it was not included in the CSRS. The values for all the homes that would be acquired are shown in Table 3.

TABLE 3: VALUES OF RESIDENTIAL ACQUISITIONS

Value Ranges	Number of Residences
$0 - $49,999	7
$50,000 - $99,999	4
$100,000 - $149,999	1
$150,000 - $199,999	0
$200,000 - $249,999	1

Source: Jennings County Assessor's Office

All thirteen of the homes being acquired are one-story homes, with the oldest home being constructed in 1940 and the newest home from 2003. All of the homes are constructed of concrete, vinyl, wood shingles, or plywood exterior finishes. See Appendix J for information on each displaced residence. One parcel located on N Base Road has three residences on the one parcel, each with its own address. These are located at 2210, 2213, and 2215 N Base Road. Table 4 provides information on each home being acquired. See Map 11 for the locations of the residences that are being acquired.

TABLE 4: RESIDENTIAL ACQUISITIONS

Address	Year Constructed	Exterior Finish	Number of Stories
350 W C.R. 250 N	1958	Concrete block	1
2055 N Base Road	1940	Concrete block	1
2075 N Base Road	1992	No info	1
2095 N Base Road	1942	Wood siding	1
2115 N Base Road	1963	Wood/vinyl siding	1
2120 N Base Road	1976	Concrete block	1
2135 N Base Road	1942	Wood siding	1
2140 N Base Road	1976	Vinyl siding	1
2210 N Base Road	1977	Wood siding	1
2213 N Base Road	1955	Wood siding	1
2215 N Base Road	1980	Manufactured home	1
480 E C.R. 175 N	2003	Masonry/wood siding	1

Source: Jennings County Assessor's Office

Business

One business would be acquired as a result of Alternative 6D. The business is located on a 1.2 acre parcel on N. Base Road and access to the property would not be maintained following construction. The business, Bill Barlow Wholesale, is a wholesale used car company. Based on discussions with the owner, it is estimated the business employs 2 to 3 persons. See Map 11, Sheet 18 for the location of the business that is being relocated.

Alternative 4NB2

Residential

Seventeen residences would be relocated as a result of Alternative 4NB2. These residences are primarily located along CR 75 W and CR 175 E within the proposed right-of-way for the alignment. Since Alternative 4NB2 was not selected as the Preferred Alternative, no further study of potential impacts to residences or acquisition discussions with property owners occurred.

Business

Three businesses would be relocated as a result of Alternative 4NB2. One of the businesses is just east of the tie-in with the West Bypass and the remaining two are along the southeastern corridor of the alignment near its terminus. The three businesses are:

- Kasey & Company, LLC – 585 Ertel Lane, North Vernon, IN 47265
- Jackson-Jennings Ag, LLC – 2100 CR 200 N, North Vernon, IN 47265
- Bill's Manufactured Homes - 1960 E. U.S. 50, North Vernon, IN 47265

It is estimated that these businesses employ 30-40 employees (combined). Since Alternative 4NB2 was not selected as the Preferred Alternative, no further study of potential impacts to businesses or acquisition discussions with business owners occurred.

Mitigation

Fair, consistent, and equitable treatment would be provided to all persons displaced as a result of the East Bypass. All residents displaced would be offered relocation services in compliance with the Uniform Act.

All acquisitions and relocations required by this project would be completed in accordance with the Uniform Act, as amended, 49 CFR 24, and Title VI of the Civil Rights Act of 1964. No person displaced by this project would be required to move from a displaced dwelling unless comparable replacement housing is available to that person. INDOT would take required actions to ensure fair and equitable treatment of persons displaced as a result of this project up to and including providing replacement housing of last resort as defined in 49 CFR 24.404. Relocation resources for this project are available to residential and business relocatees without discrimination. At the time right-of-way is acquired, a relocation agent would be assigned to this project to ascertain the needs and desires of the potentially displaced persons to provide information, answer questions, give help in finding replacement property, and issue last resort housing payments, if needed. Advisory services would be made available to farms and businesses, with the aim of minimizing the economic harm to those businesses and farm establishments.

There are no unique relocation situations that are known at this time. If a displaced resident cannot be relocated due to the unavailability of comparable housing, or because comparable housing is not available within the statutory limit of the Uniform Act, then housing of last resort would be made available to these persons. Last resort housing includes, but is not limited to, rental assistance, additions to existing replacement dwellings, construction of new dwellings and dwelling relocation. Replacement dwellings must meet the requirements of decent, safe, and sanitary standards as established by FHWA.

Financial assistance would be available to eligible persons displaced by this project. Payments received are not considered as income under the provisions of the Internal Revenue Code of 1954; or for the purposes of determining any person's eligibility, or the extent of eligibility, for assistance under the Social Security Act or any other federal law.

4.1.2 Community Cohesion/Accessibility

New roads have the potential to alter connections within a community and the ease with which people move about. Those changes can increase cohesion and accessibility by providing access that was not previously available (e.g., connecting two existing neighborhoods); but they can also reduce it by cutting off existing access or making access more difficult.

Methodology

Each of the Build Alternatives was reviewed to identify locations where access changes would occur – both increased and decreased access. The bypass would be constructed within limited

access right-of-way, meaning that, other than a small number of identified intersections at public roads, no other access, such as residential or commercial driveways, would be provided. While a detailed Traffic Management Plan will be developed later in the design process, the analysis also considered potential construction period impacts to accessibility, including special events.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would make no changes to access in the study area.

Alternative 6D (Preferred Alternative)

At the macro level, construction of Alternative 6D would complete the bypass and create a new transportation connection around the north side of North Vernon. The completed bypass would allow vehicles to both get through the region more quickly and more easily access areas near the new roadway. Alternative 6D would have intersections at SR 3 (western terminus), CR 75 W, and existing U.S. 50 (eastern terminus). Each intersection area would experience improved access and the potential development effects and indirect impacts of these new intersections are discussed in Section 4.17.

At a more localized level, Alternative 6D would cause limited changes in accessibility. During the planning phase, the Project Team worked with the CAC and local officials to identify areas of concern and minimize impacts. One street closure, at CR 250 N between CR 75 W and CR 20 W, would occur. Cul-de-sacs would be constructed on either side of the bypass with no access to or across the new road. CR 250 N is a 0.6 mile long roadway segment that terminates at CR 75 W and CR 20 W. Uses on the road are residential and agricultural; one of the residences would be acquired. Both CR 75 W and CR 20 W are relatively low volume roads that provide access to downtown North Vernon to the south and the industrial park and airport area to the north. Alternate east-west connections are available at CR 350 N (1 mile to the north) and German Street (0.8 mile to the south).

At CR 20 W, a bridge carrying the county road over the bypass is proposed, maintaining the existing level of access; no access to the bypass would be provided. This crossing was discussed extensively with the CAC and local officials. The consensus was that, while CR 20 W carries a relatively low volume of vehicles, it is an important connection between downtown and the CR 350 N corridor. An at-grade intersection was considered at this location, but concern was raised that it would create safety concerns on the bypass due to its proximity to other intersections and encourage vehicles to use this as a primary route to access downtown North Vernon. Keeping CR 20 W at its existing grade was also considered, but the cost to construct a bridge for the bypass over the county road was more expensive.

At the eastern terminus, the bypass would provide a direct, stop-free connection to existing U.S. 50 to the east. Existing U.S. 50 coming from downtown North Vernon would be realigned to connect to the bypass at a stop-controlled T-intersection. Access to CR 160 N/CR 175 N would be maintained through construction of a roundabout at its intersection with existing U.S. 50.

During construction, it would be necessary to close CR 75 W and CR 20 W at the bypass to construct the intersection and bridge, respectively. These locations may be closed simultaneously; however, CR 250 N would remain open, providing a short detour route around the construction. At the termini, both SR 3 and existing U.S. 50 would remain open throughout construction. Access to CR 175 N and CR 160 N would be maintained throughout construction.

Large events in the region include the Jennings County Fair held each July and exercises hosted by MUTC. The fairground is located approximately 1.5 miles north of the proposed western terminus of the bypass. As noted above, SR 3 would remain open to traffic throughout construction and disruption at this intersection is anticipated to be limited. Some MUTC training exercises utilize the North Vernon Airport and/or Jennings County Fairground. In general, traffic between these facilities is routed on the county road network north of the project area, in order to avoid routing vehicles through the City of North Vernon. It is anticipated that this routing would continue in the future and the project's construction would not impact those roadways.

Alternative 4NB2

Like for the Preferred Alternative, construction of Alternative 4NB2 would complete the bypass and create a new transportation connection around the north side of North Vernon. This would allow vehicles to both get through the region more quickly and more easily access areas near the new roadway. Alternative 4NB2 would have intersections at SR 3 (western terminus), CR 75 W, CR 20 W, CR 350 N (at the east end of Selmier State Forest), CR 300 N, and existing U.S. 50 (eastern terminus). Each intersection area would experience improved access and the potential development effects and indirect impacts of these new intersections are discussed in Section 4.17.

Alternative 4NB2 would require numerous modifications to the local street network to maintain access to adjacent properties. As described in Chapter 3, the CR 350 N corridor presented challenges due to the nature of the land uses on either side. As shown in Map 10, Alternative 4NB2 included construction of three separate access roads. On the south side of the bypass, an access road would be constructed from CR 20 W just south of the bypass to across the northern edge of Selmier State Forest, terminating at CR 100 E. On the north side, CR 350 N would be extended, through the golf course, to maintain access to St. Anne's golf course. Farther east, a new intersection with the bypass and access along the north side of the bypass would provide connection to residences that previously had direct access to CR 350 N.

East of the Musctatuck River, the CR 300 N/CR 175 E intersection would require relocation in order to maintain a safe distance from the proposed intersection of the bypass and CR 300 N. This also would require the realignment of one residential drive.

In the area where Alternative 4NB2 would reconnect with existing U.S. 50, numerous modifications would be required due to the local street network and the need for the bypass to bridge over the CSX Railroad. First, CR 175 E on either side of the bypass would be terminated at a cul-de-sac. Vehicles would likely utilize CR 275 E, one mile to the east as an alternate route to access areas north of the railroad. South of the bypass, Alternative 4NB2 would realign existing U.S. 50 through the Jenacres property, reconnecting to the bypass approximately one mile to the east. New connections to CR 200 N and the Jenacres grain silos would be required.

Construction of Alternative 4NB2 would be staged such that new access roads would be constructed prior to the new bypass roadway to maintain connections during construction. Closures required to construct the intersections at CR 20 W and CR 75 W would be done at different times so that the other roadway could serve as a detour route. At CR 300 N, CR 175 E and Deer Creek Road provide alternate routes.

Event-related considerations for Alternative 4NB2 would be identical to those described above for Alternative 6D.

Agency Coordination

As noted above, the decisions regarding the location of intersections were made in conjunction with the CAC and local officials. Minutes of the CAC meetings are provided in Appendix B (pages 11-13 and 213-215). Discussions were also held with representatives of St. Anne's Golf Course, Selmier State Forest, MUTC and the residents to the east of the golf course, to identify and address access concerns; minutes of these meetings are also provided in Appendix B.

Mitigation

The Project Team incorporated numerous access roads into the design of each alternative in order mitigate potential access issues as described above. A final Traffic Management Plan will be developed during final design that will ensure access is maintained to private properties during construction. This plan will be reviewed with local officials and key stakeholders. While it is unlikely that construction of the bypass would have an effect on either the Jennings County Fair or training exercises at MUTC, INDOT will notify both sponsor organizations of closures or major disruptions to access in the area.

4.2 LAND USE

Existing land use patterns were evaluated for each alternative, as well as the right-of-way impacts for those land uses. This evaluation looks at whether the proposed project would significantly alter the overall land use pattern or affect the usability of the land use types in the area.

Methodology

GIS mapping and field surveys were utilized to determine land uses in the study area and calculate acreage. Right-of-way impacts were calculated by the acreage of the land use that falls within the right-of-way of the proposed alignment.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would not have any impacts upon existing land use.

Alternative 6D (Preferred Alternative)

Existing Land Use

The project area for Alternative 6D consists of rural agricultural land with a few large industrial facilities, residences, and uneconomic remnants. West of the proposed alignment is the

downtown area of North Vernon, which has a concentration of commercial services and residential neighborhoods along SR 3, SR 7, and existing U.S. 50. Downtown North Vernon is in the study area, but outside the project limits. Just east of the proposed alignment in the study area, also outside the project limits, is Selmier State Forest.

Land Use/Right-of-Way Impacts

Land use was taken into consideration during the alternatives development process. The alignment for Alternative 6D was designed to minimize impacts to existing land use. Due to the rural nature of the area, there are a minimal number of businesses adjacent to or within the right-of-way. Only one business would be impacted as a result of the project, thus there is not a significant impact to commercial service land use. Industrial land use is primarily adjacent to the corridor and would not be impacted.

Acquisition of the right-of-way required for Alternative 6D would create 41.1 acres of property that has been deemed uneconomic remnants. Per FHWA, an uneconomic remnant is defined as "a parcel of real property in which the owner is left with an interest after the partial acquisition of the owner's property, and which the Agency has determined has little or no value or utility to the owner." By Federal law, this property would be acquired as right-of-way. Should INDOT determine, after the project is complete, that these areas are no longer needed, they may be disposed of in the same manner as other unneeded highway right-of-way.

State forest land would not be impacted by Alternative 6D, as it is outside the project limits. The bypass would cross through agricultural land, but would not significantly alter its usability in the overall project area. Impacts to agricultural land are further discussed in Chapter 4.14 Farmland, which evaluates conversion of U.S. Department of Agriculture (USDA) prime farmland.

The right-of-way impacts for each land use type are presented in Table 5 (land uses are shown in Map 11).

TABLE 5: LAND USE ACQUISITION

Land Use	Alternative 6D (Preferred Alternative)	Alternative 4NB2
Agriculture (acres)	116.52	239.86
Commercial Services (acres)	13.35	19.72
Industrial (acres)	23.24	24.60
Residential (acres)	21.97	53.38
State Forest (acres)	0.00	6.20
TOTAL	**175.1**	**343.8**
Uneconomic Remnants (acres)[1]	41.1	128.6

(1) Uneconomic remnants are included in land use totals above.

Alternative 4NB2

Existing Land Use

Land use surrounding Alternative 4NB2 is predominately rural agricultural land and state forest land. The proposed alignment runs along the northern side of Selmier State Forest. Residential, commercial services, and industrial land uses are very scattered throughout the area and not densely concentrated.

Land Use/Right-of-Way Impacts

Residences are sparse in the project area, and there is not a significant amount of residential neighborhoods; therefore Alternative 4NB2 would not significantly impact residential land use. There is also not a density of commercial services or industrial land in the area. Acquisition of the right-of-way required for Alternative 4NB2 would create 128.6 acres of property that has been deemed uneconomic remnants. As described above, this property would be acquired by INDOT and, at the completion of the project, may be disposed of if determined to be unneeded.

This alternative would impact Selmier State Forest by running directly adjacent to it and also crossing through the forest at its northwest corner. The impacts to state forest land use are a major reason that Alternative 4NB2 was not selected as the Preferred Alternative. As with Alternative 6D, this alternative would cross through agricultural land, but would not greatly impact its use. Impacts to agricultural land use are also discussed in Chapter 4.14 Farmland, which evaluates conversion of USDA prime farmland.

The right-of-way that would be acquired for each land use type is presented in Table 5 (land uses are shown in Map 11). Mitigation for displaced residences is discussed in Chapter 4.1.1 Relocations. All acquisitions and relocations required by this project would be completed in accordance with the Uniform Act, as amended, 49 CFR 24, and Title VI of the Civil Rights Act of 1964. No person displaced by this project would be required to move from a displaced dwelling unless comparable replacement housing is available to that person. INDOT would take required actions to ensure fair and equitable treatment of persons displaced as a result of this project up to and including providing replacement housing of last resort as defined in 49 CFR 24.404.

4.3 PUBLIC FACILITIES AND SERVICES

Public facilities and services were evaluated based upon the study area. These facilities and services include, but are not limited to: airports, hospitals, parks and recreational facilities, utilities, fire stations, police, emergency services, religious institutions, and libraries.

Airports

No-Build Alternative

The No Build Alternative would have no impact on the North Vernon Airport.

Alternative 6D (Preferred Alternative)

The North Vernon Airport is located approximately 2,500 feet northeast of Alternative 6D. Analysis was conducted to measure whether the elevation of the project is within a slope of 100:1 feet of the airport runway end point. Based upon this slope the maximum allowed height for the project roadway is 800.3 feet. The highest elevation of the project is 756.3 feet and the

elevation of the airport runway end point is also at a height of 756.3 feet. Adding a truck height of 17 feet to the highest elevation of the project, the elevation would be 773.4 feet, which is still below the maximum allowed roadway height. Therefore, this alternative would not impact airport runway clearance. Refer to Map 12 for a map showing the elevations of the airport runway and the project.

Alternative 4NB2

The initial alignment studied for Alternative 4NB2 would have been in proximity with the RPZ of the North Vernon Airport, but was re-aligned to a location further south outside this zone. The RPZ is a two dimensional trapezoidal area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground. Roads and highways that would fall within the RPZ require coordination with the Federal Aviation Administration (FAA). Since the alignment was redesigned so that it falls outside the RPZ, no coordination with FAA is necessary.

Hospitals

No-Build Alternative

The No Build Alternative would have no impact on hospital facilities.

Alternative 6D (Preferred Alternative)

The closest hospital to Alternative 6D is St. Vincent Jennings Hospital, which is 1.43 miles south at 301 Henry Street in North Vernon. St. Vincent Jennings Hospital is outside the project limits and would not be impacted. Emergency response impacts are discussed in the section below titled *Fire Stations, Police Stations, and Emergency Medical Services (EMS)*.

Alternative 4NB2

The findings are the same as above for Alternative 6D.

Schools

No-Build Alternative

The No Build Alternative would have no impact on any schools or their access.

Alternative 6D (Preferred Alternative)

The Jennings County School District serves all of Jennings County. However, there are no school facilities within the study area. Adjacent roads and cross-streets are used for bussing students. There will be coordination with the Jennings County School District prior to construction to determine any impacts to bus routes and to establish detours if needed.

Alternative 4NB2

The findings are the same as above for Alternative 6D.

Parks and Recreational Facilities

No-Build Alternative

The No Build Alternative would have no impact on park or recreational facilities.

Alternative 6D (Preferred Alternative)

Based upon GIS analysis and field surveys it was determined there are no parks or recreational facilities that would be impacted by this alternative.

Alternative 4NB2

Selmier State Forest and St. Anne's Golf Course are within the project area for this alternative and would be impacted. The alignment would cross through approximately 2 acres of the forest at its northwest corner. The roadway would be directly adjacent to St. Anne's Golf course and would have the potential to cause impacts under Section 4(f). These impacts and potential mitigation are discussed in Chapter 6. No mitigation measures were developed since Alternative 4NB2 was not selected as the Preferred Alternative.

Utilities

No-Build Alternative

The No Build Alternative would have no impact on utilities.

Alternative 6D (Preferred Alternative)

Utilities for North Vernon are serviced by various providers as follows: Cable/Telephone - Comcast Cable Seymour Cable, Frontier Communications, SEI Communications; Electric – Duke Energy, Southeastern Indiana REMC Electric; Water – Jennings Water Inc., Rose Acre Farms; Sanitary/Storm Sewer – North Vernon Municipal Utilities; Fiber Optic – Cinergy Metronet; and Gas – Midwest Natural Gas Corporation. Following are the proposed utility impacts for Alternative 6D:

- CR 75W – Five parcels would need to be cleared for the relocation of utilities. The relocated utilities would be along the new right-of-way outside the construction limits.
- CR 250N – Two parcels would need to be cleared for relocation of the Jennings Water Main and Frontier Communication lines. These utilities would be relocated following the new north right-of-way line outside the construction limits. One parcel must be cleared for the relocation of a Hoosier Energy transmission pole, which would be relocated to the east just outside the limited access right-of-way.
- CR 20W – Relocation of Duke Energy poles would require the clearing of two parcels. The relocated poles would follow the new right-of-way lines. Frontier Communications would relocate along the east right-of-way of CR 20W and would require two parcels to be cleared.
- Base Road – Utilities would terminate their facilities at the south right-of-way of the new East Bypass right-of-way.
- East Connection at Deer Creek Road – Three parcels would need to be cleared for Jennings Water, Frontier Communications, and SEI Communications. They would be relocated along the north side of new East Bypass right-of-way. It is possible the MUTC Force Main and Rose Acre Farms Water may need to relocate along the south right-of-way line of the new East Bypass right-of-way requiring one parcel to be cleared.

- Connection of existing U.S. 50 to Alternative 6D - The utilities would be relocated outside the proposed roundabout and would require two parcels to be cleared.

Alternative 4NB2

The utility service providers are the same as Alternative 6D. A detailed utility survey was not conducted for Alternative 4NB2 since it was not selected as the Preferred Alternative. A utility substation on CR 350 N is within the project area for this alternative and would be impacted. In the preliminary alternatives screening process, it was determined there would be a low to medium impact upon utilities for this alignment.

Fire Stations, Police Stations, and Emergency Medical Services (EMS)

No-Build Alternative

The No Build Alternative would have no impact on fire, police or EMS facilities or operations.

Alternative 6D (Preferred Alternative)

The North Vernon/Center Township Fire Department has two fire stations located within the City of North Vernon, providing fire protection and life support non-transport services, as well as rescue and hazardous materials incident responses. Neither of these fire stations is located within the project area. This department also provides automatic aid to the five surrounding fire jurisdictions.

Incidents within the project area are covered by either the North Vernon Police Department or the Jennings County Sheriff. No police or sheriff stations are located in the project area.

St. Vincent Jennings Hospital provides health and emergency services the City of North Vernon and Jennings County. A network of ambulance and medic services are available to assist in emergency calls to the project area. Emergency responders include: the North Vernon Fire Department, local township fire departments, and St. Vincent Jennings Hospital.

Alternative 6D would not result in direct impacts to fire stations, police stations, or EMS facilities. Due to the network of adjacent roadways, there is not likely to be a notable increase emergency response time throughout the project area. A Transportation Management Plan will be developed during final design and reviewed with local emergency response agencies to minimize impacts.

Alternative 4NB2

The findings are the same as above for Alternative 6D.

Religious Institutions

No-Build Alternative

The No Build Alternative would have no impact on religious institutions.

Alternative 6D (Preferred Alternative)

The two religious institutions within the study area boundary are Lord of Life Lutheran Church and First Apostolic Church. Right-of-way for the property of Lord of Life Lutheran Church was previously acquired at SR 3 for the West Bypass project. The East Bypass project would not

result in any additional impacts to this property. Although First Apostolic Church is within the study area for the project, it would not be impacted. It is located adjacent to the eastern terminus of Alternative 6D.

Alternative 4NB2

The findings are the same as above for Alternative 6D.

Libraries

No-Build Alternative

The No Build Alternative would have no impact on libraries.

Alternative 6D (Preferred Alternative)

The closest library is the Jennings County Public Library at 2375 North SR 3, which is approximately 0.70 miles west of the study area boundary and would not be impacted.

Alternative 4NB2

The findings are the same as above for Alternative 6D.

4.4 ENVIRONMENTAL JUSTICE

In accordance with Executive Order 12898 (February 11, 1994), population and income data were assessed for relevance to potential environmental justice (EJ) concerns. There are three fundamental EJ principals:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations of EJ concern.

Methodology

To determine if the proposed project would result in any disproportionate EJ impacts, an analysis was conducted for both project alternatives using the EJ guidelines set by INDOT.

The *INDOT Procedural Manual for Preparing Environmental Documents* (INDOT, 2008a) requires a full EJ analysis to identify minority and low-income populations when a project involves either: two or more relocations; or 0.5 acre or more right-of-way. Alternative 6D would result in 12 residential relocations and 1 business relocation. Alternative 4NB2 would result in 17 residential relocations and 3 business relocations. The Community of Comparison (COC) is Jennings County, Indiana. The Affected Community (AC) for each alternative includes the Census tracts that the project limits fall within. For Alternative 6D, Census tracts 9602, 9603.02, and 9605 comprise the AC; and for Alternative 4NB2 Census tracts 9602 and 9603.02 comprise the AC.

To determine if minority or low-income populations of EJ concern are present in the proposed project area, the following guidelines were applied from the Procedures Manual:

- Does the AC have more than a 50% minority or low-income population; or
- Is the minority or low-income population 25% higher than the respective populations in the COC?

If the value for the AC exceeds either of these thresholds in comparison with the COC, EJ populations are presumed to be present in the proposed project area. The supporting documentation including a map of the AC and COC, as well as source data tables B17001 and B03002, are in Appendix K (see pages 10-14).

Environmental Consequences

Low-Income Populations

According to the U.S. Census, 12.15% of the Jennings County population is below the poverty level, resulting in a COC Threshold of 15.19%. Table 6 provides a summary of income data for the COC and the three census tracts affected by the build alternatives. As shown, Census Tract 9605 exceeds the COC Threshold and is, therefore, considered to have a low-income EJ population.

TABLE 6: LOW-INCOME POPULATION EJ ANALYSIS

Location	Total Population	Population Below Poverty Level	Percentage of Total Population Below Poverty Level	125% COC Threshold	
Community of Comparison (COC)					
Jennings County, Indiana	28,006	3,403	12.15%	15.19%	
Affected Community (AC)					**EJ Population**
Census Tract 9602	5,505	551	10.01%	-	No
Census Tract 9603.02	4,636	443	9.56%	-	No
Census Tract 9605	2,787	504	18.08%	-	Yes

Source: U.S. Census Bureau, 2007-2011 American Community Survey, Table B17001

Minority Populations

According to the US Census, 4.02% of the Jennings County population belongs to an identified minority group, resulting in a COC Threshold of 5.02%. Table 7 provides a summary of minority data for the COC and the three census tracts affected by the build alternatives. As shown, Census tracts 9603.02 and 9605 exceed the COC Threshold and are, therefore, considered to have minority EJ populations.

