EIS #: FHWA-IN-EIS-02-01-D

I-69
Evansville to Indianapolis, Indiana

TIER 1
DRAFT ENVIRONMENTAL IMPACT STATEMENT & SECTION 4(f) EVALUATION
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
AND
INDIANA DEPARTMENT OF TRANSPORTATION
Submitted pursuant to 42 U.S.C. 4332(2)(c), 49 U.S.C. 303(c)

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July 22, 2002

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This is a Tier 1 Draft Environmental Impact Statement (EIS) for I-69 between Evansville and Indianapolis, Indiana. A series of alternatives have been analyzed for environmental, social, economic, and engineering concerns. The highway would be a freeway facility with interchanges providing the only access.

Comments on this Tier 1 Draft EIS are due by October 11, 2002. Comments should be directed to Michael Grovak at Bernardin, Lochmueller & Associates, Inc., 6200 Vogel Road, Evansville, Indiana 47715. Comments may also be submitted through the I-69 project website at www.I69indyevn.org.

I-69
Evansville to Indianapolis, Indiana
Tier 1
Draft Environmental Impact Statement
&
Section 4(f) Evaluation

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July, 2002

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Summary

S.1 Introduction

This section of the I-69 Evansville to Indianapolis Tier 1 Draft Environmental Impact Statement (DEIS) encapsulates the critical aspects of the study process and its major findings. First, the proposed federal action is described with the focus on its purpose and goals. Next, a discussion of "tiering" is provided to aid in understanding what this study is and is not intended to do. Other critical features of the study, such as technical tools and public outreach measures are also described. The major phases of the study are then identified. This is followed by a summary of the major performance, cost, and environmental impact issues associated with the alternatives. A summary comparison of the alternatives is then provided, followed by a brief discussion of areas of controversy and other related federal actions. Finally, the critical findings of the DEIS are discussed along with the next steps in the environmental process and a glossary of terms. This DEIS consists of three volumes. Volume I is this document. Volume II is the Appendix. Volume III is the Environmental Atlas.

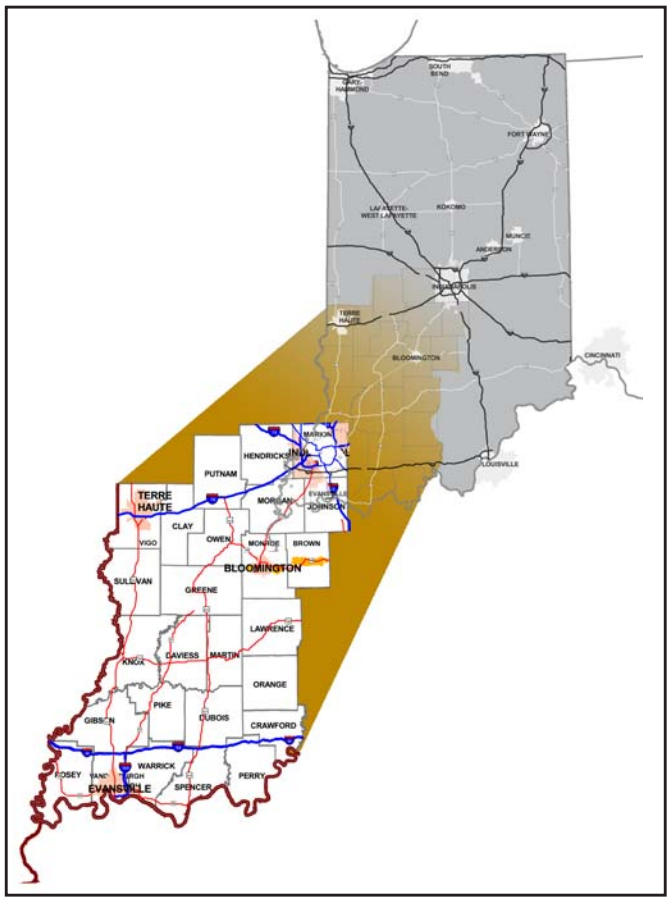


Figure S - 1: Study Area

S.2 Proposed Action

The proposed action is the completion of an Interstate highway connecting Evansville and Indianapolis, Indiana. The northern terminus of the project is I-465 on the south side of Indianapolis and southern terminus is I-69 just north of Evansville. Figure S-1 depicts the 26-county Study Area in which alternative corridors for connecting these two cities were analyzed.

The project is part of a larger, national proposal to connect the three North American trading partners of Canada, the Unites States and Mexico by means of an Interstate highway located in the states of Michigan, Indiana, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, and Texas (see Figure S-2). This part of the national proposal is Section of Independent Utility (SIU) Number 3, as defined in *I-69 (Corridor 18) Special Environmental Study: Sections of Independent Utility* (August 25, 1999) and concurred in by the Federal Highway Administration (FHWA) in a letter dated September 27, 1999 (see Appendix Z). SIU Number 1 extends from Port Huron, Michigan to I-465 on the northeast side of Indianapolis. This section of I-69 is already built. SIU Number 2 begins on the northeast side of Indianapolis and ends on the south side. The Indiana Department of Transportation

(INDOT) and the Kentucky Transportation Cabinet are currently working with FHWA on environmental studies of the next section to the south – SIU Number 4 – which will determine the location for I-69 between I-64 on the north side of Evansville to the Breathitt Parkway on the south side of Henderson, Kentucky.

Figure S-2: National I-69 Corridor

The purpose of the I-69 Evansville to Indianapolis Project is to provide an improved transportation link between Evansville and Indianapolis which:

- **Strengthens the transportation network in Southwest Indiana;**
- **Supports economic development in Southwest Indiana; and**
- **Complete the portion of the National I-69 project between Evansville and Indianapolis** (See Figure S-2).

The following goals support this Purpose Statement. These are goals based on consideration of state and federal policies, as well as the assessment of transportation and economic development needs in Southwest Indiana. The statements which are highlighted in ***bold and italics*** have been identified as core goals for this project. For each of the core goals, the selected alternative must achieve a substantial improvement over the existing condition. The derivation of these goals is further described in Chapter 2, *Purpose and Need*.

Strengthen the Transportation Network in Southwest Indiana

1. ***Improve the transportation linkage between Evansville and Indianapolis. (core goal)***
2. ***Improve personal accessibility for Southwest Indiana residents. (core goal)***
3. Reduce existing and forecasted traffic congestion on the highway network in Southwest Indiana.
4. Reduce traffic safety problems.

Support Economic Development in Southwest Indiana

5. Increase accessibility for Southwest Indiana businesses to labor, suppliers, and markets.
6. Support sustainable, long-term economic growth (diversity of employer types).
7. Support economic development that benefits a wide spectrum of Southwest Indiana residents (distribution of economic benefits).

Complete the portion of the National I-69 Project between Evansville and Indianapolis

8. ***Facilitate interstate and international movements of freight through the I-69 corridor, in a manner consistent with the national I-69 policies. (core goal)***
9. Connect I-69 to major intermodal facilities in Southwest Indiana.

S.3 Process Overview - Tiering, Technical Tools, and Public Outreach

The I-69 Evansville to Indianapolis Study is a large and complex environmental study. In his letter of September 27, 1999, FHWA's Southern Resource Center Director stated "…I-69 is a massive undertaking for the nation and the implications are monumental. The challenges before us are unique, different in scale, and complex. Our normal and routine way of advancing projects will not apply." (See Appendix Z.) The uniqueness of I-69 is reflected in three aspects of the study that are highlighted here. The first is "tiering" or conducting the environmental study process in two stages. The second has to do with the technical tools used in modeling and assessing environmental impacts. The third is the significant effort in public outreach and agency coordination, which seeks to involve all interested parties throughout the study process. Each of these is discussed, in turn, below.

S.3.1 Tiering

This study is an Environmental Impact Statement (EIS) for the Evansville-to-Indianapolis section of I-69 in Indiana. It is conducted pursuant to the National Environmental Policy Act (NEPA) and the NEPA regulations issued by the Council on Environmental Quality (CEQ), 40 CFR Part 1500, and the Federal Highway Administration (FHWA) 23 CFR Part 771.

The CEQ and FHWA guidelines permit NEPA studies for very large, complex projects to be carried out in a two-staged, "tiered" process. In the first tier, the "big picture" issues are addressed, while taking into account the full range of impacts. After the "big picture" issues are resolved in Tier 1, the focus shifts in Tier 2 NEPA studies to issues associated with a more exact measurement of impacts, and the avoidance and mitigation of adverse impacts. The difference in focus is one of degree. When exact data are needed in order to resolve the first tier issues, these data are collected and analyzed.

The Evansville-to-Indianapolis section of I-69 is indeed large and characterized by several complex issues, as the following facts suggest.

- The Study Area includes 26 counties - over one quarter of the state of Indiana. Within the Study Area, there are major cities, midsize cities, small towns, and rural communities.
- The project serves numerous and varied objectives across a broad geographic area. The diversity of this project's objectives is reflected in dozens of performance measures. As will be shown below, alternatives vary in the degree to which they meet the project's purpose and need because of this diversity of objectives.
- The alternatives are spread across a very broad geographic area, although they all share common termini. In between these termini, the alternative routes serve completely different communities: Vincennes, Petersburg, Washington, Bloomington, Terre Haute, Bedford, Spencer, Martinsville, and others.
- This project is now part of a national transportation corridor that Congress has designated as Interstate 69. For that reason, this EIS will focus on the evaluation of alternatives that involve the completion of an Interstate highway.

To accommodate the large, complex scope of this project, the FHWA and the Indiana Department of Transportation (INDOT) have decided to use a "tiered" environmental process. The current project is a Tier 1 EIS. The "big picture" issues this EIS is intended to resolve are: (1) whether or not to complete I-69 in Southwestern Indiana, and if so, (2) which corridor should I-69 use.

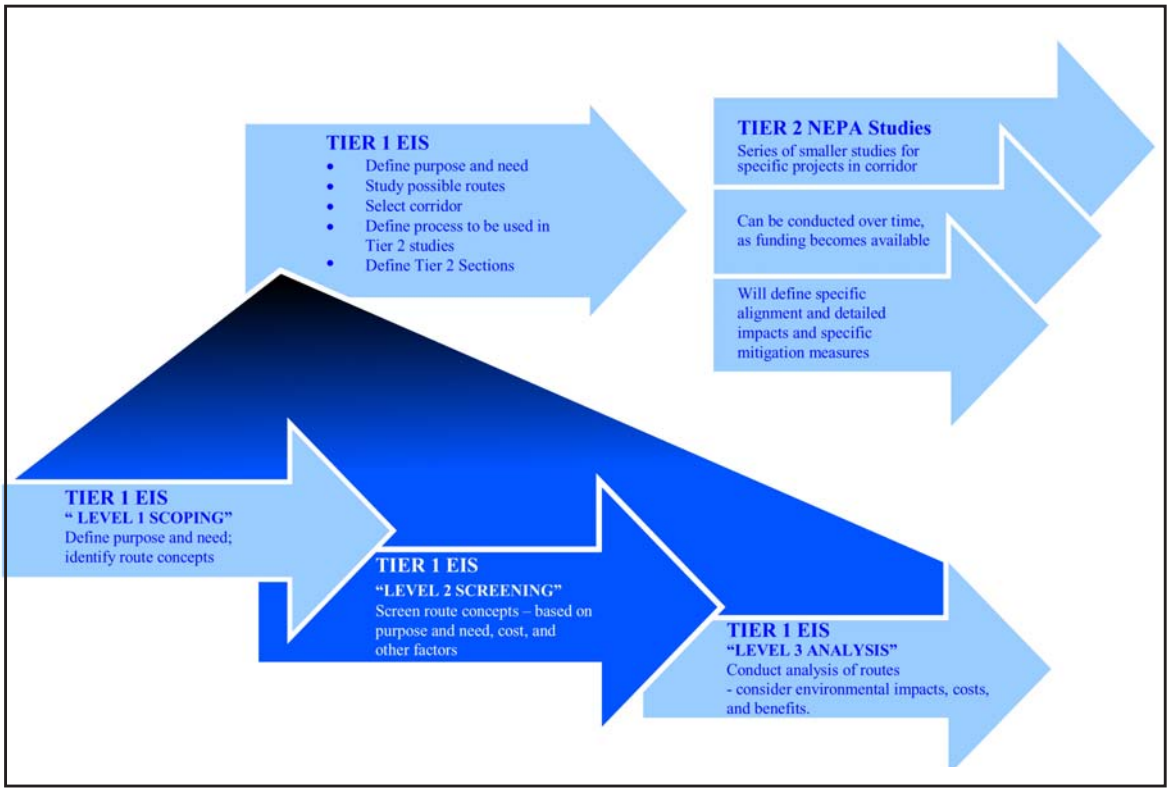


Figure S-3: Tiering Process and Tier 1 Activities

If a "build alternative" is selected by this process, Tier 2 NEPA studies will be undertaken. In these Tier 2 NEPA studies, a specific alignment will be determined, and detailed environmental mitigation plans will be specified. The Tier 2 NEPA studies will be prepared for smaller, stand-alone projects within the selected corridor. The termini for proposed Tier 2 NEPA studies are identified in Chapter 3, *Alternatives*. The procedures for Tier 2 are explained in Section 1.2, *Tier 2 NEPA Studies*.

Within this Tier 1 Study, there were three levels of analysis, which are depicted in Figure S-3. These include:

- **Level 1: Scoping and Development of Route Concepts** In this process, the *Purpose and Need* was developed, including a statement of project goals. The *Purpose and Need* is included as Chapter 2 of this document. Also, as part of Level 1, route concepts, were developed that were announced in December 2000. There were 14 basic route concepts, several of which had optional routings near Indianapolis, bringing the total number of route concepts to 19. This entire process was completed by mid-2001. During this same timeframe beginning in early 2001, a comprehensive GIS database of environmental resources was developed with the involvement of the Indiana Geological Survey.
- **Level 2: Screening Alternatives** In Level 2, the route concepts were analyzed individually to determine how well each achieved the project's goals. Preliminary cost estimates were also developed. As a result of this analysis, five alternatives were selected for further study. The screening report, which documented the selection of five alternatives from among the route

concepts, can be found in Appendix O, *Route Concepts Screening Report*. The screening process was finalized in January 2002. Concurrent with the screening process, additional environmental investigations were undertaken to further develop the GIS database.

- **Level 3: Detailed Analysis of Alternatives** Using the GIS database, together with field studies, detailed analyses of the five alternatives carried forward from Level 2 were conducted. This analysis considered the alternatives' effects on land use, air quality, historical and archaeological resources, endangered or threatened species, wetlands, wildlife, agricultural land, water quality, relocations and more. In addition to these effects on the physical environment, other impacts on the social and economic environment were considered. Performance and cost were also evaluated at this stage. This report documents these impacts, performance, and cost considerations.

The information in this DEIS is presented to solicit public and review agency comment. These comments will be considered in preparing a Final Environmental Impact Statement (FEIS). If the build option is chosen, the FEIS will recommend a preferred corridor for the highway. For further information on tiering, see Chapter 5.1, *Methodology for Evaluating Environmental Impacts* and Appendix X, *FHWA Tiering Memorandum*.

S.3.2 Technical Tools

Two technical tools have played a central role in the conduct of this study. These tools are: (1) a regional geographic information system (GIS); and (2) transportation and economic forecasting tools. Each are briefly described below.

S.3.2.1 Geographic Information System

A geographic information system (GIS) was developed specifically for this study which incorporates all 26 counties in the Study Area. A GIS is a computer representation of data which are geographically located. These data can be generated and displayed to show their physical locations. Each data set containing a certain type of information (e.g., the location of wetlands) constitutes a "layer" in the GIS. GIS layers can be superimposed to show the relationship between the location of different items.

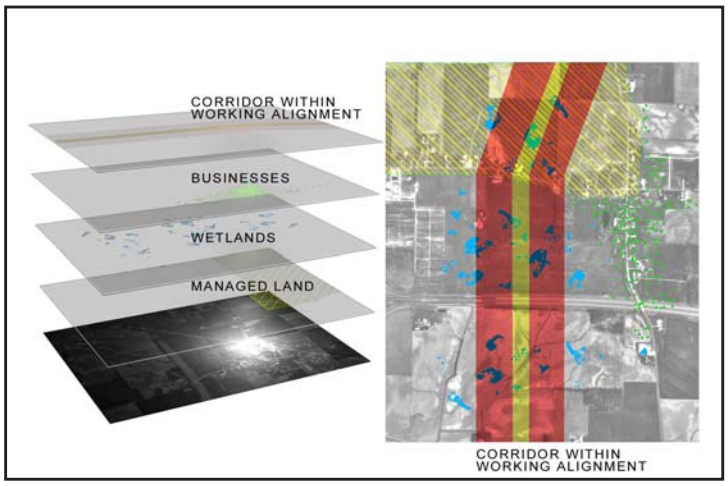


Figure S-4: Illustration of GIS Layering

Figure S-4 depicts this layering concept. The working alignment for each alternative is superimposed upon resource layers in order to determine its impact on those resources. For example, the highway's working alignment could be superimposed upon a GIS layer showing the location of wetlands. With this visual information, where possible the working alignment could be shifted to avoid taking the wetlands.

Once the GIS was developed, each alternative was mapped using a set of three overlapping geographic "bands" as described below and depicted in Figure S-5:

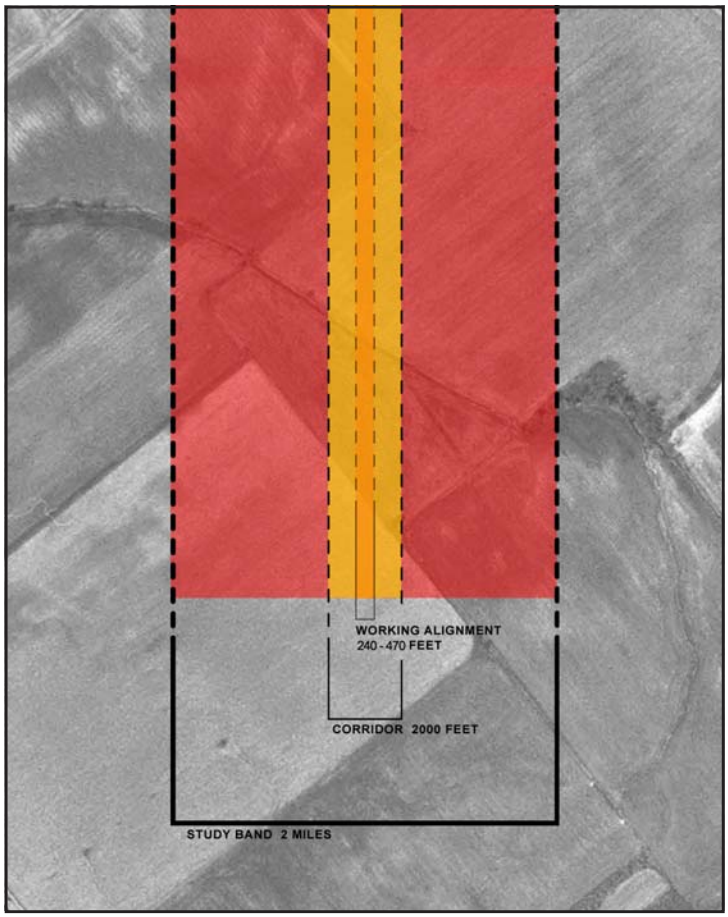


Figure S-5: Illustration of Study Band, Corridor and Working Alignment

- **Study Band** This is a two-mile wide band within which environmental data-gathering efforts were focused.
- **Corridor** For purposes of this study, a "corridor" is generally 2,000 feet wide, but its width is narrower in some places and broader in others. If a "build" alternative is selected, it is FHWA's intention to approve a Record of Decision (ROD) for a corridor at the end of Tier 1, rather than approving a specific alignment.
- **Working Alignment** A "working alignment" is a potential location for a highway right-of-way within the 2,000 foot wide corridor. The Tier 1 EIS is not intended to result in the selection of a specific alignment. However, working alignments have been developed within each corridor in order to provide a sound basis for estimating the environmental impacts of each alternative. The working alignments range in width from 240 to 470 feet. Three factors were considered in estimating the right-of-way width for individual sections of each working alignment: (1) the topography of the land, i.e., flat, rolling, hilly; (2) the expected presence or absence of frontage roads; and (3) the number of lanes required to accommodate the forecasted traffic. (See Appendix E, *Typical Sections* for detailed information on the width of the working alignments.) For purposes of estimating impacts and modeling traffic, potential interchanges were included as a part of the working alignments. An additional 10 acres was added beyond the footprint of the working alignment to account for these interchanges. Potential interchange locations were determined based on: (1) the functional classifications and traffic volumes of intersecting roadways; (2) service to communities that otherwise might be isolated; (3) distance to upstream/downstream interchanges; (4) the number of interchanges serving particular communities; and (5) other related considerations. Final determinations regarding interchange locations will be made in the Tier 2 studies.

The GIS was the initial tool used to estimate the impacts of each alternative. With this initial information, the GIS data was subsequently verified and supplemented extensively by field visits and additional data gathering. The location of resources was field verified within the two-mile study band.

Additional information about the GIS is described in Chapter 4.1. Refer to the *Environmental Atlas*, which is Volume III of this DEIS and depicts the corridors and working alignments in relation to many of the resource layers.

S.3.2.2 Forecasting Tools

In addition to the GIS, other technical tools were developed and used for this study. These tools, which provide transportation and economic forecasts, were combined to produce forecasts of indirect impacts.

The Indiana Statewide Travel Demand Model (ISTDM) is a GIS-based tool which combines forecasts of population and employment to predict future traffic flows on the highway network. These forecasts are for the year 2025. By inserting new or improved roads into a computer image of the transportation network (such as different route concepts for I-69 between Evansville and Indianapolis), it is possible to forecast the different effects which each alternative will have on the transportation system. These effects include differences in traffic volumes and congestion levels.

Many studies of this nature make use of travel demand models for planning purposes. However, in this study, the ISTDM was merely the starting point in a process that generated a variety of transportation and economic performance measures. These measures are discussed in Chapter 3, *Alternatives.*

Figure S-6 shows the normal travel demand modeling process in the blue boxes on the left side of the diagram. This conventional modeling process served as only the starting point in an expanded process that involved the integration of transportation and economic modeling components. This expanded process is depicted on the right side of the diagram.

In addition to travel demand modeling, analysis was conducted to compute the benefits of each alternative accruing to the transportation "users" (i.e., individuals, on-the-clock workers, businesses, truckers, etc.). Specifically, these benefits are: (1) reduced travel times and associated costs or longer distance travel within the same travel time budget; (2) changes in vehicle operating costs; and (3) reduced accident costs. This process step is shown in yellow in Figure S-6.

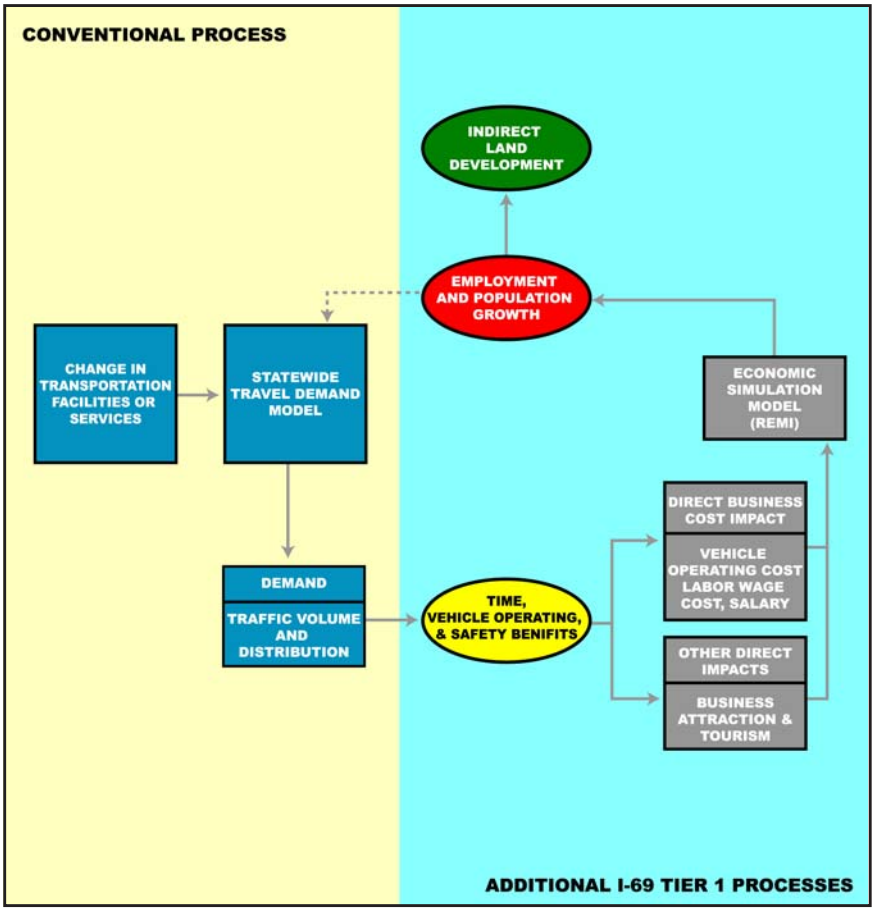


Figure S-6: Flow Diagram of Conventional and I-69 Tier 1 Modeling Processes

Once user benefits were calculated, they were further broken down into impacts that directly affect existing businesses and markets. These steps are shown in gray.

Following these steps, a state-of-the-art regional economic forecasting model was used (also shown in gray). The REMI Model (short for Regional Economic Model, Inc.) replicates in detail the economy of the Study Area, the rest of Indiana, as well as neighboring states. It models the relationship between components of the economy to forecast a wide variety of economic indicators, such as employment, income, labor force composition, and population.

REMI forecasts of increased population and employment (in red) were then "fed back" into the ISTDM in later stages of the study. These forecasts account for the full level of traffic impacts which would result from increases in population and employment expected from economic development stimulated by the highway. This "feedback loop" is an application of economic model forecasts to determine the effect of highway-induced growth on traffic levels. The traffic forecasts provided in Chapter 3.4, *Detailed Performance and Cost Analysis of Alternatives,* include this "induced" traffic for each alternative.

The REMI forecasts of increased population and employment were also used to predict indirect impacts on land use and key resources. A stated goal of this project is to support economic development in Southwest Indiana. Economic development brings more population and jobs, which result in additional land being used for residences and businesses. The analysis in Chapter 5, *Environmental Consequences*, includes estimates of land taken (and resources affected) by additional economic development which would result from a highway (i.e., indirect effects). This is in addition to the land taken and resources affected by the direct impact of the highway (i.e., right-of-way for the highway and interchanges).

S.3.3 Public and Agency Outreach

This project has had substantial public outreach activities. In February 2000, then commissioner of INDOT, Cristine Klika, said:

> "This study is intended to achieve two goals: (1) making information about the study *widely* accessible to the public, as it is developed; and (2) providing *meaningful* opportunities for the public to provide input *before* key decisions are made."

This commitment has been reaffirmed by J. Bryan Nicol, the current commissioner of INDOT.

Major aspects to this public outreach effort are described below (See Figure S-7). More detail is given in Chapter 11 - *Comments, Coordination, and Public Involvement.*

- **Public Outreach Meetings** At all key decision-making points in the study process, public outreach meetings were conducted to seek public input *before* key decisions were made. Each round of public meetings was held in different locations to encourage maximum participation. At each juncture (described below), draft study documents were released (including being posted on the project web site, www.i69indyevn.org). At each meeting, formal presentations were made, and a public comment period was provided. Citizens also were able to make written or taped comments. Project staff were available to discuss any matters of concern or to answer questions. Beginning with the third round of meetings, display areas (showing project findings) were provided. These display areas had project staff present to explain the

information, answer questions, and receive input. These meetings, and the topics covered, included:

- Project Kickoff and Scoping Meetings (March and April 2000) A total of six meetings were held in Terre Haute, Bloomington, and Evansville in March and April, 2000. At these meetings, the study team described the study process, and asked for input on alternatives to be studied. Nearly 2,000 people attended these meetings, which were held in the late afternoon and early evening at each venue.

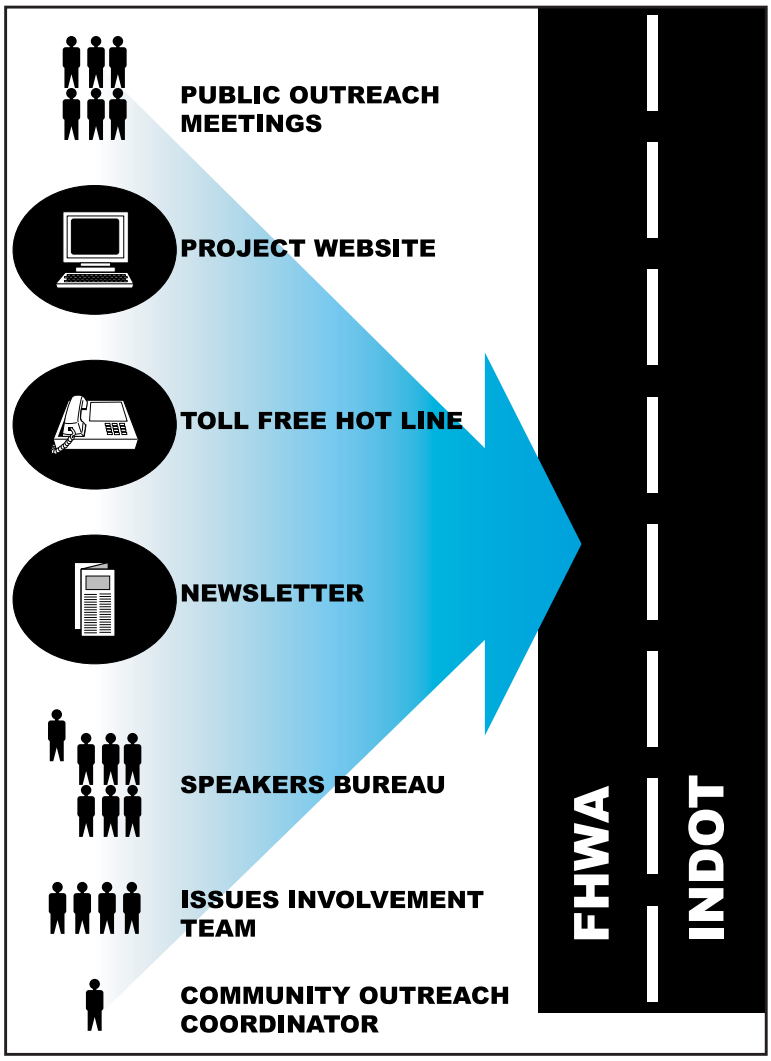


Figure S-7: Public Involvement

- Purpose and Need Discussion Paper Meetings (August 2000) In August of 2000, a Purpose and Need Discussion Paper was issued. This paper described the various issues of concern in Southwestern Indiana relating to the purpose of the project. It also discussed Transportation, Economic Development and National I-69 research issues (including possible performance measures). That same month, three meetings were held to receive public input regarding this paper. These meetings were held in Jasper, Vincennes, and Indianapolis. Nearly 400 people attended these meetings.

- Purpose and Need Meetings (May 2001) Using the input received at the previous round of public involvement meetings, a Draft Purpose and Need Statement was issued in April 2001. In May 2001, a series of public involvement meetings were held in Martinsville, Oakland City, and Sullivan to receive input on the paper. Over 300 people attended these meetings. Input received at these meetings was used to modify the *Purpose and Need* statement which is included as Chapter 2 of this document. Comments were also received regarding route concepts which had been announced in December 2000.

- Screening of Alternatives Meetings (November 2001) In October 2001, a Draft Screening of Alternatives report was issued. This report proposed that five of the 14 route concepts be carried forward for further study. In November 2001, a series of public involvement meetings were held in Linton, Greenwood, and Washington to receive input on the screening report. Nearly 500 people attended these meetings. As a result of the input received at these

meetings and at subsequent meetings with review agencies, several modifications were made to the alternatives carried forward for further study.

- **Project Website** An official project website has been provided since the outset of this study at www.i69indyevn.org. This website features: a "Frequently Asked Questions" section, which provides official statements on dozens of key study issues; a Reports section, where all study reports are posted for information; a "Newsroom" section, where media advisories are posted; a "Contact Us" section, where citizens may submit comments to the INDOT and consultant team project managers; and a "Question of the Month" section, where issues of current interest are addressed. Through the end of July 2002, there have been over 27,000 visitors to the project website. Some documents (such as the Draft Statement of *Purpose and Need*) were viewed and/or downloaded over 1,000 times.

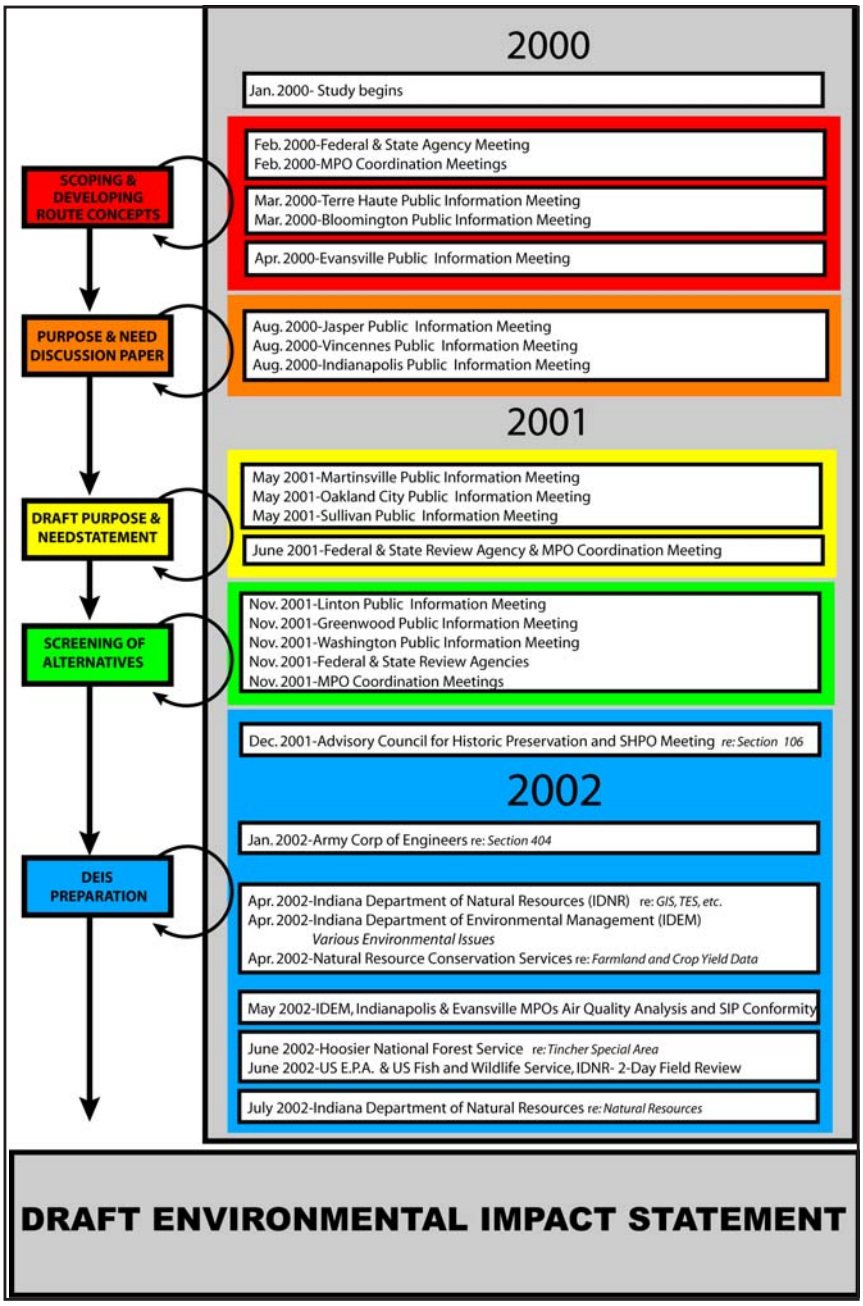


Figure S-8: Public Outreach

- **Toll Free Hot Line** A 24-hour toll free hot line (1-877-INDYEVN) is available to provide information about upcoming meetings, to allow people to subscribe to the project newsletter, and to leave comments for the study team. During times of peak activities (such as when meetings are upcoming), dozens of calls are received each week.

- **Speakers' Bureau** Since the beginning of the study, senior INDOT decision-makers and consultant staff have given talks to numerous groups and civic organizations about the study.

- **Newsletter** Beginning with the second round of public involvement meetings, a project newsletter was distributed. Each issue was sent to by over 3,000 individuals and groups. Copies also were distributed at public involvement meetings. These newsletters described the key issues regarding which public input was sought and contained other information about the study.
- **Community Outreach Coordinator** This study has included the services of a community outreach coordinator who has been responsible for day-to-day communication with public officials, concerned citizens, and community leaders. Over 150 such meetings have been held to date. Summaries of these meetings for 2000 and 2001 have been posted on the project website on the Reports page under Public & Community Outreach Summary.
- **Issues Involvement Team** A group of stakeholders was assembled and met periodically to review the progress of the study and discuss major issues. This group was particularly helpful at the outset of the study at gauging public opinion and advising INDOT and FHWA regarding aspects of the public meetings and citizen outreach.

In addition to these public involvement activities, this study has included extensive coordination with federal and state resource agencies and metropolitan planning organizations (MPOs). Figure S-8 lists a combined chronology of formal public meetings and agency coordination meetings. These public and agency contact points have been timed to solicit information and provide input *prior to* decision-making milestones at all stages of the study process. Throughout the study process, input from agencies and members of the public have resulted directly in studying new alternatives, the shifting of working alignments, and the designation of some alternatives as non-preferred.

S.4 Scoping, Purpose and Need, and Preliminary Screening

This initial stage of the project involved identifying the range of alternatives to be studied (Scoping) and determining the project goals (*Purpose and Need*). This process began in January 2000. At the end of this process, several preliminary highway route concepts were identified and an initial *Purpose and Need* statement was produced which included project goals, and performance measures associated with each goal.

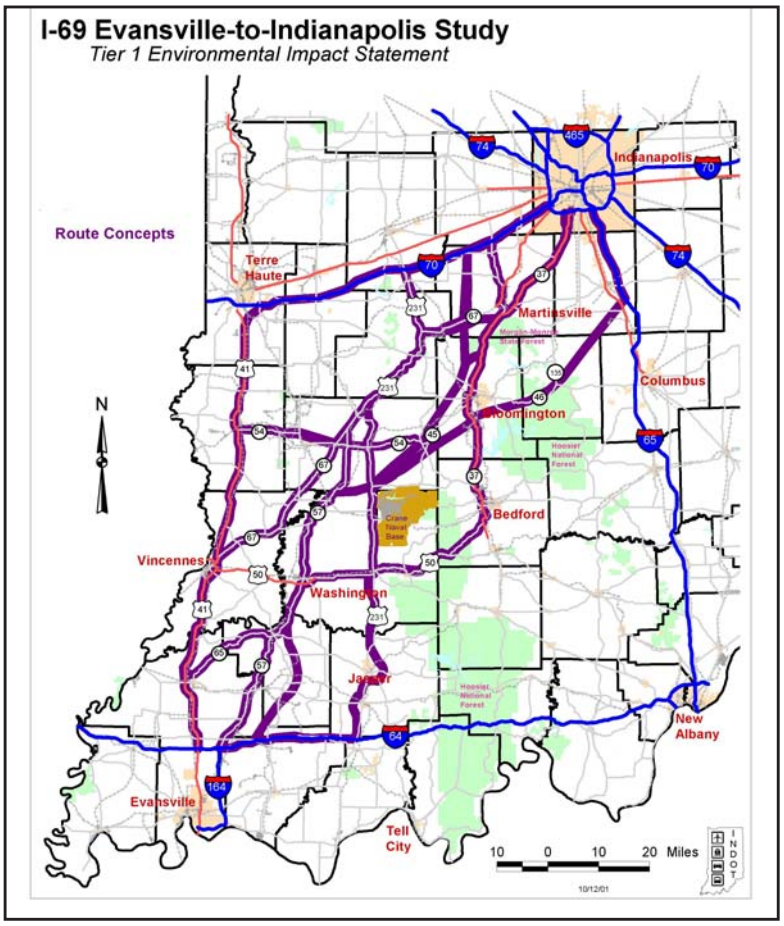


Figure S-9: Route Concepts

S.4.1 Scoping Process

Early in the study (in February 2000), meetings were held with federal and state review agencies to help frame the major issues and design a process for conducting the study. At these same meetings, "scoping" activities, which defined the range of alternatives to be studied, also were held. In March and April 2000, a series of public information meetings were held in Terre Haute, Bloomington, and Evansville. At these meetings the study process was explained. Those in attendance were asked to suggest routes which should be studied. Out of these meetings with both review agencies and the public, several alternatives were suggested.

Figure S-9 shows the corridors which were designated as "route concepts" in the scoping process. Fourteen such route concepts, were designated with the letters A - N. Several of these routes included options near Indianapolis. Counting these options, there were a total of 19 route concepts. Some of the route concepts (D, G, and K) grew out of the meetings and input process described in the paragraphs above, and were specifically suggested for inclusion by review agencies or citizens. This process is described in detail in Chapter 3.2, *Scoping and Development of Route Concepts.*

S.4.2 Purpose and Need

The *Purpose and Need* was based on an analysis of the needs that could be addressed by a project (in this case, a transportation project). It resulted in the formulation of project goals based on identified needs, and performance measures used to assess how well alternatives satisfy these goals.

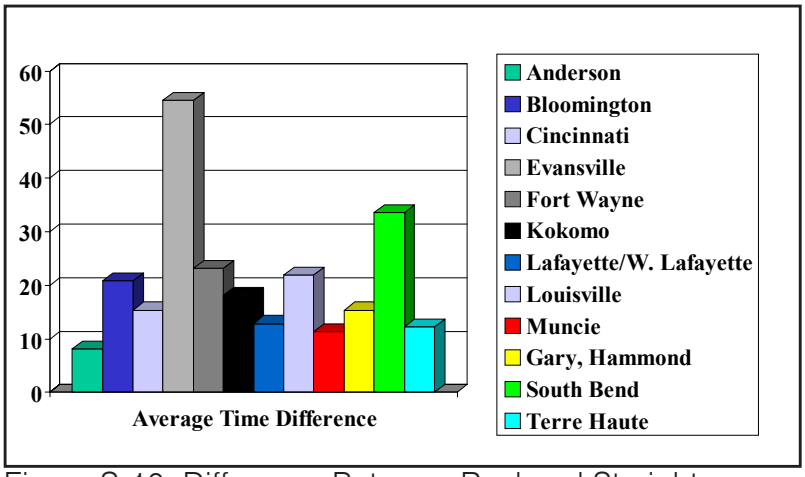


Figure S-10: Difference Between Real and Straight-Line Travel Time between Indianapolis and Regional Cities

The formulation of the *Purpose and Need* was guided by a series of policy decisions over the last 10 years at the federal and state level. These included:

Key Federal Policies

- Facilitate completion of I-69 as an Interstate highway from Canada to Mexico, connecting Evansville and Indianapolis as specified by Congress, in order to promote international and interstate trade and facilitate economic development along the I-69 corridor.
- Focus Federal aid on the National Highway System (NHS) – a 160,000 mile system that includes only 5% of the nation's highways but serves 40% of its traffic.

Key State Policies

- Promote transportation system effectiveness, safety, quality of life and other INDOT policies in all INDOT decisions.
- Establish a network of "Mobility Corridors" to enhance the connectivity between major activity centers to support the State's economy.

The *Purpose and Need* was also based on a comprehensive *Needs Assessment* of the no-build condition. In order to avoid overstating needs, the modeling used in this no-build assessment assumed that other sections of the National I-69 project had *not* yet been built. The *Needs Assessment* resulted in the following key findings and conclusions:

Transportation Needs Assessment – Key Findings

- **Evansville to Indianapolis Linkage:** Evansville residents have the least efficient connection to Indianapolis of any major city in Indiana, based on analyses of both time and mileage[1] (See Figure S-10).
- **Regional Accessibility:** Southwest Indiana as a whole has a much lower level of accessibility - to employment opportunities, to airports, and to major population centers, including Indianapolis - than other parts of Indiana (See Figure S-11).

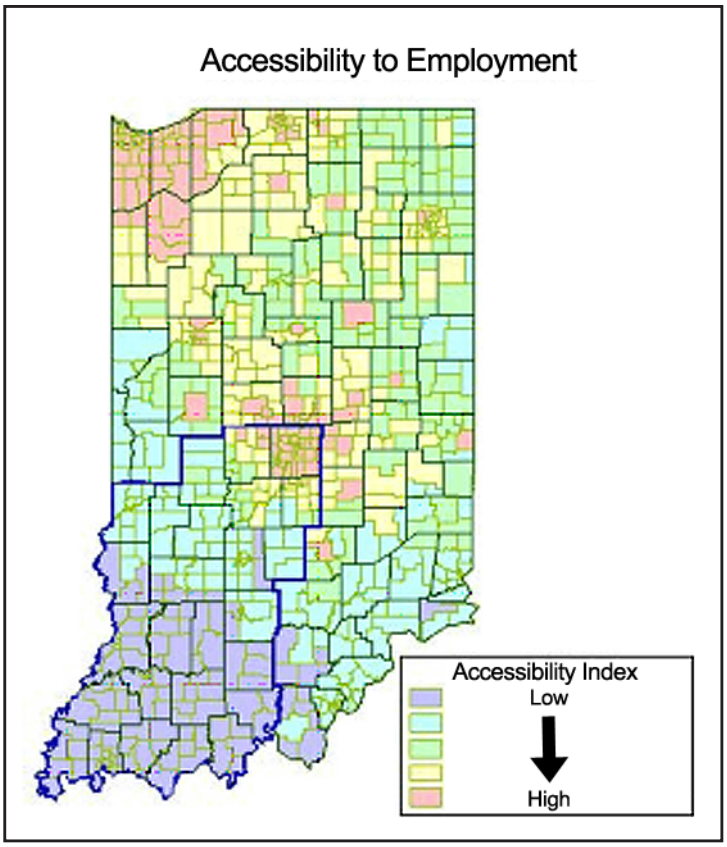


Figure S-11: Accessibility to Employment

- **Safety:** There are several rural counties in Southwest Indiana with crash rates which are significantly higher than statewide averages.

Economic Needs Assessment – Key Findings

- **Growth Rates:** Population and employment growth rates in Southwest Indiana - and in Indiana as a whole - have lagged significantly behind national averages during the last 30 years.
- **Rural Stress:** Rural counties in Southwest Indiana are under significant stress, as described by the United States Department of Agriculture (USDA), Rural Development Agency's *Year 2002 Strategic Plan*. A higher percentage of rural counties in Southwest Indiana are stressed than in other parts of the state. Key contributing factors to this stress include high poverty rates, high unemployment, and low levels of household income.
- **Transportation:** A panel of economic development practitioners from the International Economic Development Council (IEDC) found that the inadequacy of the highway system in Southwest Indiana is an important factor limiting economic growth in the region.[2]

1 All transportation and accessibility-related findings in the *Purpose and Need* assumed that certain high-priority projects will be built. These projects were treated as "given" in the transportation modeling analysis. Notable among these projects are the addition of lanes to I-70 between Terre Haute and Indianapolis and the upgrade of US 231 in Spencer and Dubois Counties.

2 The International Economic Development Council was known as the Council for Urban Economic Development (CUED) at the time they conducted their analysis.

Out of the *Needs Assessment*, ten project goals emerged. Subsequently, in Level 3 of the alternatives analysis, these ten were reduced to nine to consolidate two closely related goals. These are the nine goals shown on Page S-2.

The *Purpose and Need* is addressed in detail in Chapter 2 of this document.

S.4.3 Preliminary Screening

The *Purpose and Need,* including its goals and performance measures, were applied to each of the route concepts in order to determine which should be retained for further "Level 3" analysis. Given the large number of alternatives, and the variety of areas served, these route concepts were grouped geographically, in order to assure that a geographically diverse range of alternatives would be carried forward for further analysis. Former INDOT Commissioner Cristine Klika's memo of February 24, 2000 (mentioned above) addressed the need for geographic diversity as well. She stated:

> "Once a broad range of alternatives has been developed, we will need to screen those alternatives in order to identify a set of reasonable alternatives for detailed study. In making this decision, we will consider - as we do in every study - the ability of each alternative to achieve the project's basic objectives. But in a study of this nature, we must be particularly careful to avoid prematurely eliminating alternatives that may later be found to have significant advantages in terms of environmental impacts or costs. Therefore, we should seek to carry forward a *geographically diverse range of alternatives* in order to allow maximum flexibility in selecting a preferred alternative."

Therefore, in applying the goals and performance measures in the *Purpose and Need*, alternatives first were grouped *geographically* with the understanding that at least one alternative from each geographic area would be carried forward for further analysis. For purposes of screening, alternatives were divided into four groups. These groups included a Western Group, a Central Group with Bloomington Connection, a Central Group with no Bloomington Connection, and an Eastern Group.[3] They are categorized as follows:

Table S -1: Geographic Grouping of Alternatives

Cities Served	Western Group				Central Group (Bloomington)								Central Group (Non-Bloomington)			Eastern			
	A	C1	C2	E	B1	B2	D	F1	F2	G	H1	H2	I	J	M	K	L1	L2	N
Evansville	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Terre Haute	X																		
Princeton	X	X	X	X	X	X													
Vincennes	X	X	X	X			X												
Linton		X	X	X			X						X	X	X				
Washington					X	X		X	X	X	X	X	X	X		X	X	X	
Bloomington					X	X	X	X	X	X	X	X				X	X	X	
Jasper															X				X
Bedford																	X	X	X
Martinsville			X		X	X	X		X		X	X					X	X	X
Indianapolis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

SOURCE: Bernardin, Lochmueller & Associates, Inc.

- **Western Group** These generally follow US 41 for a significant distance along the western perimeter of the study area.

3 A sensitivity analysis was conducted that tested a wide range of geographic grouping criteria. (See Appendix D, Sensitivity Analysis and Screening Methodology.) This analysis showed that the selection of best performing alternatives was not dependent upon the exact definition of the geographic groups. In other words, across a wide variety of geographic groupings, a very similar set of alternatives would have been selected for further study.

Table S-2: Screening and Consolidation of Route Concepts by Major Geographic Region Served

Goal	Objective (Bold Caps = Core Objective)	Western				Central Bloomington								Central Non-Bloomington			Eastern			
		A	C1	C2	E	B1	B2	D	F1	F2	G	H1	H2	I	J	M	K	L1	L2	N
Transportation	INDY-EVV CONNECTION	***	****	****	***	***	***	*	*****	*****	****	*****	*****	*****	*****	**	***	****	***	*
	PERSONAL ACCESSIBILITY	**	***	****	**	*****	*****	*****	****	*****	****	*****	*****	**	***	****	***	*****	*****	*****
	Traffic Congestion Relief	*	***	***	*	****	****	****	***	****	***	***	****	***	***	***	*****	***	****	***
	Traffic Safety	***	***	*****	***	****	*****	*****	***	*****	***	****	*****	**	***	***	***	*****	*****	*****
Economic Development	Monetary User Benefits	**	***	***	*	***	****	*	****	*****	***	***	****	****	***	**	**	***	**	*
	Business Markets Accessibility	**	***	***	***	****	*****	***	*****	*****	****	*****	*****	***	***	***	*****	****	****	****
	Long-Term Economic Growth	*	*	****	*	***	*****	****	**	****	***	***	*****	**	**	***	***	***	*****	*****
	Social Distribution of Benefits	**	****	*****	***	****	*****	*****	****	*****	****	****	*****	****	****	****	*****	****	*****	*****
National I-69	INTERSTATE/INTERNAT'L TRADE	*	***	***	**	***	****	***	****	*****	***	****	****	***	***	***	*****	***	****	****
	Intermodal Accessibility	**	*****	****	***	****	****	***	*****	*****	****	*****	****	****	*****	**	****	****	****	***
Costs	Capital Costs	$	$$	$$$$	$$$	$$$$	$$$$$	$$$$$	$$	$$$	$$	$$$$	$$$$	$	$	$	$$$$	$$$	$$$$	$$$$
	O&M Costs	$	$$$$	$$$$	$$$	$$$$$	$$$$	$$$	$$$$$	$$$$$	$$$$$	$$$$$	$$$$	$$$$	$$$$$	$$$$	$$$$$	$$$$$	$$$$	$$$$
Eliminate Weaker Alts					X	X	X	X			X			X		X	X			X
Consolidate Stronger Alts		A	C1 + C2						F1 + F2 (with "H Option")						J			L1 + L2		
Alts Carried Forward		1	2						3						4			5		

Source: Bernardin, Lochmueller & Associates, Inc. September 2001

- **Central Group with Bloomington Connection** Most of these routes follow SR 57 for a significant distance, and all serve Bloomington either directly or with a short connection.
- **Central Group without Bloomington Connection** These generally follow a middle course, staying east of the US 41 corridor but west of Bloomington.
- **Eastern Group** These routes provide connections to the eastern part of the study area, and most provide connections to Bedford.

Route concepts were evaluated against the project goals and performance measures within their geographic groups. Table S-1 gives the geographic grouping of route concepts. Table S-2 shows the performance of each route concept on each criterion (cost as well as *Purpose and Need*), and shows the routes which were recommended for further study. For a detailed discussion of the application of these criteria, see Appendix O, *Route Concept Screening Report.*

In November 2001, public meetings were held to discuss the alternatives proposed for further study. In addition, meetings were held with environmental review agencies and metropolitan planning organizations (MPOs). At these venues and at other times in the public involvement process, key points were made which resulted in modifications of the alternatives carried forward for detailed

study. These modifications included:

- the addition of an option for Alternative "C" that would extend to SR 37 in the vicinity of Martinsville;
- the addition of an option for Alternative "J" that would also extend to SR 37 near Martinsville; and
- the treatment of Alternative "I" as an additional variation of Alternative "J".

The alternatives carried forward for further Level 3 study are listed in Table S-3 along with their new names. They are also shown in Figure S-11.

S.5 Performance, Cost and Environmental Impact Analysis

Alternatives carried forward for further study in Level 3 underwent analysis of their performance, cost, and impacts. The following sections summarize the findings of these analyses.

S.5.1 Performance and Cost Analysis

In this analysis, "induced traffic" was considered. Induced traffic includes additional travel resulting from: (1) economic development stimulated by the alternative, and (2) the assumption that National I-69 has been completed. Including induced growth is a cautious assumption which assures that impacts are not understated.

In analyzing the alternatives carried forward for further study, several common themes or "factors" become evident which explain why certain alternatives perform well and others do not. These factors, differ from project goal to project goal. In addition, for some project goals, multiple factors were in evidence. Factors associated with high performance and factors associated with moderate performance are discussed below.

Factors Associated with Highest Levels of Performance

The following factors were found to be associated with high levels of performance in terms of the project's goals.

- **Service to Bloomington**
  Bloomington and Monroe County represent a major population and economic center. A major transportation improvement to Bloomington increases the accessibility of its

Table S – 3: Alternatives Carried Forward for Level 3 Analysis

Alternative Description	Old Name	New Name
Evansville-Vincennes-Terre Haute via US 41-Indianapolis via I-70	A	1
Evansville-Vincennes via US 41-Spencer- Indianapolis via US 231 and I-70	C-1	2A
Evansville-Vincennes via US 41-Spencer- Indianapolis via SR 67 and new alignment to I-70	C-2	2B
Evansville-Vincennes via US 41-Spencer-Martinsville-Indianapolis via SR 37	-	2C
Evansville-Washington-near Bloomington & Ellettsville-Indianapolis via new alignment and I-70	F-1	3A
Evansville-Washington-near Bloomington & Ellettsville-Martinsville and Indianapolis via SR 37	F-2	3B
Evansville-Washington-Bloomington-Martinsville and Indianapolis via SR 37	H-2	3C
Evansville-Washington-Spencer-Indianapolis via US 231 and I-70	I	4A
Evansville-Washington-Spencer-Indianapolis via SR 67 and new alignment to I-70	J-1	4B
Evansville-Washington-Spencer-Martinsville-Indianapolis via SR 37	-	4C
Evansville-Washington-Bedford-Bloomington-Martinsville-Indianapolis via new alignment to I-70	L-1	5A
Evansville-Washington-Bedford-Bloomington-Martinsville-Indianapolis via SR 37	L-2	5B

SOURCE: Bernardin, Lochmueller & Associates, Inc.

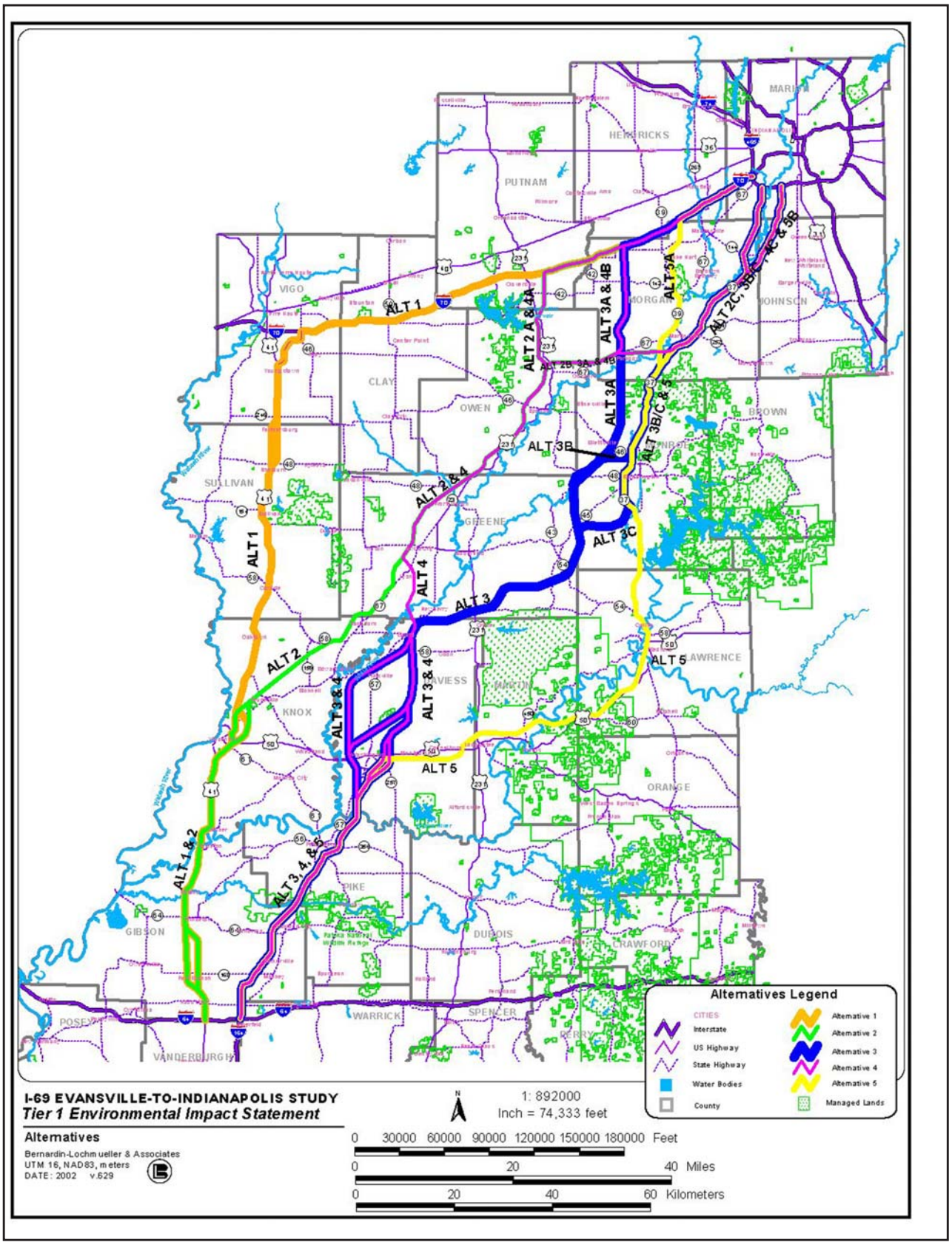


Figure S - 12: Alternatives Carried Forward to Level 3

population to desired travel destinations, as well as increases the access which its businesses have to markets and suppliers. In addition, Bloomington offers many desired travel destinations (business, educational, shopping, etc.) which people in rural Southwest Indiana desire to reach.

- **Service to SR 37 Corridor** The SR 37 corridor southwest of Indianapolis is heavily-traveled and its importance as a transportation artery will continue to grow. Relatively high levels of congestion are forecasted for certain segments of SR 37 by 2025 in the "no build" case. Providing more capacity in this corridor, in the form of an Interstate highway, would relieve congestion, reduce transportation costs, and lead to reductions in accidents. An Interstate highway in the SR 37 corridor would also provide some limited relief to forecasted congestion on I-65 on the southeast side of Indianapolis.

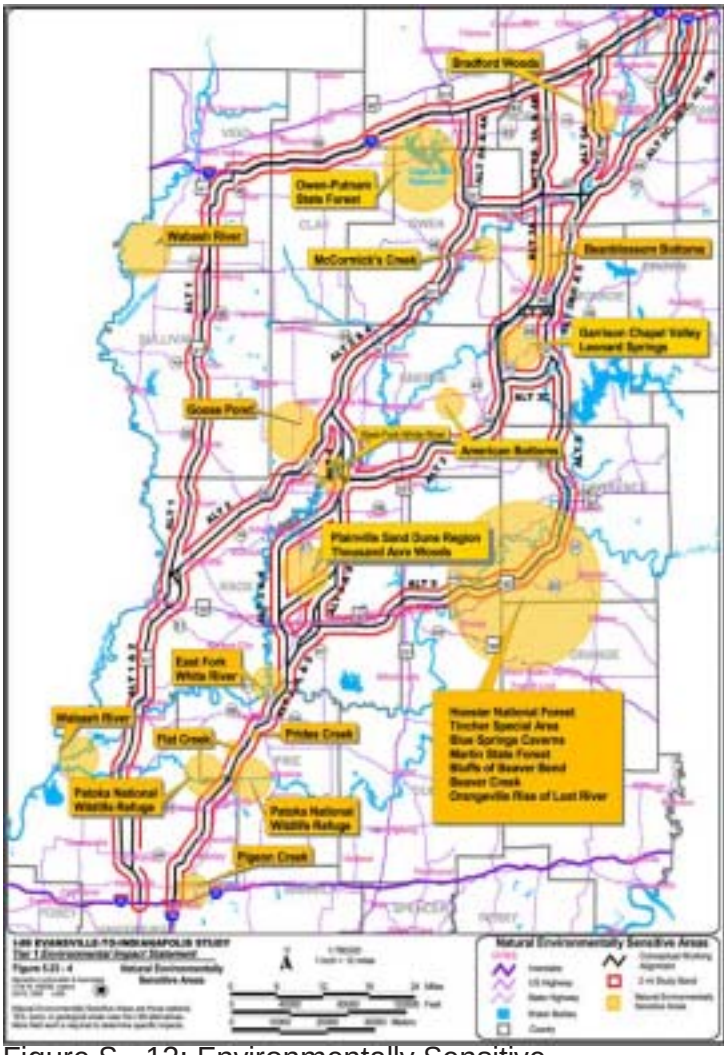


Figure S - 13: Environmentally Sensitive

- **Short Evansville to Indianapolis Mileage** Generally, a shorter Evansville-to-Indianapolis travel distance results in a shorter Evansville-to-Indianapolis travel time.

- **Service to Western Morgan County** Two major intermodal facilities are located on the west side of Indianapolis. These are the Indianapolis International Airport and the CSX Avon Yard. Alternatives which join I-70 near these two major intermodal centers offer an advantage to intermodal freight shipments. Also, an alternative in Western Morgan County can relieve some of the forecasted traffic congestion in the SR 37 Corridor.

- **Service to Crane Naval Surface Warfare Center** This major employer represents an opportunity for economic development that is limited by its lack of transportation access. The alternatives that serve Crane provide the overall highest increase in business accessibility.

Factors Associated with Moderate Levels of Performance

- **Service to Vincennes** This factor contributes to moderate performance. Vincennes represents a population and economic center. A major transportation improvement to Vincennes increases the accessibility of its population to desired travel destinations. In addition, Vincennes offers some desired travel destinations (business, educational, shopping,

etc.) which people in rural southwest Indiana desire to reach.

- **Service to West-Central Study Area** This factor contributes to moderate performance. Much of this portion of the Study Area (generally, the area west of Bloomington and east of US 41) is economically-distressed. Most of its counties (specifically, Clay, Owen, Sullivan, Greene, Daviess, Martin, and Pike) were designated as "stressed" by the United States Department of Agriculture, Rural Development Agency, in its *2002 Strategic Plan*. Providing improved access to this area allows additional economic development to occur.

Table 3-35 - 4: Performance of Alternatives on Project Goals

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Indy -Evv Travel Time Savings	○	◉	◉	◉	●	●	●	◉	●	●	◉	◉
Improved Personal Accessibility	○	◉	◉	◉	●	●	●	○	○	◉	●	●
International & Interstate Freight Movement	○	○	○	●	●	●	●	◉	◉	●	●	●
Reduction in Traffic Crashes	○	○	○	●	○	●	●	○	○	●	●	●
Congestion Relief	○	○	◉	●	◉	●	●	○	◉	●	◉	●
Improved Business Accessibility	○	○	○	●	○	●	●	○	○	●	●	●
Long-Term Economic Growth	○	◉	◉	●	●	●	●	◉	◉	●	●	●
Economic Benefits to a Wide Spectrum of Regional Residents	○	◉	◉	●	●	●	●	◉	◉	●	●	●
Improved Access to Intermodal Facilities	○	◉	◉	◉	●	●	◉	◉	●	◉	●	◉

SOURCE: Bernardin, Lochmueller & Associates, Inc.

○ LOW ◉ MEDIUM ● HIGH

These factors demonstrate that there are a variety of needs, and that alternatives perform at different levels for different goals.

Table S–5: Capital Costs by Alternative

Alternative	Capital Cost Low	Capital Cost High	Capital Cost Average
1	$ 810,000,000	$ 1,040,000,000	$ 930,000,000
2A	$ 1,090,000,000	$ 1,270,000,000	$ 1,180,000,000
2B	$ 1,170,000,000	$ 1,370,000,000	$ 1,270,000,000
2C	$ 1,470,000,000	$ 1,740,000,000	$ 1,610,000,000
3A	$ 1,290,000,000	$ 1,380,000,000	$ 1,340,000,000
3B	$ 1,650,000,000	$ 1,820,000,000	$ 1,740,000,000
3C	$ 1,640,000,000	$ 1,810,000,000	$ 1,730,000,000
4A	$ 960,000,000	$ 1,040,000,000	$ 1,000,000,000
4B	$ 1,040,000,000	$ 1,120,000,000	$ 1,080,000,000
4C	$ 1,340,000,000	$ 1,500,000,000	$ 1,420,000,000
5A	$ 1,610,000,000	$ 1,810,000,000	$ 1,710,000,000
5B	$ 1,670,000,000	$ 1,850,000,000	$ 1,760,000,000

SOURCE: Bernardin, Lochmueller & Associates, Inc.

Table S-4 groups the alternatives into "high," "medium," and "low" performance categories. There are seven alternatives whose performance is predominantly high in their ability to meet the project's goals. These are Alternatives 2C, 3A, 3B, 3C, 4C, 5A, and 5B. Each performs high or medium on all core goals, as defined in the *Chapter 2, Purpose and Need*. Each has a high rating on at least six of the nine project goals. None of these alternatives is ever in a low category for a project goal. Alternatives 3A, 3B, and 3C are the only alternatives with high ratings for all three of the core goals. Only one alternative scores very highly over all nine project goals: 3B. Alternative 3C scores high on eight of the nine goals. Alternative 4B is a moderately high performer with high scores on Evansville-Indianapolis travel time reduction and intermodal access and several medium scores. It is the best of the alternatives that approach Indianapolis on I-70.

Alternative 4B is a moderately high performer with high scores on Evansville-Indianapolis travel time reduction and intermodal access and several medium scores. It is the best of the alternatives that approach Indianapolis on I-70.

On the other hand, Alternative 1 performs much more poorly than any other alternative in terms of satisfying the purpose and need for this project.

Table S-5 reports the total capital costs for each alternative. These costs are inclusive of engineering, right-of-way and construction.

Although Alternatives 2C, 3A, 3B, 3C, 4B, 4C, 5A, and 5B are generally superior performers from the standpoint of satisfying project goals, it is clear from Table S-5 that with the exception of 4B, these same alternatives tend to have higher costs associated with them. Excluding Alternative 4B, the average construction costs for these alternatives is between $1.34 and $1.76 billion. In addition, as will be discussed below, these high performing alternatives tend to have higher environmental impacts. By comparison, the other alternatives have average construction costs ranging from $0.93 to $1.27 billion. See Chapter 3.4, Level 3: *Detailed Performance and Cost Analysis of Alternatives* for more specifics. In Chapter 6, *Comparison of Alternatives,* the trade-offs among performance, costs, and impacts are more fully discussed.

S.5.2 Environmental Impacts Analysis

I-69 would have a wide range of impacts to the natural and human environment. Following is a summary of the major issues and findings of the environmental impact analysis for this Tier 1 EIS.

Ecosystem Impacts - Figure S-13 shows the environmentally sensitive areas with regard to the alternatives. Environmentally sensitive areas that may be impacted by this project include Patoka River National Wildlife Refuge, Tincher Special Area, Beanblossom Bottoms, Blue Springs Cavern, Martin State Forest, Flat Creek, and Prides Creek.

Patoka River National Wildlife Refuge was established in 1994 and consists of 2,670 acres within the potential purchase area boundary of 22,083 acres. The refuge is one of the most significant hardwood bottomland forest ecosystems in the state. The U.S. Fish and Wildlife Service (USFWS) has agreed to a corridor to be preserved for a highway through the refuge area if one of these alternatives is selected.

The Tincher Special Area of the Hoosier National Forest encompasses approximately 4,180 acres. It is a unique ecosystem with field work having identified 18 species unique to this location. An area with 20 such species is considered a habitat of "global significance." Alternative 5A and 5B would bisect and severely impact the central part of this ecosystem.

The Beanblossom Bottoms Nature Preserve is considered a high biodiversity area by the Nature Conservancy. Alternative 3A would require between 20 and 30 acres of land from this nature preserve.

Blue Springs Cavern is a privately owned cave that is a unique karst resource. Alternative 5A and 5B directly impact the caverns.

Martin State Forest is a 7,023 acre high quality forest ecosystem. It provides high quality habitat for a number of plant and animal species. Alternative 5A and 5B pass through the middle of a portion of this forest.

Flat Creek Wetland Complex provides habitat for a number of federally and state listed threatened and endangered species. Alternatives 3, 4, and 5 would impact approximately 0.5 – 1 acre of this wetland complex.

Prides Creek Wetland Complex includes a mixture of emergent, scrub shrub, and forested wetlands. Alternatives 3, 4, and 5 would impact approximately 2 – 2.5 acres of this complex.

Noise Impacts - Alternatives 2C, 3B, 3C, 4C, and 5B have the potential to impact the most residences with regard to noise. Alternatives 3A, 4A, and 4B would impact the fewest residences with regard to noise.

Farmland Impacts – Alternative 1 represents the least impact, while Alternatives 2C, 4B, and 4C exhibit the highest potential for farmland acreage impact and crop production loss. With the exception of Alternative 1 and 4C, farmland acreage impacts for the alternatives range between 3,500 and 5,000 acres. Figure S-14 shows farmland loss in Indiana over many years. *The I-69 alternatives, including direct and indirect impacts – would account for about 1.4% of the cumulative farmland loss that is forecasted to occur in Southwest Indiana between 2002 and 2025 or about 0.2% of the total 2002 estimated farmland acreage in Southwest Indiana.*

Forests – Alternative 1 would have the fewest forest impacts with 110 to 170 acres. Alternatives 3A and 5A have the greatest forest impacts with 1,505 to 1,580 acres and 1,525 to 1,565 acres, respectively. Figure S-15 shows that forest acreage in Indiana has been increasing over the past 60 years. *The I-69 alternatives, including direct and indirect impacts – would account for about 0.1% of the total forest acreage in 1998 for Southwestern Indiana.*

Wetlands – Alternative 1 impacts the fewest number of wetland acres with 25 to 40 acres. Alternatives 3, 4 and 5 impact between 90 and 190 acres. Figure S-16 shows that wetland acreage in Indiana has been increasing over the past 50 years. *The I-69 alternatives, including direct and indirect impacts – would account for about 0.1% of the total wetland acreage in the mid 1980s for Southwestern Indiana.*

Water Quality – There is a high probability of potential impacts for karst areas such as

Figure S-15: Indiana Forest Lands

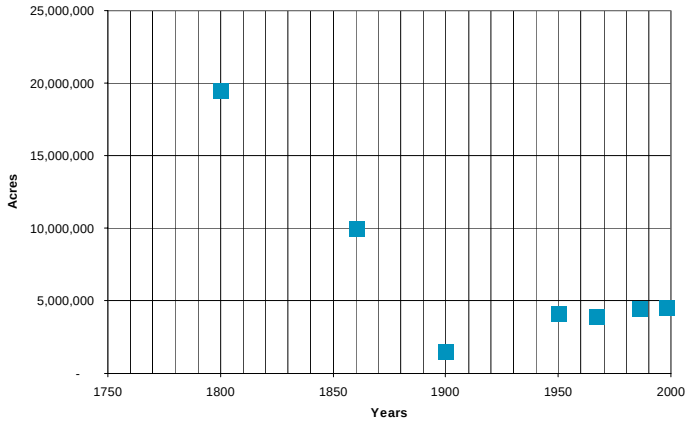


Figure S - 16: Indiana Wetlands

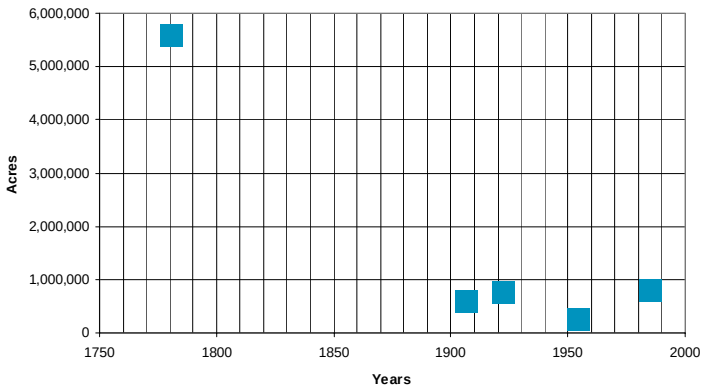
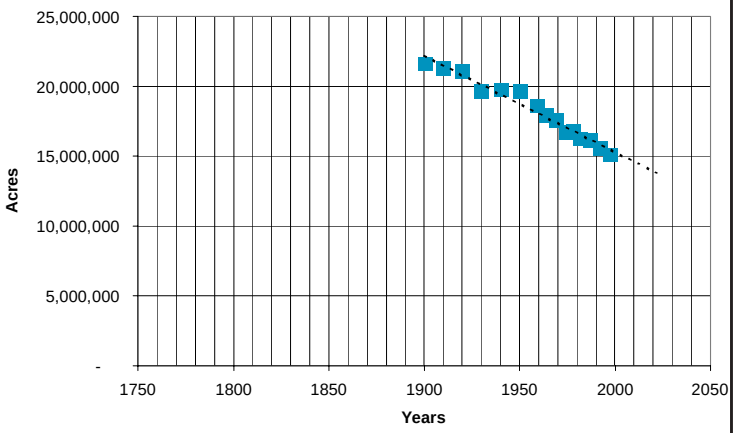


Figure S-14: Indiana Farmland



Tincher Special Area and Blue Springs Cavern for Alternatives 5A and 5B. Alternatives 2 and 4 appear to be intermediate in their potential impacts to water quality issues. Alternative 1 crosses the least amount of open water ecosystems and impaired streams and crosses no karst areas.