TABLE 7: MINORITY POPULATION EJ ANALYSIS

Location	Total Population	Minority Population	Minority Population Percentage	125% COC Threshold	
Community of Comparison (COC)					
Jennings County, Indiana	28,441	1,143	4.02%	5.02%	
Affected Community (AC)					**EJ Population**
Census Tract 9602	5,660	219	3.87%	-	No
Census Tract 9603.02	4,687	332	7.08%	-	Yes
Census Tract 9605	2,787	141	5.06%	-	Yes

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates for 2007-2011, Table B03002

No-Build Alternative

The No-Build Alternative would not result in any impacts to EJ populations.

Alternative 6D (Preferred Alternative)

Alternative 6D is located within all three Census tracts identified in Tables 6 and 7, including tracts 9603.02 and 9605, which contain EJ populations. Upon determining that EJ populations are present within the project limits for both alternatives, the next step is to establish whether the proposed project would result in a disproportionate adverse effect for the EJ populations. If a significant number of relocations would affect an EJ population and those same impacts do not affect a population that is not minority or low-income, there might be a disproportionate EJ impact.

Alternative 6D would relocate nine residences located within Census tracts with an EJ population and 4 residences in a Census tract that does not have an EJ population (see Table 8). The single business relocation that would occur with Alternative 6D is located within a Census tract with an EJ population. The Project Team notified the business owner about the potential relocation and they relocated their business before the acquisition process commenced.

In Census Tract 9603.02 there would be 2 residential relocations out of a total of 3,065 households. In Census tract 9605 there would be 7 residential relocations out of a total of 1,181 households. Given the small number of residential relocations compared to the total number of households, it is not anticipated the relocations would disrupt community cohesion. As noted in Chapter 4.1.2 Community Cohesion/Accessibility, the project would result in improved accessibility for residents with minor localized changes, as well as maintain a connection to amenities in Downtown North Vernon. Additionally, the number of EJ population relocations is not substantially more than the number of relocations for non-EJ populations. The proposed project would not result in a disproportionate adverse effect. No further EJ analysis is required for Alternative 6D.

TABLE 8: RELOCATIONS EJ ANALYSIS - ALTERNATIVE 6D

Census Tract	Residential Relocations	Business Relocations	EJ Population Census Tract
Census Tract 9602	4	0	No
Census Tract 9603.02	2	0	Yes
Census Tract 9605	7	1	Yes
Total Relocations	**13**	**1**	
EJ Tract Relocations	**9**	**1**	
Percent EJ Tract Relocations	**69%**	**100%**	

Alternative 4NB2

Alternative 4NB2 is located within Census tracts 9602 and 9603.02, the latter of which exceeds the COC Threshold for both low-income and minority populations. As shown in Table 9, Alternative 4NB2 would relocate one residence and no businesses within Census tracts with an EJ population.

In Census tract 9603.2, there would be 1 residential relocation out of a total of 3,065 households, so it is not anticipated the relocation would disrupt community cohesion. The project would result in improved accessibility for residents, as well as maintain a connection to amenities in Downtown North Vernon. Since the number of minority or low-income population relocations is not substantially more than the number of relocations for populations that are not minority or low-income, the proposed project would not result in a disproportionate adverse effect. No further EJ analysis is required for Alternative 4NB2.

TABLE 9: RELOCATIONS EJ ANALYSIS - ALTERNATIVE 4NB2

Census Tract	Residential Relocations	Business Relocations	EJ Population Census Tract
Census Tract 9602	17	3	No
Census Tract 9603.02	1	0	Yes
Total Relocations	**18**	**3**	
EJ Tract Relocations	**1**	**0**	
Percent EJ Tract Relocations	**6%**	**0%**	

On March 5, 2013 the Project Team consulted with INDOT Environmental Services and the Title VI Program Manager to discuss the results of the EJ analysis. All parties concurred that the project would not have a disproportionate impact upon the EJ populations.

4.5 ECONOMIC IMPACTS

This section evaluates the potential impacts of the project on employment and the tax base in the project area for each of the build alternatives.

Employment across the State of Indiana has experienced limited growth over the last decade with the more recent upturn only recently growing the economy to pre-recession levels. Employment in Indiana in 2012, at 3,149,743 persons, was 1 percent higher than in 2000. Over the same period, employment in Jennings County decreased by 6 percent, from 14,289 to 13,386 persons. Besides general economic conditions, a major factor in this trend is the aging work force in the region. In comparison with other counties in the state, Jennings county ranked 64th in median household income ($42,577) in 2012 (Indiana Business Research Center, 2013).

Table 10 illustrates that manufacturing, education and health services, and retail are the primary areas of employment in the project area. Manufacturing employment accounts for approximately one quarter of the employment in the project area. Furthermore, the unemployment rate was higher in the project area (10.1 percent) than the State (8.4 percent) in the year 2012.

TABLE 10: EMPLOYMENT CHARACTERISTICS SUMMARY (2012)

	Employed Persons	Unemployment Rate	Employment Category				
			Manufacturing	Education and Health	Retail	Agriculture	Other
State of Indiana	3,252,980	8.4	17.1	21.0	11.1	0.5	41.9
Jennings County	13,690	10.1	24.4	1.2	9.9	NR	66.5

NR: Not reported to avoid disclosure of confidential information

Source: Indiana Buisness Research Center, 2013

Land use within the project area consists primarily of small to medium sized agricultural fields and rural home lots in the eastern portion of the study area and more urban/rural fringe development in the western portions of the study area. Section 4.2 provides additional detail regarding land use in each of the build alternative corridors. Table 11 presents a summary of assessed property values in Jennings County. As shown, residential uses make up approximately half of all property value in the County; however, due to differing tax rates and exemptions available to different land uses, residential uses generate only about one-quarter of tax revenue in Jennings County.

TABLE 11: JENNINGS COUNTY ASSESSED PROPERTY VALUES BY LAND USE (2012)

Property Type	Gross Assessed Value	Percent of Total Value	Taxes Paid by Land Use	Percent of Tax Revenue
Homesteads	$719,333,149	51.4%	$4,900,000	25.9%
Other Residential	$131,328,000	9.4%	$2,700,000	14.3%
Ag Business/Land	$201,118,900	14.4%	$3,700,000	19.6%
Business Real/Personal	$348,489,076	24.9%	$7,600,000	40.2%
TOTAL	**$1,400,269,125**	**100.%**	**$18,900,000**	**100.0%**

Source: Indiana Legislative Services, 2013

Methodology

Employment impacts were estimated based on the businesses identified as being relocated in Section 4.1.1. Limited data was available regarding the number of employees at each business and were estimated based on the type and size of the business.

Tax base impacts were estimated based on the right-of-way impacts (i.e., property removed from the County's tax roll) identified in Section 4.2 as a percentage of the overall County tax base. A parcel-by-parcel evaluation was not conducted.

Environmental Consequences

No-Build Alternative

Because the No-Build Alternative would require no right-of-way or business relocations, it would result in no economic impacts.

Alternative 6D

As described in Section 4.1.1, Alternative 6D would result in the relocation of one business, Bill Barlow Wholesale, which employs an estimated 2 to 3 workers. This business would likely relocate within Jennings County.

As described in Section 4.2, Alternative 6D would remove approximately 175 acres of land from the Jennings County tax rolls. This would reduce the total county tax revenue by approximately $44,000 or approximately 0.23 percent.

These impacts are summarized in Table 12.

TABLE 12: ECONOMIC IMPACTS OF BUILD ALTERNATIVES

	Alternative 6D (Preferred Alternative)	Alternative 4NB2
Employees Relocated	2-3	30-40
Tax Revenue Loss	$43,969	$72,947
Share of Total County Revenue	0.23%	0.39%

Alternative 4NB2

Alternative 4NB2 would result in the relocation of three businesses, which together employ 30-40 employees. With available land in the area, it is anticipated that these businesses would relocate within Jennings County with no net change in employment.

As described in Section 4.2, Alternative 4NB2 would acquire approximately 344 acres of new right-of-way. Approximately six acres of this property is State-owned property at Selmier State Forest. Because the State does not pay property taxes on its land, Alternative 4NB2 would remove approximately 338 acres of land from the Jennings County tax rolls. This would reduce the total county tax revenue by approximately $73,000 or approximately 0.39 percent.

Mitigation

As noted above, it is anticipated that the relocation of businesses would have no net impact on employment in Jennings County. While acquisition of right-of-way would remove property from the County's tax rolls, construction of the bypass would support the County's plan for development in the area, which would at least partially offset this revenue loss.

4.6 CULTURAL RESOURCES

Cultural resources are discussed here in terms of archeological resources, including both prehistoric and historic; architectural resources; and Native American resources. Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for traditional, religious, scientific, or any other reason.

Methodology

Procedures for the identification, evaluation, and treatment of cultural resources are contained in a series of Federal and State laws and regulations and agency guidelines. Archaeological, architectural, and Native American resources are protected by a variety of laws and their implementing regulations: the National Historic Preservation Act (NHPA) of 1966, as amended in 2006; the Archeological and Historic Preservation Act of 1974; the Archaeological Resources Protection Act (ARPA) of 1979; the American Indian Religious Freedom Act (AIRFA) of 1978; and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. The Advisory Council on Historic Preservation (ACHP) further guides treatment of archaeological and architectural resources through the Protection of Historic Properties (36 CFR 800) regulations.

Due to its nature and the involvement of Federal funds, this project qualifies as an "undertaking" as defined in 36 CFR 800.16(y). As a result, the project is under the purview of Section 106 of the NHPA, which governs federal actions that could affect historic properties. Historic properties, as defined under Section 106 of the NHPA, are the subset of cultural resources listed in or eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 requires federal agencies to take into account the effects of their undertakings, including licensing and approvals, on NRHP-eligible resources and to afford the ACHP and other interested parties a reasonable opportunity to comment. The significance of historic properties is assessed by the resource's ability to meet at least one of the four criteria for inclusion in the NRHP (36 CFR 60.4):

- Criterion A: Association with events that made a significant contribution to the patterns of our history.
- Criterion B: Association with the lives of persons significant in our past.
- Criterion C: Sites that embody characteristics of a type, period, or methods of construction or that represent the work of a master, possess high artistic value, or represent a distinguishable entity.
- Criterion D: Have yielded, or may be likely to yield, information important to prehistory or history.

Resources may be eligible for the NRHP for contribution at the national, state, or local level. In order for a structure to be listed in the NRHP, it must possess physical integrity of those

features necessary to convey its significance in accordance with NRHP guidelines; these include location, design, setting, workmanship, materials, feeling, and association.

Area of Potential Effect

The Area of Potential Effect (APE) was established in coordination with the Indiana Department of Natural Resources-Division of Historic Preservation and Archaeology (DHPA). INDOT has defined the APE to consist of an area north and east of the city of North Vernon, roughly bordered by CR 400 North to the north, U.S. 50 to the south, CR 275 East to the east, and SR 3 to the west. Generally, there is a buffer of a quarter mile around the proposed project area, with exceptions given to heavily built or wooded areas, with less of a buffer, and wide open spaces with more. Overall, the APE is 2.93 miles from north to south, and 5.03 miles from east to west. A map depicting the APE is presented in Appendix E (see page 67).

Coordination with Consulting Parties

DHPA, the State Historic Preservation Officer (SHPO) in Indiana, FHWA, and INDOT are automatically included as consulting parties in the Section 106 process. The organizations or groups shown in Table 13 were invited, in writing, to participate in the Section 106 process as consulting parties (see Appendix E, pages 1-2 for a sample of the invitation letter).

TABLE 13: POTENTIAL CONSULTING PARTIES FOR THE U.S. 50 EAST BYPASS PROJECT

Organization	Status
Indiana Landmarks	Consulting Party
Harold Campbell, Mayor of North Vernon	Consulting Party
Area Planning Commission	Consulting Party
Jennings County Preservation Association	No response
Jennings County Historical Society	No response
Jennings County Historian	No response
North Vernon Parks & Recreation	No response
Jennings County Board of Commissioners	No response
Southeastern Indiana Regional Planning Commission	No response
Peoria Tribe of Indians in Oklahoma	No response
Miami Tribe of Oklahoma	No response
Delaware Tribe of Western Oklahoma	No response

These parties were provided with response postcards with which to accept or decline the invitation to be a consulting party. Greg Sekula of Indiana Landmarks, Mayor Harold Campbell of North Vernon, and Cheryl Trisler of the Area Planning Commission accepted consulting party status (Appendix E, pages 17-22). The consulting parties were each provided with a copy of the Historic Properties Report (HPR) and invited to submit comments within 30 days; no comments

were received. On May 29, 2013, SHPO and the three other consulting parties were provided a copy of the Effect Finding and Draft Memorandum of Agreement (MOA). On June 28, 2013, SHPO concurred with the finding of Adverse Effect for the undertaking and provided comments and recommendations on the Draft MOA. INDOT and FHWA-IN updated the Draft MOA as requested. No comments on the Effect Finding or the MOA were received from other consulting parties. The Final MOA was approved by INDOT on September 17, 2013, approved by SHPO on October 16, 2013, and approved by FHWA on October 23, 2013, which completes the Section 106 process (Appendix E, pages 185-194)..

Archaeology

A Phase Ia Archaeological Reconnaissance Survey of the East Bypass was conducted for Alternatives 6D and 4NB2 in October to November 2012 by Gray & Pape, Inc. and ASC Group, Inc. (Picklesimer, 2013). The survey resulted in the identification of 101 archaeological resources including four previously documented sites (Sites 12JN255, 12JN495, 12JN501, and 12JN560) and 97 previously undocumented cultural resources. Of the 101 archaeological resources, 31 are prehistoric isolates; 44 are prehistoric sites (lithic scatters); 8 are historic sites (scatters); and 18 are multi-component sites. Sixty-eight (Sites 12JN255, 12JN495, 12JN501, 12JN560, 12JN562, 12JN589 - 12JN634, and 12JN641 - 12JN665) were identified in segments associated with Alternative 4NB2; 22 (Sites 12JN566 - 12JN587) were identified in segments associated solely with Alternative 6D; 11 identified resources (Sites 12JN563 - 565, 12JN588, 12JN635 - 640, and 12JN658) are located in segments shared by both proposed alignments.

The majority of resources are not considered eligible for the NRHP. Only six are recommended as potentially eligible: three lithic scatters (Sites 12JN577, 12JN602, and 12JN649); one historic site (12JN651); and two sites with both prehistoric and historical components (Sites 12JN255 and 12JN578). Four of the six NRHP-eligible sites are located in or near the proposed alignment for Alternative 4NB2; two are located in the alignment for Alternative 6D (Table 14).

The Phase Ia survey report was submitted to SHPO for concurrence on the recommendations for eligibility. In a letter dated February 15, 2013, SHPO concurred with the recommendations of the Phase Ia Archaeological Reconnaissance Survey report, but required additional information on Site 12JN594. The report was revised to provide clarification. SHPO concurred with the revisions to the report in a letter dated March 18, 2013 (Appendix E, page 168).

TABLE 14: NRHP-ELIGIBLE ARCHAEOLOGICAL SITES BY ALTERNATIVE

Site Number	Site Type	Temporal Association	Alignment Alternative
12JN255	Cemetery and Church Foundation	Multi-component; only historic component potentially eligible	4NB2
12JN577	Lithic scatter	Prehistoric	6D
12JN578	Lithic scatter	Multi-component; only prehistoric component potentially eligible	6D
12JN602	Lithic scatter	Prehistoric	4NB2
12JN649	Lithic scatter	Prehistoric	4NB2
12JN651	Artifact scatter and architectural remnants associated with a farmhouse/residence circa (ca.) later 19th to early 20th century	Historic	4NB2

Site 12JN255. Site JN255 is a multi-component site consisting of a prehistoric lithic scatter, and a mid- to late- nineteenth century component consisting of a historical artifact scatter related to a church foundation, an associated well, and a cemetery with a single identified grave. This archaeological site has both prehistoric and historic components, but only the historic component is NRHP-eligible. Site 12JN255 was first recorded as the Rickeson Cemetery, a nineteenth century historical site consisting of a single interment with a nearby small foundation located within the Selmier State Forest (Ariens 2008a). The structural remains and artifacts were determined to be associated with the Zoar Baptist Church, the first Baptist Church in Jennings County, moved to the present location in 1847. The grave is one of the Church's early pastors, S. Rickeson, who was interred at this location in 1859.

During the Phase I survey for the current project both the gravesite and foundation were re-identified and an infilled well was newly discovered. The grave is located within 350 feet of the church foundation. The well is located within 50 feet of the foundation.

Although cemeteries and churches are not typically eligible for inclusion on the NRHP, the undisturbed archaeological deposits associated with the historic component of this site possess the potential to provide artifacts and other data sets that may yield information concerning both the secular and religious lifeways of mid-nineteenth century Jennings County. The site is considered eligible for the NRHP under Criterion D. In addition, Indiana State law requires the development and approval of an archaeological plan for any government undertaking that will disturb ground within 30.5 m (100 feet) of a burial ground (IC 14-21-1-26.5). It is assumed that the burial ground associated with Site 12JN255 is restricted to the single marked grave for S. Rickeson; however, it is not uncommon for early historic cemeteries to contain unmarked burial plots.

Site 12JN577. Site 12JN577 is a large prehistoric lithic scatter identified during surface inspection. The site measures approximately 145 m by 84 m (476 feet by 276 feet) and is located on a strath terrace west of the Vernon Fork of the Muscatatuck River. A total of 194

prehistoric artifacts, consisting of lithic debitage, cores, a projectile point/knife, bifaces, retouched flakes, and fire cracked rock (FCR), were recovered from the site. The recovered artifacts are mostly of locally available material (chert). The artifact assemblage indicates various activities were conducted at Site 12JN577. The site overlooks the Vernon Fork of the Muscatatuck River and may have been used for lithic processing and tool production, as well as hunting/food processing. Overall, a moderately high density of cultural material, diversity of activities, and discrete activity loci as shown by the artifact assemblage indicate the site has the potential to provide significant information concerning the prehistoric occupation of the area; the site is considered eligible for the NRHP under Criterion D.

Site 12JN578. Site 12JN578 is a multi-component site but only the prehistoric component is NRHP-eligible. The site measures approximately 150 m by 77 m (492 feet by 253 feet) and is located on a strath terrace south of the Vernon Fork of the Muscatatuck River. A total of 229 prehistoric artifacts, consisting of lithic debitage (n=226), cores (n=2), and a retouched flake, were recovered from the plowzone during the investigation. Additional artifacts recovered consist of two cores and one uniface. The recovered artifacts are mostly of locally available cherts.

The prehistoric artifact assemblage indicates lithic reduction was conducted at the site, possibly a lithic workshop, and limited food processing activities as evidenced by the classes of debitage and cores. The moderately high number of artifacts and large number of positive shovel tests along with the occurrence of several activities as shown by the artifact assemblage indicate that the prehistoric component of the site has the potential to provide significant information concerning the prehistoric occupation of the area. The site is considered eligible for the NRHP under Criterion D.

Site 12JN602. Site 12JN602 represents a large high density lithic scatter. The site is located on ridges overlooking the Vernon Fork of the Muscatatuck River. The site measures approximately 270 by 135 m (885.8 by 442.9 feet). The debitage classes recovered during the investigation suggest that biface manufacturing and maintenance were taking place. The abundance of recovered artifacts, the size of the site, and the proximity of the site to the Vernon Fork of the Muscatatuck River indicates that this was a frequently visited location among prehistoric groups of the region. The lack of diagnostic artifacts recovered prevents an interpretation of whether the site's assemblage is associated with a single, intense settlement or is the result of numerous short-term occupations associated with specific resource acquisition activities. The prehistoric occupation at this site is of an unknown temporal or cultural affiliation with deposits identified in both the upper stratum and the underlying subsoil. The high density and diversity of the artifact assemblage and potential for intact buried features or cultural deposits suggests that the site may contain data that can address research questions regarding local and regional topics. The site is considered eligible for the NRHP under Criterion D.

Site 12JN649. Site 12JN649 is a large lithic scatter located on a ridgetop and bench and covers an area measuring approximately 210 by 90 m (689 by 295 feet). All of the artifacts were recovered from the plowzone. The artifact assemblage recovered from Site 12JN649 provides a few insights into the function of the site. However, the majority of the debitage (n=230) could not be assigned to any particular stage of the lithic reduction sequence. The remaining debitage classes recovered during the investigation suggest that biface manufacturing and maintenance

were taking place. The presence of the chipped stone tools and FCR, coupled with the size of the site, and the proximity of the site to a permanent water source, indicates that this site either represents a more permanent occupation or a location subject to multiple occupations throughout prehistory. The lack of temporally diagnostic artifacts in the assemblage does not allow for a more precise determination of site function and affiliation. Several areas of more substantial artifact concentration were noted during the current investigations. These areas of artifact concentrations may represent either specific activity areas or distinct, separate occupations within the defined site boundaries. The high density and diversity of the artifact assemblage, the identification of distinct activity area and/or occupation zones, and potential for intact buried features or cultural deposits suggests that the site may contain data that can address research questions regarding the prehistoric occupation of the region. The site is considered eligible for the NRHP under Criterion D.

Site 12JN651. Site 12JN651 is a low density historical scatter with architectural remnants associated with a farmhouse/residence dating from the late nineteenth to twentieth centuries. Architectural features noted at this site include foundations associated with a probable farmhouse, the associated privy, root cellar, and two additional unidentified outbuildings. The presence of a number of synthetic artifacts and the mid- to late twentieth century appliances noted in the vicinity suggest that the occupation at Site 12JN651 occurred primarily during the early to mid-twentieth century. Although it is likely that the historical occupation of this site dates primarily to the twentieth century, the extant features identified at the site indicate it may possess significant data concerning the historical occupation of the region. The site is considered eligible for the NRHP under Criterion D.

Architectural Resources

A survey of architectural resources in the APE was conducted and reported on in a HPR. The survey was conducted in November 2012 by the ASC Group, Inc. All buildings and structures 45 years of age or older in the APE were photographed, recorded on maps, assigned an Architectural Location (AL) number, and evaluated for National Register of Historic Places (NRHP) eligibility. Examination of the *Jennings County Interim Report* (Historic Landmarks Foundation of Indiana [HLFI], 1989) identified 14 previously inventoried properties within the APE (of which eight have been demolished since the publication of the interim report) and rated resources as Contributing, Notable, and Outstanding but did not formally evaluate resources for NRHP eligibility. No properties previously listed in the NRHP or the Indiana Register of Historic Sites and Structures are located in the APE.

As part of the current survey, 123 properties 45 years of age or older were identified within the APE. Of these, three properties are recommended eligible for the NRHP: the Frank Selmier House (AL001 [079-087-20005]), and two Baltimore & Ohio (B&O) Railroad bridges (AL003 [079-097-20021] and AL004) (Table 15). In a letter dated February 11, 2013, SHPO concurred that the Frank Selmier House, the B&O Railroad Bridge over CR 75 East, and the B&O Railroad Bridge over CR 175 North and the Vernon Fork of the Muscatatuck River are eligible for inclusion in the NRHP (Appendix E, page 147). One additional resource, the U.S. 50 Bridge over the Vernon Fork of the Muscatatuck River (Bridge No. 050-40-00917C), was identified by SHPO as potentially occurring in the APE and having been determined eligible for inclusion in the NRHP

as a result of a prior Section 106 review. The bridge was confirmed to be located within the APE, and the bridge was added to the list of historic properties.

TABLE 15: NRHP ELIGIBLE ARCHITECTURAL RESOURCES IN THE APE

Resource Name	AL Number	Indiana Historic Sites and Structures Inventory Number	Resource Description	Date of Construction	Alignment Alternative
Frank Selmier House	AL001	079-087-20005	Residential complex	1921-1924, altered ca.1940s-50s	4NB2
B&O Railroad Bridge over CR 75 East	AL003	079-097-20021	Railroad bridge over road	1847 (abutments); 1900 (steel girders)	6D
B&O Railroad Bridge over CR 175 North and the Muscatatuck River	AL004		Railroad bridge over road and water	1847 (abutments); unknown steel girders	6D
U.S. 50 Bridge over the Vernon Fork of the Muscatatuck River		050-40-00917C	Road bridge over water; NBI No. 18680		6D

The Frank Selmier House (AL001 [079-087-20005]). The property is located within the Selmier State Forest, which is named after the Selmier family, who donated the land for the state forest. Frank Selmier was the owner of a local laundry service; when he died, his wife gave the home and land to the state of Indiana (Jennings County Historical Society 2005). The property includes several buildings, including the main residence, a detached garage, maintenance buildings and a pyramidal-roofed building that houses the forester's office. The primary building is a one-and-one-half-story house with a stone foundation, wood clapboard siding, stone masonry walls, and an asphalt shingle roof. The landscape around the property also includes a stone bridge and stone shelters at the entrance of the property. According to the Jennings County GIS Website, the property's date of construction is 1921.

The building is a Craftsman-style house, which is not common in the area, and exhibits the use of limestone block walls to make the house look more rustic. According to the *Jennings County Interim Report* (HLFI 1989), the property was given a rating of Notable. The building is a good representative of its architectural style and resembles what it looked like when it was first built, so the building retains integrity. The property also has contributing elements that make it significant, such as stone shelters and a bridge, which appear to be built out of local materials similar to the house and garage. AL001 is recommended eligible for the NRHP as a significant example of its type under Criterion C. This resource includes the house and the surrounding buildings, including its outbuildings and contributing structures.

Baltimore & Ohio Railroad Bridge over CR 75 East (AL003 ([079-097-20021]). This single-span steel railroad bridge carries the former B & O Railroad across CR 75 East. The bridge has its original limestone abutments, which were built when the railroad was constructed in 1847. The steel superstructure of the bridge was manufactured by the Bethlehem Steel Company around 1900. It is a girder bridge, a typical form of bridge construction in the early to mid-twentieth

century. As the bridge serves as a railroad bridge, the bridge is not listed in the Indiana Historic Bridges Inventory. According to the *Jennings County Interim Report* (HLFI 1989), the resource's rating is listed as Notable, a rating that would likely stand today. The property does resemble its original appearance and retains its historic integrity. The bridge, including abutments and decking, is recommended eligible under Criterion A for its association with the historic context of transportation at the local level, providing an important railroad route that was partially responsible for the founding of Jennings County's biggest town, North Vernon.

Baltimore & Ohio Railroad Bridge over CR 175 North and the Muscatatuck River (AL004). This two-span steel railroad bridge carries the former B & O Railroad across the Vernon Fork of the Muscatatuck River and CR 175 North. The bridge has its original limestone abutments over the Vernon Fork of the Muscatatuck River, and concrete abutments on the span over CR 175 North. The original bridge abutments were built when the railroad was constructed in 1847, and a stone center pier holds up the bridge. The superstructure consists of steel girders. The bridge, including abutments and decking, is recommended eligible under Criterion A for its association with the historic context of transportation at the local level, providing an important railroad route that was partially responsible for the founding of North Vernon. The bridge is also eligible under Criterion C for its engineering.

U.S. 50 Bridge over the Vernon Fork of the Muscatatuck River (Bridge No. 050-40-00917C; NBI No. 18680). This bridge is a reinforced concrete open spandrel arch bridge and was determined eligible for inclusion in the NRHP in January 2008 under Criterion C for engineering for another INDOT project (Des. No. 0600607). The bridge is significant due to the rarity of the bridge type in Indiana and its rather unique status as the first and only open spandrel bridge in the state to be widened by the addition of a segmental box girder.

Environmental Consequences

In this EA, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with CEQ regulations that implement NEPA. These impact analyses are intended to comply with the requirements of both NEPA and Section 106 of the NHPA. In accordance with the ACHP regulations implementing Section 106 (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by (1) determining the APE; (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the NRHP; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the ACHP's regulations, a determination of either adverse effect or no adverse effect must be made for affected NRHP listed or eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the build alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). Adverse effects on historic properties would include, but not be limited to:

1. Physical destruction, damage, or alteration of all or part of the property;

2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP;
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
4. Neglect of a property resulting in its deterioration or destruction; and
5. Transfer, lease, or sale of the property (36 CFR 800.9[b]).

A determination of no adverse effect means that historic properties are present, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

For the purposes of this EA, a significant impact under NEPA is defined as an "unresolvable" adverse effect under Section 106 of the NHPA. "Unresolvable" adverse effects may occur when the terms of mitigation cannot be agreed upon, or if the NHPA Section 106 process is foreclosed due to an inability to reach agreement.

Documentation and Findings

A separate Effect Finding document, prepared in compliance with 36 CFR 800.11(e), was approved by FHWA-IN on May 13, 2013 to analyze effects to historic properties under Alternative 6D, the Preferred Alternative, for the project (see Appendix E, pages 170-173). The Effect Finding is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the Preferred Alternative) on cultural resources, based upon the criteria of adverse effect found in the ACHP's regulations. A list of the historic properties and findings are in Table 16.

TABLE 16: HISTORIC PROPERTIES BY U.S. 50 BYPASS ALIGNMENT ALTERNATIVE

4NB2		6D	
Site Number/Resource Name	**Effect**	**Site Number/Resource Name**	**Effect**
12JN255	No adverse effect	12JN577	Adverse effect
12JN602	No adverse effect	12JN578	Adverse effect
12JN649	Adverse effect	B&O Railroad Bridge over CR 75 East	No adverse effect from potential visual intrusion (within 300 ft)
12JN651	Adverse effect	B&O Railroad Bridge over CR 175 North and the Muscatatuck River	No adverse effect - potential visual intrusion (within 1,250 ft)
Frank Selmier House	No adverse effect – potential visual intrusion	U.S. 50 Bridge over the Vernon Fork of the Muscatatuck River	No adverse effect - potential visual intrusion (within 200 ft)

No-Build Alternative

Implementation of the No-Build Alternative would result in no adverse impacts to archeological resources or architectural resources because no roadway construction would occur. No studies to identify or evaluate resources are required under the No-Build Alternative.

Alternative 6D (Preferred Alternative)

Five resources eligible or potentially eligible for the NRHP occur in the proposed alignment for Alternative 6D (Table 16). These resources include two archaeological sites (12JN577 and 12JN578) and three architectural resources: two railroad bridges and one highway bridge.

Sites 12JN577 and 12JN578 are located within the footprint of Alternative 6D, the Preferred Alternative, and may be impacted by the implementation of this alternative. Ground disturbing activities including boring for geophysical analysis, excavation, or grading for the proposed roadway would damage or destroy the sites. Prior to ground disturbing activities, these sites would be subject to additional archaeological investigation (Phase II evaluation) to determine if they are eligible for inclusion in the NRHP. Additional investigations and findings will be coordinated with SHPO and the process for their evaluation and subsequent treatment are stipulated in the Final MOA (Appendix E, pages 185-194).

Road improvements under Alternative 6D would occur within approximately 200 to 1,250 feet of the three NRHP-eligible bridges in the APE and would be at least partially visible from the bridges. The construction of the bypass in Alternative 6D would not destroy, damage, alter, or move these structures, but because the proposed new bypass may be within the viewshed of each bridge, it could introduce visual intrusions. The proposed bypass would not change the current use or physical features within the existing rural or suburban setting of each bridge. Further, the settings are not an important aspect of integrity in the NRHP eligibility of each resource. The new bypass would be similar to other roadways currently visible from each bridge and would not introduce any new roadway elements or vertical intrusions, so its construction would not diminish aspects of integrity of the bridge. It is not anticipated that construction of the bypass in Alternative 6D would increase audible, vibration, or atmospheric levels above existing conditions. Further, the bypass construction would not result in neglect of the existing bridges. No impacts to the three NRHP-eligible bridges are anticipated from the construction of the proposed alignment in Alternative 6D. No additional studies are required for these three bridges as part of the proposed project.

Alternative 4NB2

Four resources eligible or potentially eligible for the NRHP occur near proposed alignment for Alternative 4NB2. These resources include four archaeological sites (12JN255, 12JN602, 12JN649, and 12JN651) and one architectural resource, the Frank Selmier House (079-087-20005) (Table 16).

Two of the sites (12JN255 and 12JN602) occur within the APE but are outside the alignment and would not be affected by implementation of Alternative 4NB2. Archaeological sites 12JN649 and 12JN651 are located within the footprint of the proposed alignment for Alternative 4NB2 and would be affected by construction of the bypass. Ground disturbing activities, including boring for geophysical analysis, excavation, or grading for the proposed roadway, would

damage or destroy the sites. Selection of Alternative 4NB2 would require Phase II evaluation to determine if these sites are eligible for inclusion in the NRHP prior to any ground disturbing activity. The findings of the Phase II investigation would be coordinated with SHPO and the process for their subsequent treatment would be outlined.

The Frank Selmier House is on the south side of CR 350 N, immediately south of the proposed alignment for Alternative 4NB2. Stone features at the entrance to the property include stone shelters, short walls, and a sign post that match materials used in the construction of the main residence. These are the only features along CR 350 N that would be visible from the proposed bypass. Because these features occur just outside the alignment, they are not proposed for demolition, alteration, or relocation from roadway construction; however, because of their proximity to the alignment, they could be subject to visual and vibration impacts. Potential visual intrusions to these features would occur with construction of the alternative. The existing setting of the parcel on which the Frank Selmier House was constructed is a rural two-lane county road. Replacement of the rural road with a modern, multi-lane bypass for a major U.S. highway would change the setting of the property, altering an aspect of its integrity. The use of materials, the limestone block walls in particular, to construct the house and surrounding landscape features make the structures appear rustic, reflecting the rural nature of the resource's setting. Vibration from heavy machinery is likely to occur during construction and may result in damage to the stone features from cracking mortar and shifting ground. Vibration from vehicular traffic is also expected to increase when the bypass is built, leading to potential damage to these resources. Selection of Alternative 4NB2 would result in potential adverse effects to features that are part of the Frank Selmier House.

Mitigation

Due to the potential for adverse effects to archaeological sites potentially eligible for the NRHP that would occur under Alternative 6D (the Preferred Alternative), FHWA-IN has determined that a finding of Adverse Effect under Section 106 is appropriate for this undertaking. A Draft MOA was prepared to resolve the potential adverse effects. The Draft MOA includes stipulations for additional investigations to formally evaluate archaeological sites that may be affected by the proposed construction and establish additional treatment measures, if necessary, prior to implementation of the Preferred Alternative. The Effect Finding and Draft MOA were submitted to SHPO and other consulting parties on May 29, 2013 for their review and concurrence on the proposed measures to resolve or mitigate adverse effects (Appendix E, pages 180-183). The ACHP was also provided the Effect Finding and Draft MOA and invited to participate in the resolution of adverse effects on May 17, 2013. On June 13, 2013, the ACHP declined to participate unless requested by SHPO or another consulting party (Appendix E, page 175). The Draft MOA was approved by INDOT on September 17, 2013, by SHPO on October 16, 2013, and by FHWA on October 23, 2013 (Appendix E, page 185). FHWA filed the MOA and supporting documentation for the project with the ACHP on October 24, 2013, pursuant to 36 CFR 800.6(b)(1)(iv). The section 106 process has been completed and the responsibilities of the FHWA under Section 106 have been fulfilled. Resolution of adverse effects to historic properties in compliance with Section 106 of the NHPA would minimize the significance of impacts to these resources under NEPA. A public notice regarding the APE, historic properties identified, and Adverse Effect finding was issued for this project on June 4, 2013 in *The North*

Vernon Sun concurrently with the issuance of these findings to the consulting parties (Appendix E, page 184). A comment period ending July 2, 2013 afforded the public an opportunity to comment on the project and its effects. No comments were received from the public.

Selection of Alternative 4NB2 would require additional coordination with SHPO, Selmier State Forest, and other interested parties to determine appropriate measures to avoid, minimize, or mitigate potential adverse effects from construction of the bypass in this alignment.

4.7 HAZARDOUS MATERIALS & REGULATED SUBSTANCES

Hazardous materials and waste sites, including their use and remediation, are regulated by a number of federal laws, including the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response and Liability Act (CERCLA). Indiana has also enacted state-specific regulations under Indiana Administrative Code (IAC) 327 (Water Pollution Control Board), IAC 328 (Underground Storage Tank (UST) Financial Assurance Board) and IAC 329 (Solid Waste Management Board).

Methodology

The U.S. 50 Red Flag Investigation, included in Appendix K (see page 20) and approved by INDOT on June 25, 2013, provided a review of readily available GIS data layers provided by Indiana Map, Indiana Geological Survey (IGS), and additional data sources including the Indiana Department of Environmental Management (IDEM) UST and Leaking Underground Storage Tank (LUST) lists. This environmental database summary was reviewed to determine the general locations of sites and to provide a preliminary evaluation of the potential for hazardous environmental conditions to exist within the project area. Additional records reviewed included historic aerial photography, topographic quadrangles, and IDEM databases. After compiling all secondary source data along both alternatives, a field review was conducted on the Preferred Alternative to field verify the results of the secondary source review and identify any potential additional concerns. During this field review, all neighboring properties were reviewed to determine whether additional concerns exist in the project area. Hazardous Material Site Visit Forms documenting potential properties of concern are included in Appendix K (see pages 15-19).

Environmental Consequences

No-Build Alternative

The No-Build Alternative would have no effect on the potential hazardous materials/waste sites identified during the hazardous materials screening.

Alternative 6D (Preferred Alternative)

Three properties identified in the Red Flag Investigation are located in the vicinity of Alternative 6D: Metaldyne, Berry Materials Corp. quarry, and a property owned by Dave O'Mara Contractors. Of these properties Alternative 6D would require right-of-way from Berry Materials rock quarry and the property owned by Dave O'Mara Contractors. The field investigation identified a total of five properties that had the potential to contain hazardous materials that lie either within or immediately adjacent to the right-of-way required for Alternative 6D. These properties included the three identified in the RFI as well as two

additional suspect properties, one storage facility along U.S. 50 near the eastern terminus of the bypass and an additional suspect site. A summary of the conditions at each site is included below.

Site 1

Site 1 is the Metaldyne facility located on the east side of S.R. 3, about a tenth of a mile south of the project's western terminus (Map 11, Sheet 14) This property is immediately adjacent to property that would be acquired for Alternative 6D, but is outside of the proposed right-of-way and would not be impacted by the project. A Hazardous Materials Site Visit Form for this property is included in Appendix K (see page 15).

Site 2

Site 2 is a limestone quarry owned and operated by Berry Materials Corp. This facility is located at approximately 1800 N CR 20 W (Map 11, Sheet 17) and is listed as a National Pollutant Discharge Elimination System (NPDES) facility in the IDEM database. NPDES is a national program under Section 402 of the Clean Water Act (CWA) for regulation of discharges of pollutants from point sources to waters of the United States. Alternative 6D would require right-of-way in the amount of approximately 10.9 acres from the eastern portion of this property. Based on a review of historical aerials, a limited field review, and discussions with the property owner, no hazardous materials are anticipated to be encountered by this project. A Hazardous Materials Site Visit Form for this property is included in Appendix K (see page 16).

Site 3

Site 3 is the property owned by Dave O'Mara Contractors and was identified as an NPDES facility. Construction of the bridge for CR 20 W over the bypass would require approximately one-third of an acre of right-of-way from the northeast corner of this property (Map 11, Sheet 18). Maps of the property provided by INDOT delineating the potential subsurface extent of the chemical contamination indicate that subsurface contaminated soil is located approximately 130 feet away from any proposed right-of-way take. Therefore no hazardous materials are likely to be encountered on this site. If contaminated soil or groundwater is encountered during construction, the IDEM 24 hour spill line (317-233-7745) should be contacted. A Hazardous Materials Site Visit Form for this property is included in Appendix K (see page 17).

Suspect Site 1

Suspect Site 1 is a self storage facility identified during the field review. This site is located at approximately 465 E. U.S. 50. Approximately 0.8 acres of right-of-way would be required from this property. No indications of hazardous materials were identified on this site during the field review. A Hazardous Materials Site Visit Form for this property is included in Appendix K (see page 18).

Suspect Site 2

Suspect Site 2 consists of two adjacent properties located at 555 E. U.S. 50 and 585 CR 150 N. The location of these sites is indicated in Map 11, Sheet 20. Each parcel has a drive, but the site appears to function as a single unit. The site contains several buildings and numerous abandoned vehicles. No spills have been recorded for these sites; however, due to the nature of this operation, the site has been identified as a potential hazardous material site. Current

environmental conditions are unknown. Currently there is no proposed right-of-way being taken from either of these parcels, so the risk of environmental contamination is low. A single Hazardous Materials Site Visit Form for this property is included in Appendix K (see page 19).

No other hazardous waste sites were identified on the project site or adjacent parcels.

Alternative 4NB2

Of the properties identified in the Red Flag Investigation two are in the vicinity of Alternative 4NB2. The property closest to Alternative 4NB2 is the Metaldyne facility, described above as *Site 1*, and a Confined Feeding Operation (CFO) run by Roseacre Farms. The Roseacre Farms property is well outside of any proposed right-of-way potentially required for Alternative 4NB2 and would not be impacted.

Of the potential HAZMAT sites identified during the RFI review and field investigation, none are recommended for additional studies.

4.8 AIR QUALITY

Under the authority of the Clean Air Act (CAA) and the Clean Air Act Amendments (CAAA) of 1990 (42 US Code [USC] 7401 et seq.), a set of primary and secondary Ambient Air Quality standards for six criteria pollutants was established. The primary standards are intended to protect the public health. Secondary standards are intended to protect public welfare and are based on a pollutant's effect on vegetation and other materials. The primary and secondary standards for each of the six pollutants are shown in Table 17. Indiana's Ambient Air Quality Standards are identical to the Federal standards shown in Table 17.

TABLE 17: SUMMARY OF NATIONAL AND INDIANA PRIMARY AMBIENT AIR QUALITY STANDARDS

Pollutant		Primary/Secondary	Averaging Time	Primary Standard
Carbon Monoxide		primary	8-hour	9 ppm
			1-hour	35 ppm
Lead		primary and secondary	Rolling 3-month average	0.15 µg/m^3
Nitrogen Dioxide		primary	1-hour	100 ppb
		primary and secondary	Annual	53 ppb
Ozone		primary and secondary	8-hour	0.075 ppm
Particle Pollution	$PM_{2.5}$	primary	Annual	12 µg/m^3
		secondary	Annual	15 µg/m^3
		primary and secondary	24-hour	35 µg/m^3
	PM_{10}	primary and secondary	24-hour	150 µg/m^3
Sulfer Dioxide		primary	1-hour	75 ppb
		secondary	3-hour	0.5ppm

ppm=parts per million
ppb=parts per billion
µg/m3=micrograms per cubic meter of air

Methodology

Generally, when levels of pollutants do not exceed the annual average standards and do not exceed the short-term (1-, 8-, and 24-hour) standards more than once per year, an area is considered in attainment of the National Ambient Air Quality Standards (NAAQS [CAA 1990, Part A, Section 109]).

INDOT is responsible for ensuring that projects meet regional conformity requirements through the long-range Transportation Plan (TP) and the short-range Transportation Improvement Program (TIP). Thus, any project listed in these documents has been determined to meet conformity requirements. The preliminary engineering, right-of-way acquisition, and construction phases of the project are listed on page 206 of INDOT's FY 2014-FY 2017 Statewide Transportation Improvement Program (INSTIP; INDOT, 2013b). This page of the INSTIP is included Appendix K (see page 63).

The U.S. Environmental Protection Agency (USEPA) AirData website (http://www.epa.gov/airdata/) was reviewed for air quality monitoring sites within or close to the project area. This search revealed no monitoring sites in Jennings County.

Environmental Consequences

No-Build Alternative

Air quality impacts were not forecasted for the No-Build Alternative. Under the No-Build scenario the LOS at intersections along U.S. 50 within North Vernon will continue to deteriorate and will result in increased levels of air pollution.

Alternative 6D (Preferred Alternative) and Alternative 4NB2

No portion of this project is within a designated nonattainment area for any of the air pollutants for which the USEPA has established standards. As such, a conformity determination under 40 CFR Part 93 ("Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Funded or Approved Under Title 23 USC or the Federal Transit Laws") is not required for the build alternatives.

MSAT Level 1b Analysis

The purpose of this project is to seek a cost effective solution to the four documented transportation problems in the U.S. 50/North Vernon area. This project would reduce congestion, improve safety, improve accessibility, and adhere to local and state planning objectives. This project would solve these transportation needs by constructing a new roadway connecting the first phase of the U.S. 50 bypass, which terminated at SR 3, to U.S. 50 on the east side of North Vernon. This project has been determined to generate minimal air quality impacts for CAAA criteria pollutants and has not been linked with any special MSAT concerns. As such, this project will not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause an increase in MSAT impacts of the project from that of the no-build alternative.

Moreover, EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an

analysis of national trends with EPA's MOVES model forecasts a combined reduction of over 80 percent in the total annual emission rate for the priority MSAT from 2010 to 2050 while vehicle-miles of travel are projected to increase by over 100 percent. This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project.

Climate Change and Greenhouse Gases

From a policy standpoint, FHWA's current approach on the issue of climate change is as follows: to date, no national standards have been established regarding greenhouse gases, nor has USEPA established criteria or thresholds for greenhouse gas emissions. On April 2, 2007, the Supreme Court issued a decision in Massachusetts et al v. Environmental Protection Agency et al that the USEPA does have authority under the CAA to establish motor vehicle emissions standards for CO_2 (carbon dioxide) emissions. The USEPA is currently determining the implications to national policies and programs as a result of the Supreme Court decision. However, the Court's decision did not have any direct implications on requirements for developing transportation projects.

FHWA does not believe it is informative at this point to consider greenhouse gas emissions in an EA. The climate impacts of CO_2 emissions are global in nature. Analyzing how alternatives evaluated in an EA might vary in their relatively small contribution to a global problem will not better inform decisions. Further, due to the interactions between elements of the transportation system as a whole, emissions analyses would be less informative than ones conducted at regional, state, or national levels. Because of these concerns, FHWA concludes that we cannot usefully evaluate CO_2 emissions in this EA in the same way that we address other vehicle emissions.

FHWA is actively engaged in many other activities with the Department of Transportation Center for Climate Change to develop strategies to reduce transportation's contribution to greenhouse gases—particularly CO_2 emissions—and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. FHWA will review and update its approach to climate change at both the project and policy level as more information emerges and as policies and legal requirements evolve.

Mitigation

Jennings County is currently in attainment status for all criteria pollutants and therefore no mitigation is required for air quality impacts. The forecasted future traffic volumes result in low potential MSAT effects that will be lower in future years than the present even with the project.

4.9 NOISE

The unit of measurement used in sound measurement is the decibel (dB), and the unit of measurement used for traffic noise is the dB on the A-weighted scale (dBA). The A-weighted scale most closely represents the response of the human ear to sound. In general, a dBA change less than three is imperceptible by the human ear, while a five dBA change is readily perceptible. Further, a 10 dBA increase is perceived by the human ear to be twice as loud.

The measurement most commonly used to express dBA levels for traffic noise is the Hourly Equivalent Sound Level (Leq[h]). The Leq(h) describes a noise-sensitive receiver's cumulative exposure from all noise-producing events over a 1-hour period.

The INDOT *Traffic Noise Analysis Procedure* (INDOT, 2011) establishes INDOT policy for implementing Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) in Indiana. The *Traffic Noise Analysis Procedure* outlines the requirements for analyzing highway traffic noise. In accordance with FHWA noise regulations, the East Bypass project was determined to be a Type 1 project and as such required a noise analysis.

A *Noise Analysis Technical Memorandum* was prepared for this project to evaluate noise impacts and abatement under the requirements of 23 CFR 772 "Procedures for Abatement of Highway Traffic Noise". 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. The complete *Noise Analysis Technical Memorandum* completed for this project is included in Appendix F. INDOT Environmental Services has reviewed the report and approved it on October 8, 2012, as noted in the e-mail transmittal included in Appendix F (see pages 93-94). According to 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with FHWA noise standards.

Methodology

Traffic noise studies include five main steps: (1) identify noise sensitive receptors, (2) determine existing ambient peak noise levels, (3) predict future peak noise levels, (4) identify traffic noise impacts, and (5) evaluate mitigation measures for sensitive receptors where traffic noise impacts occur.

Traffic noise impacts are considered to occur at receptor locations where predicted design-year noise levels are at least 15 dBA greater than existing noise levels, or where predicted design year noise levels approach or exceed the Noise Abatement Criteria (NAC) for the applicable activity category (see Table 18). Where traffic noise impacts are identified, noise abatement must be considered for reasonableness and feasibility as required by 23 CFR 772 and the INDOT *Traffic Noise Analysis Procedure.* The FHWA Traffic Noise Model (TNM) Version 2.5 was used to model proposed noise levels.

TABLE 18: NOISE ABATEMENT CRITERIA IN 23 CFR 772

Activity Category	$L_{Aeq}(h)$	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	Exterior	Residential.
C	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structure, radio stations, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structure, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D, or F.
F	–––	–––	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–––	–––	Undeveloped lands that are not permitted.

Source 23 CFR 772

According to the *Traffic Noise Analysis Procedure,* abatement measures are considered acoustically feasible if a minimum noise reduction of 5dBA reduction at a majority (greater than 50%) of the impacted receptors. Other factors that affect feasibility include topography, access requirements for driveways and ramps, presence of local cross streets, utility conflicts, other noise sources in the area, and safety considerations. The overall reasonableness of noise abatement is determined by considering factors such as:

- Cost;
- Absolute predicted noise levels;
- INDOT design goal of 7dBA at a majority of impacted first row receptors;
- Predicted future increase in noise levels;
- Expected noise abatement benefits;
- Build date of surrounding residential development along the highway;

- Environmental impacts of abatement construction;
- Opinions of affected residents;
- Input from the public and local agencies; and
- Social, legal, and technological factors.

Determination of Existing Levels

A field investigation was conducted in March of 2013 by Parsons to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Single-family residences, light industrial warehouses, manufacturing facilities, a state forest, a golf course, agricultural fields, unpermitted land likely to be developed, and a church were identified as Activity Category B, C, F and G land uses in the project area. While Activity Category G land uses exist in the project area no areas of frequent outdoor use were identified.

As required by the *Traffic Noise Analysis Procedure,* although all developed land uses are evaluated in this analysis, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards and common use areas at other facilities. For this project one receptor was modeled for a single corresponding dwelling unit or area of frequent outdoor use.

To determine the number of receptors appropriate for Selmier State Forest and St. Anne's Golf course the algorithm provided in the *Traffic Noise Analysis Procedure* was used. This algorithm converts total usage to equivalent receptors. The daily number of users for Selmier State forest was obtained through correspondence with the District Forester. The daily number of users for St. Anne's Golf Course was obtained through correspondence with the course general manager. The average daily users input into the algorithm for Selmier State Forest and St. Anne's Golf Course were 20 and 50, respectively.

Environmental Consequences

Future noise level predictions utilized forecasted design hour traffic conditions to ensure a conservative estimate of noise levels for the loudest noise hour. The comparison to existing conditions is included in the analysis to identify traffic noise impacts under 23 CFR 772.

No-Build Alternative

Compared to existing conditions, projected noise levels along the existing roadway network may increase with the No-Build Alternative as background traffic levels grow over time.

Alternative 6D (Preferred Alternative)

Predicted noise levels for Category B and C receptors for Alternative 6D range from 47.0 dBA to 63.8 dBA. These results indicate that predicted traffic noise levels for the design-year with-project conditions do not approach or exceed the NAC of 67 dBA $L_{eq}(h)$. Based on the existing ambient noise levels and predicted future noise levels at nearby receptors, no receptors are predicted to experience a substantial noise increase.

Alternative 4NB2

Predicted noise levels for Category B and C receptors for Alternative 4NB2 range from 47.0 dBA to 63.8 dBA. These results indicate that predicted traffic noise levels for the design-year with-project conditions do not approach or exceed the NAC of 67 dBA $L_{eq}(h)$. Based on the existing ambient noise levels and predicted future noise levels at nearby receptors, no receptors are predicted to experience a substantial noise increase.

Construction Noise

During construction of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction.