Social – Alternatives 2A, 2B, 3A, 4A, and 4B would have the fewest relocation impacts. These alternatives avoid the heavily populated neighborhoods around Indianapolis, Terre Haute, and Bloomington (see Figure S-17). The greatest impacts to neighborhoods are the alternatives that use SR 37 and end at I-465. These alternatives include 2C, 3B, 3C, 5A, and 5B.

Air Quality – The addition of any I-69 alternative to the Indianapolis Region Long-Range Plan will not jeopardize air quality conformity for Marion County. Likewise, the addition of any I-69 alternative to the Evansville Area Long-Range Plan will not jeopardize conformity with the SIP for Vanderburgh County.

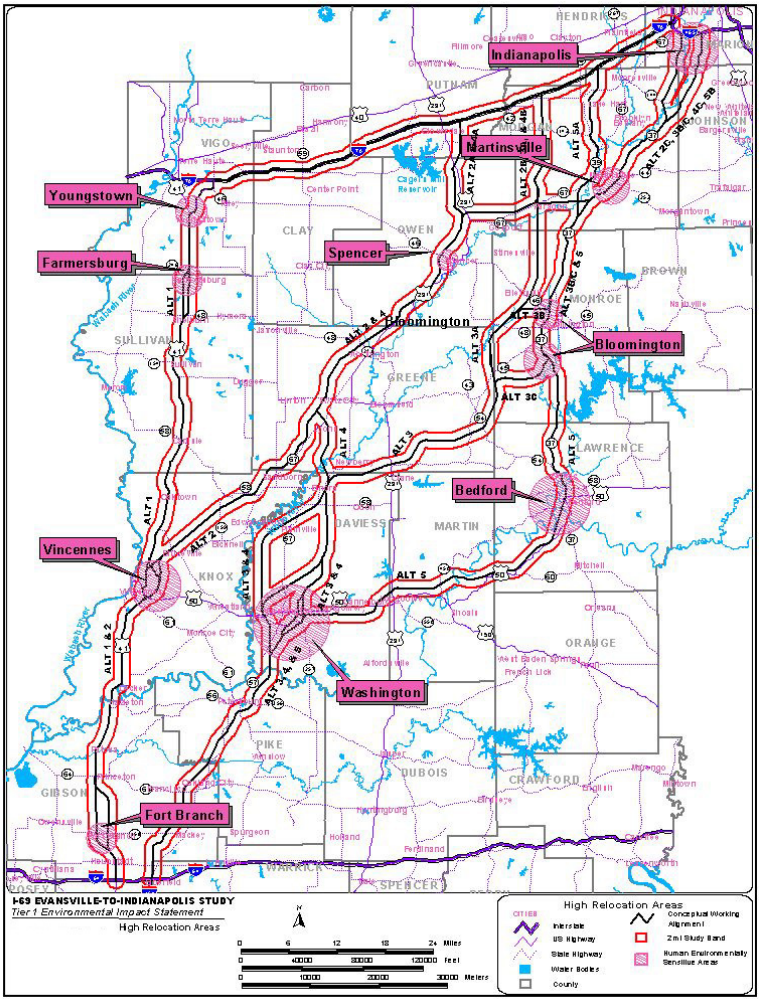


Figure S - 17: High Relocation Areas

Threatened and Endangered Species – Of the six federal species that should be considered for evaluation, Alternative 1 has the least potential for impact on these species. Alternative 5 appears to have the greatest potential for impacts to these species, while Alternative 3 comes near the Indiana Bat caves.

Karst Resources – A karst is a hilly landscape of caves and sinkholes that develops on some dissolving limestone formations. There are many karst area ecosystems within the study area (see Figure S-18). Alternatives 5A and 5B have the most impacts to these karst areas.

Section 106 Historic and Archaeology – In general, alternatives that pass through strip mining areas and through highly commercialized agricultural areas have less of an impact on historic properties. Alternatives that pass through certain areas of Daviess, Knox, Monroe, and Morgan Counties may impact historic farmsteads and landscape features.

S.6 Summary Comparison of Alternatives

In this section, significant advantages and disadvantages of each alternative are discussed. Table S-6 provides a tabular summary of comparative statistics. A more complete comparative discussion may

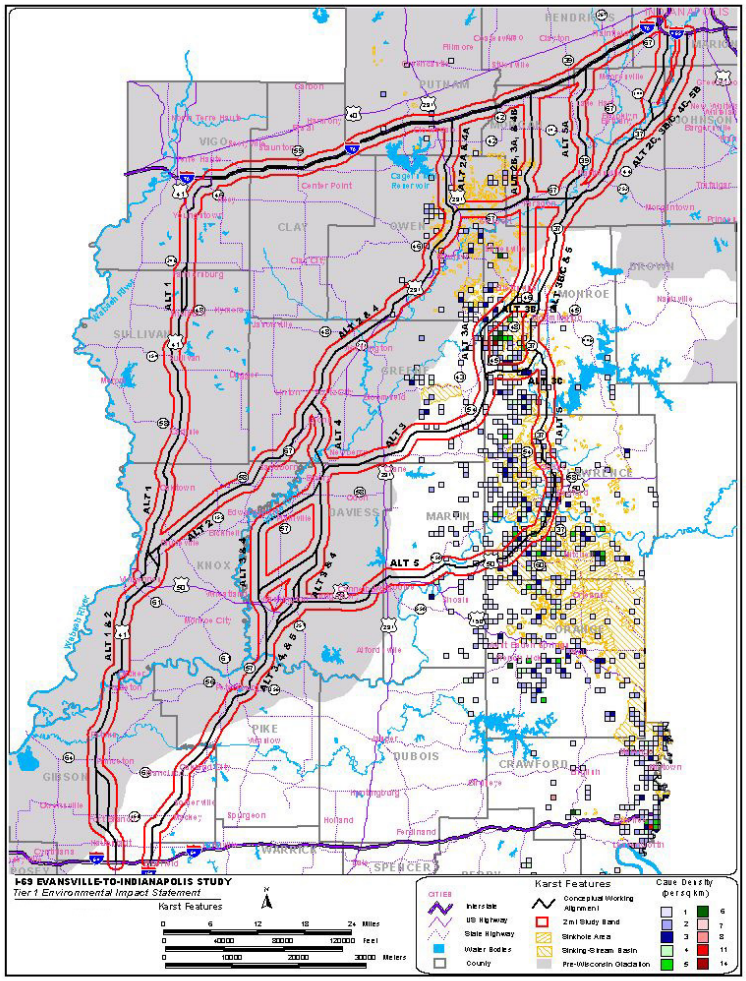


Figure S-18: Karst Features

be found in Chapter 6, *Comparison of Alternatives. Core goals are italicized.*

Alternative 1

Advantages:

- Lowest natural environmental impacts (e.g. forest, wetland, farmland, floodplain, threatened and endangered species).
- Lowest impacts to High Quality Natural Communities.
- Lowest construction cost ($0.80-$1.04 billion) and operation and maintenance costs[4].
- No karst features impacted (e.g. caves, sinkholes, sinking stream basins; 0 acres).
- Lowest number of streams crossed (65-75).

Disadvantages:

- *Poorest travel time savings between Indianapolis and Evansville – 12 minutes (core goal).*
- *Poorest improvements in regional accessibility (core goal).*
- *Poorest improvements of interstate and international movement of freight (core goal).*
- Poorest improvements to personal economic performance.
- Lowest improvements to business accessibility.
- Low potential for reduction of crashes and congestion.
- Highest potential business relocations (70-131).
- Highest disruption of existing traffic during construction.
- No improvement in access to Crane Naval Surface Warfare Center.

Alternative 2A

Advantages:

- Low natural environmental impacts (e.g. forest, wetland, farmland).
- Low impacts to High Quality Natural Communities.
- Low construction cost ($1.09-$1.27 billion) and operation and maintenance costs.
- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 65 acres).
- Low potential residential relocations (179-240).

Table S – 6: Summary of Key Performance Measures and Environmental Impacts[1]

Criteria	Alternative 1	Alternative 2			Alternative 3			Alternative 4			Alternative 5	
		A	B	C	A	B	C	A	B	C	A	B
Alternatives												
Total Length (miles)	154 - 156	147 - 148	145 - 146	145 - 147	142 - 144	140 - 143	140 - 143	143 - 145	141 - 143	141 – 144	149 - 152	146 - 147
Total Impact Length (miles)	87 - 89	122 - 123	133 - 134	145 - 147	136 - 138	140 - 143	140 - 143	118 - 120	129 - 131	141 – 144	148 - 151	146 - 147
Total New Right-of-Way Impacted (acres)	1710 - 2210	4760 - 4990	5380 - 5550	5500 - 6260	6120 -6200	5850 - 6440	5500 - 6090	5420 - 5490	5980 - 6050	6160 - 6760	6120 - 6150	5570 - 6130
Estimated Cost (billions of dollars; to the nearest 10 million)	0.81 – 1.04	1.09-1.27	1.17-1.37	1.47-1.74	1.29-1.38	1.65-1.82	1.64-1.81	0.96-1.04	1.04-1.12	1.34-1.50	1.61-1.81	1.67-1.85
Potential Bridges Over Water	19	36	44	48 - 54	49 - 50	59	58 - 59	44 - 49	52 - 57	56 – 62	52 - 55	52 - 58
Potential Interchanges	23 - 25	23 - 26	24 - 27	29 - 32	18 - 19	22 - 27	28 - 31	19	20	25 – 28	35 - 37	35 - 37
Potential Grade Separations for Roads/Railroads	37 - 40	58 - 60	62 - 64	66 - 70	51 - 60	52 - 58	57 - 64	51 - 56	55 - 60	59 – 61	56 - 59	56 - 59
Purpose & Need Performance[2]												
Indy-Evv Connection - Freeflow Travel Time Savings (min.)	11	16	19	17	20	24	21	20	21	20	15	14
Indy-Evv Connection - Typical Travel Time Savings (min.)	12	18	21	19	25	29	26	22	27	26	21	20
Accessibility - Increase in # of People Within 1 Hr of Indy	0	8000	8000	37000	25000	46000	60000	0	8000	37000	60000	60000
Accessibility - Increase in # of People Within 2 Hrs of Indy	18000	32000	33000	42000	61000	46000	40000	32000	32000	42000	24000	24000
Accessibility - Increase in # of People Within 3 Hrs of Indy	58000	85000	100000	85000	232000	216000	166000	112000	112000	112000	150000	123000
Accessibility - Increase in # of People Within 1 Hr of Educ Inst	0	0	58000	243000	253000	286000	360000	0	58000	243000	417000	372000
Accessibility - Increase in # of People Within 1/2 Hr of Major Urban Area	9000	4000	4000	13000	5000	12000	37000	0	0	9000	28000	37000
National I-69 - Daily Truck-Hours Saved	2000	2400	2500	3600	3800	4500	4300	3200	3000	4000	3500	4100
Environmental Consequences												
Potential Relocations[3]												
Homes	264 - 335	179 - 240	194 - 251	280 - 408	215 - 236	346 - 484	370 - 458	143 - 168	158 - 179	247 – 336	360 - 419	377 - 503
Businesses	70 - 131	29 - 63	32 - 66	56 - 113	17 - 18	42 - 66	51 - 75	8 - 9	11 - 12	35 – 59	53 - 54	72 - 96
Farmland (acres)	1270 - 1780	3630 - 3900	4100 - 4360	4300 - 5070	4510 - 4560	4290 - 4850	4070 - 4630	4500 - 4560	4970 - 5020	5170 - 5730	4200 - 4240	3840 - 4390
Prime Farmland (acres)	810 - 1330	2500 - 2930	2930 - 3370	3140 - 4100	2520 - 3410	2300 - 3750	2280 - 3730	2850 - 3690	3290 - 4130	3480 - 4880	2630 - 2790	2330 - 3060
Forest (acres)	110 - 170	885 - 920	970 - 1005	840 - 935	1505 - 1580	1315 - 1450	1140 - 1275	850 - 920	935 - 1005	805 – 935	1525 - 1565	1265 - 1365
Estimated Core Forest Habitat (acres)	0	117	130	85	502	440	398	129	142	97	682	544
Wetlands (acres)	25 - 40	60 - 75	65 - 80	90 - 110	120 - 165	100 - 155	90 - 150	110 - 160	115 - 165	140 – 190	125 - 140	110 - 130
Estimated Wetland Mitigation (acres)	75 - 135	175 - 270	190 - 290	255 - 390	325 - 630	295 - 590	265 - 570	325 - 610	340 - 630	390 – 710	370 - 530	325 - 490
Section 4(f) Resources												
Historic Sites/ Districts[4]	0	0	0	0	0	0	0	0	0	0	0	0
Archaeological Sites[4]	0	0	0	0	0	0	0	0	0	0	0	0
Public Parks, Refuges, Recreation Areas	0	0	0	0	1	0	0	0	0	0	1	1
Potential Hazardous Material Sites[5]	8-15	2-7	2-7	9-17	0	10-15	14 - 19	0 - 1	0 - 1	12-17	6-8	17 - 22
Total Streams Crossed	65 - 75	95 - 110	110 - 125	120 - 140	115 - 130	115 - 135	95 - 120	100 - 120	105 - 120	130 – 145	105 - 115	105 - 120
Perennial Streams	15 - 20	25 - 30	35 - 40	40 - 45	35 - 40	35 - 45	30 - 40	30 - 40	35 - 40	45 – 50	35 - 40	35 - 40
Intermittent Streams	50 - 55	70 - 80	75 - 85	80 - 95	80 - 90	80 - 90	65 - 80	70 - 80	70 - 80	85 – 95	70 - 75	70 - 80
Floodplains Crossed (acres)	370 - 470	1010 - 1100	1070 - 1160	1540 - 1850	860 - 900	800 - 1060	820 - 1080	1010 - 1060	1080 - 1120	1550 - 1810	1200	980 - 1190
Federal Threatened & Endangered Species[6]	1	2	2	2	1	2	2	2	2	2	4	4
State Threatened & Endangered Species[6]	12	8	10	15	10	13	14	9	9	15	20	22
Sinkhole Areas & Sinking Stream Basins (acres)[7]	0	65	140	110	60	30	50	65	140	110	675	675
Indirect Impacts												
Farmland (acres)	420-490	525-595	580-650	735-820	595-665	720-800	710-790	510-575	530-595	715-800	615-705	690-790
Forest (acres)	70-140	125-185	190-205	215-285	245-300	310-380	325-400	145-200	150-205	220-290	350-440	340-455
Wetlands (acres)	0-25	5-30	5-25	5-35	10-20	10-25	10-30	5-30	5-30	5-30	20-45	15-45

1 Does not include committed projects such as SR 641 (Terre Haute Bypass) and improvements to I-70, includes impacts within the Working Alignment Right-of-Way unless otherwise noted.
2 This section of the table summarizes only those performance measures that relate to core project goals.
3 Structures only
4 Identifies direct impacts to sites listed on or determined eligible for the National Register of Historic Places (see Section 5.13, for further evaluation of potentially eligible sites).
5 Includes Underground Storage Tanks (USTs), Leaking Underground Storage Tanks (LUSTs), Resource Conservation and Recovery Act (RCRA) sites, and Brownfield sites
6 Represents the number of species reported within a 2-mile wide study band
7 Indicate karst features

SOURCE: Bernardin, Lochmueller & Associates, Inc.

Disadvantages:

- *Low improvements of interstate and international movement of freight (core goal).*
- Low improvements to regional economic performance.
- Low improvements to business accessibility.
- Low potential for reduction of crashes and congestion.
- Low improvement in access to Crane Naval Surface Warfare Center.

Alternative 2B

Advantages:

- Low impacts to High Quality Natural Communities.
- Low potential residential relocations (194-251).

Disadvantages:

- *Low improvements of interstate and international movement of freight (core goal).*
- Low improvements to accessibility of labor and consumer markets.
- Low potential for reduction of crashes.
- Low improvement in access to Crane Naval Surface Warfare Center.

Alternative 2C

Advantages:

- *Moderately high improvements of interstate and international movement of freight (core goal).*
- Moderately high performance for long-term economic growth.
- Moderately high potential for reduction of crashes and congestion.
- Moderately high improvement in business accessibility.
- High economic improvements for wide spectrum of Southwest Indiana residents.
- Low impacts to High Quality Natural Communities.

Disadvantages:

- High farmland impacts (4,300-5,070 acres).
- Moderately high construction cost ($1.47-$1.74 billion) and operation and maintenance costs.
- High potential for business relocations (56-113).
- Highest disruption of existing traffic during construction (on US 41 and SR 37).
- Highest potential floodplain impacts.
- Low improvement in access to Crane Naval Surface Warfare Center.

Alternative 3A

Advantages:

- *High travel time savings between Indianapolis and Evansville - 25 minutes (core goal)*
- *High improvements in personal accessibility (core goal).*
- *High improvements of interstate and international movement of freight (core goal).*
- High performance for long-term economic growth.
- Highest improvements to connections to intermodal facilities.
- High economic improvement for wide spectrum of Southwest Indiana residents.

- Low potential for business relocations (17-18).
- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 60 acres).
- Low potential floodplain impacts (860-900 acres).
- High improvement to access of Crane Naval Surface Warfare Center.

Disadvantages:

- High unavoidable impacts to High Quality Natural Communities (e.g. Beanblossom Bottoms).
- Proximity to hibernacula (caves) for the federally endangered Indiana Bat.
- High forest impacts (1,505-1,580 acres) including high impacts to core forest (502 acres).
- High wetland impacts (120-165 acres).
- Low improvements to accessibility of labor and consumer markets.
- High operation and maintenance costs.
- Low potential for reduction of crashes.

Alternative 3B

Advantages:

- *High improvements in personal accessibility (core goal).*
- *High improvements of interstate and international movement of freight (core goal).*
- *Highest travel time savings between Indianapolis and Evansville – 29 minutes. (core goal).*
- High performance for long-term economic growth.
- High economic improvements for wide spectrum of Southwest Indiana residents.
- High potential for reduction of crashes and congestion.
- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 30 acres).
- High improvement to access of Crane Naval Surface Warfare Center.

Disadvantages:

- High construction cost ($1.66-$1.82 billion) and operation and maintenance costs.
- High total new right-of-way impacts (5,850-6,440 acres).
- High potential for residential relocations (346-484).
- High forest impacts (1,315 - 1,450 acres) including high core forest impacts (440 acres).

Alternative 3C

Advantages:

- *High improvements in personal accessibility (core goal).*
- *High improvements of interstate and international movement of freight (core goal).*
- *High travel time savings between Indianapolis and Evansville – 26 minutes. (core goal).*
- High performance for long-term economic growth.
- High economic improvements for wide spectrum of Southwest Indiana residents.
- Highest improvements to accessibility of labor and consumer markets.
- High potential for reduction of crashes.
- High improvement to access of Crane Naval Surface Warfare Center.

Disadvantages:

- High potential for residential relocations (370-458).
- High construction costs ($1.64-$1.81 billion).
- High forest impacts (1,140 - 1,275 acres) including high core forest impacts (398 acres).
- High disruption of existing traffic during construction.
- Proximity to hibernaculum (cave) for the Federally endangered Indiana bat.

Alternative 4A

Advantages:

- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 65 acres).
- Low construction costs ($0.96-$1.04 billion).
- Lowest potential for business relocations (8-9).
- Lowest potential for residential relocations (143-168).

Disadvantages:

- *Low improvements to personal accessibility (core goal).*
- Low improvements to accessibility of labor and consumer markets.
- Low potential for reduction of crashes.
- Low improvement in access to Crane Naval Surface Warfare Center

Alternative 4B

Advantages:

- *High travel time savings between Indianapolis and Evansville – 27 minutes. (core goal)*
- High improvements to connections to intermodal facilities.
- Low construction costs ($1.04-$1.12 billion).
- Low potential for residential relocations (158-179).
- Low potential for business relocations (11-12).

Disadvantages:

- *Low improvements to personal accessibility (core goal).*
- Low improvements to accessibility of labor and consumer markets.
- High farmland impacts (4,970-5,020 acres).
- High wetland impacts (115-165 acres).
- High operation and maintenance costs.
- Low improvement in access to Crane Naval Surface Warfare Center

Alternative 4C

Advantages:

- *High travel time savings between Indianapolis and Evansville – 26 minutes. (core goal)*
- *High improvements of interstate and international movement of freight (core goal).*
- High performance for long-term economic growth.
- High potential for reduction of crashes and congestion
- High improvements to business accessibility

- High economic improvements for wide spectrum of Southwest Indiana residents.
- Low impacts to forest (805-935 acres) core forest (87-97 acres).

Disadvantages:

- Highest farmland impacts (5,170-5,730 acres).
- Highest wetland impacts (140-190 acres).
- Highest total new right-of-way impacts (6,160-6,760 acres).
- High floodplain impacts (1,550-1,810 acres).
- Highest number of stream crossings (130-145).
- Low improvement in access to Crane Naval Surface Warfare Center

Alternative 5A

Advantages:

- *High improvements in personal accessibility (core goal).*
- *High improvements of interstate and international movement of freight (core goal).*
- High performance for long-term economic growth.
- High potential for reduction of crashes.
- High improvements to business accessibility.
- High economic improvements for wide spectrum of Southwest Indiana residents.
- High improvement to connections to intermodal facilities.

Disadvantages:

- High unavoidable impacts to High Quality Natural Communities (e.g. Tincher Special Area, Blue Springs Cavern).
- Proximity to Blue Springs Cavern Natural Area, nominated for National Natural Landmark status.
- Unavoidable impacts to Section 4(f) resources (Martin State Forest).
- Highest potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 675 acres).
- Highest forest impacts (1,525-1,565 acres) including highest core forest impacts (682 acres).
- High construction cost ($1.61-$1.81 billion) and operation and maintenance costs.
- High potential for residential relocations (360-419).
- Potential increased construction cost due to mitigative measures for karst.

Alternative 5B

Advantages:

- *High improvements in personal accessibility (core goal).*
- *High improvements of interstate and international movement of freight (core goal).*
- High performance for long-term economic growth.
- High economic improvements for wide spectrum of Southwest Indiana residents.
- Highest improvements to business accessibility.
- High potential for reduction of crashes and congestion.

Disadvantages:

- High unavoidable impacts to High Quality Natural Communities (e.g. Tincher Special Area, Blue Springs Cavern).

- Proximity to Blue Springs Cavern Natural Area, nominated for National Natural Landmark status.
- Unavoidable impacts to Section 4(f) resources (Martin State Forest).
- Highest potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 675 acres).
- High forest impacts (1,265 - 1,365 acres) including high core forest impacts (544 acres).
- Highest construction costs ($1.67-$1.85 billion).
- High potential for residential relocations (377-503).
- High potential for business relocations (72-96).
- Potential increased construction cost due to mitigative measures for karst.

No–Build Alternative

Advantages:

- No adverse environmental impacts
- No construction costs or increase in operation and maintenance costs

Disadvantages:

- *No travel time savings between Indianapolis and Evansville (core goal)*
- *No improvement in personal accessibility (core goal)*
- *No improvement in interstate and international improvement in freight (core goal)*
- No reduction in traffic crashes or congestion
- No improvement in business accessibility
- No improvement in long-term economic growth
- No economic improvements to Southwest Indiana residents
- No improvement in connections to intermodal facilities

S.7 Areas of Controversy

Since before the inception of this study, controversy has focused on the choice of a corridor for I-69 in Southwest Indiana. Many have argued strongly in favor of a route that would make exclusive use of existing divided highways, in particular, US 41 and I-70, to minimize environmental impacts. Others have argued just as forcefully that the choice of a US 41 / I-70 alternative would not fulfill the basic purpose of the study; that this could only be accomplished by a new, more direct route connecting Evansville to Indianapolis.

The critical issues associated with I-69 in Southwest Indiana have to do with farmland impacts, the extent and location of economic development that would be stimulated by the highway, the disruption of sensitive ecosystems, karst, and environmental resources.

There are trade-offs among these areas of concern. These issues will be continually addressed in the NEPA process through agency coordination and public involvement. Alternatives that minimize the impact to farmland also tend to have low transportation and associated economic benefits. Alternatives that would require relatively large farmland acreage tend to have somewhat lower impact on sensitive ecosystems. Other alternatives with comparatively modest farmland impacts tend to effect greater disruption to the natural environment, especially forests.

S.8 Regulatory Actions Associated with This Project

Coordination with all appropriate federal and state agencies has been initiated. Inventories and coordination with consulting parties pursuant to Section 106 of the National Historic Preservation Act are under way for both historic and archaeological sites. Preliminary discussions regarding permitting under Section 404 of the Clean Water Act have been undertaken with the U.S. Army Corps of Engineers. Consultation under Section 7 of the Endangered Species Act has been initiated with the U.S. Fish and Wildlife Service. In addition, the Indiana Department of Environmental Management has been contacted for a 401 Water Quality Certification on wetlands and water quality.

The Indiana Department of Natural Resources (IDNR) has provided information on significant, ecological, and protected lands in the vicinity of the corridors, and state-listed threatened and endangered species. Coordination with IDNR (Division of Water) will be needed in crossing rivers and streams. An inventory on managed lands has been completed.

Coordination with the U.S. EPA has been initiated on the NEPA process. Environmental information requested by them has been included in the document.

S.9 Summary of Major Findings

In the following section, a summary of major study findings are provided followed by a discussion of the preferred and non-preferred alternative.

S.9.1 Findings

- Alternatives that serve higher population densities perform better than alternatives that are remote to population centers. Personal accessibility, market-driven economic benefits, safety, and congestion goals are all positively affected by alternatives that serve concentrations of population.
- Alternatives that make use of a portion of SR 37 provide superior performance in satisfying the purpose and need of the project than alternatives that do not use SR 37. These alternatives would provide an entirely new Interstate connection to Indianapolis with associated improvements in mobility to and from the south and southwest.
- Higher performing alternatives tend to be more expensive than lower performing alternatives.
- For most alternatives, 75 - 80% of land impacted is farmland.
- All the alternatives would involve impacting large quantities of farmland; however none of them would result in direct and indirect impacts in excess of 1.4% of the cumulative farmland loss that will occur in Southwest Indiana between 2002 and 2025. These direct and indirect impacts would be about 0.2% of the total 2002 farmland in Southwest Indiana.
- Under the worst case, over 1,500 acres of forest would be directly affected. However, the

largest combined direct and indirect effects of I-69 would impact about 0.1% of the total forests in Southwest Indiana.

- Under the worst case, about 190 acres of wetlands would be directly affected. However, the largest combined direct and indirect effects of I-69 would involve about 0.1% of the total wetlands in Southwestern Indiana and new wetlands would be created at an approved replacement ratio.
- Alternatives in the SR 37 corridor, along with Alternative 1, have higher levels of relocations. This is an indicator of their relative effect upon the existing human environment.
- Alternative 1 is markedly inferior to any other alternative in terms of its ability to satisfy the purpose and need of the project.
- Alternative 1 has significantly fewer impacts to the natural environment than any other alternative. It requires the taking of much less land, and the land that would be taken is generally in an existing transportation corridor.
- Other than Alternative 1, the general land use impacts of alternatives are similar in magnitude.
- Alternatives that use a significant portion of the US 41 corridor have a higher percentage of business relocations than other alternatives.
- Alternatives that make extensive use of US 41 and/or SR 37 would cause greater disruption of traffic during construction.
- The Tincher Special Area in the Hoosier National Forest is a resource of potentially global significance as a unique ecosystem. It would be bisected and impacted by Alternatives 5A and 5B.
- The Beanblossom Bottoms northwest of Bloomington is a high-quality nature preserve. It would be bisected by Alternative 3A.

S.9.2 Preferred Alternatives

At this stage, a single preferred alternative has not been identified. However, some important preliminary conclusions have been reached. Table S-7 groups the alternatives into two categories. The top row identifies “preferred alternatives”. The bottom row identifies those alternatives that are not preferred.

The non-preferred alternatives fall into two groups: (1) alternatives that are not preferred for environmental reasons; and (2) alternatives that are not preferred because of their poor performance in meeting the goals of the project as defined in Chapter 2, *Purpose and Need*.

Alternatives 3A, 5A, and 5B are not preferred for environmental reasons, even though they are among the better performers in terms of achieving the project’s goals. These three alternatives have such serious impacts on critical, high quality natural areas that they present virtually insurmountable obstacles to selection as a preferred alternative, particularly in light of the availability of other alternatives with similar or better performance that avoid these highly sensitive resources. Alternative 3A would traverse the Beanblossom Bottoms Nature Preserve, a very high

Table S – 7: Preferred versus Non-Preferred Alternatives	
Preferred Alternatives	2C, 3B, 3C, 4B, 4C
Non-Preferred Alternatives	1, 2A, 2B, 3A, 4A, 5A, 5B

quality natural area northwest of Bloomington. Alternatives 5A and 5B would bisect the Tincher Special Area of the Hoosier National Forest west of Bedford. Tincher is a unique ecosystem with a high likelihood of being designated a habitat of "global significance." Moreover, Alternatives 5A and 5B would pass over Blue Springs Cavern, a privately owned cave that is a unique karst resource. In the process of coordinating with federal and state resource agencies, Tincher Special Area and Beanblossom Bottoms were identified as particularly important among the ecosystems in the state. Accordingly, FHWA and INDOT have identified Alternatives 3A, 5A, and 5B as non-preferred alternatives.

While Alternative 1 would have relatively low impacts on the natural environment, it performs much more poorly than any other alternative in terms of satisfying the goals of the project. Alternative 1 is the only alternative with low performance on all project goals, including all three core goals. This poor performance can be explained in terms of the factors most frequently associated with high performing alternatives. These factors are: (1) service to Bloomington; (2) service to the SR 37 corridor; (3) short Evansville to Indianapolis mileage; (4) service to Western Morgan County; and (5) service to Crane Naval Warfare Center. By contrast, alternatives with low performance tend to be associated with few of these factors. One alternative (Alternative 1) has the poorest performance and is not associated with any of these factors.

Moreover, while Alternative 1 would have comparatively low impacts on the natural environment, it would result in the largest number of business building relocations.

Alternatives 2A, 2B, and 4A are also not preferred due to poor overall performance in terms of meeting the project's *Purpose and Need*. These three alternatives do not provide any "high" performance ratings for the nine project goals. 2A and 4A each have five "medium" ratings and four "low" ratings, while 2B has six "medium" ratings and three "low". These three alternatives each provide a "medium" level of performance for two of three core goals and "low" performance for the third.

Alternatives 2C, 3B, 3C, 4B and 4C are among the preferred alternatives. These alternatives are generally high performers that are not fatally flawed from an environmental perspective. Alternatives 2C, 3B, 3C and 4C have "high" performance ratings on at least 6 out of 9 project goals. Alternative 3B scores "high" on all nine project goals, while Alternative 3C scores "high" on eight of the nine.

Unlike 3A, it was possible to shift the working alignment of Alternative 3B to avoid Beanblossom Bottoms. This was not an issue for Alternative 3C, since it joins SR 37 on the south side of Bloomington. Adjustments were also made in the working alignment of Alternative 3 (A, B, and C) to avoid an important hibernaculum (cave) for the Indiana Bat. All of the preferred alternatives that make use of SR 37 (2C, 3B, 3C, and 4C) also benefited from a shift in the working alignment that avoids major housing developments near the northern terminus of the project.

Alternative 4B is also a reasonably strong performer. It is second only to 3B in travel time savings between Indianapolis and Evansville (one of the core goals). It also scores highly on improved access to intermodal facilities due to its proximity to the Indianapolis International Airport and it scores in the "medium" range on four other goals.

For all of these reasons, Alternatives 2C, 3B, 3C, 4B, and 4C are preferred alternatives, and Alternatives 1, 2A, 2B, 3A, 4A, 5A, and 5B are non-preferred alternatives.

S.10 Next Steps for Tier 1

Public hearings to discuss this document and its findings will be held on August 19 (in Terre Haute), August 20 (in Bloomington) and August 21 (in Evansville). Input from citizens will be sought at that time regarding the study and its findings. In the upcoming weeks, input from resource agencies also will be sought.

As comments are received, they will be considered to help determine: (1) whether to choose a build alternative; and if so (2) which corridor should be selected. Given the great variety in impacts, performance, and cost of the remaining alternatives, public and resource agency input will be very important in coming to a final decision.

If a "build" alternative is selected, Tier 2 NEPA studies will ensue. Procedures for Tier 2 are described in Section 1.5.

S.11 Glossary of Key Terms

A number of key terms used in this document are defined here.

Accessibility – The ability of people to reach desired destinations (such as employment, shopping, recreational facilities, medical facilities, cultural centers, airports, etc.). Accessible regions allow residents to reach many such destinations in a shorter period of time. Inaccessible regions allow residents to reach fewer destinations, and require longer periods of time.

Congestion – A condition in which the number of vehicles using a road approaches the capacity of that road. It is characterized by reduced travel speeds and (at high levels of congestion) stop-and-go conditions.

Cumulative Impact – Is defined by the Council on Environmental Quality (CEQ) Regulations 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."* (CEQ Regulations) Cumulative impacts

include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Economic Model – A computerized representation of the economy of a region. It models the interaction of components such as labor, capital, markets, and government policy. The model used in this study (the Regional Economic Model Inc. - REMI Model) analyzes the interaction of 53 industry categories with available markets, labor, and capital resources. It is used to forecast the economic effects of a significant change in policies which affect the economy - such as the construction of a new Interstate highway between Evansville and Indianapolis.

EIS – Environmental Impact Statement. A detailed document prepared as part of the NEPA process. A draft EIS (DEIS) is published to seek agency and public input. A final EIS (FEIS) adds (1) the comments and the responses to the DEIS and (2) selects a preferred alternative.

Forecast Year – A year, 20 - 25 years into the future, for which traffic forecasts are made. The design of any transportation facility must accommodate travel which would occur in the forecast year. For this study, the Forecast Year is 2025.

Geographic Information System (GIS) – A computer representation of data which is geographically distributed. These data can be generated and displayed to show their physical location. Each data set with a certain type of information (e.g., the location of wetlands) constitutes a "layer" in the GIS. GIS layers can be superimposed to show the relationship between the location of different items.

Historic Properties – Buildings, structures, sites, objects or districts which are an important part of the historical and cultural heritage of the United States.

Indirect Impacts – are defined by the CEQ Regulations as *"effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate..."* (CEQ Regulations) For this project, an example of an indirect impact would be farmland bought by a developer to build a service station at an interchange.

Level of Service (LOS) Ratings – A scale measures the level of congestion on a road. It goes from A (free flowing traffic) to F (the highest level of congestion).

National Highway System (NHS) – A national system of highways, consisting of all Interstate Highways and other principal arterial highways. Federal policy is to focus Federal highway investments on these roads. The NHS includes 5% of the national roadway network but serves approximately 40% percent of the Nation's highway travel.

NEPA (National Environmental Policy Act) – Legislation passed by the Congress in 1969 that requires preparation of an Environmental Impact Statement (EIS) for Federal actions that may significantly impact the environment.

"No Build" Scenario – The scenario in which a proposed project is not built. All benefits and impacts are forecasted with reference to the "no build" scenario (also called the "No Action" alternative). The "No Build" scenario must remain under consideration throughout the study process.

Performance Measure – A rating (typically numerical) which assesses the degree to which an alternative satisfies a project goal.

Physiographic Region – An area characterized by consistency in soil and geology.

Purpose and Need – The section of an environmental document that discusses the needs problems and defines the goals (purposes) of the proposed project.

Relocation – The purchase of private property (land and/or structures) for a public purpose, such as a transportation facility. The purchase price includes the costs of relocating residents or businesses - hence the name "relocation."

Scoping – The initial step of an environmental study. It includes the determination of a range of possible alternatives, and analysis of Purpose and Need for the project.

Screening – The second step of an environmental study. It applies Purpose and Need criteria to all alternatives to arrive at a set of alternatives for detailed study.

Travel Demand Model – A computerized representation of the population, employment, socioeconomic characteristics, and transportation network of a region. Travel on the transportation network is forecasted as a function of population, employment, and socioeconomic characteristics. If proposed projects (such as an alternative of I-69) can be added to the transportation network, the model can forecast the effects of that proposed project.

Volume-to-Capacity (V/C) Ratio – The ratio of volume of traffic on a roadway to the capacity of that roadway. As the volume approaches the capacity, the roadway becomes congested.

Wetland – A type of land use protected by various state and federal laws. Wetlands are characterized by plants adapted to a wet environment, soils which are characterized by anaerobic conditions, and which is inundated or saturated to the surface for at least 5% of the growing season in most years.

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Chapter 1 - Project History and Background

1.1 Previous Studies

The proposed action in this Tier 1 EIS involves the completion of an highway linking the City of Evansville with the City of Indianapolis, as part of an Interstate highway connecting Canada to Mexico. This current proposal has as its background several decades of studies and planning efforts. This historical background is provided to put this Draft Environmental Impact Statement of an Evansville to Indianapolis highway in perspective. This current study is the ***first*** time that a comprehensive NEPA study has been completed for an Evansville-to-Indianapolis highway.

These following points summarize key themes in these studies.

- **The proposal for a north-south highway link continues to be made.** As time has gone on, these proposals have focused more specifically on an Evansville-to-Indianapolis highway.
- **These previous efforts generally were planning studies.** This is the first time an Evansville-to-Indianapolis project has been studied under the provisions of the National Environmental Policy Act (NEPA). In 1996, a NEPA study advanced to the Draft Environmental Impact Statement (DEIS) stage; however, this was a study of an Evansville-to-Bloomington highway.
- **Previously, system continuity (to the south) was lacking.** Several previous proposals were not recommended in part because of a lack of system continuity to the south through Kentucky. The National I-69 project provides this missing system continuity.
- **Some previous proposals were studied as toll roads.** These proposals were not recommended because the road would not be financially feasible as a toll road. "Toll feasibility" requires that traffic levels not only pay ongoing operating and maintenance costs, but that they also provide revenues sufficient for construction debt service. Being "toll feasible" requires higher traffic volumes than those which justify construction of a non-toll facility.

Following is a summary of major transportation studies in Southwest Indiana.

1944: Initial Studies of Interstate Routes in Southwest Indiana (Evansville to Calumet; Evansville to Indianapolis). The Indiana State Highway Department proposed several Interstate routes in addition to those designated in 1947 as part of the original 40,000 mile National System of Interstate Highways. These included a route from Evansville to the Calumet Area paralleling US 41, and a route from Indianapolis to Evansville. See Figure 1-1. The lack of system continuity through Kentucky was a major factor in not obtaining approval for either of these routes.

1966: North-South Toll Road Feasibility Report (Evansville to Lafayette). This report studied a multi-lane toll road facility extending from Evansville to the then proposed I-65 near Lafayette, Indiana. See Figure 1-2. This project was found not to be financially feasible as a toll road.

1968: Proposed I-63 (Evansville to I-70 near Brazil, Indiana). The State of Indiana proposed an addition to the Interstate system from the present junction of I-64 and I-164 near Evansville to I-70

east of Brazil, Indiana. See Figure 1-3. The extension of I-24 to Paducah, Kentucky rather than Evansville eliminated the necessary system continuity for I-63. I-63 was not approved as an addition to the Interstate System.

1980: Western Indiana Toll Road Feasibility Study (Evansville or Rockport to I-70 west of Indianapolis). This study analyzed the construction of an multi-lane toll road from the junction of I-64/I-164 near Evansville or from Rockport, Indiana near the Ohio River, to I-70 west of Indianapolis, and extending to I-65 just south of Lafayette, Indiana. See Figure 1-4. It was concluded that this would generate enough revenue to offset maintenance and operating costs, but not provide adequate coverage of the debt service for a bond issue.

1982: Improved North-South Corridor Feasibility Report (Indianapolis to Evansville). This study examined the cost-effectiveness of a proposed North-South Corridor beginning at the junction of SR 37 and I-465 in Indianapolis and extending south on SR 37 to the US 50 Relocation Project termini at Bedford, and then west along US 50 to US 231. The route then proceeded southward on US 231 to I-64, then proceeded west on I-64 to the junction of SR 57 and proposed I-164, and ended at the southern terminus of I-164. See Figure 1.5. This proposal did not consider an Interstate-type facility for most of the route but primarily included improvements to existing roads. This route was not considered economically feasible.

1984: Improved North-South Corridor Feasibility Report – Update (Evansville to Indianapolis). This brief study considered the same route as the above 1982 study but proposed the upgrading of SR 37 to Interstate standards from Indianapolis to Bedford. Further conclusions regarding project feasibility were not made in this study.

1985: Feasibility Study, SR 37 Upgrade from I-64 to SR 60. This study proposed the upgrading of a 40-mile section of the SR 37 corridor from SR 60 at Mitchell, Indiana to I-64 in Perry County. See Figure 1-6. The recommended alignment called for the upgrading of SR 37 from Mitchell to Paoli. From Paoli, a new roadway would be constructed to the southwest and tie into SR 145 near Patoka Reservoir. SR 145 would then be improved south to the intersection of SR 64. A new roadway would then be constructed south of SR 64 to the SR 37/I-64 interchange in Perry County (milepost 79).

Figure 1-1: 1944-47, Initial Studies of Interstate Routes in Southwestern Indiana

Figure 1-2 : 1966, North-South Toll Road Proposal

Figure 1-3: 1968, Proposed I-63.

Figure 1-4: 1980, Western Indiana Toll Road Feasibility Study.

1986: Special Study US 231 from I-64 to Owensboro, Kentucky. This study examined the cost of improving US 231 from I-64 to SR 66 and across the Ohio River to Owensboro, Kentucky. See Figure 1-7. This project is currently part of the Statewide Long-Range Multimodal Transportation Plan.

1989-1990: Southwest Indiana Highway Feasibility Study (Indianapolis to Evansville, Rockport, or Tell City). This study, commonly known as the Donohue Study, assessed the economic feasibility of three major north-south corridors in southwest Indiana. The three alternatives had a common alignment utilizing SR 37 from Bloomington to Indianapolis. South of Bloomington, Alignment A generally followed a route along SR 45 to SR 57 and ended at I-64/I-164 near Evansville. Alignment B followed a route along SR 45 to US 231 to SR 66 at the Ohio River near Rockport. Alignment C continued south along SR 37 to Paoli and then transitioned southwest to SR 145 near Patoka Reservoir. The alignment then continued south along SR 37

Figure 1-5 : 1982, Improved North-South Corridor Feasibility Report.

south of I-64 to the Tell City area. See Figure 1-8. Based upon "optimistic" assumptions for business attraction, Alternative A was economically feasible.

1990: Initiation of Environmental Studies for the Evansville Highway. The Indiana Department of Transportation began the first phase of environmental studies for the "Indianapolis-to-Evansville Highway." The study corridor was based on Alternative A from the 1989 - 1990 Southwest Indiana Highway Feasibility Study. The upgrading of SR 37 to Interstate standards between Bloomington and Indianapolis was not considered as part of the project. The corridor was separated into three sections. See Figure 1-9. These were:

- Section 1 – Bloomington (SR 37) to Newberry.
- Section 2 – Newberry to Petersburg.
- Section 3 – Petersburg to Evansville (at the I-64/I-164 interchange)

Section 1 was to be developed as a full EIS pursuant to the National Environmental Policy Act (NEPA). Sections 2 and 3 were to be developed as preliminary "environmental overviews" with formal environmental studies to be completed at a later date.

1992: Initiation of Draft EIS for Southwest Indiana Highway Project (Evansville to Bloomington). In 1992, prior to the completion of the DEIS for Section 1, the three corridor sections specified above were consolidated into a single federal action with the mandate to develop one EIS for the corridor between Evansville and Bloomington. See Figure 1-10.

1996: Publication of Draft EIS for Southwest Indiana Highway Project (Evansville to Bloomington). The Draft EIS for the Southwest Indiana Highway Project was published in the spring of 1996, with public hearings conducted over the summer. The hearings were well attended. Some commenters expressed concern about the economic feasibility of the highway and the environmental and economic impacts resulting from the preferred alignment. There was also contention that the northern terminus should be Indianapolis rather than Bloomington. Also raised was the concern that the

Figure 1-6: 1985, SR 37 Feasibility Upgrade Study.

Figure 1-7: 1986, Special Study of US 231.

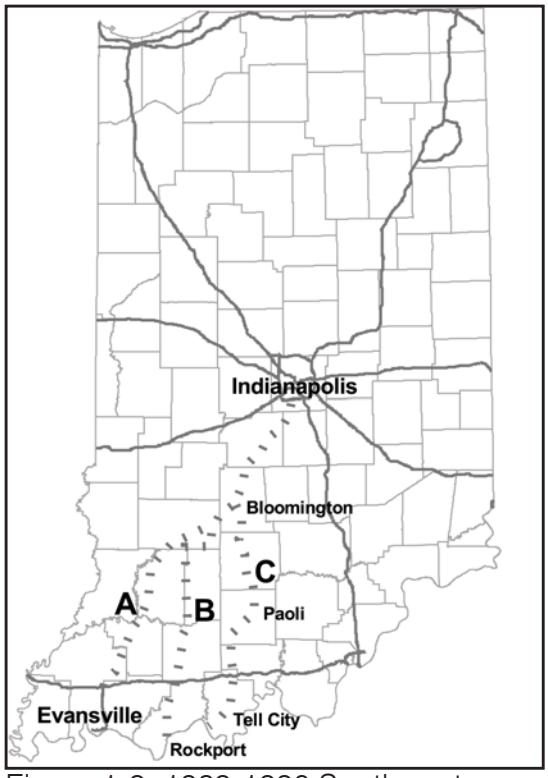


Figure 1-8: 1989-1990 Southwest Indiana Highway Feasibility Study..

Figure 1-9: 1990, Initiation of Studies for Indianapolis-to-Evansville Highway.

alternative of utilizing the I-70/US 41 route was not adequately considered. Others stressed the need for a connecting link between the communities of Southwest Indiana and the capital city of Indianapolis. Many people stated that the economic vitality of Evansville, Petersburg, Oakland City, and Washington was seriously hindered without an Interstate link to Indianapolis. Overall, these commenters were concerned about the future of Southwest Indiana and the continued loss of economic opportunities due to the lack of an Interstate facility.

The U.S. Environmental Protection Agency (US EPA) provided comments on the DEIS. The US EPA recommended further analysis of non-transportation alternatives to the proposed highway and potential secondary impacts resulting from the highway. These recommendations were made based on the stated purpose and need for the project in the DEIS being based primarily on economic development.

Figure 1-10: 1992, Initiation of Draft EIS for Southwest Indiana Highway Project.

1997: Supplemental EIS for Southwest Indiana Highway Project (Evansville to Bloomington). On October 3, 1997, FWHA issued a Notice of Intent to prepare a supplemental EIS for the Southwestern Indiana Highway Project. The supplemental EIS was intended to address concerns raised by US EPA in its comments on the DEIS. As explained below, the supplemental EIS was never issued because a new larger study was initiated.

1998: Expansion of Scope of EIS for Southwest Indiana Highway Project. In November 1998, INDOT Commissioner Curt Wiley announced that the scope of the Southwest Indiana Highway EIS would be expanded to include consideration of the need for an Evansville-to-Indianapolis link in the context of the planned extension of I-69 ("Corridor 18"). Given this major change in the scope of the study, it was announced that entirely new corridor alternatives would be evaluated in addition to the routes that had been previously considered.

1.2 Federal Actions

During the 1990s, important transportation policy decisions were made at the federal level. Those policy decisions changed the context for the Southwest Indiana Highway Project, which was being studied at that time. The following points summarize key themes in these policy decisions:

- **A National Highway System has been established.** Most of the elements of the National Highway System (NHS) are existing roads. Certain high-priority future projects also are included. Within Indiana, the NHS includes numerous routes in Southwest Indiana.
- **The Evansville-to-Indianapolis highway is now part of a national, border-to-border highway.** I-69 has been designated, in a series of Congressional actions, as a national priority. It is to be an Interstate highway through eight states, connecting the Michigan/Ontario border with the Texas/Mexico border. An Interstate highway connecting Evansville and Indianapolis has been specifically identified as part of the National I-69 project.

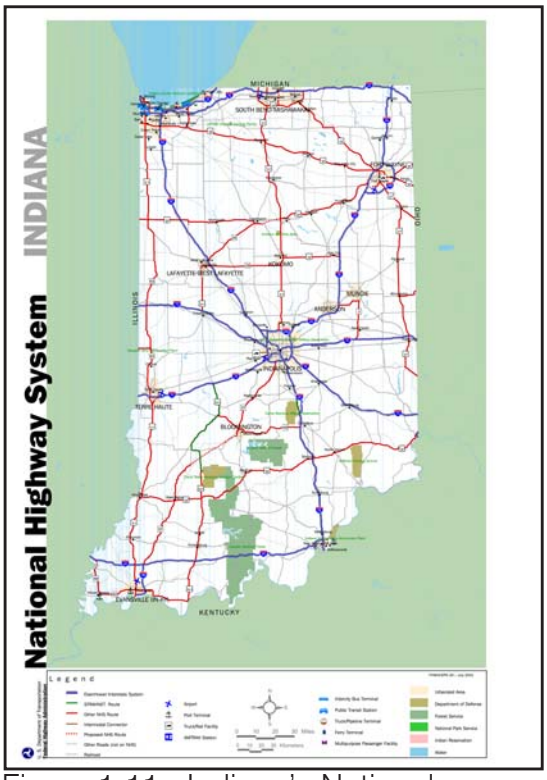


Figure 1-11: Indiana's National Highway Map.

Following is a summary of major federal actions which relate to this project.

1991: Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Congress passed the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). This act established the National Highway System (NHS), a 158,674 mile system. Within the NHS, Congress designated a number of high-priority corridors. One of the high-priority corridors designated in ISTEA was "Corridor 18," which extended "from Indianapolis, Indiana to Memphis,

Tennessee via Evansville, Indiana." Subsequent legislative changes (described below) have greatly expanded this corridor.

1995: National Highway System Designation Act (1995). In 1995, Congress passed the National Highway System Designation Act (NHSDA). The NHSDA approved maps showing the NHS routes in each state, and also extended Corridor 18 to the south. Figure 1-11 shows Indiana's NHS map.

1998: Transportation Equity Act for the 21st Century (TEA-21). In 1998, Congress enacted the Transportation Equity Act of the 21st Century (TEA-21). TEA-21 modified Corridor 18 in several ways: (1) it extended the corridor northward to the Canadian border at Port Huron, Michigan; (2) it included spurs connecting the corridor to Detroit and Chicago; and (3) it adopted a specific route for Corridor 18 in Tennessee, Mississippi, Arkansas, and Louisiana. In addition, TEA-21 also designated Corridor 18 as "Interstate Route I-69."

1999: Determination of Sections of Independent Utility (SIU) for National I-69 Project. On September 27, 1999, FHWA determined that NEPA studies should proceed for 32 "sections of utility" within the National I-69 corridor. The Evansville-to-Indianapolis section was designated as Section of Independent Utility (SIU) Number 3.

1.3 Indiana Statewide Plans

Plans and policy decisions made by the Indiana legislature and the Indiana Department of Transportation (INDOT) also provide context for the decision to expand the scope of the Southwest Indiana Highway Project Study to include the entire Evansville-to-Indianapolis project. The following points summarize key themes in these policy decisions.

- *Indiana has longstanding state policies which state that highways are to support economic development.* These policies have been set by the Indiana legislature, and have been used to guide the formulation of statewide transportation plans.
- *Supporting economic growth has been an important factor in the designation of the National Highway System (NHS) routes in Indiana.*
- *An improved Evansville-to-Bloomington connection is part of various statewide plans, dating back to the early 1990s.*

Following is a summary of major state plans which relate to this project.

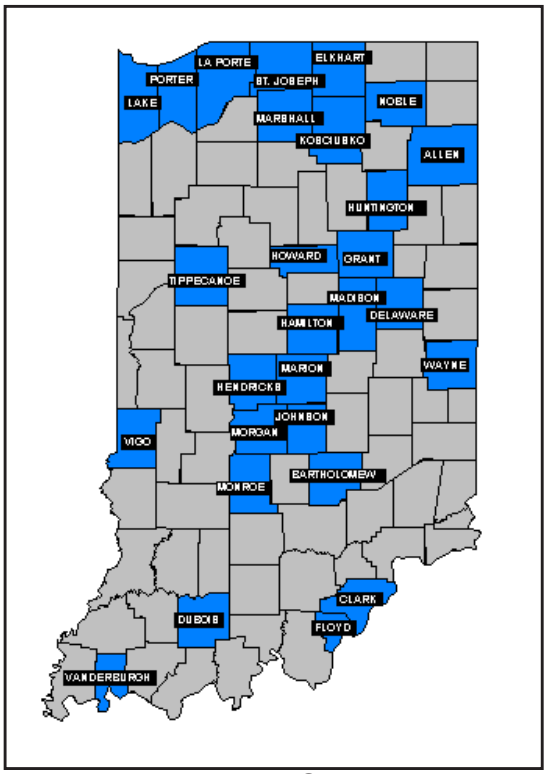


Figure 1-12: Indiana Counties Designated as Economic Centers for Transportation Planning Purposes

1991 - 1992: Designation of Commerce Corridors. A state law passed in 1991 directed INDOT to designate a network of "commerce corridors." The legislation defined a "commerce corridor" as "that part of a recognized system of

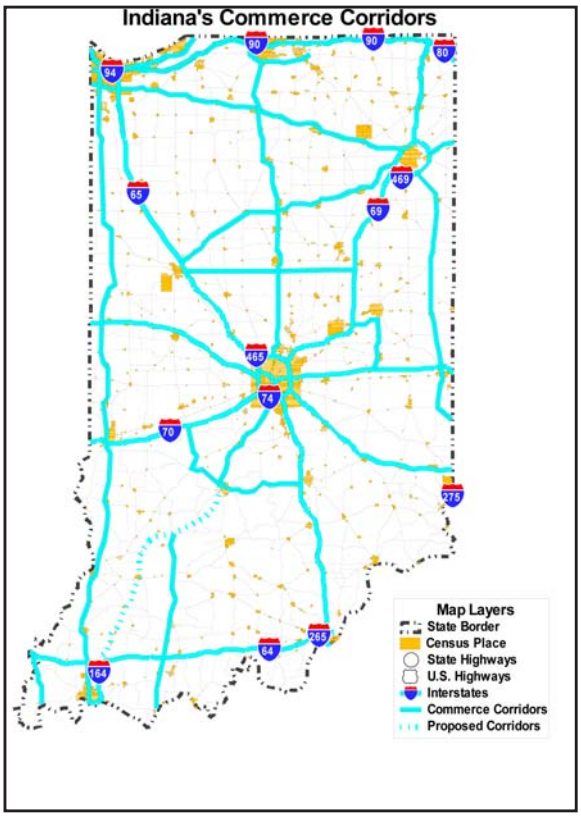


Figure 1-13: Indiana's Commerce Corridors.

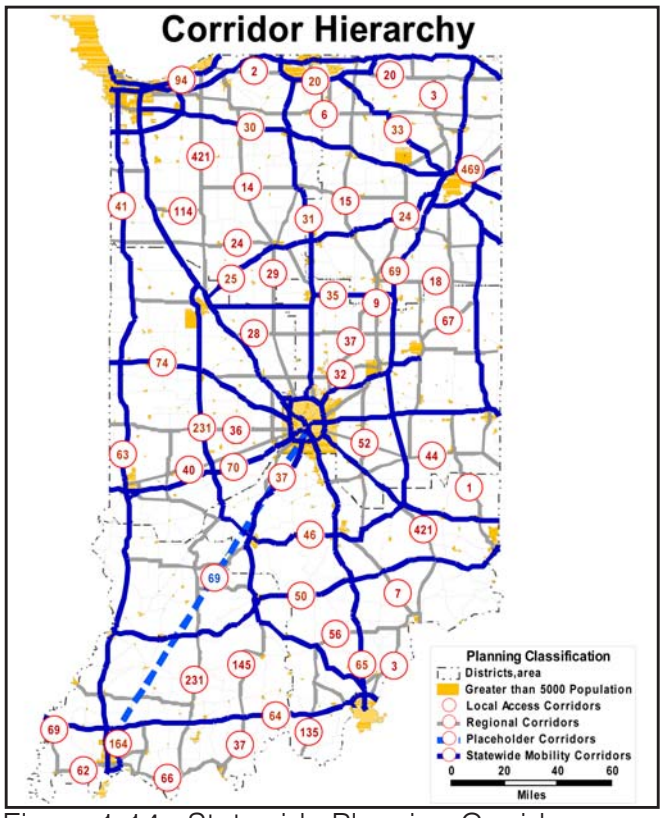


Figure 1-14: Statewide Planning Corridors.

highways (1) that directly facilitates intrastate, Interstate, or international commerce and travel; (2) enhances economic vitality and international competitiveness; or (3) provides service to all parts of the United States." (IC-8-23-1-14.5). These corridors are designed to link the counties determined to be "economic centers" for transportation planning purposes, as shown in Figure 1-12. The commerce corridors are shown in Figure 1-13. An improved Evansville-to-Bloomington link is shown as an as-yet unbuilt commerce corridor.

1995: Indiana Statewide Long-Range Multimodal Transportation Plan. In 1995, INDOT formally adopted the Indiana Statewide Long-Range Multimodal Transportation Plan, which incorporated the analysis of economic activity centers and commerce corridors, and the NHS routes for Indiana.

2001: INDOT 2000-2025 Long Range Plan, 2001 Update. This plan was published as an update to the 1995 Long Range Multimodal Plan. It established a hierarchy of Planning Corridors, with the most important being designated as Statewide Mobility Corridors. These corridors are designed to directly connect metropolitan areas of 25,000 population or greater. See Figure 1-14 for a map of INDOT's Planning Corridors.

Section 1.4 Current Environmental Impact Statement (Tier 1)

The existing study was initiated against the background of the federal and state policy decisions, as noted in Sections 1.2 and 1.3. While it is being conducted against the background of previous studies

described in Section 1.1, it is in every respect a new undertaking. The following points give the major milestones at the inception and early stages of this present study.

1999: Resource Agency Meeting on Tiered Approach. On May 18, 1999, a meeting was held with resource agencies to discuss the transition from the Southwest Indiana Highway Project Study to the new expanded EIS for I-69 from Evansville to Indianapolis. At the meeting, FHWA and INDOT introduced the concept of a tiered approach to the new study, and requested resource agency comments. Over the next several months, FHWA and INDOT refined the tiered approach, taking the account comments received from resource agencies and the public.

2001: Initiation of Tier 1 EIS for I-69, Evansville to Indianapolis. On January 5, 2000, FHWA published a Notice of Intent (NOI) in the Federal Register to announce that an Environmental Impact Statement will be prepared for "the proposed extension of I-69 from Indianapolis to Evansville in Southwest Indiana (Corridor 18)." The NOI specified the termini as I-64 north of Evansville and I-465 in Indianapolis. These termini (Indianapolis and Evansville) are consistent with Section of Independent Utility (SIU) Number 3 for the National I-69 project.

The NOI specified that this study would result in a Tier 1 EIS. The NOI stated, "The Tier 1 document will involve extensive environmental studies, as well as transportation studies, economic impact studies, and cost analysis. This document will provide the basis for FHWA to grant approval for a specific corridor."

The NOI also announced that the March 25, 1996 DEIS for an Evansville-to-Bloomington Highway was officially withdrawn.

2001: Initiation of Studies for I-69, Evansville to Henderson, Kentucky on May 10, 2001. FHWA published a Notice of Intent (NOI) to announce a joint Environmental Impact Statement with INDOT and the Kentucky Transportation Cabinet (KYTC) for I-69 from Evansville to Henderson, Kentucky. The Evansville to Henderson project corresponds to SIU Number 4 for the National I-69 project. Its northern terminus is specified as I-64 north of Evansville.

1.5 Tier 2 NEPA Studies

As explained above, the Tier 1 study is intended to provide the information needed to select a corridor for I-69 between Evansville and Indianapolis. After the Tier 1 study is completed, Tier 2 NEPA studies will be conducted to determine a specific alignment within the selected corridor. Of course, Tier 2 studies will not be conducted if Tier 1 results in a No Build decision.

Termini for Tier 2 Sections. The corridor selected in Tier 1 will be divided into sections for purposes of completing the Tier 2 studies, rather than conducting a single Tier 2 study for the entire corridor. Dividing the corridor into sections will provide greater flexibility in Tier 2, and is consistent with FHWA tiering guidance. The project considered in a Tier 2 Study is referred to as a “Tier 2 Section.”

Type of NEPA Document. The type of NEPA document prepared for the Tier 2 Sections will be determined on a section-by-section basis, in consultation with resource agencies.

Range of Alternatives. The range of alternatives presented in a Tier 2 NEPA document will differ from the range of alternatives in a typical NEPA document. It is expected that the range of alternatives presented in a Tier 2 document will consist of a single “mainline” alignment together

with routing variations or design options in specific areas within the selected corridor. However, the range of alternatives appropriate for each Tier 2 document will be determined on a section-by-section basis, in consultation with resource agencies.

Scope of Environmental Analysis. Each Tier 2 NEPA document will "look beyond" the termini of the Tier 2 Section for which that document is being prepared, in order to determine whether there are any sensitive environmental resources just beyond the termini that would affect the location of the adjoining section. This approach is intended to provide additional assurance that decisions made in one section do not prematurely preclude consideration of alternatives for adjoining sections.

Alternatives Outside Selected Corridor. In general, the range of alternatives considered in a Tier 2 study will be confined to the corridor selected in Tier 1. However, the flexibility will exist to consider alternatives outside the selected corridor if necessary to avoid unanticipated impacts within the selected corridor. The issue of whether to consider alternatives outside the selected corridor will be determined in consultation with resource agencies in Tier 2.

Permits. Appropriate permit applications will be filed for each Tier 2 Section. It is anticipated that permit applications will be submitted during or shortly after the completion of each Tier 2 study. Consultation with the relevant permitting agencies has commenced during Tier 1.

Chapter 2 - Purpose and Need

2.1 Statement of Purpose and Need

The purpose of the I-69, Evansville to Indianapolis Project is to provide an improved transportation link between Evansville and Indianapolis which;

- Strengthens the transportation network in Southwest Indiana;
- Supports economic development in Southwest Indiana; and
- Completes the portion of the National I-69 project between Evansville and Indianapolis.

The Needs Assessment in Section 2.3 is organized according to these three overall purposes. Each project goal supports one of these overall purposes. The project goals are based on both the Needs Assessment, as well as the Policy Framework given in Section 2.2.

2.2 Policy Framework

The proposal to complete I-69 from Evansville to Indianapolis grows out of series of policy decisions that have been made in recent years at the federal and state level. These policy decisions do not require that I-69 be completed between Evansville and Indianapolis, nor do they dictate a specific route for this section of I-69. But they do provide some broad, over-arching goals that must be taken into account in defining the purpose-and-need for this project. This section briefly summarizes these important federal and state policy decisions.

2.2.1 Federal Legislation and Policies

In the 1990s, Congress enacted two major laws defining national transportation policies. The first was the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The second was the Transportation Equity Act for the 21st Century (TEA-21), which was enacted in 1998. Two key policies established by these laws are: (1) the policy of focusing federal transportation funding on routes designated as part of the National Highway System; and (2) the policy of completing I-69 as an Interstate from Canada to Mexico.

2.2.1.1 National Highway System (NHS)

In ISTEA, Congress called for the designation of a new category of highways – the National Highway System ("NHS") – which would include not only the Interstate System, but also other major principal arterial highways across the country. As a frame of reference, the Interstate System contains approximately 40,000 miles of roadway; by contrast, the NHS contains approximately 160,000 miles (including all of the Interstates). Although the NHS includes less than 5 percent of the United States' 3.9 million miles of public roads, it carries over 40 percent of the nation's highway traffic. (Rodney Slater, FHWA Administrator, *The National Highway System: The Backbone of the National Transportation System*, Dec. 9, 1993).

The NHS is intended to "focus a portion of the limited Federal assistance on strategic investments, with a goal of overall system efficiency and performance."[1] As the USDOT explained in a 1993 report to Congress:

> "...the rationale for designation of an NHS is to focus Federal attention on a subset of the Nation's 3.9 million miles (6.3 million kilometers) of public roads. The NHS will include roads that serve and will continue to serve a large percentage of the Nation's highway travel and associated strategic priorities. It will also emphasize connections from the NHS to major military installations, border crossings, airports, ports, and rail-highway transfer facilities..." (DOT Report, p. 1)

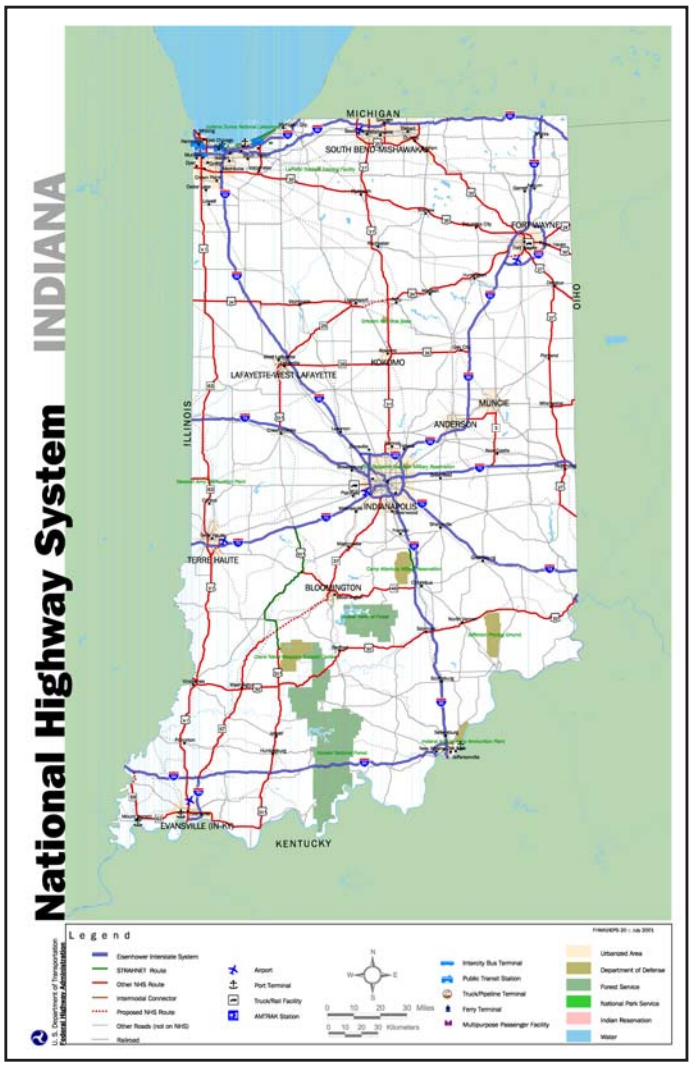


Figure 2-1: Indiana's National Highway System Routes

The routes currently included on the NHS in Indiana are shown in Figure 2-1. Within Southwest Indiana, the NHS routes include:

- **Interstate 64** between Crawford/Harrison County line and Illinois State line
- **Interstate 65** between Bartholomew/ Johnson County line and Indianapolis
- **Interstate 70** between Indianapolis and the Illinois State line
- **Interstate 164** between Evansville and I-64
- **US 41** between Vigo/Vermillion County line and Ohio River
- **US 50** between Lawrence/Jackson County line and Illinois State line
- **US 231** between I-70 and Ohio River
- **SR 37** between Indianapolis and Bloomington
- **SR 46** between US 231 and Brown/Bartholomew County line
- **SR 57** between I-64 and Newberry as a placeholder for an Evansville to Bloomington highway
- **SR 62** between Evansville and Mt. Vernon
- **SR 66** between Evansville and US 231
- **SR 69** between I-64 and SR 62

1 U.S. Department of Transportation, Report to Congress on the Proposed National Highway System Required by Section 1006(a) of the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240 at 7 (Dec. 1993) (hereinafter "DOT Report"), p. 7.

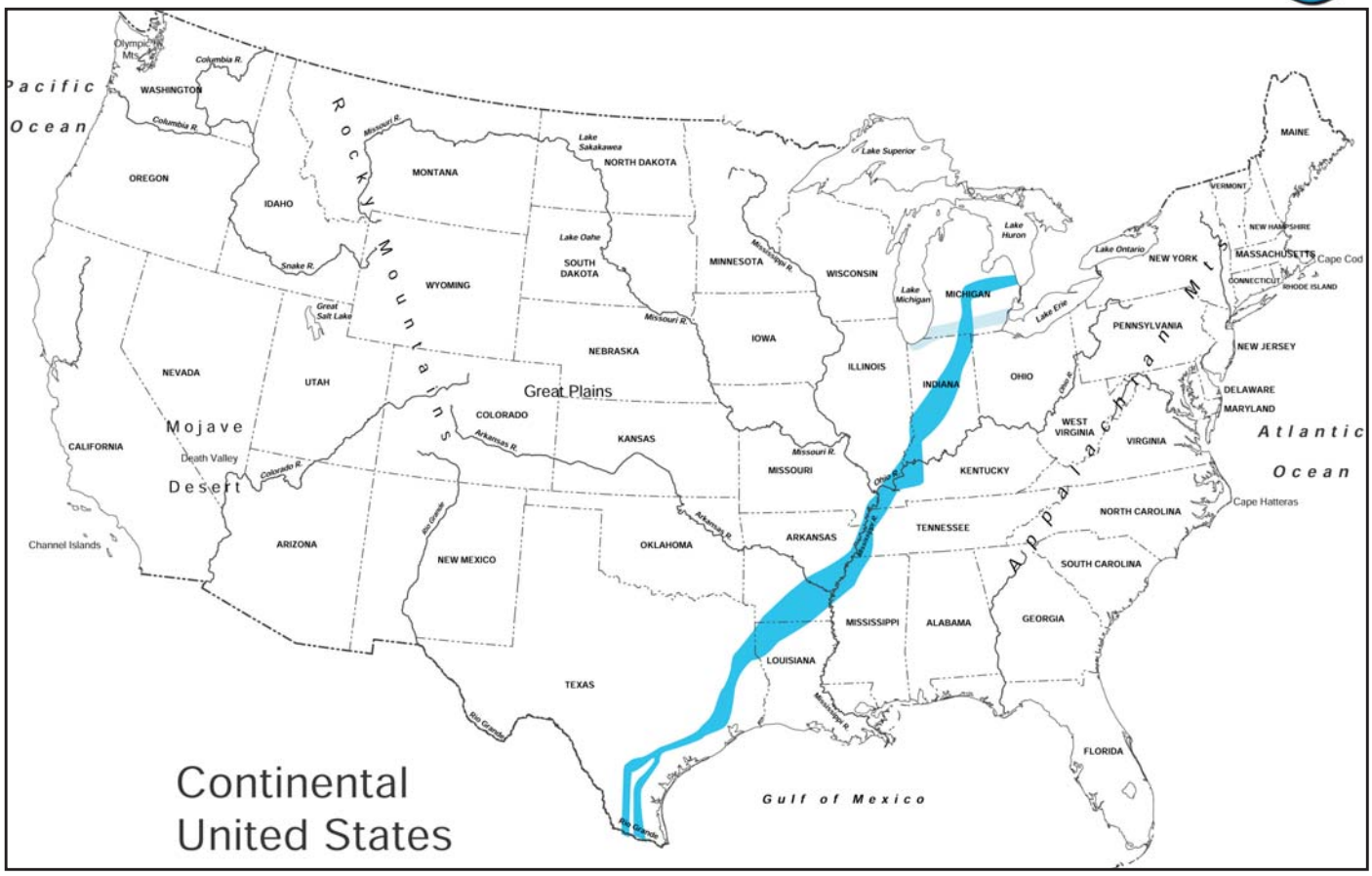


Figure 2-2: National I-69 Corridor

The National Highway System Designation Act of 1995 (Public Law 104-59 - NHS Act) gave FHWA the authority to approve modifications to the NHS map, as long as FHWA determines that the modifications are consistent with the purposes of the NHS. FHWA has issued regulations listing the factors that it considers in deciding whether to approve requests for changes to the NHS[2].