No adverse noise impacts from construction are anticipated because construction noise would be short term and intermittent. Measures to minimize the temporary impacts will include requiring equipment to have sound-control devices that are no less effective than those provided on the original equipment and requiring all equipment to be muffled.

Mitigation

Based on the studies thus far conducted for U.S. 50 North Vernon Bypass – East Project, the State of Indiana has not identified any locations where noise abatement is likely. Noise abatement was not evaluated as no receivers were found to be impacted by this project. A reevaluation of the noise analysis will occur during final design. If during final design it is determined that conditions have changed such that noise abatement is feasible and reasonable, abatement measures might be provided. The final decision on the installation of any abatement measure(s) will be made upon the completion of the project's final design and the public involvement processes.

4.10 WATER RESOURCES

This section evaluates the alternatives' potential impact on streams, ponds, wetlands, and drinking water resources in the study area.

4.10.1 Streams, Rivers, Watercourses, and Jurisdictional Ditches

The U.S. Army Corps of Engineers (USACE) and IDEM regulate impacts to surface water resources within the State of Indiana. Jurisdictional waters of the United States are protected under Sections 401 and 404 of the Clean Water Act (CWA) and Executive Order 11990. The USACE has the primary regulatory authority for enforcing Section 404 requirements for waters of the United States. Indiana also has a state program protecting surface waters for both isolated and non-isolated wetlands and other waters of the State under authority of Section 401.

Potential boundaries for streams, rivers, and other watercourses were delineated in the field at the ordinary high water mark (OHWM). Typically, waterways with an OHWM are classified as perennial, intermittent, or ephemeral. An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral streambeds are located above the water table year-round. Furthermore, groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for ephemeral stream flow.

An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow, and runoff provides a supplemental source of water. During dry periods, intermittent streams may not have flowing water. Perennial streams have flow throughout the year except during drought conditions. The water table is located above the stream bed for most of the year.

Methodology

The U.S. Geological Survey (USGS) quadrangle maps provide limited assistance in locating stream types as they depict solid blue lines to indicate perennial flow and dashed lines to indicate intermittent flow. Ephemeral drainages are not identified on these maps.

All streams, regardless of potential connectivity to other waters, were delineated by Parsons in October 2012 and May 2013. Assumptions were made as to whether or not the stream eventually drained into another water of the U.S. as the limit of study did not allow for a full investigation of connectivity. Aerial photography and topographic maps were utilized as aides in supporting decisions regarding connectivity with other "waters."

Two different functional and value assessment methodologies were used, either the Qualitative Habitat Evaluation Index (QHEI) for larger streams or the Headwater Habitat Evaluation Index (HHEI) for smaller streams. More information about the QHEI and HHEI assessments can be found on page 10 of the Waters Report (Appendix D). Scores from these assessment methods will be utilized in establishing performance goals for the stream mitigation required as part of the Sections 401 and 404 permitting process.

Environmental Consequences

The project spans two USGS 12-digit watersheds (see Figure 3 of the Waters Report in Appendix D). The two watersheds are HUC 051202070705 (Sixmile Creek) and HUC 051202070701 (Long Branch – Vernon Fork Muscatatuck River). Waterbodies in the eastern two-thirds of the project area drain directly or via tributaries to the Vernon Fork of the Muscatatuck River. Ponds, streams, and wetlands in the western third of the project are all tributaries to Sixmile Creek, which flows into the Vernon Fork beyond the project area to the southwest. The Vernon Fork then flows into the Muscatatuck River, which flows into the East Fork of the White River, which then joins the West Fork of the White River before flowing to the Wabash River (see Figure 7).

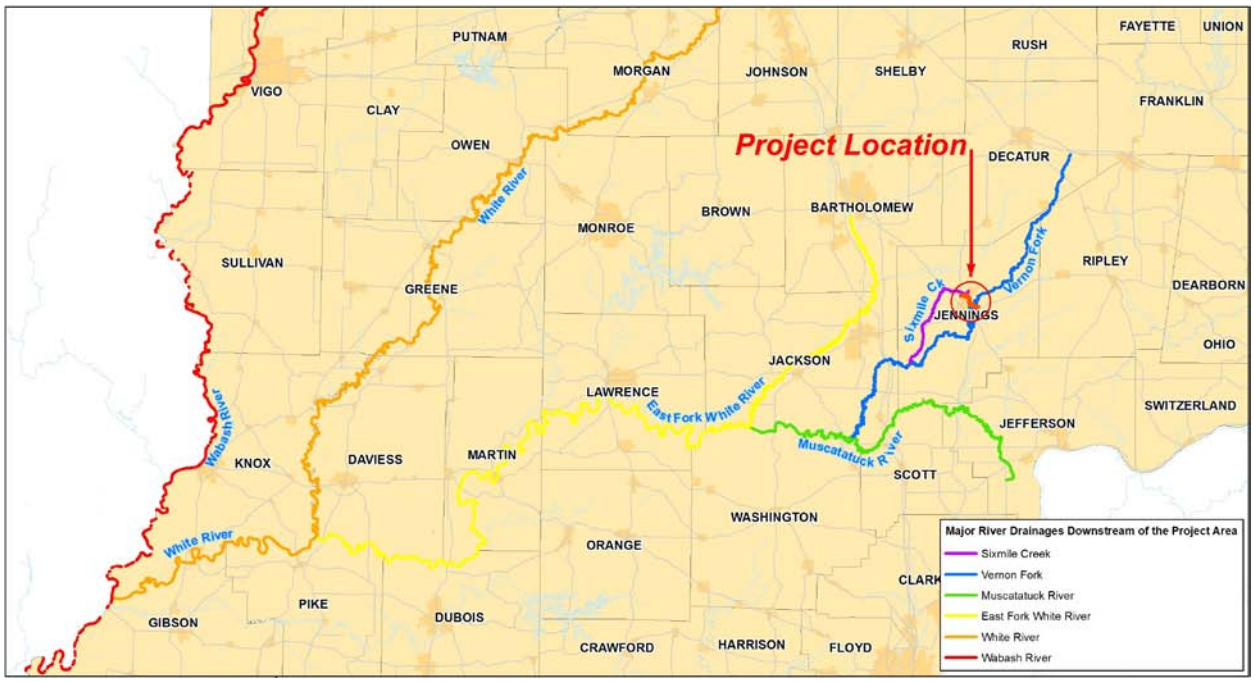


FIGURE 7: MAJOR RIVER DRAINAGES DOWNSTREAM OF THE PROJECT AREA

There are no National Wild and Scenic Rivers in Indiana. Within the project limits, there are no rivers in the National River Inventory, as listed by the U. S. National Park Service. The Indiana Natural Resources Commission has included the portion of the Vernon Fork of the Muscatatuck River within the project area on its Outstanding Rivers List for Indiana. The Vernon Fork is included in the listing because it qualifies under two categories: #11 (State Heritage Program Sites) and #13 (Canoe Trails). Except where incorporated by statue or rule, this listing is intended to provide guidance rather than to have regulatory application. This project would not affect the Vernon Fork of the Muscatatuck River's status as an Outstanding River.

For streams located within the proposed right-of-way of the build alternatives, potential impacts include encapsulation by bridges or culverts as well as fills below the OHWM due to the placement of riprap on the spill slopes. Impacts for each alternative are presented in Table 19. Note that these impacts are based on the project's right-of-way limits, rather than the narrower construction limits. Actual impacts would be limited to the construction limits and would be detailed in the appropriate IDEM Section 401 Water Quality Certification and/or USACE Section 404 permit applications once design elements have been finalized.

TABLE 19: STREAMS WITHIN THE STUDY AREA

	Alternative 6D		Alternative 4NB2	
Stream Classification	**Number of Streams**	**Linear Feet of Impact**	**Number of Streams**	**Linear Feet of Impact**
Ephemeral	10	2,546	13	4,238
Intermittent	0	0	3	1,128
Perennial	1	410	1	365
TOTAL	11	2,956	17	5,731

No-Build Alternative

The No-Build Alternative would not impact any streams or other watercourses.

Alternative 6D (Preferred Alternative)

Eleven streams have been identified as waters of the U.S. within the proposed right-of-way of the Preferred Alternative. Ten of these streams have been determined to be ephemeral, while the eleventh is a perennial stream. The Preferred Alternative would impact 2,546 linear feet of ephemeral streams and 410 linear feet of a perennial stream. All of these streams are assumed to be waters of the U.S. Stream impacts for both build alternatives are summarized in Table 19 above. More information on the streams delineated within the 6D corridor can be found in the Waters Report (Appendix D).

Alternative 4NB2

Seventeen streams have been identified as waters of the U.S. within the preliminary right-of-way of alternative 4NB2. Thirteen of these streams have been determined to be ephemeral, three are intermittent, and one perennial stream. This alternative would impact 4,238 linear feet of ephemeral streams, 1,128 feet of intermittent stream and 365 linear feet of a perennial stream. All of these streams are assumed to be waters of the U.S. Stream impacts for both build alternatives are summarized in Table 19 above.

Agency Coordination

Early coordination responses were received from the U.S. Fish and Wildlife Service (USFWS, Appendix C, pages 17-20), the Indiana Department of Natural Resources (IDNR, Appendix C, pages 27-30) and IDEM (Appendix C, pages 40-46) regarding this project's potential impacts to streams. The USFWS recommends that the project be located and designed to minimize stream/riparian impacts, avoid areas of high quality aquatic habitats such as rock riffles and mussel beds, and avoid the need to realign or relocate stream channels.

In its coordination response letter, the IDNR Division of Fish & Wildlife (IDNR-F&W) recommends: 1) new bridges that allow for wildlife passage underneath the new roadway; 2) smooth-surface armoring be used along sideslopes of new bridges instead of riprap; 3) riprap should be used only at the toe of the sideslopes up to the OHWM; 4) soft armoring and bioengineering techniques should be considered first when bank stabilization is needed; 5) the banks above the OHWM should be restored, stabilized and revegetated using geotextiles and a mixture of grasses, sedges, wildflowers, shrubs, and trees native to Central Indiana and specifically for stream bank/floodway stabilization purposes as soon as possible upon completion; 6) do not work in the waterway from April 1 through June 30 without the prior written approval of the DNR-F&W; 7) do not excavate in the low flow area except for the placement of piers, foundations and riprap, or removal of an old structure; 8) use minimum average 6-inch graded riprap extended below the normal water level to provide habitat for aquatic organisms in the voids; and 9) do not construct any temporary runarounds or causeways.

IDEM, in its standardized response letter, recommends that the physical disturbance of the stream and riparian vegetation, especially large trees overhanging any affected water bodies should be limited to only that which is absolutely necessary to complete the project. It also

stresses the importance of acquiring the proper Section 404 permit from the USACE and Section 401 permit from IDEM.

Mitigation

During the final engineering of the Preferred Alternative, the construction limits would be used to calculate stream impacts. The stream impacts based on the construction limits should be less than what is stated above, which used the proposed right-of-way limits. Impacts to streams would be further minimized during project development by reducing the construction limits as much as practical within riparian corridors. No work outside the construction limits would occur in these stream channels, and "Do Not Disturb" signs would be placed to clearly mark these areas during construction. The streams beyond the construction limits would be further protected during construction by silt fence and erosion control best management practices (BMPs).

A mitigation plan has not been completed for this project. It will be included as part of the IDEM 401 and USACE 404 permit applications. Typical mitigation strategies include planting wooded, riparian corridors along stretches of streams that currently lack riparian corridors. These riparian corridors would be planted in a one-to-one ratio based on the total linear feet of each stream classification impacted by the Preferred Alternative.

4.10.2 Other Surface Waters

Open water systems such as lakes, aesthetic ponds, farm ponds, dammed streams, retention ponds, reservoirs, borrow pits and similar are open water systems, and the limits are defined by the OHWM near the shoreline or the edge of its littoral fringe (if one is present and meets the 1987 Corps Manual criteria for a wetland). The OHWM is the line on the shore or bank established by flowing and/or standing water, marked by characteristics such as a clear, natural line impressed on the bank, erosion shelving, changes in the character of the soil, destruction of terrestrial vegetation, presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Methodology

Ponds encountered during the field determination effort were identified as bodies of open water if no emergent vegetation was visible above the surface of the water. These areas were designated as ponds, not wetlands. All of the ponds delineated were considered jurisdictional if they were connected via a channel containing a continuous OHWM and met the significant nexus criteria.

Environmental Consequences

There are no naturally-occurring ponds or lakes in the project area. There are scattered man-made-impoundments (farm ponds) throughout the project area. Ponds impacted by construction of this project would be completely filled in, which may require a small amount of temporary right-of-way in areas where the pond extends beyond the limits of the project's permanent right-of-way. The acreages for pond impacts given in the following paragraphs assume a complete fill of each impacted pond.

No-Build Alternative

The No-Build Alternative would not impact any surface waters.

Alternative 6D (Preferred Alternative)

Three ponds were delineated within the preliminary right-of-way of the Preferred Alternative. All of these ponds outlet to other watercourses and should be considered waters of the U.S. Filling in all three of these ponds would result in a loss of about 1 acre of open water habitat. Pond impacts for both build alternatives are summarized in Table 20.

TABLE 20: OTHER SURFACE WATERS WITHIN THE STUDY AREA

	Alternative 6D		Alternative 4NB2	
Surface Water Type	**Number**	**Acres**	**Number**	**Acres**
Farm Ponds	3	1.0	2	0.95

Alternative 6D would cross the Vernon Fork just under a half mile upstream of a low head dam across the Vernon Fork of the Muscatatuck River. This dam creates a small reservoir within the channel extending nearly a mile upstream from the dam. The city of North Vernon draws its municipal fresh water supply from this pool from an inlet near the dam. The entire pool would be spanned by the new Alternative 6D bridge over the Vernon Fork, so there would be no direct impacts to this resource. See Section 4.10.4 for a discussion of proposed mitigation to protect the city's water supply.

Alternative 4NB2

Two ponds were delineated within the proposed right-of-way of alternative 4NB2. Both ponds outlet to other watercourses and should be considered waters of the U.S. Filling in these ponds would result in a loss of about 0.95 acre of open water habitat. Pond impacts for both build alternatives are summarized in Table 20 above.

Agency Coordination

The agency response letters to requests for early coordination contain comments directed towards the protection of wetlands and streams. No comments are uniquely directed towards ponds or other surface waters.

Mitigation

A mitigation plan has not been completed for this project. It will be included as part of the IDEM 401 and USACE 404 permit applications. The impacted ponds provide little habitat value, so mitigation for open water impacts would be at a one-to-one ratio. Mitigation could include constructing a new, small open water habitat in conjunction with the wetland mitigation developed for the project's wetland impacts.

4.10.3 Wetlands

The USACE and IDEM regulate impacts to surface water resources within the State of Indiana. Jurisdictional waters of the U.S. are protected under Sections 401 and 404 of the Clean Water

Act and Executive Order 11990. The USACE has the primary regulatory authority for enforcing Section 404 requirements for waters of the United States. Indiana also has a state program protecting surface waters for both isolated and non-isolated wetlands and other waters of the State under authority of Section 401.

Wetlands are a category of waters of the United States, and they are defined by the USACE as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Typical wetlands include bogs, marshes, and swamps but also may include temporarily or seasonally flooded depressions that receive overland storm-water runoff or overbank floodwaters.

In 1987 the USACE published a document to assist in determining the boundaries of a wetland. This document, referred to as the 1987 Corps Manual (Environmental Laboratory, 1987), contains information related to soils, hydrology, and plants.

Methodology

Wetlands are identified using the guidance provided in the 1987 Corps Manual. The presence of potentially jurisdictional wetlands is determined by the positive indication of three criteria in accordance with the 1987 Corps Manual: the presence of greater than 50% hydrophytic (wetland) vegetation, a minimum of one primary or two secondary indicators of hydrology and one positive hydric soil indicator. In addition, the USACE recently finalized the "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region" (RS; USACE, 2010) which covers most of Indiana. Methodologies are utilized in accordance with the RS.

Although the presence of wetland vegetation is the first indicator used to identify wetland, topographic signatures such as depressional features, and areas exhibiting signs of wetland hydrology, such as saturated soils, water marks, algal mats, etc., if observed, are also investigated as potential wetlands. Soil pits are dug in representative areas to evaluate soil characteristics and assist in determining if indicators of wetland hydrology are present. Evidence of wetland hydrology is assessed within the soil pit by observing saturated soils within the upper 12 inches and/or documenting the presence of water within the upper 12 inches of the pit. Other signs of hydrology may include, but are not limited to, drainage patterns, surface water, rafted debris, and crayfish burrows.

Once it is determined that the wetland vegetation, soil, and hydrology criteria are met, notes pertaining to flora, soil, and hydrology are recorded on a Wetland Determination Data Form, following guidance provided in the RS. Data is collected from one wetland and one upland data point for each wetland system. A photo point is taken, usually in proximity to the wetland data point, but occasionally a better vantage point away from the data point is used to better depict the characteristics of a wetland.

Each wetland is delineated using a sub-meter GPS unit (Trimble Geo-XH). Notes pertaining to significant nexus and the potential for USACE jurisdiction are also recorded at each wetland. Wetlands are identified as isolated waters if they do not directly connect to, are not adjacent to, or do not abut a jurisdictional channel.

Wetlands are classified utilizing the Cowardin Classification System (Cowardin, 1979), which identifies three principal classes of wetland and open water habitats: Palustrine, Riverine, and Lacustrine. Palustrine wetland communities are divided into eight types. The three Palustsrine types frequently encountered in Indiana are Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO). PEM wetlands are characterized by a vegetation pattern that is dominated by herbaceous species such as wildflowers and grasses and lack a shrub or tree stratum. PSS wetlands are defined as areas where woody vegetation such as smaller trees and shrubs (< 20 feet tall) dominate the area. PFO wetlands are dominated by trees taller than 20 feet.

Environmental Consequences

None of the alternatives investigated as part of this project avoid all wetland impacts. In addition to not meeting the project's Purpose and Need, any alternative that completely avoids wetlands would likely result in high impacts to another resource (i.e. residential and business relocations, State Forest property, historic properties). The largest wetland impacts occur in Wetlands 101 and 102, which due to their proximity to the beginning of the East Bypass project, makes them unavoidable by all of the practicable alternatives. However, alternatives were developed and screened, in part, on how well they minimized wetland impacts. Both of the build alternatives discussed below incorporate design elements to reduce impacts to wetlands and other jurisdictional waters. No scrub-shrub wetlands were delineated within either corridor. Impacts to the wetlands within the proposed project corridor would consist of clean earthen fill used to make a base for the new roadway. Wetland areas outside the construction limits of the project would be protected by silt fencing and would be marked as "Do Not Disturb" areas on the plans. Table 21 summarizes the wetland impacts associated with each alternative.

TABLE 21: WETLANDS WITHIN THE STUDY AREA

	Alternative 6D		Alternative 4NB2	
Wetland Type	**Number of Wetlands**	**Acres of Impact**	**Number of Wetlands**	**Acres of Impact**
Emergent (PEM)	4	9.51	10	9.62
Forested (PFO)	1	6.85	2	10.64
TOTAL	5	16.36	12	20.26

No-Build Alternative

The No-Build Alternative would not impact any wetlands.

Alternative 6D (Preferred Alternative)

Five wetlands were delineated within the right-of-way for the Preferred Alternative. One of these impacts would be to a forested (PFO) wetland, while the other four impacts would be to emergent (PEM) wetlands. Like Alternative 4NB2, the Preferred Alternative would impact a large wetland complex consisting of Wetland 101 and Wetland 102 (see Map 11, Sheets 15-16). As shown in Table 21, the total area of the wetlands within the study area is 16.36 acres (9.51

acres PEM, 6.85 acres PFO). None of these wetlands appear to be isolated. All five of these wetlands should be considered jurisdictional waters of the U.S. See the Waters Report (Appendix D) for more information regarding the potential wetland impacts of Alternative 6D. Table 22 provides more details about the wetlands delineated within the Preferred Alternative corridor. Two of these wetlands (Wetlands 101 and 104) extend beyond the study area, and therefore their full boundaries were not surveyed.

TABLE 22: WETLANDS WITHIN THE PREFERRED ALTERNATIVE

Wetland ID	Classification	Total Size (Ac)	Impacted Area (Ac)	Comments
101	PFO	58.7*	6.85	High quality mesic flatwoods that is contiguous with wetland 102.
102	PEM	45.0	9.23	Emergent wetland that was once a forested wetland like wetland 101 before it was cleared for industrial development. It is maintained by occasional mowing.
104	PEM	0.24*	0.20	Emergent wetland in a roadside ditch. Flows through this ditch travel to a large detention pond in the southwest quad of the CR 75W / CR 350N intersection.
209	PEM	0.02	0.02	One of several small, depressional emergent wetlands in an old agricultural field.
304	PEM	0.06	0.06	Emergent wetland within a drainage swale surrounded by row-crop agricultural field.
Total Acreage		**104.0***	**16.36**	

*Portions of these wetlands extend beyond the survey area, so not all boundaries were delineated. The actual sizes of these wetlands are larger than what is listed here.

Alternative 4NB2

Twelve wetlands were delineated within the right-of-way for Alternative 4NB2. As shown in Table 21, ten of these impacts would be to emergent (PEM) wetlands, for a total of 9.62 acres. Two forested (PFO) wetlands would also be impacted, resulting in 10.64 acres of wetland fill. The largest wetland impacts would be just west of CR 75 W, where the road corridor passes through an emergent (Wetland 102) and forested wetland (Wetland 101) complex (Map 11, Sheets 2-3). Wetland 101 is a mesic flatwoods, while Wetland 102 was once a mesic flatwoods before being cleared for development. The other wetlands within the 4NB2 corridor are mostly small, depressional wetlands, with limited wildlife or water quality functions. See the Waters Report (Appendix D) for more information regarding Wetlands 101 and 102. All of the wetlands within the Alternative 4NB2 corridor should be considered as under the jurisdiction of the USACE.

Agency Coordination

Early coordination letters were sent to resource agencies in August 2012 (see Appendix C, pages 1-5). Response letters were received from the USFWS and IDEM regarding this project's

potential impacts to wetlands. The USFWS states that wetland impacts should be avoided to the extent possible, and that unavoidable impacts should be mitigated in accordance with the Memorandum of Understanding (MOU) between INDOT, the USFWS, and IDNR. IDEM's response stresses the need for both a 404 and a 401 permit before impacting wetlands. These early coordination response letters can be found in Appendix C (see pages 17-20 and 40-46).

Mitigation

During the final engineering of the Preferred Alternative, the construction limits would be used to calculate wetland impacts. The wetland impacts based on the construction limits should be less than what is stated above, which used the proposed right-of-way limits. Impacts to wetlands would be further minimized during project development by reducing the construction limits as much as practical within wetland areas. No work outside the construction limits would occur in these wetland areas, and "Do Not Disturb" signs would be placed to clearly mark these areas during construction. The wetlands beyond the construction limits would be further protected during construction by silt fence and erosion control BMPs.

A mitigation plan has not yet been completed for this project. It will be included as part of the IDEM 401 and USACE 404 permit applications. The likely mitigation strategy would be to compensate for wetland losses by creating one or more wetland mitigation sites. Based on the total impacted acreage, forested wetland (PFO) impacts would be mitigated at a four-to-one ratio, while emergent wetlands (PEM) would be built at a two-to-one ratio. The wetland mitigation site(s) would be designed, planted, and monitored to restore the habitat and water quality functions lost due to the development of this project.

4.10.4 Drinking Water

North Vernon Water, which provides drinking water to customers in North Vernon uses the Vernon Fork of the Muscatatuck River as its sole source of water. The intake point is located at a low-head dam near CR 20 W. During the alternatives development process, concerns were raised by the utility and the City about the possibility of contamination of the drinking water supply if an accident occurred on or near the bridge that resulted in the spilling of chemical or other pollutants.

Methodology

Drinking water resources were identified through review of mapping of sole source aquifers (SSAs), coordination with the IDEM Drinking Water Branch, and through direct consultation with the City of North Vernon and North Vernon Water.

Environmental Consequences

Indiana currently has only one legally designated SSA, the St. Joseph Aquifer System, located in northern Indiana. This project would not impact the St. Joseph Aquifer.

In response to the early coordination letter, the IDEM Ground Water Section replied on August 24, 2012 that the project is not located within a Wellhead Protection Area (see Appendix C, page 16).

No-Build Alternative

The No-Build Alternative would result in no impacts to drinking water resources.

Alternative 6D (Preferred Alternative)

Alternative 6D would construct a new bridge across the Vernon Fork of the Muscatatuck River, approximately 2,500 feet upstream from the drinking water intake. As noted above, concern was raised by North Vernon Water that an incident on the bridge could jeopardize the safety of the drinking water. Parsons conducted a thorough evaluation of the risks to the drinking water supply and detailed these findings in a memo (*U.S. 50 North Vernon Bypass – Drinking Water Mitigation Plan*) provided in Appendix C (see pages 80-92). The analysis found that there is, in fact, a risk to the drinking water supply; however, it is relatively modest in magnitude. Importantly, the analysis noted that the risk is nearly identical for Alternative 6D and Alternative 4NB2. The primary difference was in the response time – the time it would take for a spill to be acknowledged, North Vernon Water to be notified, and the intake pump turned off – available. For Alternative 6D, under high flow conditions, the response time could be less than 10 minutes under a peak storm event.

Alternative 4NB2

As described in the *U.S. 50 North Vernon Bypass – Drinking Water Mitigation Plan* memo in Appendix K (see pages 46-58), the risk of a spill and contamination of the drinking water supply is essentially identical to the risk associated with Alternative 6D. However, with the location of the new bridge across the Musctatuck River approximately 20,000 feet upstream from the water intake, the response time would be substantially longer – approximately 1 hour under a peak storm event.

Agency Coordination

North Vernon Water first raised a concern about the drinking water intake during a CAC meeting on November 19, 2012. Following that discussion, a number of meetings and correspondence between the Project Team and representatives of North Vernon Water and the City of North Vernon occurred:

- December 10, 2012 – Letter from RLM Engineering (on behalf of North Vernon Water) to Pat Carroll, Chief, IDEM Drinking Water Branch
- January 2, 2013 – RLM Engineering report titled *U.S. 50 Bypass Design and the Protection of the City of North Vernon, Indiana Water Supply*
- January 30, 2013 – Meeting at North Vernon City Hall
- May 14, 2013 – Meeting at North Vernon City Hall
- June 4, 2013 – Meeting at North Vernon Water Plant
- September 6, 2013 – Memo titled *U.S. 50 North Vernon Bypass – Drinking Water Mitigation Plan* from Parsons to Trevor Mills, INDOT Project Manager, documenting the risk and recommended option.

The documents and minutes from each of the meetings are provided in Appendix C, pages 58-92.

Mitigation

As described in the September 6, 2013 memo (Appendix C, pages 80-92), the Project Team evaluated several options to mitigate the risk of contamination to the drinking water supply. These alternatives are discussed in more detail in Chapter 3. The selected option would construct a closed drainage system along the new roadway for a length of approximately 0.7 mile, from 950 feet west of CR 20 W to the bridge over the CSX Railroad. Within this area, all stormwater landing on the roadway or shoulders would be collected via roadside ditch and carried by either a roadside ditch or buried pipe to outfalls in the river located below the dam and the City's drinking water intake. In doing so, any spill that occurred on the bridge over the Vernon Fork of the Muscatatuck River or the adjacent roadway segments would be captured and conveyed downstream of the intake. The system would be "passive" in that no acknowledgment of an incident or action on the part of emergency responders or North Vernon Water is required to provide the requisite protection. This and other options considered were presented to the City of North Vernon and North Vernon Water; both concurred that this was the preferred option and that the drinking water supply would be adequately protected.

Potential impacts to surface water would be minimized to the greatest extent possible by the implementation of BMPs. Agency requests for implementation of BMPs are included in Chapter 5. These BMPs would help avoid impacts to the Vernon Fork of Muscatatuck River by containing sediment and pollutants within the project site. Specific information regarding the location, quantity, and type of BMP will be included in the Rule 5 permit documentation. It is anticipated that the outfall would meet the requirements for exemption from a Construction in a Floodway permit under 312 IAC 10-5-8. Any construction occurring within the OHWM of a jurisdictional feature would be included in the project's 404/401 permit.

4.10.5 Floodplains

Floodplains, lowland areas adjacent to streams and rivers that are inundated by excess water breaching the stream/river banks during a flood, can be found in the project area in conjunction with the Vernon Fork of the Muscatatuck River. Of particular interest are the 100-year floodplains as they indicate the most severe and infrequent flood-related water levels. They, as well as their associated floodways (e.g., the canal or path of the floodwater), are regulated via state statues and laws (IC 14-28-1 S 20) as to construction within their boundaries. One-hundred-year floodplains can be found along Vernon Fork of the Muscatatuck River and its tributaries. Floodways can be found on the river itself.

Methodology

Flood Insurance Rate Maps (FIRM), provided by the Federal Emergency Management Agency (FEMA), and a digitized GIS file of this data provided by IDNR were used to determine the locations and areas of affected 100-year floodplains and floodways. FEMA FIRM number 1801080004B for Jennings County, effective date August 28, 1977, was consulted to identify floodplain within the right-of-way of both alternatives analyzed. FEMA maps do not necessarily identify or delineate all floodways in the project area. Within the project area the floodway identified by FEMA and IDNR terminates at approximately river mile 44.96, between the

proposed crossing of Alternative 6D and 4NB2. Therefore floodway impacts could not be accurately quantified from secondary source data for the Alternative 4NB2 crossing.

Determining floodways for the purposes of securing an IDNR Construction in a Floodway (CIF) Permit also requires that the size of the drainage area be assessed (i.e., greater than one square mile). Given this, future floodway delineations may be needed for the Preferred Alternative crossing. A Flood Risk Assessment has been conducted for Alternative 6D, the Preferred Alternative (see Appendix K, page 64).

Impacts to floodways and floodplains from the project could include the placement of fill (e.g., embankments or placement of riprap) or obstructions such as piers that could restrict the flow of water. Additional impacts could occur through the removal of trees within the floodplain as these riparian corridors provide valuable habitat. Impacts were quantified based on the proposed right-of-way limits and assumed all floodway/floodplain within that area was impacted. Because a portion of this area would be outside the construction limits and others would be spanned by the roadway bridge, the actual impacts are expected to be far less than the values presented.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would incur no impacts to regulatory floodplains.

Alternative 6D (Preferred Alternative)

As shown in Map 11, Alternative 6D crosses the Vernon Fork of the Muscatatuck River transversely which has a floodplain designated by FEMA. The FIRM indicates that the FEMA has determined a Regulatory Flood Elevation (RFE) of approximately 661.5 above sea level (asl) for the river at the proposed crossing location.

As shown in Table 23, this alternative would impact 3.96 acres of floodplain, 0.44 acres of floodway, and 0.4 acres of forested floodplain. The total crossing length (width of the floodplain to be crossed) would be 470 feet. The proposed bridge would have its east abutment and surrounding riprap within the floodplain. Both of the bridge's piers would also be located within the floodway.

TABLE 23: IMPACTS TO 100 YEAR FLOODPLAINS AND FLOODWAYS

EA Alternative	Waterbody	100-year Floodplain[1] (acres)[2]	Floodway (acres)[2]	Upland Forested Floodplain (acres)[2]	Floodplain Crossing (feet)
4NB2	Vernon Fork	2.64	**	1.5	590
	UNT Vernon Fork	3.42	**	1.2	360
	Total	6.06	**	2.7	950
6D	Vernon Fork	3.96	0.44	0.4	470

[1] Includes both upland and wetland habitat types and forested and non-forested land use.

[2] Based on right-of-way

** Floodway not delineated by FEMA; however, filed observations indicate presence of a floodway.

Alternative 4NB2

As shown on Map 11, Sheet 6 in Appendix A, Alternative 4NB2 crosses the Vernon Fork of the Muscatatuck River and an Unnamed Tributary (UNT) to Vernon Fork transversely, both of which have floodplains designated by FEMA. The FIRM indicates that the FEMA has determined a RFE of approximately 684.9 asl for the Vernon Fork of the Muscatatuck River at the proposed crossing location. No RFE was shown for the UNT to Vernon Fork of the Muscatatuck River.

Because this bridge did not proceed to the level of design as did the Preferred Alternative, the location of piers and any riprap was not determined. It is likely that these impacts would be comparable to those of Alternative 6D. Based on the proposed right-of-way, this alternative would impact 6.06 acres of floodplain and 2.7 acres of forested floodplain. Because FEMA has not defined a floodway in this segment of the river, it was not possible to estimate floodway impacts. The total crossing length (width of the floodplain to be crossed) would be 950 feet. The higher impacts associated with Alternative 4NB2 are attributable to the need to cross both the Vernon Fork of the Muscatatuck River as well as UNT to Vernon Fork of the Muscatatuck River.

Agency Coordination

The IDNR, in their response to the Early Coordination (IDNR, letter 8/16/12), stated that this project would require formal approval for construction in a floodway under the Flood Control Act, IC14-28-1. Additional coordination will be conducted with IDNR during preparation of the CIF Permit.

Mitigation

A hydraulic analysis has been completed in the vicinity of the Preferred Alternative's crossing of Vernon Fork. This analysis ensured that the bridge associated with the Preferred Alternative would not result in substantial change in flood risks; and there would be no substantial increases in potential for interruption or termination of emergency service or emergency evacuation routes; therefore it has been determined that this encroachment is not substantial. A hydraulic design study that addresses various structure size alternatives has been completed during design, a summary of which is included with the Field Check Plans.

The Preferred Alternative crosses the Vernon Fork in a location where the river's floodplain and riparian corridor are very narrow when compared to other reaches of the river. Any fill below the RFE would be limited to the fill required to support the new structure and the placement of riprap around the piers for scour protection. Mitigation for these impacts would likely consist of the preservation, creation, or enhancement of floodplain habitat at an offsite location. Additional mitigation measures to floodplain impacts will be considered during the preparation of the CIF permit.

4.11 TERRESTRIAL HABITAT

Terrestrial habitat is an important consideration as it can directly impact the survival of certain species, both floral and faunal, that require certain types, quality, and quantity of specific habitat to complete their life cycle. The one critical species potentially impacted by this project

is the Indiana bat (*Myotis sodalis*). More discussion on this project's impacts to the Indiana bat is contained in Section 4.13.

Methodology

Several types of terrestrial habitats were identified within the project area. Terrestrial habitats were assessed via general field reconnaissance in October 2012. The dominant types are hardwood forests (including forested wetlands), early to mid-successional forests, forest fragments/remnants, emergent wetlands, old fields, agricultural fields, and developed lands (residential, industrial, recreational, etc). Using data from the field surveys and recent aerial photography (INDOT, November 2011), terrestrial habitat types were mapped using GIS software. Direct impacts to habitat types were then assessed using the 300-foot-wide proposed right-of-way for each alternative.

In addition to direct impacts to habitat resulting from the conversion of land to highway use, some habitat types, such as forests, can be indirectly affected by fragmentation. Fragmentation is the process through which once large contiguous tracts of habitat are broken up into smaller, more isolated patches separated by a different habitat type. One approach used to assess forest fragmentation is to examine impacts to core forest. As used for this project, core forest is any forested habitat that has at least a 100 meter buffer of forest surrounding it (see Figure 8 below). Core forest impacts were evaluated on two levels: direct conversion of core forest to highway use, and indirect loss of core forest by conversion of the buffer that created the core forest. The direct and indirect impacts of each alternative to core forest are described below. Indirect impacts to forest habitat and other land use categories are discussed in Section 4.17.

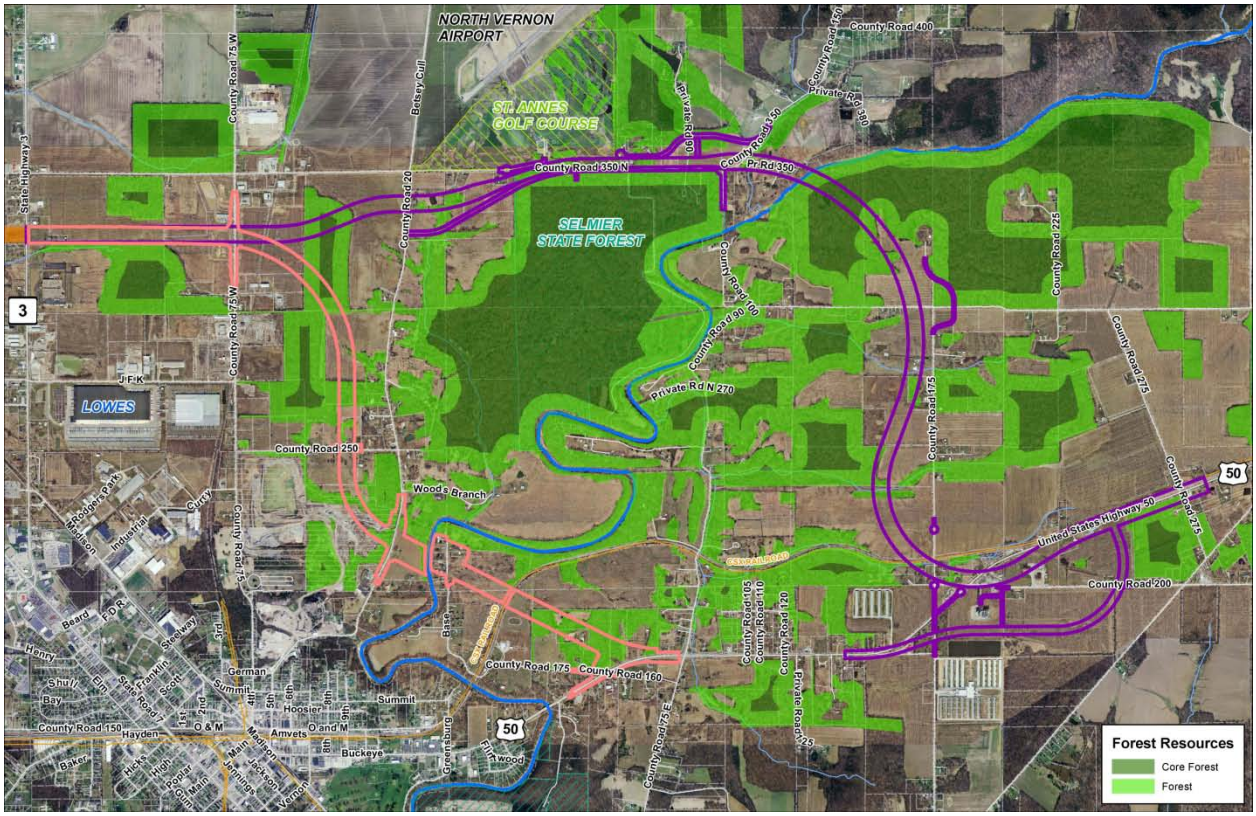


FIGURE 8: CORE FOREST WITHIN THE PROJECT AREA, SHOWN WITH ALTERNATIVES 4NB2 AND 6D.

Environmental Consequences

Forested areas within the project area vary from widely scattered fence rows, isolated tracts, and riparian corridors to large continuous tracts of mature forest. The larger woodlots consist of typical maple, beech, and hickory climax assemblages while many smaller tracts are characterized by successional and invasive species. Typical observed species within wooded tracts include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), shagbark hickory (*Carya ovata*), pin oak (*Quercus palustris*), sweet gum *(Liquidambar styraciflua)*, tulip tree *(Liriodendron tulipifera),* American sycamore *(Platanus occidentalis),* green ash *(Fraxinus pennsylvanica),* eastern cottonwood *(Populus deltoides),* spice bush *(Lindera benzoin),* multiflora rose *(Rosa multiflora),* and stinging nettle (*Urtica dioica* ssp*. dioica*).

Herbacious areas within the project area occur in unmaintained lawns and fallow fields. Typical observed species located within these areas include grass *(spp.),* clover *(spp.),* wild carrot *(Daucus carota),* dandelion *(Taraxacum officinale),* honeysuckle *(spp.),* multiflora rose *(Rosa multiflora)*, and black raspberry *(rubus occidentalis).*

Wildlife species typically observed in these habitat types include raccoon *(Procyon lotor),* whitetail deer (*Odocoileus virginianus*), woodchuck (*Marmota monax*), striped skunk (*Mephitis mephitis*), various small mammals such as mice and other small rodents, many small birds such as sparrows, woodpeckers, and many species of common perching birds (passerines).

No-Build Alternative

The No-Build Alternative would not impact any terrestrial habitat.

Alternative 6D (Preferred Alternative)

Alternative 6D would convert habitat of all types to roadway uses. Impacts to Indiana bat habitat are described in Section 4.13, while impacts to wetlands are described in Section 4.10.3.

As shown in Table 24, Alternative 6D would clear 38.0 acres of forest habitat. With regards to core forest, Alternative 6D would directly impact 1.8 acres of core forest and indirectly cause the loss of 2.9 additional acres of core forest due to forested buffer removal. The total core forest impact for Alternative 6D is therefore 4.7 acres.

TABLE 24: FOREST IMPACTS

	Alternative 6D (Preferred Alternative) (acres)	Alternative 4NB2 (acres)
Forest Habitat Cleared (Total)	38.0	38.3
Core Forest Cleared	1.8	8.4
Core Forest Converted	2.9	22.7
Core Forest Impact (Total)	4.7	31.1

Alternative 4NB2

Like Alternative 6D, Alternative 4NB2 would convert habitat of all types to roadway uses. Impacts to Indiana bat habitat are described in Section 4.13, while impacts to wetlands are described in Section 4.10.3.

As shown in Table 24, Alternative 4NB2 would clear 38.3 acres of forest habitat, similar to Alternative 6D. However, Alternative 4NB2 would have substantially higher core forest impacts: 8.4 acres of direct core forest clearing and indirect loss of 22.7 additional acres of core forest due to forested buffer removal. The total core forest impact for Alternative 4NB2 is therefore 31.1 acres.

Agency Coordination

Early coordination responses were received from the USFWS and the IDNR-F&W regarding the project's potential impacts to terrestrial habitat. In its early coordination response letter dated September 10, 2012, the USFWS recommends 1) that all route alternatives be designed to minimize forest loss and fragmentation, 2) secondary impacts should be minimized by not locating the new route near good quality habitats and sensitive areas, and 3) taking all practical measures to minimize detrimental effects on bald eagles. Additional correspondence regarding the Indiana bat is included in Appendix C, pages 21-23.

The IDNR-F&W, in a response letter dated September 14, 2012, recommends 1) that the new structure should not create conditions that are less favorable for wildlife passage under the structure compared to the current conditions; 2) that impacts to non-wetland forest cover over one acre should be mitigated at a minimum 2:1 ratio, or if under one acre, a 1:1 ratio; 3) revegetating all bare disturbed areas with a mixture of grasses, legumes, and native shrub and hardwood trees species as soon as possible upon completion; 4) minimizing and containing within the project limits the clearing of trees and brush; 5) not cutting any trees suitable for

Indiana bat roosting from April 1 through September 30, and 6) seeding and protecting all disturbed streambanks and slopes that are 3:1 or steeper with erosion control blankets and seed and apply mulch on all other disturbed areas.

Mitigation

INDOT would minimize the construction limits as much as practicable in sensitive areas and would only disturb those areas required for construction. Impacts to wetlands would be mitigated according to the requirements of USACE and IDEM. Proposed commitments pertaining to the loss of bat (forested) habitat are discussed in Section 7 of the Biological Assessment (Appendix G, pages 25-26).

Each of the alternatives would require the construction of new bridges over the Vernon Fork of the Muscatatuck River and the CSX Railroad; Alternative 6D additionally would require a bridge for CR 20 W over the new bypass. The conceptual plans for Alternative 4NB2 did not progress to the stage where span layout was considered; as a result, the ability to provide wildlife crossings was not considered.

For Alternative 6D, structure size and type analyses are complete and span layouts have been determined. At the bridge over the river, there would be large, relatively flat, unhardened areas on either side the river that would be usable by wildlife for crossing the bypass corridor. On the west side of the river, this area would be approximately 75 feet wide with a vertical clearance of approximately 10 feet. On the east side of the river, a similar area approximately 50 feet wide with a vertical clearance of approximately 30 feet would be provided.

The bridge over the CSX Railroad would be approximately 97 feet long; while there is only one existing rail track at this location, the bridge is being built to accommodate a second track in the future. As such sufficient width is provided for animals to utilize this bridge to cross the railroad track. As railroad right-of-way, however, INDOT does not control the grade and ground surface treatment of this area.

The bridge for CR 20 W has been designed to allow for the construction of two additional lanes for the bypass in the future. As such, the bridge would have a total length of 240 feet. Only approximately half of that width is required for construction of the bypass at this time; the remaining area would be left clear and could likely be used by animals to cross CR 20 W.

4.12 KARST

Karst landscapes are locally present throughout many parts of southern Indiana. Features that may be present in a karst landscape include caves, sinkholes, disappearing streams, springs, and underground streams. Where caves and underground streams are present, a unique assemblage of fauna and flora are often observed. The karst terrain develops as a result of water slowly dissolving the bedrock in the area. The dissolution of the rock is concentrated at the water table and in areas of concentrated groundwater flow, such as along joints, bedding planes, and fractures in the rock. As the dissolution occurs, this further concentrates groundwater flow in these areas, creating voids such as caves and underground stream channels. Thus some areas of the bedrock would undergo extensive dissolution whereas others undergo little dissolution. Where a cavity becomes large enough that it can no longer support the material above, the ground can collapse causing a sinkhole.

Movement of groundwater in these solution-enlarged channels can be quite rapid, and can bypass the buffering effect of the soil and aquifer matrix typically seen in flow in traditional porous media. Karst areas are vulnerable to contamination from both point sources (spills, leaking tanks, and septic systems) and from areal source contamination (road salts, pesticides, and fertilizers).

Methodology

The study methodology for the analysis of the Preferred Alternative was developed to be consistent with the objectives identified in the 1993 MOU between INDOT, IDNR, the IDEM, and USFWS for the purpose of delineating guidelines for construction of transportation projects in karst regions of the State (see Appendix H, pages 45-48).

This project is within the Muscatatuck Plateau physiographic unit of the Southern Hills and Lowland Region which has been identified to contain small amounts of isolated karst features. Due to this potential for karst features in the area INDOT Environmental Services determined that a Karst Evaluation Report would be necessary for the project's Preferred Alternative. This determination was based on two areas of sinking stream basins identified in the Indiana Geological Survey Database and the presence of field identified karst features within the project corridor. The final report, with specific locations of karst features redacted, is included in Appendix H.

The karst evaluation was performed within the area in and surrounding the Preferred Alternative, Alternative 6D. A review of literature on the geology and hydrogeology of the area of the Preferred Alternative was performed prior to performing a field reconnaissance. The field reconnaissance for the Evaluation Report was conducted by Parsons on February 5 and February 6, 2013.

A separate review of the potential karst impacts caused by Alternative 4NB2 was conducted using secondary source data compiled from the Indiana Geological Survey. This secondary source review was augmented by interviews with landowners and observations made during the field surveys conducted in support of the Waters Determination Report. This field work was conducted by Parsons during the week of October 22, 2012.

Pollutant Loading Methodology

A pollutant loading assessment was conducted to determine the change in ambient water quality loading and concentrations from a pre-development condition to conditions during construction and post-development. Nine water quality parameters of interest are reported. The assessment was based on methodology defined in USDA's Technical Release 55 (TR-55; USDA, 1986), rainfall data from the Precipitation Frequency Data Server hosted by National Oceanic and Atmospheric Administration (NOAA) (NOAA, 2013), and land use-based water quality loading parameters reported in the National Stormwater Quality Database (USEPA, 2005) as well as a review of published data for construction level water quality loading parameters (Lin, 2004).

Five karst features and/or areas of karst – A-04, Area D, E-01 & E-02, E-06, and E-07 & E-08 – were identified as having the potential to receive runoff from the highway identified in the Preferred Alternative. Karst features were organized into these separate groupings based on

their geographic locations and likelihood to receive similar runoff quantities and pollutant levels.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would have no impact on the karst features in the area. Several sinkholes were identified within the vicinity of the Preferred Alternative that currently receive untreated road runoff from U.S. 50, CR 175 N, CR 20 W, and CR 250 N. These karst features would receive an increased pollutant load from the increased traffic projected for the no-build scenario.

Alternative 6D (Preferred Alternative)

Alternative 6D traverses two areas identified by the IGS as "Sinkhole Areas and Sinking Stream Basins" (see Map 11, Sheets 18-20). During field investigations conducted in support of the preparation of the project's waters determination, several potential karst features were identified and noted. Due to the prevalence of these identified features and the increased potential for this alternative to impact sensitive karst features a detailed field analysis was conducted specifically to identify karst features.

During the karst-specific field analysis, more than 60 karst features were located within or adjacent to the Alternative 6D alignment. 30 of these features lie within the right-of-way of Alternative 6D and will be treated in accordance with INDOT standard specifications. Specific mitigation measures are detailed in the mitigation/treatment discussion below. Approximately 10 karst features have been identified that may be impacted by roadway drainage. Vegetation surrounding these features will be undisturbed and will act as a filter strip to capture sediment and roadway pollutants. Almost all of the karst features identified are sinkholes. Several seeps were identified; however, no significant springs were observed. Several small openings were identified that are termed caves in the notes. However, none of these features were large enough to allow human entry. Additional details regarding the identified features are provided in the Karst Evaluation Report in Appendix H. Due to the sensitivity of these resources, location data is not provided.

Pollutant Loading Findings

As described in the methodology section the pollutant loading model analyzed the pre-development, during construction, and post development conditions. Pre- highway baseline data was calculated for the five karst areas; this data is provided in the Karst Evaluation Report in Appendix H.

During construction the sinkholes are anticipated to experience an increased pollutant load from sources such as disturbed sediment, fuels spills, and leaking equipment. After construction of the highway, contaminant loads would generally increase due to the combination of greater runoff from the impervious surface and additional contaminants from the traffic. Within the karst features studied the relative contaminant load difference between features depended largely on the percentage of overall drainage area to the sinkhole occupied by the highway. Table 25 provides a summary of the changes in pollutant load anticipated for Alternative 6D

resulting from construction and after completion of construction. In both scenarios, values are compared to pre-construction pollutant loads.

TABLE 25: ALTERNATIVE 6D POLLUTANT LOADING RELATIVE TO PRE-CONSTRUCTION LEVELS

	A-04	Area D	E-01 & E-02	E-06	E-07 & E-08
Post-Construction					
Runoff Volume (% change)	4.4	17.8	31.3	17.9	21.9
Total Suspended Solids Concentration (% change)	7.3	22.8	28.5	20.8	25.2
Total Suspended Solids Mass (% change)	12.3	44.9	61.8	42.0	53.0
During Construction					
Runoff Volume (% change)	11.5	79.5	137.5	91.1	118.8
Total Suspended Solids Concentration (% change)	260	908	725	599	689
Total Suspended Solids Mass (% change)	301	1712	1836	1232	1638

The contaminant loading data presented above assumes that no mitigation measures are utilized. Although the water being discharged to the five sinkhole clusters would contain higher contaminant loading, it should be recognized that a number of other sinkholes nearby would not receive surface runoff from the highway. The large number of small sinkholes suggests an interconnection of the subsurface flow paths, as it is not probable that discrete flow paths from so many features would travel any significant distance without intersecting with another discrete flow path. The contaminants in the water entering the five sinkholes that receive highway runoff would mix with the water without highway impacts that enter the many other sinkholes in the area. Thus the changes to overall water quality would be significantly lower than the changes predicted at these five sinkholes.

Alternative 4NB2

Alternative 4NB2 intersects a mapped area identified by the IGS as containing one cave entrance (see Appendix C, page 9). This cave entrance will not be impacted by the project because Alternative 4NB2 was not selected as the Preferred Alternative.