2.2.1.2 Interstate 69 (Corridor 18)

In addition to the routes recommended by States, Congress has specifically designated 43 "high-priority corridors" as part of the NHS (Figure 2-2). One of the high-priority corridors designated in ISTEA was a route from Indianapolis to Memphis via Evansville – the route that soon became known as Corridor 18 and is now called I-69. In ISTEA and several subsequent laws, Congress addressed both the location and the Interstate status of Corridor 18.

Route Definition

In ISTEA, Congress defined Corridor 18 as simply a corridor "from Indianapolis, Indiana to Memphis, Tennessee via Evansville, Indiana." (ISTEA § 1105(c))(18)). In 1993, Congress extended the corridor south to Houston, and in 1995, it extended the corridor all the way to the border with

2. U.S. Department of Transportation, Report to Congress on the Proposed National Highway System Required by Section 1006(a) of the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240 at 7 (Dec. 1993) (hereinafter "DOT Report"), p. 7.

Mexico in the Lower Rio Grande Valley. Finally, in 1998, as part of TEA-21, Congress extended the corridor north to the border with Canada at Port Huron, Michigan; added a spur connecting the corridor eastward to Detroit and westward to Chicago via I-94; and adopted the route shown in the 1995 Corridor 18 Special Issues Study as the legislatively mandated route in four states – Tennessee, Mississippi, Arkansas, and Louisiana. (TEA-21 § 1211(b)).

Despite the repeated amendments to the legal definition of Corridor 18, the definition of the route within Indiana has remained constant: Congress specified Evansville and Indianapolis as part of the corridor in the original legislation, and those two cities remain part of the corridor today. Significantly, Congress has never included any language requiring a specific route for the corridor between Evansville and Indianapolis. In particular, while Congress has allocated funds at various times for an Evansville-to-Bloomington project, Congress has never amended the definition of Corridor 18 to require that Bloomington be included on the route.

Therefore, while a route via Bloomington is possible for the Evansville-to-Indianapolis section of I-69, the existing federal laws do not specifically mandate selection of a route for I-69 that directly connects to Bloomington.

Interstate Designation

In ISTEA, Congress designated Corridor 18 as a "high-priority corridor" on the NHS. Because the NHS is, by definition, a highway system, the designation of Corridor 18 as part of the NHS reflected a clear intention that Corridor 18 be developed as a highway. However, the original ISTEA legislation did not specify any design standards or requirements for Corridor 18; not only did it not designate Corridor 18 as an Interstate, it did not even specifically require the corridor to be completed as a four-lane highway.

In TEA-21, following the completion of a series of feasibility studies for Corridor 18, Congress specifically designated Corridor 18 as an Interstate highway: the law stated that Corridor 18 (and Corridor 20) "shall be designated as Interstate 69 (I-69)."[3] The legislation means that future planning for Corridor 18 should proceed on the assumption that it will be developed as a continuous Interstate highway (I-69) linking Canada to Mexico.

Following TEA-21, FHWA issued further guidance concerning the Interstate status of Corridor 18. In a Federal Register notice published on December 8, 2000, FHWA announced that it "has initiated the project planning, development, and decision making process for numerous transportation projects related to a transcontinental highway corridor, designated as I-69."(FHWA, "Announcement of I-69 Status," Federal Register, Vol 65, No. 237 (Dec. 8, 2000).

Goals of National I-69 Project

In February 2000, a Statement of Purpose and Need was issued for the national I-69 project by the Corridor 18 Steering Committee, a group composed of representatives from eight state departments of transportation (including INDOT) and the FHWA. The February 2000 purpose-and-need document defined the following "overall goals" for I-69:

3. TEA-21, § 1211 (I) (3) (B) ("The routes referred to in subsections (c)(18) and (c)(2) [of ISTEA] shall be designated as Interstate Route I-69.").

Goal 1: To improve international and interstate movement of freight by ensuring a safe transportation system that is accessible, integrated, and efficient while offering flexibility of transportation choices in mid-America.

Goal 2: To enhance the regional and local transportation systems by providing transportation capacity to meet current and future needs.

Goal 3: To facilitate economic development and enhance economic growth opportunities domestically and internationally through efficient and flexible transportation with particular emphasis being given to economic growth in the Lower Mississippi Delta Region.

Goal 4: To facilitate connections to intermodal facilities and major ports along the corridor.

Goal 5: To facilitate the safe and efficient movement of persons and goods by fostering a reduction in incident [crash] risk.

Goal 6: To upgrade existing facilities to be utilized as I-69 within the corridor to design standards suitable for an Interstate highway and commensurate with projected demand.

Goal 7: To directly connect the urban areas named by Congress (the "named cities" of Indianapolis, Evansville, Memphis, Shreveport/Bossier City, and Houston and the Lower Rio GrandeValley with an Interstate highway connection. (*I-69 (Corridor 18) Special Environmental Study: Statement of Purpose and Need for Interstate Highway 69* (Feb. 7, 2000), at 2.)

In its December 8, 2000 announcement, FHWA provided a more concise summary of the goals of the national I-69 project. The FHWA described the goals of I-69 as follows:

> "The I-69 Corridor has been identified to address the transportation needs associated with the increase in goods movement between the three partners (U.S.A., Mexico, and Canada) to the North American Free Trade Agreement of 1992. It is also a key component of the Clinton Administration's Delta Initiative, which is aimed at the revitalization and economic development of the Lower Mississippi Delta region. The overall purpose of I-69 corridor is to improve international and interstate trade in accordance with national and state goals; and to facilitate economic development in accordance with state, regional, and local policies, plans, and surface transportation consistent with national, state, regional, local needs and with congressional designation of the corridor." (FHWA, "Announcement of I-69 Status," Federal Register, Vol 65, No. 237 Dec. 8, 2000).

In addition to defining these overall goals for the national I-69 project, the FHWA stated in the December 8 announcement that the national project would be divided into 32 segments of independent utility (SIUs) – 26 segments along I-69 itself, and an additional 6 segments on connecting routes. The FHWA stated that the environmental document for each segment should consider not only the national and international goals of I-69 as a whole, but also the state and local needs to be addressed by that particular segment. The Indianapolis-to-Evansville segment is designated as SIU number 3.

2.2.2 Indiana Statewide Transportation Policies

In 2001, the Indiana Department of Transportation (INDOT) issued the *INDOT 2000 - 2025 Long Range Plan* (2001 Plan). The 2001 Plan reaffirmed broad policy goals identified in the previous multimodal transportation plan in 1995 (1995 Plan). The plan addresses each major element of the State's transportation network; airports, highways, ports, railroads, public transit, and bicycle and pedestrian facilities. The statewide plan is developed by INDOT through consultation with local elected officials, local transportation officials, and the public. The 2001 Plan supplements, but does not replace, the 1995 Plan *(Transportation in Indiana: Multimodal Plan Development for the 1990's and Beyond.*).

2.2.2.1 Overall Transportation Policies

The 2001 Plan reaffirmed nine overall policies to guide all INDOT decisions.

- ***Transportation System Effectiveness***: "INDOT will strive to develop an efficient and well-integrated multimodal transportation system ..."
- ***Transportation Safety: "***INDOT will work to ensure that safety is considered and implemented, as appropriate, in all phases of transportation planning, design, construction, maintenance, and operations. . . ."
- ***Demographic Changes and Quality of Life:*** "INDOT is committed to develop a transportation system that responds to demographic change and contributes to the quality of life. INDOT will provide safe and efficient intermodal access to the diverse business, recreational, and cultural opportunities of Indiana."
- ***Transportation Finance:*** "INDOT supports adequate and reliable funding for Indiana's transportation system from all sources: federal, state, and local governments; and the private sector."
- ***Intergovernmental Coordination:*** "INDOT will actively solicit greater coordination and cooperation with other agencies, units of government, and other stakeholders with the goal of developing a state transportation plan that will guide the selection of investments that offer the best value while providing support for Indiana's continued economic growth."
- ***Economic Development:*** "INDOT has a unique role in sustaining and fostering Indiana's economy and recognizes that policy decisions and transportation infrastructure investments have major effects on economic growth and development. To support economic competitiveness, INDOT will improve upon Indiana's high quality transportation system to reduce the cost of moving goods, and freight, connect Indiana with regional, national, and international markets, provide communities with an edge in competing for jobs and business locations, and connect people with economic opportunities."
- ***Natural Environment and Energy:*** "INDOT will establish and maintain a transportation system that is consistent with the state's commitment to protect the environment. INDOT will contribute to energy conservation efforts by promoting efficiency in all modes of travel and by encouraging the most efficient use of transportation systems."
- ***Bicycle and Pedestrian Facilities:*** "INDOT will support non-motorized modes of travel as a means to increase system efficiency of the existing transportation network, reduce

congestion, improve air quality, conserve fuel, and promote tourism benefits. INDOT will work to remove unnecessary barriers to pedestrian and bicycle travel."

- ***New Technology:*** "INDOT will provide leadership for the State of Indiana to develop and deploy advanced transportation technologies. INDOT will embrace a broad-based, comprehensive research program to support all elements of intermodal transportation."

2.2.2.2 Highway System and Economic Growth Policies

One prominent feature of the 2001 Plan is the added emphasis given to the role of transportation investment in economic development. The importance of existing and potential highway links were evaluated with regard to their importance to the state's economy. The plan states:

"The state highway system definition process attempts to identify the importance of the various elements of the system in terms of the movement of people and goods. The various segments of the highway system are evaluated in terms of statewide significance relative to levels of passenger and freight operations. *A major focus is the enhancement of connectivity between major activity centers to support the state's economy.*" (2001 Plan, p. 81)

In furtherance of this goal the 2001 Plan (p. 82) established a hierarchy consisting of three levels of transportation corridors. Figure 2-3 shows these three levels.

- ***Statewide Mobility Corridors.*** These corridors are the top-end of the highway system and are meant to provide mobility across the state. They provide safe, free-flowing, high-speed connections between metropolitan areas of the state and surrounding states. They serve as the freight arteries of the state and are thus vital for economic development. INDOT has a strategic goal to directly connect metropolitan areas of 25,000 population or greater. (Note: The dashed line shown in Figure 2-3 reflects a Mobility Corridor connecting Evansville, Bloomington, and Indianapolis. A dashed line was used because no specific alignment has been determined.)
- ***Regional Corridors.*** These corridors are the middle tier of the highway system and are meant to provide mobility within regions of the state. They provide safe, high speed connections.
- ***Local Access Corridors.*** These corridors make up the remainder of the highway system. They are the bottom level of the system and are used for lower speed travel, and provide access between locations of short distances (10-15 miles).

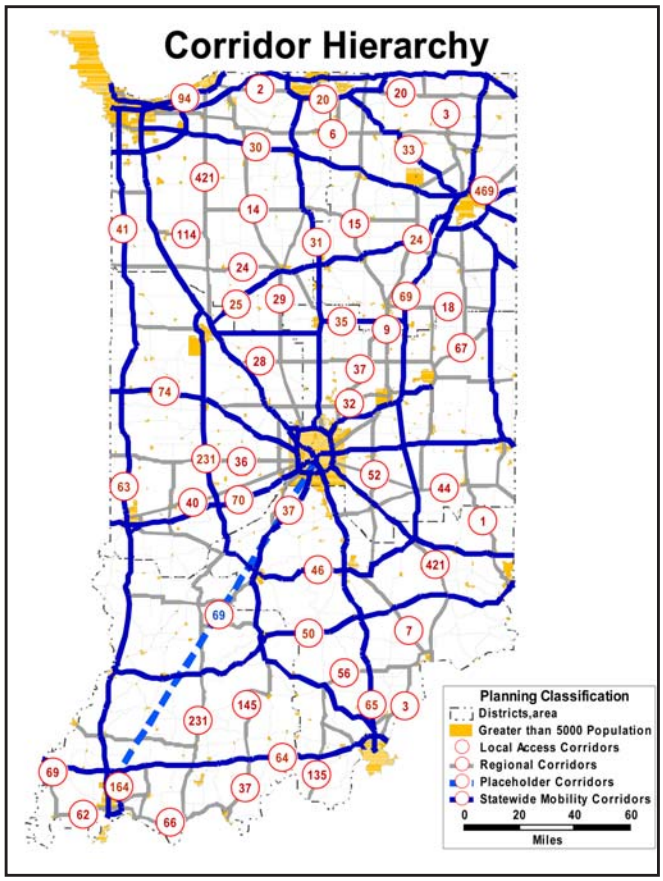


Figure 2-3: INDOT 2001 Plan - Planning Corridor Hierarchy

The most important highway corridors were designated as "Statewide Mobility Corridors." Figure 2-3 shows these Mobility Corridors. These corridors are characterized by:

- Upper level design standards
- High speeds
- Free flowing conditions
- Serving long distance trips
- Large through volumes of traffic
- Heavy commercial vehicle flows
- Serve longer distance commuter trips
- Generally multi-lane, divided
- Full access control desirable, no less than partial access control
- Railroad and highway grade separations desirable
- Desirable to bypass congested areas
- No non-motorized vehicle/pedestrian interaction
- Major river crossings

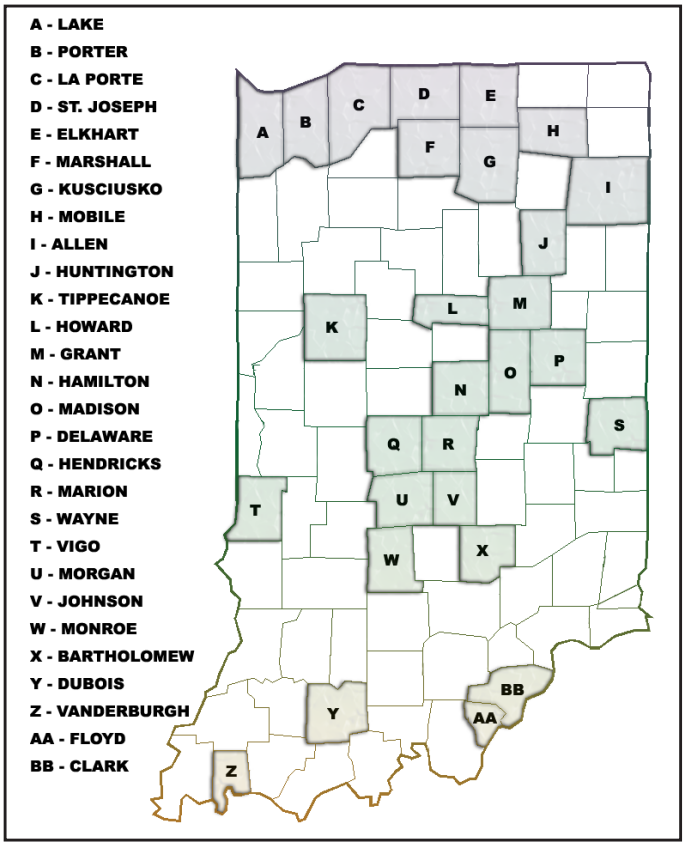


Figure 2-4: Indiana Counties Designated as Economic Centers for Transportation Planning Purposes

A state law passed in 1991 directed INDOT to designate a network of "commerce corridors" in the State. The legislation defined a "commerce corridor" as "that part of a recognized system of highways that (1) directly facilitates intrastate, interstate, or international commerce and travel, (2) enhances economic vitality and international competitiveness; or (3) provides service to all parts of Indiana and the United States." (IC 8-23-1-14.5). The legislation directed INDOT to determine the level of service within each commerce corridor, establish procedures to maintain the level of service in each corridor, and adopt an improvement plan for each commerce corridor that does not achieve its prescribed level of service. (IC 18-23-8-1.3). These Commerce Corridors are designed to link the counties designated as "economic centers" for transportation planning purposes, as shown in Figure 2-4.

The 1995 Plan further describes these Commerce Corridors as follows:

> "Consistent with the focus of supporting the State's economy, major commercial routes were selected with the objective of providing an interconnected network of high quality highways linking the activity concentrations within Indiana, and connecting those concentrations with major markets in surrounding states. The principles used to guide commerce corridor selection were as follows:

- "Link Indiana's major population concentrations to the National Highway Network;
- "Provide good accessibility to Indiana's major manufacturing concentrations;
- "Provide good accessibility to Indiana's major trade and service concentrations; and
- "Improve access to Indiana's major tourism and recreation areas, regional economic concentrations and those areas with demonstrated and anticipated potential for growth."

The 2001 Plan retained this designation of the Commerce Corridors. The concept of Mobility Corridors grew out of the concept of Commerce Corridors

Figure 2-5 shows Indiana's Commerce Corridors.

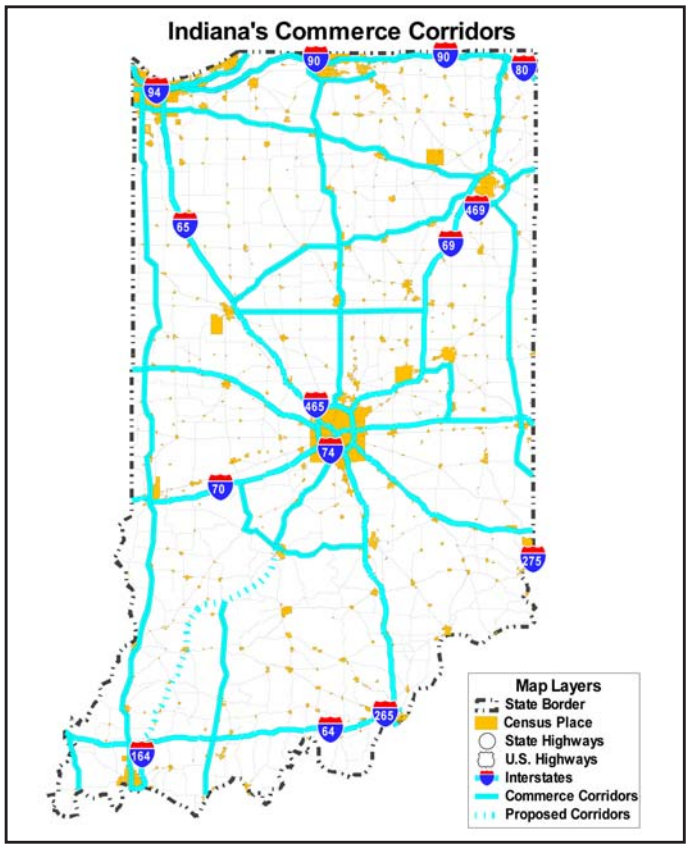


Figure 2-5: Indiana's Commerce Corridors

2.3 Needs Assessment

Guided by the federal and state legislation and policy decisions described above, FHWA and INDOT have undertaken a comprehensive needs assessment for this project.

The needs assessment involved extensive analysis of both transportation and economic conditions in Southwest Indiana. For purposes of this needs analysis, a 26-county Study Area was defined, as shown in Figure 2-7 ("Study Area"). The Study Area was defined to include all counties within the area between I-70 on the north, State Route 37 on the east, and the state boundaries on the south and west. The range of alternatives considered were within this area.

The analysis examined both existing conditions and future conditions. The analysis of future conditions focused on the year 2025, which is being used as the design year for this study. (The design year, which is typically 20 years from project construction, is the year used to determine the future needs which a proposed transportation project may address.)

The needs analysis is conducted with reference to the "no build" condition of existing and committed projects (e+c network). "Committed" projects are those which are anticipated by INDOT to be built in the near future or for which INDOT has a firm, long-term policy to build. Committed projects in the Study Area include:

- Added travel lanes on I-70
- Upgrade of US 231 near Jasper and Huntingburg, continuing south to the Ohio River
- Upgrade of US 50 east of Washington

- Upgrades of SR 62 and 66 in Warrick County
- Construction of SR 641 (Terre Haute bypass) in Vigo County
- Upgrade of US 41 in Vanderburgh County
- Upgrade of SR 37 in Orange County
- Upgrade of SR 46 in Monroe County

The needs analysis describes the conditions which existed in the base year (1998) and would exist in the "no-build" case in the forecast year (2025) in the absence of I-69 being built between Evansville and Indianapolis. The "no-build" also assumes that no other part of I-69 is built south of I-64. [4]

2.3.1 Transportation Needs in Southwest Indiana

The evaluation of transportation conditions was conducted using the latest version of the Indiana Statewide Travel Demand Model. In order to capture shorter-distance trips, the network in Southwest Indiana is highly detailed for greater accuracy. The model also accounts for the trips coming from or going to States adjacent to Southwest Indiana. The model includes substantial portions of Kentucky, Illinois, Michigan, and Ohio, as well as all of Indiana. See Figure 2-6 for a map of the modeled area.

The evaluation of transportation needs in Southwest Indiana focused on four factors: (1) the connection between Evansville and Indianapolis, (2) personal accessibility throughout Southwest Indiana, (3) congestion on highways in Southwest Indiana, and (4) highway safety in Southwest Indiana.

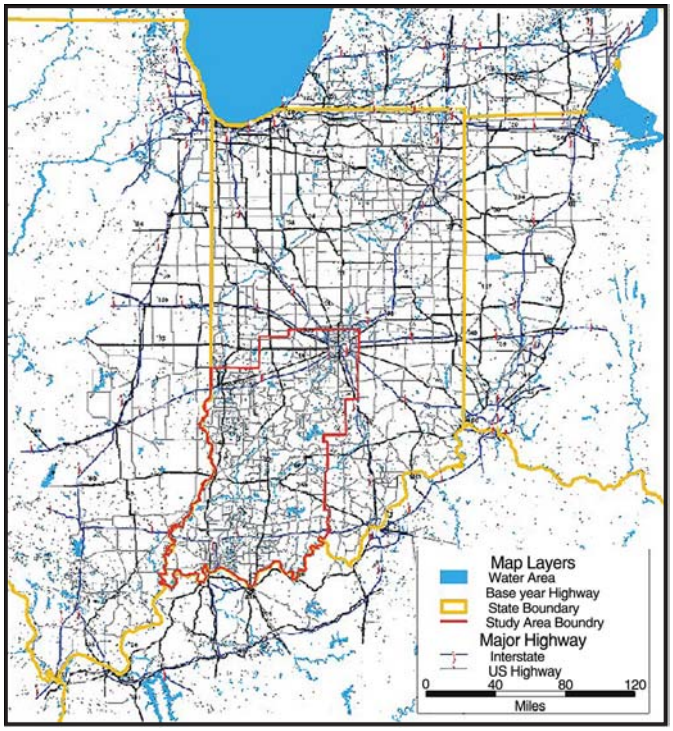


Figure 2-6: I-69 Modeled Area

2.3.1.1 Evansville-to-Indianapolis Connection

The Indiana Statewide Travel Demand Model was used to evaluate the efficiency of the existing transportation linkage between Evansville and Indianapolis[5]. This evaluation compared the Evansville-to-Indianapolis linkage with the linkages between Indianapolis and other major urban centers in Indiana (those cities which have a Metropolitan Planning Organization, or MPO). In addition, the evaluation considered the linkages between Indianapolis and two major

4 Analysis reported in Section 3.4 *Detailed Performance and Cost Analysis of Five Alternatives* and in other impact related sections assume that National I-69 has been completed. This was done in order to avoid overstating the performance of the alternatives and underestimating the impacts.

5 A description of the Indiana Statewide Travel Model and associated 2025 forecasts can be found in Task Report 3.3.3.2, ***Travel Model Documentation.***

urban centers on the Indiana border – Cincinnati, Ohio and Louisville, Kentucky. These cities are shown in Figure 2-7.

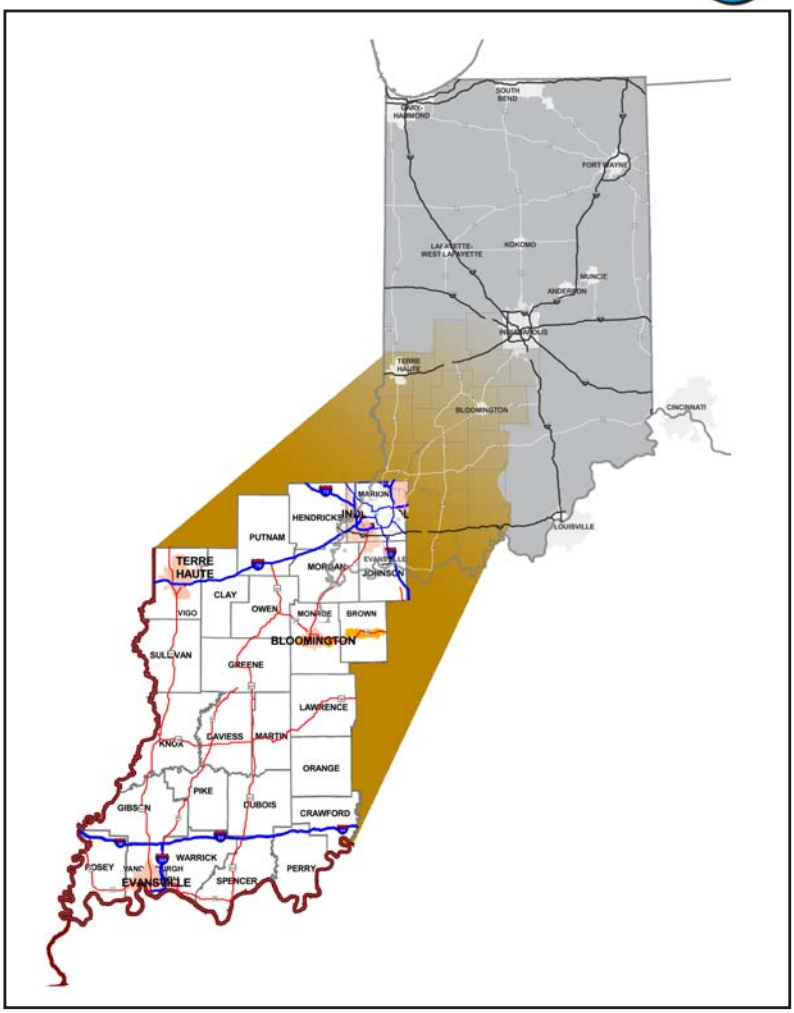


Figure 2-7: Study Area

The linkages between each of these urban centers and Indianapolis were evaluated using both distance and time criteria.[6] These evaluations were made for both the travel model's 1998 base year, and 2025 forecast year. The analysis revealed that, when compared to other major cities in and bordering Indiana, the linkage between Evansville and Indianapolis ranks last or near to last, using the methodology described in the following paragraph.

The analysis of the linkage of major cities to Indianapolis uses a straight line between each city and Indianapolis. This method does not imply any desired or preferred route. Rather, it allows an "apples to apples" comparison of the connection which different cities have to Indianapolis. A straight line between any two points is the most efficient connection possible between those two points. The degree to which an existing connection corresponds to such a straight line comparison measures how efficient that connection is. By using this straight line comparison, this analysis shows, on a comparative basis, how efficient or inefficient the connection is that different cities have to Indianapolis. This "straight-line" comparison method was used by INDOT in its 2001 Plan.

Travel Distance

A straight line was drawn from the central business district of each city to the nearest point on I-465 around Indianapolis.[7] See Figure 2-7, which shows these 12 cities. The actual highway distance by the quickest route was then compared with this straight-line path. The difference between the actual distance and straight-line distance was then calculated in two ways: (1) the absolute difference in mileage, and (2) the ratio of the straight-line mileage to the actual mileage. Finally, the cities outside

6 Major components of traveler cost are related to time and distance traveled. User travel time is related to vehicle travel time. Vehicle operating cost and safety (crash cost) are related to the distance traveled.

7 Within Indianapolis, the time required (and delay encountered) in traveling between I-465 and downtown can vary considerably, depending upon the orientation of one's travel. Some travelers have direct Interstate access to downtown (via I-65 or I-70) while other travelers do not.

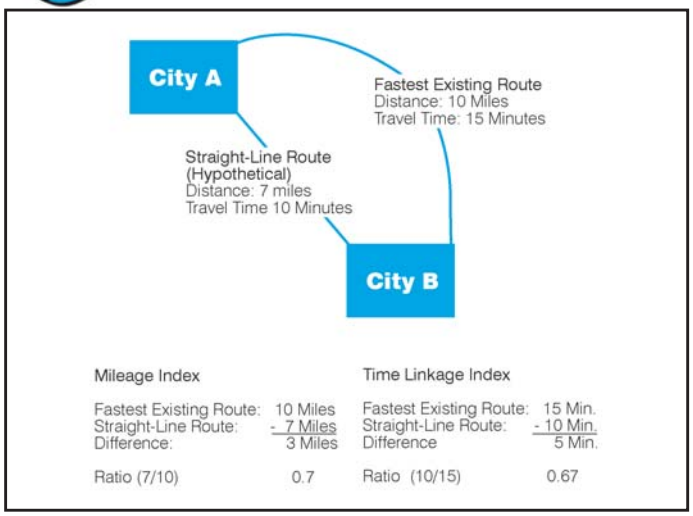


Figure 2-8: Calculation of Time and Mileage Linkage Indexes

Table 2-1: Ranking of Cities by Average Mileage Difference and Mileage Index to Indianapolis, 1998 and 2025

Metropolitan Area	1999 Population	Average Mileage Difference	Mileage Difference Rank	Average Mileage Linkage Index	Mileage Index Rank
Anderson	58,000	4.1	2	0.86	10
Bloomington	67,000	5.8	6	0.88	8
Cincinnati	331,000	10.3	10	0.90	6
Evansville	**122,000**	**32.4**	**12**	**0.81**	**12**
Fort Wayne	197,000	15.4	11	0.86	11
Kokomo	45,000	5.3	5	0.88	7
Lafayette/W. Lafayette	80,000	2.8	1	0.95	2
Louisville	253,000	4.9	3	0.95	1
Muncie	67,000	6.3	7	0.87	9
Gary, Hammond, E. Chicago	218,000	9.5	9	0.93	3
South Bend	99,000	9.3	8	0.93	4
Terre Haute	53,000	5.0	4	0.93	5

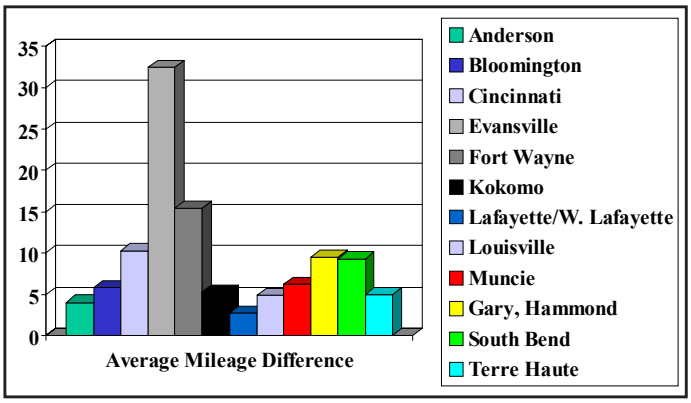


Figure 2-9: Difference Between Actual and Straight-line Mileage from Key Cities to Indianapolis.

Indianapolis were ranked in terms of their existing connection to Indianapolis, based on each of these measures.

The analysis revealed that Evansville ranks last among the 12 cities by both measures. Table 2-1 shows the average mileage differences in 1998 and 2025.[8] The actual distance from Evansville to Indianapolis is more than 32 miles longer than the straight-line distance. The difference between actual and straight-line distances for the next-to-last city, Fort Wayne, is 15.4 miles – less than half as large. In other words, the gap between the actual and straight-line distances between Evansville and Indianapolis is more than twice as large as the comparable measurement for any of the other 12 cities analyzed.

Figure 2-8 illustrates the calculation of a linkage index. Figure 2-9 displays the average Mileage Difference, as displayed in Table 2-1.

Travel Time

A straight line travel time, defined as traveling over the straight-line distance at Interstate travel times, was compared with the actual daily average travel time using the quickest available existing route. Again, the difference between the actual travel and straight-line travel times was calculated in two ways: (1) the absolute difference, and (2) the ratio of the straight-line travel time to the actual travel time. Finally, the cities outside Indianapolis were ranked in terms of their existing connection to Indianapolis, based on both of these measures.

The analysis revealed that Evansville ranks last and third-last among the 12 cities by these two measures. See Table 2-2. The difference between the ideal and straight-line travel times between Evansville and Indianapolis is, on average, more than 52 minutes. This difference is the largest of

8 Due to the planned construction of new projects (e.g., SR 641 - Terre Haute bypass) some of the shortest time paths will change in the future.

any of the 12 cities analyzed. For the city ranked next-to-last, South Bend, the difference was much less – about 34 minutes.

Figure 2-10 shows the Average Time Difference, as displayed in Table 2-2.

Compared to other metropolitan areas in Indiana, as well as two which border Indiana, the time and distance connections between Evansville and Indianapolis are the worst of any large city. There are no recognized transportation industry standards suggesting by how much this connection should be improved. This analysis demonstrates that the connection between Evansville and Indianapolis is far inferior to that enjoyed by other cities in Indiana. It establishes the need for this connection to be improved.

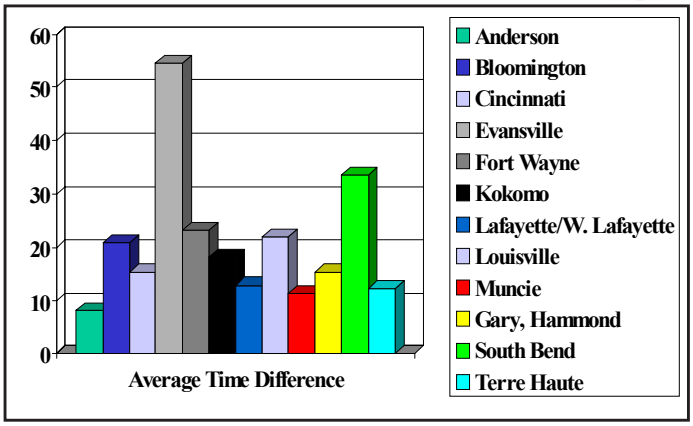


Figure 2-10: Difference Between Actual and Straight-line Travel Times from Key Cities to Indianapolis

Table 2.2- Ranking of Cities by Average Travel Time Difference and Travel Time Index to Indianapolis, 1998 and 2025

Metropolitan Area	1999 Population	Average Time Difference	Time Difference Rank	Average Time Linkage Index	Time Linkage Index Rank
Anderson	58,000	8.1	1	0.73	9
Bloomington	67,000	20.9	8	0.63	12
Cincinnati	331,000	15.4	5	0.84	2
Evansville	**122,000**	**52.6**	**12**	**0.69**	**10**
Fort Wayne	197,000	23.2	10	0.78	5
Kokomo	45,000	18.2	7	0.64	11
Lafayette/W. Lafayette	80,000	12.9	4	0.77	6
Louisville	253,000	21.9	9	0.80	4
Muncie	67,000	11.3	2	0.76	7
Gary, Hammond, E. Chicago	218,000	15.4	6	0.88	1
South Bend	99,000	33.6	11	0.76	8
Terre Haute	53,000	12.2	3	0.82	3

2.3.1.2 Personal Accessibility

The concept of personal accessibility refers to the ease with which residents of a particular region can travel to population and employment centers and other types of attractions (e.g., health care facilities, educational institutions, airports, and cultural events). Generally, a region that is well-connected internally and externally to common travel destinations will have a high degree of accessibility. By contrast, a region that has a less-well-developed highway network, will generally have a lower degree of accessibility.

The basic methodology for measuring accessibility in Indiana has been established based upon the Indiana Statewide Travel Demand Model. The travel model includes substantial portions of the States of Kentucky, Illinois, Michigan, and Ohio, and these geographic areas are included in the calculation of accessibility indices. Thus, the model does take into account the accessibility of areas along the state border to attractions (employment, etc.) in neighboring states.

Accessibility was measured by calculating an index. This computation involves relatively complex, technical calculations. Readers with an interest in the technical details of these calculations should refer to Task Report 3.3.4, *Regional Transportation Needs Analysis*, posted on the project web site (www.i69indyevn.org). The key concepts used in calculating an accessibility index can be summarized as follows; Figure 2-11 gives an example of a calculation of a simple accessibility index:

- **Traffic Analysis Zone** The Study Area was divided into 229 individual traffic analysis zones (TAZs). Each TAZ represents a portion of a county.

- **Attractive Force** Each TAZ was assigned a separate Attractive Force (AF) rating for purposes of each accessibility index. The higher the attractive force, the stronger the attraction of that TAZ as a destination for a particular type of travel – e.g., travel to work, to medical facilities, to educational institutions, etc.

Example: When calculating the index for accessibility to major airports, the Attractive Force for each TAZ was defined as the annual number of air passenger trips taken from an airport within that TAZ. As a result, the TAZs that contain the Indianapolis and Louisville airports have high Attractive Force ratings for the index that measures accessibility to major airports. (The methods used to determine the Attractive Force for each Accessibility Index are explained below, in the sections that provide the results of the modeling for each index.)

- **Network Travel Time** For each TAZ, the model calculated the average congested travel time (for 24 hours) between that TAZ and each of the other TAZs in the entire Study Area. The travel time between the TAZs was then adjusted to reflect a factor known as the "impedance" exponent. This impedance exponent is used to reflect people's actual behavior, by which drivers' willingness to travel to destinations drops significantly beyond a certain distance.

- **Accessibility Index** The Accessibility Index for each TAZ was then determined by calculating the ratio of Attractive Force to Travel Time between that TAZ and each other TAZ, and then calculating the sum of those ratios. ***The greater the value of an index, the better access a zone has to the indicator being evaluated.***

Figure 2-11 gives an example of this calculation for four Traffic Analysis Zones.[9]

Generally, the accessibility index for a TAZ will be tend to be *high* (that is, favorable) if the TAZ has short travel times to a large number of TAZs with high Attractive Force ratings. By contrast, the accessibility index for a TAZ will tend to be *low* if the TAZ is surrounded by other TAZs with low Attractive Force ratings and the TAZs has relatively long travel times to TAZs with higher Attractive Force ratings.

Using this methodology, each accessibility index measures accessibility to a single type of attraction – e.g., accessibility to major airports. To ensure that the needs assessment reflects the diverse values, interests, and needs among Southwest Indiana residents, a range of accessibility indexes were developed. These include accessibility to:

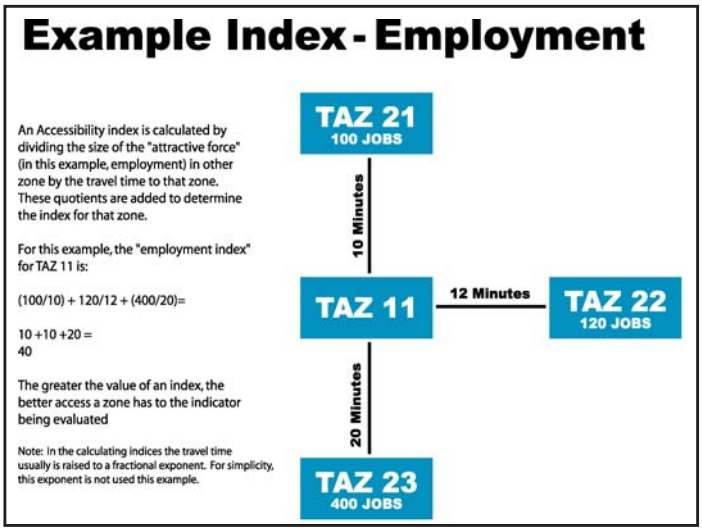


Figure 2-11: Example Calculation of Accessibility Index

9 The actual formula for calculating an accessibility index is:

$$AI = \sum_j \frac{AF_j}{t_{ij}^x}$$

AI = Accessibility Index
AF_j = Attractive force at zone j
t_{ij} = Network travel time between i and j
x = Impedance exponent

- Population Centers (all sizes)
- Employment
- Urban Areas (over 50,000 population)
- Major Airports
- Institutions of Higher Education
- Indianapolis

These indexes showed that, compared with the rest of Indiana, the I-69 Study Area has significantly poorer highway accessibility. Figures 2-12 through 2-17 show graphic displays of the results of this accessibility analysis.[10] The accessibility analysis determined the following, at a statistically significant level:

- ***Accessibility to Population Centers (Figure 2-12)*** **. The Study Area is less accessible to other centers of population than is Indiana outside of the Study Area**.[11] This is true both in the base year (1998), as well as the forecast year of 2025. This is true for the Study Area as a whole, as well as for urban and rural areas separately.
- ***Accessibility to Employment (Figure 2-13)*****. The Study Area is less accessible to employment than is Indiana outside of the Study Area**. This is true both in the base year, as well as the forecast year. This is true for the Study Area as a whole, as well as for urban and rural areas separately.
- ***Accessibility to Urban Areas (Figure 2-14)*****. The Study Area is less accessible to major urban centers than is Indiana outside of the Study Area**. This is true both in the base year, as well as the forecast year. This is true for the Study Area as a whole, as well as for urban and rural areas separately.
- ***Accessibility to Major Airports (Figure 2-15)*****. The Study Area is less accessible to major airports than is Indiana outside of the Study Area.** This is true both in the base year, as well as the forecast year. This is true for the Study Area as a whole, as well as for urban and rural areas separately.
- ***Accessibility to Institutions of Higher Education (Figure 2-16)*****. Generally, both the Study Area and the rest of the state are equally accessible to institutions of higher education.** The exception to this is that rural zones in the Study Area are ***less accessible*** to institutions of higher education that than rural zones in the rest of the state in the base year. In the forecast year, there is no statistical difference between the two regions.

10 The color coding shows the ranges of Accessibility to Population indexes for Traffic Analysis Zone (TAZ) in the Indiana Statewide Travel Demand Model. The higher the index, the greater accessibility a TAZ has to population in other TAZs. The color coding groups TAZs by 20% ranges, corresponding to the value of their accessibility indexes. The bottom 20% of the TAZs (the ones with the poorest population-weighted accessibility) are shown in blue, and the top 20% of TAZs (the ones with the best population-weighted accessibility) are shown in pink-violet.

These indexes are calculated considering the access which each TAZ has to other zones both within and outside of Indiana. Outside of Indiana, zones in Illinois, Kentucky, Ohio, and Michigan are included in accessibility index calculations.

11 All measures of statistical significance are at the 95% confidence level, using a Student-t difference of means test comparing accessibility of TAZs within the Study Area to all other TAZs in Indiana. These calculations are documented further in *Task Report 3.3.4, Regional Transportation Needs Analysis.*

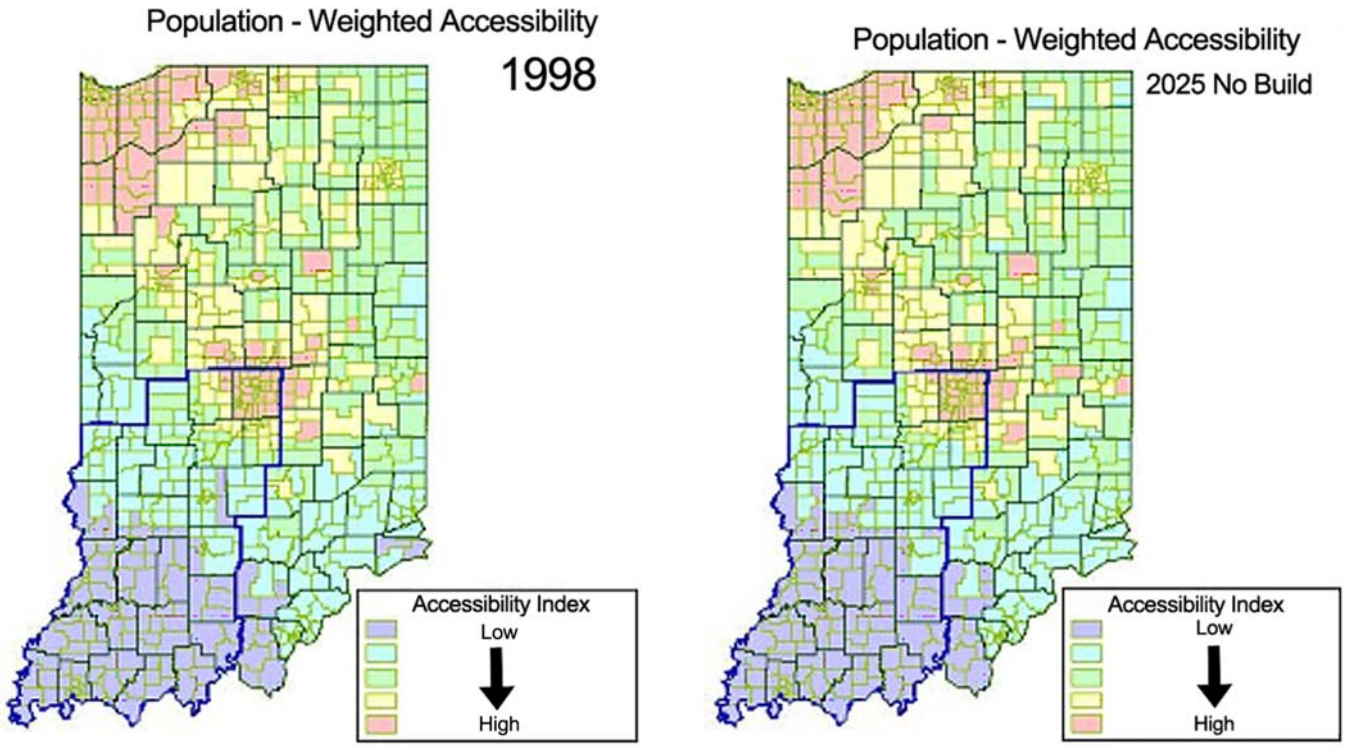
- ***Accessibility to Indianapolis (Figure 2 -17).*** ***The Study Area is less accessible to Indianapolis than other regions of the state.*** Large parts of the Study Area (those areas more than 50 miles from Indianapolis) are less accessible to Indianapolis than other regions of the state an equivalent distance from Indianapolis. This is true both in the base year, as well as the forecast year.

In viewing Figures 2-12 through 2-17, keep in mind that areas with low levels of accessibility are not necessarily lacking those things to which attraction is being measured. Rather, these figures show that the relative ***amount*** of that item is less than what is available in other parts of Indiana.

For example, there are regional airports in Evansville and Louisville, and the effect of their presence is measured by the "Accessibility to Airports" measure. In calculating this measure, the attractive force is expressed as the number of enplanements (passengers boarding commercial aircraft) in a year. By comparison with airports in Indianapolis and Chicago, the number of opportunities for air travel afforded by the Evansville and Louisville airports are small. Moreover, due to a limited number of bridges that cross the Ohio River, cross-river travel times are relatively high even for short, straight line distances. Thus, the accessibility which the Indianapolis and northwest Indiana regions have to air travel is greater than that found in Southwest Indiana, or near Louisville.

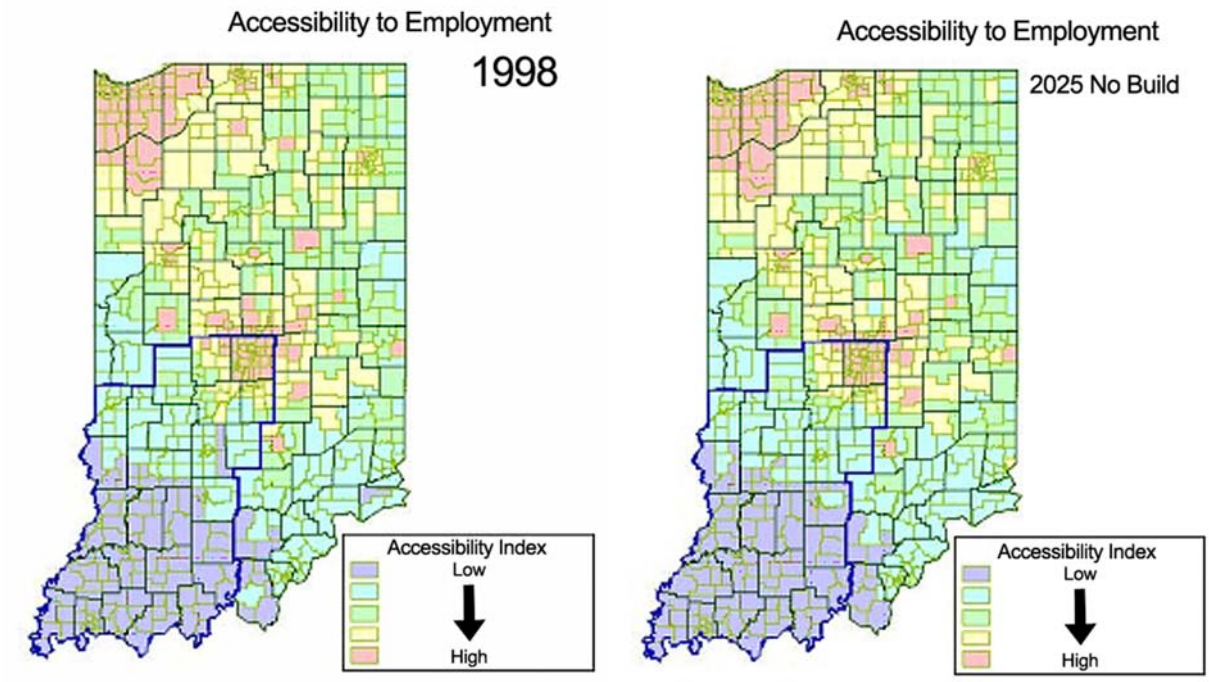
For Figure 2-17, the color coding depicts the ranges of accessibility to Indianapolis for Traffic Analysis Zone (TAZs) in the Indiana Statewide Travel Demand Model, from 50 to 100 miles and 100 miles or more from Indianapolis. The higher the index, the greater accessibility a TAZ has to Indianapolis. The color coding groups TAZs by $^1/_6$ ranges, corresponding to the value of their accessibility indexes.

Figure 2-12: Indiana Accessibility to Population Centers



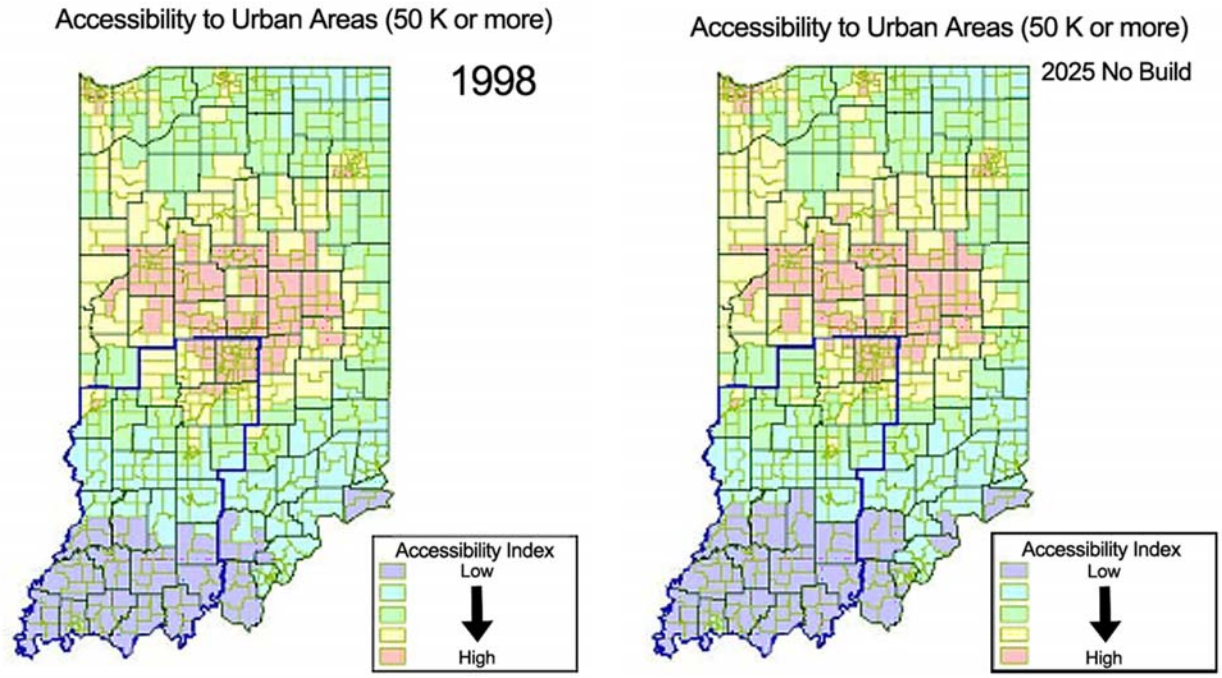
The formula to calculate the accessibility index is as given above, where AF is the population of each TAZ.

Figure 2-13: Indiana Accessibility to Employment



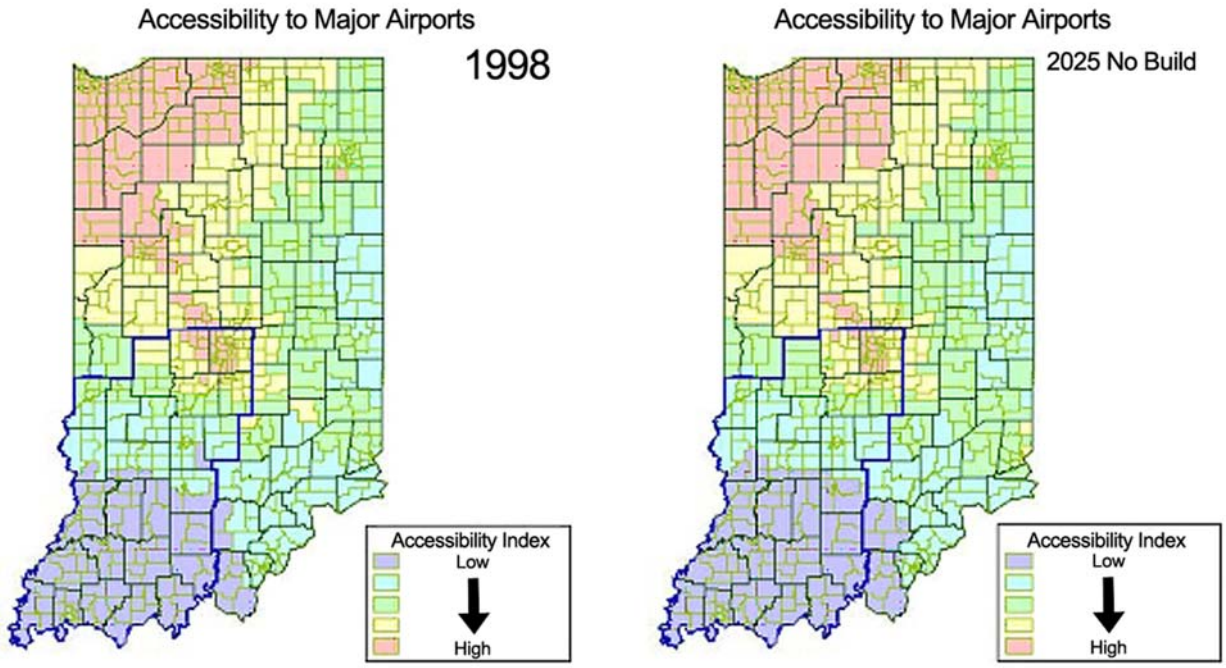
The formula to calculate the accessibility index is as given above, where AF is the number of jobs located in each TAZ.

Figure 2-14: Indiana Accessibility to Urban Areas



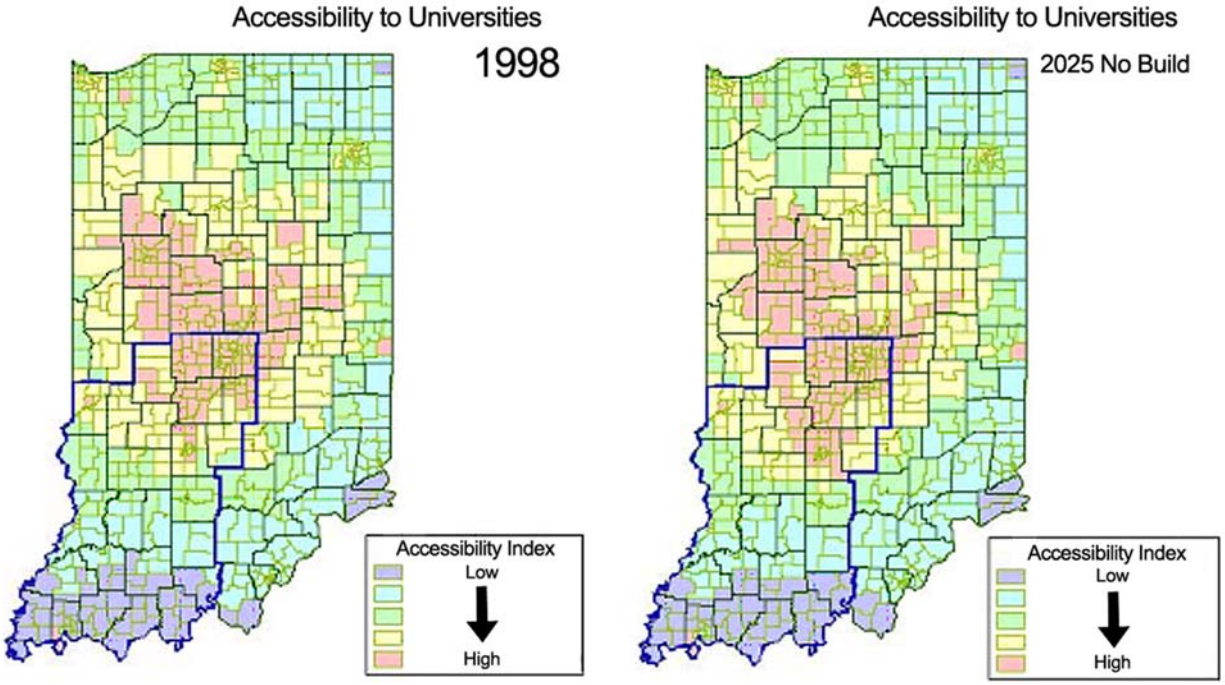
The formula to calculate the accessibility index is as given above, where AF is equal to 1 if the TAZ is part of an urban area, and it is equal to 0 if the TAZ is not part of an urban area.

Figure 2-15: Indiana Accessibility to Major Airports



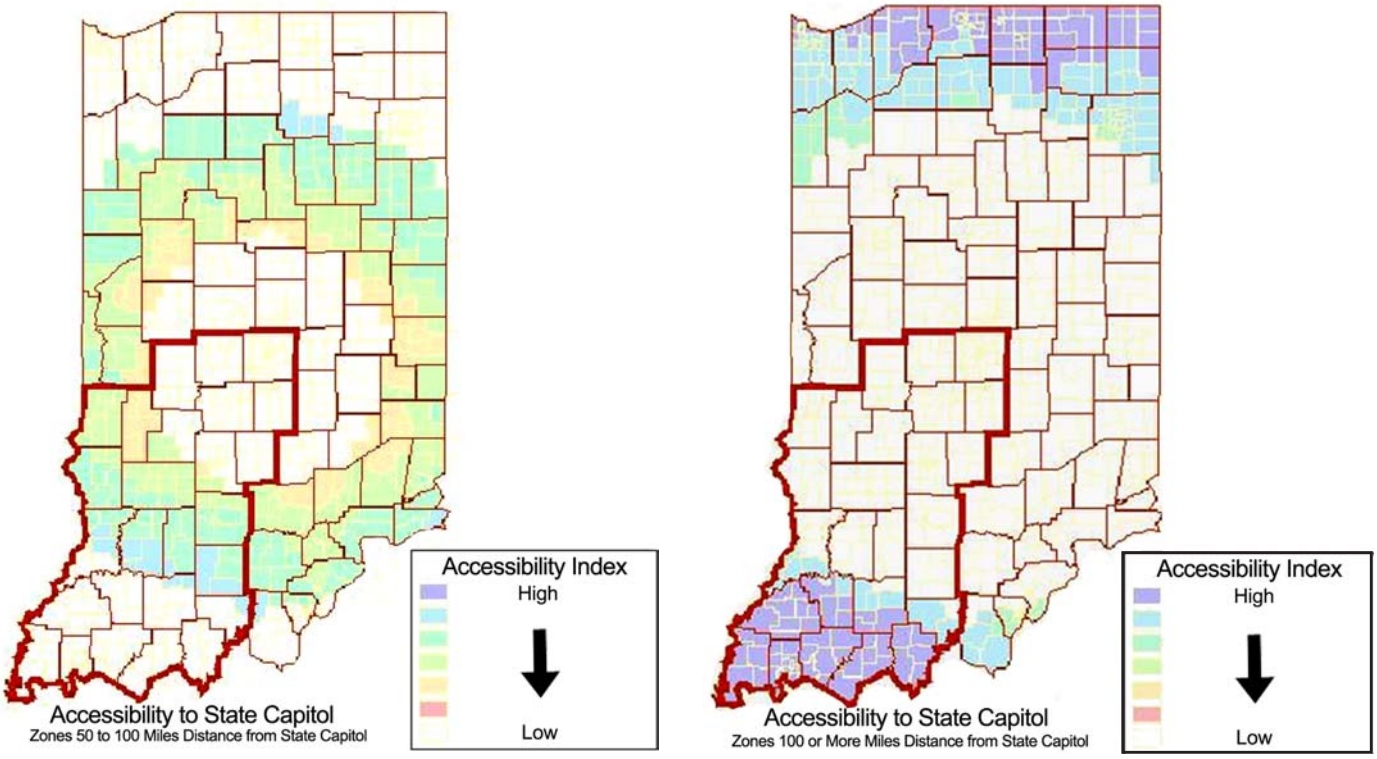
The formula to calculate the accessibility index is as given above, where AF is the annual air-passenger enplanements in each TAZ.

Figure 2-16: Indiana Accessibility to Institutions of Higher Education



The formula to calculate the accessibility index is as given above, where AF is the number of students enrolled in institutions of higher education which have enrollments of at least 2,500.

Figure 2-17: Indiana Accessibility to Indianapolis



These indexes are calculated considering the access which each TAZ has to Indianapolis. The formula to calculate the accessibility index is as given above, where AF equal to 1000 for the zone in downtown Indianapolis, and equal to 0 for all other zones.

This accessibility analysis showed that for TAZs between 50–100 miles from Indianapolis, as well as those over 100 miles from Indianapolis, the Study Area has poorer accessibility to Indianapolis than the rest of Indiana for TAZs an equivalent distance from Indianapolis.

In conclusion, the analysis of accessibility showed that Southwest Indiana is significantly less accessible than the rest of the State. This conclusion applies not only to the Study Area as a whole, but also to the rural and urban areas of the Study Area when evaluated separately. Thus, there is a need for increased accessibility within Southwest Indiana.

For a more detailed explanation of the accessibility analysis, please refer to *Task Report 3.3.4 - Regional Transportation Needs Analysis.*

2.3.1.3 Traffic Congestion

In technical terms, traffic congestion reflects the difference between traffic volume and roadway capacity; if the traffic volumes on a highway system approach the system's capacity, the level of traffic congestion will be relatively high. By contrast, if traffic volumes are significantly *below* the capacity of the system, the level of traffic congestion will be relatively low.

Traffic congestion can be measured in different ways. For this study, two separate measures of travel efficiency were used:

- **Level of Service** The level-of-service rating scale is a simple, widely accepted method for describing traffic conditions. The scale ranges from Level of Service "A" (free-flowing traffic) to Level of Service "F" (highly congested conditions).[12] Generally, when designing a highway to accommodate future traffic flows, the minimum acceptable condition in rural areas is Level of Service C. For a full discussion of levels of service, see *Technical Report 3.2, Project Issues and Performance Factors,* September 5, 2000, pp. 15-16.

- **Peak Hour Volume-to-Capacity Ratio (v/c)** Volume-to-capacity ratios provide more precise measurements of traffic conditions than level-of-service ratings. Each level-of-service category includes a range of traffic conditions – some at the "low" end of that category, and others at the "high" end of that category. A volume-to-capacity ratio, by contrast, provides a more precise measurement for each roadway. It is calculated by comparing the roadway's traffic volume (the actual number of vehicles in the peak hour) to the roadway's capacity (the number of vehicles that can be accommodated in an hour at Level of Service E).

The starting point for calculating level of service and volume-to-capacity ratios is to determine the traffic volumes on roadways within Southwest Indiana. Traffic volumes are measured in two ways:

- **Average Daily Traffic (ADT)** The average daily traffic (ADT) is the average number of vehicles that use a particular roadway segment each day.

- **Vehicle-Miles Traveled (VMT)** The vehicle-miles traveled (VMT) for a roadway segment is calculated by multiplying the ADT for that segment by the length of the segment. The sum of the VMT for all segments in a region produces estimated the VMT for that entire region.

Both ADT and VMT for roadways in Southwest Indiana were calculated for the base year (1998) and the design year (2025), using the Indiana Statewide Travel Demand Model.

Table 2-3 summarizes the changes in forecasted daily VMT between 1998 and 2025, comparing the Study Area to all of Indiana. These are based upon traffic forecasts from the Indiana Statewide Travel Demand Model. It shows that the compounded annual increase in VMT in the Study Area is about one-half that of Indiana as a whole. For purposes of this comparison, the nine counties of the Indianapolis Metropolitan Statistical Area (MSA) are excluded from both categories (that is, from the Study Area and from all of Indiana). This is because the amount of vehicle travel in the nine-county Indianapolis MSA is very large, compared with the rest of the state. Excluding Indianapolis regional travel when comparing other parts of the state prevents trends in other parts of the state from being hidden, and allows an "apples to apples" comparison. If Indianapolis regional travel were not excluded, trends in travel growth in Southwest Indiana (as well as other parts of the state) would be hidden, since they would be grouped together with very large amounts of travel which occur within the Indianapolis MSA.

Table 2- 3: Growth in Daily Forecasted VMT between 1998 and 2025

	Vehicle Miles of Travel (VMT)			
	1998 Forecast	2025 Forecast	DIfference	Compounded Annual Growth Rate
Study Area	17,163,000	19,294,000	2,131,000	0.43%
State of Indiana	84,061,000	103,701,000	19,640,000	0.78%

Source: Indiana Statewide Travel Demand Model

12 Level of Service definitions are as described in *Highway Capacity Manual (HCM 2000)* by the Transportation Research Board.

Table 2.4 - V/C by Functional Classification[1]				
	Base Year (1998)		Future Year (2025)	
	Study Area	All of Indiana	Study Area	All of Indiana
V/C for Rural Interstates	0.35	0.53	0.44	0.68
V/C for Other Rural Principal Arterials	0.41	0.40	0.47	0.50
V/C for Rural Minor Arterials	0.26	0.37	0.28	0.39
V/C for Rural Major Collectors	0.16	0.17	0.15	0.20
V/C for Urban Interstates	0.40	0.88	0.45	0.90
V/C for Other Urban Freeways	0.52	0.55	0.62	0.53
V/C for Other Urban Principal Arterials	0.81	0.66	0.53	0.75
V/C for Other Urban Minor Arterials	0.47	0.43	0.57	0.50

[1] "Functional Classification" refers to the kind of travel served by a type of road. "Higher" functional classes (Interstates and Arterials) serve longer trips and higher volumes of traffic. "Lower" functional classes (Collector and Local Roads) serve shorter trips and lower volumes of traffic.
Source: Indiana Statewide Travel Demand Model

Table 2-4 provides a summary of volume/capacity ratios (v/c) by functional classification. Other travel efficiency measures show similar results in comparing the Study Area with the rest of the state.

The highway network is generally *less* congested in the Study Area than in the state as a whole. Both rural and urban Interstates are significantly more congested elsewhere in the state than they are in the Study Area. Figure 2-18 shows these v/c ratios for 2025. However, it is expected that there will be areas with significant traffic congestion by the forecast year of 2025. For example, segments of SR 37 north of Bloomington and US 41 near Princeton are forecasted to have significant traffic congestion. Figure 2-19, on following page, shows roads forcasted to be highly congested by 2025.

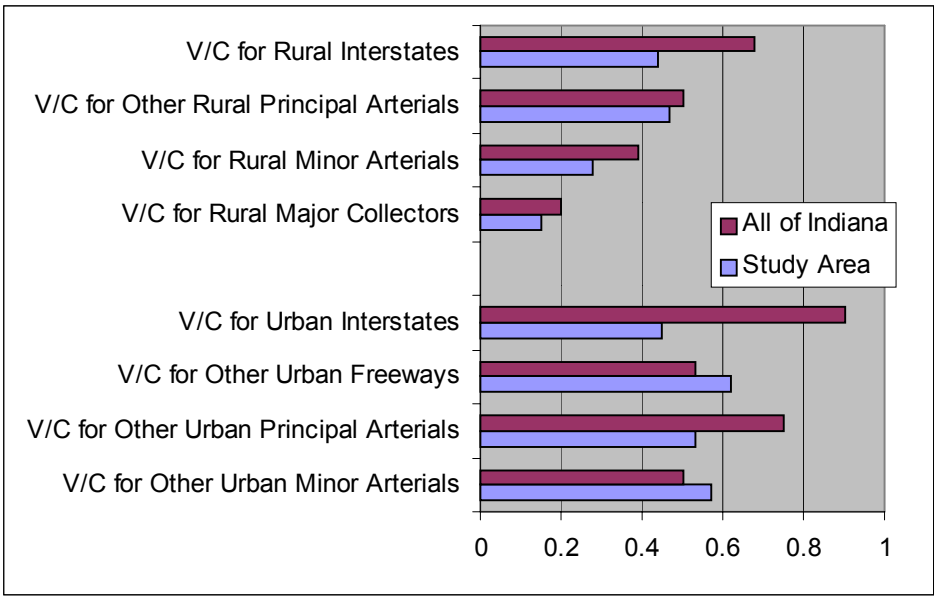


Figure 2-18: Comparison of Study Area and Statewide V/C Ratios

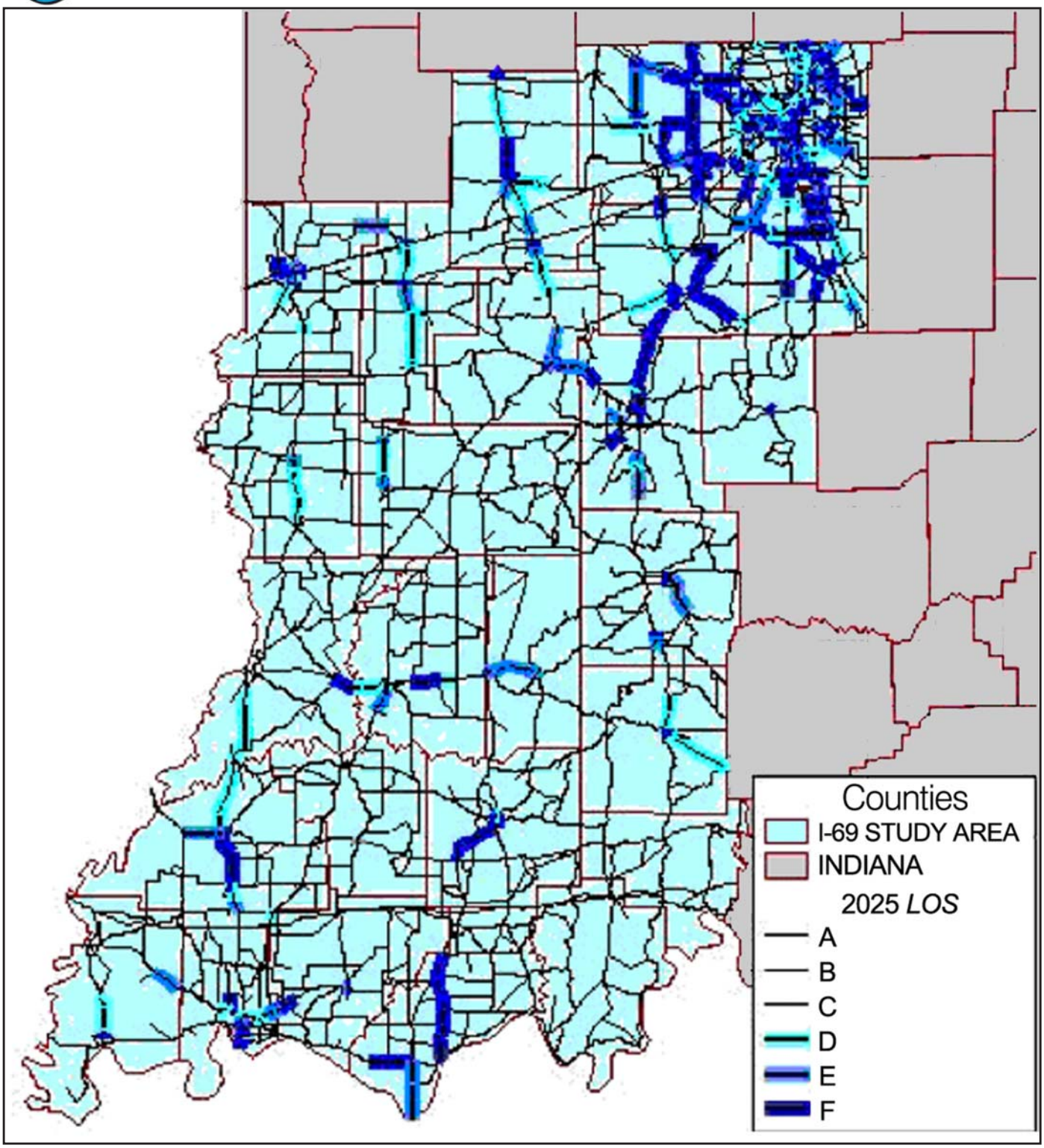


Figure 2-19: Major Highways with High Levels of Congestion Forecasted in "No Build" Case, 2025

This analysis indicates that traffic congestion is not currently a pressing problem in Southwest Indiana as a whole, but is likely to emerge as a problem on certain roadway segments by 2025. In light of these findings, alternatives were evaluated to assess how well they relieved traffic congestion in the Study Area.

2.3.1.4 Safety

Typically, vehicles traveling between Evansville and Indianapolis must use two-lane highways, or follow a four-lane route without full access control (US 41), which connects to an Interstate route (I-70).