Agency Coordination

Agency responses regarding karst were received from the USFWS (see Appendix C, pages 17-20) and the USEPA (see Appendix C, page 31). The USFWS stated that most of the study area is underlain by karst geologic formations, a karst survey should be completed in accordance with the karst MOU, and that all route alternatives should be designed to avoid water quality impacts on significant karst resources. The USEPA also recommended that a karst study be

completed in accordance with the MOU and gather enough information to identify the alternative with the lowest potential to impact karst resources.

Mitigation

The primary objective of the 1993 MOU is to minimize the impacts of highway construction and operation on karst resources, including habitat of all species, groundwater quality, and public health and safety. Four strategies to meet this goal include: avoidance, alternative drainage, mitigation/treatment, and operation and maintenance. This project will follow all requirements set forth in the 1993 Karst MOU. These strategies are listed below along with a discussion of how each was considered during the project development process.

Avoidance

The Preferred Alternative has been selected based on a careful review of a number of factors including environmental factors, constructability, effectiveness to meet the transportation goals, and cost. Within the Preferred Alternative, there is a limited ability for the construction process and highway to avoid some of the karst features identified in the field reconnaissance. Modifications to the Preferred Alternative that avoid all karst features were considered. These modifications would require alterations to the horizontal alignment that would result in either undesirable geometrics at the proposed bypass tie in to existing US 50, a river crossing at a less desirable location, additional forest impacts, or additional wetland impacts. Specific locations of known karst features would be available to the roadway design team in order to further avoid specific features and ensure roadway drainage would not impact these features.

Alternative Drainage

Alternative drainage is an important strategy to minimize the impacts of the highway construction and operation on karst resources. The roadway design must consider the collection and management of highway runoff. It may not be possible to redirect the highway runoff away from all of the karst features that were identified during the site reconnaissance. However, many of the karst features that were identified would lie underneath the pavement and actual construction footprint of the highway. These features would have to be filled and stabilized as a part of the construction process, which would eliminate them as potential pathways for the migration of highway runoff. Construction details specifying an approved method for capping sinkholes will be described in the final construction plans. The redirection of runoff and the elimination of the inflow to the sinkholes is not anticipated to impact aquatic species as cave features in the corridor are not known to exist, and as such, cave fauna are not anticipated to be present.

Runoff from the highway from approximately 950 feet west of the Vernon Fork of the Muscatatuck River to the CSX railroad tracks would be collected and diverted through ditches and pipes to the Vernon Fork of the Muscatatuck River south of the dam that creates a reservoir for the North Vernon Water intake. This alternative drainage would prevent all highway runoff from reaching the karst features in areas immediately adjacent to the Vernon Fork of the Muscatatuck River.

Mitigation/Treatment

Where avoidance of a karst feature and diversion of roadway drainage away from the karst feature is not possible, mitigation and treatment of the runoff will be considered. Mitigation measures for highway runoff include the implementation of peat and sand filters, gravel filters, vegetative buffers, and lined spill or runoff containment structures. These measures can be implemented to detain and treat the runoff prior to discharge to a karst feature.

Monitoring of the discharges from these treatment measures may be required to evaluate their effectiveness in mitigating the impact of the highway runoff.

Mitigation measures would be utilized during construction of the highway. These may include such measures as silt fencing, temporary berms, accelerated vegetation of completed areas, and other erosion control measures. The construction project would require a Rule 5 Permit from the IDEM which would detail the location of each measure and how they would be implemented.

Operation and Maintenance

Maintenance of the highway and the associated treatment/mitigation measures should be performed to ensure that the impacts to karst features are minimized. Routine maintenance and inspection of filters, buffers, and containment structures should be performed and any deficiencies or problems should be corrected at the earliest possible time. Examination of drainage features in areas adjacent to karst areas should be performed periodically to identify any emerging karst features. Consideration should be given to implementation of no mowing and no spray zones to increase vegetative cover and buffering of runoff. Technological advances in runoff treatment and mitigation technology should be reviewed for potential application.

4.13 THREATENED OR ENDANGERED SPECIES

The Endangered Species Act (ESA) of 1973 requires Federal agencies to use their authority to carry out their programs for the conservation of endangered species and their critical habitat. Section 7 of the Act requires that Federal agencies (and recipients of Federal funds) assist in the conservation of federally listed Threatened and Endangered Species (TES) and, in consultation with USFWS, ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat.

Methodology

Information about threatened and endangered species was provided by the USFWS and IDNR (see Appendix C, pages 17-20 and pages 24-30) for this proposed project.

State Listed Species

State listed species that are known to occur within the project area include eastern box turtle (*Terrapene carolina carolina*, state special concern) and eastern hemlock (*Tsuga Canadensis*, watch list). Other listed plant and animal species known to occur near the impact area include sullivantia (*Sullivantia sullivantii*, state threatened), shining ladies'-tresses (*Spiranthes lucida*, state rare), barren strawberry (*Waldsteinia fragarioides*, state rare), wolf bluegrass (*Poa wolfii*, state rare), eastern hemlock, eastern box turtle, Kirtland's snake (*Clonophis kirtlandii*, state

endangered), least weasel (*Mustela nivalis*, state special concern), and the bald eagle (*Haliaeetus leucocephalus,* state special concern).

Eastern box turtles are predominantly land turtles that occasionally go into shallow water at the edge of ponds or streams. They are active throughout the day from April to October, but limit activity during the heat of the day during the warm summer months. In the winter, the turtles hibernate under dead leaves, inside old stumps, or below the soil surface in shallow burrows. The box turtle's range extends throughout the U.S. from southern Maine to Florida along the East Coast and west to Michigan, Illinois, eastern Kansas, Oklahoma, and Texas. They have been found throughout Indiana, but are more common in southern Indiana.

The eastern hemlock is a shade tolerant tree that thrives in cool humid climates. These evergreen trees are slow growing in fairly acidic soils. The eastern hemlock is known to occur in southern Canada, throughout the northeastern United States, and along the Appalachian Mountains south down to Georgia.

Federally Listed Species

Two federally-listed species were identified as occurring within the vicinity of the project: the Indiana bat (*Myotis sodalis*, federally endangered) and the gray bat (*Myotis grisescens*, federally endangered). The bald eagle is also found in the project area, but was delisted in 2007. The bald eagle continues to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (as do all native migratory birds).

The Indiana bat's range includes most of the eastern United States. The species' range is generally consistent with the presence of limestone caves that serve as hibernacula in the winter. Indiana bats are known to migrate up to 360 miles from their hibernacula to find suitable summer habitat to raise offspring. During autumn, Indiana bats use sloughing bark and cracks in dead, partially dead, and live trees as day roosts. During the winter, Indiana bats hibernate primarily in caves. During the summer months, Indiana bat habitat consists of wooded or semi-wooded areas, mainly along streams and riparian corridors. Primary roost species include: silver maple (*Acer sccharinum*), shagbark hickory (*Carya ovata*), shellbark hickory (*C. laciniosa*), bitternut hickory (*C. cordiformis*), green ash (*Fraxinus pennsylvanica*), white ash (*F. Americana*), eastern cottonwood (*Populus deltoides*), northern red oak (*Quercus rubra*), post oak (*Q. stellata*), white oak (*Q. alba*), slippery elm (*Ulmus rubra*), and American elm (*U. Americana*). Indiana bats forage primarily in forested habitats, but they also forage in edges of forests and croplands, fallow fields, and areas of impounded water.

Gray bats inhabit caves all year, living in cold hibernating caves or mines in winter and warmer caves in the summer. The primary range for gray bats is in Alabama, Kentucky, Missouri, and Tennessee, with smaller populations occurring in adjacent states. Summer foraging habitat is along open water of rivers, streams, lakes, or reservoirs.

Survey Results

Following completion of the *U.S. 50 North Vernon Corridor Planning and Environmental Assessment Study*, an Indiana bat survey was conducted between July 16 and July 23, 2009 encompassing portions of the entire bypass corridor. A total of 29 individuals representing six species (eastern pipistrelle, little brown bat, big brown bat, eastern red bat, northern long

eared bat, and evening bat) were captured during this mist-net survey; however no Indiana bats were captured or observed during this survey. One bat species listed as endangered by the state of Indiana, the evening bat, was captured.

Following initiation of the East Bypass project and identification of preliminary alignments, a more targeted survey was conducted in August 2012 by Eco-Tech Consultants, Inc. at a total of 11 sites. A total of 86 bats from six species were captured at the 11 sites. One federally endangered Indiana bat was captured. The individual was tagged with a transceiver; however, the home range of this individual could not be established due to the fact that it could not be relocated after capture. Due to the relatively late date of capture, it is possible that the bat captured represents a transient individual from a nearby colony rather than a juvenile from an unknown maternity colony within the project area. The results of the survey are documented in a report titled *Mist Net Survey for Federally Listed Bat Species for the Proposed U.S. 50 North Vernon Bypass (East) in Jennings County, Indiana* and included in Appendix G.

The big brown bat was the most commonly encountered species. Other bat species captured included eastern red bat (*Lasiurus borealis*), northern long-eared bat, tri-colored bat, and little brown bat.

An Indiana bat habitat assessment was also conducted for the alignment alternatives where relevant forest stands occurred. Based on the data collected, 11 locations were classified as having high suitability, 14 as moderate, and 10 as low. High quality areas had characteristics that were favorable for foraging, roosting, and/or commuting by Indiana bats. Additional detail is provided in the *Indiana Bat (Myotis Sodalis) Summer Habitat Impact Analysis for the Proposed US Highway 50 North Vernon Bypass, Jennings County, Indiana* included in Appendix G.

Biological Assessment

At the request of USFWS, a Biological Assessment was prepared by Eco-Tech documenting the potential impacts of Alternative 6D, the Preferred Alternative. The report, included in Appendix G, considered direct, indirect and cumulative impact to the Indiana bat. Findings of the Biological Assessment are discussed below.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would result in no impacts to threatened and endangered species.

Alternative 6D (Preferred Alternative)

The Preferred Alternative would result in the direct loss of approximately 42.1 acres of potential Indiana bat habitat. Fragmentation of forested blocks and the creation of a wide, paved new roadway may further impede movement of Indiana bats through the project area, thereby increasing the area of Indiana bat habitat affected by the project.

Screening of preliminary alternatives eliminated alignments that were much more deleterious to Indiana bat habitat in terms of potential habitat clearing, habitat fragmentation, and potential for cumulative impacts. Wetland and stream mitigation would provide over 24 acres of potential maternity habitat for Indiana bats that would be protected in perpetuity. In

addition, INDOT would seek opportunities to minimize tree clearing and preserve forested tracts where possible.

Construction during the hibernating season that results in destruction of karst systems has the potential to directly affect Indiana bats. However, the USFWS maintains a list of known Indiana bat hibernacula, none of which are in Jennings County. Therefore, no effect to Indiana bat winter habitat is anticipated.

Construction projects within karst areas have the potential to indirectly affect Indiana bats through alteration of airflow within cave systems, flooding due to increased runoff, and introduction of contaminants. If blasting is conducted, there is potential for air flow alterations due to changes in the bedrock structure. Because of increases in paved area, the project has the potential to increase the speed with which water drains into sinkholes, and may increase flooding of the receiving karst systems. In addition, soil disturbance may increase the silt load of runoff within the project area if sediment and erosion BMPs are not in place.

Noise disturbance created during construction is another potential direct effect to Indiana bats. If adjacent maternity roosts or hibernacula are affected by noise and/or vibrations, the area of direct effects may extend outside of the area where direct disturbance would occur. However, there are documented examples of bats tolerating vehicle noise, where multiple roosts have been noted near an interstate.

In addition to the direct effects of construction on Indiana bats and their habitat, the road may also indirectly lead to Indiana bat mortality later through collisions of bats with cars. Another potential indirect effect of the project is disturbance to the aquatic ecosystem. Indiana bats forage extensively on insects, and many insects have aquatic larvae. Indiana bats could potentially be affected if aquatic habitat quality is reduced by construction siltation and/or subsequent infiltration of roadway contaminants.

Based on the lack of any substantial maternity colonies within the project limits and the conservation measures proposed for protection and enhancement of potential Indiana bat habitat, the project may affect, but is not likely to adversely affect, the Indiana bat.

Alternative 4NB2

Alternative 4NB2 would result in the direct loss of approximately 49.8 acres of potential Indiana bat habitat. As with Alternative 6D, fragmentation of forested blocks and construction of a new roadway may further impede the movement of Indiana bats. Likewise wetland and stream mitigation would provide approximately 40 acres of potential habitat, protected in perpetuity. All other potential impacts discussed for Alternative 6D apply equally to Alternative 4NB2.

Agency Coordination

Throughout the project's development, INDOT coordinated with the USFWS and IDNR-F&W regarding threatened and endangered species.

In its September 10, 2012 response to early coordination (see Appendix C, pages 17-20), the USFWS indicated that there are numerous recent summer records of Indiana bats from the Muscatatuck River watershed. USFWS indicated the need for informal consultation under

Section 7 of the Endangered Species Act and for a biological assessment to determine if formal consultation is necessary.

In an email dated January 2, 2013 (see Appendix C, page 22), USFWS concurred with the findings of the *Indiana Bat Summer Habitat Impact Analysis* that Alternative 6D would have the least impact on Indiana bats. In an email dated January 17, 2013, USFWS reiterated their preference for Alternative 6D and indicated that it would not directly affect enough habitat to cause a "take". However, the agency indicated continued concerns for the impacts that could be caused by secondary development and disruption of habitat connectivity.

In a letter dated September 10, 2013, the USFWS provided comments on the Biological Assessment report prepared by Eco-Tech (see Appendix C, page 93). The letter summarized the anticipated impacts, noting that the 42.1 acres of direct habitat impact (conversion to transportation use) reported in the Biological Assessment was based on clearing of the full right-of-way. Because INDOT plans to clear only what is required to construct a 2-lane facility, approximately 22 acres of habitat would be impacted during construction. The response also notes that some impacts to bats could occur as a result of habitat fragmentation and reduced habitat connectivity, but that the majority of the forested habitat in the area lies to the east of the bypass. The response also notes that the proposed bridge over the Vernon Fork of the Muscatatuck River would provide sufficient opening above the river and floodplain to allow bats to move along the corridor. Finally, the letter notes the potential for indirect impacts as a result of induced growth, as documented in the *Indirect and Cumulative Impact Analysis* (see Appendix I), but that Alternative 6D would have substantially lower impacts than Alternative 4NB2.

Based on their review of the Biological Assessment, USFWS, in their September 10, 2013 letter, concurred with the determination in the Biological Assessment that they project is not likely to adversely affect the Indiana bat and that the anticipated effects of the proposed action on the Indiana bat are insignificant and discountable. This concurrence precludes the need for further consultation on this project under Section 7 of the Endangered Species Act of 1973, as amended. If new information on endangered species at the site becomes available or if project plans are changed significantly, INDOT shall contact USFWS for further consultation.

In its August 16, 2012 response to early coordination (see Appendix C, pages 27-30), the IDNR recommended avoiding and minimizing all impacts, to the extent possible, to state-listed species. Impacts to listed plant species and the least weasel were not anticipated by IDNR. To avoid impacts to eastern box turtles, Kirtland's snakes, and other herpetofauna, the IDNR recommended conducting construction operations between April and October to avoid impacts to hibernating individuals. It was also recommended to remove all debris and vegetation, to the extent possible, from the work area to discourage individuals from using the work site for cover. Additionally, silt fence should be placed around the work site to prevent individuals from entering the site. Finally, a thorough search for individuals should be conducted by an accredited herpetologist within the work site each day and any captured individuals should be relocated away from the work site. The eastern hemlock and bald eagle could potentially be impacted near riparian areas. To reduce impacts the IDNR recommended avoiding areas with eastern hemlock stands and minimizing the amount of riparian tree clearing.

On September 11, 2012, IDNR provided a list of endangered, threatened and rare species within the study area based on the Indiana Natural Heritage Data Center (see Appendix C, pages 24-26). This data mirrored the recommendations provided in their August 16, 2012 correspondence.

Mitigation

In the Biological Assessment INDOT indicated that it would seek opportunities to preserve and/or create Indiana bat habitat during the evaluation of excess right-of-way. In its September 10, 2013 letter concurring with the findings of the Biological Assessment, USFWS "strongly encourage[d] INDOT to consider preservation and reforestation of adjacent and nearby habitat in order to help conserve and recover the endangered Indiana bat" (see Appendix C, page 93).

INDOT has identified approximately 41.1 acres of excess right-of-way (see Section 4.2) associated with Alternative 6D, of which approximately 11.7 acres is already forested. At the conclusion of the construction, INDOT would review this property for suitability as Indiana bat habitat mitigation. Property that is either currently suitable or could reasonably be revegetated to provide habitat would be preserved (and revegetated if appropriate) either through permanent INDOT ownership or an appropriate deed restriction that would prohibit destruction of the habitat.

In addition, as described in Section 4.10.3, the project would require mitigation for wetland and stream impacts under Sections 401 and 404 of the Clean Water Act. The amount of wetland and stream mitigation required would be determined during the permitting process in conjunction with IDEM and USACE.

No further recommendations for mitigation were provided by IDNR beyond their correspondence on August 16, 2012 and September 11, 2012 noted in the Agency Coordination section of this chapter.

4.14 FARMLAND

Historically, agriculture has played a central role in the economy of Jennings County. Like many of the surrounding counties, Jennings County has relied upon soybeans, corn, wheat, hay, cattle, and hogs to support its agricultural economy. Over the last half century, urban development (residential and commercial) has spread throughout the area surrounding North Vernon, reducing the amount of land available for agriculture.

According to the Indiana Agricultural Statistics Service, in 2007 there were 613 farms in Jennings County encompassing 138,331 acres, which was approximately 57 percent of the land in the county (USDA, 2013a). The average value per acre for land and buildings in 2007 was $3,189. The statewide ranking for Jennings County based on commodity type production in 2007 is as follows; 67th in corn, 57th in soybeans, 78th in wheat, 38th in hay, 13th for beef cows, 71st for hogs, and 40th for sheep.

Prime farmland soils are prominent throughout the project area. As defined by the USDA Natural Resources Conservation Service (NRCS), prime farmland is "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops, and is also available for these uses (i.e., land that could be cropland, pastureland, rangeland, forest land or other land, but not urban built-up land or water)." These soils must

also be protected from flooding and not be susceptible to ponding for long periods of time in order to be considered prime farmland.

In Jennings County, a majority of the project area is underlain by Nabb, Cobbsfork, and Avonburg soils, which are all prime or prime if drained farmland. These soils have the "quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods."

Methodology

Under the Farmland Protection Policy Act of 1981 (FPPA), all Federal corridor projects are required to calculate and describe the proposed acres of farmland impacts and report such findings to the NRCS through the Farmland Conversion Impact Rating for Corridor Projects (NRCS-CPA-106) review process. If farmland impacts equal or exceed a score of 160 points on the NRCS-CPA-106 form, the FPPA suggests the agency consider alternative actions, as appropriate, to reduce adverse impacts.

Copies of the NRCS-CPA-106 forms are included in Appendix C (see page 57). Farmland impacts (as calculated on the CPA-106 form) for each alternative are shown in Table 26. These values are provided by NRCS using a preliminary estimate of right-of-way. The NRCS based these values on an assumption that all proposed right-of-way is agricultural; therefore these values do not exactly match the values presented in Section 4.8 which are based upon actual corridor land uses. Farmland within the proposed right-of-way of the build alternatives is described as "converted directly." Farmland that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to it is labeled as "converted indirectly." As discussed below (*Bisected Parcels)*, for this project such restricted access to landlocked parcels is expected to be temporary and therefore not considered "converted indirectly" for the purposes of the NRCS CPA-106 form and evaluation.

Bisected Parcels, Point Rows, and Uneconomic Remnants

In addition to the direct conversion of farmland to roadway, the build alternatives also result in bisected parcels, point rows, and uneconomic remnants, a secondary impact to farmland. Such bisecting can result in odd shaped parcels or landlocked parcels. Given that many of these bisected parcels are landlocked by ownership rather than physical barriers, a variety of alternatives exist to keep these parcels in agricultural production. Such alternatives include sale or rental to an adjacent owner, creation of a new access point for the original owner, or structural accommodations associated with the new facility such as a culvert large enough to move farm equipment through. If these mitigation measures are not reasonable, then the parcel would be addressed as landlocked during the right-of-way acquisition process. Several uneconomic remnant parcels have the potential to be acquired and utilized as upland forest restoration. Due to the likelihood that these prime farmland acres would remain in production, bisected parcels were not tabulated in the NRCS-CPA-106 form as "converted indirectly."

Environmental Consequences

No-Build Alternative

The No-Build Alternative would incur no impacts to farmland.

Alternative 6D (Preferred Alternative)

Alternative 6D, as shown in Table 26, would directly convert 160 acres to transportation use. 91 of these 160 acres contain prime or unique farmland. As required by the FPPA, the NRCS-CPA 106 was submitted to the NRCS. Alternative 6D received a total corridor point value of 141.

Alternative 4NB2

Alternative 4NB2, as shown in Table 26, would directly convert 246 acres to transportation use. 157 of these 246 acres contain prime or unique farmland. As required by the FPPA, the NRCS-CPA 106 was submitted to the NRCS. Alternative 4NB2 received a total corridor point value of 155.

TABLE 26: IMPACTS TO FARMLAND

Alternative	Total Acres Converted Directly	Total Acres Converted Indirectly	Total Acres	CPA 106 Score
6D	160	0	160	141
4NB2	246	0	246	155

Alternative 4NB2 carries the greatest total impact to farmland (246 acres) and 86 acres more than Alternative 6D. Alternative 4NB2 also carries the greatest impact to prime and unique farmland totaling 157 acres, 66 more acres than Alternative 6D.

Mitigation

As required by the FPPA, Form NRCS-CPA-106 was submitted to the NRCS. Each build alternative received an estimated total corridor assessment point value less than 160 points.

Since the 160 threshold score was not exceeded, the initiating agency (FHWA) is not required to, as part of this process, consider alternative actions (e.g. alternate routes, alternative interchange configurations, etc.) that could reduce adverse impacts associated with the build alternatives. The completed NRCS-CPA-106 form assessing the alternatives is included in Appendix C (see page 57).

Although alternative actions were not required to be considered, several options were considered. These options focused on those practices that assist in avoiding and/or minimizing conversion, or designing alignments to minimize disruption to existing agricultural patterns. General practices that were considered in developing alternatives for the proposed alignments included the following:

- When reasonable, alignments were developed to follow existing property lines and minimize dividing or splitting of large tracts of farmland.

- Agricultural property lines were followed as much as possible or fields were crossed at perpendicular angles to reduce point rows and the creation of uneconomic remnants.

Where reasonable, access would be provided to parcels that would otherwise be landlocked as a result of the project.

4.15 MINERAL RESOURCES

Mineral resources continue to play an integral role in society, as they have throughout human history. Mineral resources in Southeast Indiana include gas, shale, sand, gravel, and limestone. These minerals have many uses, such as providing electricity for homes and offices; energy for transportation, and heating/cooling for residents and businesses; and building products. Building products include cement products from shale, asphalt paving bitumens from crude oil, and limestone premium aggregate products. Within this project area the major mineral resource in the project area is stone and gravel.

Methodology

GIS data provided by IndianaMap was used to identify potential mineral resources for both alternatives (Indiana Geographic Information Council, 2012). These resources could potentially include sand and gravel, limestone, and natural gas. Resources within the vicinity of either alternative were identified and correspondence was initiated to solicit input from the owners of the resource.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would have no impacts on mineral resources.

Alternative 6D (Preferred Alternative)

Alternative 6D crosses an active quarry operated by Berry Materials and would require approximately 9.6 acres of permanent right-of-way from the property. This alternative would require the relocation of an existing entrance to the quarry.

Alternative 4NB2

Alternative 4NB2 is not anticipated to have impacts on mineral resources.

Agency Correspondence

The IGS responded to early coordination in a letter dated August 17, 2012. In this letter they stated that the project area is underlain by Devonian and Silurian carbonate rocks, which have been mined within and near the project site as a source of crushed-stone products. The IGS also identified the Berry Materials quarry and noted that there are five abandoned quarries near the project area. These statements are consistent with field surveys of the project area.

Mitigation

Any interruption of an existing operation and its extra associated cost would potentially affect the desirability of the development of the natural resource. All property owners would be compensated based on what is acquired at its fair market value at the time of the acquisition,

as determined by its current developed use. The Preferred Alternative would include an overpass for CR 20 W and would provide an access point to the Berry Materials quarry where the overpass ties into the existing CR 20 profile, south of the bypass. No mitigation would be performed for impacts to known limestone deposits, which are not commercially owned.

4.16 VISUAL AND AESTHETIC RESOURCES

Methodology

Visual and aesthetic resources were identified by observing the visual corridor associated with the East Bypass project alternatives. The visual corridor takes into account the entire aesthetic landscape. For the purposes of the East Bypass project, the visual corridor includes two main aspects: views to the proposed road and views from the proposed road. Views to the proposed road include what is seen from adjacent properties when facing the corridor. These views are normally from a fixed vantage point where the visual corridor would be viewed by residents, drivers, or pedestrians. Views from the road are what would be experienced by roadway travelers, such as commuters, haulers, or tourists. As roadway travelers, these viewers have a broader exposure to the visual corridor than adjacent residents.

Environmental Consequences

No-Build Alternative

The No-Build Alternative would not have any impacts upon visual and aesthetic resources.

Alternative 6D (Preferred Alternative)

For purposes of this investigation, the proposed roadway for Alternative 6D was split into three segments: *Tie-in at U.S. 50 West Bypass, Southern Corridor of Alternative 6D*, and *Eastern Corridor of Alternative 6D*.

Tie-in at U.S. 50 West Bypass (SR 3 to CR 75 W)

This area is characterized by scattered residential and commercial properties. The visual corridor consists primarily of agricultural land use that is mostly level in its topography. At the western edge of this segment is SR 3, which would cross the proposed two-lane divided highway at-grade between CR 300 N and CR 350 N. The segment would also cross CR 75 W at-grade, where a new intersection is proposed as part of this alternative. At this intersection, there is currently an undeveloped parcel of land owned by the North Vernon Redevelopment Commission. A few commercial/industrial facilities can be seen if looking south of the proposed road: Metaldyne along SR 3, Lowe's Distribution Center along W JFK Drive, and PBM Industries along W JFK Drive. If looking north of the proposed road, a few residences and CR 350 N can be seen.