Typically, two-lane roads (e.g., SR 57) have substantially higher crash rates than four-lane, divided highways. Similarly, four-lane, divided highways with partial access control (e.g., U.S. 41) have higher crash rates than highways built to Interstate standards. Table 2-5 provides crash data for each of these facility types.

As part of Task 3.3, a *Regional Safety Analysis* (published as Task Report 3.3.4.1) was conducted to determine the extent of safety problems in the Study Area. This report identified a number of safety problems. The *Regional Safety Analysis* investigated both crash experience on individual state highways in the Study Area, as well as countywide crash statistics. In both cases, the *Regional Safety Analysis* tabulated only those crashes involving fatalities and/or personal injuries.[14] Major findings of this analysis are summarized in the following paragraphs.

This analysis compared crash rates (crashes/100 million VMT) on similar facilities in Indiana. Using crash rates (as opposed to the number of crashes) is necessary to account for different traffic volumes. This technique is standard traffic engineering practice.

Above-average crash rates have a variety of causes, including road conditions, topography, and other factors. The data showing safety problems on the existing highway network provides a baseline for evaluating safety improvements that could be achieved by each of the potential build alternatives.

Safety Statistics for Individual Highways[15] The analysis performed for individual highways has the following major findings:

- Urban Interstates in Marion County have high crash rates. This is partially attributable to the fact that traffic volumes on Interstate highways in Marion County are much higher than in most other urban areas in Indiana.

Table 2-5: Crash Rate Comparison, Rural Roads

	Crashes per 100 Million Vehicle Miles	
Facility Type	Fatal Crashes	Injury Crashes
Interstate Highway	1.2 - 1.6	24
4-Lane Divided, Partial Access Control	1.6 - 2.0	65 - 81
2-Lane	2.8 - 4.0	83 - 107

Source: The Highway Economic Requriements System, Technical Report, Jack Faucett Associates for FHWA, July 1991

14 Reporting practices for "property damage only" (PDO) crashes are inconsistent among various law enforcement agencies. By contrast, statistics for personal injury and fatality crashes are reported with a high degree of uniformity. Also, the human and economic impact of crashes involving injuries and fatalities is much greater than those involving only property damage. For these reasons, the analysis considered only crashes involving personal injuries or fatalities.

15 Roads were defined as having "high" crash rates if their crash rate was at least 25% higher than the statewide average for their functional classification.

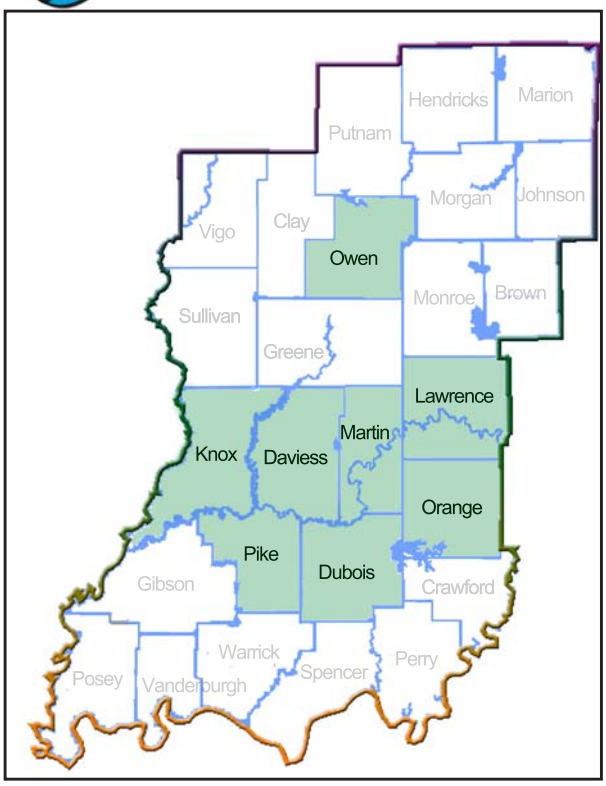


Figure 2-20: Study Area Counties with High County-Wide Crash Rates

- State highways in Owen, Knox, Martin and Dubois counties showed high rates of serious crashes.
- A stretch of SR 67 across Owen, Greene and Knox counties has high crash rates.
- Major state highways leading to Monroe county have high crash rates.
- Major state highways such as US 41, US 231, I-64 and the rural portion of I-70 did not have unusually high crash rates.

County-by-County Safety Statistics[16] The analysis of countywide statistics showed the following findings:

- There is a "band" of counties with poor safety records in the middle of the Study Area. It includes Knox, Daviess, Pike, Martin, Dubois, Lawrence and Orange counties.
- Owen County also shows high crash rates for both fatal and injury crashes. Figure 2.20 shows all rural counties in the Study Area with high county-wide crash rates.

In terms of the percentage of serious crashes which involve fatalities, Orange County had the highest percentage in Indiana.

The above findings suggest that rural parts of the Study Area have some highway safety problems as compared to the rest of rural Indiana. Several measures shows that a band stretching through the middle of the Study Area, including Lawrence, Martin, Orange, Daviess, Knox, Dubois and Pike counties, has a high occurrence of crashes. In the northern part of the Study Area, Owen County has high crash rates. SR 67 through Owen, Knox and Greene Counties also has high crash rates.

Constructing a major new facility, such as an Interstate highway, can alleviate some of these safety problems. As the data in Table 2-5 shows, a driver traveling on a rural two-lane highway is twice as likely to be involved in a fatal crash, and four times as likely to be involved in a crash resulting in injuries, than if one were traveling the same distance on an Interstate highway. To the extent that travelers can make their trips on a multi-lane, divided highway, they are much less likely to be involved in serious crashes. The forecasting and analysis tools used in this study account for the diversion of traffic to new facilities, and estimate the resulting crash reductions.

2.3.2 Economic Development Needs in Southwest Indiana

The proposal to complete a highway from Evansville to Indianapolis has long been associated with the objective of stimulating economic development in Southwest Indiana in general and in rural parts of the region in particular. Promoting economic development is an important goal of the Indiana Department of Transportation when it invests in highway infrastructure (*2001 Plan, p. 3)*. In

16 A county is defined as having a "high" crash rate if that crash rate is at least 25% higher than the statewide average for that type of county (rural or urban).

addition, the 2001 Plan places special emphasis on Mobility Corridors (*2001 Plan, p. 82*), which are "vital for economic development." Given this history and these state policies, the needs assessment for this study includes: (1) a comprehensive analysis of economic conditions in Southwest Indiana; and (2) an assessment of the potential role of transportation improvements in creating or enhancing economic development opportunities in Southwest Indiana.

2.3.2.1 Economic Conditions in Southwest Indiana

The starting point for most discussions of economic conditions in Southwest Indiana is the perception that the region lags behind other parts of the State in terms of its current prosperity and its future economic growth trends. To test this assumption, this needs assessment gathered the latest available data regarding economic conditions in the 26-county study region of Southwest Indiana. These data came from several sources, including the United States Department of Agriculture, the U.S. Bureau of the Census, the U.S. Bureau of Economic Analysis, and the Indiana Department of Workforce Development. The following discussion also incorporates the analysis of the data from these sources.

Economic Stress

In January of 2002, the United States Department of Agriculture published its annual strategic plan for rural Indiana in a report entitled, *USDA Rural Development Strategic Plan for Indiana, Revised 1-2002* (USDA 2002). This strategic plan has as its role "...helping the people of rural America develop sustainable communities." (USDA 2002, p. 1)

The USDA study identified certain rural counties in Indiana as "stressed." Stressed counties are considered as "... areas in Indiana that are having difficulty in being successful and sustainable." (USDA 2002, p. 13) Factors which were considered in making this evaluation included housing, housing-related infrastructure, household income, poverty rates, employment, available health care, education, and recent business growth (USDA 2002, p. 16).

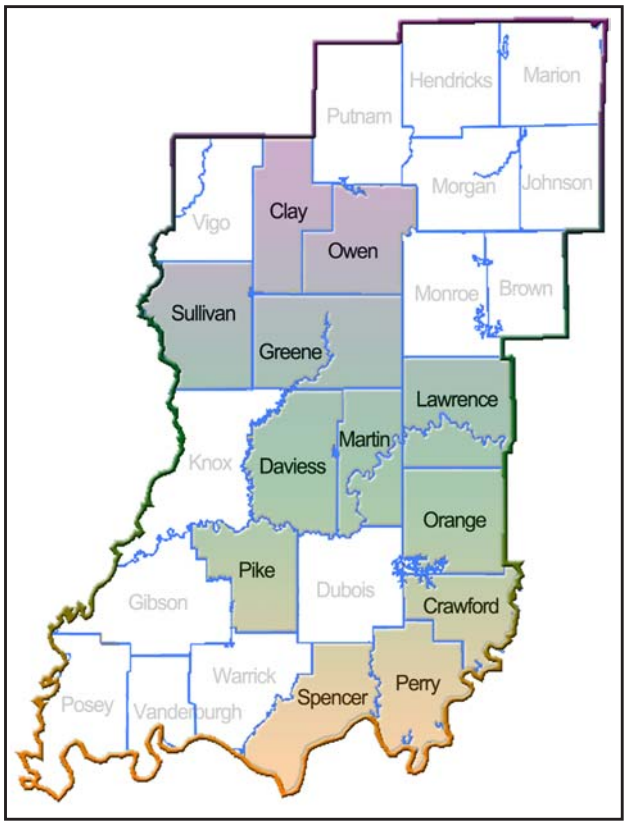


Figure 2-21: Stressed Counties in Southwest Indiana, 2002 (United States Department of Agriculture, Rural Development Agency,

Four of the 7 counties considered to be most stressed (Crawford, Owen, Orange, and Pike) are in the 26-county Study Area, including the two counties classified as being most stressed (Crawford and Owen). Further, of the 19 rural counties in the Study Area, nearly two thirds (12 out of 19) are rated as "stressed."[17] These include Crawford, Owen, Orange, Pike, Greene, Martin, Sullivan, Clay, Spencer, Lawrence, Perry, and Daviess Counties. Figure 2-21 shows those counties in the I-69 Study Area which the USDA rates as "stressed".

17 A "rural" county is defined as one outside of the Indianapolis MSA not having a city with a population of over 25,000.

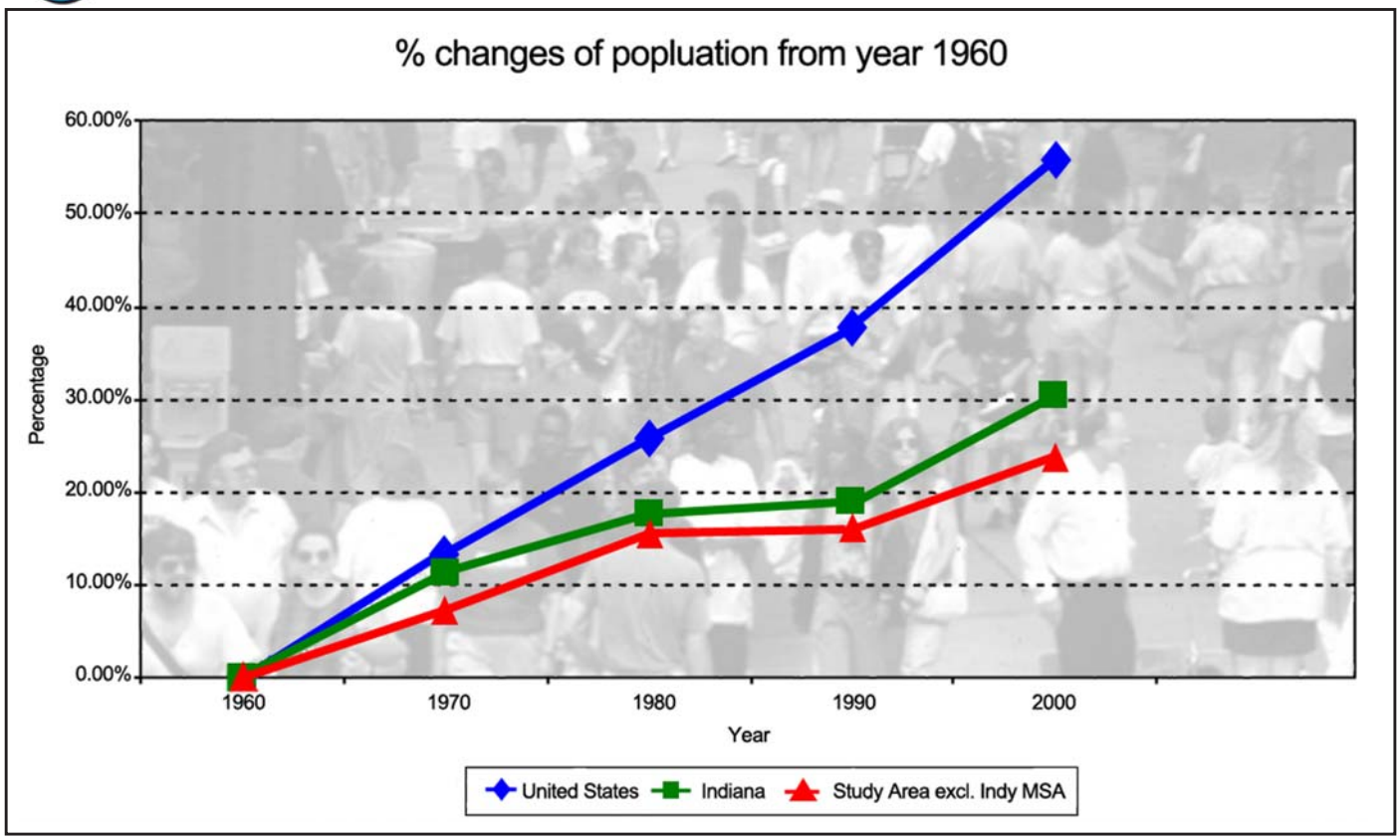


Figure 2-22: Percentage Changes in Population, 1960 - 2000

Population Trends

For the last 40 years, Indiana as a whole has lagged significantly behind the rest of the United States in population growth. Between 1960 and 2000, United States population grew at an annual rate of 0.80%[18] By contrast, between 1960 and 2000, the population of Indiana grew at an average rate of 0.40%.[19]

The population of the Study Area outside of the Indianapolis MSA (excluding Marion, Hendricks, Morgan, and Johnson Counties) grew even less during this period, increasing by an annual rate of 0.37%.[20] In other words, population growth in Southwest Indiana outside of the Indianapolis metropolitan area has lagged behind even the rest of Indiana, growing at less than one-half the national rate. A low rate of population growth compared to other parts of the United States is an indicator of the lack of economic opportunity, suggesting that many individuals are relocating to other areas where economic opportunity is greater. Figure 2-22 shows these population trends.

18 United States population in the 1960 Census was 180,671,158. In the 2000 Census, its population was 281,421,906. (Sources: *Population of Counties by Decennial Censuses: 1900 to 1990, and 2000 counts from the 2000 Census, U.S. Census Bureau.)*

19 Indiana's population in the 1960 Census was 4,662,000. Its population in the 2000 Census was 6,080485. (Sources: *Population of Counties by Decennial Censuses: 1900 to 1990; and 2000 counts from the 2000 Census, U.S. Census Bureau.)*

20 Population of the Study Area excluding the Indianapolis MSA grew from 736,014 in 1960 to 911,720 in 2000. (Sources: *Population of Counties by Decennial Censuses: 1900 to 1990; and 2000 counts from the 2000 census, U.S. Census Bureau.)*

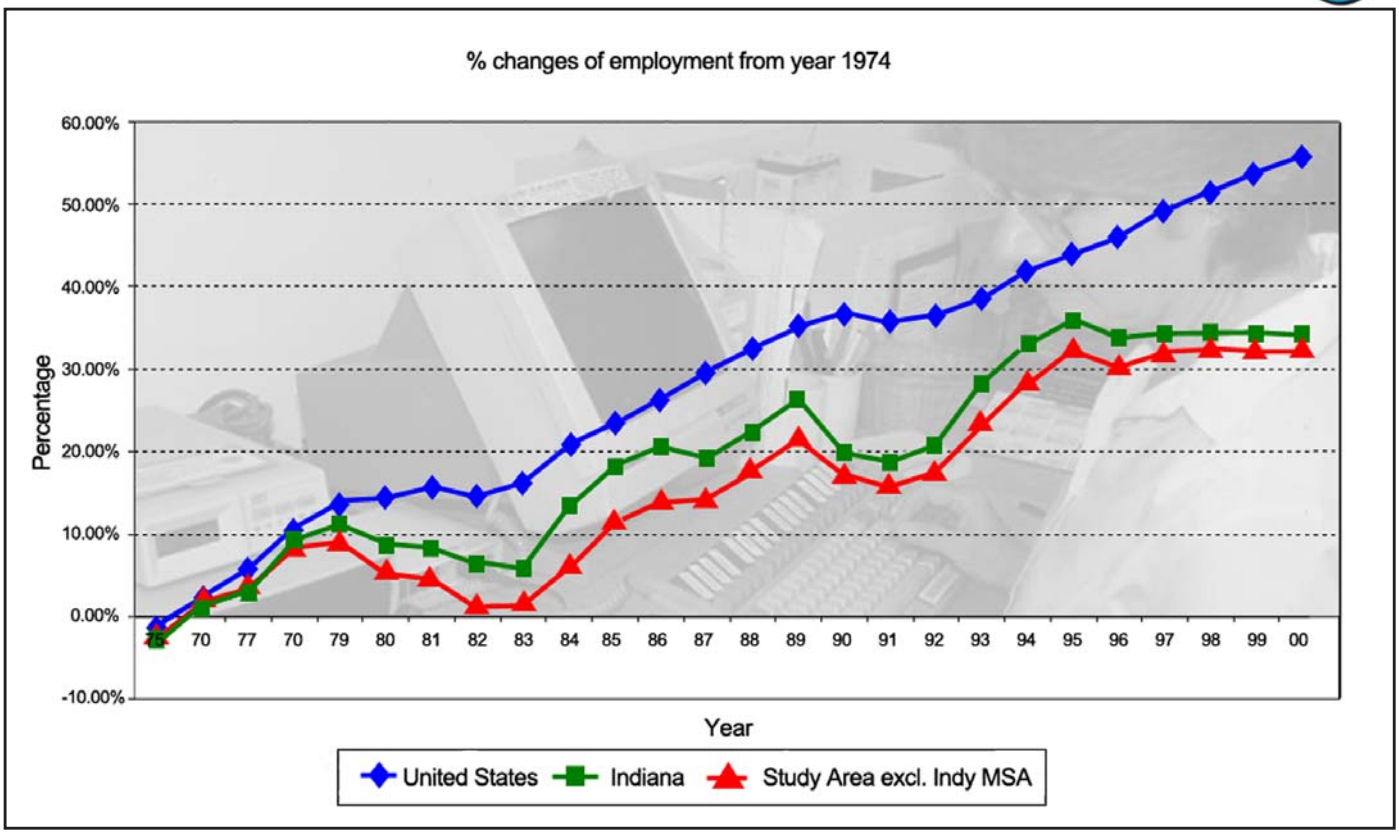


Figure 2-23: Percentage Changes in Employment, 1974 -2000

Employment Trends

Another indication of the lack of economic opportunity is the lower rates of job growth in the Study Area. During the last quarter century, both Indiana as a whole, and the Study Area itself, have lagged significantly behind the rest of the United States in employment growth. Between 1974 and 2000, employment in the United States grew at an average annual rate of 1.79%.[21] By contrast, employment in Indiana grew at an average annual rate of 1.12% during the same period.[22] Employment growth in the Study Area outside of the Indianapolis MSA grew at a slightly higher annual rate of 1.18% during this same period.[23] Figure 2-23 shows these employment trends.

In addition to considering the overall employment trends, it also is important to consider the trends within particular industries. Generally, a region's prospects for employment growth are greater if the region's employment base includes industries in which employment levels are growing rapidly. However, as detailed in Task Report 3.4, *Regional Economic Needs Analysis,* both Indiana and the Study Area are significantly *under*-represented in those industries that are the fastest-growing nationally. Key findings include the following:

21 Number of persons employed in the United States grew from 86,794,000 in 1974 to 135,208,000 in 2000. Source: Indiana Department of Workforce Development, Labor Market Information Services.

22 Number of persons employed in Indiana grew from 2,258,000 in 1974 to 2,983,900 in 2000. *(Source: Indiana Department of Workforce Development, Labor Market Information Services.).*

23 "SIC" stands for Standard Industrial Classification. It refers to a system of numerical coding for the classifying of industries.

- Across the United States, the 10 most rapidly growing industries, as measured by two-digit SIC code[24], include 14.1% of all jobs in 1997.[25]
- In Indiana, employment in these 10 most rapidly growing industries is 10.0% of all employment.
- In the Study Area outside of the Indianapolis MSA, 8.0% of all employment is in these 10 most rapidly-growing industries.
- The same trends are seen when the 20 most rapidly-growing industries nationally are considered.[26]
- Nationally, these 20 most rapidly-growing industries have 40.3% of all employment in 1997.
- In Indiana, employment in these 20 most rapidly-growing industries is 34.9% of all employment. This is about the same percentage for the Study Area outside of the Indianapolis MSA.

Finally, when considering employment trends, another important measurement is the rate of unemployment. Appendix 1 of the USDA study referenced above found that, during an 11 year period, six of the nine Indiana counties with the highest unemployment rates were in the Study Area. Table 2-6 shows these counties, with their average unemployment rate during this period.

Table 2- 6: Study Area Counties with High Unemployment, 1990 - 2001

County	Average Unemployment, 1990 - 2001	State Rank (of 92)
Orange	9.2%	2
Crawford	8.5%	4
Greene	8.1%	5
Lawrence	7.6%	6
Perry	7.5%	7
Sullivan	7.3%	9

Source: USDA Rural Development FY 2002 - Strategic Plan for Indiana

Personal Income

The Study Area (outside of the Indianapolis MSA) lagged behind both the United States and Indiana (outside of the Indianapolis MSA) in per capita personal income. In 1998 (the most recent year for which statistics are available) per capita personal income in the United States was $27,200.[27] In Indiana (outside of the Indianapolis MSA) per capita personal income was $23,800, and in the Study

24 "SIC" stands for Standard Industrial Classification. It refers to a system of numerical coding for the classifying of industries.

25 These 10 most rapidly growing industries include Agricultural services (SIC 07); Local and interurban passenger transportation (SIC 41); Nondepository institutions (SIC 61); Security and commodity brokers (SIC 62); Business services (SIC 73); Motion pictures (SIC 78); Amusement and recreational services (SIC 79); Social services (SIC 83); Museums and botanical and zoological gardens (SIC 84); and Services, NEC (SIC 89). "Agricultural Services" (SIC 07) refers to agriculture-related activities other than those related to the production of crops or livestock.

As of the compilation of these data, the most recent annual county level employment estimates by industry are from 1997.

26 In addition to the 10 industries cited in the previous footnote, the 20 most rapidly growing industries include Special trade contractors (SIC 17); Trucking and warehousing (SIC 42); Transportation by air (SIC 45); Transportation services (SIC 47); Home furniture, furnishings and equipment stores (SIC 57); Auto repair, services, and parking (SIC 75); Health services (SIC 80); Educational services (SIC 82); Membership organizations (SIC 86); and Engineering and management services (SIC 87).

27 Source for all income data in this paragraph: *Personal Income for All States & Counties, 1969 - 1998, U.S. Bureau of Economic Analysis.*

Table 2-7: Effective Buying Income in Selected Study Area Counties

County	2001 Effective Buying Income	Rank in Indiana (92=lowest)
Martin	$28,019	92
Orange	$28,356	91
Pike	$28,904	90
Greene	$29,352	89
Knox	$29,680	88
Daviess	$29,869	86
Crawford	$30,030	85
Clay	$30,201	84
Sullivan	$30,589	83
Vigo	$30,996	80
Owen	$31,674	77
Lawrence	$32,238	74

Source: USDA Rural Development FY 2002 - Strategic Plan for Indiana

Table 2-8: Poverty Rates in Selected Study Area Counties

County	1998 Poverty Rate	Rank in Indiana
Crawford	15.1%	1
Knox	15.0%	2
Vigo	14.9%	3
Daviess	13.9%	5 (tie)
Sullivan	13.9%	5 (tie)
Orange	13.4%	9
Vanderburgh	12.6%	13
Marion	11.9%	15
Monroe	11.7%	18
Clay	11.3%	21
Martin	11.2%	22
Owen	11.1%	24

Source: USDA Rural Development FY 2002 - Strategic Plan for Indiana

Area (outside of the Indianapolis MSA) it was even lower, at $22,700. The Study Area outside of the Indianapolis MSA reported per capita income which is 83% of the national average.

Furthermore, according to 2001 data in the USDA study, 12 of the 18 Indiana counties with the lowest average effective buying income were in the Study Area.[28] Table 2-7 shows these counties, with their 2001 Effective Buying Income. Nine of the ten counties with the ***lowest*** Effective Buying Income were in the Study Area. In addition, counties with high incomes are under-represented in the Study Area. Nine (9) of the 26 counties in the Study Area have effective buying income in the top 50% of the state; of these, four (Marion, Hendricks, Morgan, and Johnson) are in the Indianapolis MSA. Of the 22 Study Area counties outside of the Indianapolis MSA, only five (Spencer, Dubois, Warrick, Brown, and Posey) rank in the top one-half of the state in effective buying income.

Poverty

According to 1998 data in the USDA study, 12 of the 24 counties in Indiana with the highest poverty rates were in the Study Area.[29] **Five of the seven counties with the highest reported poverty rates are in the Study Area.** Table 2-8 shows the poverty rates in these 12 counties.

2.3.2.2 The Role of Transportation Systems in Supporting Economic Development

The analysis of economic conditions in Southwest Indiana indicates a need to enhance economic development opportunities. Therefore, it is important to consider the separate question of whether transportation improvements can help to address that need.

28 Source: U.S. Census Bureau, 1998. Cited in United States Department of Agriculture Rural Development, FY2002 Strategic Plan for Indiana, Appendix 1. "Poverty Rate" defined as percentage of people living in poverty

29 "Effective Buying Income" is defined as Household Personal Income minus taxes and non-tax payments. Source: United States Department of Agriculture Rural Development, FY2002 Strategic Plan for Indiana. Appendix 1

The relationship between transportation improvements and economic development is highly complex. However, it is possible to draw general conclusions about the potential role of transportation projects in creating opportunities for economic growth.

General Principles

The opportunity for economic growth in a region is directly affected by the cost of doing business. High costs of doing business tend to limit productivity, which makes businesses less competitive. Lower costs tend to produce greater sales, profits, employment, and an enhanced business climate. An improved business climate, in turn, benefits residents throughout the region.

One way to reduce the cost of doing business, and thus enhance opportunities for economic growth, is to reduce transportation costs. It is important to note, in this context, that even relatively small reductions in transportation costs – when measured for each individual trip – can have large overall benefits for a region's economy. The reason is that a small benefit, when multiplied over a large number of trips, results in a large net benefit to the economy. For example, if a transportation improvement allows businesses to complete deliveries quicker, transportation costs are reduced. Because they now enjoy a competitive advantage, these businesses can expand, employ more workers, and/or become more profitable. All of these circumstances benefit the regional economy.

Another opportunity which transportation improvements afford to businesses is to allow them to have a broader range of customer and supplier markets. A transportation improvement that increases a region's accessibility will expand the number of customers to which a business can market its goods and services. It also gives businesses a broader range of suppliers. This increase in the number of potential suppliers allows businesses to lower their costs of inputs, through the market forces of competition.

These reductions in business costs and broadening of markets for goods and services affects thousands of businesses. The economic models used in this analysis capture the effects of these improvements to the business climate, and forecast the effect they have on such things as number of people employed, levels of personal income, and many other economic measures.

In addition to reducing business costs, improvements in the transportation system result in increases in consumer disposable income. This is due to increased wages paid by businesses, as well as reductions in out-of-pocket crash costs. This increase, in turn, leads to increased consumer spending, and/or increased savings. Increased consumer spending causes business sales to increase; increased savings (among other results) makes more capital available for business investment. Thus, improving the transportation system can lead to enhanced economic growth not only by reducing business costs, but also by directly improving the economic well-being of individual consumers.

Analysis of Conditions in Southwest Indiana

The study team retained a panel of experts from the International Economic Development Council[30] (IEDC - formerly known as the Council for Urban Economic Development, or CUED). These experts were retained to help the study team develop a better understanding of the connection between transportation conditions and economic development opportunities in Southwest Indiana. In April of

30 IEDC is a nationally-recognized professional association of economic development practitioners.

2000, the IEDC panel and staff made a site visit to the Study Area. IEDC issued a report in October, 2000 entitled, *Evansville-to-Indianapolis (I-69) Project: Regional Economic Needs Analysis* (IEDC 2000). A summary of its key findings follows.

- The lack of accessibility to many areas of the Study Area is an impediment to business growth. This lack of accessibility is reflected in "extended and unreliable shipping times" in these areas. The panel further found: "...These problems will constrain economic growth...." (p. 63)
- IEDC found: "...The region's current businesses are highly reliant upon *all components* of the road system. Dependable trucking is a major driver of Indiana's and more particularly Southwest Indiana's economy..." (p. 62)
- IEDC found that the region's reliance upon highway transportation probably will increase in the future. It stated: "Current national logistics trends assure that the road system will remain of high economic importance, and most likely will increase in importance. Trends supporting this assertion include:
- Increasing customer expectations for quick delivery,
- Businesses' growing reliance upon just-in-time distribution,
- Expanding intermodalism, which involves a truck component, and
- Declining shipment sizes, which leads to increasing utilization of trucking over water or rail transport." (pp. 62-62)
- IEDC found that the Crane Naval Surface Warfare Center constitutes a particularly important opportunity to spur regional economic growth. It also found that the scope of this opportunity may be restrained by roadway accessibility to Crane. Other military locations which have been successful at attracting private economic development have a high level of ground access which Crane presently does not have. (p. 63)

The IEDC panel also analyzed the relationship between access to four-lane highways and economic growth in small towns. It found that, "The majority of the most rapidly-growing small towns have access to four-lane highways of some kind. This suggests that highways are important factors in generating employment growth through business attraction, retention, and expansion." (p. 63) This conclusion was based upon an analysis of the communities listed in "America's Top 100 Small Towns for Corporate Facilities," as listed in the March, 2000 issue of *Site Selection* magazine. This analysis identified cities and towns outside of metro areas which attracted the largest numbers of new and expanded business facilities during the approximately 11 years between 1989 and February 2000. (p. 48) The study found that:

- Of the 102 towns listed, 58 were located along either an Interstate or other fully access-controlled highway. Another 30 towns were located along a four-lane highway for which access was not fully controlled.
- Thus, 86% (88 of the 102) of small towns that were most successful in attracting significant new business were located along a four-lane highway.

These data strongly suggest that, in most cases, access to a four lane highway (though not necessarily an Interstate highway) is a necessary factor in attracting significant new industries to small towns. As the IEDC panel stated, "... economic development in rural areas served directly by

high quality four-lane highways does have potential to proceed on a different, and larger scale than does development in rural areas that are more isolated from highway systems. Highways can peak the interest of site selectors in many industries. Still, individual rural communities and regions may want only a moderate level of growth. For such areas, four-lane highway access is not critical." (p.54)

2.3.2.3 Crane Naval Surface Warfare Center and Economic Development

An outstanding center of cutting-edge, high tech employment is the Crane Naval Surface Warfare Center, located in Martin County. Few organizations surpass Crane in their impact on Southwestern Indiana, as well as the state as a whole. In December of 2000, an Impact Assessment of Crane's effect on the regional economy was prepared for the Southern Indiana Business Alliance, and the Indiana University School of Public and Environmental Affairs. (Impact Assessment, Crane Division of Naval Surface Warfare Center, Naval Sea Systems Command, by Strategic Development Group, Inc. December 13, 2000). The following sections are quoted from pages 3 and 4 of this report. The entire report (without its appendices) is included as Appendix AA in this DEIS.

> "...Crane is directly and indirectly responsible for almost 6,800 jobs in Indiana, and the over $241 million [in 1999] in wages associated with those jobs. It also adds over $22.2 million in tax revenues to state and local coffers.
>
> "At one time Crane's impact on the region and state was even greater. In 1991, the base employed approximately 4,700 workers, compared to the 3,240 people working at Crane as of July 2000. That's an estimated net loss of 1,460 jobs for Hoosiers over the course of nine years. Losses are likely to continue unless all stakeholders understand Crane's value and work to protect the interests of the region and state.
>
> "Conversely, an expansion at NSWC Crane would be a boon for Hoosiers. The next round of Base Realignment and Closure could lead to an increase in workload at Crane (as work from other military facilities is redistributed). New projects may also be assigned to the base. A sample projection shows that an addition of 200 jobs at the base would lead to 124 related jobs off the base. This translates to over $2.6 million in wages to employees. It would also bring in over $540,000 in tax revenues for the state and region.
>
> "Not only has Crane boosted the economies of surrounding communities, it has taken a leading role in assisting its neighbors with environmental protection, education, economic development, public safety and recreational opportunities. Projects typically involve local officials, Crane employees, and other community organizations.
>
> "In the primarily rural counties most heavily impacted by NSWC Crane, the base has a significant positive impact on education. It employs residents in a range of skilled jobs, counteracting the state's "brain drain" problem by attracting and retaining educated workers. Over 670 Crane employees attended Indiana institutions of higher education: 21 with associate degrees, 651 with baccalaureate degrees, and one with a doctoral degree. Workforce training dollars for Crane

> employees exceed $4.7 million annually. Crane contributes about $600,000 to Indiana colleges and universities. The base attracts federal aid to local schools, and its employees participate in a range of programs that enrich the education of the region's young people.
>
> "Community outreach is evident in the volunteerism and charity of Crane employees and their organizations, as well as public use of Crane facilities, community safety and infrastructure partnerships, and active participation in local and regional economic development efforts. Crane has also been a leader in environmental stewardship. The base makes significant contributions in the areas of natural resources management and research, hunting and fishing, outdoor recreation, green practices, and wildlife preservation and research. Technology transfer is another means by which communities have benefitted from the presence of Crane.
>
> "Despite the high level of economic and other benefits emanating from Crane, they could be considerably higher if Crane were used as an engine of technological leverage to spur a high-technology cluster in the region. The resources available at Crane, not the least of which is its cluster of scientists and engineers, make this a promising venture. Mechanisms to maximize technology transfer from Crane might include expanding partnerships with higher education institutions, creating a technology park, augmenting the technology transfer program with state funding, and providing state and federal funding support to channel retiring employees into starting high-tech entrepreneurial firms. Building on Crane's assets, a high-technology corridor could be developed that would benefit all of Indiana."

The report noted improved transportation linkages would be very helpful in Crane becoming a magnet for high-technology development. This was stated on page 54 of this same report:

> "Improved infrastructure linkages, particularly in terms of transportation, between Crane and the rest of the region would no doubt amplify the spillover benefits accruing from a Crane Technology Park. The proposed I-69 interstate highway would have a multiplier effect on the spillover of technology from Crane to private users. ... "

2.4 Public And Agency Input

Seeking input from environmental review agencies and the public has been an important part of this study. The Purpose and Need Statement was written with significant public and agency input. The public and agency input process into the Purpose and Need Statement included six public meetings and one meeting with government agencies. In these meetings, as well as other communications, the following key points were raised:

- Connection to Bloomington
- National and International I-69 Goals
- Consideration of Environmental Factors
- “Double Counting” of Goals & Performance Measures

- Analysis of Non-Transportation Alternatives
- Safety Analysis
- Economic Needs Analysis

See Chapter 11, *Comments, Coordination, and Public Input*, for detailed information regarding this public input process, the key issues which were raised, and how they were addressed in the Purpose and Need Statement.

2.5 Project Goals And Performance Measures

The proposed action is the completion of I-69 as an Interstate highway from I-64, just north of Evansville, Indiana, to I-465, south of Indianapolis, Indiana. The purpose of this proposed action is to achieve the following goals. The goals that are highlighted in *italics* have been identified as core goals of the project, based on consideration of the policy/legislative framework as well as the transportation and economic development needs assessment:

Strengthen the Transportation Network in Southwest Indiana

- *Improve the transportation linkage between Evansville and Indianapolis*
- *Improve personal accessibility for Southwest Indiana residents*
- Reduce existing and forecasted traffic congestion on the highway network in Southwest Indiana
- Reduce traffic safety problems.

Supports Economic Development in Southwest Indiana[31]

- Increase accessibility for Southwest Indiana businesses to labor, suppliers, and markets
- Support sustainable, long-term economic growth (diversity of employer types)
- Support economic development that benefits a wide spectrum of Southwest Indiana residents (distribution of economic benefits)

Completes the Portion of the National I-69 Project Between Evansville and Indianapolis

- *Facilitate interstate and international movements of freight through the I-69 corridor, in a manner consistent with the national I-69 policies*
- Connect I-69 to major intermodal facilities in Southwest Indiana

Specific performance measures have been developed for each of the project goals. For example, travel time and travel time savings were used to measure improvements in the transportation linkage between Evansville and Indianapolis. These performance measures are defined in Section 2.5.1, Performance Measure Definitions.

Tables 2-9 to 2-11 list national and state policies, as well as identified needs. Shown with these policies and needs are goals which address these identified policies and needs. Also shown are

31 An additional goal to reduce business costs was used in Level 2 Screening of Alternatives, but not in Level 3 Detailed Analysis of Five Alternatives. See Section 3.4 for explanation.

Table 2-9: Transportation Policies, Needs, Goals, and Performance Measures

1	TRANSPORTATION
Policy	Provide quality highway connections between major population centers
Need	Poor existing service between Evansville and Indianapolis (Evansville ranks last or near-last among 12 major urban centers in terms of connection to Indianapolis)
Project Goal	Core Goal: Improve the transportation linkage between Evansville and Indianapolis
Performance Measures	**Travel Time Savings** · **Free flow travel time savings between Evansville and Indianapolis** · **Congested travel time savings between Evansville and Indianapolis**
2	
Policy	Provide quality highway connections between major population centers. Provide accessibility to major tourism and recreation areas, regional economic centers, and areas with growth potential.
Need	As a whole, Southwest Indiana has lower level of accessibility to employment, population centers airports, etc. than other areas of the State.
Project Goal	Core Goal: Improve personal accessibility for Southwest Indiana residents
Performance Measures	**Proximity Indices** · **Population within 1, 2, and 3 hours of Indianapolis** · **Population within 1 hour of major educational institutions** · **Population within 30 minutes of major urbanized area (50,000+population)** Travel Measures · Vehicle-miles of travel (VMT) on Major Highways · Vehicle-hours of travel (VHT) on Major Highways Accessibility Indices · Accessibility to population index · Accessibility to employment index · Population-weighted accessibility to employment index
3	
Policy	Provide quality highway connections between major population centers. Provide accessibility to major tourism and recreation areas, regional economic centers, and areas with growth potential.
Need	Overall, congestion is not a major problem on the rural arterial network in SW Indiana. However by 2025, congestion will become severe in localized areas within SW Indiana, including: . Bloomington to Indianapolis . US 41 Near Princeton . US 50
Project Goal	Reduce existing and forecasted traffic congestion on the highway network in Southwest Indiana.
Performance Measures	**Study Area Congestion Measures** · **Volume-to-capacity ration (V/C) on major highways, weighted by VMT** · **Percentage of congested road lane -miles** · **Percentage of Congested VMT** · **Percentage of Congested VHT** · **Percentage of VHT Operated in Delayed Conditions** · **Efficient System Performance Index (ESPI) by VHT**
4	
Policy	Consider safety in all aspects of planning, design, and operation of transportation network.
Need	Several rural counties in the Study Area have crash rates well above the statewide average. · Owen County · Band of counties in the middle of the Study Area - Knox, Daviess, Pike, Martin, Dubois, Lawrence, and Orange Several individual highway segments have above-average crash rates.
Project Goal	Improve safety levels in Southwest Indiana.
Performance Measures	**Crash Rates** · **Reduction in number of fatal crashes** · **Reduction in number of injury crashes** · **Reduction in number of property damage only (PDO) crashes.**

Table 2-10: Economic Development Policies, Needs, Goals, and Performance Measures

5	ECONOMIC DEVELOPMENT
Policy	Provide good accessibility to Indiana's major production and manufacturing concentrations; regional economic concentrations
Need	Lack of accessibility increases transportation costs, and therefore poses barrier to increased economic growth
Project Goal	Increase accessibility for Southwest Indiana businesses to labor, suppliers, and consumer markets.
Performance Measures	**Access to Labor and Consumer Markets** · **Access of businesses to labor and consumer markets, which captures project benefits for attracting workers and shoppers** **Access to Buyer / Supplier Markets** · **One-day freight access to buyer/supplier markets, which captures project benefits related to improved freight connections**
6	
Policy	Develop a transportation system that responds to demographic change while contributing to the quality of life.
Need	Study Area is significantly under-represented in fastest growing and highest paying industries.
Project Goal	Support sustainable, long-term economic growth.
Performance Measures	**Employment** · **Net change in employment** · **Employment in high-growth industries** · **Employment in high-paying industries** **Income** · **Net change in real disposable income** · **Net change in farm income and forest income** **Sales** · **Estimated change in roadside business sales**
7	
Policy	Develop a transportation system that responds to demographic change and contributes to the quality of life.
Need	Study Area has a disproportionate number of counties with high rates of poverty, when compared to the rest of Indiana. High level of economic stress among rural counties
Project Goal	Support economic development that benefits a wide spectrum of Southwest Indiana residents
Performance Measures	**Population** · **Young working-age population** **Income** · **Transfer payments per capita** Employment · Ratio of employment-to-labor force

Table 2-11: National I-69 Policies, Needs, Goals, and Performance Measures

8	NATIONAL I-69
Policy	Improve international and interstate trade in accordance with national and state goals. Connect "named cities" (including Evansville and Indianapolis) with an Interstate
Need	Need to address transportation needs associated with increased good movements between Canada, USA and Mexico under NAFTA
Project Goal	*Core Goal:* Facilitate interstate and international movements of freight through the I-69 corridor, in a manner consistent with the national I-69 policies.
Performance Measures	**Truck Traffic** · **Daily Truck Hours of Vehicle Travel (VHT) saved** Design Compatibility · Termini: I-64 north of Evansville and I-465 south of Indianapolis · Mode: Freeway constructed to Interstate design standards
9	
Policy	Facilitate connections to intermodal facilities and major ports along the corridor
Need	Need to connect existing intermodal facilities to new I-69 corridor
Project Goal	Connect I-69 to major intermodal facilities in Southwest Indiana
Performance Measures	**Intermodal Connections** · **Accessibility to Intermodal Centers**

performance measures which show how well a particular alternative satisfies each goal. For further information about each performance measure, consult *Task Report 3.2, Project Issues and Performance Factors*, September 5, 2000. As noted in Tables 2-9 to 2-11 different measures were used in the screening versus the detailed analysis of five alternatives. Measures which were used in both the screening (Level 2) and detailed analysis (Level 3) are shown in **bold** type. Other measures were used only in the screening analysis.

2.5.1 Performance Measure Definitions

Following are definitions of each performance measure shown in Table 2-9 to Table 2-11. For more information, see Technical Reports 3.2.1, *Transportation Performance Measures* and 3.2.2, *Economic Performance Measures*.

2.5.1.1 Transportation Performance Measures

Following are the definitions of transportation performance measures used in Table 2 - 9.

Evansville - Indianapolis Connection (core goal)

- *Free flow travel time savings between Evansville and Indianapolis is the savings in time which a vehicle would have if it made a trip in the absence of any traffic congestion.*
- *Congested travel time savings between Evansville and Indianapolis is the savings in time which a vehicle would have if it made a trip under typical weekday traffic conditions.*

Personal Accessibility (core goal)

- *Vehicle-miles of travel (VMT) on Major Highways is the daily vehicle miles traveled on Interstate Highways and Principal Arterial Roads.*
- *Vehicle-hours of travel (VHT) on Major Highways is the daily vehicle hours traveled on Interstate Highways and Principal Arterial Roads.*
- *Accessibility to Population Index is a mathematical measure of access based on the size of population at various destinations and the highway travel time to those destinations.*
- *Accessibility to Employment Index is a mathematical measure of access based on the size of employment at various destinations and the highway travel time to those destinations.*
- *Population-weighted Accessibility to Employment Index is a mathematical measure of access based on the size of employment at various destinations and the highway travel time to those destinations, weighted by the size of population at the origin.*
- *Population within 1, 2, and 3 hours of Indianapolis is the sum of the increase in population within 1, 2 or 3 hours highway travel time of Indianapolis.*
- *Population within 1 hour of Major Educational Institutions is the sum of the increase in population within a one hour highway travel time of major universities.*
- *Population within 30 minutes of Major Urbanized Area is the sum or the population within a 30 minute travel time of Indianapolis, Terre Haute, Bloomington, or Evansville.*

Traffic Congestion

- Volume-to-Capacity Ratio (v/c) on major highways, weighted by VMT is the ratio of the usage to capacity of Interstates and Other Principal Arterials.
- Percentage of congested road lane-miles is percentage of Study Area lane miles with v/c ratio of over 0.75.
- Percentage of congested VMT is percentage of Study Area Vehicle Miles of Travel (VMT) with v/c ratio of over 0.75.
- Percentage of congested VHT is percentage of Study Area Vehicle Hours of Travel (VHT) with v/c ratio of over 0.75.
- Percentage of VHT operated in delayed conditions is a measure of the “excess” VHT which occurs due to traffic congestion.
- Efficient System Performance Index by VHT is an index which measures the amount of highly congested conditions (v/c ratios over 1.00).

Safety

- Reduction in number of fatal crashes is the reduction in Forecasted Year 2025 crashes in the Study Area which involve a fatality.
- Reduction in number of injury crashes is the reduction in Forecasted Year 2025 crashes in the Study Area which involve an injury, but no fatality.
- Reduction in number of property damage only (PDO) crashes is the reduction in Forecasted Year 2025 crashes in the Study Area which do not involve a death or personal injury.

2.5.1.2 Economic Development Performance Measures

Following are the definitions of economic development performance measures used in Table 2 - 10.

Business Accessibility

- Access to labor and consumer markets is the percentage increase in the population reachable within one-half hour of key locations in the I-69 Study Area.
- Access to buyer and supplier markets is the increase in employment reachable within three hours of key locations in the I-69 Study Area.

Long-Term Economic Growth

- Net change in employment is the increase in the number of jobs in the Study Area in 2025.
- Employment in high growth industries is the increase in Study Area employment in the fastest growing industries in the United States.
- Employment in high-paying industries is the increase in Study Area employment in the industries with the highest average wage in the United States.
- Net change in real disposable income is the increase in total household disposable income for all households in the Study Area.
- Net change in farm income and forest income is the change in Study Area income from activities related to the raising and harvesting of agriculture and forestry products.
- Estimated change in roadside business sales is the change in annual sales by businesses which are located on or near the proposed highway.

Social Distribution of Economic Benefits

- Ratio of employment to labor force is a measure of unemployment in the Study Area.
- Transfer payments per capita is a measure of the per person payments of all forms of government assistance in the Study Area.
- Young working age population is the number of workers in the Study Area in the 25-44 year old age cohort.

2.5.1.3 National I-69 Performance Measures

Following are the definitions of economic development performance measures used in Table 2 - 11.

Interstate and International Trade (core goal)

- *Termini refers to the need for a route to connect I-64 near Evansville with I-465 Southwest of Indianapolis.*
- *Mode refers to the need for a route to be a freeway constructed to Interstate design standards.*
- *Daily truck hours of vehicle travel saved is the reduction in the number of truck hours traveled.*

Intermodal Connectivity

- Accessibility to intermodal centers is a mathematical measure of access based on annual intermodal tonnage served at various freight facilities and the highway travel time to those destinations. "Intermodal tonnage" refers to freight which travels by more than one mode (Water, rail truck, air, etc.).

Chapter 3 - Alternatives

3.1 Process Overview

The process of scoping, screening, and analyzing alternatives in detail is the heart of the Environmental Impact Study (EIS) process. This chapter summarizes this process. In describing this process, the following factors must be noted in order to understand the study procedures.

- The Study Area includes 26 counties – approximately one quarter of the State of Indiana. Within the Study Area, there are major cities, mid-size cities, small towns, and rural communities.
- The project serves numerous objectives across a broad geographic area. The diversity of the project's goals is reflected in dozens of performance measures.
- The alternatives are spread across a broad area. While they all connect the same termini, they serve different cities and pass through different counties.
- This project is now part of a national transportation corridor that Congress has designated as Interstate 69. For that reason, this EIS will focus on the evaluation of alternatives that involve the completion of an Interstate highway.

As a result of the size and complexity of this project, FHWA and INDOT determined that it was appropriate to use a "tiered" procedure for completing the environmental studies required under the National Environmental Policy Act (NEPA). The use of a tiered process to comply with NEPA is authorized under the Council on Environmental Quality (CEQ) regulations, which apply to all federal agencies, and under FHWA's own NEPA regulations. (See 40 CFR 1508.28 and 23 CFR 771.135(o)).

In recent years, the use of tiering for FHWA NEPA documents has increased. In the context of one recent project, which involved an existing section of I-70 in Missouri, FHWA headquarters explained the agency's overall approach to preparing tiered documents (Appendix X):

> "As contemplated in our regulations and in the Council on Environmental Quality regulations, tiering is an option available to organize analysis and decision-making in complex circumstances in a way that takes into account the different geographic scope and timing for different decisions. The difference in scope and timing for the strategic decision of how to address long range needs on a 200 mile long section of I-70 between the major metropolitan areas in Missouri versus the specific location and design decisions for much shorter "projects" on I-70 certainly justifies a tiered approach. Because tiering is an option available to address complex situations, we have deliberately stayed away from prescriptive guidelines on how to apply tiering, so that each tiered process can be custom designed to the specific situation."

In accordance with this flexible approach, a tiered process was developed that is appropriate to the specific needs of this project. In this process, the purpose of the Tier 1 EIS is to provide the basis for an informed decision on a "corridor" for I-69 between Evansville and Indianapolis, not to determine the exact alignment for the highway. (The concept of a corridor is explained in Section 3.3.4.) As a result, the environmental data in this Tier 1 EIS has been developed with the intention of providing

the level of detail needed to make an informed decision on a corridor. As can be seen by the scope of this document, FHWA and INDOT have determined that a substantial amount of information is needed even at this first tier. Nonetheless, it must also be recognized that this study is not intended to provide the basis for selection of an exact alignment, and therefore does not contain the level of engineering or environmental detail that would be needed to make a specific alignment decision. That information will be developed in Tier 2.

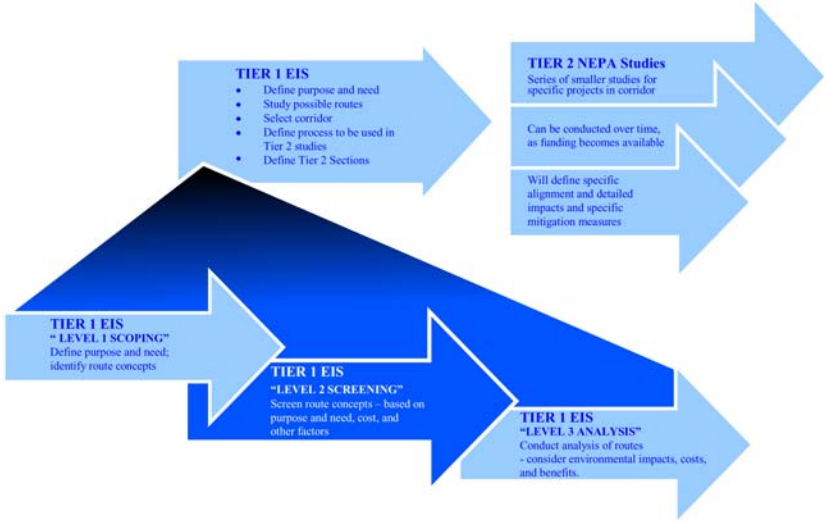


Figure 3-1: Tiering Process and Tier 1 Activities

The Tier 1 EIS analysis of alternatives involves three levels, which are also depicted in Figure 3-1. The three levels in Tier 1 include:

- **Level 1: Scoping and Development of Route Concepts** The scoping process included the development of the Purpose and Need statement. Fourteen (14) potential route concepts were developed. Some had different "options" for connecting to Indianapolis. Altogether, taking into account the options, a total of 19 route concepts were developed.
- **Level 2: Screening of Alternatives** Each of the 19 route concepts were analyzed to determine how each achieved the project's goals as defined in the purpose and need. Preliminary cost estimates also were developed. Five routes were selected for detailed analysis.
- **Level 3: Detailed Analysis of Alternatives** Detailed analyses of the five routes were conducted. Several of these routes had options for connecting to Indianapolis. Altogether, taking into account the options, 12 distinct alternatives are being considered in Level 3. The analysis included effects on land use, air quality, construction, historical and archaeological preservation, endangered or threatened species, wetlands, wildlife, agricultural land, water quality, indirect impacts, cumulative impacts, and relocations. Likewise, performance and cost measures were analyzed.

This chapter summarizes the results of the Level 1 and Level 2 analysis, as well as the Purpose and Need and cost analysis conducted in Level 3. Chapter 5, *Environmental Consequences*, contains the environmental analysis conducted in Level 3. Chapter 6, *Comparison of Alternatives,* combines this information into the overall Level 3 impacts analysis.

As a final note, this study's process of developing, screening, and evaluating alternatives in detail differs significantly from the typical EIS. A typical EIS involves alternatives within a specific corridor or urban area. In this EIS, alternatives are found within a 26 county study area which is larger than the State of New Jersey. It was realized at the outset of the study that it was important not to confine the range of alternatives to a single corridor or narrowly-defined geographic area. INDOT Commissioner Cristine Klika gave the following direction at the outset of the study:

> "Once a broad range of alternatives has been developed, we will need to screen those alternatives in order to identify a set of reasonable alternatives for detailed study. In making this decision, we will consider - as we do in every study - the ability of each alternative to achieve the project's basic objective. But in a study of this nature, we must be particularly careful to avoid prematurely eliminating alternatives that may later be found to have significant advantages in terms of environmental impacts or costs. Therefore, we should seek to carry forward a *geographically diverse range of alternatives* in order to allow maximum flexibility in selecting a preferred alternative."(Memo, February 24, 2000)

This need to be flexible and innovative, given the nature of this project, also was acknowledged by FHWA at the national level. Eugene W. Cleckley, FHWA Director of the Southern Resource Center who oversees the National I-69 project for FHWA wrote the following in a September 27, 1999 letter to Dan Flowers, Director of Highways and Transportation for the Arkansas State Highway Commission and Chairman of the National I-69 Steering Committee:

> "As discussed at our May 21, 1999, meeting, I-69 is a massive undertaking for the nation and the implications are monumental. The challenges before us are unique, different in scale, and complex. Our normal and routine way of advancing projects will not apply. Using our existing procedures, processes and decision-making we must apply special emphasis and technique to advance I-69...."

Accordingly, in addition to the use of a tiered process, there are two other ways in which the analysis framework differs from the typical EIS. These are:

- **Screening Alternatives in Geographic Groups.** In the Level 2 Screening of Alternatives, routes were grouped according to common geographic characteristics. In determining which routes were carried forward for detailed analysis, routes were compared (using Purpose and Need and cost considerations) **only with alternatives in their same geographic group.** Thus, the alternatives carried forward for detailed study did not represent the alternatives which, overall, best satisfied the Purpose and Need. Rather, they represented the alternative(s) which, within each geographic group, performed the best. Thus, in the Level 2 analysis, the alternatives which were compared were the "best in family" from within each geographic group and were not necessarily the best overall, in terms of satisfying the Purpose and Need. This screening is described in Section 3.3.
- **Identifying Preferred Alternatives in the DEIS.** This DEIS indentifies preferred alternatives. The preferred alternatives performed well in addressing the Purpose and Need, and also had an acceptable level of impacts. Other alternatives, either because of high impacts or poor performance, were not identified as preferred alternatives. After receiving input from review agencies and the public, a single preferred alternative will be identified in the Final EIS. The preferred alternatives are identified in Section 6.2.

3.2 Level 1 Scoping and Development of Route Concepts

This section of the report describes the scoping process and the development of the route concepts. A route concept may be thought of as a simple line connecting points on a map. Each route concept is described below. Also, see Figure 3-2.

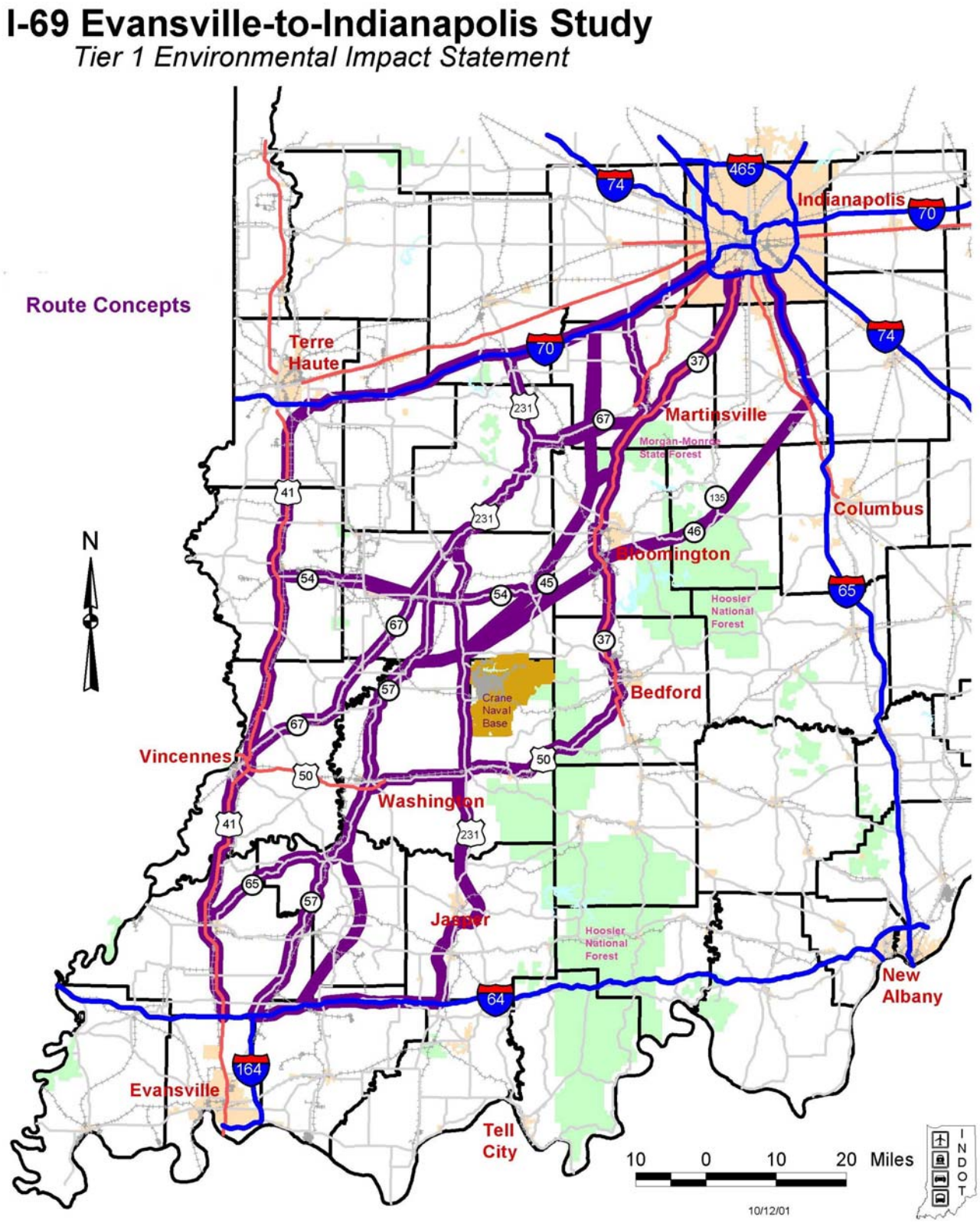


Figure 3-2: Route Concepts

3.2.1 The Scoping Process

Early in the study, meetings were held with federal and state review agencies to help frame the major issues and design a process for conducting the study. An additional aspect of those meetings was to "scope" the range of alternatives that should be studied. Two corridor concepts (i.e., "D" and "K") originated from suggestions made in those meetings. Similarly, three public meetings were held out of which Route "G" arose as a variation of "F". In addition to these outreach efforts, previous studies were examined to ensure that the work of others was considered in the scoping of alternatives.

3.2.2 Route Concepts

The following describes the route concepts that were evaluated in this phase of the study. Figure 3-3 shows individual maps for each route concept.

3.2.2.1 Route Concept "A"

Route Concept A consisted of about 155 – 158 driving miles from I-64 / US 41 to I-465. However, it is important to note that the length of construction is only about 90 miles, since the widening of I-70 between Terre Haute and Indianapolis from 4 to 6 lanes is a "committed project." This route concept began at the US 41 / I-64 interchange, and made use of the US 41 corridor, northward to the proposed SR 641 Terre Haute bypass. Some options were developed through and around Fort Branch, Vincennes, and Farmersburg. This route concept then used the SR 641 bypass to I-70, and I-70 from SR 641 to I-465.

3.2.2.2 Route Concept "B"

Route Concept B consisted of about 147 – 156 driving miles from I-64 / US 41 to I-465. The route began at the US 41 / I-64 interchange, and made use of the US 41 corridor, northward to SR 65. Some alternative alignments were considered through or around Fort Branch. This route concept then followed the SR 65 corridor, northeast, to just north of the East Fork of the White River. It then traveled along the SR 57 corridor to near the Daviess / Greene County Line (near Elnora). Optional alignments were considered to bypass Washington. It then traveled northeast cross-country to SR 37 (near Bloomington). Then, it traveled along the existing SR 37 corridor to SR 39. Two options were considered to bring this route concept from SR 39 to I-465. Route "B-1" traveled along the SR 39 corridor northward to I-70, then take I-70 to I-465. The second option, "B-2" used the SR 37 corridor to I-465. For portions of the SR 37 corridor, new alignments were considered.

3.2.2.3 Route Concept "C"

Route Concept "C" was about 146 – 149 driving miles from I-64 / US 41 to I-465. This route concept began at the US 41 / I-64 interchange, and made use of the US 41 corridor, northward to SR 67. Some alternative alignments were considered through or around Fort Branch and Vincennes. Route "C" then followed the SR 67 corridor to Paragon, in Morgan County. During the course of this study, a second option for the northern portion of this route (from a point near Paragon on SR 67) was added

to the original concept. The original concept was referred to as "C-1" and the second concept as "C-2". Route Concept "C-1" traveled cross-country from a point at or near Paragon, northward, in Morgan County to I-70. Alternative alignments were considered between Paragon and I-70. This route concept then make use of I-70 to I-465. "Route Concept C-2" continued along the SR 67 corridor east of Paragon until reaching the SR 39 bypass, which connected SR 67 and SR 37 south of Martinsville. At that point, Route Concept "C-2" diverged from SR 67 and connected to SR 37, and then proceeded northward along the SR 37 corridor to I-465.

3.2.2.4 Route Concept "D"

Route Concept "D" consisted of about 164 – 168 driving miles from I-64 / US 41 to I-465. This route concept began at the US 41 / I-64 interchange, and made use of the US 41 corridor, northward to near SR 54. Some alternative alignments were considered through or around Fort Branch and Vincennes. Route Concept "D" then traveled along the SR 54 corridor, northeast to a point west of SR 45. From this point, the route concept traveled cross-country to SR 37, near Bloomington. It followed the SR 37 corridor north to I-465. For portions of the SR 37 corridor, cross-country options were considered.

3.2.2.5 Route Concept "E"

Route Concept "E" was about 150 – 153 driving miles from I-64 / US 41 to I-465. This route concept began at the US 41 / I-64 interchange, and made use of the US 41 corridor, northward to near SR 54. Some alternative alignment were considered through or around Fort Branch and Vincennes. This route concept then traveled along the SR 54 corridor northeast to a point near SR 67. It followed the SR 67 corridor in an easterly direction to Paragon in Morgan County. The route then traveled cross-country from Paragon to I-70. Alternative alignments were considered to bring I-69 from Paragon to I-70. The route concept then traveled on I-70 to I-465.

3.2.2.6 Route Concept "F"

Route Concept F consisted of about 141 – 142 driving miles from I-64 / I-164 / SR 57 to I-465. This concept began at the I-64 / I-164 / SR 57 interchange, and followed the SR 57 corridor northeast to Newberry in Greene County. Two different concepts were considered to bypass Washington. Route "F" then traveled cross-country, east, from Newberry to US 231; then northeast to around SR 46 near Ellettsville in Monroe County. During the course of this study, a second option for the northern portion of this route (from near Ellettsville to I-465) was added to the original concept. The original concept was referred to as "F-1" and the second concept as "F-2". The first option ("F-1") traveled cross-country, north to I-70. Alternative alignments were considered between Paragon in Morgan County and I-70. "F-1" then traveled along I-70 to I-465. The second alternative ("F-2") traveled cross-country to SR 37 and uses the SR 37 corridor to I-465. For portions of the SR 37 corridor, new alignments were considered.

3.2.2.7 Route Concept "G"

Route Concept "G" consisted of about 142 – 143 driving miles from I-64, east of I-164 / SR 57, to I-465. This route concept traveled cross-country from I-64 (east of the I-164 / SR 57 Interchange) to SR

356. It then traveled along the SR 57 corridor to Newberry, in Greene County. Some alternative alignments were considered to bypass Washington. This route concept then traveled cross-country east, from Newberry to US 231; then northeast to around SR 46 near Ellettsville in Monroe County; and north to I-70. Some alternative routings were considered between Paragon in Morgan County and I-70. This route concept then traveled along I-70 to I-465.

3.2.2.8 Route Concept "H"

Route Concept "H" consisted of about 139 – 146 driving miles from I-64 / I-164 / SR 57 to I-465. This route concept began at the I-64 / I-164 / SR 57 interchange, and followed the SR 57 corridor, northeast to Newberry in Greene County. Some alternative routings were considered to bypass Washington. Route Concept "H" traveled cross-country, east from Newberry to SR 37 near Bloomington. Then, it traveled along the SR 37 corridor to SR 39. This route concept had two major options between SR 39 to I-465. The first option ("H-1") traveled along the SR 39 corridor, northward to I-70 and then takes I-70 to I-465. The second option ("H-2") used the SR 37 corridor to I-465. For portions of the SR 37 corridor, new alignments were considered.

3.2.2.9 Route Concept "I"

Route Concept "I" consisted of about 143 driving miles from I-64 / I-164 / SR 57 to I-465. This route concept began at the I-64 / I-164 / SR 57 interchange, and followed the SR 57 corridor, northeast to SR 67. Alternative routings were considered to bypass Washington. It then used the SR 67 corridor northeast to US 231, where it followed the US 231 corridor north to I-70. This route concept then traveled on I-70 to I-465.

3.2.2.10 Route Concept "J"

Route Concept "J" consisted of about 141 – 142 driving miles from I-64 / I-164 / SR 57 to I-465. This concept began at the I-64 / I-164 / SR 57 interchange, and followed the SR 57 corridor, northeast to SR 67. Alternative routings were considered to bypass Washington. It then used the SR 67 corridor northeast to Paragon in Morgan County. From this point, it traveled north cross-country to I-70. Optional routings were considered between Paragon and I-70. Route Concept "J" then traveled on I-70 to I-465.

3.2.2.11 Route Concept "K"

Route Concept "K" is about 152 driving miles from I-64 / I-164 / SR 57 to I-465. This route began at the I-64 / I-164 / SR 57 interchange, and followed SR 57 northeast to Newberry in Greene County. Optional routings were considered to bypass Washington. The route concept then traveled cross-country, northeast from Newberry to SR 37 near Bloomington. From this point, it traveled cross-country to SR 46 near the Monroe / Brown County Line. The route concept then used the SR 46 corridor to SR 135 near Nashville. It then traveled cross-country northeast from SR 135 to I-65. This route concept then proceeded along I-65 to I-465.

Figure 3-3: Individual Route Concept Maps

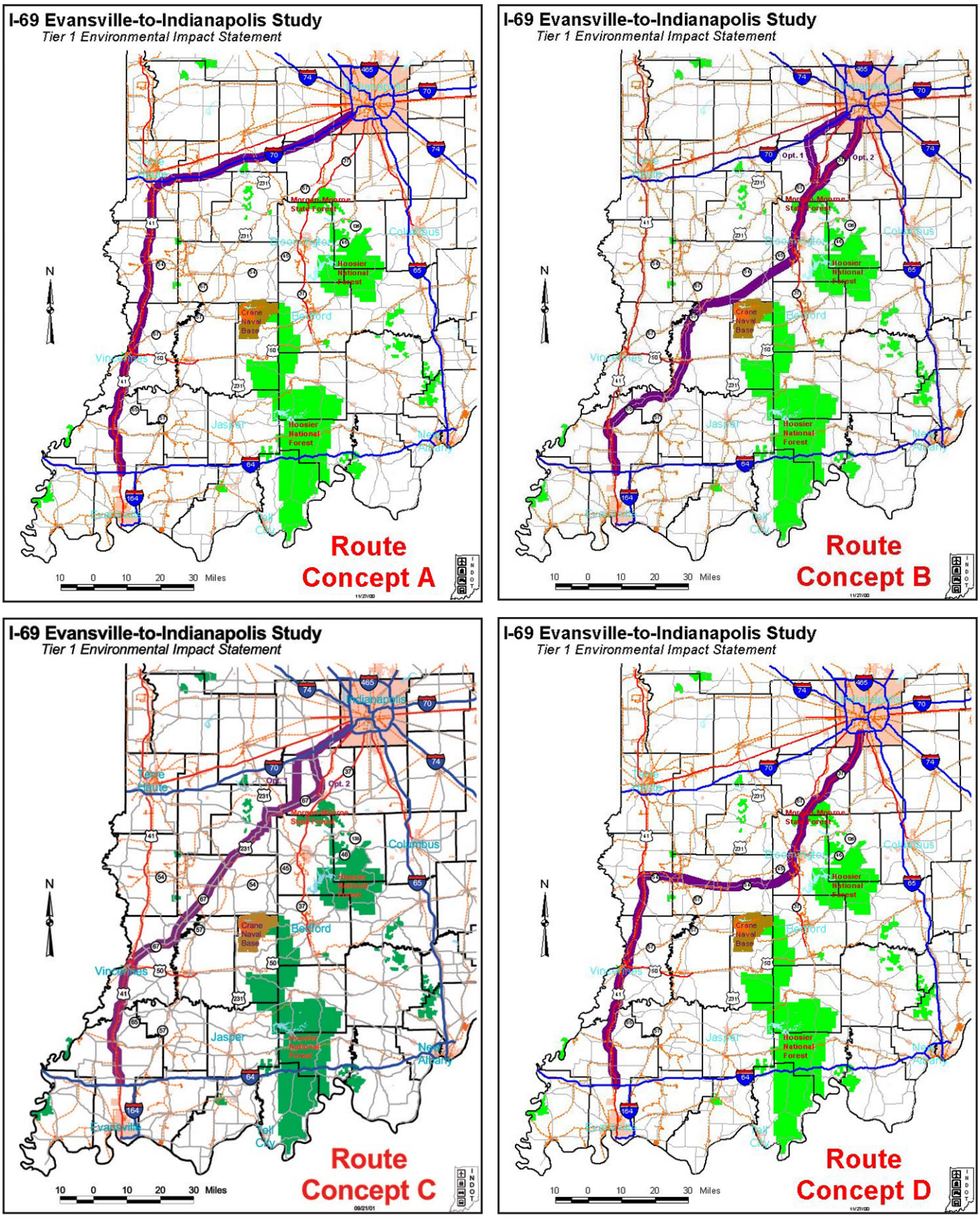
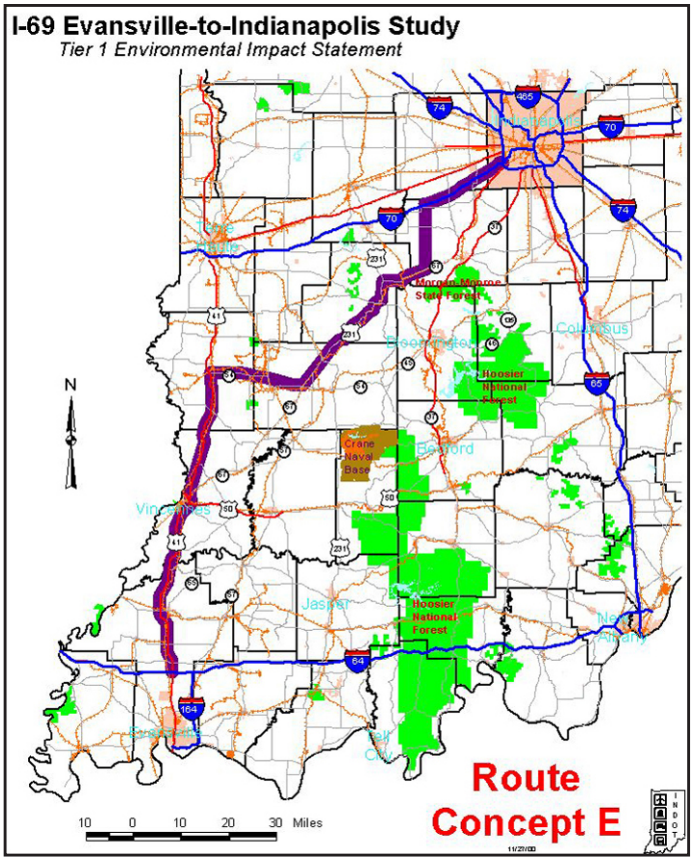
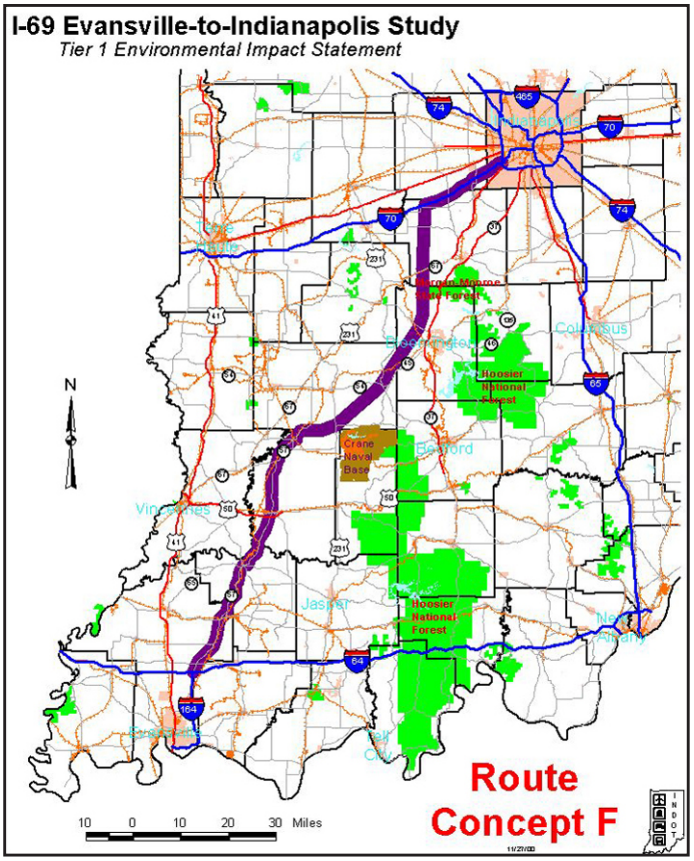
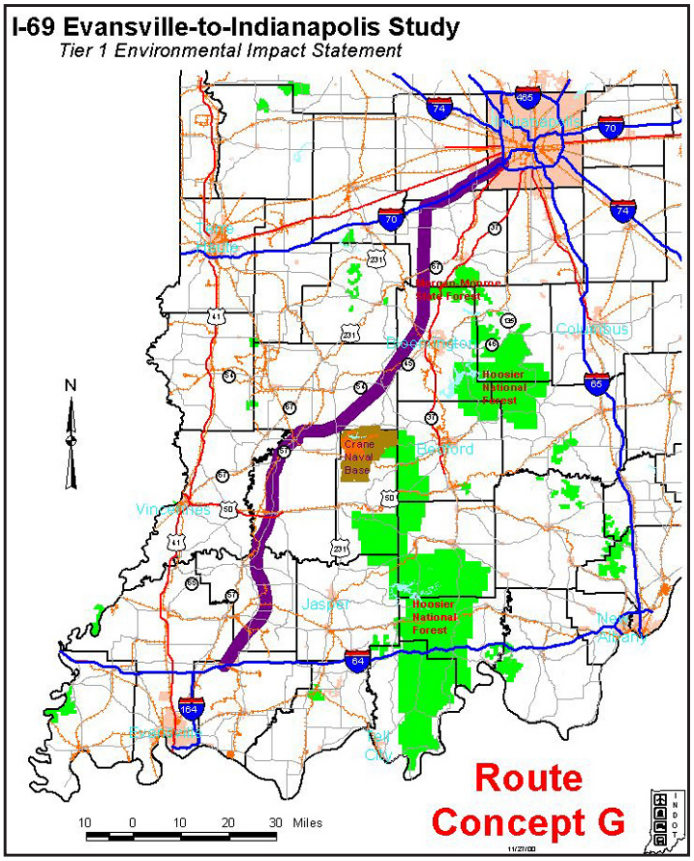


Figure 3-3: Individual Route Concept Maps







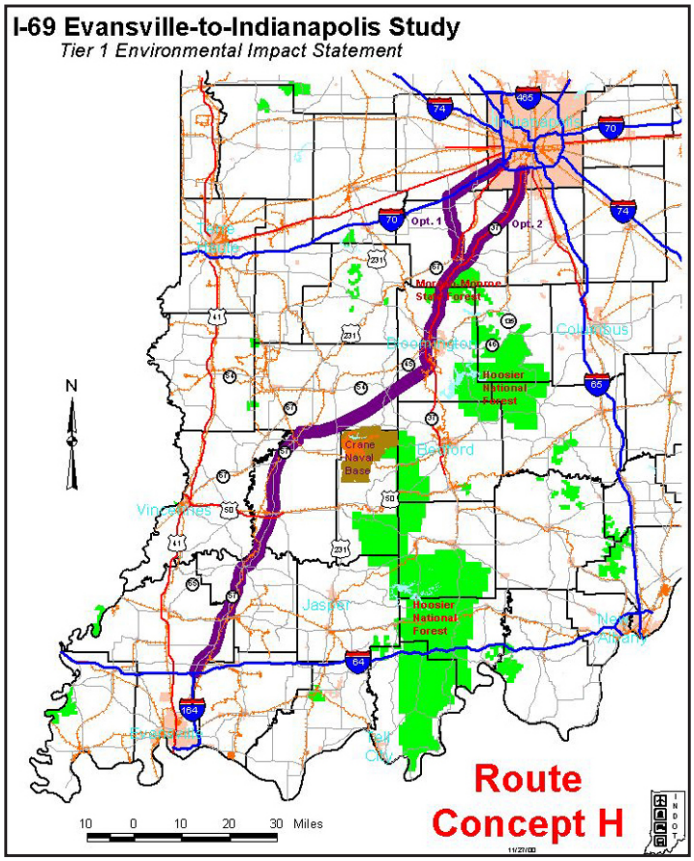


Figure 3-3: Individual Route Concept Maps

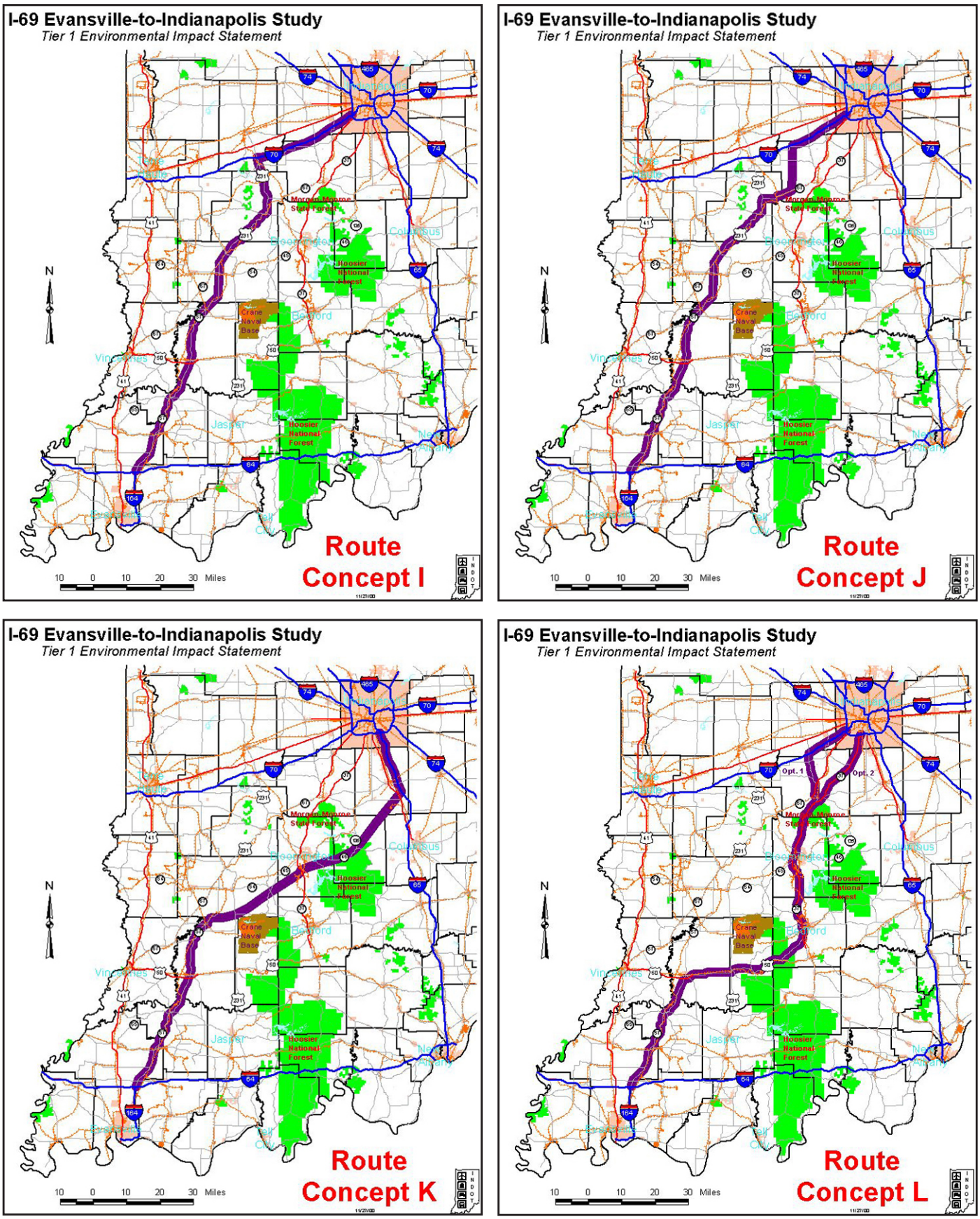
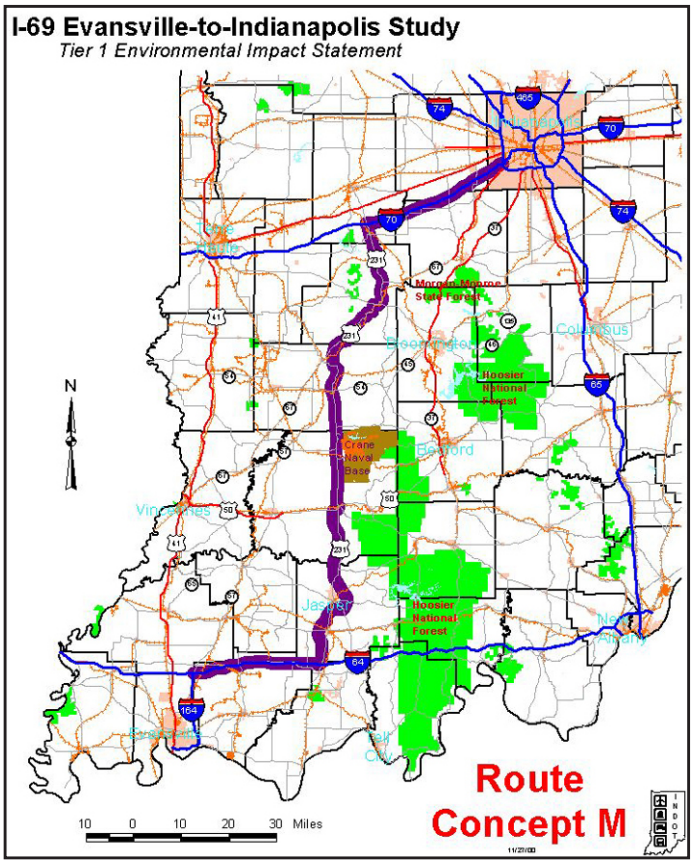
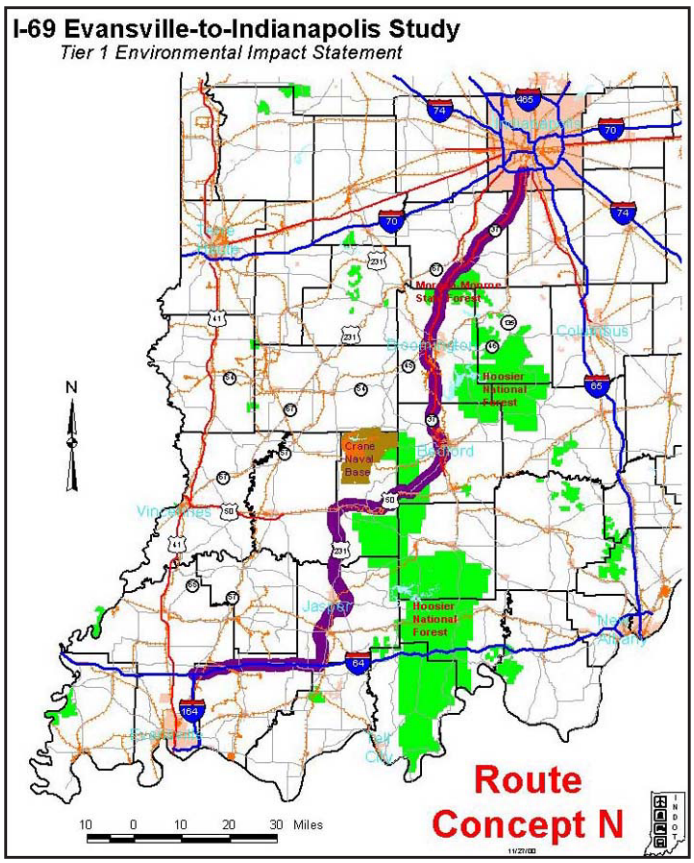


Figure 3-3: Individual Route Concept Maps





3.2.2.12 Route Concept "L"

Route Concept "L" consisted of about 146 – 152 driving miles from I-64 / I-164 / SR 57 to I-465. This route concept began at the I-64 / I-164 / SR 57 interchange, and followed the SR 57 corridor, northeast to US 50 near Washington. Some alternative alignments were considered to bypass Washington. Route "L" then traveled along the US 50 corridor in an easterly direction to SR 37, where it followed the SR 37 corridor to SR 39. Route Concept "L" had two major options from SR 39 north to I-465. "L-1" traveled along the SR 39 corridor northward to I-70, and then took I-70 to I-465. "L-2" used the SR 37 corridor to I-465. For portions of the SR 37 corridor, new alignments were considered. The US 50 corridor between Washington and Bedford has been identified for potential improvement to a four-lane facility in the Statewide Long-Range Plan. Accordingly, the preliminary cost estimate for these improvements was deducted from the cost of Route Concept "L".

3.2.2.13 Route Concept "M"

Route Concept "M" consisted of about 161 driving miles from I-64 / I-164 to I-465. This route concept began at the I-64 / I-164 / SR 57 interchange and traveled east along I-64 to US 231. At this point, the route concept traveled north on the proposed upgrade/relocation of the US 231 corridor near Jasper and Huntingburg. From Jasper, this concept utilized the US 231 corridor to its interchange at I-70. The route concept then traveled along I-70 to I-465.

3.2.2.14 Route Concept "N"

Route Concept "N" consisted of about 159 – 161 driving miles from I-64 / I-164 to I-465. It began at the I-64 / I-164 / SR 57 interchange and traveled east along I-64 to US 231. It turned north on the proposed upgrade/relocation of the US 231 corridor. It then utilized the US 231 corridor to US 50 and traveled east along the US 50 corridor to SR 37. The route concept then made use of SR 37 north to I-465.

Table 3-1: Geographic Grouping of Alternatives

	Western Group				Central Group (Bloomington)								Central Group (Non-Bloomington)				Eastern		
Cities Served	A	C1	C2	E	B1	B2	D	F1	F2	G	H1	H2	I	J	M	K	L1	L2	N
Evansville	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Princeton	X	X	X	X	X	X													
Terre Haute	X																		
Vincennes	X	X	X	X			X												
Linton		X	X	X			X						X	X	X				
Washington					X	X		X	X	X	X	X	X	X		X	X	X	
Bloomington					X	X	X	X	X	X	X	X				X	X	X	
Jasper															X				X
Bedford																	X	X	X
Martinsville			X		X	X	X		X		X	X					X	X	X
Indianapolis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

3.3 Level 2: Screening of Alternatives

Each route concept was evaluated using the Purpose & Need performance measures given in Chapter 2, Section 2.5.1. The details of this evaluation are in Appendix O, *Route Concepts Screening Report*. This section summarizes the results for each alternative individually, highlighting that alternative's relative strengths and weaknesses. As explained below, the alternatives have been presented in geographic groups, which have been used to simplify the description of the screening process. This section is organized as follows:

- 3.3.1, *Screening Approach* describes the approach to the screening process, including the geographic groupings of the alternatives.
- 3.3.2, *Route Performance and Cost*, summarizes the performance and cost of route concepts, organized by geographic groupings. Included in this section is a discussion of the No Build Alternative.
- 3.3.3, *Alternatives Recommended for Further Study*, presents the alternatives carried forward for detailed study.

3.3.1 Screening Approach

To facilitate the screening process, the route concepts were grouped into four geographic categories, which are shown in Table 3.1 and described below. As noted in Section 3.1, this analysis differs from the typical EIS. In this Level 2 Screening of Alternatives, routes were grouped according to common geographic characteristics. In determining which routes were carried forward for detailed analysis, routes were compared (using Purpose and Need and cost considerations) **only with alternatives in their same geographic group.** Thus, the alternatives carried forward for detailed study did not

represent the alternatives which, overall, best satisfied the Purpose and Need. Rather, they represented the alternative(s) which, within each geographic group, performed the best. Thus, the alternatives carried forward for detailed study in Level 3 were the "best in family" from within each geographic group and were not necessarily the best overall, in terms of satisfying the Purpose and Need.

The four geographic categories were:

- **Western Group** This group included Alternatives A, C1, C2, and E. These routes generally followed U.S. 41 for a significant distance, along the western perimeter of the study area. All of these alternatives included a connection to Vincennes, most serve Linton (directly or via a short connection), One served Terre Haute, and none served the Bloomington area.
- **Central Group – Bloomington Connection** This group included Alternatives B1, B2, D, F1, F2, G, H1, and H2. Most of these routes followed SR 57 for a significant distance. All of these routes served Bloomington, either directly or via a short connection, and all but one of them served Washington. With one exception, none of these routes served Vincennes or Linton.
- **Central Group – No Bloomington Connection** This group included Alternatives I, J, and M. These routes generally followed a middle course, staying east of the US 41 corridor but west of Bloomington. All of them provided service to Linton, and two out of the three connected to Washington, but none served Vincennes and none served Bloomington.
- **Eastern Group** This group included Alternatives K, L1, L2, and N. These routes all provided connections to one or more locations in the eastern part of the study area: K passed through Brown County, and L1, L2, and N all provided connections to Bedford. No other alternatives provided connections to these locations.

The process of geographic grouping was used in order to assure that a geographically diverse array of alternatives is carried forward for detailed study. Geographic diversity is important in the context of this study for two reasons:

- Carrying forward a geographically diverse range of routes provides the best possible chance of finding an alternative that meets project goals while also meeting environmental concerns and minimizing costs.
- Carrying forward a diverse range of alternatives provides an opportunity to consider the interests and viewpoints of all of the potentially affected communities within Southwest Indiana, before making a final decision about which cities, counties, and towns will be directly served by the project.

The screening process involved the computation of an average composite score for each route concept based on ten sets of performance measures and on project costs (both capital and O&M costs). These composite scores were then re-calculated in several different ways in recognition of the fact that not all of the performance measures have the same degree of importance. For example, in some cases, the performance measures associated with the project's core goals were given heavier weights than other performance measures. In addition to varying the weights associated with different project goals, the alternatives were also grouped and re-grouped based on several different criteria (e.g., common highway corridors, common geographic areas served, etc). These variations in weights and groupings were developed and analyzed to ensure that the screening conclusions were not artificially based on only one way of considering the data. This analysis is documented in Appendix D, *Sensitivity*

Table 3-2: Screening and Consolidation of Route Concepts by Major Geographic Region Served

Goal	Objective (Bold Caps = Core Objective)	Western				Central Bloomington								Central Non-Bloomington			Eastern			
		A	C1	C2	E	B1	B2	D	F1	F2	G	H1	H2	I	J	M	K	L1	L2	N
Transportation	INDY-EVV CONNECTION	***	****	****	***	***	***	*	*****	*****	****	*****	*****	*****	*****	**	***	****	***	*
	PERSONAL ACCESSIBILITY	**	***	****	**	*****	*****	*****	****	*****	****	*****	*****	**	***	****	***	*****	*****	*****
	Traffic Congestion Relief	*	***	***	*	****	****	****	***	****	***	***	****	***	***	***	*****	***	****	***
	Traffic Safety	***	***	*****	***	****	*****	*****	***	*****	***	****	*****	**	***	***	***	*****	*****	*****
Economic Development	*Monetary User Benefits*	**	***	***	*	***	****	*	****	*****	***	***	****	****	***	**	**	***	**	*
	Business Markets Accessibility	**	***	***	***	****	*****	***	*****	*****	****	*****	*****	***	***	***	*****	****	****	****
	Long-Term Economic Growth	*	*	****	*	***	*****	****	**	****	***	***	*****	**	**	***	***	***	*****	*****
	Social Distribution of Benefits	**	****	*****	***	****	*****	*****	****	*****	****	****	*****	****	****	****	*****	****	*****	*****
National I-69	INTERSTATE/INTERNATL TRADE	*	***	***	**	***	****	***	****	*****	***	****	****	***	***	***	*****	***	****	****
	Intermodal Accessibility	**	*****	****	***	****	****	***	*****	*****	****	*****	****	****	*****	**	****	****	****	***
Costs	*Capital Costs*	$	$$	$$$$	$$$	$$$$	$$$$$	$$$$$	$$	$$$	$$	$$$$	$$$$	$	$	$	$$$$	$$$	$$$$	$$$$
	O&M Costs	$	$$$$	$$$$	$$$	$$$$$	$$$$	$$$	$$$$$	$$$$$	$$$$$	$$$$$	$$$$	$$$$	$$$$$	$$$$	$$$$$	$$$$$	$$$$	$$$$
Eliminate Weaker Alts					X	X	X	X			X			X		X	X			X
Consolidate Stronger Alts		A	C1 + C2						F1 + F2 (with "H Option")						J			L1 + L2		
Alts Carried Forward		1	2						3						4			5		

Source: Bernardin-Lochmueller & Associates, Inc. September 2001

Analysis and Screening Methodology.

These multiple rounds of analysis revealed a remarkable degree of consistency. Assuming the application of a reasonable range of weights, the same alternatives tended to perform well, or perform poorly, regardless of the particular weighting scheme or geographic grouping being used.

Following this analysis, the alternatives were arrayed into the four geographic groups described earlier – Western, Central-Bloomington, Central-Non-Bloomington, and Eastern – and each alternative was assigned a rating (from one to five stars) for each performance measure and for the two cost categories (from one to five dollar signs). Table 3-2 shows these ratings. The number of stars assigned in each category was based on the alternative's (unweighted) performance score; a score between 0 and 20 received a one-star rating; scores between 21 and 40 received a two-star rating, etc. The cost ratings were assigned in the same manner.

Following this rating process, decisions were made about which alternatives to keep. These decisions were made in two steps, which are depicted in Table 3 - 2 and explained below:

- First, in each geographic grouping, clearly inferior alternatives were eliminated. Considering both performance and cost, alternatives were eliminated if they had a significant weakness in comparison to other alternatives in the same grouping.

- Alternatives that were not eliminated in the first step were then consolidated with other alternatives if they were very similar in concept. These consolidated alternatives were then re-named as Alternatives 1-5, for ease of reference in the remainder of the study.

The outcome of this analysis is summarized in Table 3-2.

Finally, it is important to add a caveat regarding subsequent stages of the environmental analysis. In general, alternatives were carried forward for detailed study in an EIS only if they clearly satisfy the project's goals, as defined in the Purpose and Need Statement. In this case, the decision to carry forward a geographically diverse range means that the performance of certain alternatives is marginal on certain performance measures – including measures related to core goals. Despite their weaknesses, these marginal alternatives were carried forward. However, the screening report noted:

> "... the possibility still exists that one or more of these alternatives will ultimately be found to be unreasonable. Also, the fact that an alternative is being carried forward at this stage does not signify that FHWA and INDOT consider that alternative to be prudent or practicable for purposes of any applicable resource-protection statutes."

3.3.2 Route Performance and Cost

Performance measures were applied to Route Concepts A through N. This analysis produced a total of 19 scores for each performance measure. Each Route Concept was rated between 1st (highest) and 19th (lowest) on each measure. For a description of the Route Concepts, please refer to Section 3.2.2.

3.3.2.1 Western Group

Route Concept "A"

Ranking on Core Goals:

Indianapolis - Evansville Connection - 16th

Personal Accessibility - 19th

Interstate and International Trade - 19th

Like the No Build Alternative, the major strength of Alternative "A" was its relatively low cost. Since the entire length of this route followed an existing 4-lane, divided highway, the incremental increase in its operation and maintenance cost was very low; in fact, regarding O&M costs, it was in a class by itself when compared to any of the other alternatives. Similarly, in terms of construction costs, it was one of the two least expensive "build" alternatives.

On the other hand, "A" performed poorly by comparison to most of the other routes in terms of its ability to achieve the project's goals. This fact was the result of its inability to provide benefits by any other means than a comparatively small increase in speed and the removal of at-grade access on an existing route. Among the "build" alternatives, it ranked lowest or next to lowest on seven out of the ten families of performance measures.

Among the families of performance measures, the highest ranking received by Route "C-1" was 5th place for intermodal accessibility. Its scores put it in 8th place for Evansville-Indianapolis travel time savings and monetary user benefits. In terms of expense, it ranked 7th and 4th for capital and O&M costs, respectively. However, it should be pointed out, that its 4th place ranking for O&M costs was still several times more expensive than Route "A".

Route Concept "C-1"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 7th
Personal Accessibility - 15th
Interstate and International Trade - 17th

Alternative "C-1's" weaknesses were in the areas of traffic congestion relief, national/international transportation, and long-term economic growth, all categories in which it ranked 17th. It also ranked in 16th place for business accessibility and 15th place for improving personal accessibility – one of the project's core goals.

Route Concept "C-2"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 10th
Personal Accessibility - 10th
Interstate and International Trade - 7th

Route Concept "C-2" performed better than "C-1" for all but three families of performance measures. It was one of the strong performers relative to the social distribution of economic benefits. It garnered 7th place scores for traffic safety and long-term economic growth and had 10th place rankings for travel time savings and personal accessibility.

Among the "build" alternatives, "C-2" ranked in 14th and 7th places for capital and O&M costs, respectively. The 12th place capital cost ranking was about 6% above the mean for all the "build" alternatives.

Route Concept "E"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 15th
Personal Accessibility - 17th
Interstate and International Trade - 18th

Alternative "E" performed quite poorly. Its rankings are consistently poor across the board. It had most of the disadvantages associated with Alternative "A" without the advantage of a comparatively low price tag.

3.3.2.2 Central Group – With Bloomington Connection

Route Concept "B-1"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 11th
Personal Accessibility - 5th
Interstate and International Trade - 10th

A strength of alternative B-1 was its 5th place ranking on the personal accessibility scale. Even so, this is not a distinguishing trait, since there were three other routes with slightly poorer rankings that did almost as well. "B-1" also did a good job improving intermodal accessibility (i.e., 6th place), one of the national I-69 performance measures. Overall, "B-1" was reasonably strong route concept. This, however, was not because it was outstanding in any particular category, but rather because it did not have any particularly low rankings. On the other hand, among the "build" alternatives it was one of the most expensive route concepts, ranking 17th for capital costs and 12th for O&M costs.

Route Concept "B-2"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 14th
Personal Accessibility - 3rd
Interstate and International Trade - 4th

From the viewpoint of performance measures, Route Concept "B-2" proved to be one of the best alternatives. It ranked 2nd for traffic congestion relief and long-term economic growth, 3rd for personal accessibility improvement and traffic safety, 4th for business accessibility, and 5th for monetary user benefits and national/international transportation. It ranked 1st for social equity (i.e., Family 7), although this is a distinction shared with seven other routes. On most of

the performance measures, Alternative "B-2" had better scores than "B-1". This is consistent with a pattern in which routes that follow the SR 37 corridor north of Martinsville did a superior job to otherwise identical routes that follow SR 39 to I-70.

The cost of "B-2" was its major weakness. Out of 19 "build" alternatives, this route was the second most expensive in terms of capital costs. Moreover, although it did well on most of the performance measures, it ranked only 14th in its ability to reduce travel times between Evansville and Indianapolis – one of the core goals of the highway.

Route Concept "D"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 19th
Personal Accessibility - 9th
Interstate and International Trade - 13th

Route Concept "D" was the alternative of extremes. It tended to perform relatively well or relatively poorly, although on balance Route Concept "D" was not a strong alternative. Of all the "build" alternatives, it was the most expensive to construct, fully 40% above the average route's capital cost (although it ranks in 3th place for O&M costs). It ranked in 19th place for travel time savings and last place (behind the No-Build) for monetary user benefits. On the other hand, it was the best of all the alternatives in terms of improving traffic safety and tied for 1st place in the social distribution of economic benefits (along with several others).

Route Concept "F-1"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 1st
Personal Accessibility - 11th
Interstate and International Trade - 8th

Route Concept "F-1" performed either very well or about average. The major exception to this rule was in the area of O&M costs, where it was among the most expensive due to its large increase in new road mileage. "F-1" ranked in 1st place for improved Evansville-Indianapolis connectivity (one of the core goals). "F-1" also ranked in 1st place for intermodal accessibility, 3rd place for monetary user benefits, and 5th place for business accessibility. It was the 5th least expensive in terms of capital costs.

Its poorest-ranking performance was in the category of improved traffic safety (15th place), although its actual composite score for this performance measure was clustered at the low end of five alternatives that had scores within 5 points of each other. It also scored a 14th place rank for social distribution of economic benefits and 14th for long-term economic growth.

Route Concept "F-2"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 2nd
Personal Accessibility - 6th
Interstate and International Trade - 2nd

Overall, Route Concept "F-2" was the best performing of all the alternatives. It scored in 1st place for monetary user benefits and business accessibility and was tied in 1st place for the social distribution of economic benefits. It held 2nd place for Evansville-Indianapolis connectivity (i.e., travel time savings) and national/international transportation, both of which are core goals. It was in 3rd place for improved traffic congestion and intermodal accessibility. Among the performance families, "F-2's" poorest ranking was 6th place, for personal accessibility, traffic safety, and intermodal accessibility.

In regard to cost, "F-2" fell in the middle of the range of capital costs for "build" alternatives. Including the No Build Alternative, it was ranked 9th in capital costs and 13th in O&M costs.

Route Concept "G"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 8th
Personal Accessibility - 12th
Interstate and International Trade - 14th

Route Concept "G" was an alternative that looked like, and in some important respects, performed like "F-1". In concept, "G" differed from "F-1" only in its southern terminus, which was offset to the east of I-164. "G" was like "F-1" in terms of personal accessibility, traffic congestion, traffic safety, and cost. It was also reasonably similar in terms of monetary user benefits. It was quite different, however, in terms of the Evansville-Indianapolis connection, national/international transportation, and intermodal accessibility – all measures on which "F-1" did significantly better. With the exception of monetary user benefits (6th place), it did not perform especially well among the economic development performance families.

Route Concept "H-1"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 3rd
Personal Accessibility - 2nd
Interstate and International Trade - 8th

Route Concept H-1 had several strong points. It was ranked 2nd in terms of personal accessibility and intermodal accessibility and 3rd in the category of business accessibility and improving the travel time between Evansville and Indianapolis. It also had solid mid-range rankings for traffic safety, national/international transportation, and monetary user benefits. Its only relatively poor score was for traffic congestion relief with a ranking of 15th place.

In terms of cost, with a rank of 11th among the "build" alternatives, "H-1" was about 10% more expensive than the average route concept. It was ranked quite poorly (15th) for O&M costs because of its comparatively large increase in new highway mileage.

Route Concept "H-2"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 6th
Personal Accessibility - 1st
Interstate and International Trade - 4th

In terms of performance measures, Route Concept "H-2" was very similar to "F-2". On nearly all measures, it scored highly. It was ranked 1st for personal accessibility (a core objective) and 2nd for monetary user benefits and business accessibility. Like "F-2", it also had high scores for facilitating national/international transportation, long-term economic growth, traffic safety, and traffic congestion relief. It was ranked in 6th place for improving Evansville-Indianapolis travel time. Its lowest ranking was 7th for intermodal accessibility.

The weakness of Alternative "H-2", however, was its cost. It was ranked 16th out of the 19 "build" alternatives for capital costs. It did moderately better with a rank of 11th for O&M costs.

3.3.2.3 Central Group – Without Bloomington Connection

Route Concept "I"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 5th
Personal Accessibility - 18th
Interstate and International Trade - 15th

Overall, Route Concept "I" delivered an average and, in some cases, poor performance. The notable exceptions to this rule had to do with monetary user benefits (4th place) and reducing Evansville-Indianapolis travel time (5th place).

Its major advantage is cost. Out of the 19 "build" alternatives, Route Concept "I" ranked 3rd in terms of capital costs, about 65% of the average route cost. It had a mid-range ranking for O&M costs.

Route Concept "J"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 3rd
Personal Accessibility - 16th
Interstate and International Trade - 16th

Route Concept "J" performed much like "I" due to the similarity of its location. In almost all cases, "J's" scores mirrored "I". It did, however, score significantly better for intermodal accessibility due to its more direct service to the west side of Indianapolis where the Airport and Avon Yard are located. In terms of capital costs, it was slightly more expensive than "I", but still significantly below the mean for all "build" alternatives. Its capital cost rank was 3rd place. It was quite expensive for ongoing O&M costs (16th place).

Route Concept "M"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 17th
Personal Accessibility - 13th
Interstate and International Trade - 10th

Aside from cost, Alternative "M" consistently performed below average. Its best ranking was 10th place for national/international transportation. It ranked 18th on two families of performance measures and 19th on another. Its generally poor performance was explained in large part by its lack of direct connectivity to Evansville, which was seen in its rank of 17th for Evansville-Indianapolis travel time savings (a core objective).

On the other hand, this route concept was relatively inexpensive, both in terms of capital costs and O&M costs. Among the "build" alternatives, its capital cost ranked in 1st place, about on par with Route Concept "A". This was the result of comparatively short construction mileage. It had a rank of 6th place for O&M costs.

3.3.2.4 Eastern Group

Route Concept "K"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 13th
Personal Accessibility - 14th
Interstate and International Trade - 1st

Alternative K functioned in a class by itself. On some performance measures, "K" was exceptionally strong. As a result of its atypical routing that connects with I-65 in Johnson County, it ranked in 1st place for traffic congestion relief. It also ranked 1st for national/international transportation due to the fact that it improves both the I-69 and I-65 corridors. It did reasonably well with respect to business accessibility (6th place) and 8th place for intermodal accessibility.

On the other hand, its performance was only average (and sometimes poor) on most of the remaining families of performance measures. Because of its increase in vehicle-miles of traffic, it ranked 16th for monetary user benefits. Moreover, it was only 13th for personal accessibility and travel time and 14th for intermodal accessibility.

Route Concept "L-1"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 9th
Personal Accessibility - 8th
Interstate and International Trade - 12th

Alternative "L-1" was a fairly consistent mid-range route. It neither ranked at the top nor the bottom of any of the performance measures. Its best rank was 8th place for traffic safety and for personal accessibility. It also had a respectable rank (9th place) and composite score for intermodal accessibility and the social distribution of economic benefits. It was in 9th place,

but had only an average score for long-term economic growth. In terms of capital costs, "L-1" was ranked 10th. It was relatively expensive in terms of O&M costs with a rank of 14th place.

Route Concept "L-2"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 12th
Personal Accessibility - 7th
Interstate and International Trade - 6th

Route Concept "L-2" was generally a good performer. As is true of all the routes that had optional northern sections near Indianapolis, the option that followed SR 37 all the way to I-465 (Option 2) performed better on most performance measures than the option that follows SR 39 connecting to I-70 (Option 1). For the most part, "L-2" conformed to this same pattern of better performance than "L-1". It does especially well with respect to long-term economic growth (3rd place), traffic safety and traffic congestion relief (4th place), and social distribution of economic benefits (1st place). With the exception of "D", neither of the "L" routes performed as well as the other options that connect to SR 37 farther north.

Alternative "L-2" was somewhat more expensive than "L-1", ranking 12th as opposed to 10th with respect to capital costs. Its O&M costs, however, were less, ranked 9th as opposed to 14th.

Route Concept "N"

Ranking on Core Goals:
Indianapolis - Evansville Connection - 18th
Personal Accessibility - 4th
Interstate and International Trade - 3rd

Alternative "N" was a combination of "L-2" and "M". Accordingly, its performance was generally consistent with these two routes. Its greatest strength was a 1st place ranking for long-term economic growth and the social distribution of economic benefits. It was also very strong with respect to traffic safety. From the viewpoint of traffic safety, it was virtually tied in 1st place with Alternative "D". It was ranked 3rd and 4th for national/international transportation and personal accessibility, respectively.

On the other hand, Route "N" had some very low ratings. It was ranked in 18th place for improving the Evansville-Indianapolis travel time connection (a core objective), 18th for monetary user benefits, and 17th place for intermodal accessibility. In terms of capital costs, it was somewhat more expensive than "L-1" and "L-2" (ranked 15th), although its O&M costs were ranked considerably better, in 6th place.

3.3.2.5 The No Build Alternative

The No Build Alternative consists of the "existing" highway network, plus projects which are considered "committed." (The abbreviation "e + c" is used to refer to this "existing plus committed," or "no build" network). "Committed" projects are those which are regarded as reasonably certain to be built or for which INDOT has a firm, long term policy to build. They are included in the transportation analysis so that the transportation effects and benefits of each alternative are estimated with reference to the transportation system which will exist when they are completed.

Examples of some major projects in the Study Area in the e + c network for this project include the following. This is not an inclusive listing. In addition to these projects, the e + c network includes major upgrades in other parts of Indiana, as well as in adjoining states which are included in the travel model network.

- Added travel lanes on I70
- Upgrade of US 231 near Jasper and Huntingburg, continuing south to the Ohio River
- Upgrade of US 50 east of Washington
- Upgrades of SR 62 and 66 in Warrick County
- Construction of SR 641 (Terre Haute bypass) in Vigo County.
- Upgrade of US 41 in Vanderburgh County
- Upgrade of SR 37 in Orange County
- Upgrade of SR 46 in Monroe County

Table 3-3: Alternatives Carried Forward for Level 3 Analysis

Alternative Description	Old Name	New Name
Evansville-Vincennes-Terre Haute via US 41-Indianapolis via I-70	A	1
Evansville-Vincennes via US 41-Spencer- Indianapolis via US 231 and I-70	C-1	2a
Evansville-Vincennes via US 41-Spencer- Indianapolis via SR 67 and new alignment to I-70	C-2	2b
Evansville-Vincennes via US 41-Spencer-Martinsville-Indianapolis via SR 37	-	2c
Evansville-Washington-near Bloomington & Ellettsville-Indianapolis via new alignment and I-70	F-1	3a
Evansville-Washington-near Bloomington & Ellettsville-Martinsville and Indianapolis via SR 37	F-2	3b
Evansville-Washington-Bloomington-Martinsville and Indianapolis via SR 37	H-2	3c
Evansville-Washington-Spencer-Indianapolis via US 231 and I-70	I	4a
Evansville-Washington-Spencer-Indianapolis via SR 67 and new alignment to I-70	J-1	4b
Evansville-Washington-Spencer-Martinsville-Indianapolis via SR 37	-	4c
Evansville-Washington-Bedford-Bloomington-Martinsville-Indianapolis via new alignment to I-70	L-1	5a
Evansville-Washington-Bedford-Bloomington-Martinsville-Indianapolis via SR 37	L-2	5b

The "No Build" in this Level 2 analysis assumed that *no* part of the National I-69 project is built - including the section between Evansville to Henderson (SIU#4). In the detailed analysis in Level 3, the National I-69 project is assumed to be built. See Section 3.4.1 for further discussion of this Level 3 modification.

While the No Build Alternative did nothing to achieve any of the goals of I-69, it also required no capital outlay for construction and caused no increase in operation and maintenance costs. Over time, however, there are significant regional problems (the very poor connection between Indianapolis and Evansville, and the inferior personal accessibility) which remain unaddressed. In addition, the major national and international trade corridor, I-69 has a significant gap, which leave Indiana at an increased competitive business disadvantage. On most of the performance measures, it ranked in last place. Accordingly, it is the benchmark against which the other alternatives were measured.

3.3.3 Alternatives Recommended for Further Study

The route concepts were analyzed using a range of analytical methods to assess their ability to meet the various performance measures, while minimizing cost and ensuring geographic diversity in the set of alternatives carried forward for detailed study. In this screening report, alternatives carried forward for detailed study were redesignated using numbers. Table 3-3 shows the relationship between the lettered route concepts and the numbered alternatives carried forward for detailed study.

The screening report issued on October 16, 2001 (see Appendix O) recommended alternatives to be carried forward for detailed study:

3.3.3.1 Initial Screening Recommendations

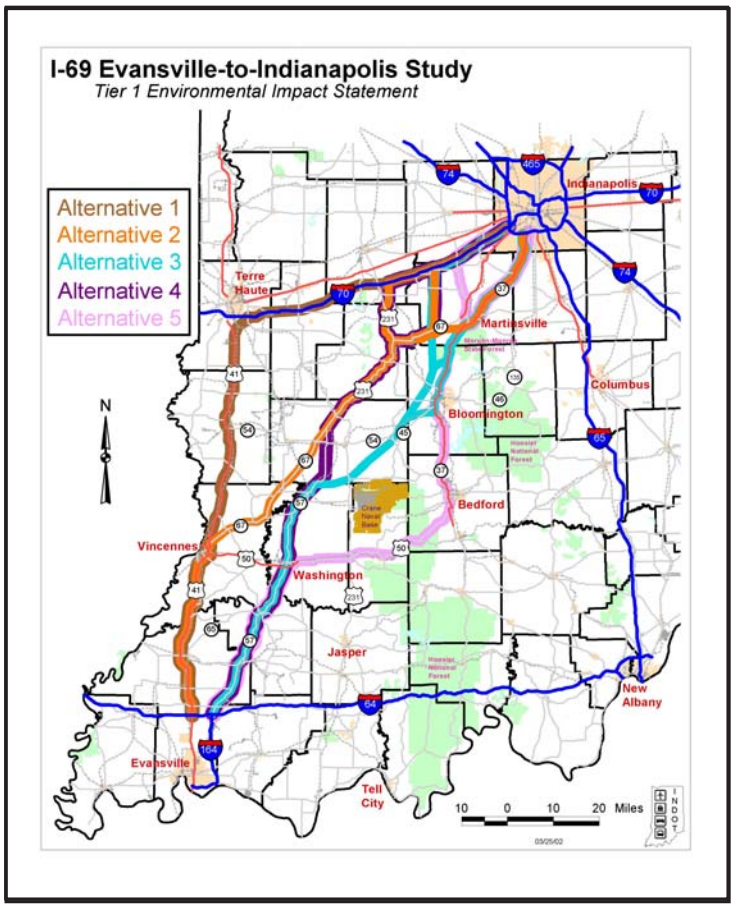


Figure 3-4: Alternatives Carried Forward for Detailed Study.

Alternative 1 was based on Route Concept "A." It was carried forward from the Western Group. It performed poorly on all the core goals, as well as most of the other performance measures. However, it was the least costly of the five alternatives carried forward.

Alternative 2 was based on Route Concepts "C-1" and "C-2." It was carried forward from the Western Group. It offered reasonably good performance scores and simultaneously combined service to Princeton and Vincennes with elements of a direct route to Indianapolis. However, it was the most costly of the five alternatives carried forward.

Alternative 3 was based on Route Concepts "F-1" and "F-2." It was carried forward from the Central Bloomington Group. It had an optional connection to Bloomington that was similar to "H-1" and "H-2." These options – in particular F2 – consistently deliver high composite performance scores. Option "F-2" is one of only two alternatives that simultaneously makes use of SR 37 and avoids passing through the City of Bloomington, while still serving it. In relative terms, the estimated capital costs of Route Concept "F" are in the low-to-mid-range (among the "build" alternatives). The "H" routes are also strong performers and offer an alternative connection with SR 37.

Alternative 4 was based on Route Concept "J." It was carried forward from the Central non-Bloomington Group. It was proposed for detailed study as a mid-course alternative both geographically and in terms of performance. It also had a comparatively low price tag. While "I" and "J" were quite similar, "J" performed slightly better than "I". Moreover, it was significantly better than "M".

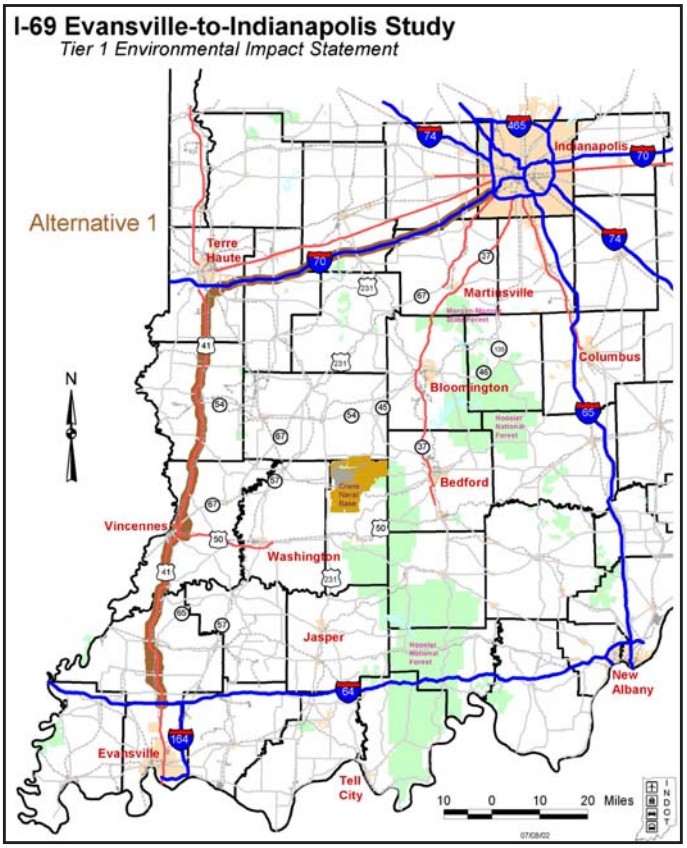
Alternative 5 was based on Route Concepts "L-1" and "L-2." It was carried forward from the Eastern Group. These alternatives are the best of the alternatives serving the eastern part of the I-69 Study Area. Overall, it is a good performer with the added feature of improving accessibility to the cities of Bedford and, indirectly, Jasper.

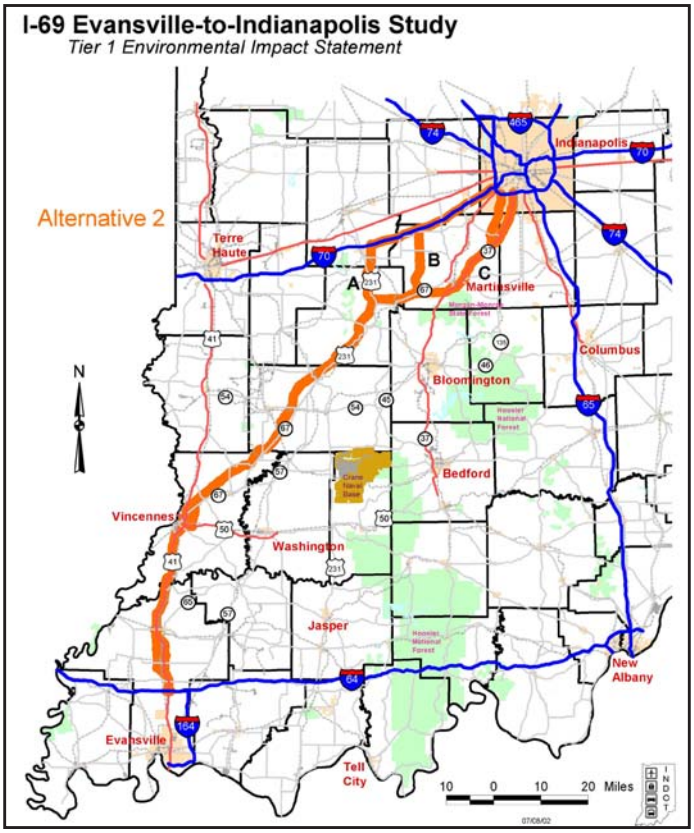
3.3.3.2 Public and Agency Input

Public meetings to discuss these proposed alternatives for detailed study were held November 6 - 8, 2001, in Linton, Greenwood, and Washington. In addition, meetings were held with environmental review agencies and metropolitan planning organizations (MPOs) on November 27, 2001. At these venues and at other times in the public involvement process, some key points were made which resulted in a modification of the alternatives carried forward for detailed study. This key input included:

- The benefits associated with Route Concept I (which was not initially recommended to be carried forward) were very close, overall, to those of Route Concept J (which was recommended to be carried forward). In addition, it was suggested that the environmental impacts of Route Concept I (which approaches I-70 via the US 231 corridor) could be considerably less than those of Route Concept J. Accordingly, Route Concept I was carried forward for detailed study, included as a variation of Alternative 4.
- The SR 37 corridor variations for all routes had much higher user benefits than variations which use the SR 39 corridor, or some other corridor in Western Morgan County. Alternative 2 had a common routing with Alternative 4 north of Central Greene County, and had a SR 37 variation. However, Alternative 4 did not have a SR 37 variation. Accordingly, a SR 37 variation was added to Alternative 4.
- The same logic for adding a US 231 corridor variation to Alternative 4 also applied to Alternative 2. Both have a common routing north of Central Greene County. Accordingly, a US 231 variation was added to Alternative 2.

Figure 3-5: Individual Maps of Five Alternatives Carried Forward for Detailed Study.





3.3.3.3 Alternatives Carried Forward for Detailed Study

Figure 3.4 shows all alternatives carried forward for detailed study. Figure 3-5 shows an individual map for each of the five alternatives. The following listing gives a word description of each alternative. The portion in italics represents the portions of alternatives added as a result of public and agency input.

Alternative 1: Evansville to Vincennes to Terre Haute to Indianapolis

Alternatives 2A, 2B, and 2C: Evansville to Vincennes, then proceeding along the SR 67 corridor. From here:

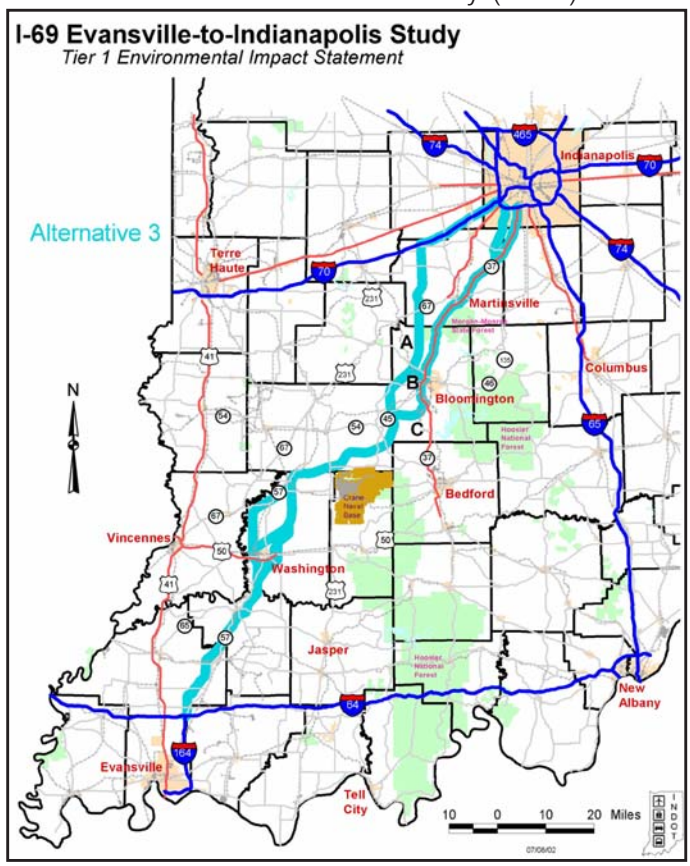
- *Alternative 2A uses the US 231 corridor to I-70. It continues via I-70 to Indianapolis.*
- Alternative 2B continues on the SR 67 corridor to Morgan County, and goes directly north to I-70. It continues via I-70 to Indianapolis.
- Alternative 2C continues on the SR 67 corridor to Morgan county and uses SR 37 to Indianapolis.

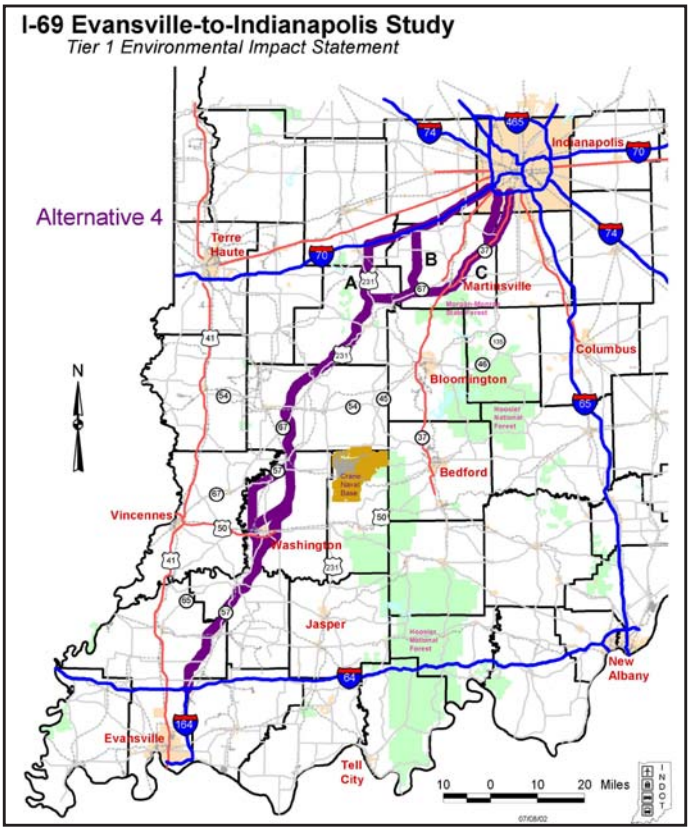
Alternatives 3A, 3B, and 3C: Evansville to Washington, then proceeding to the Monroe/ Green County line. From here:

- Alternative 3A goes due north through western Monroe and western Morgan Counties.
- Alternative 3B continues north into northern Monroe county. It turns east to join SR 37 north of Bloomington. It continues in the SR 37 Corridor to Indianapolis.
- Alternative 3C goes due east to SR 37 just south of Bloomington. It continues in the SR 37 corridor to Indianapolis.

Alternatives 4A, 4B, and 4C: Evansville to Washington, then proceeding along the SR 57 and SR 67 corridors to eastern Owen County.

Figure 3-5: Individual Maps of Five Alternatives Carried Forward for Detailed Study (cont.)





From here:

- *Alternative 4A uses the US 231 corridor to I-70. It continues via I-70 to Indianapolis.*
- Alternative 4B continues on the SR 67 corridor to Morgan County, and goes directly north to I-70. It continues via I-70 to Indianapolis.
- *Alternative 4C continues on the SR 67 corridor to Morgan county and uses SR 37 to Indianapolis.*

Alternatives 5A and 5B: Evansville to Washington, then proceeding east along the US 50 corridor to Bedford, Bloomington and Martinsville. From here:

- Alternative 5A uses the SR 39 corridor to I-70. It continues via I-70 to Indianapolis.
- Alternative 5B uses the SR 37 corridor to Indianapolis.

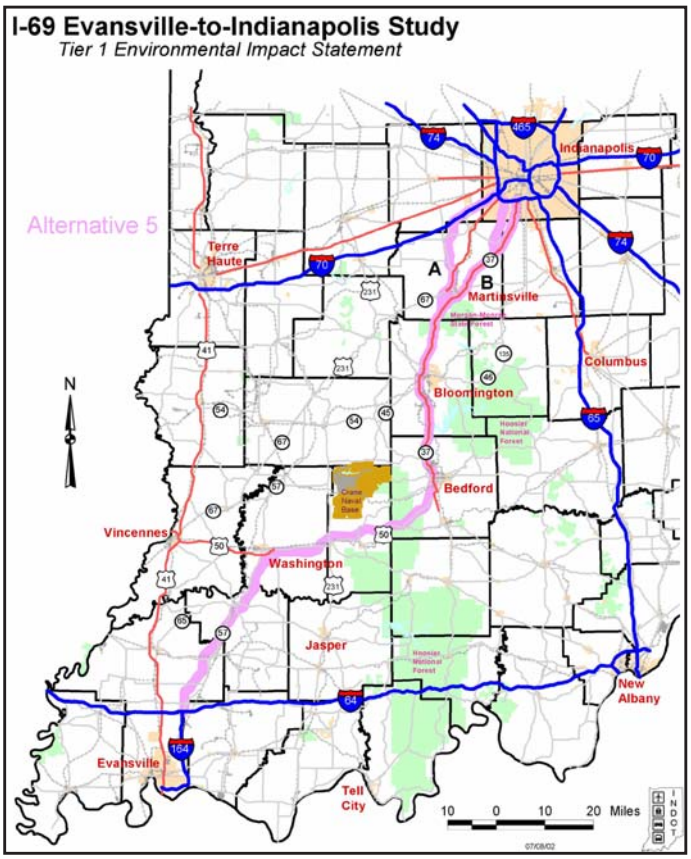


Figure 3-5: Individual Maps of Five Alternatives Carried Forward for Detailed Study (cont.)

3.3.4 Summary

As Table 3-3 shows, related route concepts carried forward for further study were consolidated into alternatives identified by a number. These numbered alternatives are broadly defined in terms of the cities that they connect and the highway corridors that they utilize. They are defined broadly to allow for some flexibility in modifying and/or combining sections of related route concepts. This flexibility may be needed in order to define a preferred corridor that ultimately avoids or minimizes adverse impacts to Southwest Indiana's environmental resources.

Each build alternative considered in the initial screening stage of this study was developed as a "route concept," which may be thought of as a simple line connecting points on a map. Through the screening process, the initial set of route concepts (A through L) was reduced to five major routes (1 through 5). These five routes – several of which include a range of potential connections to Indianapolis at their northern end – were carried forward for detailed analysis (Level 3) in the Tier 1 EIS.

In order to provide a set of tools for analyzing environmental impacts, each alternative carried forward for detailed analysis was defined as a set of three overlapping bands:

- Study Band. A "study band" is a *two-mile-wide* band within which focused its environmental data-gathering efforts for each alternative. It should be noted that much of the environmental data was gathered throughout the entire 26-county Study Area. However, more intensive efforts – for example, field verification of recorded resources – were concentrated within the two-mile-wide study bands.

- Corridor. A "corridor" is *generally 2000 feet wide*, but its width has been narrowed in some places and broadened in others. If a build alternative is selected, it is FHWA's intention to approve a Record of Decision for a corridor at the end of Tier 1, rather than approving a specific alignment.

- Working Alignment. A "working alignment" is a potential location for a highway right-of-way within the 2000-foot-wide corridor. The Tier 1 EIS is not intended to result in the selection of a specific alignment. However, working alignments have been developed within each corridor in order to provide a sound basis for estimating the environmental impacts of each alternative. The working alignments range in width from 240 to 470 feet. Three factors were considered in estimating the right-of-way width for sections of each working alignment: (1) the topography of the land, i.e. flat to rolling vs. hilly, (2) the number of frontage roads expected, if any, and (3) the number of lanes expected. (See Appendix E, "Typical Sections," for detailed information on the widths of each working alignment.) For purposes of estimating impacts and modeling traffic, potential interchanges were included as a part of the working alignments. An additional 10 acres was added beyond the footprint of the working alignment to account for these interchanges. Potential interchange locations were determined based on: (1) the functional classifications and traffic volumes of intersecting roadways; (2) service to communities that otherwise might be isolated; (3) distance to upstream/downstream interchanges; (4) the number of interchanges serving particular communities; and (5) other related considerations. Final determinations regarding interchange locations will be made in the Tier 2 NEPA studies. Figure 3.6 illustrates the study band, corridor, and working alignments.

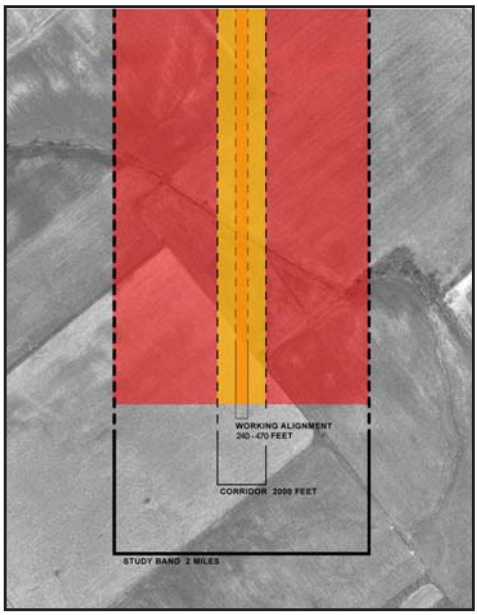


Figure 3-6: Illustration of a Study Band, Corridor and Working Alignment.

3.4 Level 3: Detailed Performance and Cost Analysis of Alternatives

This section contains the performance measure and cost information for the Level 3 - *Detailed Analysis of Five Alternatives*. Environmental impact information is presented in Chapter 5, *Environmental Consequences*. Information on environmental impacts, cost and performance is combined in Chapter 6, *Comparison of Alternatives.*

As noted in Section 3.1, this draft EIS identifies preferred alternatives. Preferred alternatives performed well in addressing the Purpose and Need, and also had an acceptable level of impacts. Other alternatives, either because of high impacts or poor performance, were not identified as preferred alternatives. After receiving input from review agencies and the public, a single preferred alternative will be identified in the Final EIS. The preferred alternatives are identified in Section 6.2.

3.4.1 Methodology

In the 1990's, INDOT undertook a significant effort to develop analytical procedures designed to assess the transportation and economic impacts of large corridor investments. This effort resulted in the *Major Corridor Investment Benefit Analysis System* (MCIBAS). MCIBAS is a suite of programs and technical procedures, which consists of the *Indiana Statewide Travel Demand Model* (ISTDM) linked by post-processors and analytical procedures to a regional econometric simulation model. ISTDM is a computer model that forecasts traffic flow throughout the highway network given a proposed change or changes to the existing system.

In the early phases of this Tier 1 EIS, significant improvements were made to both MCIBAS and ISTDM. These improvements included:

- the expansion of ISTDM into the four neighboring states to allow for improved testing/modeling of transportation improvements that might draw traffic from neighboring states;
- the addition of minor collectors and some local roads into the ISTDM transportation network to permit improved estimates of traffic flows;
- the ability to input traffic into the statewide network that would be generated by the completion of I-69 at the national level;
- the ability to output some economic and transportation data for five regions within the 26-county study area;[1]
- the development of a "feedback loop" from these regions to the starting point of ISTDM to determine the effects of the new population and employment "induced" by an improved highway corridor on the transportation network.

1 These five economic regions are: (1) Indianapolis including its western and southern suburbs (Hendricks, Johnson, Marion, and Morgan counties); (2) the Bloomington area (Monroe County); (3) the Terre Haute area (Vigo and Clay counties); (4) the Evansville area (Gibson, Posey, Vanderburgh and Warrick counties); and (5) Rural Southwest Indiana (Brown, Crawford, Daviess, Dubois, Greene, Knox, Lawrence, Orange, Owen, Perry, Pike, Putnam, Spencer, and Sullivan counties). See Figure 3-18

It should be noted that this process is the methodological source from which the indirect land use impacts reported in other sections of this document were derived.

It should also be noted that the combination of these improvements – including the national I-69 traffic, the feedback loop, and land use estimates – represents a significant step beyond the usual state-of-the-practice for modeling planned transportation improvements. Typically, travel demand models will take into account only the effects of changes in destination choices and route diversions resulting from a prospective improvement to the transportation system (e.g., added speeds and capacity to an existing road and/or the construction of a new road). Most travel demand models are not integrated with an economic model, nor do they allow for the feedback of "generated" or "induced" demand resulting from new development that would occur solely because the highway is built or improved.

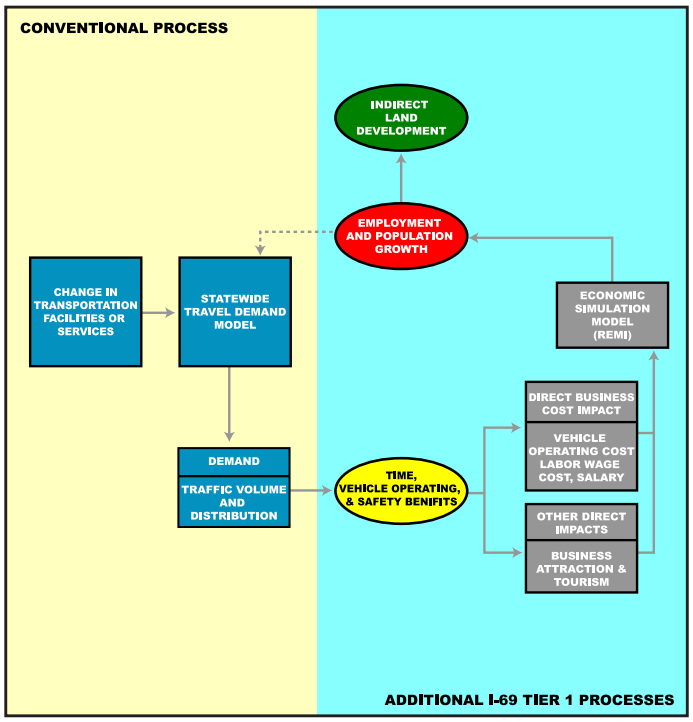


Figure 3-7: Induced Land Use Change - Feedback Loop in Travel Model

Five alternatives (most with multiple routing options near Indianapolis) were selected for further evaluation in the DEIS. Of the steps noted above, point 3 (inclusion of National I-69 traffic) and point 5 (inclusion of land use change induced by the highway) were done only in Level 3: Detailed Analysis of Alternatives.

As Figure 3-7 illustrates, the modeling process for this study takes into account changes in land use resulting from the transportation project. This "feedback loop" allows the effect of land use changes caused by the project to be reflected in the traffic forecasts. The effects of these land use changes also is reflected in the forecasts of impacts, as described in Chapter 5, *Environmental Consequences*.

Including induced growth is a cautious assumption, which ensures that benefits are not overstated, and impacts are not understated. For example, including induced traffic results in increased congestion, increased crashes, and reduced user benefits.

In the ensuing sections, the performance of the alternatives in meeting project goals is discussed. The performance measures used in the detailed analysis of alternatives (Level 3) have been refined, as shown in Table 2-9 to 2-11. Performance measures are grouped by project goal under one of three headings of Transportation, Economic Development, or National I-69. These measures are defined in Chapter 2.5.1, *Performance Measure Definitions*.

3.4.2 Factors Associated with Better Performance

In analyzing the alternatives carried forward for detailed analysis, it became apparent that several factors were associated with alternatives that performed well. These factors differ from project goal to project goal. In addition, for some project goals, there were multiple factors that tended to be associated with high performance.

These factors demonstrate a guiding principle for this study - that there are a variety of needs, and that alternatives will perform at different levels on different goals.

The following factors were found to be associated with high levels of performance in terms of the project's goals.

- **Service to Bloomington** Bloomington and Monroe County represent a major population and economic center. A major transportation improvement to Bloomington increases the accessibility of its population to desired travel destinations, as well as increases the access which its businesses have to markets and suppliers. In addition, Bloomington offers many desired travel destinations (business, educational, shopping, etc.) which people in rural Southwest Indiana desire to reach.
- **Service to SR 37 Corridor** The SR 37 corridor southwest of Indianapolis is heavily-traveled and its importance as a transportation artery will continue to grow. Relatively high levels of congestion are forecasted for certain segments of SR 37 by 2025 in the "no build" case. Providing more capacity in this corridor, in the form of an Interstate highway, would relieve congestion, reduce transportation costs, and lead to reductions in accidents. An Interstate highway in the SR 37 corridor would also provide some limited relief to forecasted congestion on I-65 on the southeast side of Indianapolis.
- **Short Evansville to Indianapolis Mileage** Generally, a shorter Evansville-to-Indianapolis travel distance results in a shorter Evansville-to-Indianapolis travel time.
- **Service to Western Morgan County** Two major intermodal facilities are located on the west side of Indianapolis. These are the Indianapolis International Airport and the CSX Avon Yard. Alternatives which join I-70 near these two major intermodal centers offer an advantage to intermodal freight shipments. Also, an alternative in Western Morgan County can relieve some of the forecasted traffic congestion in the SR 37 Corridor.
- **Service to Crane Naval Surface Warfare Center** This major employer represents an opportunity for economic development that is limited by its lack of transportation access. The alternatives that serve Crane provide the overall highest increase in business accessibility.

Factors Associated with Moderate Levels of Performance

- **Service to Vincennes** This factor contributes to moderate performance. Vincennes represents a population and economic center. A major transportation improvement to Vincennes increases the accessibility of its population to desired travel destinations. In addition, Vincennes offers some desired travel destinations (business, educational, shopping, etc.) which people in rural southwest Indiana desire to reach.
- **Service to West-Central Study Area** This factor contributes to moderate performance. Much of this portion of the Study Area (generally, the area west of Bloomington and east of US 41) is economically-distressed. Most of its counties (specifically, Clay, Owen, Sullivan, Greene, Daviess, Martin, and Pike) were designated as "stressed" by the United States Department of Agriculture, Rural Development Agency, in its *2002 Strategic Plan*. Providing improved access to this area allows additional economic development to occur.

These factors demonstrate that there are a variety of needs, and that alternatives perform at different levels for different goals.

3.4.3 Transportation Performance Indicators

3.4.3.1 Improve Evansville-Indianapolis Linkage

A *core goal* of this project is to improve the connection between Evansville and Indianapolis. Two performance measures are used for this goal. These are:[2]

- Typical travel time savings between Evansville and Indianapolis
- Free flow travel time savings between Evansville and Indianapolis

Table 3-4 gives the performance of each alternative on both of these measures (see Section 2.5 Purpose and Need)

There is a significant variation in the performance of alternatives on this key goal. Alternatives fall into three groupings.

- Alternatives 3A, 3B, 3C, 4B, and 4C provide typical travel time savings of 25-29 minutes.
- Alternatives 2A, 2B, 2C, 4A, 5A, and 5B provide typical travel time savings of 18-22 minutes.
- Alternative 1 provides a typical travel time savings of 12 minutes.

These groupings reflect the range of one-way driving mileages between Evansville and Indianapolis associated with each set of alternatives. The average one-way driving mileages[3] for Alternatives 3B, 3C, 4B, and 4C range from 141 to 143 miles. The average one-way driving mileages for Alternatives 2A, 2B, 2C, 3A, 4A, 5A, and 5B range from 144 to 150 miles. The average one-way driving mileage for Alternative 1 is 155 miles.

Figure 3-8 portrays the typical travel time savings for each alternative. Alternatives are grouped by their range in driving miles. Table 3-33 shows the driving miles for each alternative.

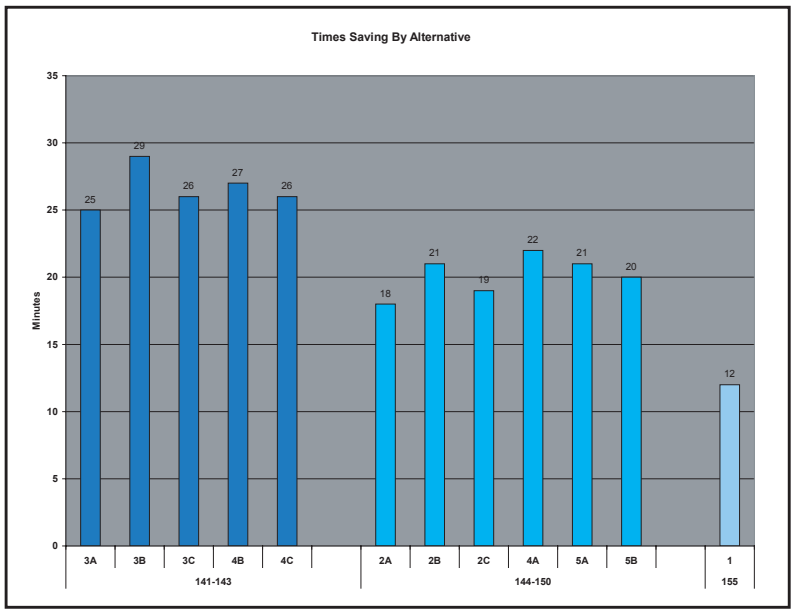


Figure 3-8: Typical Evansville to Indianapolis Travel Time Savings (Year 2025)

Table 3-4: Travel Time Savings between Evansville and Indianapolis by Alternative (minutes)

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Typical	12	18	21	19	25	29	26	22	27	26	21	20
Free Flow	11	16	19	17	20	24	21	20	21	20	15	14

Source: Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model

2 "Typical" travel time savings is the change in travel time which would occur under typical weekday traffic conditions. "Free flow" travel time savings is the change in travel time which would occur if a trip were made in the absence of any traffic congestion.

3 "Average one-way driving miles" is the average of the high and low of the mileage range, rounded to the nearest mile.

Summary

On this core goal, five of the alternatives (3A, 3B, 3C, 4B, and 4C) perform similarly, providing a typical travel time savings approaching one-half hour. Another six alternatives (2A, 2B, 2C, 4A, 5A, and 5B) perform similarly, providing a typical travel time savings of about twenty minutes. One alternative (Alternative 1) provides a much smaller travel time savings, about 12 minutes. The No-Build Alternative results in no travel time savings.