Southern Corridor of Alternative 6D (CR 75 W to CR 20 W)

The southern corridor of the proposed highway runs along more agricultural land. There are a few neighborhoods of single family residences that can be seen to the east of the proposed highway, along CR 20 W and at CR 250 N. These residences do not have any obstructions in front of them other than scattered trees, thus would have direct sight of the road from their properties due to proximity. This segment of the road would also cross CR 250N at-grade. To

the west of the proposed highway, within visual range, is a large rock quarry operated by Berry Materials Corp. varying in elevation, which would be above and below the grade of the proposed road.

Eastern Corridor of Alternative 6D (CR 20W to CR 75E)

At the eastern corridor, a bridge would be built for the highway to cross over the Vernon Fork of the Muscatatuck River. The river would be seen from the bridge to both the north and the south. East of the proposed bridge, to the north of the corridor is primarily agricultural land. South of the corridor is agricultural land with scattered single family residences that would have a direct view of the road. Farther south of these residences is the continuation of the Vernon Fork of the Muscatatuck River, which would be seen off in the distance from the road.

Alternative 4NB2

For purposes of this investigation, the proposed roadway for Alternative 4NB2 was split into three segments: *Tie-in at U.S. 50 West Bypass*, *Eastern Corridor of Alternative 4NB2*, and *Southern Corridor of Alternative 4NB2*.

Tie-in at U.S. 50 West Bypass (SR 3 to CR 75W)

This segment is the same as above for Alternative 6D.

Eastern Corridor of Alternative 4NB2 (CR 75W to CR 300 N)

North of this portion of Alternative 4NB2, which would be seen from the highway, are St. Anne's Golf Course and the North Vernon Airport. To the south is Selmier State Forest. Golfers at St. Anne's Golf Course would have a direct view of the road. At Selmier State Forest, the densely wooded landscape and distance of the hiking trails from the proposed roadway would make it unlikely that people would see the highway from within the forest. This segment would also have a proposed bridge that would cross the Vernon Fork of the Muscatatuck River. The river would be seen from the bridge to the east and the west.

Southern Corridor of Alternative 4NB2 (CR 300 N to CR 280 E)

This corridor is characterized by forested and rural agricultural land, with sparse areas of residential neighborhoods and businesses. Residences to the east have an existing view from their properties of CR 175 E, and beyond that the proposed highway would be seen. To the west of the proposed highway is rural agricultural land and forest. At the southern edge of this corridor, also along CR 175 E, is Rose Acre Farms, Inc., which would have a direct view of the road.

Mitigation

The proposed roadways for both alternatives have been designed to fit with the rural quality of North Vernon. Current topography was considered so that changes to the landscape would be minimized. There would be no physical barriers that would obstruct views on either side given the primarily at-grade elevation of the roadway design. At the CR 20 and B&O Railroad bridges, there would not be architectural features to the roadway that would alter the current aesthetic character.

4.17 INDIRECT AND CUMULATIVE IMPACTS

Impacts that would occur beyond those that would be directly incurred or induced by the East Bypass have been assessed. These impacts fall into one of two categories – indirect impacts and cumulative impacts. Indirect impacts are defined as the effects of the proposed project that occur at a different time or location from the direct impacts of the project. Typically, indirect impacts are associated with a project's potential to induce development. For transportation projects, this usually involves the creation of new or significantly improved access to areas that are relatively undeveloped. The new/improved access then has the potential to induce commercial, residential, and/or business development. The potential future impacts to natural resources that may be associated with the induced development are then considered indirect impacts.

Cumulative impacts are defined as "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" (40 CFR § 1508.7).

Methodology

The indirect and cumulative impact analysis was conducted in accordance with the guidelines in the following documents:

- *Procedural Manual for Preparing Environmental Documents* (INDOT, 2008a);
- *Assessing Indirect Effects and Cumulative Impacts under NEPA* (Center for Environmental Excellence by AASHTO, 2011);
- *Considering Cumulative Effects Under the National Environmental Policy Act* (Council on Environmental Quality, 1997);
- *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (Transportation Research Board, 2002);
- *Indirect and Cumulative Impact Assessment in the Highway Project Development Process* (FHWA, 1992); and
- *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (USEPA, 1999).

The indirect impacts and direct impacts from the West Bypass project's Preferred Alternative are included with the impacts from the East Bypass project to determine the combined/total indirect and cumulative impacts from both projects. A detailed memo documenting the methodology and impacts was prepared and is included in Appendix I.

Indirect Impacts

The study area for the indirect analysis includes the area around the proposed new county road intersections with the bypass. This is based on the assumption that project-related induced development would be limited to these new intersection areas.

Current land uses were mapped within these indirect study areas. In addition, recent development trends (i.e., within the last 10 years) were evaluated to determine if these areas would likely experience growth and development regardless of the project. If so, these areas were not considered for indirect impacts. Local zoning and comprehensive land use plans were

reviewed to determine any areas that are currently designated for development. The areas that were evaluated for potential indirect impacts are currently undeveloped and zoned/planned for agricultural or other undeveloped land uses. Areas that are currently developed and/or zoned/planned for development were not evaluated for indirect impacts.

The areas designated for indirect impacts were reviewed for the presence of farmland, forests, and aquatic resources (wetlands, streams, open water) using cursory field surveys, secondary source data, and GIS. These resources were selected for the indirect impact analysis due to their prevalence within the project area and their likelihood of being directly and indirectly impacted. The indirect impacts to these resources would be compared to their direct impacts in order to present the potential total amount of impacts from both and the differences in the relative magnitude of their impacts.

Cumulative Impacts

The proposed study area for the cumulative analysis is a one-mile wide buffer from the centerline of the Build Alternatives (two mile total width). The study area was expanded to include future development and growth areas identified in the Jennings County Comprehensive Plan. For additional details regarding these areas, see Appendix I.

The resources that were evaluated for cumulative impacts are the same as the indirect impacts: farmland, forests, and aquatic resources (wetlands, streams, and open water). These resources have been identified and mapped within the study area based on available secondary source data and GIS. As part of the analysis of cumulative impacts, the regional/local historical trends associated with the presence and condition of these resources was determined. The timeframe and level of historical information collected was based on available secondary source data.

The analysis also included the identification of past, present, and reasonably foreseeable future projects and the estimation of their impacts to the designated resources. Through coordination with INDOT and local planning officials and review of historical aerial photos, past developments (i.e., within the last ten years) were identified and their impacts to the designated resources estimated. Similarly, current development projects (i.e., projects under construction) were also identified and their impacts estimated. Future developments included 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 transportation projects, INDOT's Statewide Transportation Improvement Program (STIP) FY 2012-2015 was reviewed along with local transportation improvement plans to identify any future transportation projects that are planned within the study area (INDOT, 2011).

The impacts to the designated resources from all these past, present, and future projects were calculated and compared to the project's direct and indirect impacts.

The following resources were reviewed for purposes of the Indirect and Cumulative Analysis:

- Jennings County Economic Development Commission website – www.jenningsedc.com
- *The Status of Wetlands in Indiana* - http://www.in.gov/dnr/fishwild/files/statusof.pdf
- *Jennings County Comprehensive Plan*, (Jennings County Area Plan Commission, 2012)
- *2007 Census of Agriculture, County Profile, Jennings County, Indiana* (USDA, 2013)

- *North Vernon Municipal Airport Airport Layout Plan Report* (City of North Vernon, 2012)
- *Statewide Transportation Improvement Program FY 2012 – 2015, Indiana Department of Transportation (INDOT, 2011)*

Environmental Consequences

Indirect Impacts

Most vacant parcels within the study area for both alternatives are currently zoned agricultural. Impacts in these areas are considered "indirect," influenced directly and solely by the East Bypass project in an area that is otherwise unlikely to be developed in the reasonably foreseeable future.

No-Build Alternative

The No-Build Alternative would not result in any indirect impacts.

Alternative 6D (Preferred Alternative)

Based on the intersections discussed in the methodology section, the direct and indirect impacts resulting from Alternative 6D are summarized in Table 27.

TABLE 27: SUMMARY OF DIRECT AND INDIRECT IMPACTS – ALTERNATIVE 6D

	U.S. 50 North Vernon Bypass						
	Alternative 6D		West Bypass		TOTAL		TOTAL
Resource	Direct	Indirect	Direct	Indirect	Direct	Indirect	IMPACTS
Farmland (ac)	51.6	57.3	132	255	183.6	312.3	495.9
Forest (ac)	36.4	56.0	27	88	63.4	144.0	207.4
Aquatic Resources							
Wetlands (ac)	16.6	1.1	1.4	9.3	18.0	10.4	28.4
Open Water (ac)	1.1	0.6	2.5	n/a	3.6	0.6	4.2
Streams (ft)	2,923	4,933	3,465	n/a	6,388	4,933	11,321

Alternative 6D would result in indirect impacts to approximately 57.3 acres of farmland, 56.0 acres of forest, 1.1 acres of wetlands, 0.6 acres of open water, and 4,933 linear feet of streams. These indirect impacts from Alternative 6D were combined with the direct impacts from this alternative and then combined with the direct and indirect impacts from the West Bypass project to determine the total impacts from the proposed bypass. Total impacts, both direct and indirect, are approximately 495.9 acres of farmland, 207.4 acres of forest, 28.4 acres of wetlands, 4.2 acres of open water, and 11,321 linear feet of streams. The direct and indirect impacts from Alternative 6D are illustrated in Map 14.

Alternative 4NB2

Based on the intersections discussed in the methodology section, the direct and indirect impacts for Alternative 4NB2 are summarized in Table 28.

TABLE 28: SUMMARY OF DIRECT AND INDIRECT IMPACTS – ALTERNATIVE 4NB2

Resource	U.S. 50 North Vernon Bypass						TOTAL IMPACTS
	Alternative 4NB2		West Bypass		TOTAL		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	
Farmland (ac)	90.9	156.6	132	255	222.9	411.6	634.5
Forest (ac)	40.3	250.0	27	88	67.3	338.0	405.3
Aquatic Resources							
Wetlands (ac)	21.1	9.7	1.4	9.3	22.5	19.0	41.5
Open Water (ac)	1.1	2.9	2.5	n/a	3.6	2.9	6.5
Streams (ft)	5,433	30,030	3,465	n/a	8,898	30,030	38,928

This alternative would result in indirect impacts to approximately 156.6 acres of farmland, 250.0 acres of forest, 9.7 acre of wetlands, 2.9 acres of open water, and 30,030 linear feet of streams. These indirect impacts from Alternative 4NB2 were combined with the direct impacts from this alternative along with the direct and indirect impacts from the West Bypass project to determine the total impacts from the proposed bypass. Total impacts, both direct and indirect, include approximately 634.5 acres of farmland, 405.3 acres of forest, 41.5 acres of wetland, 6.5 acres of open water, and 38,928 linear feet of streams. The direct and indirect impacts from Alternative 4NB2 are illustrated in Map 13.

Cumulative Impacts

No-Build Alternative

The No-Build Alternative would not result in any cumulative impacts.

Alternative 6D (Preferred Alternative)

Alternative 6D would result in cumulative impacts to approximately 2,706 acres of forest, 2,694 acres of farmland, 196 acres of wetlands, 61 acres of open water, and 103,099 linear feet of streams. Table 29 provides a summary of the cumulative impacts for Alternative 6D. A portion of the cumulative impact areas for Alternative 6D and the West Bypass overlap. To avoid counting these impacts twice, the impact calculations for the West Bypass do not include the overlap area.

The total cumulative impacts from Alternative 6D combined with the West Bypass would result in impacts to approximately 6,164 acres of forest, 4,843 acres of farmland, 261 acres of wetlands, 217 acres of open water, and 207,945 linear feet of streams. The cumulative impacts from Alternative 6D are illustrated in Map 16.

TABLE 29: SUMMARY OF CUMULATIVE IMPACTS – ALTERNATIVE 6D

Resource	U.S. 50 North Vernon Bypass		TOTAL
	Alternative 6D	West Bypass	
Farmland (ac)	2,694	2,149	4,843
Forest (ac)	2,706	3,458	6,164
Aquatic Resources			
Wetlands (ac)	196	65	261
Open Water (ac)	61	156	217
Streams (ft)	103,099	104,846	207,945

Alternative 4NB2

Alternative 4NB2 would result in cumulative impacts to approximately 3,656 acres of forest, 3,208 acres of farmland, 232 acres of wetlands, 77 acres of open water, and 111,612 linear feet of streams. Table 30 provides a summary of the cumulative impacts for Alternative 4NB2. A portion of the cumulative impact areas for Alternative 4NB2 and the West Bypass overlap. To avoid counting these impacts twice, the impact calculations for the West Bypass do not include the overlap area.

TABLE 30: SUMMARY OF CUMULATIVE IMPACTS – ALTERNATIVE 4NB2

Resource	U.S. 50 North Vernon Bypass		TOTAL
	Alternative 4NB2	West Bypass	
Farmland (ac)	3,208	2,149	5,357
Forest (ac)	3,656	3,459	7,115
Aquatic Resources			
Wetlands (ac)	232	65	297
Open Water (ac)	77	156	233
Streams (ft)	111,612	104,846	216,458

Alternative 4NB2 combined with the West Bypass would result in cumulative impacts to approximately 7,115 acres of forest, 5,357 acres of farmland, 297 acres of wetlands, 233 acres of open water, and 216,458 linear feet of streams. The cumulative impacts from Alternative 4NB2 are illustrated in Map 15.

Conclusions

Jennings County has maintained its rural character over the years, with the majority of the existing land use surrounding North Vernon remaining as agricultural. Development has been concentrated in North Vernon and along major roadways. Construction of U.S. 50 would result in the direct loss of farmland, forest, wetlands, open water, and streams. It is anticipated that

the new bypass would encourage development at the new intersections. A number of vacant parcels with no indication of development exist within these new intersection locations. These areas may experience indirect impacts as a result of the proposed bypass. Comparatively, cumulative impacts are substantially greater than direct impacts.

Overall, the indirect impacts are less than the direct impacts. Because Alternative 4NB2 is the longer alternative (5.6 miles compared to 3.3 miles for Alternative 6D) and would have a greater number of intersections, it should be expected that this alternative would have the higher direct, indirect, and cumulative impacts. The impacts for both alternatives are summarized in Table 31.

TABLE 31: SUMMARY OF DIRECT, INDIRECT, AND CUMULATIVE IMPACTS

	Direct and Indirect Impacts		Cumulative Impacts	
Resource	**4NB2**	**6D**	**4NB2**	**6D**
Farmland (ac)	247.5	108.9	3,208	2,694
Forest (ac)	290.3	92.4	3,656	2,706
Aquatic Resources				
Wetlands (ac)	30.8	17.7	232	196
Open Water (ac)	4.0	1.5	77	61
Streams (ft)	35,463	7,856	111,612	103,099

The alternatives were developed and refined with the goal of minimizing impacts to natural (and other) resources. This analysis demonstrates that the alternative with the longer route, 4NB2, would result in higher indirect impacts, but there are limited differences in terms of cumulative impacts between the two alternatives evaluated.

Mitigation

Because no significant indirect or cumulative impacts were identified, no additional mitigation or modifications to the alternatives are recommended.

CHAPTER 5: PUBLIC COMMENTS AND AGENCY COORDINATION

5.1 PUBLIC INVOLVEMENT PLAN AND ACTIVITIES

A Public Involvement Plan (PIP) was developed for the project in September 2012. A copy of the PIP is provided in Appendix B (see pages 2-9). Key elements of the plan include:

- Developing and maintaining a comprehensive mailing list;
- Issuing a Notice of Survey to adjacent landowners and actively managing property access;
- Initiating early coordination with local, State, and Federal agencies;
- Consultation regarding historic properties and resources;
- Meeting in person or communicating via phone or email with property owners and other stakeholders;
- Maintaining a project website;
- Publishing periodic news releases in local media outlets;
- Resource Agency Meetings at key decision points;
- Establishing and holding meetings with a CAC; and
- Conducting public meetings and a public hearing at appropriate project milestones.

During the development of the project, the following actions have been taken to solicit input from concerned stakeholders.

Mailing List

At the project's initiation, a mailing list containing all potentially affected property owners, CAC members, agency representatives, and other stakeholders was developed. Throughout the project, as additional individuals have engaged in the project, they too have been added to the mailing list. To date, the list contains more than 450 individuals, organizations, and agencies. This list is used to distribute notifications regarding public meetings and to contact stakeholders as needed.

Notice of Survey Letter

On August 17, 2012 Notice of Survey letters were sent to property owners in the vicinity of the Alternative 6D and Alternative 4NB2. Postcards were included for property owners to return to the consultant if they chose to be notified in advance by phone or email each time a project representative would need to enter their property for surveying. A database of all property owners who returned postcards was then created in order to track each phone call or email notification in advance of each survey visit. All substantial project questions or concerns discussed during contact with property owners were also tracked in the database.

On February 18, 2013 the same Notice of Survey procedure as above was repeated for all property owners potentially affected by the Preferred Alternative alignment. This is due to the INDOT requirement that property owners must be notified again if additional surveying is needed six months beyond initial notification.

Early Coordination Letter

An Early Coordination Letter was sent on August 14, 2012 to various relevant Federal, State, and local agencies informing them of the scope of the project and to solicit their input. A sample of the letter and copies of all responses received are in Appendix C. Responses are discussed in relevant sections throughout this document. Following is a list of agencies to which the Early Coordination Letter was sent:

- Area Planning Commission
- City of North Vernon
- Delaware Tribe of Oklahoma
- IDNR-DHPA
- Indiana Landmarks
- INDOT – Cultural Resources Office
- Jennings County Historical Society
- Jennings County Preservation Association
- Miami Tribe of Oklahoma
- North Vernon Parks and Recreation
- Peoria Tribe of Indians in Oklahoma
- Southeast Indiana Regional Planning Council

Section 106 Consulting Party Coordination

The NHPA requires that federal agencies take into account the impact of federal undertakings upon historic properties, including buildings, structures, sites, objects, and/or districts. Activities to obtain input on historic properties are described in detail in Section 4.6.

Informal Meetings and Telephone/Email Communication

Several local residents requested informal one-on-one meetings with the Project Team to further discuss the project and its impacts. All project materials distributed to the public listed email and telephone contact information for the INDOT Seymour District Customer Service Manager and Parsons' Public Involvement Lead, so interested parties may reach them to comment or request information on the project.. To date, more than 160 phone calls and 30 emails have been exchanged between stakeholders and the Project Team. A matrix summarizing the phone calls and emails is included in Appendix B (see pages 321-340).

Project Website

The project website at www.in.gov/indot/projects/2429.htm has a project overview, maps, public involvement information, and a media section. The latter includes all project-related releases to the media (see Media section below). Following the public information meeting, all displays and handouts were posted on the website. It was also updated in December 2012 with information regarding the selection of the Preferred Alternative. The website also includes contact information for the INDOT Seymour District Customer Service Manager and Parsons' Public Involvement Lead.

Media

The two primary media sources publishing information about the project have been The North Vernon Plain Dealer and The North Vernon Sun. These newspapers have published, in print and on their websites, press releases and newspaper articles related to the project throughout the planning process. Newspaper articles were generally op-ed topics related to impacts, scope of the project, and its progress. Press releases included information about public information meetings, alternatives selection, and the public hearing. Articles and press releases are included in Appendix B (see pages 241-303).

Agency Coordination

Throughout the project, INDOT and the Project Team have coordinated with Federal, State, and local agencies regarding design or environmental issues related to the project. These contacts are discussed throughout this document. Where copies of coordination letters have not been incorporated as part of another attachment, they are included in Appendix C. In addition to the written correspondence, INDOT and Parsons hosted two Resource Agency Meetings to discuss the scope of the U.S. 50 project. The two meetings are summarized below.

Resource Agency Meeting #1 – The first Resource Agency meeting was held on October 5, 2012. The agenda topics at this meeting were the project history, key environmental resources, alternatives screening process, preliminary alternatives, and the project schedule. Minutes and materials from this meeting are provided in Appendix B (see pages 310-312).

Resource Agency Meeting #2 – The second Resource Agency meeting was held on November 29, 2012. Following up on the items from the previous meeting, the topics discussed included the selection of 3 alternatives for detailed study, dismissal of Alternative 6F/E, variations of Alternative 4B, field survey areas of concern and potential mitigation, and project schedule. Minutes and materials from this meeting are provided in Appendix B (see pages 313-314).

Community Advisory Committee

The Community Advisory Committee was created to provide a forum for discussing community-level issues related to the project. The CAC included representatives from the City of North Vernon, Jennings County, INDOT, FHWA, and other key stakeholders in the project area. Two meetings were held with the CAC and are summarized below; copies of presentations and minutes for each are provided in Appendix B.

CAC Meeting #1 – The first CAC meeting was held August 21, 2012. The meeting provided an overview of the project including its relationship to previous planning efforts in the corridor, the project's purpose and need, the process to be followed. Five conceptual alignments were presented to gather input from CAC members. Key items of discussion included the location of intersections; the proximity of the project to the Vernon Fork of the Muscatatuck River dam and intake for North Vernon Water, which supplies drinking water to the city; impacts to businesses; and impacts to the airport and its RPZs.

CAC Meeting #2 – The second CAC meeting was held on November 19, 2012. Progress since the first CAC meeting consisted of additional data collection, development of 14 alternatives, a public meeting, Resource Agency Meeting #1, a short list of alternatives, and detailed field studies. At this meeting it was announced that Alternative 6F/E were dropped and adjustments were made to Alternatives 4B and 6D. Some corridor-wide issues were also examined, such as planning level alignment, intersection locations, water supply, relocations, karst, Indiana bat habitat, and cultural resources. The next steps established were further studies in order to narrow down to a Preferred Alternative for selection by December 2012.

Public Meetings

A public information meeting for the project was hosted by the Project Team on September 6, 2012. The purpose of the meeting was to present the studied alternatives to community members and other interested stakeholders, as well as offer an in-person opportunity for them to discuss their opinions or concerns with project officials. Forms with an aerial map image showing each studied alternative were also provided. Instructions on the form requested that the participant write down any comments about the proposed project, draw arrows over their Preferred Alternative, and draw a circle around any areas of concern.

Approximately 60 comments were received, either on the forms at the meeting or via email after the meeting. Comments were received regarding impacts to private property, Deer Creek Campground, and farmland; noise; roadway connections; and the bypass' potential effect on local development patterns. Copies of the meeting materials are provided in Appendix B (see pages 47-56).

5.2 PUBLIC CONTROVERSY ON ENVIRONMENTAL GROUNDS

The project did not generate any significant controversy based upon environmental grounds. During preliminary alternatives presentations, residents provided feedback about which alternatives they felt would have the least impacts to forested areas, recreational areas, and parks. On comment forms at the public open house and via email, community members primarily commented regarding the alternatives that would have an impact upon St. Anne's Golf Course, Selmier Forest, or the Deer Creek Campground. The project team took community feedback into consideration and moved forward with studying the other alternatives that would have the least environmental impact.

5.3 PERMITS CHECKLIST

Based on impacts documented throughout this EA and coordination with relevant agencies, implementation of either Alternative 6D or Alternative 4NB2 would require the following permits:

- USACE Section 404 – Individual Permit
- IDEM Section 401 – Individual Permit
- IDEM – Rule 5
- IDNR – Construction in a Floodway

The Section 404/401 and Construction in a Floodway permits will require mitigation measures to be determined during the permit application process.

5.4 ENVIRONMENTAL COMMITMENTS

The following commitments, both firm and for further consideration, have been made during the project development process. Legal requirements may be modified upon issuance of the requisite permits.