3.4.3.2 Improve Personal Accessibility

A *core goal* of this project is to improve personal accessibility. In order to assess the comparative performance in improving personal accessibility, five performance measures were used. These measures gauge how many additional people gain access to important destinations. These destinations are those to which people wish to travel for important business, recreational, medical, or educational purposes. The measures are:

- Year 2025 increase in number of people within one, two, and three hours of Indianapolis.
- Year 2025 increase in number of people within one hour of a major educational institution in Study Area.
- Year 2025 increase in number of people within one-half hour of major urban centers (Evansville, Terre Haute, Bloomington, or Indianapolis). This measures access to locations such as major medical institutions, airports, cultural centers, and shopping.

Table 3-5 shows the performance of alternatives on each indicator.

Table 3-5: Year 2025 Increase in Number of People within Given Proximity

Within	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
One Hour of Indianapolis	0	8,000	8,000	37,000	25,000	46,000	60,000	0	8,000	37,000	60,000	60,000
Two Hours of Indianapolis	18,000	32,000	33,000	42,000	61,000	46,000	40,000	32,000	32,000	42,000	24,000	24,000
Three Hours of Indianapolis	58,000	85,000	100,000	85,000	232,000	216,000	166,000	112,000	112,000	112,000	150,000	123,000
One Hour of Major Edu. Inst.	0	0	58,000	243,000	253,000	286,000	360,000	0	58,000	243,000	417,000	372,000
Thirty Minutes of Major Urban Area	9,000	4,000	4,000	13,000	5,000	12,000	37,000	0	0	9,000	28,000	37,000

Source: Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model

The alternatives vary significantly in improving personal accessibility. Alternatives which serve Bloomington (Alternatives 3A, 3B, 3C, 5A, and 5B) perform the best. This group improves three hour access to Indianapolis by 123,000 to 232,000 people, access to major educational institutions by 253,000 to 417,000 people, and improves 30 minute access to major urban areas by 5,000 to 37,000 people.

A second group of alternatives provides a significant increase in access to either Vincennes or the SR 37 corridor, but does not serve Bloomington. This group includes alternatives 2A, 2B, 2C, and 4C. This group improves three hour access to Indianapolis by 85,000 to 112,000 people, access to major educational institutions by 0 to 243,000 people, and improves 30 minute access to major urban areas by 4,000 to 13,000 people.

The remaining alternatives (1, 4A, and 4B) do the least to increase personal accessibility. This group improves three hour access to Indianapolis by 58,000 to 112,000 people, access to major educational institutions by 0 to 58,000 people, and 30 minute access to major urban areas by 0 to 9,000 people.

Table 3-6: Summary of Accessibility Increases

Increase in Population Within:	Alternatives that Serve Bloomington 3A, 3B, 3C, 5A, 5B	Alternatives that Serve Vincennes or SR 37 2A, 2B, 2C, 4C	Other Alternatives 1, 4A, 4B
One Hour of Indianapolis	25,000 - 60,000	8,000 - 37,000	0 - 8,000
Two Hours of Indianapolis	24,000 - 61,000	32,000 - 42,000	18,000 - 32,000
Three Hours of Indianapolis	123,000 - 232,000	85,000 - 112,000	58,000 - 112,000
One Hour of Major Educational Institution	253,000 - 417,000	0 - 243,000	0 - 58,000
30 Minutes of Major Urban Center	5,000 - 37,000	4,000 - 13,000	0 - 9,000

Source: Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model

Table 3-6 shows the performance of each of these alternative groups. Figures 3-9 through 3-13 illustrate their performance graphically. Alternatives are grouped as shown in Table 3-6. While these groupings do not explain all of the variation between alternatives, there is a marked overall relationship between the groupings and the performance of alternatives. For example, the routes which serve Bloomington perform as well as or better than all alternatives in all other groups 20 times (out of a possible 25).

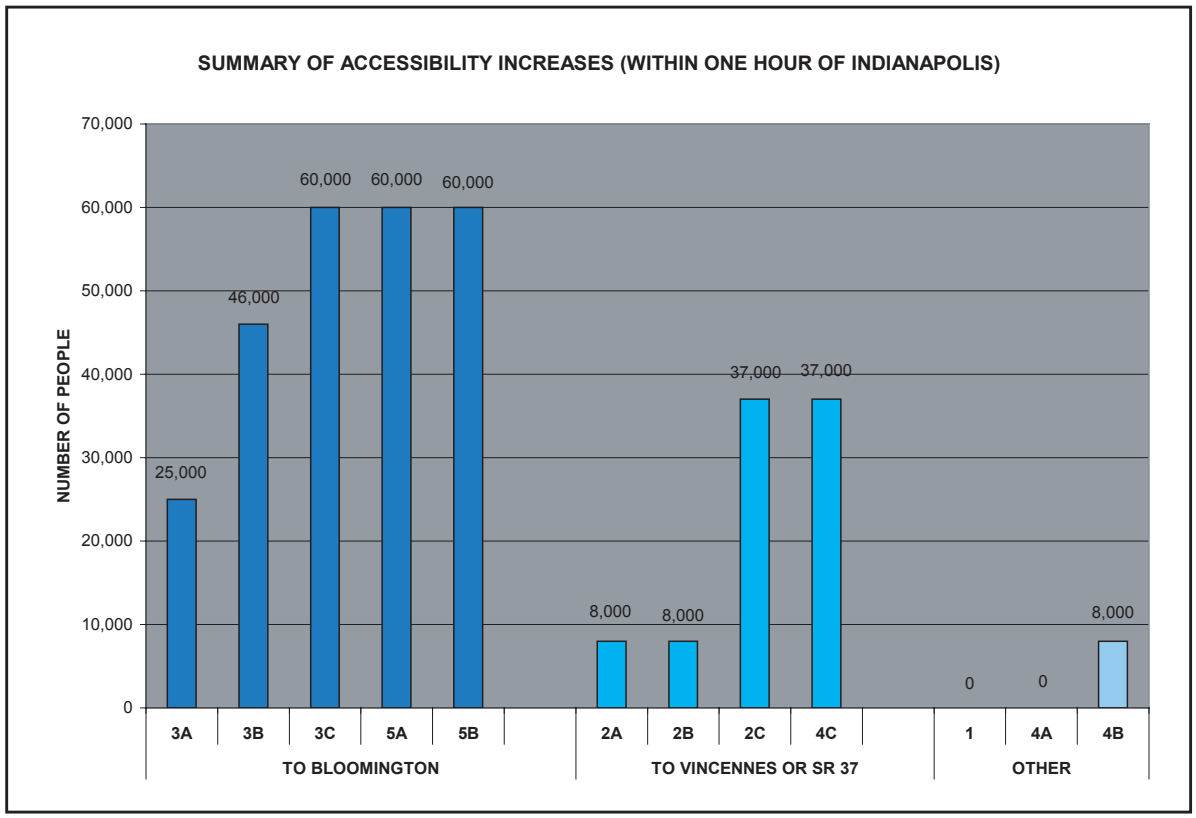


Figure 3-9: Additional People Within One Hour of Indianapolis (Year 2025)

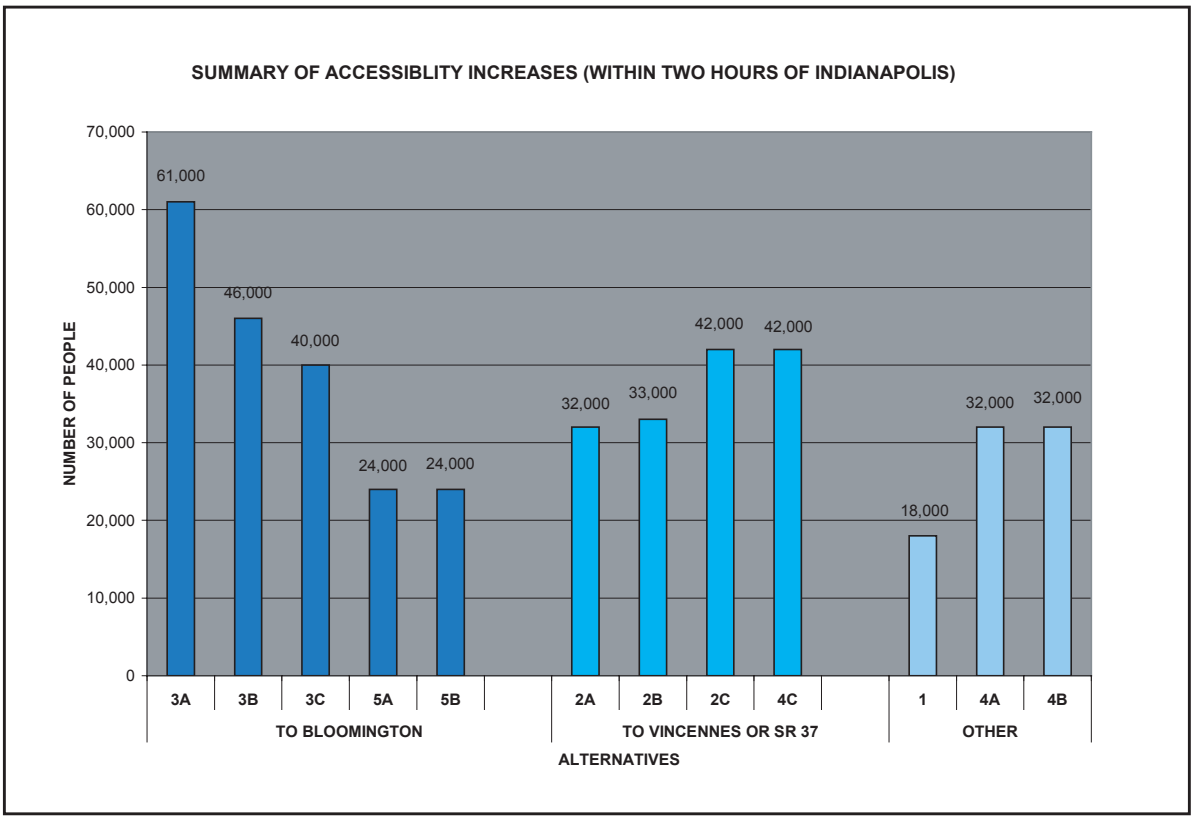


Figure 3-10: Additional People Within Two Hours of Indianapolis (Year 2025).

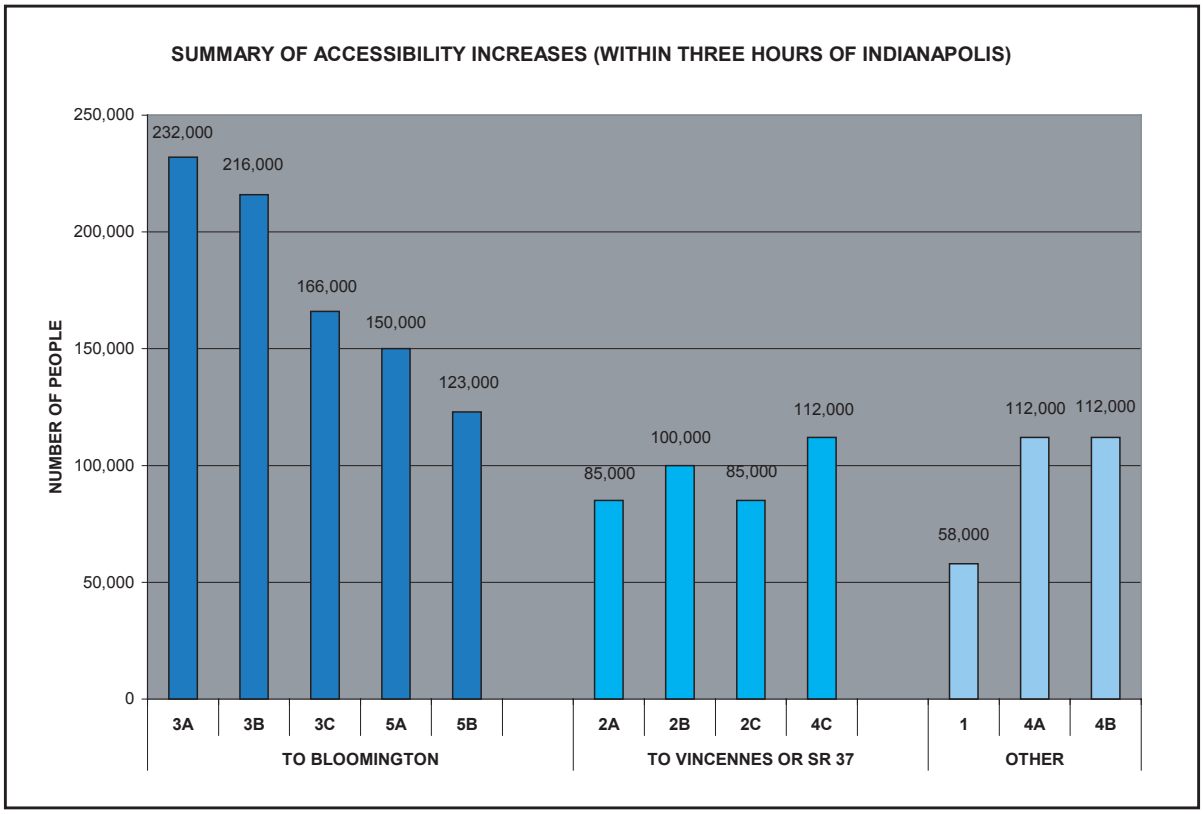


Figure 3-11: Additional People Within Three Hours of Indianapolis (Year 2025).

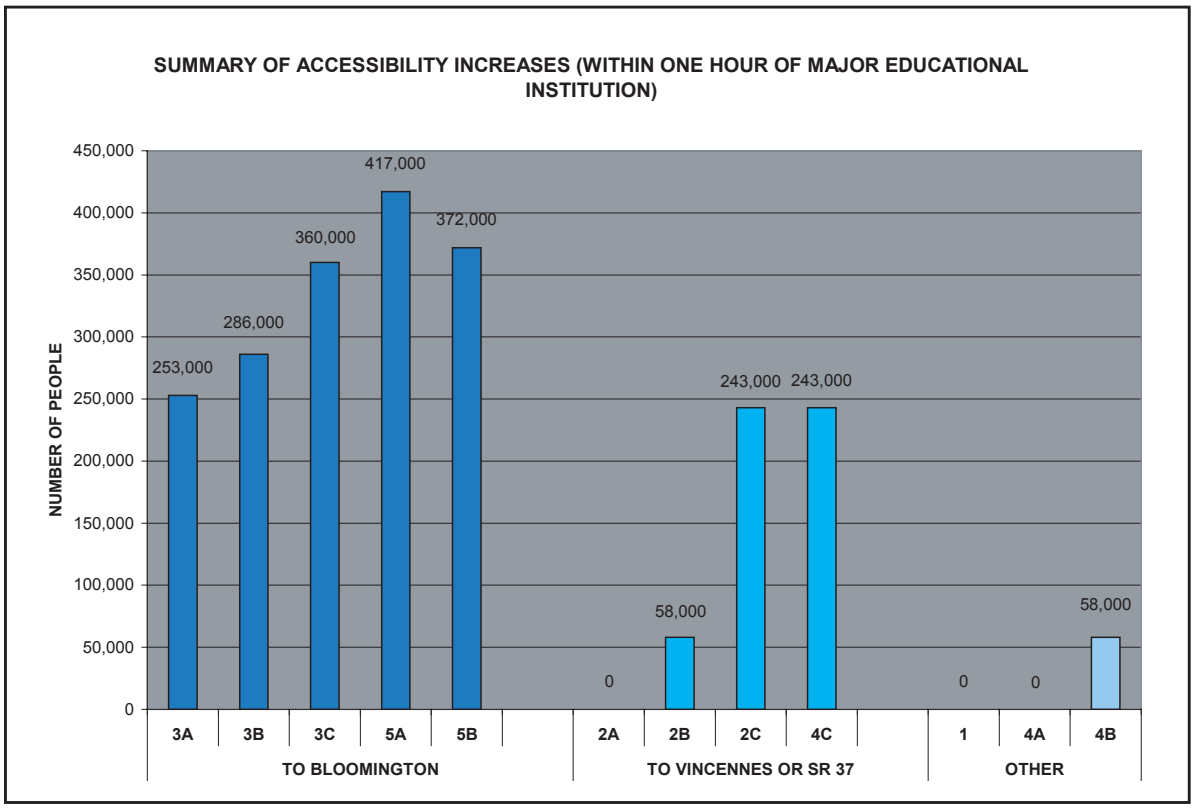


Figure 3-12: Additional People Within One Hour of Major Educational Institution (Year 2025).

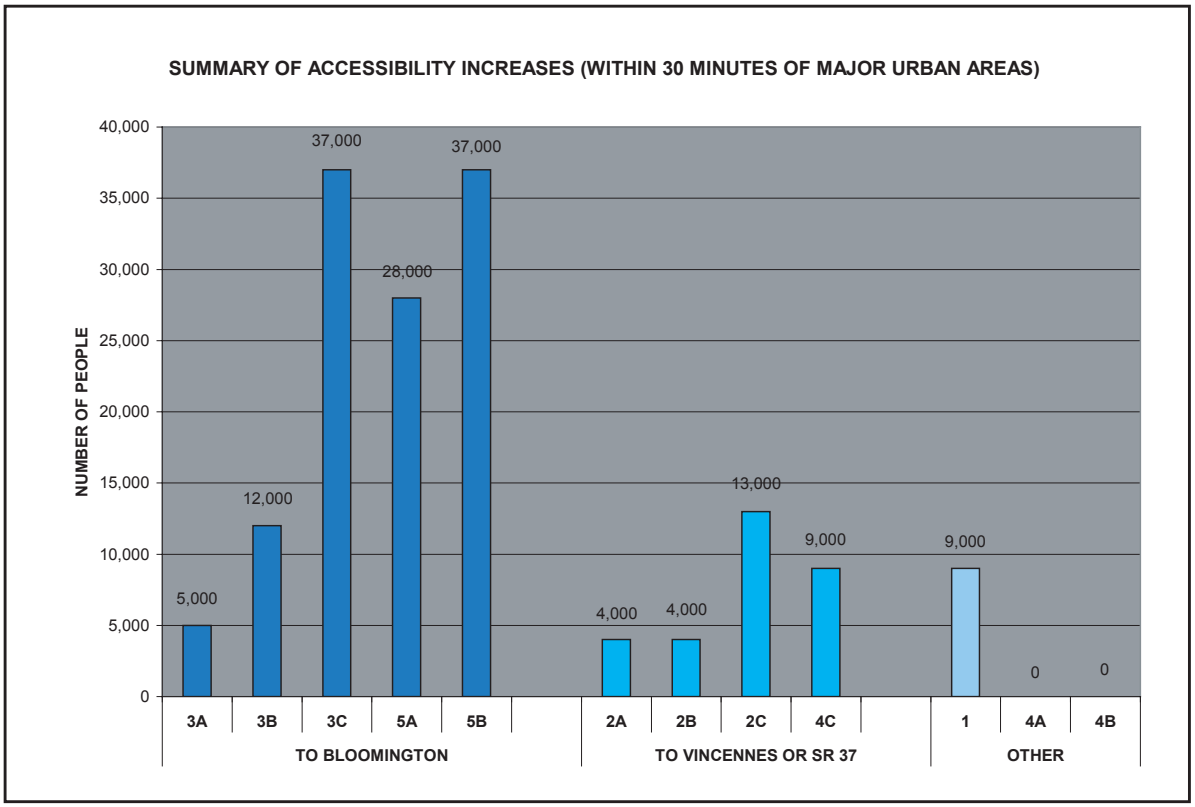


Figure 3-13: Additional People Within 30 Minutes of Major Urban Area (Year 2025).

Summary

Overall, alternatives which serve Bloomington (3 and 5) provide sizeable increases in accessibility to the Study Area. Alternatives which provide a significant increase in access to either Vincennes or the SR 37 corridor, but do not serve Bloomington (2A, 2B, 2C, and 4C) provide moderate increases in accessibility to the Study Area. Other alternatives (1, 4A, and 4B) generally provide low increases in accessibility within the Study Area. The No-Build Alternative results in no increase in personal accessibility in the Study Area.

3.4.3.3 Reduce Traffic Congestion

A goal of this project is to reduce forecasted traffic congestion. In order to assess the comparative ability of various alternatives to reduce traffic congestion, six performance measures were used for the entire Study Area. These six measures which are further explained in Section 2.5, *Purpose and Need* are:

- Volume to Capacity Ratio (v/c) on Major Highways, weighted by Vehicle-Miles of Travel (VMT)
- Percentage of Congested Road Lane-Miles
- Percentage of Congested VMT
- Percentage of Congested Vehicle Hours of Travel (VHT)
- Percentage of VHT Operated in Delayed Conditions
- Efficient System Performance Index (ESPI) by VHT

Table 3-7 summarizes these performance measures for the Study Area.

For the first five indicators, lower values show reduced congestion. For the last indicator a higher value shows reduced congestion.

In terms of congestion relief, alternatives fell into three groups. Alternatives which reach I-465 via the SR 37 corridor (2C, 3B, 3C, 4C, and 5B) provide the greatest congestion relief. Alternatives which reach I-70 via Western Morgan County (2B, 3A, 4B, and 5A) provide the next greatest congestion relief. Alternatives which reach I-70 west of Morgan County (1, 2A, 4A) provide the least congestion relief. Table 3-8 gives the average value for each measure by alternative group. For additional details consult the Section 5.8, *Traffic Impacts.*

Table 3-7: Summary of Study Area Congestion Performance Indicators, by Alternative

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
V/C ratio on major highways, weighted by VMT	0.89	0.88	0.87	0.86	0.87	0.86	0.86	0.87	0.87	0.86	0.87	0.86
% of congested road lane-miles	9.79%	9.63%	9.46%	9.28%	9.45%	9.46%	9.17%	9.42%	9.45%	9.34%	9.45%	9.25%
% of congested VMT	34.03%	33.93%	33.75%	33.13%	33.94%	34.19%	33.04%	33.83%	33.93%	33.50%	33.78%	33.10%
% of congested VHT	57.81%	57.96%	57.82%	57.34%	57.59%	57.65%	57.19%	57.51%	57.80%	57.49%	57.72%	57.21%
% VHT in delayed conditions	68.54%	68.69%	67.27%	66.67%	67.04%	66.75%	66.89%	67.34%	67.59%	66.71%	67.62%	66.87%
ESPI by VHT	7.915	7.896	7.994	8.064	8.024	8.039	8.059	8.01	7.975	8.052	7.979	8.059

Source: Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model

Table 3-8: Average Congestion Measure Performance, by Approach to Indianapolis

	SR 37 Alternatives (2C, 3B, 3C, 4C, 5B)	Western Morgan County Alternatives (2B, 3A, 4B, 5A)	Western Approach to I-70 (1, 2A, 4A)
V/C ratio on major highways, weighted by VMT	0.86	0.87	0.88
% of congested road lane-miles	9.3%	9.5%	9.6%
% of congested VMT	33.4%	33.8%	33.9%
% of congested VHT	57.4%	57.7%	57.8%
% VHT in delayed conditions	66.8%	67.4%	68.2%
ESPI by VHT	8.05	7.99	7.94

Summary

The further east that alternatives approach Indianapolis, the more congestion relief they provide. Two facilities south of Indianapolis which are forecasted to have significant congestion by 2025 are I-65, and the SR 37 Corridor. The alternatives in the SR 37 corridor have the greatest opportunity to relieve these congested facilities. Alternatives in Western Morgan County afford some measure of congestion relief, but not as much as those in the SR 37 Corridor. Alternatives which reach I-70 west of Morgan County have comparatively smaller effects on forecasted congestion. The No-Build Alternative provides no relief in forecasted levels of traffic congestion in the Study Area.

3.4.3.4 Improve Traffic Safety

A goal of this project is to improve regional traffic safety. In order to assess the comparative performance of alternatives in satisfying this goal, three performance measures were used. Forecasts were made at Year 2025 annual reductions in fatal crashes, injury crashes, and property damage only crashes. Crash reductions were calculated using the Indiana Statewide Travel Demand Model, and its post-processor, which analyzes data in an modeled traffic network. For transportation system improvements, such as the various I-69 alternatives, it forecasts the reductions in the number of crashes which occur when drivers change their routes to use different, safer highways.[4]

Table 3-9 summarizes the crash reduction forecasted for each alternative.

Alternatives are in two distinct groups, based upon their approach to I-465. Routes which are situated in a portion of the SR 37 corridor provide significantly higher crash reduction than those which use I-70.[5] Table 3-10 summarizes the crash reduction of these two groups. Figures 3-14 to 3-15 portray the forecasted annual reduction in crashes, by alternative. These alternatives are grouped by their approach to I-465 (I-70 vs. SR 37 Corridor).

Summary

This analysis indicates that the greatest potential for this project to significantly reduce crashes is to provide a higher quality, safer facility in the SR 37 corridor. Routes which are located there result in a much higher reduction in all types of crashes. The differences between these two groups are consistent, and statistically significant.[6] The No-Build Alternative results in no decrease in crashes.

4 Crash reductions are computed using a model post-processor which computes crashes for each road in the entire travel network. Crash rates are computed based upon the type of facility, and the traffic volume.

5 The two groups (I-70 and SR 37 Alternatives) differ significantly in their reductions in fatal, injury and property-damage only crashes. This determination was made using a student-t test, at a 95% confidence level.

6 Determined using a student-t test, at a 95% confidence level.

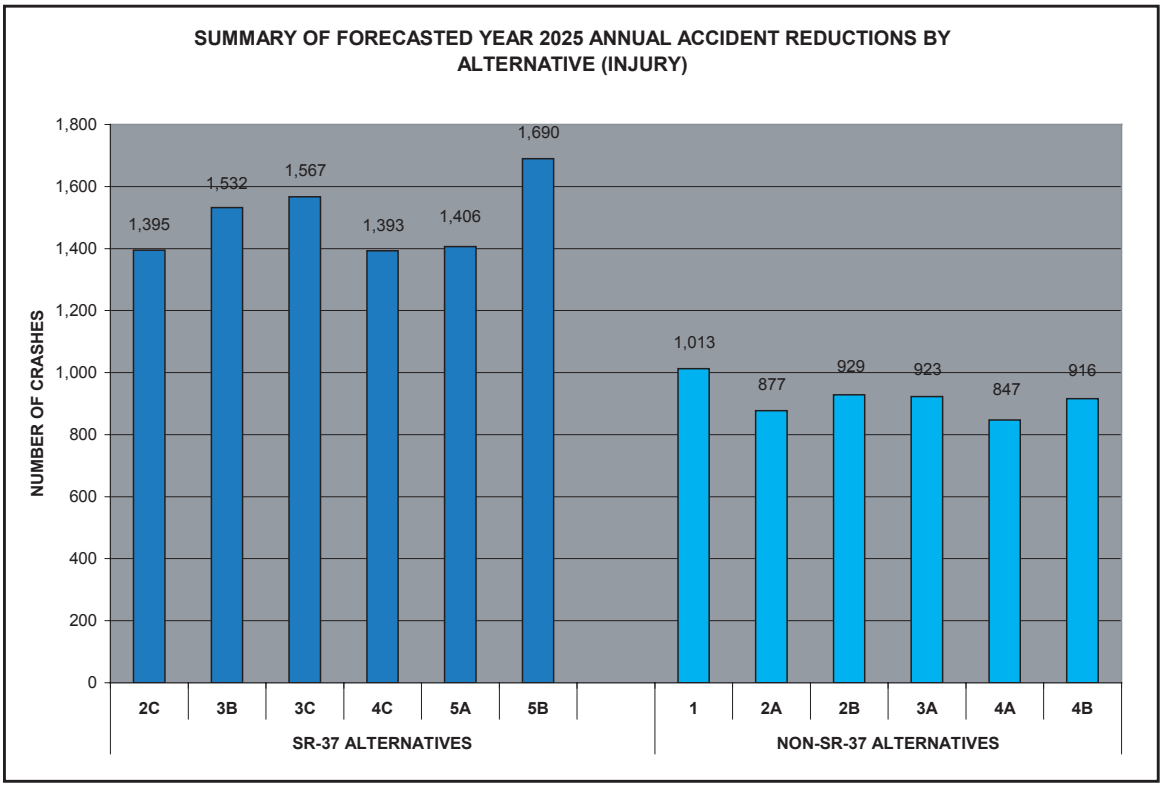


Figure 3-14: Reduction in Injury Crashes (Year 2025)

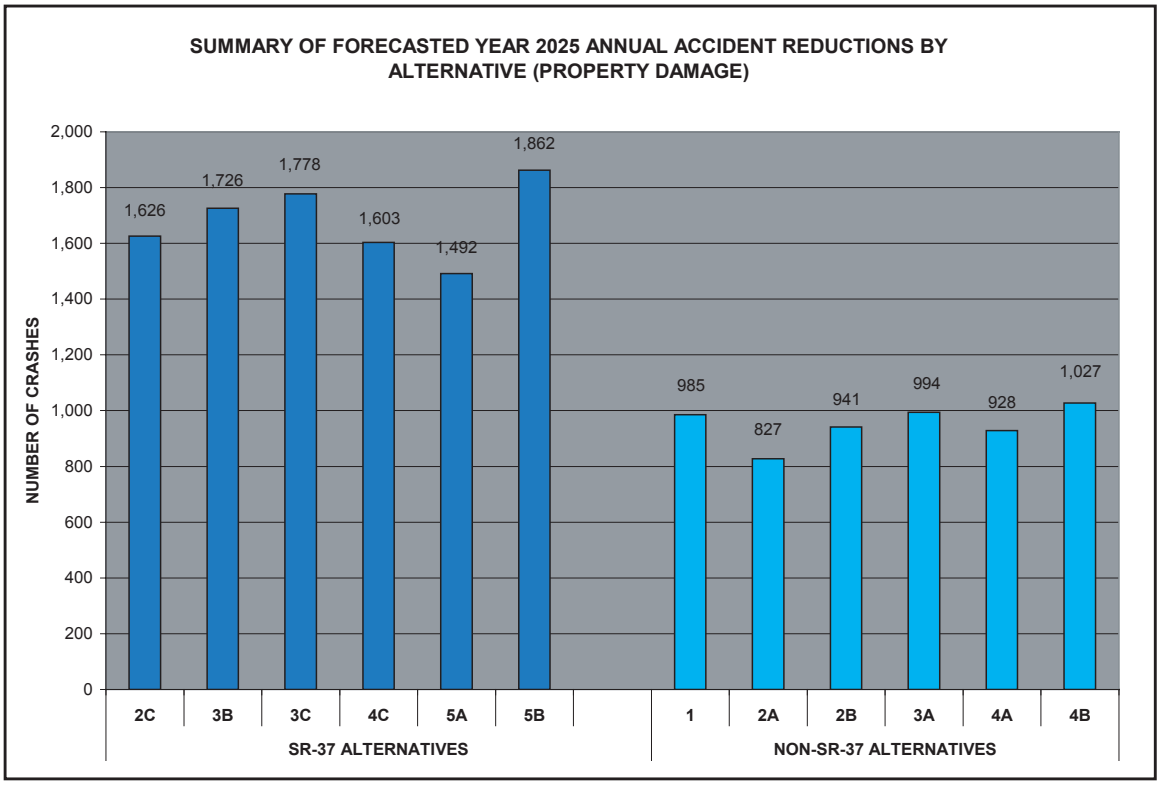


Figure 3-15: Reduction in Property Damage Only Crashes (Year 2025)

Table 3-9: Summary of Forecasted Year 2025 Annual Crash Reductions, by Alternative

Crash Type	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Fatal	5	4	4	6	3	7	7	2	2	3	6	8
Injury	1,013	877	929	1,395	923	1,532	1,567	847	916	1,393	1,406	1,690
Property Damage, Only	985	827	941	1,626	994	1,726	1,778	928	1,027	1,603	1,492	1,862

Source: Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model, Post-Processor

Table 3-10: Annual (Year 2025) Crash Reductions, by Group

Crash Type	SR 37 Alternatives (2C, 3B, 3C, 4C, 5A, 5B)		I-70 Alternatives (1, 2A, 2B, 3A, 4A, 4B)	
	Range in Reductions	Average Reduction	Range in Reductions	Average Reduction
Fatal	3 - 8	7	2 - 5	3
Injury	1,393 - 1,690	1,497	847 - 1,013	918
Property Damage, Only	1,603 - 1,862	1,681	827 - 1,027	950

Source: Bernardin, Lochmueller & Associates, Indiana Statewide Travel Model and Post Processor

3.4.4 Economic Development Indicators

3.4.4.1 Improve Business Accessibility[7]

A goal for this project is to improve the overall business climate by improving business access to customers, employees, and suppliers. The performance measures for this goal include:

- Access of businesses to labor and consumer markets
- Access of business to buyer and supplier markets

Access of business to labor and consumer markets is measured by the increase in the numbers of people within 30 minutes of a typical traffic analysis zone (TAZ)[8] in Southwest Indiana. Thirty (30) minutes was chosen since it represents a reasonable commute time for workers, as well as a likely travel time for people to make shopping trips. Access to additional customers enables businesses to increase their sales volumes. This allows businesses to become more profitable, and can lead to increases in employment, and an overall improvement in the business climate. Access to more workers enables businesses to select employees from a wider labor pool. This allows workers to choose from a wider selection of employers, as well as provide businesses to choose from a wider pool of qualified employees. In the "no build" case, the typical TAZ outside of the Indianapolis MSA has 30 minute access to a population of 125,000. Thus, each 1% increase in access to labor and consumer markets represents an increase in 1,250 potential employees and retail customers.

Access of business to buyer and supplier markets is measured by the increase in the number of employees within three hours of a typical TAZ in Southwest Indiana. Three hours was chosen since

7 Improved Business Accessibility was found to be highly correlated with reductions in business costs, which was a goal used in the Level 2 Screening. Therefore, these two goals were consolidated into this measure - Increase in Business Accessibility.

8 A traffic analysis zone (TAZ) is a geographic unit in the model which contains demographic and land use data. A TAZ generally is characterized by consistent land use. There are 229 TAZs in the Indiana Statewide Model.

it corresponds to a reasonable round-trip travel time within one day for truck deliveries (six hours round trip driving time, plus time for pickups and deliveries). Access to a greater number of suppliers provides a more competitive purchasing environment and enables businesses to reduce their costs. Access to a greater number of business customers enables businesses to increase their sales volumes, and become more profitable. In the "no build" case, the typical TAZ outside of the Indianapolis MSA has three hour access to employment of 5,600,000. Thus, each 1% increase in access to buyer and supplier markets represents an increase in access to businesses employing 56,000 workers.

Using ***employees*** as our measure of access to business takes into account both the number and size of businesses. Data on employment is readily available from the travel model, and it is a reasonable measure of the location and amount of business activity.

Table 3-11 gives the performance measures for each alternative.

Table 3-11: Summary of Forecasted Year 2025 Increase in Business Accessibility, by Alternative

Access to:	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Labor and Consumer Markets	0.55%	0.39%	0.43%	2.72%	0.47%	2.74%	3.76%	0.16%	0.37%	2.59%	1.87%	3.56%
Buyer and Supplier Markets	1.52%	2.41%	2.67%	3.41%	3.45%	4.09%	3.84%	2.72%	2.86%	3.62%	3.06%	3.41%

Source: Cambridge Systematics, Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model

Table 3-12 Annual (Year 2025) Increase in Business Accessibility, by Group

	SR 37 Alternatives		I-70 Alternatives	
Access to:	Range of Increase	Average	Range of Increase	Average
Labor and Consumer Markets	1.87 - 3.76%	2.89%	0.16 - 0.55%	0.40%
Buyer and Supplier Markets	3.06 - 4.09%	3.57%	1.52% - 3.45%	2.61%

Source: Cambridge Systematics, Bernardin, Lochmueller & Associates. Indiana Statewide Travel Demand Model

The alternatives' performances on this measure falls into two groups, determined by their routing to I-465. Table 3-12 gives these two groups (approaching I-465 via I-70 versus via SR 37). Figures 3-16 to 3-17 portray the forecasted annual increase in business accessibility, by alternative. These alternatives are grouped by their approach of I-465 (I-70 vs. SR 37 Corridor). Routes which are located in the SR 37 corridor provide a significantly greater increase in business accessibility.[9] The average route serving SR 37 provides businesses outside the Indianapolis MSA with access to an additional 3,600 potential employees and customers. It also provides access to businesses employing an additional 200,000 workers. By contrast, the average route which does not serve SR 37 provides access to an additional 500 potential employees and customers. It also provides access to businesses employing an additional 146,000 workers. In addition to service to SR 37, one other factor explains higher performance on these indicators. Among the routes serving SR 37, Routes 3B and 3C also serve the Crane Naval Surface Warfare Center (NSWC). These two routes have the first and second

9 The two groups (I-70 and SR 37 Alternatives) differ significantly in their reductions in access to labor and consumer markets, and access to buyer and supplier markets. This determination was made using a student-t test, at a 95% confidence level.

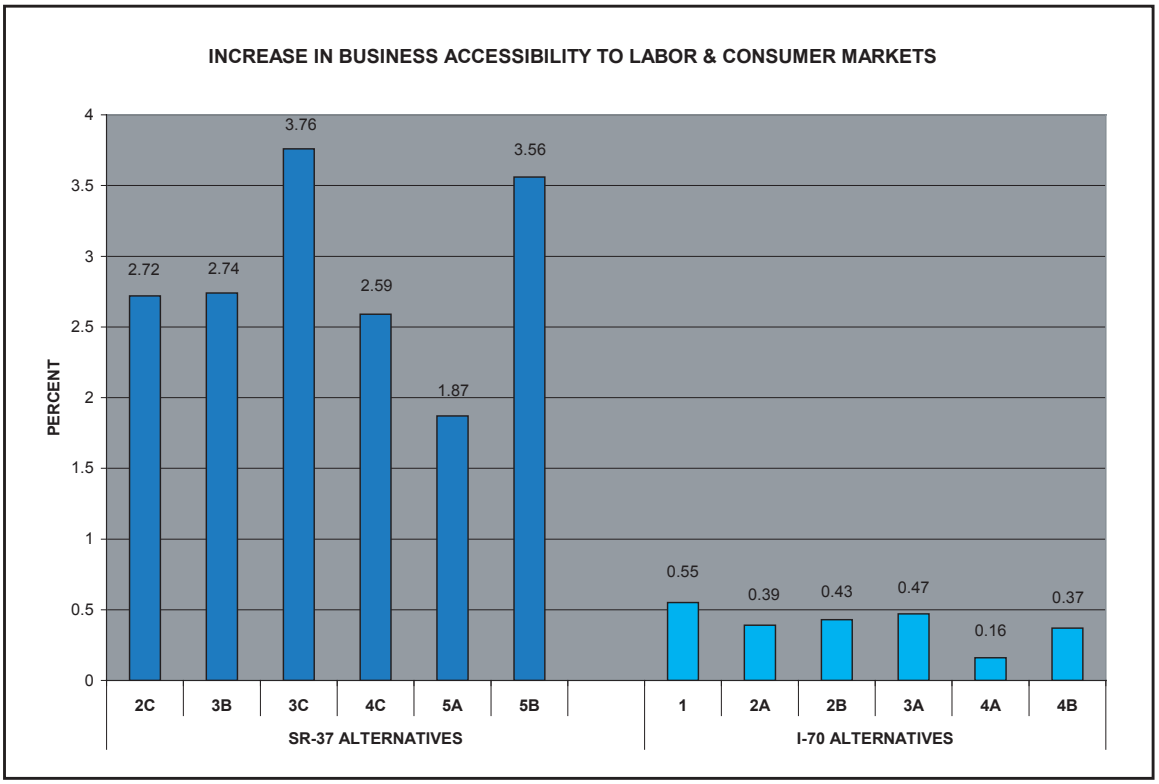


Figure 3-16: Increase in Business Accessibility to Labor and Consumer Markets

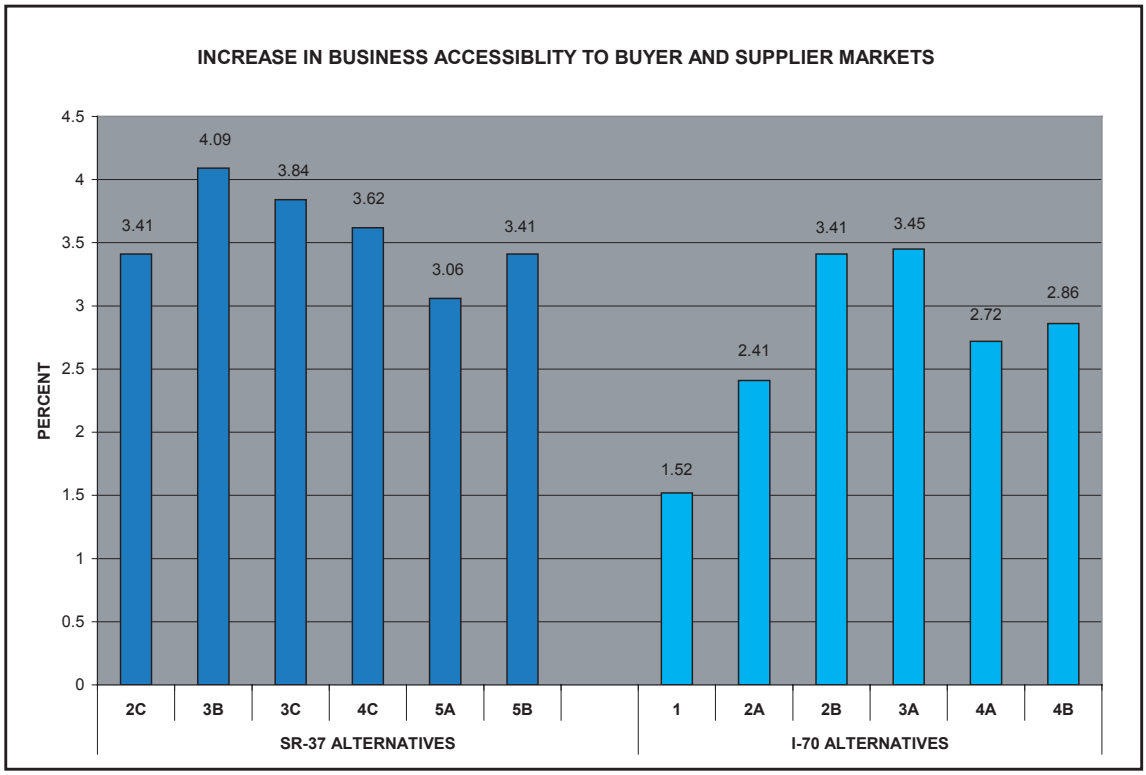


Figure 3-17: Increase in Business Access to Buyer and Supplier Markets (Year 2025).

highest increase in access to buyer and supplier markets, and the first and third highest increase in access to labor and consumer markets. Crane NSWC has a concentration of scientific and high-tech employment which presently is geographically isolated. As described in Section 2.3.2.3, Crane NSWC represents an opportunity for economic development which is limited by its lack of transportation access. The SR 37 routes which also serve Crane provide the overall highest increase in business accessibility.

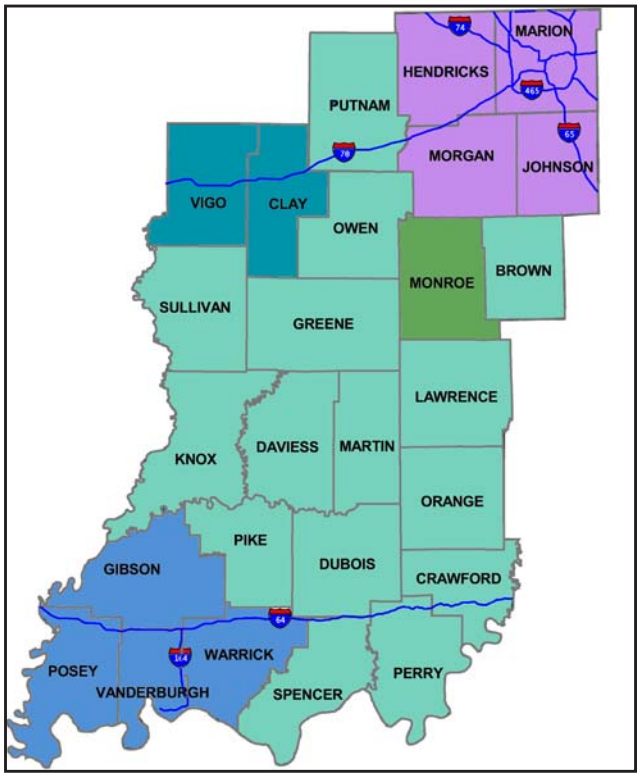


Figure 3-18: Economic Regions.

In addition to these overall results, the Level 3 modeling considered the relative effects of each alternative on the different economic regions in Southwest Indiana. The Study Area was divided into five economic regions, consisting of the following counties:

- **Indianapolis Region**. Marion, Johnson, Hendricks, Morgan
- **Bloomington Region**. Monroe
- **Terre Haute Region**. Vigo and Clay
- **Evansville Region**. Vanderburgh, Posey, Warrick, Gibson
- **Rural SW Indiana**. Putnam, Owen, Sullivan, Greene, Brown, Knox, Daviess, Martin, Lawrence, Orange, Pike, Dubois, Crawford, Spencer, Perry

Figure 3-18 shows these economic regions.

Tables 3-13 through 3-24 give the increase in business accessibility afforded by each alternative to each economic region. This increase is given as the added number of people reachable within 30 minutes from a typical TAZ in that economic region (access to labor and consumer markets), as well as the added number of employees reachable within three hours from a typical TAZ in that economic region (access to buyer and supplier markets).

A comparison of these tables shows that alternatives differ greatly in the additional markets which they open up to businesses. Generally, the Evansville Region receives the greatest benefit, followed by either the Indianapolis or Bloomington Region.

Summary

This analysis indicates that the greatest potential to increase business accessibility is by a project located in the SR 37 corridor. Routes located there result in a significantly greater increase in business accessibility. The differences between these two groups are consistent, as well as statistically significant. The No Build Alternative results in no increase in business accessibility in the Study Area.

Table 3-13: Alternative 1 Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	544	63,455	0.07%	0.60%
Bloomington	0	0	0.00%	0.00%
Terre Haute	1,890	36,171	1.67%	0.47%
Evansville	1,486	308,790	0.83%	8.50%
Rural SW Indiana	1,355	20,830	2.22%	0.36%

Table 3-14: Alternative 2A Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	72	96,809	0.01%	0.92%
Bloomington	683	43,057	0.39%	0.59%
Terre Haute	0	12,777	0.00%	0.17%
Evansville	1,486	437,768	0.83%	12.05%
Rural SW Indiana	1,161	112,709	1.90%	1.93%

Table 3-15: Alternative 2B Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	779	109,775	0.10%	1.04%
Bloomington	280	53,316	0.16%	0.73%
Terre Haute	0	12,777	0.00%	0.17%
Evansville	1,486	477,281	0.83%	13.14%
Rural SW Indiana	1,110	129,302	1.82%	2.21%

Table 3-16: Alternative 2C Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	29,127	185,859	3.83%	1.76%
Bloomington	612	241,147	0.35%	3.29%
Terre Haute	0	15,969	0.00%	0.21%
Evansville	1,486	472,371	0.83%	13.01%
Rural SW Indiana	975	196,405	1.59%	3.36%

Table 3-17: Alternative 3A Increases in Business Accessibility (Typical TAZ).

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	1,748	151,578	0.23%	1.44%
Bloomington	1,019	228,635	0.58%	3.12%
Terre Haute	0	3,575	0.00%	0.05%
Evansville	877	540,016	0.49%	14.87%
Rural SW Indiana	1,050	209,140	1.72%	3.57%

Table 3-18: Alternative 3B Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	27,803	226,343	3.66%	2.15%
Bloomington	5,505	338,231	3.15%	4.61%
Terre Haute	0	3,575	0.00%	0.05%
Evansville	877	555,036	0.49%	15.28%
Rural SW Indiana	994	233,553	1.62%	3.99%

Table 3-19: Alternative 3C Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	32,335	210,311	4.25%	1.99%
Bloomington	18,473	434,344	10.57%	5.92%
Terre Haute	0	36,158	0.00%	0.47%
Evansville	877	505,280	0.49%	13.91%
Rural SW Indiana	1,943	196,203	3.18%	3.35%

Table 3-20: Alternative 4A Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	139	108,732	0.02%	1.03%
Bloomington	0	45,422	0.00%	0.62%
Terre Haute	0	6,770	0.00%	0.09%
Evansville	877	491,696	0.49%	13.54%
Rural SW Indiana	367	136,170	0.60%	2.33%

Table 3-21: Alternative 4B Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	1,793	121,003	0.24%	1.15%
Bloomington	280	62,393	0.16%	0.85%
Terre Haute	0	7,214	0.00%	0.09%
Evansville	877	499,123	0.49%	13.74%
Rural SW Indiana	681	151,010	1.11%	2.58%

Table 3-22: Alternative 4C Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	29,127	201,452	3.83%	1.91%
Bloomington	612	258,648	0.35%	3.53%
Terre Haute	0	9,961	0.00%	0.13%
Evansville	877	493,718	0.49%	13.59%
Rural SW Indiana	546	212,830	0.89%	3.64%

Table 3-23: Alternative 5A Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	9,871	140,601	1.30%	1.33%
Bloomington	18,422	432,177	10.55%	5.89%
Terre Haute	0	73,253	0.00%	0.95%
Evansville	877	406,998	0.49%	11.21%
Rural SW Indiana	1,693	176,490	2.77%	3.02%

Table 3-24: Alternative 5B Increases in Business Accessibility (Typical TAZ)

Economic Region	Increase In Access To:		Percentage Increase In Access to:	
	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)	Labor/Consumer Markets (Population Within 30 Minutes)	Buyer/Supplier Markets (Employees Within Three Hours)
Indianapolis	30,701	192,977	4.04%	1.83%
Bloomington	17,945	428,093	10.27%	5.84%
Terre Haute	0	73,253	0.00%	0.95%
Evansville	877	415,604	0.49%	11.44%
Rural SW Indiana	1,693	183,097	2.77%	3.13%

3.4.4.2 Support Sustainable, Long-Term Economic Growth

The needs analysis demonstrated that long-term economic growth in Southwest Indiana has lagged significantly behind the rest of the country. A goal for this project is to support sustainable, long-term economic growth in Southwest Indiana. The following performance measures are associated with this goal.

- Net Change in Disposable Income in the Study Area (in 2025)
- Increase in Study Area Employment (in 2025)
- Increase in Employment in High Growth Industries (in 2025)
- Increase in Employment in High Paying Industries (in 2025)
- Net Change in Farm & Forest Income
- Net Change in Roadside Business Sales

Note: The last two performance measures could be quantified only in relation to present day farming, forestry, and retail sales activities "on the ground." As such, they are forecasts in 1997 dollars (Farm & Forest Income) and 2001 dollars (Roadside Business Sales) respectively.

Table 3-25 summarizes the performance of alternatives on this measure.

On the first four indicators, alternatives fall into three groups. The best performing alternatives (2C, 3A, 3B, 3C, 4C, 5A, 5B) serve SR 37 and/or Bloomington. Four other alternatives which serve the west-central part of the study area (2A, 2B, 4A, and 4B) provide a lesser level of benefits. One alternative in the far western portion of the study area (1) provides the smallest level of benefits. Table 3-26 shows the ranges of performance for these groups of alternatives.

Table 3-25: Summary of Forecasted Year 2025 Long Term Study Area Economic Growth												
Net Change	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Annual Disposable Income	$52,000,000	$88,000,000	$99,000,000	$130,000,000	$133,000,000	$165,000,000	$162,000,000	$98,000,000	$106,000,000	$135,000,000	$125,000,000	$142,000,000
Total Employment	1,400	2,200	2,500	3,400	3,400	4,300	4,300	2,500	2,700	3,500	3,300	3,800
Employment in High Growth Industries	700	1,000	1,100	1,500	1,600	1,900	1,900	1,200	1,300	1,600	1,400	1,600
Employment in High Paying Industries	500	900	1,000	1,200	1,300	1,500	1,400	1,000	1,100	1,300	1,100	1,200
Farm/Forest Income	$(210,000)	$(350,000)	$(380,000)	$ (500,000)	$ (340,000)	$ (430,000)	$ (420,000)	$ (330,000)	$ (370,000)	$ (480,000)	$ (280,000)	$ (380,000)
Roadside Business Sales	($7,300,000)	$90,100,000	$54,900,000	$152,600,000	$50,900,000	$146,100,000	$166,800,000	$25,500,000	$37,100,000	$130,300,000	$49,100,000	$125,400,000

Source: Regional Economic Model, Inc., Cambridge Systematics, Bernardin, Lochmueller & Associates, Inc.

The other two indicators (Farm & Forest Income, and Roadside Business Sales) help to complete the picture for these Alternatives. Farm and Forest Income changes are included to show the effect of each alternative on agricultural income. These estimates show that the effects on agricultural income are a fraction of one percent of total personal income effects. Changes in roadside business sales give an estimate of what will happen in the immediate vicinity of where the highway would be located. However, most of the gains (or losses) would be offset by opposite changes elsewhere in Southwest Indiana. See Section 5.5, *Economic Impacts*, for a discussion of these localized effects.

Figures 3-19 - 3-22 show the performance of alternatives on these first four measures. They are shown in the groups identified in Table 3-26.

Summary

Alternatives which are located in the SR 37 corridor and/or serve Bloomington (2C, 3A, 3B, 3C, 4C, 5A, 5B) have notably higher benefits, as measured by long term economic growth performance measures. Alternatives located in the west-central Study Area (2A, 2B, 4A, 4B) provide a moderate level of benefits, as measured by long term economic growth performance measures. The one alternative located in the far west of the study area (1) provides the smallest level of support to long term economic growth. The No-Build Alternative results in no increase in long term economic growth.

Table 3-26: Grouping of Alternatives by Performance in Long Term Economic Growth Indicators			
	Alternatives Serve SR 37 and/or Bloomington	Serve West- Central Study Area	Other
	2C, 3A, 3B, 3C, 4C, 5A, 5B	2A, 2B,4A, 4B	1
Net Change in Annual Disposable Income	$125,000,000 - $162,000,000	$88,000,000 - $106,000,000	$52,000,000
Total Employment	3,300 - 4,300	2,200 - 2,700	1,400
Employment in High Growth Industries	1,400 - 1,900	1,000 - 1,300	700
Employment in High Paying Industries	1,100 - 1,500	900 - 1,100	500

Source: Regional Economic Model, Inc., Cambridge Systematics, Bernardin, Lochmueller & Associates, Inc.

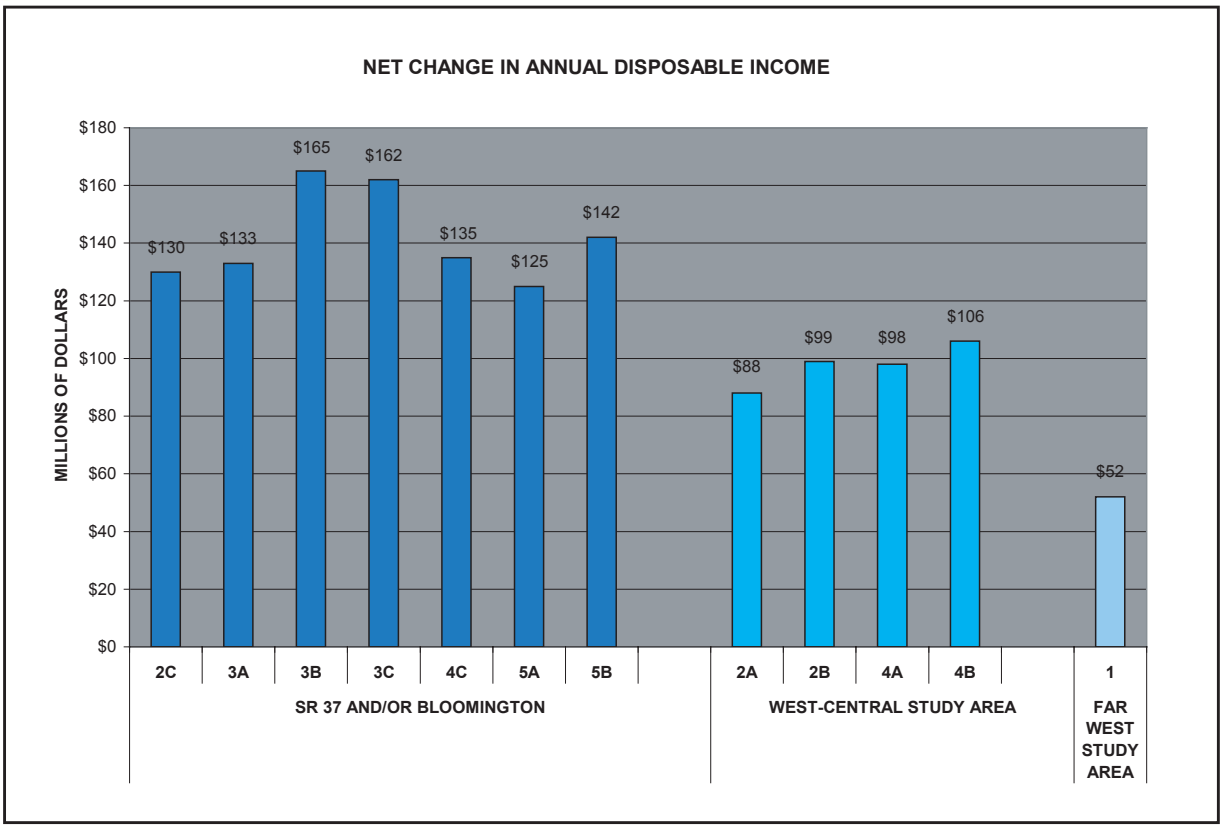


Figure 3-19: Increase in Study Area Disposable Income (Year 2025)

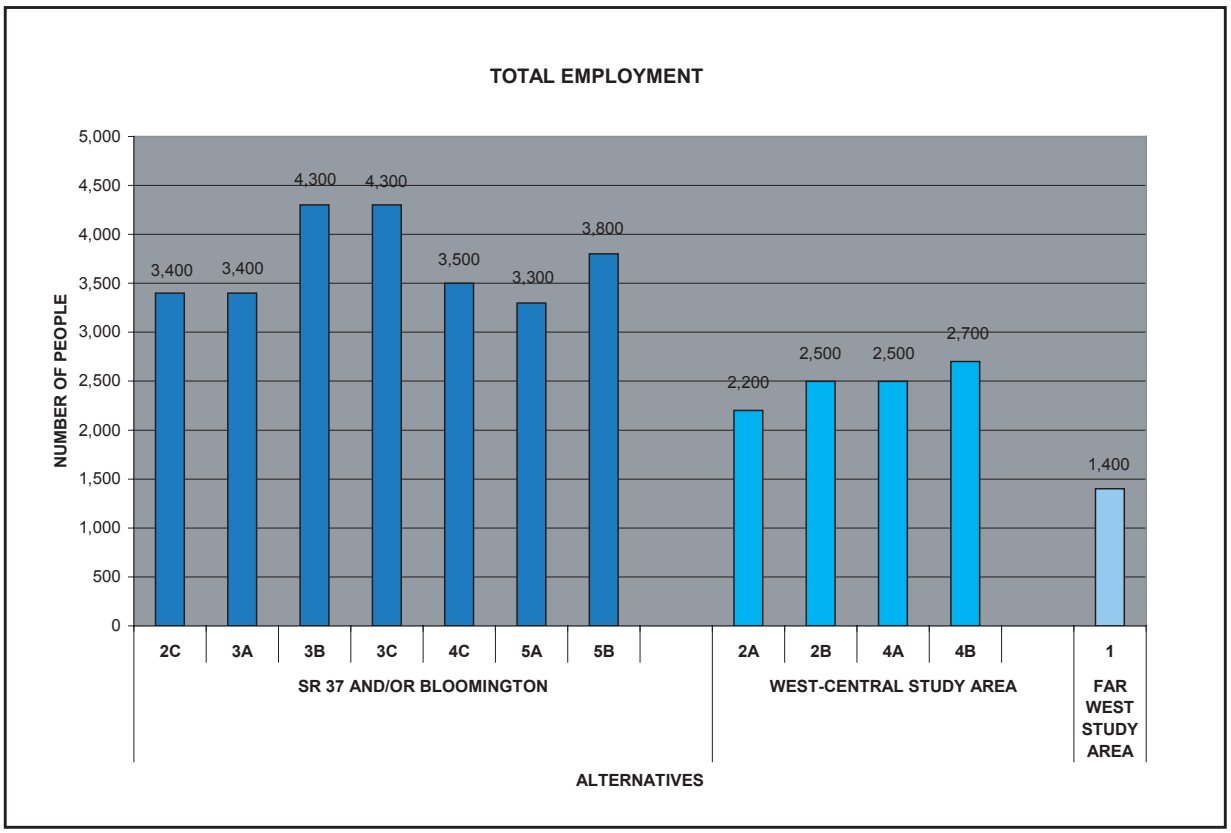


Figure 3-20: Increase in Study Area Employment (Year 2025)

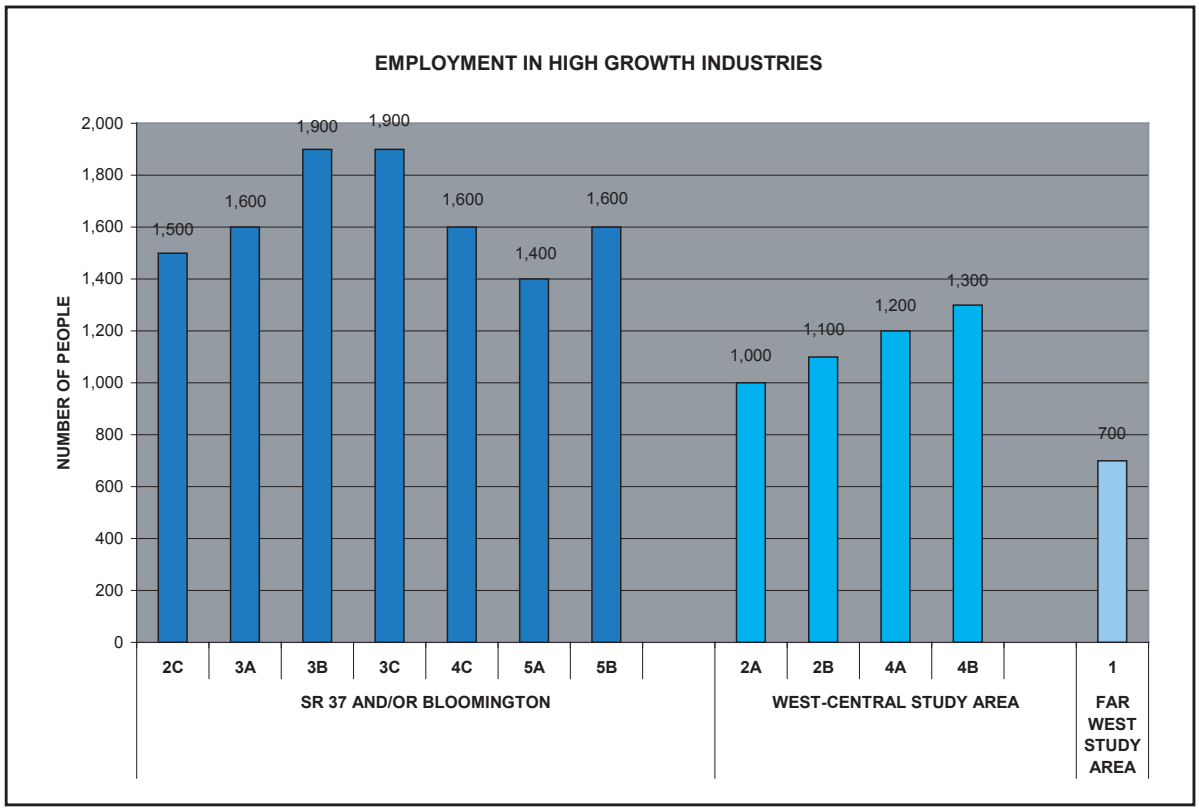


Figure 3-21: Increase in Study Area Employment in High Growth Industries (Year 2025)

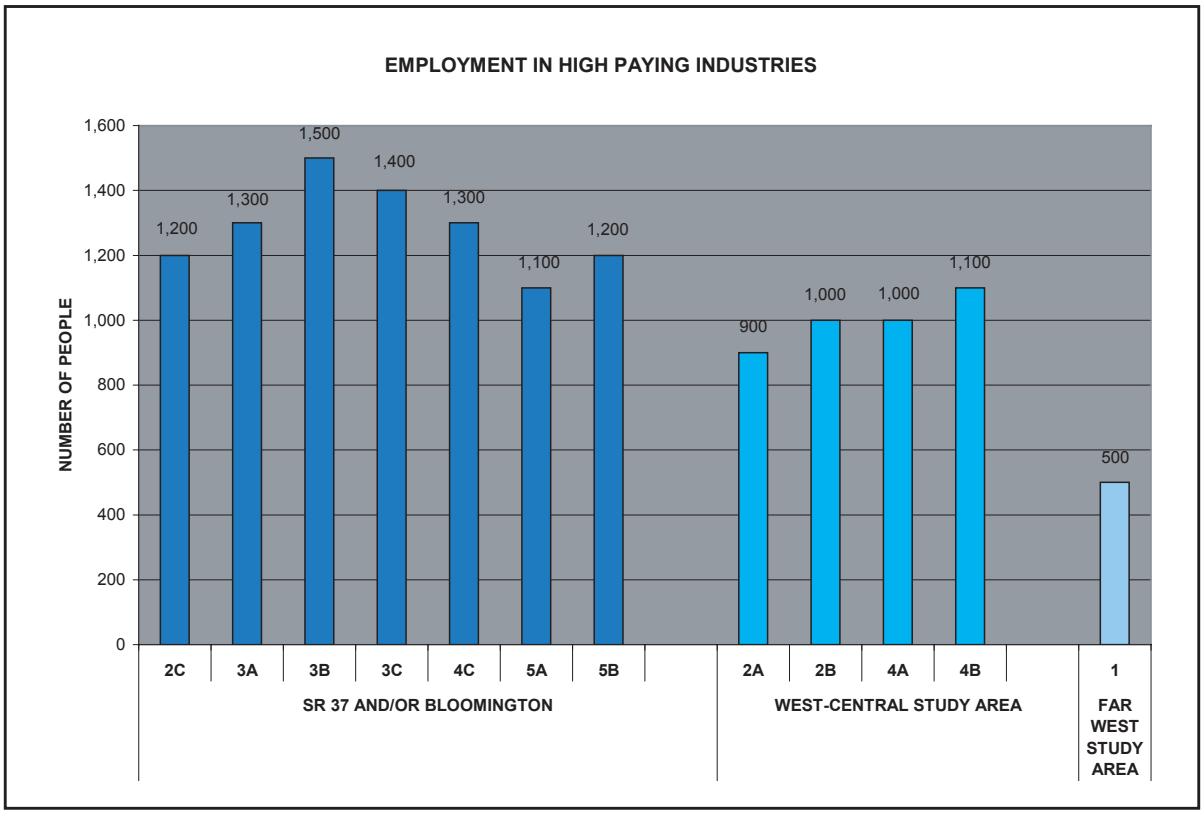


Figure 3 - 22: Increase in Study Area Employment in High Wage Industries (Year 2025)

3.4.4.3 Support Economic Development to Benefit a Wide Spectrum of Area Residents

These performance indicators are intended to identify how well alternatives perform in benefitting a wide spectrum of area residents. The following performance measures assess how well alternatives perform on this goal.

- Young working age (25 - 44) population
- Government transfer payments per capita

The increase in young working age population is an important indicator. Workers in this age group are the most mobile. Their decisions about where to locate are highly sensitive to economic opportunity. An increase in workers in this category is an indication of positive prospects for economic growth. There has been considerable anecdotal testimony offered which states that the loss of young workers due to the lack of economic opportunity is a major factor limiting economic growth in Southwest Indiana.

Table 3-27: Grouping of Alternatives by Performance in Economic Development Spectrum Indicators

	Alternatives		
	Serve SR 37 and/or Bloomington	Serve West-Central Study Area	
Change In:	2C, 3A, 3B, 3C, 4C, 5A, 5B	2A, 2B,4A, 4B	1
Young Working-Age Population	2,000 - 2,600	1,400 - 1,600	800
Transfer Payments Per Capita	$ (8) - (10)	$ (5) - (6)	$ (3)

Source: Regional Economic Model, Inc., Cambridge Systematics, Inc.

"Transfer payments" are a comprehensive enumeration of direct government payments to or on behalf of groups or individuals. They include disability payments, retirement payments, survivor benefits, medical payments, public assistance, food stamps, unemployment compensation, veterans benefits, education and training assistance. These also include payments on all levels (federal, state and local). A reduction in transfer payments does not assume any change in government policies regarding eligibility for these programs. Rather, it demonstrates that the economic status of individuals improves, so that these programs are less needed. Alternatives are in the groups shown in Table 3-27. Table 3-28 summarizes the performance of alternatives on these measures.

On these indicators, alternatives fall into three groups. The best performing alternatives serve the SR 37 corridor, and/or Bloomington (2C, 3A, 3B, 3C, 4C, 5A, 5B). Four alternatives in the west-central study area (2A, 2B, 4A, and 4B) provide a lesser level of benefits. One alternative in the far west portion of the study area (1) provides fewer benefits than other alternatives. Table 3.28 shows the ranges of performance for these groups of alternatives.

Figures 3-23 to 3-24 show the performance of alternatives on each indicator.

Table 3-28: Summary of Forecasted Year 2025 Economic Development Spectrum Performance Indicators, by Alternative

Change in:	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Young Working-Age Population	800	1,400	1,500	2,000	2,100	2,600	2,600	1,500	1,600	2,100	2,000	2,300
Transfer Payments Per Capita	$ (3)	$ (5)	$ (6)	$ (8)	$ (8)	$ (10)	$ (10)	$ (6)	$ (6)	$ (8)	$ (8)	$ (9)

Source: Regional Economic Model, Inc., Cambridge Systematics, Inc.

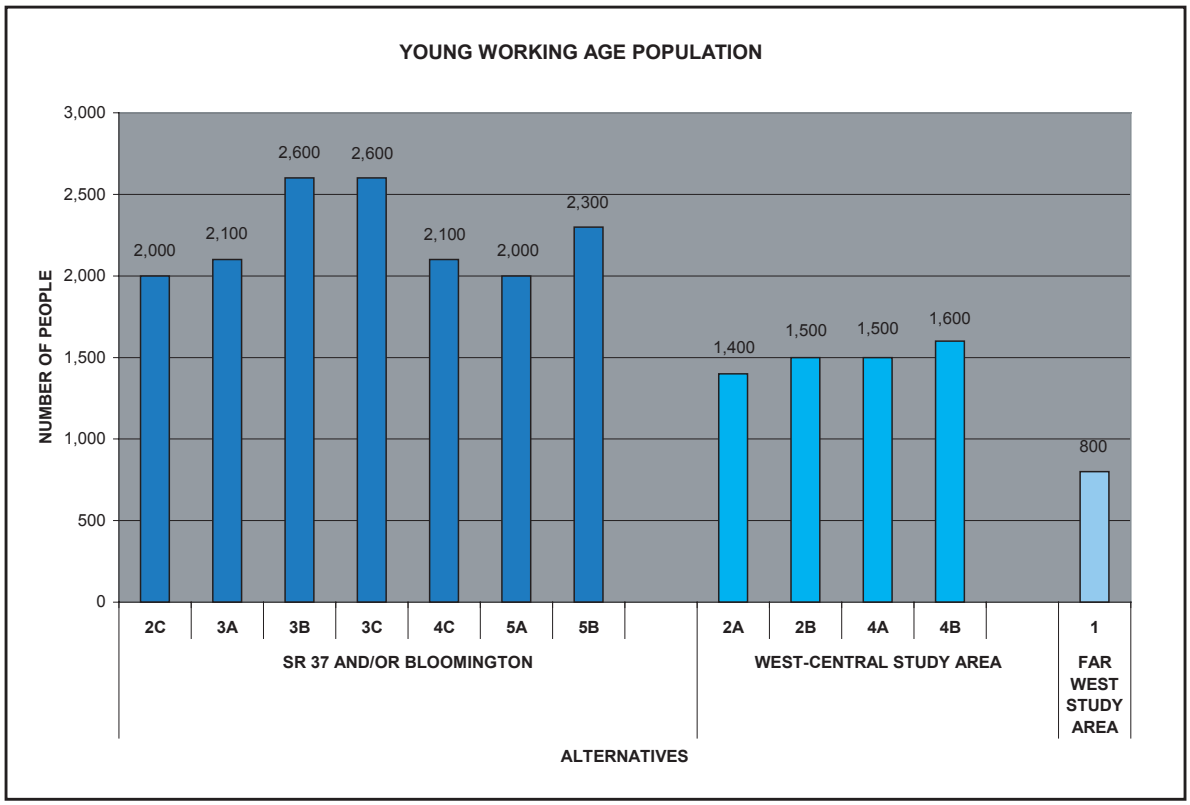


Figure 3-23: Increase in Study Area Young Working Age Population (Year 2025).

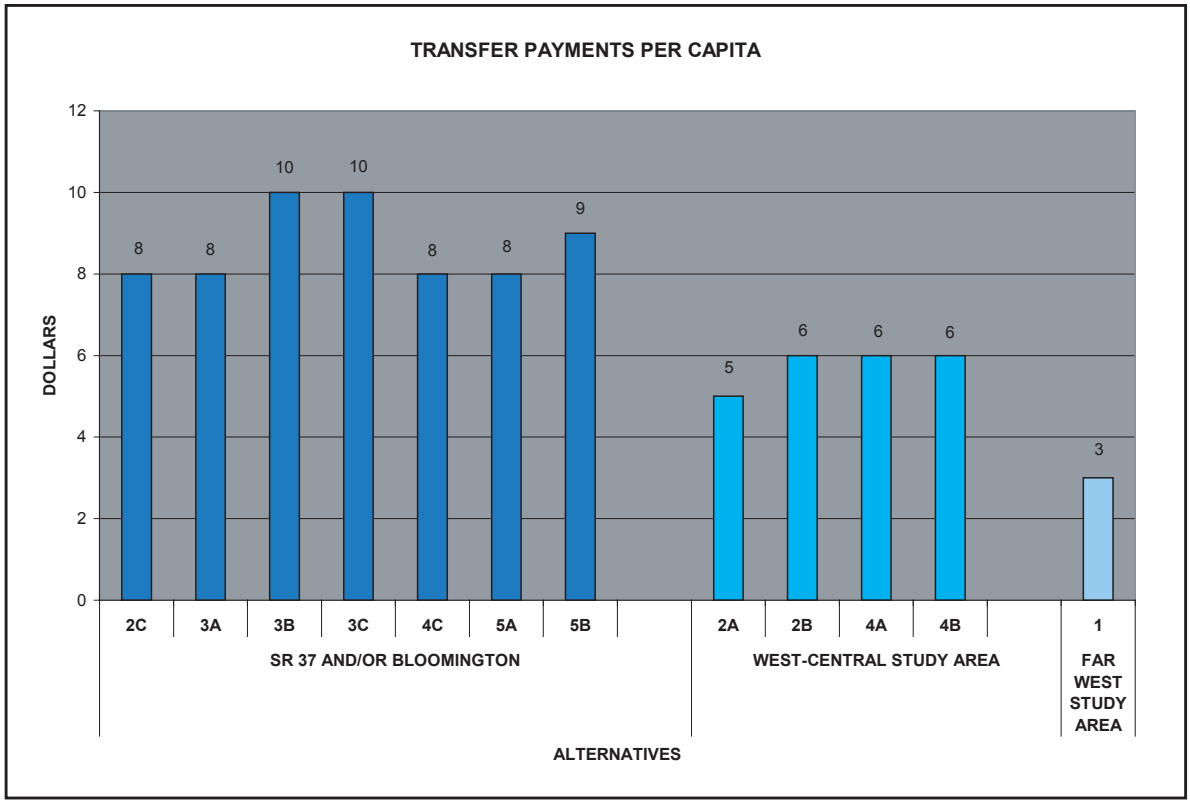


Figure 3-24: Decrease in Study Area Transfer Payments Per Capita (Year 2025).

Summary

Alternatives which serve the SR 37 corridor and/or Bloomington, have notably higher benefits, as measured by economic development spectrum performance measures. Alternatives located in the west-central study area (2A, 2B, 4A, 4B) provide a moderate level of benefits, as measured by economic development spectrum performance measures. One alternative located in the far west of the study area (1) performs significantly lower than other alternatives in the performance indicators for economic development spectrum performance.

3.4.5 Nationa I-69 Performance Indicators

3.4.5.1 Improve Interstate and International Movement of Freight

Congress has established that the I-69 project is a national priority. The emphasis for this project is to expedite the international and interstate movement of freight. A *core goal* for this project is to support this national priority by providing a facility which expedites these movements.

Congress specified that I-69 should be an Interstate Highway, and that it should serve certain cities, including Evansville and Indianapolis[10]. Accordingly, all alternatives considered in this document must connect Evansville and Indianapolis (two cities cited in the 1991 ISTEA legislation) and would be designed to meet Interstate design standards.[11]

Table 3-29: Summary of Forecasted Year 2025 I-69 Freight Movement Performance Indicator, by Alternative

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Daily Truck Hours Saved	2,000	2,400	2,500	3,600	3,800	4,500	4,300	3,200	3,000	4,000	3,500	4,100

Table 3-30: Daily (Year 2025) Truck-Hours Saved, by Group

	Serve SR 37 and/or Bloomington		Other Alternatives	
	2C, 3A, 3B, 3C, 4C, 5A, 5B		1, 2A, 2B, 4A, 4B	
	Range	Average	Range	Average
Daily Truck-Hours Saved	3,500 - 4,500	4,000	2,000 - 3,200	2,600

In order to assess the ability of each alternative to expedite freight movements, its effect on truck movements was assessed. For each alternative the daily savings (as compared to the No Build Alternative) in truck-hours of travel in 2025 was forecasted. Table 3.29 gives the daily truck-hours saved for each alternative.

Alternatives fell into two groups for their performance on this goal. The alternatives which serve the SR 37 corridor and/or Bloomington, had a significantly higher daily truck-hours saved. Table 3-30 below shows the daily truck-hours saved for each group.

Figure 3-25 below shows the daily truck-hours saved for each alternative. Grouped alternatives are shown in Table 3-30.

10 *Intermodal Transportation Efficiency Act of 1991 (ISTEA),* Section 1105(c). *Transportation Efficiency Act for the 21st Century (TEA-21)*, Section 1211(i)

11 For information on design standards, see *A Policy on Geometric Design of Highways and Streets* (2001) by American Association of State Highway and Transportation Officials

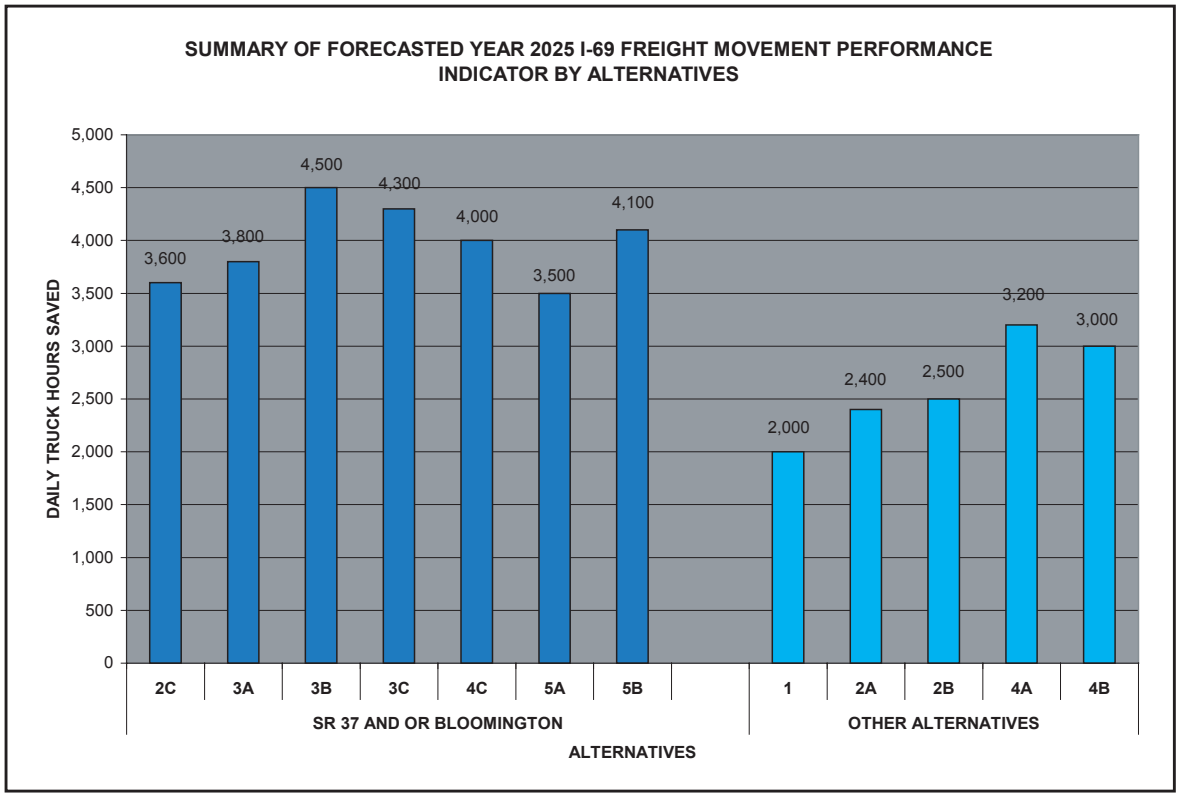


Figure 3-25: Daily Truck Hours Saved (Year 2025)

Summary

All alternatives provide some level of freight efficiencies, as measured by daily truck hours saved. Alternatives which serve the SR 37 corridor, and/or Bloomington (2C, 3A, 3B, 3C, 4C, 5A, 5B), provide a higher level of freight efficiencies. Other alternatives (1, 2A, 2B, 4A, 4B) provide a lesser level of freight efficiencies.

3.4.5.2 Connect to Intermodal Facilities

Another goal of the National I-69 project is to provide connections to intermodal facilities and major ports along the corridor. In order to assess how well alternatives perform on this goal, the percentage improvement of each alternative's intermodal accessibility index was calculated. (See Section 2.5) Table 3-31 below shows the performance of each alternative on this measure.

The alternatives which offer the greatest improvement in accessibility to intermodal centers are those which serve Western Morgan County (2B, 3A, 4B, and 5A). The next highest group are the alternatives which use SR 37 to I-465 (2C, 3B, 3C, 4C, and 5B). The lowest group are the remaining alternatives, which approach Indianapolis via more westerly access to I-70. Table 3.32 shows the performance of alternatives within these groups.

Table 3-31: Summary of Forecasted Year 2025 Improvement in Accessibility Index to Intermodal Facilities

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Percent Increase in Index	0.6%	1.2%	1.6%	1.4%	2.1%	1.8%	1.7%	1.5%	1.8%	1.6%	1.8%	1.4%

Table 3-32: Grouping of Alternatives by Performance in Intermodal Accessibility Index Increase

	Alternatives		
	Western Morgan County (2B, 3A, 4B, 5A)	State Route 37 (2C, 3B, 3C, 4C, 5B)	Other (1, 2A, 4A)
Range in Index Increase	1.6 - 2.1%	1.4 - 1.8%	0.6 - 1.5%
Average Index Increase	1.8%	1.6%	1.1%

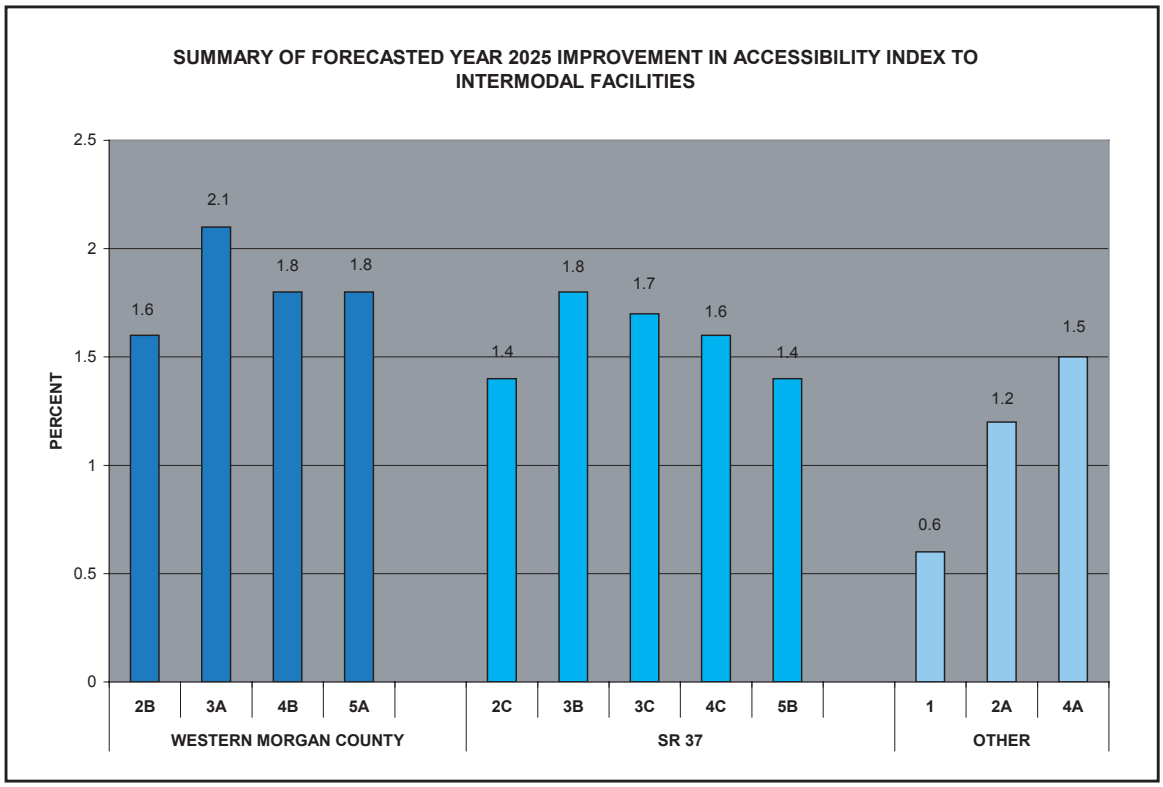


Figure 3-26: Increase in Accessibility Index to Intermodal Centers (Year 2025)

Table 3-33: Capital Cost and Mileage Estimates of Alternatives Carried Forward for Detailed Study

Alternative	Construction Cost			Driving Miles	
	Low	High	Average	Low	High
1	$ 810,000,000	$ 1,040,000,000	$ 930,000,000	154	156
2A	$ 1,090,000,000	$ 1,270,000,000	$ 1,180,000,000	147	148
2B	$ 1,170,000,000	$ 1,370,000,000	$ 1,270,000,000	145	146
2C	$ 1,470,000,000	$ 1,740,000,000	$ 1,610,000,000	145	147
3A	$ 1,290,000,000	$ 1,380,000,000	$ 1,340,000,000	142	144
3B	$ 1,650,000,000	$ 1,820,000,000	$ 1,740,000,000	140	143
3C	$ 1,640,000,000	$ 1,810,000,000	$ 1,730,000,000	140	143
4A	$ 960,000,000	$ 1,040,000,000	$ 1,000,000,000	143	145
4B	$ 1,040,000,000	$ 1,120,000,000	$ 1,080,000,000	141	143
4C	$ 1,340,000,000	$ 1,500,000,000	$ 1,420,000,000	141	144
5A	$ 1,610,000,000	$ 1,810,000,000	$ 1,710,000,000	149	152
5B	$ 1,670,000,000	$ 1,850,000,000	$ 1,760,000,000	146	147

1 The INDOT 2001 Plan calls for a major improvement to the US 50 Corridor East of Washington, costing approximately $50,000,000. If Alternative 5A or 5B were chosen, this money would be available for other uses.

The alternatives which serve Western Morgan County provide more direct access to two major intermodal centers in Indianapolis, the CSX Avon Yard and Indianapolis International Airport. This is reflected in their overall higher performance scores.

Figure 3-26 shows the performance of each of these alternatives, grouped by their access to Indianapolis.

Table 3-34: Annual O & M Cost Increases, Alternatives Carried Forward for Detailed Study

	Annual Cost Increases (2001 Dollars)		
Alternatives	Maintenance	Operations	Total
1	$240,000	$50,000	$290,000
2A	$1,150,000	$950,000	$2,100,000
2B	$1,280,000	$1,070,000	$2,350,000
2C	$1,130,000	$900,000	$2,030,000
3A	$1,530,000	$1,350,000	$2,880,000
3B	$1,490,000	$1,230,000	$2,720,000
3C	$1,590,000	$1,320,000	$2,910,000
4A	$1,350,000	$1,190,000	$2,540,000
4B	$1,490,000	$1,310,000	$2,800,000
4C	$1,570,000	$1,330,000	$2,900,000
5A	$1,590,000	$1,310,000	$2,900,000
5B	$1,550,000	$1,250,000	$2,800,000

Summary

Two groups of alternatives provide higher levels of increased intermodal access. These are the alternatives reaching I-70 via western Morgan County, and those using the SR 37 corridor to reach I-465. Alternatives which reach I-70 west of Morgan County do not offer as much increase in intermodal access as these other alternatives.

3.4.6 Cost and Mileage Estimates

In the Level 2 Screening (Section 3.3), costs were based upon preliminary route concepts. For the Level 3: Detailed Analysis of Alternatives, costs were estimated based upon working alignments for each alternative and option. Table 3-33 gives the cost range, as well as the driving mile range for each alternative.

Costs were estimated to provide the number of lanes that would be required to achieve an acceptable standard of traffic flow at any given location along the route during peak-hour conditions in the forecast year, 2025. This standard for traffic flow is an accepted traffic engineering concept known as level of service (LOS) "C."

Costs are similar to those estimated for the Level 2 screening. Generally, the cost range has narrowed since the previous estimate, since more information about the location of each alternative is known. The cost estimation methodology is described in *Task 4.4 Report, Preliminary Alternative Cost Estimates.*

In addition to capital costs, I-69 will require an increase in the ongoing operation and maintenance (O & M) cost budgets of INDOT and the Indiana State Police. Table 3-34 provides estimates of the added O & M costs associated with each alternative.

Alternative 1, since it provides for a much smaller amount of new roadway, has incremental Operating and Maintenance (O & M) costs which are a fraction of other alternatives. Alternatives 2A, 2B, and 2C, since they use a large part of the existing US 41 right of way, have annual O & M cost increases in the neighborhood of $2.1 to $2.3 million. Other alternatives have O & M cost increases in the neighborhood of $2.5 to $2.9 million.

Table 3-35: Performance of Alternatives on Project Goals

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Indy-Evv Travel Time Savings	○	◉	◉	◉	●	●	●	◉	●	●	◉	◉
Improved Personal Accessibility	○	◉	◉	◉	●	●	●	○	○	◉	●	●
International & Interstate Freight Movement	○	○	○	●	●	●	●	◉	◉	●	●	●
Reduction in Traffic Crashes	○	○	○	●	○	●	●	○	○	●	●	●
Congestion Relief	○	○	◉	●	◉	●	●	○	◉	●	◉	●
Improved Business Accessibility	○	○	○	●	○	●	●	○	○	●	●	●
Long-Term Economic Growth	○	◉	◉	●	●	●	●	◉	◉	●	●	●
Economic Benefits to a Wide Spectrum of Regional Residents	○	◉	◉	●	●	●	●	◉	◉	●	●	●
Improved Access to Intermodal Facilities	○	◉	◉	◉	●	●	◉	◉	●	◉	●	◉

SOURCE: Bernardin, Lochmueller & Associates, Inc.

○ LOW ◉ MEDIUM ● HIGH

3.4.7 Conclusion

Table 3-35 groups the performance of each alternative into "high," "medium" or "low" categories. These summary groupings consider all the performance measures for each of the nine Purpose and Need Goals. The three core goals are shown in ***bold italics***. Certain conclusions may be drawn from this table. Seven out of the twelve alternatives demonstrate predominantly high performance. These are: 2C, 3A, 3B, 3C, 4C, 5A, and 5B. Each performs high or medium on all core goals. Alternatives 3A, 3B and 3C are the only alternatives with "high" ratings for all three of the core goals. Each of these seven has a "high" performance rating on at least six Purpose and Need Goals. One alternative scores "high" on all nine project goals: 3B. Alternative 3C scores high on eight of the nine.

Alternative 4B is also reasonably strong performer in that it is second only to 3B in travel time savings between Indianapolis and Evansville (one of the core goals). It also scores highly on improved access to intermodal facilities due to its proximity to the Indianapolis International Airport and it scores in the "medium" range on four other goals.

The remaining alternatives deliver an inferior performance interms of goal satisfaction. None score high on any core goals. Alternatives 2A, 2B, and 4A do not have any "high" ratings. 2A and 4A each have five "medium" ratings and four "low" ratings, while 2B has six "medium" ratings and three "low."

Alternative 1 performs poorer then any other alternative in terms of satisfying the Purpose and Need for this project. It performs low on all three core goals. Alternative 1 is in the "low" category for all nine Purpose and Need Goals. There are eight performance measures associated with the three core

goals. Of these eight performance measures, Alternative 1 has, or is tied for, the poorest performance on seven of these eight core performance measures. For the measures associated with all nine goals, Alternative 1 has or is tied for the poorest performance on most of them.

In general, the performance of alternatives can be explained in terms of the factors discussed above. These factors are: (1) service to Bloomington, (2) service to the SR 37 corridor, (3) short Evansville to Indianapolis mileage, (4) north-south service to western Morgan County, and (5) service to Crane NSWC. The alternatives with high performance tend to be associated with all or most of these factors. By contrast, alternatives with low performance tend to be associated with few of these factors. Alternative 1 has the poorest performance, and is associated with none of these factors.

3.5 Tier 2 Sections

The Tier 2 NEPA studies will be conducted on shorter sections of the alternative that is eventually chosen as the preferred corridor connecting Evansville and Indianapolis. These shorter sections must conform to certain regulatory criteria to ensure that each section would perform a useful purpose if none of the other sections were to be built. These criteria, specified in 23 CFR 771.111(f), require that the project:

- connect logical termini and be of sufficient length to address environmental matters on a broad scope
- have independent utility or independent significance, and
- not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

FHWA has issued guidance explaining how to apply these criteria when establishing termini for project sections to be evaluated in Tier 2 NEPA studies. See Appendix X, *FHWA Tiering Guidance*. Following that guidance, FHWA and INDOT have applied these three criteria in determining proposed Tier 2 sections for the I-69 Evansville-to-Indianapolis project. Since a single, preferred alternative has not yet been selected, Tier 2 sections have been identified for each alternative. These sections are described in Tables 3-36 through 3-38 on the following pages.

Table 3–36: Tier 2 Sections – Alternatives 1, 2A, 2B, 2C

Via	From	To	Rationale	Alternatives			
				1	2A	2B	2C
US 41	I-64	SR 64 (Princeton)	Princeton is a major community, and the location of the Toyota Industrial Complex. SR 64 is a major state highway.	X	X	X	X
US 41	SR 64 (Princeton)	US 50 (Vincennes)	Vincennes is a major city in the study area, and US 50 is part of the National Highway System.	X			
US 41	SR 64 (Princeton)	SR 67 (Vincennes)	Vincennes is a major city in the study area, and SR 67 is a major state highway.		X	X	X
US 41	US 50 (Vincennes)	SR 641 (Terre Haute)	Terre Haute is a major city in the study area, and this is the point where Alternative 1 leaves US 41 and travels via the then-existing SR 641 freeway.	X			
SR 641	US 41	I-70		X			
I-70	SR 641	I-465		X			
SR 67 Corridor	US 41	SR 46 (Spencer)	SR 46 is on the National Highway System. Spencer is a major community in the study area.		X	X	X
US 231 Corridor	SR 46 (Spencer)	I-70 (Cloverdale)	Cloverdale is where Alternative 2A begins to travel via I-70		X		
I-70	US 231 (Cloverdale)	I-465			X		
SR 67 Corridor	SR 46 (Spencer)	I-70 (Western Morgan Co.)	Western Morgan County is where Alternative 2B begins to travel via I-70			X	
I-70	Western Morgan Co.	I-465				X	
SR 67 Corridor	SR 46 (Spencer)	SR 37 (Martinsville)	Martinsville is a major community in the study area. This is the point where Alternative 2C joins the SR 37 Corridor.				X

Table 3–37: Tier 2 Sections – Alternatives 3A, 3B, 3C 4A, 4B, 4C

Via	From	To	Rationale	Alternatives					
				3A	3B	3C	4A	4B	4C
SR 57 Corridor	I-64	SR 64 (Princeton/Oakland City)	Princeton is a major community, and the location of the Toyota Industrial Complex. SR 64 is a major state highway.	X	X	X	X	X	X
SR 57 Corridor	SR 64	US 50 (Washington)	Washington is a major city in the study area, and US 50 is part of the National Highway System.	X	X	X	X	X	X
SR 57 Corridor, and cross county routing	US 50 (Washington)	US 231 (Crane NSWC)	US 231 is part of the National Highway System, and is likely to be upgraded to four lanes by the time I-69 is constructed. In addition, Crane NSWC is a major traffic generator	X	X	X			
Cross country routing	US 231 (Crane NSWC)	SR 46 (Bloomington)	SR 46 is a major state highway, which will provide a four-lane connection to Bloomington.	X	X				
Cross country routing	US 231 (Crane NSWC)	SR 37 (South of Bloomington)	This is where Route 3C joins with the SR 37 Corridor south of Bloomington			X			
Cross country routing	SR 46 (Bloomington)	I-70 (Western Morgan Co.)	Western Morgan County is where Alternative 3A begins to travel via I-70.	X					
I-70	Western Morgan Co.	I-465		X					
SR 37 Corridor	SR 46 (Bloomington)	Martinsville (SR 39)	Martinsville is a major community in the study area. SR 39 is a major state highway.		X				
SR 37 Corridor	S. of Bloomington	Martinsville (SR 39)	Martinsville is a major community in the study area. SR 39 is a major state highway.			X			
SR 37 Corridor	Martinsville	I-465			X	X			
SR 57/67 Corridor	US 50 (Washington)	SR 46 (Spencer)	SR 46 is on the National Highway System. Spencer is a major community in the study area.				X	X	X
US 231 Corridor	SR 46 (Spencer)	I-70 (Cloverdale)	Cloverdale is where Alternative 4A begins to travel via I-70				X		
I-70	US 231 (Cloverdale)	I-465					X		
SR 67 Corridor	SR 46 (Spencer)	I-70 (Western Morgan Co.)	Western Morgan County is where Alternative 4B begins to travel via I-70					X	
I-70	Western Morgan Co.	I-465						X	
SR 67 Corridor	SR 46 (Spencer)	SR 37 (Martinsville)	Martinsville is a major community in the study area. This is the point where Alternative 2C joins the SR 37 Corridor.						X
SR 37 Corridor	Martinsville	I-465							X

Table 3–38: Tier 2 Sections – Alternatives 5A, 5B

Via	From	To	Rationale	Alternatives	
				5A	5B
SR 57 Corridor	I-64	SR 64 (Princeton/Oakland City)	Princeton is a major community, and the location of the Toyota Industrial Complex. SR 64 is a major state highway.	X	X
SR 57 Corridor	SR 64	US 50 (Washington)	Washington is a major city in the study area, and US 50 is part of the National Highway System.	X	X
US 50 Corridor	SR 57 (Washington)	SR 37 (Bedford)	Bedford is a major city in the study area, and SR 37 is part of the National Highway System	X	X
SR 37	Bedford	Bloomington	Bloomington is a major city in the study area.	X	X
SR 37	Bloomington	SR 39 (Martinsville)	Martinsville is a major community in the study area. SR 39 is a major state highway.	X	X
SR 39 Corridor)	SR 37 (Martinsville)	I-70		X	
I-70	SR 39	I-465		X	
SR 37	SR 39 (Martinsville)	I-465			X

Chapter 4 - Affected Environment

The purpose of the Affected Environment section of this Environmental Impact Statement (EIS) is to give a general overview of the Study Area for the proposed I-69 project. This general overview is intended to provide a greater understanding of the Study Area, as well as the potential impacts detailed in the Environmental Consequences section of this document. The Affected Environment has been subdivided into the Natural Environment, section 4.2, and the Human Environment, section 4.3. Topics discussed in the Natural Environment include: physiographic and natural regions, forests, farmland, wetlands, water bodies, karst, and climate. Topics discussed in the Human Environment include: population, households, education, employment and economic environment, colleges and universities, churches, cemeteries, federal and state recreation areas, hospitals, transportation facilities, and Crane Naval Surface Warfare Center.

The Affected Environment section of this document gives a general overview of the natural and human environment of the 26 county Study Area. GIS, or Geographic Information Systems, is a powerful tool used in this document to create a visual picture of the affected environment and analyze potential impacts due to the proposed project. This section describes GIS and explains how it was used in the I-69 Study Area.

4.1 The GIS Approach

GIS is a combination of hardware, software, and data that can be used to map, and analyze information. GIS data is stored in the form of data layers. Data layers are typically made up of information that is similar in nature. For example, the churches in the study area are in a data layer, the streams are in a separate data layer, coal mines in another data layer, and so on. Data layers may either be made up of points, lines, or polygons. A point data layer is used to represent a single, distinct place on a map. Point data layers are often used to represent buildings or structures. The church data layer is an example of a point layer. A line data layer is used to represent something of linear form on a map. The stream data layer is an example of a line layer. Finally, a polygon data layer is used to represent something that has a distinct shape or area on a map. The coal mine layer is an example of a polygon layer. Figure 4-1 provides a generalized drawing of how these layers are arranged with overlaying the corridor and working alignment.

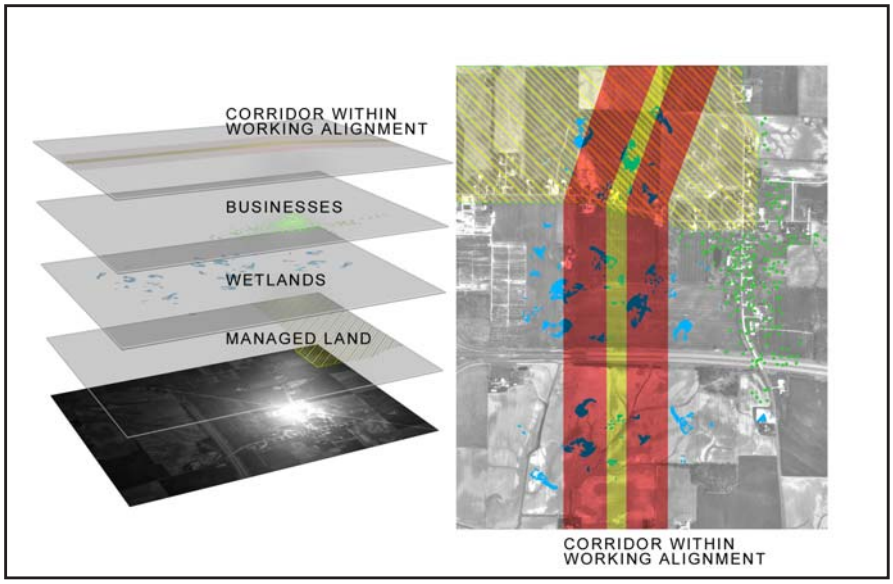


Figure 4–1: Examples of GIS Data Layers

GIS can be used to map data, store information about that data, and perform analysis on that data. GIS data layers can contain information on an object's

geographical location, as well as other useful information about that object in a database. For example, the church data layer contains the location of churches on a map, as well as information such as the name, address, county, and other information about each church. GIS can also be used to analyze data. For example, it can be used to determine the number of churches within 1000 feet of a stream, or the acreage of a coal mine. GIS was used primarily in the Affected Environment section of this document to map data and create a visual picture of the study area. Analysis of that data is included later in Chapter 5*, Environmental Consequences*.

GIS was used in this study to create an Environmental Atlas which is Volume III of this DEIS. The purpose of the Environmental Atlas is to act as a companion document to the EIS. The Environmental Atlas contains a detailed series of maps for each of the alternatives. Approximately 75 data layers were placed on 1998 Digital Ortho Quarter Quads (DOQQs), or aerial photographs, along with each 2-mile wide study area, proposed alternative corridor, and working alignment.

The corridor is an area, approximately 2000 feet wide in most areas, for each alternative. The corridor has been narrowed in some areas around committed projects such as I-70 and SR 641 (Terre Haute Bypass), and to avoid or minimize impacts to sensitive areas such as the Patoka River National Wildlife Refuge. If a "build" alternative is chosen, the final decision will be made on a corridor rather than on the working alignment. The working alignment is located within the corridor and was created in order to estimate potential impacts. It does not represent the actual location of the Interstate if a "build" alternative is chosen. The location of an alignment would come later after more detailed Tier 2 NEPA documents. The data layers used included existing data from federal and state government agencies, as well as private individuals and organizations. Data representing structures (such as churches, homes, businesses, etc.) were field checked within 1 mile on either side of the working alignment in rural areas and within the corridor in densely populated areas.

In addition to the maps, the Environmental Atlas also includes a number of other features. A brief discussion on how to use the Environmental Atlas, as well as a list of acronyms and definitions of terms in order to make reading this document easier, are included in the front of the Atlas. It also includes a list of the data layers used in the Environmental Atlas. The list of data layers includes a brief description of the layer and the data source for each layer. A removable legend is included to help the reader understand the various symbols and colors found on each map. Lists of historic, and potentially historic structures, and threatened and endangered species found for each alternative are included in the Atlas after the aerial sheets for each alternative.

The purpose of the Affected Environment section is to give a general overview of the resources within the study area before the reader begins the Environmental Consequences section of this document. The Environmental Atlas was developed as a companion document to the Draft EIS. Many resources discussed in the Affected Environment section of this document will have corresponding maps in the Environmental Atlas. The maps will provide a visual perspective for each alternative and the particular resource discussed. For example, the general discussion of farmland will refer to the Farmland Route Maps for each proposed I-69 Alternative. It is highly recommended that the reader use the Environmental Atlas while reading the Affected Environment and Environmental Consequences sections of the Draft EIS.

4.2 Natural Environment

4.2.1 Physiographic Regions

The proposed I-69 study area includes 26 counties in southwestern Indiana. The following counties are included in the study area: Posey, Vanderburgh, Warrick, Spencer, Perry, Gibson, Pike, Dubois, Crawford, Orange, Knox, Daviess, Martin, Lawrence, Sullivan, Greene, Monroe, Brown, Vigo, Clay, Owen, Morgan, Johnson, Putnam, Hendricks, and Marion. The study area includes a diverse range of topography and land use ranging from flat farmland to rolling, forest covered hills to karst plains dotted with sinkholes.

Physiographic regions are areas that have similar topography and land use. They provide a general view of the terrain of an area, and what resources may potentially be affected if a proposed I-69 alternative would cross a particular region. The I-69 study area includes 10 physiographic regions. The 10 physiographic regions are the: Wabash Lowland, Boonville Hills, Central Wabash Valley, Crawford Upland, Martinsville Hills, Mitchell Plateau, New Castle Till Plains and Drainageways, Norman Upland, Scottsburg Lowland, and the Tipton Till Plain. The Central Wabash Valley and the Scottsburg Lowland make up small portions of the study area and are not crossed by any of the five proposed I-69 alternatives. Those two regions will not be discussed in detail in this document. Physiographic regions within the study area are shown in Figure 4-2 Physiographic Region maps, including pictures and percentages crossed, for each alternative are included in the Environmental Atlas.

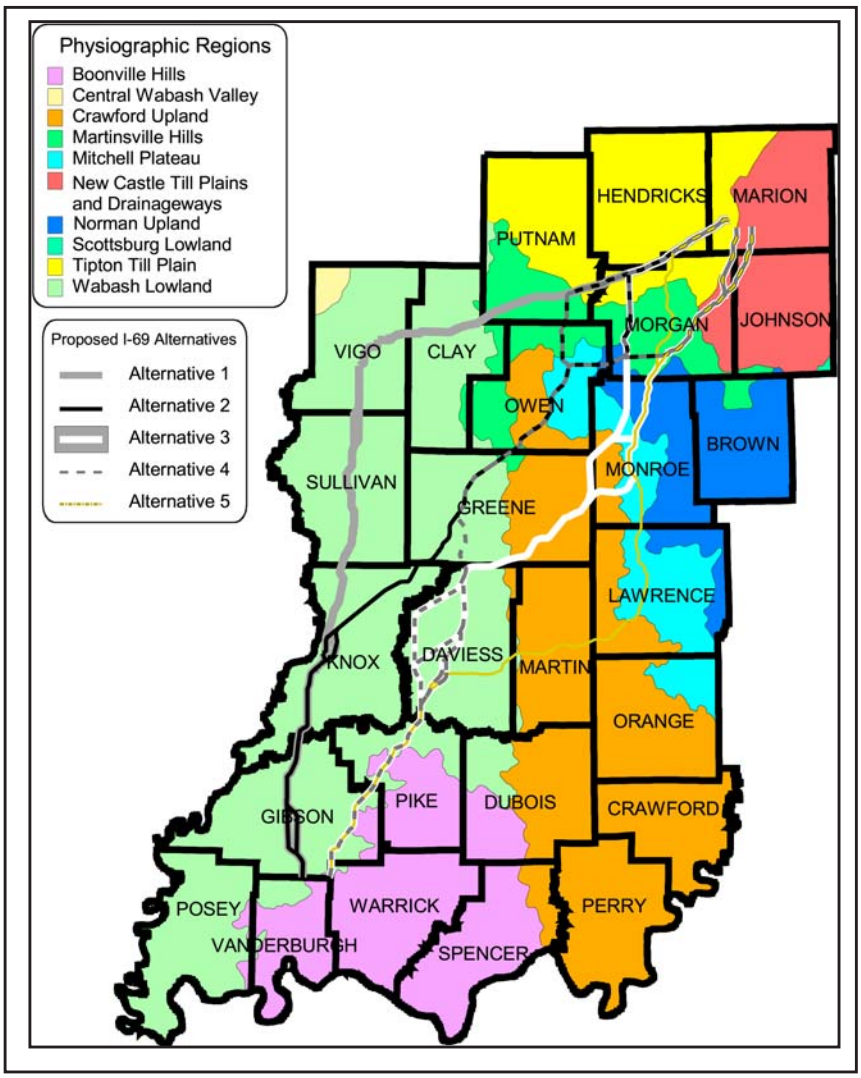


Figure 4-2: Physiographic Regions of the I-69 Study Area (Gray, 2000)

Much of the differences in topography among the physiographic regions in Indiana come from glaciation during the ice age. A glacier is defined as a slowly moving sheet of ice, ice often containing rocks, pebbles, cobbles, and boulders. The Wisconsinan glacier was the most recent, beginning approximately 70,000 years ago, and covered about two-thirds of Indiana. The Illinoian glacier,

beginning approximately 125,000 years ago, reached further south in Indiana along the Wabash River valley (Wayne, 1966). Land that was once glaciated is often very flat with rich soils; while, unglaciated land is often much more hilly. The heavy weight of the glacier acted to scour and compress the land, with soil, rocks, and other debris deposited upon its retreat. It also formed large, expansive shallow lakes especially in Gibson, Pike, Daviess, and Knox Counties, which attracted many prehistoric animals. Glaciated lands in Indiana are often excellent farmlands, with some low lying areas often wetlands. The glaciers fractured rocks at the edge of the glacier that today provide cover for many animals. Also, the glacial debris left behind has filled many karst areas with overburden of varying depths. Unglaciated lands in Indiana are often hilly and characterized by forests. Figure 4-3 shows the extent of glaciated land in the proposed I-69 study area.

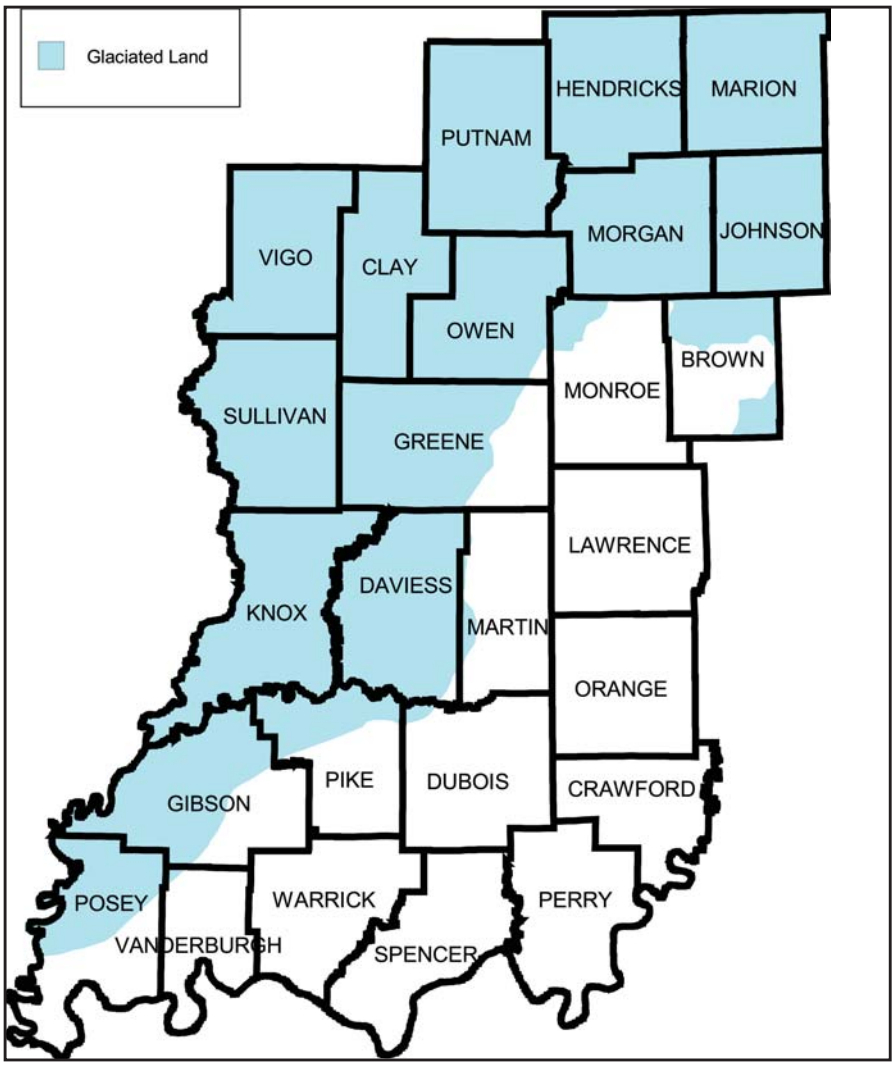


Figure 4-3: Glaciated Land in the Proposed I-69 Study Area (Gray, 1971)

The **Wabash Lowland Region** includes areas in the counties of: Posey, Gibson, Knox, Sullivan, Greene, Vigo and Clay. Portions of the Wabash Lowland can also be found in Vanderburgh, Pike, Dubois, Owen, and Putnam counties. This region is flat to rolling with wide expanses of alluvial land, some of which is lacustrine in origin. The Wabash Lowland region is the largest of the southern Indiana regions and was completely covered by the Illinoian Glacier. Land use is essentially agricultural, some forest land (mostly floodplain forests), extensive wetlands (e.g., Pigeon Creek and Patoka River Bottoms), and coal mining especially important in Warrick, Gibson, Pike, and Daviess counties. Agriculture is the dominant land use with more than 61% of the area devoted to farming. Figure 4–4 shows cropland within the Wabash Lowland. Approximately 22–25 % of the land is forested, while the remaining land area is represented by urban and miscellaneous uses (IDNR, 1980). Eighty-seven percent of the

Lacustrine: having to do with a lake or lakes

Figure 4-4: Cropland in the Wabash Lowland

Figure 4-5: The Crawford Upland Region

forests are owned by farmers and private individuals. The remaining forests are owned by federal, state, county, municipal, and/or forest companies.

The **Boonville Hills Region** is found predominately within Vanderburgh, Warrick, Pike, and Spencer Counties. This region is slightly more hilly than the adjacent Wabash Lowland Region, possibly because it has not been glaciated. Strip mining has been extensive in this region, and there are large areas of reclaimed or modified land in the eastern portion (Gray, 2000). Land use in the Boonville Hills includes farmland, forest, and mining.

The **Martinsville Hills Region** includes areas in Putnam, Owen, Clay, Morgan, Brown, and Johnson Counties. This is a relatively small region within the study area, and more rugged than the adjacent Tipton Till Plain region to the north. The eastern and western parts of this region are more rugged than the central, which contains lacustrine and till plain areas (Gray, 2000). Predominate land use includes farmland and forest.

The **Tipton Till Plain Region** is found within Putnam, Morgan, Hendricks, and Marion counties within the study area. The land surface in this region is a relatively flat, glacial plain, but marked by many terminal moraines, resulting in gently rolling topography in some portions. Some wide areas are very flat. The best agricultural land in the state is found in this region. It was once heavily forested, but has lost almost all of its woodlands within the past 100 years. Most remaining forested areas are present as small woodlots or riparian growth (Mumford & Whitaker, Jr., 1982).

The **New Castle Till Plains and Drainageways** is found in Marion, Johnson, and Monroe Counties within the study area. This region is very similar to the Tipton Till Plain Region to the west. However, its distinguishing feature is the number of valleys that cross it in a southerly to southeasterly radial pattern. These valleys fed the White River, the East Fork of the White River and several of its tributaries, and the several forks of the Whitewater River (Gray, 2000). Farmland is the predominate land use in this region.

The **Crawford Upland Region** is found primarily in Perry, Crawford, Dubois, Orange, Martin, Lawrence, Monroe, Greene, and Owen counties. This region is largely unglaciated and is a rugged highland with varied elevations and v-shaped valleys with sharp ridges to u-shaped valleys and

rounded ridges. Sinkholes and caves are common. Land use is approximately 43% cropland, 20% pasture, and 28% woodland. Seventy-one percent of the forests in this region are owned by farmers and private individuals. Figure 4-5 shows land within the Crawford Upland Region.

Figure 4-6: Typical topography of the Mitchell Plateau

To the east of the Crawford Upland Region is the **Mitchell Plateau Region**. Orange, Lawrence, Monroe, and Owen counties include areas of the Mitchell Plateau. This region is a limestone, somewhat flat to rolling plain with many caves, sinkholes and continuous tracts of forests. There is extensive karst topography in the Mitchell Plateau, just west of Bloomington. In addition of caves and sinkholes, the Mitchell Plateau has many acres of forest. Sixty-one percent of the forests are owned by farmers and private individuals. Livestock, crops, timber, and limestone are its main commercial resources. Figure 4-6 shows an example of the topography of the Mitchell Plateau.

The **Norman Upland Region** includes portions of Lawrence, Monroe, Brown, and Owen counties. This upland region contains great local relief due to stream action over a long period of time. This has resulted in long, sharp ridges and v-shaped valleys, which in turn create rugged, picturesque hills. Prime examples of this scenic landscape can be found in Brown County (Mumford & Whitaker Jr., 1982).

4.2.2 Natural Regions

In addition to physiographic regions, the I-69 study area can also be divided into natural regions. A natural region is "a major, generalized unit of the landscape where a distinctive assemblage of natural features is present. It is part of a classification system that integrates several natural features, including climate, soils, glacial history, topography, exposed bedrock, presettlement vegetation, species composition, physiography, and flora and fauna distribution to identify a natural region. A section is a subunit of a natural region where sufficient differences are evident such that recognition is warranted" (Homoya, et al, 1985). Natural regions are similar to physiographic regions, but whereas physiographic regions may give information on predominant land use, natural regions may give more information about the native plant and animal species of an area. Some natural regions may have a similar corresponding physiographic region, while some may be unique to the classification system.

The I-69 study area is divided into six natural regions. The six natural regions are the: Central Till Plain Region, Southwestern Lowlands Region, Southern Bottomlands Region, Shawnee Hills Region, Highland Rim Region, and the Bluegrass Region. These six regions can be further divided into eleven sections. The eleven sections are the: Entrenched Valley Section, Tipton Till Plain Section, Plainville Sand Section, Glaciated Section, Driftless Section, Southern Bottomlands Section, Crawford Upland Section, Escarpment Section, Mitchell Karst Plain Section, Brown County Hills Section, and the

Scottsburg Lowland Section. The natural regions sections are shown in Figure 4-7. Only a small portion of the Bluegrass Region, which includes the Scottsburg Lowland Section, is present in the study area in Johnson County. No proposed alternatives traverse this region, therefore it will not be discussed further. Natural Region Section maps, including pictures and percentages crossed, for each alternative are included in the Environmental Atlas. The following natural regions descriptions come from "The Natural Regions of Indiana," by Homoya et. al., 1985.

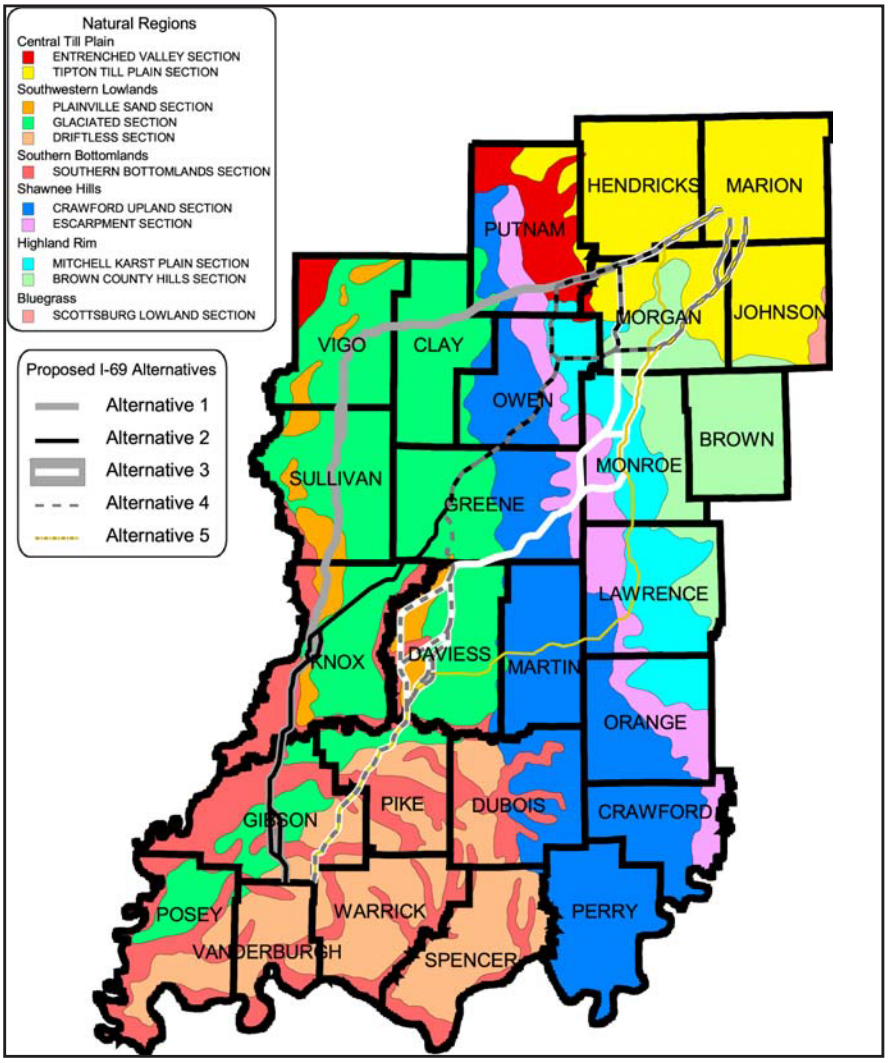


Figure 4-7: Natural Region Sections of the I-69 Study Area (Homoya *et al.*, 1985))

The **Southern Bottomlands Section** is the only section within the Southern Bottomlands Natural Region. This natural region includes the alluvial bottomlands along the rivers and larger streams of southwestern Indiana. Figure 4–8 shows the East Fork of the White River in the Southern Bottomlands Section. The Southern Bottomlands can be found in Sullivan, Knox, Gibson, Posey, Vanderburgh, Warrick, Spencer, Pike, Dubois, and Daviess Counties, primarily along major rivers and streams. The soils are mostly neutral to acid silt loams, and include series such as Nolin, Newark, Huntington, Linside, Stendal, and Bonnie. Much of the area is subject to frequent flooding. The natural communities of the region include bottomland forest, swamp, pond, slough, and formerly marsh and prairie. The bottomland forest, the major community of this region is characterized by pecan, sugarberry, swamp chestnut oak, pin oak, swamp white oak, red maple, silver maple, honey locust, catalpa, shellbark hickory, sycamore, and green ash. Swamp and slough communities are characterized

Figure 4-8: East Fork of the White River in the Southern Bottomlands

by bald cypress, swamp cottonwood, water locust, pumpkin ash, and overcup oak. Other distinctive species (many of which are restricted to this region) include American featherfoil, bloodleaf, acanthus, climbing dogbane, catbird grape, woolly pipe-vine, swamp privet, American snowbell, climbing hempweed, spiderlily, mistletoe, and giant cane. Distinctive southern animals include: cottonmouth, hieroglyphic turtle, diamondbacked watersnake, eastern mud turtle, northern copperbelly, swamp rabbit, mosquitofish, harlequin darter, and yellow-crowned night heron.

The **Southwestern Lowlands Region** includes the **Driftless Section, the Glaciated Section,** and the **Plainville Sand Section**. The Southwestern Lowlands Region is characterized by low relief and extensive aggraded valleys. This region, except for the southern portion, was covered by the Illinoian Glacier. Much of the region is nearly level, undissected, and poorly drained, although in some areas the topography is hilly and well drained.

The **Driftless Section** includes areas in Posey, Vanderburgh, Warrick, Spencer, Dubois, Pike, and Gibson Counties. This section is south of the Illinoian glacial border, and is characterized by low hills and broad valleys. This area has the longest growing season and highest average summer temperature in the state. Natural communities include upland forest, occupying the well drained slopes and southern flatwoods occupying the lacustrine plains and river terraces. Flatwoods species include: cherry bark oak, sweetgum, shellbark hickory, pin oak, swamp white oak, Shumard's oak, green ash, black gum, and locally, post oak. The upland forests of this section are relatively dry oak-hickory dominated communities. Other natural community types include marsh, swamp, sandstone cliff, and low to medium-gradient stream. Soils in this section are predominately acid in reaction.

The **Glaciated Section** is also part of the Southwestern Bottomlands Region. It includes areas in Posey, Gibson, Pike, Daviess, Knox, Sullivan, Greene, Vigo, Clay, Putnam, and Owen Counties. Natural communities in this section are mostly forests, but several types of former prairie are known. Figure 4-9 shows typical topography in the Glaciated Section. The flatwoods community is common, but the species composition differs from the Driftless Section. Common flatwoods species in this section include: shagbark hickory, shellbark hickory, pin oak, shingle oak, hackberry, green ash, red maple, and silver maple. Black ash swamps are near their southern border in this section. This section also appears to have the largest amount of prairie south of the Wisconsinan glacial border in Indiana, however little is known about the composition of this prairie. Additional community types include: swamp, marsh, pond, and low-gradient stream. The prairie kingsnake and the crawfish frog are characteristic animal species of this region.

Figure 4-9: Typical topography in the Glaciated Section

The **Plainville Sand Section** is the third section within the Southwestern Bottomlands Region. The Plainville Sand Section can be found in Daviess, Knox, Sullivan, and Vigo Counties. This section is a small, but unique, area of wind-blown sand dunes east of the Wabash River and the White River. Soils in this section are sandy and acidic. The barrens natural community type, now almost gone from the landscape, was predominant on the ridges and well drained areas, and swamp,

marsh, and wet prairie occupied the swales. The barrens vegetation consisted mostly prairie species, along with some western and southern sand dwelling species including: beard grass, Carolina anemone, tube penstemon, clustered poppy-mallow, hairy golden aster, narrowleaf dayflower, black hickory, adrosace, rose gentian, sedge, and fleabane. In a few areas, barren vegetation including: little bluestem, big bluestem, Indian grass, side-oats grama, New Jersey tea, and blackjack oak, can still be seen. Animal species geographically restricted here include the bull snake, ornate box turtle, and six-lined racerunner. Figure 4-10 shows cropland in the Plainville Sand Section.

Figure 4-10: Cropland in the Plainville Sand Section

The portion of the **Plainville Sand Section** west and northwest of Washington in Daviess County is considered to be an "extremely significant ecological area," by the Indiana Department of Natural Resources (IDNR), as found in a coordination letter dated January 31, 1992. The IDNR also states that the area "consists of wind deposited sand dunes which formerly supported a complex mosaic of dry, savanna and prairie-like vegetation. Small wetlands occurred in the poorly drained sand flats. Numerous species of southern and western affinities occurred in the dunes, while ephemeral wetlands often contained rare disjunct plant species of coastal Atlantic origins. Despite almost complete conversion to agriculture, numerous small remnants remain which are usually characterized by state listed plant species and other species of exceptional interest." The IDNR states "due to the area's small size, its past and present ecological significance, and the paucity of these natural remnants, negative impacts will likely represent significant losses to the state's natural diversity" (IDNR, 1992). This letter from the IDNR is found in Appendix Y, *Agency Coordination Materials*

The **Shawnee Hills Natural Region** includes the **Crawford Upland Section** and the **Escarpment Section**. This natural region appears to represent general presettlement conditions better than any other terrestrial region in the state. It is a rugged and generally sparsely populated area. The majority of the natural communities are upland forest types although, a few sandstone and limestone glades, gravel washes, and barrens are known.

The **Crawford Upland Section** of the Shawnee Hills Natural Region contains rugged hills with sandstone cliffs and rockhouses. Figure 4-11 shows rock springs in the Crawford Upland. This section includes areas in Perry, Crawford, Dubois, Orange, Martin, Lawrence, Greene, Owen, and Putnam Counties. The soils are characteristically well drained acid silt loams. The forest vegetation consists of an oak-hickory assortment on the upper slopes, while coves have a mesic component. Characteristic upper slope species include: black oak, white oak, chestnut

DISJUNCT SPECIES: a species found growing in a natural setting separated by a relatively large distance from other populations of the same species

oak, scarlet oak, post oak, pignut hickory, small-fruited hickory, shagbark hickory, and rarely, sourwood. Characteristic species of the cove forests include: beech, tulip tree, red oak, sugar maple, black walnut, white ash, and locally, yellow buckeye, white basswood, white basswood, hemlock, yellow birch, and umbrella magnolia. The sandstone cliff and rockhouse communities provide environments for several species with Appalachian affinities including: mountain laurel, mountain spleenwort, sourwood, and umbrella magnolia. Distinctive species associated with rockhouses include: filmy fern, alumroot, Bradley's spleenwort, French's shooting star, and the Appalachian gametophyte. There are a few examples of the acid spring community, a type extremely rare in Indiana, that occur in this section. Vegetation characteristic of these communities include: cinnamon fern, royal fern, sedges, small clubspur orchid, black chokeberry, winterberry, tearthumb, jewelweed, crested wood fern, and *Sphagnum* spp. The barrens community is, and probably was, a minor component of this section, and only a few remnants remain. Sandstone glades are very rare in Indiana, but at least two are known in this section. Characteristic species in sandstone glades include: bluestem, slender knotweed, poverty grass, farkleberry, goat's rue, pineweed, pinweed, and panic grass. Most of Indian's timber rattlesnake collections have come from this section, the Brown County Hills Section of the Highland Rim Natural Region. Two interesting mammals in this section are the smoky shrew and the pygmy shrew.

Figure 4-11: Rock springs in the Crawford Upland

The **Escarpment Section** of the Shawnee Hills Natural Region includes areas in Crawford, Orange, Lawrence, Monroe, Greene, Owen, and Putnam Counties. This section includes rugged hills along the eastern border of the region. Sandstone and sandstone derived soils are found on the hill tops, and limestone and limestone derived soils are present in the lower elevations. Karst features are not uncommon, especially in the lower and middle elevations. The natural communities in this section consist of various upland forest types, especially dry-mesic and mesic. Species composition is similar to the Crawford Upland Section, except that certain species, such as post oak and black oak, commonly replace chestnut oak in the dry sites; and some of the mesic cove species, especially those with Appalachian affinities are absent. Limestone glades and barrens occur in this section, but are more common in the Highland Rim Natural Region. Limestone cliff communities occur at the southern end of this section. Rare species such as alumroot, wall-rue spleenwort, cleft phlox, wild liveforever, and black-seeded sedge can be found in the limestone cliffs. Eastern woodrats live in the crevices of cliffs along the Ohio River, which is also a favorite roosting site for the black vulture. Cave communities are also common in this section. They support unique animal species such as the troglobitic crayfish and northern cavefish. Some caves support populations of hibernating bats, including the federal and state endangered Indiana bat. Limestone gravel wash communities can be found in this section, and the wild blue indigo is apparently confined in Indiana to these communities here. The typical aquatic features include normally clear, medium and high-gradient streams, springs, and sinkhole ponds.

The **Highland Rim Natural Region** within the study area includes the **Mitchell Karst Plain Section** and the **Brown County Hills Section**. This natural region is unglaciated, except for relatively unmodified glaciated areas at the northern and eastern boundary. A distinctive feature of this region is the large expanse of karst topography. Although several other major topographical features are present such as cliffs and rugged hills. Much of the area was forested in presettlement times, but large areas of barrens occurred, along with smaller areas of glade (limestone and siltstone) and gravel wash communities.

The **Mitchell Karst Plain Section** of the Highland Rim Natural Region includes areas of Orange, Lawrence, Monroe, Owen, Morgan, and Putnam Counties. The major feature of this section is the karst (sinkhole) plain. Several natural community types are associated with this plain, including cave, sinkhole pond and swamp, flatwoods, barrens, limestone glade and several upland forest types. The plain is relatively level, although in some areas, especially near the section's periphery, limestone cliffs and rugged hills are present. Caves are common. The soils are generally well drained silty loams derived from loess and weathered limestone. Possibly the largest area of barrens in Indiana was located in this section. Species commonly found in remnants of this prairie-like community include: Indian grass, big bluestem, little bluestem, rattlesnake master, prairie dock, hairy sunflower, prairie willow, clasping milkweed, and *Carex meadii*. Most of Indiana's limestone glades occur in this region, although most are in counties outside the study area. This bedrock community has a prairie flora with additional distinctive species including: downy milk pea, angle-pod, axe-shaped St. John's wort, adder's tongue fern, crested coral root, orchid, and heartleaf Alexander. Gravel wash communities composed of limestone and chert gravel border most streams. Characteristic species in these communities include: big bluestem, Indian grass, Carolina Willow, water willow, ninebark, pale dogwood, and bulrush. Karst wetland communities are the major aquatic features of this section. Southern swamp species are known from some of the sinkhole swamps including: beakrush, log sedge, giant sedge, Virginia willow, small buttercup, and netted chain fern. Common dominants of these swamps are swamp cottonwood, pin oak, swamp white oak, red maple, and sweetgum. Sinkhole pond communities normally have open water and marshy borders with cattails, bulrush, bur-reed, spatterdock, buttonbush, swamp loosestrife, bladderwort, and *Carex comosa*. Several forest communities are also present in this section, but the western mesophytic forest type is the most common. Species characteristic of this forest type include: white oak, sugar maple, shagbark hickory, pignut hickory, and white ash. Near the glad communities some xeric forest occurs where in post oak, chinquapin oak, and blue ash are characteristic. In karst areas, surface streams are few, as post of the drainage is underground.

The **Brown County Hills Section** is the second section found in the study area of the Highland Rim Natural Region. The Brown County Hills Section includes areas in Lawrence, Monroe, Brown, Johnson, and Morgan Counties. This section is characterized by deeply dissected uplands, underlain by siltstone, shale, and sandstone. The soils are well drained acid silt loams with minor amounts of loess. Bedrock is near the surface, but rarely crops out. The natural communities are rather uniform in composition, with uplands dominated by oak-hickory, especially chestnut oak, and ravines with mesic species, such as beech, red oak, sugar maple, and white ash. The yellowwood tree is known in Indiana, but only from a small area in this section. Small, high-gradient ephemeral streams are common, and most larger streams are predominately medium to low-gradient.

Finally, the **Central Till Plain Natural Region** is the fifth natural region that comprises the I-69 study area. This region includes the **Entrenched Valley Section** and the **Tipton Till Plain Section** within the study area. The Central Till Plain Natural Region is the largest natural region in Indiana, and is a formerly forested plain of the Wisconsinan till in the central portion of the state. With the exception of the Entrenched Valley Section, the topography is homogenous, although glacial features such as moraines are common.

The **Entrenched Valley Section** of the Central Till Plain Natural Region includes areas in Vigo, Clay, Putnam, Morgan, and Owen Counties. This section is quite unlike the other sections of the region, and is identified by deeply entrenched valleys along major drainages, particularly the Wabash, Sugar, and Big Pine riverine systems. Bedrock is exposed in many places and massive cliffs are common. A variety of soils are present, including poorly drained to well drained silt loams that are acid to neutral in reation and commonly covered with a moderately thick layer of loess. Upland forests, bottomland forests, and flatwoods are the major natural community types present. Except in the specialized cliff and ravine communities, the forest associations are essentially the same as those of the Tipton Till Plain Section. Other natural communities present in this section include: prairie, gravel-hill prairie, fen, marsh, savannah, cliff, seep spring, and pond. The circumneutral seep spring is well represented and possible is more common here than elsewhere in the state. Species characteristic of this community include: skunk cabbage, marsh marigold, Pennsylvania saxifrage, swamp woodbetony, jewelweed, queen-of-the-prairie, nannyberry, black ash, sedges, white turtlehead, roughleaf goldenrod, and purple-stem aster. The cliff and ravine communities provide an environment for an interesting assemblage of species, many of which occur as disjuncts that have northern affinities. Many of these species include: white pine, hemlock, Canada yew, Canada blueberry, shinleaf, wild sarsparilla, northern enchanter's nightshade, roundleaf dogwood, false melic grass, and two-leaf Solomon's seal. Gravel hill prairies are state restricted here and include typical prairie species as well as: plains muhly, western wallflower, narrowleaf houstonia, gromwell, androsace, and post oak. This section marks the northern limit for several animal species including: cave salamander, zigzag salamander, long-tailed salamander, earth snake, and copperhead. Streams in this section are typically medium-gradient, relatively clear and rocky

The second section of the **Central Till Plain Natural Region** found in the study area is the Tipton Till Plain Section. This section includes areas of Johnson, Morgan, Marion, Hendricks, and Putnam Counties. This section is a mostly undissected plain formerly covered by an extensive beech-maple-oak forest. The soils are predominately neutral silt and silty clay loams. The northern flatwoods community associated with these poorly drained soils was ubiquitous but now is confined to scattered woodlots. Species common within the community include: red maple, pin oak, bur oak, swamp white oak, Shumard's oak, American elm, and green ash. In slightly better drained sites characteristic species include: beech, sugar maple, black maple, white oak, red oak, shagbark hickory, tulip poplar, red elm, basswood, and white ash. Other community types of this section include: bog, prairie, marsh, seep, spring, and pond.

Table 4-11 shows the percentages of each of the proposed I-69 alternatives that pass through the physiographic and natural regions.

4.2.3 Forests

Table 4-1: Percentages of Proposed I-69 Alternatives in Physiographic Regions and Natural Region Sections

	Alternative											
	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Physiographic Region (%)												
Boonville Hills	0	0	0	0	3	3	3	3	3	3	2	2
Crawford Upland	0	5	5	5	20	21	15	5	5	5	14	14
Martinsville Hills	10	11	9	12	8	9	9	11	9	13	12	9
Mitchell Plateau	0	7	9	9	3	3	9	7	9	9	22	22
New Castle Till Plains & Drainageways	0	0	0	13	0	14	14	0	0	13	0	13
Norman Upland	0	0	3	3	5	5	6	0	3	3	6	6
Tipton Till Plain	18	19	16	1	17	0	0	20	17	1	11	0
Wabash Lowland	72	58	58	57	44	45	44	54	54	53	33	34
Percent TOTAL	100	100	100	100	100	100	100	100	100	100	100	100
Natural Region Section (%)												
Entrenched Valley	5	5	0	0	0	0	0	6	0	0	0	0
Tipton Till Plain	16	16	19	14	20	15	15	17	20	14	10	14
Plainville Sand	12	1	1	1	5	5	5	4	4	4	3	3
Glaciated	43	37	36	36	23	23	22	32	32	32	13	13
Driftless	2	2	2	2	12	12	12	12	12	12	12	12
Southern Bottomlands	17	18	18	18	8	8	8	8	8	8	8	8
Crawford Upland	2	10	10	10	9	9	9	10	10	10	13	13
Escarpment	3	3	3	3	11	11	6	3	3	3	2	2
Mitchell Karst Plain	0	8	7	5	7	5	11	8	7	5	24	24
Brown County Hills	0	0	4	11	5	12	12	0	4	12	15	11
Percent TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

Forests are a large and important resource in Indiana. Indiana's forests make significant environmental and economic contributions, including: timber, employment, outdoor recreation, protection of soil and water resources, and habitat for many plant and animal species. Prior to European settlement, forests covered about 85 % of the state. Forested land was converted to farmland as farming became a central part of Indiana's economy. The acreage of forested land reached its low during the early 1900's, and increased until the 1990's. Today, forested acreage in Indiana has appears to have reached a plateau. Approximately 20 % of Indiana is forested, and most of the forested land is located in the southern half of the state (Tormoehlen, et al, 2000). The majority of the forested land in the I-69 study area is found within the Crawford Upland, Mitchell Plateau, Norman Upland, and Martinsville Hills physiographic regions. These regions are predominately hilly areas, and less suited to agriculture. Forest land maps for each alternative are included in the Environmental Atlas. A more detailed discussion on forest land trends in Indiana can be found in Appendix G, *Forest Land Baseline Trends*.

Three forest survey units are included within the I-69 study area. Indiana was divided into four forest survey units during the first Forest Inventory Analysis completed by the U.S. Department of Agriculture (USDA) Forest Service in 1950. Forest survey units have remained consistent throughout the years in order to more accurately track changes in forests from survey to survey. Each unit contains approximately one-fourth the state's forests (Tormehlen et al., 2000). The three survey units in the study area are the: Lower Wabash, the Knobs, and the Northern. The forest survey units are shown in Figure 4-12. The following survey unit descriptions come from "Forests of Indiana: A 1998 Overview," by Tormoehlen et al, 2000.

The Lower Wabash Unit includes the following counties within the study area: Posey, Vanderburgh, Gibson, Pike, Knox, Daviess, Martin, Sullivan, Greene, Vigo, Clay, and Putnam. This unit contains many wet sites and bottomlands due to the convergence of the Ohio and Wabash Rivers. Trees such

as bald cypress and swamp cottonwood are naturally more abundant here than in other parts of the state. The higher, drier portions of the unit provide growing sites for most of the common tree species found in other parts of the state. The major forest types in this unit are maple-beech (37 %), oak-hickory (35 %), and elm-ash-cottonwood (20 %).

The Knobs Unit includes the following counties within the study area: Warrick, Spencer, Perry, Dubois, Crawford, Orange, Lawrence, Monroe, Brown, Owen and Morgan. The Knobs Unit contains some of the hilliest areas in the state. As a result, the area supports trees that prefer very dry sites and ridge tops, as well as those that prefer very wet sites, ravines or bottomlands. Tree types unique to the unit include black jack oak and swamp tupelo. There are portions of this unit on sandstone bedrock and some on limestone. This results in a variety of trees and their associated plants and shrubs. The Knobs Unit contains the highest number of trees in Indiana. The most common forest types in this unit are oak-hickory (48 %) and maple-beech (35%). Figure 4-13 shows Martin State Forest in the Knobs Unit.

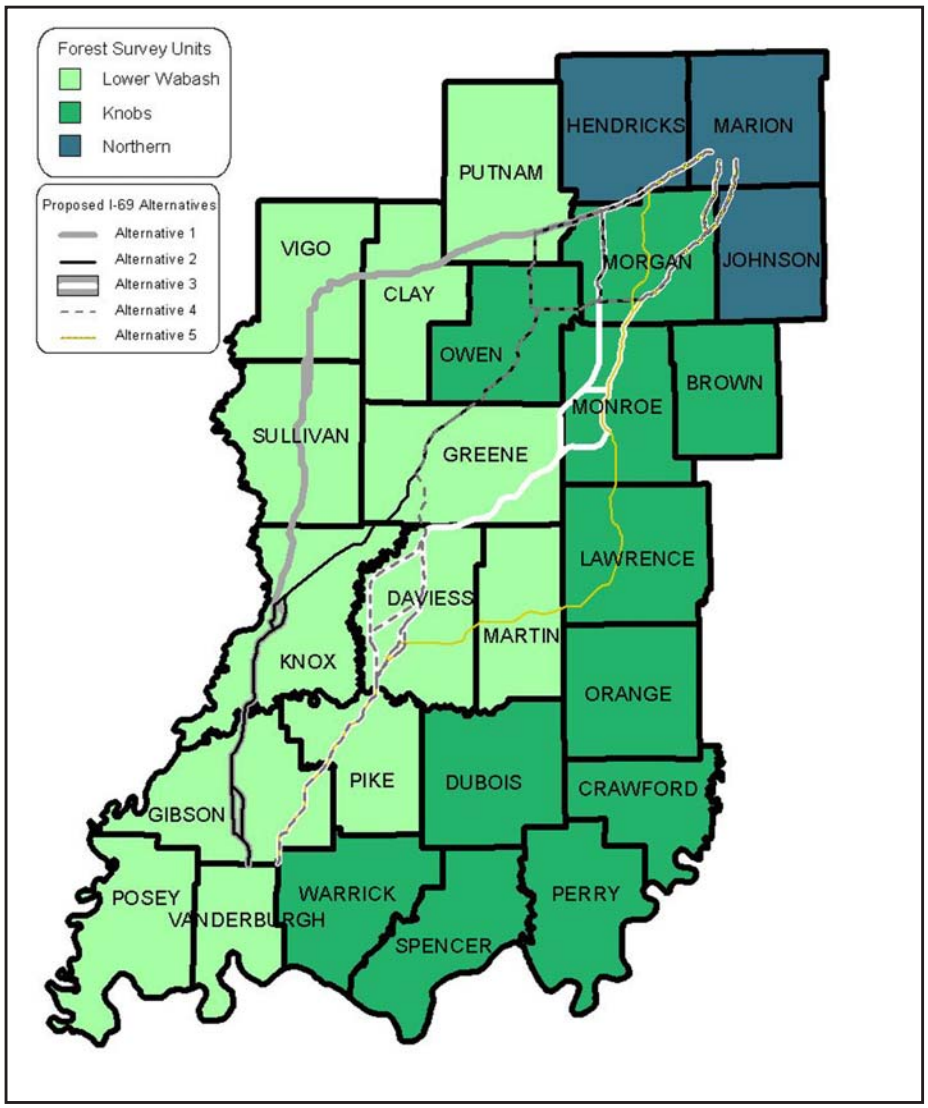


Figure 4-12: Forest Survey Units and Proposed I-69 Alternatives

Figure 4-13: Martin State Forest, Forestland in the Knobs Unit

The Northern Unit includes the following counties within the study area: Hendricks, Marion, and Johnson. This unit includes many different types of growing conditions due to its large size in the state. Trees in the central portion of the state, as part of the study area, grow on rich glaciated soils.

The most common forest types in the Northern Unit are maple-beech (45 %), oak-hickory (27 %), and elm-ash-cottonwood (23 %).