Firm Commitments

1. The project should be located and designed to minimize stream/riparian impacts, avoid areas of high quality aquatic habitats such as rock riffles and mussel beds, and avoid the need to realign or relocate stream channels. The USFWS would oppose realignments of perennial streams and good-quality intermittent streams. (USFWS)
2. A preliminary wetland survey should be conducted for all routes, using all available mapping and orthophotography resources. Comprehensive wetland delineation should be conducted for alternatives carried forward as soon as access becomes available. (USFWS)
3. Wetland impacts should be avoided to the extent possible and unavoidable impacts should be mitigated in accordance with the MOU between INDOT, the USFWS and the Indiana DNR. (USFWS)
4. The environmental document should include a discussion of best management practices to be used to avoid erosion and runoff of soil and other pollutants during construction, and to mitigate the effects of polluted road runoff from traffic on new routes. (USFWS)
5. Most of the study area is underlain by karst geologic formations. A karst survey should be conducted in accordance with our karst MOU with INDOT. All route alternatives should be designed to avoid adverse physical and water quality/quantity impacts on significant karst resources (e.g. caves, springs, sinkholes). (USFWS)
6. We recommend compensatory wetland mitigation be provided to adequately offset the naturally-occurring wetland functions that are lost due to project implementation activities. Wetland compensation should take place in the same watershed where the impacts occur. USEPA

7. To minimize impacts to the eastern box turtle and kirtland's snake, where any excavation/digging will occur, we recommend that construction only take place from April through October. This will help minimize the threats to hibernating kirtland's snakes and eastern box turtles that would be unable to get away. (IDNR)
8. Impacts to non-wetland forest under one acre should be mitigated at a 1:1 ratio, while impacts to non-wetland forest over one acre should be mitigated at a minimum 2:1 ratio. Impacts to wetlands should be mitigated at the appropriate ratio as well, in accordance with the DNR's new Floodway Habitat Mitigation guidelines. (IDNR)
9. Any new, replacement, or rehabbed structure should not create conditions that are less favorable for wildlife passage under the structure compared to current conditions. (IDNR)
10. Design plans for new bridges should include a level area of natural ground under the structure with a minimum 8 foot tall by 24 foot wide opening (that does not include the size of the opening over the channel). This opening under the bridge with unsubmerged, dry land is essential for wildlife passage. (IDNR)
11. If riprap is planned under the bridge, only dry land unarmored with riprap should be considered in the opening dimensions. Considerations can be made if alternative armoring materials are used. (IDNR)
12. Because part of the area above the banks is typically used by wildlife, we recommend that a smooth-surfaced material such as articulated concrete mats be placed on the side-slopes instead of part or all of the proposed riprap (or riprap at the toe and turf reinforcement mats above the riprap toe protection). (IDNR)
13. From the OHWM to the top of the bank, we recommend using erosion control blankets or turf reinforcement mats instead of riprap as these are compatible with vegetation growth and provide equal or better erosion control protection than riprap. (IDNR)
14. The use of erosion control blankets, turf reinforcement mats, and other similar materials seeded with a native plant seed mix will allow a natural, vegetated stream bank to develop. We recommend bioengineered bank stabilization materials and methods. (IDNR)
15. Revegetate all bare and disturbed areas in the floodway with a mixture of native grasses, sedges, wildflowers, and also native hardwood trees and shrubs as soon as possible upon completion. Do not use any varieties of Tall Fescue or other non-native plants (e.g., crown-vetch). (IDNR)
16. Minimize and contain within the project limits inchannel disturbance and the clearing of trees and brush. (IDNR)
17. Do not work in the waterway from April 1 through June 30 without the prior written approval of the Division of Fish and Wildlife. (IDNR)
18. Do not cut any trees suitable for Indiana bat roosting (greater than 3 inches dbh, living or dead, with loose hanging bark) from April 1 through September 30. (IDNR, USFWS)

19. Do not excavate in the low flow area except for the placement of piers, foundations, and riprap, or removal of the old structure. (IDNR)
20. Do not construct any temporary runarounds or causeways. (IDNR)
21. Use minimum average 6 inch graded riprap stone extended below the normal water level to provide habitat for aquatic organisms in the voids. (IDNR)
22. Plant native hardwood trees along the top of the bank and right-of-way to replace the vegetation destroyed during construction. (IDNR)
23. Post "Do Not Mow or Spray" signs along the right-of-way. (IDNR)
24. Appropriately designed measures for controlling erosion and sediment must be implemented to prevent sediment from entering the stream or leaving the construction site; maintain these measures until construction is complete and all disturbed areas are stabilized. (IDNR)
25. Seed and protect all disturbed stream banks and slopes that are 3:1 or steeper with erosion control blankets (follow manufacturer's recommendation for installation); seed and apply mulch on all other disturbed areas. (IDNR)
26. Plant five native trees, at least 2 inches in diameter-at-breast height, for each tree which is removed that is ten inches or greater in diameter-at-breast height. (IDNR)
27. If any archaeological artifacts or human remains are uncovered during construction, demolition, or earth-moving activities, State Law (IC 14-21-1-27 and 29) requires that work must stop and that the discovery must be reported to the Division of Historic Preservation and Archaeology in the Indiana Department of Natural Resources within two business days. In the event that artifacts or features are discovered during implementation of the Federally assisted project, activity, or program and a plan has not been developed, it is the Federal agency's responsibility to make reasonable efforts to avoid, minimize, or mitigate adverse effects in accordance with 36 CFR 800.13. IDNR Division of Historic Preservation and Archaeology (317) 232-1646. (IDNR)
28. Section 404 of the Clean Water Act requires that you obtain a permit from the USACE before discharging dredged or fill materials into any wetlands or other waters, such as rivers, lakes, streams and ditches. USACE recommends you have a consultant check to determine whether your project will abut, or lie within, a wetland area. (IDEM)
29. In the event a Section 404 wetlands permit is required from the USACE, you also must obtain a Section 401 Water Quality Certification from the IDEM Office of Water Quality Wetlands Program. (IDEM)
30. If the USACE determines that a wetland or other water body is isolated and not subject to Clean Water Act regulation, it is still regulated by the state of Indiana. A State Isolated Wetland permit from IDEM's Office of Water Quality (OWQ) is required for any activity that results in the discharge of dredged or fill materials into isolated wetlands. (IDEM)
31. If your project will involve over a 0.5 acre of wetland impact, stream relocation, or other large-scale alterations to water bodies such as the creation of a dam or a water

diversion, you should seek additional input from the OWQ Wetlands Program staff. (IDEM)

32. Work within the one-hundred year floodway of a given water body is regulated by the Department of Natural Resources, Division of Water. The Division issues permits for activities regulated under the following statute: IC 14-28-1 Flood Control Act . (IDEM)
33. The physical disturbance of the stream and riparian vegetation, especially large trees overhanging any affected water bodies should be limited to only that which is absolutely necessary to complete the project. The shade provided by the large overhanging trees helps maintain proper stream temperatures and dissolved oxygen for aquatic life. (IDEM)
34. For projects involving construction activity (which includes clearing, grading, excavation and other land disturbing activities) that result in the disturbance of one or more acres of total land area, contact the Office of Water Quality – Watershed Planning Branch regarding the need for of a Rule 5 Storm Water Runoff Permit. (IDEM)
35. If your project is located in an IDEM-approved MS4 area, please contact the local MS4 program about meeting their storm water requirements. Once the MS4 approves the plan, the NOI can be submitted to IDEM. (IDEM)
36. Reasonable precautions must be taken to minimize fugitive dust emissions from construction and demolition activities. For example, wetting the area with water, constructing wind barriers, or treating dusty areas with chemical stabilizers. Dirt tracked onto paved roads from unpaved areas should be minimized. (IDEM)
37. All facilities slated for renovation or demolition (except residential buildings that have four or fewer dwelling units and which will not be used for commercial purposes) must be inspected by an Indiana-licensed asbestos inspector prior to the commencement of any renovation or demolition activities. (IDEM)
38. If regulated asbestos-containing material (RACM) that may become airborne is found, any subsequent demolition, renovation, or asbestos removal activities must be performed in accordance with the proper notification and emission control requirements. (IDEM)
39. Ensure that asphalt paving plants are permitted and operate properly. The use of cutback asphalt, or asphalt emulsion containing more than 7 percent oil distillate, is prohibited during the months April through October. (IDEM)
40. If your project involves the construction of a new source of air emissions or the modification of an existing source of air emissions or air pollution control equipment, it will need to be reviewed by the IDEM Office of Air Quality (OAQ). A registration or permit may be required under 326 IAC 2. (IDEM)
41. If the site is found to contain any areas used to dispose of solid or hazardous waste, you need to contact the Office of Land Quality (OLQ). (IDEM)
42. All solid wastes generated by the project, or removed from the project site, need to be taken to a properly permitted solid waste processing or disposal facility. (IDEM)

43. If any contaminated soils are discovered during this project, they may be subject to disposal as hazardous waste. (IDEM)
44. If PCBs are found at this site, please contact the Industrial Waste Section of OLQ for information regarding management of any PCB wastes from this site. (IDEM)
45. If there are any asbestos disposal issues related to this site, please contact the Industrial Waste Section of OLQ for information regarding the management of asbestos wastes. (IDEM)
46. If the project involves the installation or removal of an underground storage tank, or involves contamination from an underground storage tank, you must contact the IDEM Underground Storage Tank program. (IDEM)
47. If any potential hazardous materials are discovered during construction, contact the North Vernon City Fire Department at (812) 346-6480 to organize the proper handling of the material in accordance with IDEM guidelines. The IDEM Spill Line should be notified with details of the discovery within 24 hours. IDEM Spill Line: (888) 233-7745. (IDEM/INDOT)

Commitments for Further Consideration

1. Secondary impacts should be minimized by not locating new routes near good quality habitats and sensitive areas, and by implementing access control near such areas. (USEPA)
2. USEPA recommends voluntary mitigation for any tree loss and core forest loss associated with the proposal. Mitigation might include, assisting local, County or State agencies with any on-going or planned forest reclamation projects in the watershed or planting native tree saplings in areas outside the safety areas, if feasible. (USEPA)
3. We also recommend that all logs, trash, or any other type of debris (including riprap) be removed from the construction zone at least one week prior to the start of work to keep these species from hiding underneath the debris. If any vegetation will be removed during work, this should also be done one week prior to construction. (IDNR)
4. After the trash and vegetation are removed, a trenched-in silt fence should be placed around the construction area. Once the silt fence is installed, a walk-through should be conducted to look for any eastern box turtles. (IDNR)
5. Any equipment, materials, or debris left overnight in the area should be checked for the presence of kirtland's snakes prior to the start of work the next day. (IDNR)
6. Reptiles or amphibians encountered in the project area should be removed, unharmed, and placed outside the construction area. (IDNR)
7. Turtles encountered should be moved to the nearest forested area. An accredited herpetologist should be hired to translocate state or federally listed herps from current locations within the construction area to an area of suitable habitat. (IDNR)

8. We recommend coordinating with the Division of Fish and Wildlife herpetologist regarding development of herpetile removal plans. Removal of any state endangered species will require a permit issued by the Division of Fish and Wildlife. (IDNR)
9. Such materials will not impair wildlife movement along the banks under the bridge. Minimize the use of riprap and use alternative erosion protection materials whenever possible. Where riprap must be used, place only enough to provide stream bank toe protection, such as from the toe of the bank up to the OHWM. (IDNR)
10. IDEM generally recommends that you take vegetative wastes to a registered yard waste composting facility or that the waste be chipped or shredded with composting on site (you must register with IDEM if more than 2,000 pounds is to be composted. (IDEM)
11. If construction or demolition is conducted in a wooded area where blackbirds have roosted or abandoned buildings or building sections in which pigeons or bats have roosted for 3 to 5 years precautionary measures should be taken to avoid an outbreak of histoplasmosis. (IDEM)

CHAPTER 6: SECTION 4(F) AND SECTION 6(F) RESOURCES

6.1 SECTION 4(F) RESOURCES

Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303(c)) requires that, prior to the use of any of the land types listed below, it must be determined that there are no prudent and feasible alternatives that avoid such use and that the project includes all possible planning to minimize harm to such resources.

- A publicly-owned park.
- A publicly-owned recreation area.
- A publicly-owned wildlife or waterfowl refuge.
- Land from an historic property that is listed in or eligible for inclusion in the NRHP.
- Archaeological sites listed in or eligible for inclusion in the NRHP and that warrant preservation in place.

Methodology

Parks and recreational Section 4(f) resources were identified through a review of aerial photography, the IndianaMap database, coordination with local officials, and field reconnaissance conducted by Parsons; two such properties were identified in the project area.

Parks and Recreational Facilities

Selmier State Forest

Many state forest properties do not provide recreational functions and are, therefore, not automatically Section 4(f) resources. Selmier State Forest, a 355 acre site owned by IDNR and located south of CR 350 between CR 20 W and the Vernon Fork of the Muscatatuck River, provides several walking/hiking trails that are open to the public. The trails, depicted in Map 11, Sheets 4-5, generally originate at a small parking area near CR 350 N. There is also one publicly accessible road that provides access to the southern portion of the forest as well as a single private property located south of the state forest.

St. Anne's Golf Course

St. Anne's Golf Course, located north of CR 350 N to the east of the North Vernon Airport (see Map 11, Sheets 4-5), is operated by a private company, but is open to the public. The company leases land from the North Vernon Airport, which is owned by the City of North Vernon. Based on consultation with FHWA, INDOT has determined the golf course is a potential Section 4(f) resource. The 18-hole, par 71 course includes a club house and maintenance barn located near the entrance on CR 350 N. Several of the golf holes parallel and are close to CR 350 N.

Wildlife and Waterfowl Refuges

The closest wildlife or waterfowl refuge to the study area is the Muscatatuck National Wildlife Refuge located approximately 10 miles west of North Vernon adjacent to U.S. 50. This property would not be impacted by the project.

Historic Properties

ASC Group conducted a historic property survey and ASC Group and Gray & Pape conducted archaeological surveys of the project corridor. The details of these surveys are provided in Section 4.6.

Four architectural resources were identified as eligible for listing on the NRHP and, therefore, qualify as Section 4(f) resources (see Section 4.6 for details regarding each eligibility criterion):

- Frank Selmier House (Criterion B)
- B&O Railroad Bridge over CR 75 East (Criterion C)
- B&O Railroad Bridge over CR 175 North and the Vernon Fork of the Muscatatuck River (Criterion C)
- U.S. 50 Bridge over the Vernon Fork of the Muscatatuck River (Criterion C)

Environmental Consequences

No-Build Alternative

The No-Build Alternative would not impact any Section 4(f) resources.

Alternative 6D (Preferred Alternative)

Parks and Recreational Facilities

Alternative 6D would not impact Selmier State Forest or St. Anne's Golf Course.

Historic Properties

Road improvements under Alternative 6D would occur within approximately 200 to 1,250 feet of the three NRHP-eligible bridges in the APE and would be at least partially visible from the bridges. The construction of the bypass in Alternative 6D would not destroy, damage, alter, or move these structures, but because the proposed new bypass may be within the viewshed of each bridge, it could introduce visual intrusions. The proposed bypass would not change the current use or physical features within the existing rural or suburban setting of each bridge. Further, the settings are not an important aspect of integrity in the NRHP eligibility of each resource. The new bypass would be similar to other roadways currently visible from each bridge and would not introduce any new roadway elements or vertical intrusions, so its construction would not diminish aspects of integrity of the bridge. It is not anticipated that construction of the bypass in Alternative 6D would increase audible, vibration, or atmospheric levels above existing conditions. Further, the bypass construction would not result in neglect of the existing bridges. No impacts to the three NRHP-eligible bridges are anticipated from the construction of the proposed alignment in Alternative 6D.

Alternative 4NB2

Parks and Recreational Facilities

Selmier State Forest

As shown on Map 11, Sheet 4, Alternative 4NB2 would require approximately 2 acres of right-of-way from Selmier State Forest at its northwest corner. Included within this area are two of

the hiking trails within the forest (approximately 200 feet of trails) and a portion of the primary parking area for several trails. Based on coordination with the State Forester it is anticipated that these impacts could be mitigated through the provision of improvements to the trail network in the State Forest. This is a potential Section 4(f) issue; however as this is not the Preferred Alternative, no further coordination or documentation is necessary.

St. Anne's Golf Course

As shown on Map 11, Sheets 4 and 5, Alternative 4NB2 would require the construction of a new access drive to the golf course, minor reconfiguration of one golf hole (west of the existing entrance drive and adjacent to CR 350 N), possible relocation of the maintenance barn, and complete relocation of one golf hole (east of the existing entrance drive. Based on coordination with the owners of the golf course, they were confident that the course could be reconfigured in a manner that would not diminish the function of the golf course. As with Selmier State Forest, this is a potential Section 4(f) issue; however as this is not the Preferred Alternative, no further coordination or documentation is necessary.

Historic Properties

The Frank Selmier House is located within the Selmier State Forest on the south side of CR 350 N, immediately south of the proposed alignment for Alternative 4NB2. Stone features at the entrance to the property include stone shelters, short walls, and a sign post that match materials used in the construction of the main residence. These are the only features along CR 350 N that would be visible from the proposed bypass. Because these features occur just outside the alignment, they are not proposed for demolition, alteration, or relocation from roadway construction; however, because of their proximity to the alignment, they could be subject to visual and vibration impacts. Potential visual intrusions to these features would occur with construction of the alternative. The existing setting of the parcel on which the Frank Selmier House was constructed is a rural two-lane county road. Replacement of the rural road with a modern, multi-lane bypass for a major U.S. highway would change the setting of the property, altering an aspect of its integrity. The materials used to construct the house and surrounding landscape features make the structures appear rustic, reflecting the rural nature of the resource's setting. These impacts are limited and would not be anticipated to cause an impact under Section 4(f).

Mitigation

Alternative 6D, the Preferred Alternative, would not result in any impacts to Section 4(f) resources; therefore no further coordination or documentation is needed. If Alternative 4NB2 were pursued further, additional coordination and documentation regarding potential impacts to Selmier State Forest, St. Anne's Golf Course, and the Frank Selmier House may be required.

6.2 SECTION 6(F) RESOURCES

The Land and Water Conservation Fund (LWCF), was created by the Land and Water Conservation Fund Act of 1965. Funds in the LWCF come primarily from revenues from federal offshore oil and gas leases and are available for federal and state land acquisition for public outdoor recreation. The LWCF program is administered by the National Park Service (NPS).

Section 6(f) of the LWCF Act is of concern for transportation projects because it restricts conversion of lands that have been acquired with or improved by LWCF grants.

A search of the National Park Service Land and Water Conservation Fund Database confirmed that there are no known resources purchased with or improved by LWCF grants within the project area, nor in Jennings County. An Early Coordination Letter was sent to IDNR, and their response did not state there are any LWCF grant resources in Jennings County. The Early Coordination Letter and response are in Appendix C (see pages 1-2 and 27-30). A printout of the Land and Water Conservation Fund Database for Indiana is in Appendix K (database begins on page 65).

CHAPTER 7: PREFERRED ALTERNATIVE

As described in Chapter 3, the East Bypass project considered a wide range of potential alignments before narrowing the list to the two most viable: Alternative 6D and Alternative 4NB2. Either alternative would meet the project's purpose and need to address safety, congestion, economic development, and planning goals. However, as shown in Table 32, Alternative 6D would cause fewer social, economic, and environmental impacts in nearly every category considered. At a cost that is less than half that of Alternative 4NB2, Alternative 6D is also substantially more cost-effective.

The Preferred Alternative, Alternative 6D, begins at SR 3, directly east from where the West Bypass roadway ends. From SR 3, the route travels due east for ¾ mile to CR 75 W. There would be a full-access intersection at CR 75 W (the bypass would be free-flowing, while CR 75 W is stop controlled), which would accommodate traffic to/from several industrial sites, the North Vernon Airport, St. Anne's Golf Course, and Selmier State Forest. East of CR 75 W, the bypass would curve to the south and run parallel to CR 20 W. The bypass would cross CR 250 N about 0.15 mile west of CR 20 W, but there would be no access at this location. Instead, CR 250 N would be closed in both directions via cul-de-sacs where the bypass crosses. South of CR 250 N, the bypass would turn towards the southeast to pass through the northeast corner of the Berry Materials quarry and intersect CR 20 W at a nearly ninety-degree angle. Traffic on CR 20 W would be maintained by building a new bridge over the bypass, but there would be no access to the bypass in this location. The bypass would continue southeast and cross over the Vernon Fork via a new bridge. East of the river, the bypass would cross Base Road, where the southern leg of Base Road would terminate at the bypass via a cul-de-sac. The short northern leg of Base Road would be left without access, which would require acquisition/relocation of all parcels at the north end of Base Road. Continuing southeast, Alternative 6D would cross the CSX Railroad line via a new bridge. As the bypass approaches the CR 75 E (Deer Creek Road)/U.S. 50 intersection, it would turn towards the east to tie into the existing U.S. 50 roadway. The tie-in would occur west of the CR 75 E (Deer Creek Road) intersection, so it would not need to be rebuilt as part of this project. The total length of Alternative 6D is approximately 3.2 miles.

Alternative 6D has been selected as the Preferred Alternative because it best meets the project's purpose and need, as well as achieves the following:

- Aligns with INDOT's long-term goals for the U.S. 50 corridor by completing a bypass around North Vernon.
- Provides an efficient connection with existing U.S. 50 to facilitate use of the new roadway.
- Supports the planning and economic development goals of North Vernon and Jennings County.
- Provides the best balance between construction cost and access.
- Minimizes impacts to residences and businesses.
- Minimizes impacts to wetlands and streams.
- Received broad support from the community and agency stakeholders.

TABLE 32: ALTERNATIVE IMPACT SUMMARY

Category	Unit	Alternative 6D (Preferred Alternative)	Alternative 4NB2
Right-of-Way	Acres	144	185
Residential Relocations	Number	13	17
Business Relocations	Number	1	3
Wetlands (Total)	Acres	16.36	24.7
Forested	Acres	6.85	10.8
Emergent	Acres	9.51	13.9
Streams (Total)	LF	2,956	5,731
Ephemeral	LF	2,546	4,238
Intermittent	LF	0	1,128
Perennial	LF	410	365
Core Forest	Acres	4.7	31.0
Indiana Bat Habitat	Acres	42.1	49.8
Farmland	Acres	51.6	90.9
Historic Properties	Number	2	2
Noise	Impacted Receivers	0	0
Cost (Total)	Dollars	$20,455,900(1)	$42,308,000
Construction	Dollars	$14,930,900	$28,125,000
Right-of-Way	Dollars	$2,200,000	$5,000,000
Utility Relocation	Dollars	$750,000	$4,500,000
Railroad	Dollars	$75,000	$325,000
Environmental Mitigation	Dollars	$2,500,000	$4,358,000

(1) Costs for Alternative 6D reflect refinements made through Stage 1 plans. As described in Chapter 3, at the time it was selected as the Preferred Alternative, the estimated cost was $28,030,000. It is likely that the cost of Alternative 4NB2 could also be reduced through similar efforts.

LIST OF REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), Center for Environmental Excellence, *Assessing Indirect Effects and Cumulative Impacts under NEPA*, April 2011.

Brown, Laurence and Roy Nunnally. "U.S. 50 North Vernon Bypass Analyses" Indiana Department of Transportation, June 18, 2009.

City of North Vernon, *North Vernon Municipal Airport, Airport Layout Plan Report,* July 2011.

Council on Environmental Quality*, Considering Cumulative Effects Under the National Environmental Policy Act*, January 1997.

Cowardin, L. M., V. Carter, F.E. Golet, E. T. LaRoe. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, 1979.

Eco-Tech Consultants, Inc. *Indiana Bat Biological Assessment North Vernon U.S. 50 Bypass (East) Jennings County, Indiana,* May 2013.

Eco-Tech Consultants, Inc. *Mist Net Survey for the Federally Endangered Indiana Bat (*Myotis sodalis) *for the Proposed US 50 North Vernon Bypass, Jennings County, Indiana,* August 2009.

Eco-Tech Consultants, Inc. *Mist Net Survey for the Federally Listed Bat Species for the Proposed US 50 North Vernon Bypass (East) in Jennings County, Indiana, September 2012.*

Environmental Laboratory. *U.S. Army Corps of Engineers' Wetland Delineation Manual, Technical Report Y-87-1,* 1987.

Federal Highway Administration (FHWA), Position Paper HEP-32 "Indirect and Cumulative Impact Assessment in the Highway Project Development Process," April 1992.

Federal Highway Administration (FHWA). *Technical Advisory T 6640.8A: Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, October 1987.

Historic Landmarks Foundataion of Indiana. *Jennings County Interim Report,* 1989.

Indiana Buisness Research Center, STATS Indiana http://www.stats.indiana.edu/topic/laus.asp#lfprojections, June 2013.

Indiana Department of Natural Resources (IDNR), *The Status of Wetlands in Indiana*, http://www.in.gov/dnr/fishwild/files/statusof.pdf

Indiana Department of Transportation (INDOT). *Indiana 2013-2035 Future Transportation Needs Report*, April 2013a.

Indiana Department of Transportation (INDOT), Indiana Department of Natural Resources, Indiana Department of Environmental Management, and U.S. Fish and Wildlife Service. "Memorandum of Understanding" (Karst MOU), October 1993.

Indiana Department of Transportation (INDOT), Indiana Department of Natural Resources and U.S. Fish and Wildlife Service, "Memorandum of Understanding (Wetlands MOU)" January 1991.

Indiana Department of Transportation (INDOT). Indiana Statewide Access Management Study, January 2006.

Indiana Department of Transportation (INDOT). *Procedural Manual for Preparing Environmental Documents*, 2008a.

Indiana Department of Transportation (INDOT). *Public Involvement Policies and Procedures Manual*, 2012.

Indiana Department of Transportation (INDOT). *Statewide Transportation Improvement Program FY 2012 – 2015*, 2011.

Indiana Department of Transportation (INDOT). *Statewide Transportation Improvement Program FY 2014 – 2017*, 2013b.

Indiana Department of Transportation (INDOT). *Traffic Noise Analysis Procedure,* 2011.

Indiana Department of Transportation (INDOT). *U.S. 50 North Vernon Corridor Planning and Environmental Assessment Study*, May 2008b.

Indiana Geographic Information Council, InaianaMap. http://www.indianamap.org/resources.php, accessed October 2012.

Indiana Legislative Services Agency, "2012 Jennings County Property Tax Report", September 2012.

Jennings County Area Plan Commission. *Jennings County Comprehensive Plan*, December 2012.

Jennings County Area Plan Commission. *Jennings County, Indiana Comprehensive Plan*, November 1994.

Jennings County Economic Development Commission. "Jennings County Community Resume 2013."

Jennings County Economic Development Commission, www.jenningsedc.com

Lin, J.P. *Review of Published Export Coefficient and Event Mean Concentration Data,* Wetlands Regulator Assistance Program, 2004.

National Oceanic and Atmospheric Administration (NOAA), Precipitation Frequency Data Server: http://dipper.nws.noaa.gov/hdsc/pfds/, accessed June 2013.

Picklesimer, John. *Phase Ia Archaeological Reconnaissance Survey of the US 50 North Vernon Bypass, Alternatives 4b and 6D, Jennings County, Indiana,* Gray & Pape and ASC Group, February 2013.

Transportation Research Board, National Cooperateive Highway Research Proram, *Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, 2002);

United States Army Corps of Engineers (USACE). *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)*, August 2010.

United States Department of Agriculture (USDA), Census of Agriculture *2007 Census of Agriculture, County Profile, Jennings County, Indiana*, www.agcensus.usda.gov, accessed June 2013a.

United States Department of Agriculture (USDA), National Agricultural Statistics Service. http://www.nass.usda.gov/Statistics_by_State/Indiana/index.asp, accessed June 2013b.

United States Department of Agriculture (USDA), Natural Resources Conservation Service. "Technical Release 55, WinTR-55 Watershed Hydrology," 1986.

United States Environmental Protection Agency (USEPA). AirData website http://www.epa.gov/airdata/, accessed June 2013.

United States Environmental Protection Agency (USEPA), *Consideration of Cumulative Impacts in EPA Review of NEPA Documents,* US EPA 315-R-99-002, May 1999.

United States Environmental Protection Agency (USEPA). "National Stormwater Quality Database," 2005.