4.2.4 Farmland

Farmland is one of Indiana's most important resources. Agriculture and food processing are an intrinsic part of the state's economy, contributing $17 billion annually and supporting 500,000 jobs in Indiana (Indiana Land Resources Council, 1999). Prior to European settlement, there was little farmland, as much of the state was covered in forests and wetlands. Farmland acreage in Indiana reached its maximum in the early 1900's and has been declining since. Although farmland acreage is declining, farmland production has been and continues to increase. Much of the farmland within the I-69 study area is located in the Wabash Lowland and Tipton Till Plain physiographic regions. These regions are flat to rolling with rich, glaciated soil that is ideal for agriculture. Farmland maps for each alternative are included in the Environmental Atlas. Figure 4-14 shows farmland in the Wabash Lowland Region.

Despite its less than average size in total land area, Indiana ranks 14th in overall production of agricultural commodities (Indiana Land Resources Council, 1999), and ranked 10th nationally in crop cash receipts for the 2000-01 period. According to the 1998-99 Indiana Agricultural Statistics, corn and soybeans were the leading source of income for Indiana farmers, amounting to $1.42 billion and 1.34 billion respectively in 1998. Meat animals ranked third with $760 million, followed by poultry and eggs at $530 million, and dairy at $319 million. Over 89 % of the 1998 cash receipts in Indiana came from those commodities (Indiana Agricultural Statistics Service, 1999). Additional crops grown in the state include small grains (wheat, oats), hay, popcorn, peppermint, spearmint, oils, potatoes, beans, sweet corn, tomatoes, cucumbers, watermelon, cantaloupe, apples, peaches, blueberries, and tobacco combine to contribute an additional $411 million to the state's crop production value (Indiana Agricultural Statistics Service, 1999).

Prime farmland is essentially land that is best suited for growing crops. The Natural Resources Conservation Service (NRCS) defines prime farmland as "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 (the land could be cropland pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil 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" (USDA-NRCS, 2002). Indiana has approximately 58 % prime farmland, the second highest percentage in the nation (Indiana Land Resources Council, 1999). In 1997, the state ranked 8th in the nation in terms of total acreage of prime farmland, with 12,940,300 acres (Indiana Land Resources Council, 1999). Eighty-four percent of Indiana's prime farmland in 1997 was used for cropland, 6

Figure 4-14: Farmland within the Wabash Lowland

Conservation Reserve Program (CRP): a voluntary program for agricultural landowners. Through the CRP, landowners can receive annual rental payments and cost-share assistance to establish long-term resource conserving covers (such as forests, buffer strips, or wetlands) on eligible farmland.

% was used as pastureland, and the remaining 10 % was in the form of forestland, Conservation Reserve Program (CRP) or miscellaneous rural land (USDA-NRCS, 2002).

Maps showing the percentage of prime farmland per general soil map unit for each alternative are included in the Environmental Atlas. General soil map units are relatively broad areas that have a distinctive pattern of soils, relief, and drainage. Typically they consist of one or more major soils and some minor soils. The general soil map units are named for the major soils that comprise them. Soils making up one unit can occur in another, but in a different pattern (Strum, 1981).

Although Indiana's farmland, especially prime farmland, is an important resource, it is being lost to industrial, commercial, and residential development. Often land that is well suited to agriculture (flat, well drained land) is also easiest to develop. From 1982 to 1997 approximately 78,883 acres of farmland was lost annually to other uses (Indiana Agricultural Statistics Service, 1999). Much of this is high quality prime farmland, as the NRCS estimates that prime and important agricultural soils are being converted at a rate of 3 to 4 times that of less productive non-prime farmland (USDA-NRCS, 2002). A more detailed discussion on farmland trends in Indiana is found in Appendix F, Agricultural Land Baseline and Trends.

4.2.5 Wetlands

Wetlands are highly important ecosystems that include swamps, bogs, marshes, mires, fens, and other wet areas. Wetlands are often transition areas between upland and deepwater habitats. Their placement in the landscape results in a number of important values and functions including: nutrient sources and sinks, floodwater storage, protection of coastal areas, water purification, and habitat for a diverse plant and animal species. Wetlands across the U.S. have and been filled, dredged, drained at alarming rates.

Because of their important values and large loss, there are several federal and state laws that regulate activities that affect wetlands. The major laws protecting wetlands are the Federal Clean Water Act, the River and Harbors Act, and Indiana's Flood Control Act. Wetland maps for each alternative are included in the Environmental Atlas.

Prior to European settlement, the U.S. Fish and Wildlife Service estimated that Indiana had some 5,600,000 acres of wetlands. Over the past 200 years, Indiana has lost approximately 85% of its wetlands (Dahl, 1990). In mid 1980's study by Rolley with the Indiana Department of Natural Resources, Indiana was estimated to have approximately 813,032 acres of wetlands (Rolley, 1991). Of this area, approximately 245,817 acres were located in the I-69 study area. Because of the importance of these ecosystems, federal policy maintains there should be "no net loss of wetlands." For every acre of wetland that is taken as part of a project, several acres will be created or restored. Wetlands are spread throughout the study area. The majority are found along rivers and streams

and within their associated floodplains. Wetland types within the study area are primarily forested, with some emergent and scrub shrub. Figure 4-15 shows a wetland near the Patoka River. A more detailed discussion on wetland trends in Indiana is found in Appendix H, Wetlands Baseline and Trends.

Figure 4-15: Wetland near Patoka River

4.2.6 Water Bodies

There are six major rivers that are crossed by proposed alternatives in the study area. The six major rivers are the: White River, the West Fork of the White River, the East Fork of the White River, Pigeon Creek, the Patoka River, and the Eel River. The White River in the study area follows the county lines of Knox, Gibson, and Pike County, and empties into the Wabash River along the Indiana/ Illinois border. The White River has a moderate flow and its watershed drains approximately one-third of Indiana. This large river provides habitat for types of fish such as sturgeon, gar, goldeneye, mooneye, and blue suckers, and mussels not typically found in smaller streams. Southern cane, swamp cottonwood, sugarberry, and Shumard's red oak can be found in the bottomlands (McPherson, 2000). The East Fork of the White River is a slow stream that drains approximately 5,700 square miles. The most scenic portion of this river is in Martin County where springs flow into the river and the banks are lined with sandstone bluffs and rockhouses. The West Fork of the White River is one of Indiana's longer rivers at approximately 353 miles with a 5,746 square mile watershed. This river meanders through a large portion of the study area, through Marion, Morgan, Owen County, Greene County, Knox County, and Daviess County. The West and East Forks of the White River join just east of Petersburg. Pigeon Creek flows through Gibson, Warrick, and Vanderburgh Counties into the Ohio River. Pigeon Creek is a low-gradient stream with turbid waters. This creek is classified as a legal drain and has been dredged in places to channelize the stream. The Patoka River is approximately 100 miles long with an 860 square mile drainage basin. A portion of this river and its associated wetlands is the site of the Patoka River National Wildlife Refuge. Much of the Patoka River has been dredged and straightened; however, the final portion is natural and meandering from about US 41 to the Wabash River (McPherson, 2000). The Eel River is a tributary of the West Fork of the White River. The Eel River flows primarily through Clay County into Greene County where it joins the West Fork of the White River.

These six streams have been listed in the Indiana Department of Environmental Management 1998 303 (d) List of Impaired Waterbodies. This list showed that the lower portion of Pigeion Creek is impaired with a severity ranking of "high". Parameters of concern for Pigeon Creek are polychlorinatied biphenyls (PCBs), organic compounds, and chlordane. The White River is listed as impaired with a severity ranking of "medium." parameters of concern for the White River include PCBs, mercury, and an impaired biotic community. The East Fork of the White River is listed as impaired with a severity ranking of "high" in Lawrence County and "medium" in Martin County. Parameters of Concern for this portion of the East Fork of the White River include PCBs and mercury. The West Fork of the White River is listed as impaired with a severity ranking of "high" in a

portion near Indianapolis, and "medium" south until it joins with the East Fork. Parameters of concern for the West Fork of the White River include: PCBs , mecury, cyanide, dissolved oxygen, E. Coli, lead, and an impaired biotic community. The Patoka River is listed as impaired with a severity ranking of "medium." Parameters of concern include PCBs and mercury. The Eel River is listed as impaired with a severity ranking of "medium." Parameters of concern include PCBs and mercury. The impaired status severity rankings were a qualitative rating assigned by the IDEM.

There are three major lakes within the study area. These lakes are: Patoka Lake in Dubois, Crawford, and Orange Counties; Monroe Lake in Monroe and Brown Counties; and Cagles Mill State Reservoir. The Cagles Mill State Reservoir was created as a result of a dam on the northwest side of the lake. It was made in 1953 by the U.S. Army Corps of Engineers. The Lieber State Recreation Area is located near the center of the lake. This area consists of mostly forested land. Patoka Lake is the second largest reservoir in the state. Patoka Lake is unique in that it has a population of fresh water jellyfish. These jellyfish can only survive in very clean water. Monroe Lake was created in 1966. It is the largest reservoir in Indiana. Monroe Lake is surrounded by the Morgan-Monroe State Forest and the Hoosier National Forest. All three of these lakes provide habitat for a number of plant and animal species and offer a variety of recreational opportunities.

In addition to surface water drainages, significant subsurface drainages in karst areas exist in the study area. Karst areas particularly in the Mitchell Plateau and Crawford Upland physiographic regions may contain underground streams and sinking stream basins.. These subsurface drainages can be found near the Bloomington and Bedford areas.

Groundwater is used throughout the study area as a water supply; however, there are no sole source aquifers located within the study area. A sole source aquifer is one that provides the only water supply for a particular area.

4.2.7 Karst

The term karst refers to "landscapes characterized by caves, sinkholes, underground streams, and other features formed by the slow dissolving, rather than the mechanical eroding of bedrock" (AGI, 2001). Karst areas within the I-69 study area occur predominately in the Mitchell Plain, and some in the Crawford Upland physiographic region. Monroe, Lawrence, and Orange Counties have large amounts of karst, and Owen, Greene, Martin, and Crawford also contain smaller amounts of karst. Karst forms as water dissolves bedrock. Carbonic acid is a weak acid naturally found in water. The acid is formed as water reacts with carbon dioxide in the atmosphere. The slightly acidic water readily dissolves the mineral calcite, which is found in limestone, marble, and dolomite. These rocks, particularly limestone, are associated with karst terrain in the study area. Maps showing karst features, such as sinkhole areas and sinking stream basins, cave opening densities, and seeps and springs, for each alternative are included in the Environmental Atlas.

Water resources are especially important in karst areas. Water flowing through spaces and cracks in the bedrock can create large passageways and channels underground. Sinkholes can form as the bedrock at the surface is dissolved downward. Karst areas often lack surface water, and sinking stream basins that disappear from the surface may occur. Because the underlying bedrock is easily dissolved by water, there can be a direct connection between the surface water and the ground water. Very little water purification occurs because the water flows directly through cracks and fissures rather than percolating slowly through ground as in other types of terrain. Therefore urban and rural

pollution of groundwater is an important concern in karst areas. Urban pollution may be in the form of sewage, road runoff containing paving chemicals, domestic and industrial chemicals, and trash. Rural pollution may be in the form of sewage, fertilizers, pesticides, herbicides, dead livestock, and trash (AGI, 2001).

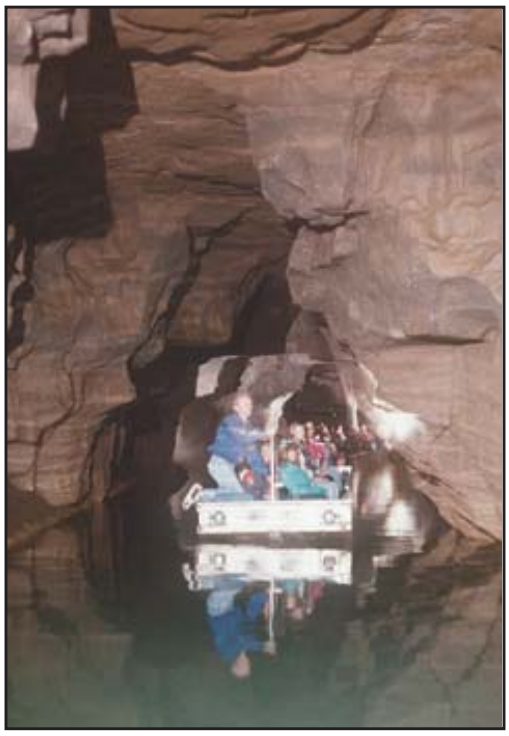


Figure 4-16: Guided boat tour in Blue Springs Cavern (Blue Springs Caverns, 2002).

Karst areas are also important because they provide habitat for a number of rare, threatened, and endangered species. Many species of bats including the federally endangered Indiana bat (Myotis sodalis), use caves in karst areas. Because caves are not exposed to sunlight, they create highly specialized ecosystems. Troglobites are animals that have adapted to these dark low-energy environments.

These animals have no eyes, lack pigment (appear white), and have elongated legs and antennae. Fish salamanders, spiders, beetles, crabs, and many other animals have evolved in these environments. Microbial organisms in cave environments have only recently been studied. Several of these microbes show promise for cancer medicines and bioremediation of hazardous waste spills (AGI, 2001). Several federal and state endangered troglobitic species have been found within the study area including the: northern cavefish (Amblyopsis spelaea), troglobitic crayfish (Orcanecter inermis testii), cave pseudoscorpion (Apochthonius indianensis), and the cave beetle (Pseudanophthalmus emersoni). Pollution is also an important concern for these species, as pollutants in water can easily be introduced into their habitat.

Recreation is another important aspect of karst. Karst areas can provide scenic and unique areas both above and below the ground. Recreational activities in karst areas can include: car touring, boating, hiking, fishing, camping, swimming, backpacking, nature watching, photography, and exploring wild and show caves. Blue Springs Caverns, in Lawrence is one cave that provides guided boat tours within the I-69 study area. Figure 4-16 shows a one such tour in Blue Springs Cavern.

Troglobite: An organism that must live its entire life underground

Karst areas also provide important mineral resources. Limestone mined in Indiana, is used as a construction and architectural material across the country. The commercial name for the limestone is Indiana limestone. Indiana limestone has a high degree of machinability, and can be shaped and textured at a low cost. It was used in the construction of such notable structures as the Empire State Building in New York, the Tribune Tower in Chicago, the Pentagon, and the National Cathedral in Washington, D.C. Indiana limestone is also being used in the reconstruction of the Pentagon after the September 11, 2001 attack. Indiana limestone is only mined in southern Indiana, particularly near the Bedford and Bloomington areas in Lawrence and Monroe Counties.

In addition, karst areas can provide construction problems, particularly the clearing and stabilization of land for buildings and roads. Engineering and environmental concerns associated with the

development of karst terrain include: sinkhole collapse, drainage problems, and groundwater contamination. A sinkhole collapse occurs when the land making up the base of sinkhole falls into an underlying cave. Sinkhole collapses can result in the loss of life and money. Sinkholes may collapse naturally, or can be induced by human activities. Urbanization increases the risk of sinkhole collapse because of (1) land use changes, stream bed diversions, and impoundments that increase the downward movement of water into bedrock openings beneath the soil, (2) greater frequency and magnitude of water table fluctuations caused by urban groundwater withdrawal and injection (AGI, 2001). Drainage problems can also result from urban development. Erosion, a common side effect of development, can transport sediment to the bottom of the sinkhole, essentially clogging the drain. This can result in flooding in other areas such as homes and businesses. Finally, groundwater contamination from both urban and rural areas, as well as potential spills along roads and railroads is an important concern in karst areas. This is an issue due to the ease with which contaminants can move through karst (AGI, 2001). Groundwater pollution can adversely affect drinking water sources, troglobitic cave species, and recreational opportunities associated with karst. Once groundwater is contaminated, it is very difficult and costly to remediate it. Prevention is the best course of action when dealing with groundwater contamination.

The Indiana Department of Transportation (INDOT) has a Memorandum of Understanding (MOU) with the Indiana Department of Natural Resources (IDNR), the Indiana Department of Environmental Management (IDEM), and the United States Fish and Wildlife Service (USFWS) regarding karst resources. The karst MOU identifies guidelines for the construction of transportation projects in karst regions of the state. The karst MOU is found in Appendix U. Existing GIS layers provided, by the Indiana Geological Survey, showing karst dye trace lines, cave opening density per square kilometer, sinkhole areas, and sinking stream basins were used in this study to identify and, if possible, avoid potential karst areas.

4.3 The Human Environment

4.3.1 Population

The population of the study area has grown at a slower rate than the rest of Indiana and the United States, as shown in Table 4-2.

The annual population growth rate in the study area (excluding the Indianapolis region) has averaged 0.3 percent from 1980 to 1998, or less than one third of the national population growth rate over the same period. A significant portion of the state's population growth in the past 20 years has taken place in the counties surrounding Indianapolis and Bloomington.

Table 4-2: Population Growth in Study Area, State of Indiana, and United States

	Population			Average Annual Growth Rate	
Region	1980	1998	2025	1980-1998	1998-2025
Study Area, Excluding Indianapolis MSA Counties	851,547	899,200	1,004,000	0.3%	0.4%
Entire Study Area	1,815,823	1,982,300	2,348,000	0.5%	0.6%
All Indiana	5,490,210	5,907,600	7,072,000	0.4%	0.7%
United States	226,545,805	270,250,600	345,700,000	1.0%	0.9%

Source: US Census Bureau (history) and Regional Economic Models, Inc. (forecasts)

Projections for the forecast year, 2025, are taken from an economic forecast developed by Regional Economic Models, Inc. (REMI). Between 1998 and 2025, population growth in the study area is expected to occur at a more rapid rate (0.4 percent per year) in the No-Build scenario, but this rate is still less than half of the rate that the U.S. population is expected to occur (0.9 percent per year), and also less than the rate at which Indiana as a whole is forecast to grow (0.7 percent per year).

Table 4-3: Populations of Cities and Towns in the I-69 Study Area

Cities or Town	Population In 2000	Percent of Study Area
Indianapolis	781,870	19.0%
Evansville	121,582	3.0%
Bloomington	69,291	1.7%
Terre Haute	59,614	1.4%
Lawrence	38,915	0.9%
Greenwood	36,037	0.9%
Franklin	19,463	0.5%
Vincennes	18,701	0.5%
Plainfield	18,396	0.4%
Beech Grove	14,880	0.4%
Brownsburg	14,520	0.4%
Bedford	13,768	0.3%
Speedway	12,881	0.3%
Jasper	12,100	0.3%
Martinsville	11,698	0.3%
Washington	11,380	0.3%
Greencastle	9,880	0.2%
Mooresville	9,273	0.2%
Brazil	8,188	0.2%
Princeton	8,175	0.2%

The study area includes major cities and towns, as well as rural farming communities. In addition, there is a considerable Amish population in Daviess County, northeast and east of Washington. Community services, such as utilities and emergency services, in the study area are typical of urban and rural areas. A number of pipelines and powerlines pass through the 26 county study area. Coal power facilities are also present in this part of the state. Fire and police stations are more numerous in urban areas, as expected, but are also found in rural areas. Table 4-3 shows the populations of some of the larger cities and towns located within the study area.

The four largest cities located within the study area are Indianapolis, Evansville, Bloomington, and Terre Haute. These four cities make up approximately 50% of the total population within the study area.

The remaining 50% inhabit smaller towns and rural areas. Figure 4-17 shows the population density from the 2000 Census Tracts.

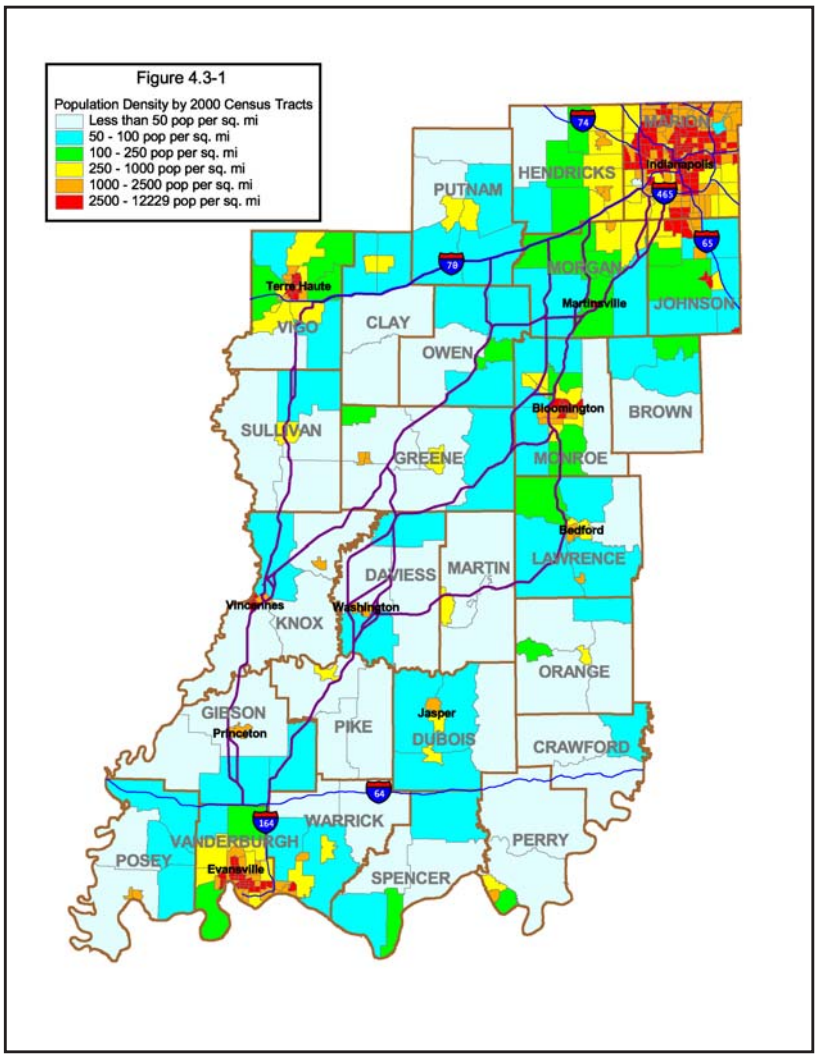


Figure 4-17: Population Density from 2000 Census

Aesthetics in the study area are often dependent upon which the land use and topography. Farmland is common in flat to rolling areas, particularly in the Wabash Lowland and Tipton Till Plain physiographic regions. While forests and karst areas are more common in more the hilly and rugged terrain of the Crawford Upland, Martinsville Hills, Norman Upland, and Mitchell Plateau regions. Residential, commercial, and industrial buildings are more common in the major cities and towns of the study area.

Table 4-4: Age Distribution

Age in 2000	Number	Percent Distribution in Study Area	Percent Distribution in State
Preschool (0 – 4)	140,665	6.8%	7.0%
School Age (5 – 17)	375,618	18.3%	18.9%
Adult (18 – 64)	1,293,229	62.8%	61.7%
Older (65 plus)	248,653	12.1%	12.4%

Table 4-5: Race and Ethnicity Distribution in 2000

Population by Race and Ethnicity in 2000	Number	Percent Distribution in Study Area	Percent Distribution in State
Reporting Only One Race	2,033,186	98.8%	98.8%
African American or Black	239,403	11.6%	8.4%
American Indian or Alaska Native	4,917	0.2%	0.3%
Asian	22,344	1.1%	1.0%
White	1,743,541	84.7%	87.5%
Other	22,981	1.1%	1.6%
Reporting More Than One Race	24,979	1.2%	1.2%

Source: US Census Bureau

Approximately 62.8% of the population within the study area, are between the ages of 18 to 64. Table 4-4 shows the population by age distribution of the study area.

Many different races and ethnicities live within the study area. Some of these groups include, but are not limited to African American or Black, American Indian or Alaska Native, Asian, and White. Table 4-5 shows the population by race and ethnicity in the year 2000 for the study area.

2.2.2 Households and Education

Household types within the study area include people who are married with children, married without children, single parents, and living alone. Table 4-6 shows the percent distribution of household types within the study area and the percent distribution within the state of Indiana.

The education distribution within the study area includes people who have completed kindergarten through high school and people who have completed some type of higher education. Table 4-7 contains information on education within the study area.

4.3.3 Employment and Economic Environment

Growth in employment in the study area shows trends similar to population growth (see Table 4-7). From 1980 to

Table 4-6: Household

Household Type	Number	Percent Distribution in Study Area	Percent Distribution in State
Households in 2000 (Includes details not shown below)	811,016	100.0%	100.0%
Married With Children	178,215	22.0%	23.8%
Married Without Children	224,929	27.7%	29.8%
Single Parents	77,083	9.5%	9.1%
Living Alone	228,946	28.2%	25.9%

Source: US Census Bureau

1998 employment growth rates have averaged 1.9 percent per year in the United States and 1.7 percent per year in Indiana. In the study area, employment growth rates have averaged 1.8 percent per year, or 1.4 percent when the Indianapolis MSA counties are excluded. In the No-Build scenario, from 1998 to 2025 employment growth is projected to slow to an average of 0.9 percent per year in the U.S., 0.8 percent per year in the study area and in Indiana as a whole, and 0.6 percent per year in the study area when the Indianapolis MSA counties are excluded. Annual employment growth rates are expected to decrease from current levels as the "baby boom" generation retires from the labor force.

Table 4-7: Education

Education Type	Number in Study Area	Percent of State In Study Area	Number in State
K to 12 School Enrollment (1999/2000 Total Reported)	362,550	32.7%	1,108,293
Public	316,708	32.1%	988,065
Private	45,842	38.1%	120,228
High School Graduates (1999/2000)	17,539	30.8%	56,999
Going to Higher Education	12,948	30.6%	42,264
4-year	9,611	29.8%	32,284
2-year	1,968	36.5%	5,392
Voc/tech.	1,369	29.8%	4,588

Source: Indiana Department of Education; US Census Bureau

Table 4-9 shows the employment levels by industry in the study area excluding Indianapolis and, separately, in the "Indianapolis" region (which in this study consists of Hendricks, Johnson, Marion, and Morgan Counties) in 1980, 1998, and 2025. Durable and non-durable manufacturing combined made up about the same share of employment outside and inside Indianapolis in 1980 (21 percent and 20 percent, respectively), but employment growth in the services sector, particularly in Indianapolis, caused the share of total employment in manufacturing to decrease to 17 percent outside Indianapolis and 12 percent in Indianapolis by 1998. In that same year 25 percent of study-area jobs outside Indianapolis were in services, compared to 31 percent in the Indianapolis region. From 1998 to 2025 the most rapid employment growth is forecast to occur in the services sector, with that category expected to account for 33 percent of jobs outside Indianapolis and 39 percent of jobs in Indianapolis by 2025.

Table 4-8: Employment Growth in Study Area, Indiana, and United States

	Employment			Average Annual Growth Rate	
Region	1980	1998	2025	1980-1998	1998-2025
Study Area, Excluding Indianapolis MSA Counties	400,200	517,500	615,300	1.4%	0.6%
Entire Study Area	962,700	1,324,200	1,624,000	1.8%	0.8%
All Indiana	2,632,200	3,576,700	4,394,000	1.7%	0.8%
United States	114,231,200	160,198,700	204,766,000	1.9%	0.9%

Source: Regional Economic Models, Inc.

Finance, insurance, and real estate employment, retail trade employment, and government employment have all been growing inside and outside the Indianapolis region and all three employment categories are forecast to grow through 2025. However, the share of total employment in these three categories is forecast to decline between 1998 and 2025 as services sector employment growth dominates. Farming employment is expected to continue to decline from 1998 to 2025.

A survey of economic conditions and trends in the I-69 study area was conducted in order to provide context for the economic forecasts that are discussed in this report. A regional economic needs analysis [Task 3.4 Technical Report, *Regional Economic Needs Analysis*, prepared by Bernardin-Lochmueller & Associates (September 26, 2001).] assembled economic data published by the US Bureau of the Census, Indiana Department of Workforce Development, and the US Bureau of Economic Analysis. Two reports, one published by the U.S. Department of Agriculture [United States Department of Agriculture, *Rural Development Strategic Plan for Indiana* (January 2001).] and the other by the Council for Urban Economic Development [Council for Urban Economic Development, *Evansville to Indianapolis (I-69) Project: Regional Economic Needs Analysis* (October, 2000).], provided additional information about current economic conditions in Southwest Indiana. This section contains a summary of the regional economic needs analysis and a discussion of population and employment trends for the No-Build scenario. The results of the detailed economic analysis for each of the build alternatives can be found in Section 5.5, *Economic Impacts*.

Table 4-9: Number of Jobs by Industry, with Percent of Total Employment in 1980, 1998, and 2025

	Study Area, Excluding Indianapolis MSA Counties			Indianapolis Region (Hendricks, Johnson, Marion, and Morgan Counties)		
Employment Category	1980	1998	2025	1980	1998	2025
Durable Manufacturing	55,500 14%	55,600 11%	69,100 11%	76,700 14%	58,200 7%	59,400 6%
Non-Durable Manufacturing	26,400 7%	30,000 6%	31,500 5%	34,800 6%	37,200 5%	37,700 4%
Mining	9,200 2%	6,000 1%	4,500 1%	1,300 <1%	700 <1%	700 <1%
Construction	21,900 5%	31,200 6%	32,100 5%	25,800 5%	46,100 6%	51,500 5%
Transportation and Public Utilities	19,700 5%	24,200 5%	23,900 4%	30,900 6%	51,900 6%	52,000 5%
Finance, Insurance, and Real Estate	20,400 5%	26,100 5%	27,300 4%	51,100 9%	67,700 8%	78,800 8%
Retail Trade	67,800 17%	98,900 19%	107,000 17%	95,400 17%	148,000 18%	164,200 16%
Wholesale Trade	15,900 4%	18,600 4%	19,200 3%	34,500 6%	48,900 6%	49,200 5%
Services	75,900 19%	130,600 25%	200,600 33%	116,200 21%	249,200 31%	397,300 39%
Agriculture, Forestry, and Fishery Services	1,400 <1%	4,300 1%	7,200 1%	1,900 <1%	5,300 1%	9,100 1%
Government	62,900 16%	75,700 15%	81,700 13%	89,200 16%	90,500 11%	107,200 11%
Farming	23,400 6%	16,300 3%	11,300 2%	4,700 1%	3,000 <1%	2,100 <1%
TOTAL EMPLOYMENT	400,200 100%	517,500 100%	615,300 100%	562,500 100%	806,800 100%	1,009,100 100%

Source: Regional Economic Models, Inc.

The *Regional Economic Needs Analysis* focuses on measures of economic vitality in Southwest Indiana. These measures include personal income, population growth, and employment growth. Data from the nine counties that are located in the Indianapolis Metropolitan Statistical Area (MSA), as defined by the U.S. Census Bureau, are excluded from some calculations since the hoped-for economic impacts of the project are not directed at the Indianapolis region, but rather at the area in

Southwest Indiana that lacks adequate highway access. The Indianapolis MSA counties that are in the "Indianapolis" region of the study area include Morgan, Marion, Hendricks, and Johnson Counties. The other five counties in the Indianapolis MSA (Boone, Hamilton, Madison, Hancock, and Shelby Counties) are located outside the study area.

Table 4-10: Comparison of Per Capita Income, Study Area and Rest of Indiana

Year	Study Area, Excluding Indianapolis MSA Counties	Rest of State, Excluding Indianapolis MSA Counties	Ratio of Study Area to Rest of State
1970	$ 3,380	$ 3,788	0.89
1975	$ 5,363	$ 5,761	0.93
1980	$ 8,796	$ 9,229	0.95
1985	$ 12,314	$ 12,720	0.97
1990	$ 16,136	$ 16,912	0.95
1995	$ 19,747	$ 20,995	0.94
1998	$ 22,745	$ 24,106	0.94

Source: Stats Indiana

When data from the Indianapolis MSA counties are excluded, the study area has a lower per capita income than in the rest of Indiana. Table 4-10 shows the per capita income in Southwest Indiana compared to the rest of the state from 1970 to 1998. In 1970, Southwest Indiana's personal income per capita of $3,380 was 89 percent of the per capita income in the rest of Indiana. By 1985, Southwest Indiana's personal income per capita had grown to 97 percent of the per capita income in the rest of Indiana, but had fallen to 94 percent in 1998.

4.3.4 Colleges and Universities

There are a total of 40 different colleges and universities located within the study area. Approximately 50% of these colleges and universities are located in Indianapolis and Evansville. The other 50% are distributed throughout the study area. Some of the major universities that are located within the study area include: University of Southern Indiana, University of Evansville, Oakland City College, Vincennes University, Indiana University, Rose Hulman University, Depauw University, University of Indianapolis, Indiana University Purdue University Indiana, and Butler University (Figure 4.3-2).

The University of Southern Indiana (USI) is located on the west side of Evansville, Indiana. It is one of the fastest growing colleges in the nation. USI is a public, four-year college. There were 8,217 undergraduate students enrolled at USI in 2001.

The University of Evansville (UE) is located on the east side of Evansville, Indiana. UE is a private, nonprofit, 4-year college. The total enrollment at UE in 2001 was 2,400 students.

Oakland City University (OCU) is located east of SR 57 in Oakland City, Indiana. OSU is a private, nonprofit, 4-year university. The undergraduate enrollment at OSU in 2001 was 1,258 students.

Vincennes University (VU) is located in downtown Vincennes, Indiana. VU is a public, 2-year college. The undergraduate enrollment in 2001 was 8,462 students.

Indiana University (IU) is located in Bloomington, Indiana. IU is a public, 4-year college. The total enrollment in 2001 including undergraduates and graduates was 93,775 students.

Rose Hulman University is located in Terre Haute, Indiana. Rose Hulman is a 4-year, private, nonprofit college. The total enrollment at Rose Hulman was 1,600 students in 2001

Depauw University is located in Greencastle, Indiana. Depauw is a private, nonprofit, 4-year college. Depauw University had 2,216 undergraduate students enrolled in 2001.

The University of Indianapolis is located on the south side of Indianapolis, Indiana. The University of Indianapolis is a private, nonprofit, 4-year college. The University of Indianapolis had 2,781 undergraduates students enrolled in 2001.

Indiana University Purdue University Indiana (IUPUI) is located in downtown Indianapolis, Indiana. IUPUI is a public, 4-year college. IUPUI had an undergraduate enrollment of 20,416 students in 2001.

Butler University (BU) is located on the north side of Indianapolis, Indiana. Butler is a private, nonprofit, 4-year college. BU had 3,294 undergraduates students enrolled in 2001.

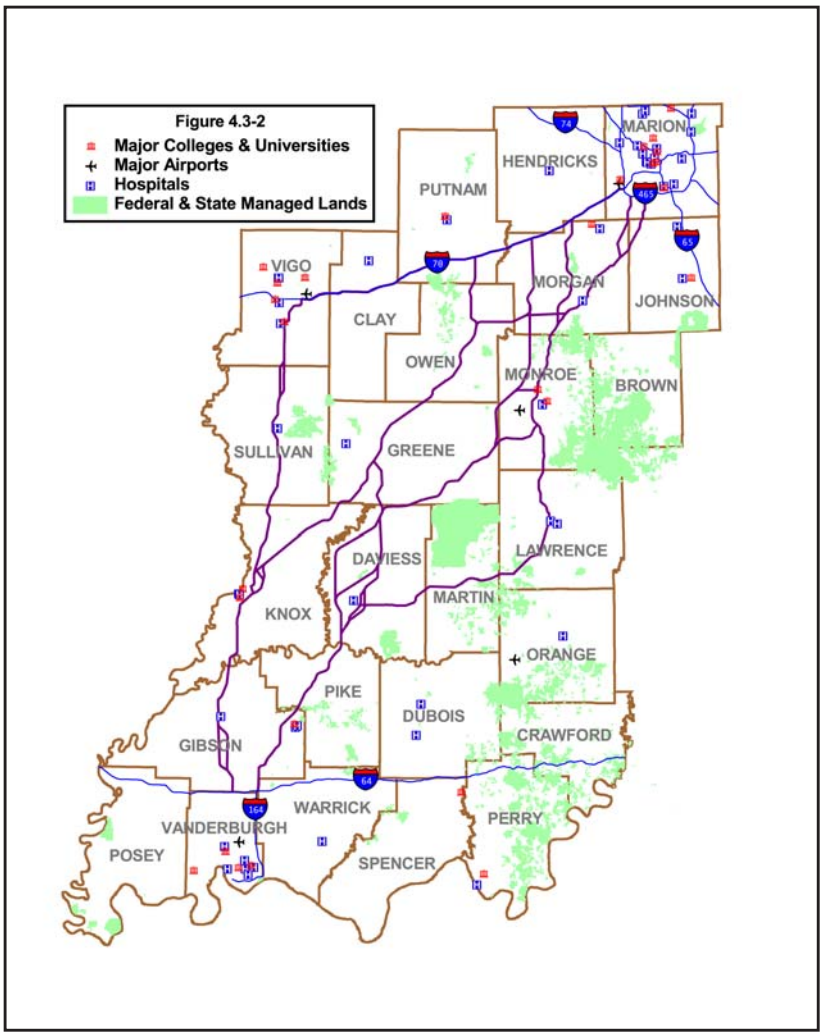


Figure 4-18: Major Facilities and Managed Lands

4.3.5 Airports

A total of 108 airports, both private and public, are located throughout the twenty-six county study area. Of these 108 airports, four are large airports that are the most frequently used by the public. These four airports include: Evansville Dress Regional Airport, Hulman Regional Airport in Terre Haute, Monroe County Airport in Bloomington, and Indianapolis International Airport (Figure 4-18). The Indianapolis International Airport is the only international airport within the study area.

4.3.6 Churches and Cemeteries

There are approximately 1,830 churches and 1,552 cemeteries located throughout the study area of this project. The cemeteries located in the study area can range in size from small to large. State statues preclude the Indiana Department of Transportation from relocating cemeteries. Cemeteries will be avoided in this study.

4.3.7 Federal and State Managed Lands

There are a number of parks and recreational facilities that attract visitors to the study area. Some of these areas include the following: Crane Surface Warfare Support Center, Hoosier National Forest, Patoka River National Wildlife Refuge, Thousand Acre Woods, Martin State Forest, Monroe Reservoir, Owen-Putnam State Forest, Lieber State Recreation Area,

McCormicks Creek State Park, Minnehana Fish and Wildlife Area, Glendale Fish and Wildlife Area, and others (Figure 4-18). Many of these areas are discussed in more detail in the Environmental Consequence Section.

4.3.8 Hospitals

A total of 65 hospitals or clinics are located within the twenty-six county study area. Of these 65 hospitals or clinics, 40 are located in Indianapolis or Evansville (Figure 4.3-2). The other 25 are located throughout the study area. Many of the larger medical hospitals are located in Evansville or Indianapolis. Some of the hospitals located between Evansville and Indianapolis include: Columbia Terre Haute Regional Hospital, Bedford Regional Hospital, Dunn Memorial Hospital (Bedford), Bloomington Hospital, Daviess County Hospital (Washington), Gibson County Hospital (Princeton), Mary Sherman Hospital (Sullivan), Morgan County Memorial Hospital (Martinsville), and others. (Figure 4-18)

Many of the hospitals between Evansville and Indianapolis are not as will equipped to handle patients with unique critical illnesses, such as burn patients. Therefore, they depend on the larger hospitals, which are generally better equipped, to handle special illnesses patients. Increased accessibility of ground transportation of critically ill medical patients will help move patient to a more appropriate facility. Many patients from across southwestern Indiana are transported by ground to the Indiana Medical Research Center in Indianapolis. A 4-lane Interstate would provide a safer and faster transport for patients.

4.3.9 Transportation

Existing transportation facilities within the study area include Interstate highways, U.S. highways, state routes, county and other rural roads, railroads, and airports. There are four major interstates within the study area. I-64 runs east and west across the south end of the study area, and is the southern terminus for the project. I-70 runs east and west from Terre Haute to Indianapolis, and is included in a number of proposed alternatives. I-164 runs north and south along the eastern side of Evansville, and connects to several proposed alternatives. I-465 circles Indianapolis and is the northern terminus for the project. A number of state highways, county roads, and railroads pass through the study area.

The study area includes two National Scenic Byways, the Ohio River Scenic Route and the Historic National Road. The Ohio River Scenic Route runs east and west through the southern portion of the study area along SR 62 and SR 66. This route is winding and hilly, and follows the Ohio River. The Ohio River Scenic Route offers both historical architecture and natural scenery such as swamps, rock outcroppings, forested hills, and scenic waterways. This route is south of all proposed alternatives. The Historic National Road runs east and west along US 40 in the northern portion of the study area.

This road is one the America's earliest roads and gives a good example of the settlement pattern of the country. A number of sites listed on the National Register of Historic Places can be found along this road. The Historic National Road is north of all proposed alternatives.

4.3.10 Crane Naval Surface Warfare Center

The Crane Naval Surface Warfare Center (Crane) is located in Martin County, with small portions in Greene and Lawrence Counties. Crane serves the U.S. Navy, and is recognized as a leader in diverse and highly technical product lines such as microwave devices, acoustic sensors, small arms, and microelectric technology (Crane, 1998). It is a center of cutting-edge, high tech employment in the southwestern portion of the state. In 1999, Crane was directly and indirectly responsible for about 6,800 jobs in the state of Indiana and over $241 million in wages associated with those jobs (Indiana University, 2000). Over one-third of these jobs belong to scientists, engineers, or technicians. A report to the Southern Indiana Business Alliance titled "Impact Assessment Crave Division of Naval Surface Warfare Center, Naval Sea Systems Command" prepared by the School of Public and Environmental Affairs at Indiana University states that "Not only has Crane boosted the economics of surrounding communities, it has taken a leading role in assisting its neighbors with environmental protection, education, economic development, public safety and recreational opportunities. Projects typically involve local officials, Crane employees, and other community organizations " (Appendix AA).

Chapter 5 - Environmental Consequences

5.1 Methodology for Evaluating Environmental Impacts

This section provides an overview of the methodology that has been used in evaluating the environmental impacts of the Build and No-Build Alternatives. More detailed explanations of the methodologies used for evaluating specific impacts can be found in subsequent sections of this chapter. The purpose of this introductory section is simply to explain the overall approach used in evaluating environmental impacts and to introduce key terms and concepts that will be used later in this chapter.

5.1.1 Tiered Approach

As a result of the size and complexity of this project, FHWA and INDOT determined that it was appropriate to use a "tiered" procedure for completing the environmental studies required under the National Environmental Policy Act (NEPA). The use of a tiered process to comply with NEPA is authorized under the Council on Environmental Quality (CEQ) regulations, which applies to all federal agencies, and under FHWA's own NEPA regulations. (See 40 CFR 1508.28 and 23 CFR 771.135(o)).

In recent years, the use of tiering for FHWA NEPA documents has increased. In the context of one recent project, which involved an existing section of I-70 in Missouri, FHWA headquarters explained the agency's overall approach to preparing tiered documents:

> As contemplated in our regulations and in the Council on Environmental Quality regulations, tiering is an option available to organize analysis and decision-making in complex circumstances in a way that takes into account the different geographic scope and timing for different decisions. The difference in scope and timing for the strategic decision of how to address long range needs on a 200 mile long section of I-70 between the major metropolitan areas in Missouri versus the specific location and design decisions for much shorter "projects" on I-70 certainly justifies a tiered approach. Because tiering is an option available to address complex situations, we have deliberately stayed away from prescriptive guidelines on how to apply tiering, so that each tiered process can be custom designed to the specific situation.

In accordance with this flexible approach, a Tiered Process has developed a tiered process appropriate to the specific needs of this project. In this process, the purpose of the Tier 1 EIS is provide the basis for an informed decision on a "corridor" for I-69 between Evansville and Indianapolis, *not* to determine the exact alignment for the highway. (The concept of a corridor is explained further below.) As a result, the environmental data in this Tier 1 EIS has been developed with the intention of providing the level of detail needed to make an informed decision on a corridor. As can be seen by the scope of this document, FHWA and INDOT have determined that a substantial amount of information is needed even at this first tier. Nonetheless, it must also be recognized that this study is not intended to provide the basis for selection of an exact alignment, and therefore does not contain the level of engineering or environmental detail that would be needed to make a specific alignment decision. That information will be developed in Tier 2 NEPA studies.

5.1.2 Key Concepts: Study Bands, Corridors, and Working Alignments

Each build alternative considered in the initial screening stage of this study was developed as a "route concept," which may be thought of as a simple line connecting points on a map. Throughout the screening process, the initial set of route concepts (A through L) was reduced to five major routes (1 through 5). These five routes – several of which include a range of potential connections to Indianapolis at their northern end – were carried forward for detailed analysis.

In order to provide a set of tools for analyzing environmental impacts of these alternatives, the study team defined each alternative as a set of three overlapping bands (see Figure 5.1-1).

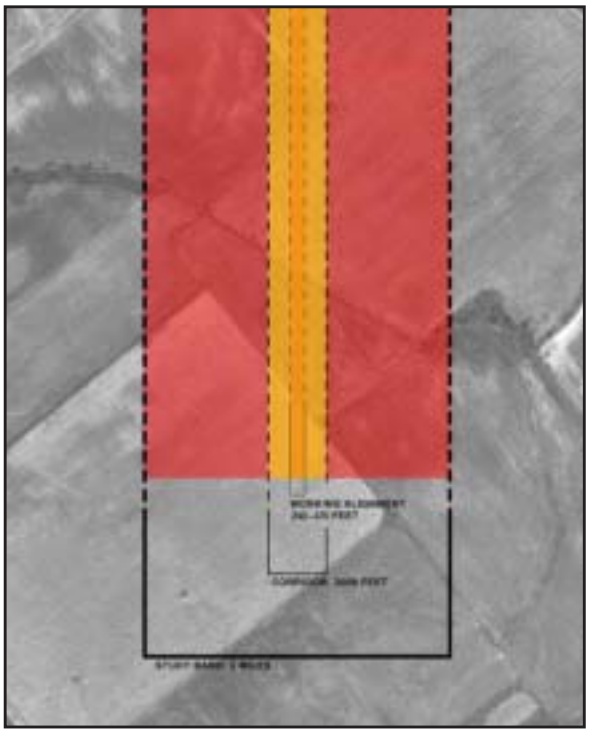


Figure 5.1-1: Illustration of Study Band Corridor and Working Alignment

- **Study Band** – A "study band" is a 2-mile-wide band within which the study team focused its environmental data-gathering efforts for each alternative. It should be noted that much of the environmental data was gathered throughout the entire 26-county study area. However, more intensive efforts – for example, field verification of recorded resources – were concentrated within the two-mile-wide study bands.

- **Corridor** – A "corridor" is generally 2000 feet wide, but its width is narrower in some places and broader in others. If a Build Alternative is selected, it is FHWA's intention to approve a Record of Decision for a corridor at the end of Tier 1, rather than approving a specific alignment.

- **Working Alignment** – A "working alignment" is a potential location for a highway right-of-way within the 2000-foot-wide corridor. The Tier 1 EIS is not intended to result in the selection of a specific alignment. However, working alignments have been developed within each corridor in order to provide a sound basis for estimating the environmental impacts of each alternative. The working alignments range in width from 240 to 470 feet. Three factors were considered in estimating the right-of-way width for sections of each working alignment: (1) the topography of the land, i.e. flat to rolling vs. hilly; (2) the number of frontage roads expected, if any; and (3) the number of lanes expected. (See Appendix E, "Typical Sections," for detailed information on the widths of each working alignment.)

5.1.3 Calculation of Environmental Impacts

The basic tool used for estimating the environmental impacts of each alternative was the project's

Geographic Information System (GIS). As explained in Section 4.1, *GIS Approach*, the GIS is an electronic database that consists of a series of data layers. The GIS database for this project includes layers containing each of the study bands, corridors, and working alignments, as well as more than 170 layers containing the locations of various environmental resources and other features.

The GIS database provided two powerful tools for developing the environmental impact information that has been presented in this Tier 1 EIS. First, the GIS was used to generate maps showing the relationship between each alternative and specific environmental resources and other features. Some of these maps are contained in Chapter 5, *Environmental Consequences*; additional maps are included in the Environmental Atlas, which is contained in a separate volume but also is part of the Tier 1 EIS. In addition to generating these maps, the GIS also was used to calculate the impacts that would be caused by each of the working alignments. The impact calculations are given in the tables contained in Chapter 5, *Environmental Consequences* and elsewhere in the document.

The direct impact calculations shown in this document reflect the impacts *within the footprint of the working alignment of each alternative*, subject to the following qualifications:

- **Impacts of I-70 Widening and SR 641 Project**. The impacts associated with the planned widening of I-70 and the completion of SR 641 have not been counted as part of the impacts for the alternatives presented in this document. Instead, the impact calculations are based on the impacts of each alternative from its southern terminus at I-64 near Evansville to the point at which the alternative connects with I-70 or SR 641 (or I-465 in the case of those alternatives that do not use any portion of I-70 or SR 641). This approach has been followed because the completion of SR 641 and the widening of I-70 are expected to occur without regard to whether I-69 is completed. Excluding the impacts of those projects from the alternatives analysis for this project allows the reader to compare the I-69 alternatives based on the *additional* impact that each alternative would cause, over and above the impact that would result from projects that will occur independently of the I-69 project. (The impacts of the SR 641 were disclosed in a Final Environmental Impact Statement, which was signed by FHWA on January 3, 2000. The impacts of the I-70 widening have not been studied in a separate NEPA document, but are summarized in the Cumulative Effects chapter of this document based on existing information, along with other reasonably foreseeable actions that are independent of the I-69 project.)

- **Use of Existing SR 37 and US 41 Right-of-Way.** Several alternatives incorporate portions of existing SR 37 and US 41. Both of these routes are four-lane, divided highways with at-grade access points (signalized and unsignalized intersections). Upgrading these routes to meet Interstate standards (which do not allow for at-grade access) would require additional right-of-way for interchanges, frontage roads, and other improvements. For sections of alternatives that follow these routes, the impact estimates reflect only the additional right-of-way that would be needed beyond the existing SR 37 or US 41 right-of-way.

- **Working Alignments with Multiple Variations**. Several of the working alignments include multiple variations. For example, the working alignment for Alternative 1 splits into several possible variations in the vicinity of Ft. Branch, Vincennes, and Farmersburg,

while Alternative 2 splits into possible variations in the vicinity of Ft. Branch and Vincennes. Similarly, the working alignments for Alternatives 3, 4, and 5 split into several variations in the vicinity of Washington. North of Washington, Alternative 4 has several variations for crossing the West Fork of the White River. For Alternative 3, there is a variation for the Keisler Forest Legacy property north of SR 45. North of Martinsville along SR 37, there are variations that use either Mann Road or SR 37 to connect into I-465 for Alternatives 2C, 3B, 3C, 4C, 5A, and 5B. Each variation has slightly different impacts. Consequently, the impact totals for each alternative are presented as ranges. The ranges reflect the different levels of impact associated with the various working alignments that have been developed in these populated areas.

- **Interchanges** This document reflects potential interchange locations. These locations were determined using the following criteria:
  - The functional classification of intersecting roadways
  - The traffic volumes on intersecting roadways
  - Service to significant communities which otherwise would be isolated
  - Distance to next interchanges
  - Ability to relocate/consolidate state highways which are close to each other
  - The number of interchanges serving particular communities

  The number of potential interchange locations are on the high side to ensure full coverage of the Study Area. During the Tier 2 NEPA studies and design analysis, some of these locations could be discarded. New locations could also be added. For this I-69 project, right-of-way needs of approximately ten acres were assumed for each potential interchange.

- **Rest Areas** Potential rest area locations have not been identified for this I-69 project. If an alternative is selected, rest areas will be identified and located in the Tier 2 NEPA studies. However, to avoid underestimating the right-of-way needs for the I-69 alternatives, the acreage for two potential rest areas has been included in the total right-of-way needs for each alternative. This acreage is approximately 15 acres for each rest area. The land taken for the rest areas is assumed to be agricultural land.

5.1.4 Format for Impact Evaluations

Each section within the Environmental Consequences chapter of this document typically includes: (1) an introduction to the resource; (2) the methodology used to analyze the resource; (3) policies that may accompany the resource; (4) the results of the analysis; (5) mitigation for impacts to the resource; and (6) a summary of the discussion. The procedure detailed above describes the process used to determine potential environmental impacts. If a different process was used for a particular resource, it is noted in the methodology section of that discussion.

The alternatives that are discussed in the following sections of this Section are shown in Figure 5.1-2.

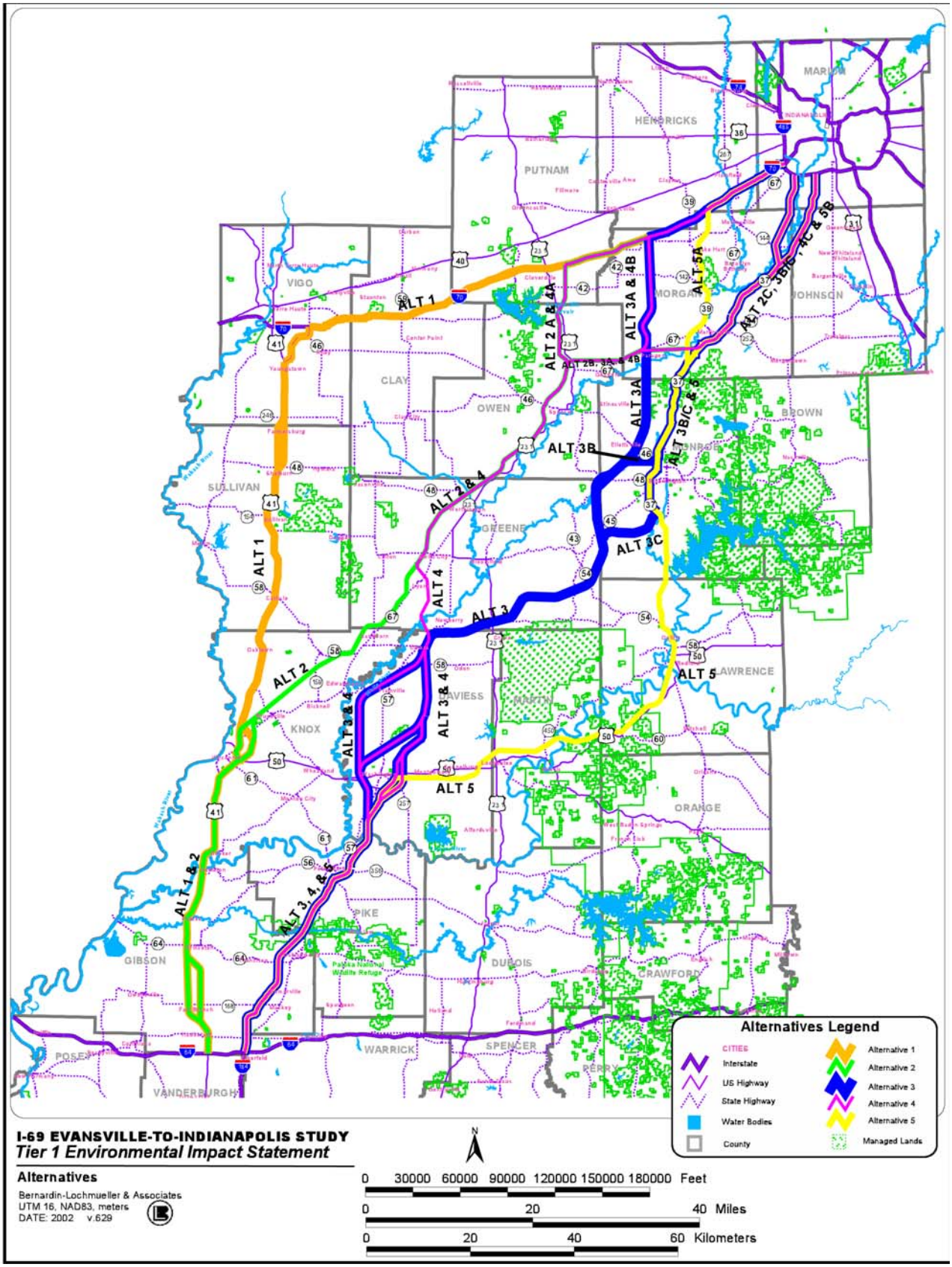


Figure 5.1-2: Alternatives Carried Forward for Environmental Analyses

5.2 Land Use Impacts

5.2.1 Introduction

Transportation projects can influence land use changes as a result of direct impacts or indirect impacts (See Section 5.26 *Cumulative Impacts*). Direct impacts are defined by the Council on Environmental Quality (CEQ) Regulations as "*effects which are caused by the action and occur at the same time and place*" (40 CFR 1508). For this project, the direct impacts are due to the right-of-way needs of the various I-69 alternatives.

Indirect impacts are defined by the Council of Environmental Quality Regulations as "*effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate...*" (40 CFR 1508). For this project, the indirect impacts caused by the project have been forecasted using a combination of an economic forecasting model and a transportation planning model.

This section addresses the total impacts of the various I-69 alternatives upon land use and land use patterns in the Study Area. For the 26 counties in the Study Area for Southwest Indiana, the land use planning process covers a wide spectrum. There are counties like Monroe, Vanderburgh, Vigo, and Warrick having regularly updated Comprehensive Land Use Plans with zoning and subdivision control ordinances. There are counties like Gibson and Greene that have no Comprehensive Plans and no land use controls.

Many of these comprehensive plans show growth in business and industry along major transportation corridors. For example, both Vanderburgh and Warrick counties show industrial growth along I-164 just south of I-64. In Monroe County, much of the industrial and commercial growth is shown along the SR 37 corridor. In Vigo County, industrial and commercial growth is shown along US 41, I-70 and SR 46.

Another consideration is the location of interchanges on I-69 to access these growth areas. The specific location of these interchanges is very important in determining whether the I-69 project will stimulate and enhance these growth patterns. Specific interchange locations will be finalized in the Tier 2 NEPA studies and further refined in the design phase.

5.2.2 Methodology

The direct and indirect impacts of the various alternatives were calculated using the Geographic Information System(GIS) and the economic and transportation planning modeling combination. The Methodology section of this Environmental Consequences section discusses the Southwest Indiana Geographic Information System (GIS) and how this tool is used in identifying impacts for the alternatives. For more information about the GIS and on the methodology, see Section 4.1 and 5.1, respectively.

The direct land use impacts of the five alternative corridors consists of the right-of-way needs for the working alignment. This was calculated by placing the estimated roadway cross-sections on top of the United States Geological Survey Land Cover data layer in the GIS. Using tools in the GIS, the land uses impacted due to the cross-sections were grouped into five categories: forest, farmland, wetlands, developed areas, and other. The other category includes such land uses as open water areas, quarries, bare rock areas, shrubland, and urban grasses. The total acreages include the right-of-way needs for the highway as well as the interchanges.

The indirect land use impacts were calculated using a combination of the economic forecasting model and transportation planning models. County level population and employment forecasts to the year 2025 were obtained from Woods and Poole (a nationally recognized company specializing in demographic and economic forecasts). These forecasts were divided into sub-county areas based on existing development patterns and input into the Indiana Statewide Travel Demand Model to forecast the transportation impacts of each I-69 alternative.

The transportation impacts were then input into the Major Corridor Investment Benefit Analysis System (MCIBAS) to assess the relative economic impacts of each I-69 alternative. The increases in population and employment as computed by MCIBAS were then converted into acreages using standard land use densities for housing and employment. This information was computed for each of the five economic analysis regions. These regions are shown in Figure 3-17.

In addition to computing indirect land use impacts for the five economic analysis regions, the indirect impacts of the I-69 alternatives were computed for groups of potential interchanges. This was done using models developed from a national study of commercial development at rural and small town Interstate exits (Hartgen, David T. *et al.*, 1998). Using these models, forecasts of commercial activity was computed and this activity was converted into acres using standard land use densities.

Table 5.2-1: Direct Land Use Impacts for Each Alternative

Land Uses	Alternative	Alternative 2			Alternative 3			Alternative 4			Alternative 5	
(acres)	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Farmland	1270-1780	3630-3900	4100-4360	4300-5070	4510-4560	4290-4850	4070-4630	4500-4560	4970-5020	5170-5730	4200-4240	3840-4390
Forests	110-170	885-920	970-1005	840-935	1505-1580	1315-1450	1140-1275	850-920	935-1005	805-935	1525-1565	1265-1365
Wetlands	25-40	60-75	65-80	90-110	120-165	100-155	90-150	110-160	115-165	140-190	125-140	110-130
Developed Lands	170-220	100-120	100-120	160-230	40-50	120-180	180-240	5-10	10-20	60-120	310-310	330-380
Other*	90-105	75-100	75-100	85-170	45-115	35-55	35-105	35-45	35-45	45-115	70-70	65-125
TOTAL **	1710-2210	4760-4990	5380-5550	5500-6260	6120-6200	5850-6440	5500-6090	5420-5490	5980-6050	6160-6760	6120-6150	5570-6130

* Other land uses include open water, quarries, bare rock, urban grasses, and shrubland.

** Totals are not equal to the sum of the individual land uses because increasing one type of land use will decrease other land uses.

Table 5.2-1 shows the impacts (in acres) of the right-of-way needs for each alternative. These values represent the direct impacts of each alternative. Figure 5.2-1 presents this information in a graph for comparative purposes. Table 5.2-2 shows the acreages that are estimated to be impacted due to residential, commercial, and industrial land use development as a result of the highway. These indirect impacts are also presented in Figure 5.2-2 for comparative purposes. With acreages shown in ranges, the ranges for the total acreages in Tables 5.2-1 and 5.2-2 are not equal to the sum of the individual land use categories because increasing one type of land use will decrease other land uses. For further discussion of indirect impacts, see Section 5.26 Cumulative Impacts.

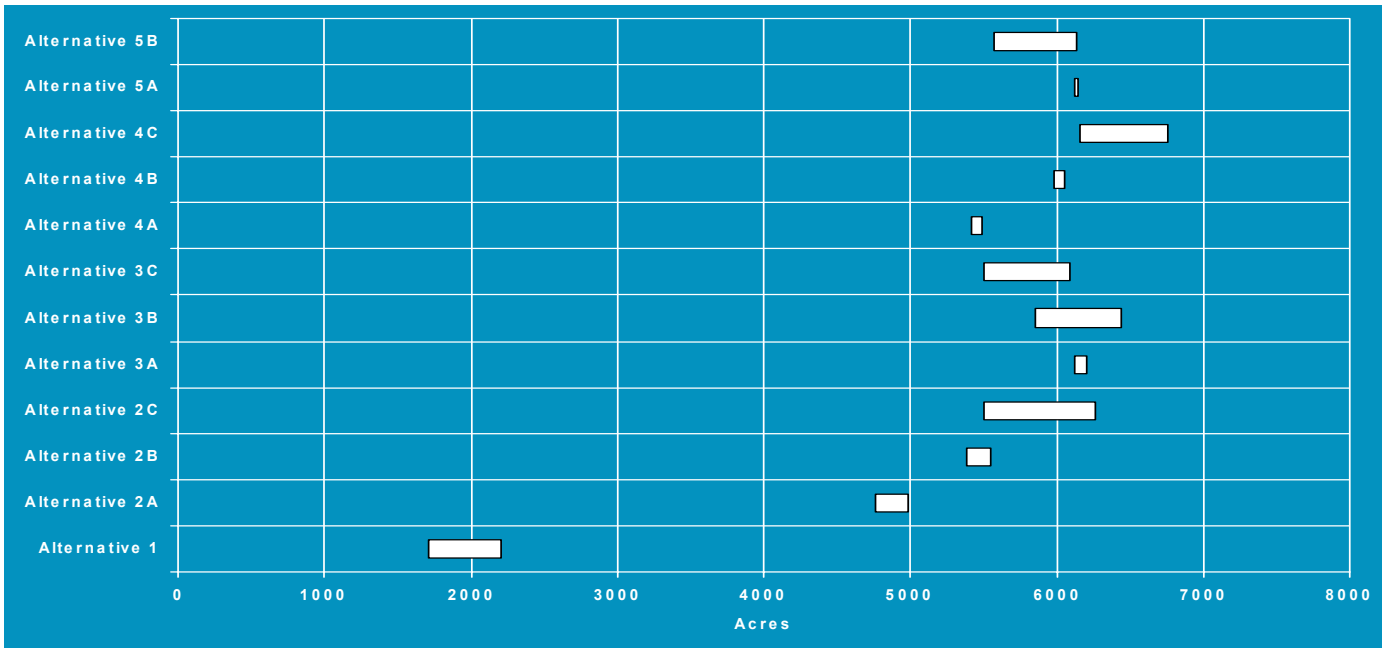


Figure 5.2-1: Direct Land Use Impacts for Each Alternative

Table 5.2-2: Indirect Land Use Impacts for Each Alternative

Land Uses (acres)	Alternative 1	Alternative 2 2A	2B	2C	Alternative 3 3A	3B	3C	Alternative 4 4A	4B	4C	Alternative 5 5A	5B
Farmland	420-490	525-595	580-650	735-820	595-665	720-800	710-790	510-575	530-595	715-800	615-705	690-790
Forests	70-140	125-185	190-205	215-285	245-300	310-380	325-400	145-200	150-205	220-290	350-440	340-455
Wetlands	0-25	5-30	5-25	5-35	10-20	10-25	10-30	5-30	5-30	5-30	20-45	15-45
TOTAL *	490-650	655-810	775-870	955-1130	850-980	1040-1205	1045-1210	660-800	685-820	940-1110	985-1190	1045-1280

* Totals are not equal to the sum of the individual land uses because increasing one type of land use will decrease other land uses.

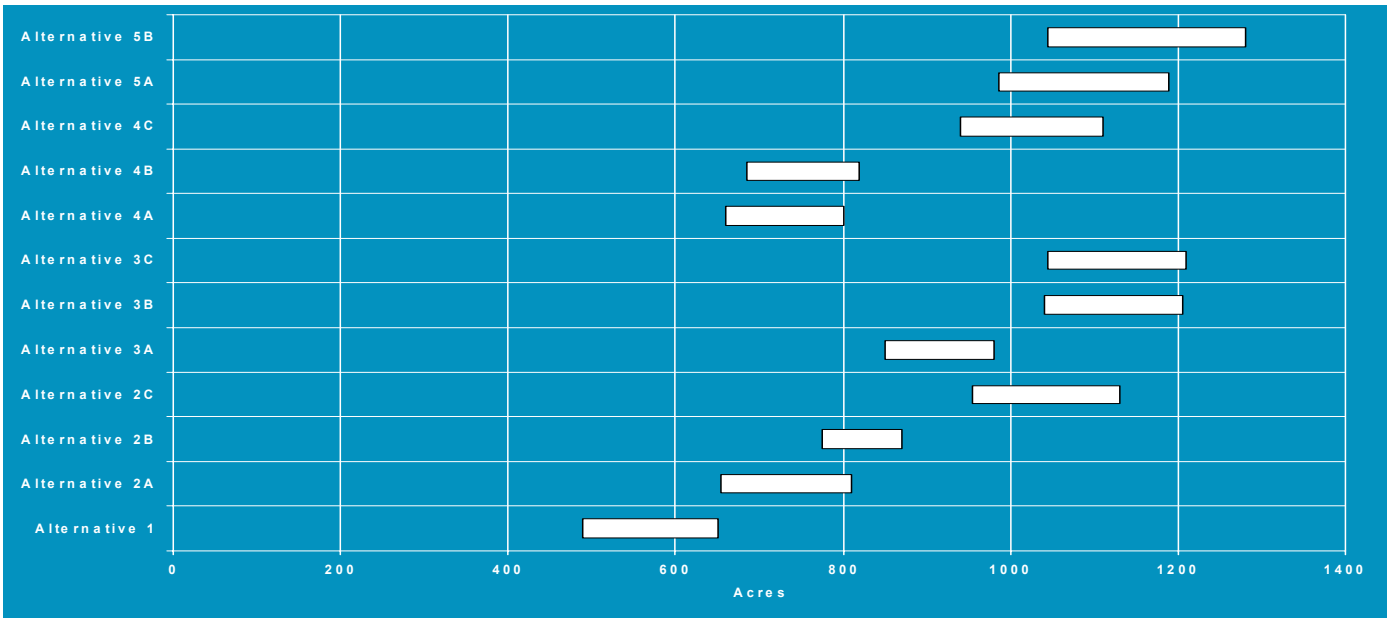


Figure 5.2-2: Indirect Land Use Impacts for Each Alternative

5.2.3 Analysis

Alternative 1

Alternative 1 will impact the fewest acres as a result of direct and indirect impacts but will eliminate the direct access currently available to residences, businesses, industries, and farms along US 41. The land use patterns along US 41 will change due to the loss of the direct access. Many of these residences, businesses, industries, and farms have driveways that open directly onto US 41. Placing an Interstate highway on existing US 41 will result in the loss of these driveways and possibly the loss or relocation of many of these land uses. While frontage roads would be used to provide access to some of these residences, businesses, industries and farms not directly taken for right-of-way needs, the lack of direct access from US 41 will create an inconvenience. This could result in residences, businesses, industries, and farms moving to new locations creating new land use patterns.

Alternative 1 will require the fewest acres of any of the alternatives for right-of-way needs. The direct impacts on land use patterns will be the taking of between 1,710 and 2,210 acres of land for right-of-way needs for Alternative 1 (see Table 5.2-1). This right-of-way includes only land needed along US 41 to construct this alternative. There is sufficient existing right-of-way along SR 641 to accommodate this alternative. I-70 will probably require some additional right-of-way to accommodate I-69.

Approximately 90 miles of Alternative 1 uses US 41 corridor. The proposed right-of-way width along US 41 varies from 270 feet to 450 feet. The existing right-of-way width along US 41 varies from 175 feet to 300 feet. Additional right-of-way will be required along US 41 for Alternative 1. Among all alternatives, Alternative 1 uses the least amount of forest, farmland, and wetland because this alternative will use the existing right-of-way along a large portion of US 41.

Alternative 1 has several variations near Fort Branch, Vincennes, and Farmersburg. For each of these three areas, one variation of Alternative 1 uses US 41 while the other variation goes either to the east or west of the community. With regard to the land use impacts of these variations, the acreages are included within the ranges shown in Table 5.2-1. As a general observation, the variations that use US 41 through the community will require more acres of developed land, while the variations to the east or west will require more farmland and forest land.

The indirect impacts upon land use patterns as a result of Alternative 1 will be a growth in residences, businesses, and industries that will use an estimated 490 to 650 acres of existing farmland, forests, and wetlands (see Table 5.2-2). These indirect impacts are the fewest of any alternative. The tables in Appendix Q show that most of the indirect impacts and resulting land use changes will occur at potential interchanges and in the counties along US 41.

Alternative 2

Among Alternatives 2A, 2B, and 2C, Alternative 2C will have the greatest direct and indirect impacts. The direct impacts of Alternative 2C will be the acquisition of between 5,500 and 6,260 acres for right-of-way (see Table 5.2-1). Alternative 2 will use approximately 45 miles of the US 41 corridor up to Vincennes. Up to Vincennes, the proposed right-of-way width along US 41 for all the

Alternative 2 options varies from 270 feet to 450 feet. The existing right-of-way width along US 41 for this stretch varies from 200 feet to 240 feet. Additional right-of-way will be required along US 41 for Alternatives 2A, 2B, and 2C.

Alternative 2C would use existing right-of-way for approximately 20 miles of the SR 37 corridor. The proposed right-of-way along SR 37 varies from 290 feet to 420 feet. The existing right-of-way along SR 37 for this stretch varies from 180 feet to 300 feet. Additional right-of-way will be required along SR 37 for Alternative 2C.

Alternative 2 has several variations near Fort Branch, Vincennes, and Mooresville. For each of these three areas, one variation of Alternative 2 uses US 41 or SR 37 while the other variation goes either to the east or west of the community. With regard to the land use impacts of these variations, the acreages are included within the ranges shown in Table 5.2-1. As a general observation, the variations that use US 41 or SR 37 through the community will require more acres of developed land, while the variations to the east or west will require more farmland and forest land.

Alternative 2A, 2B, and 2C all will eliminate the direct access currently available to residences, businesses, industries, and farms on US 41 from I-64 north to Vincennes. The land use patterns along US 41 will change due to the loss of the direct access. For these land uses that have driveways that open directly onto US 41, placing an Interstate highway on existing US 41 will result in the loss of these driveways and possibly the loss or relocation of many of these land uses. While frontage roads would be used to provide access to some of these residences, businesses, industries, and farms not taken for right-of-way needs, the lack of direct access will create an inconvenience and could result in these land uses moving to new locations.

Alternative 2C will impact land use patterns along SR 37 by eliminating the direct access currently available to residences, businesses, industries, and farms along SR 37. While SR 37 has more access control than US 41, there are driveways that open directly onto SR 37. Similar to US 41, placing an Interstate highway on existing SR 37 will result in the loss of these driveways and possibly the loss or relocation of many of these land uses. Frontage roads will be used to provide access to some of these land uses but the lack of direct access from SR 37 will create an inconvenience. This could result in changes in land use patterns as residences, businesses, and industries relocate to improve access.

Of Alternatives 2A, 2B, and 2C, Alternative 2C has the most indirect impacts upon land use patterns. The growth in residences, businesses, and industries will use an estimated 955 to 1,130 acres of existing farmland, forests, and wetlands (see Table 5.2-2). The tables in Appendix Q show that most of the indirect impacts and resulting land use changes will occur along SR 37 and US 41 at potential interchanges and in the counties along these highways.

Alternative 3

Among Alternatives 3A, 3B, and 3C, Alternative 3B will have the greatest direct impacts, while Alternatives 3B and 3C will have the greatest indirect impacts. The direct impacts of Alternative 3B will be the acquisition of between 5,850 and 6,440 acres for right-of-way (see Table 5.2-1). All Alternative 3 options could require more than 6,000 acres of land for right-of-way needs. While none of the Alternative 3 options use the US 41 corridor, Alternative 3C will use approximately 50 miles of the SR 37 corridor from Bloomington to I-465 south of Indianapolis while Alternative 3B will use

approximately 45 miles of the SR 37 corridor. The proposed right-of-way width along SR 37 for Alternatives 3B and 3C varies from 290 feet to 420 feet. The existing right-of-way width along SR 37 for this stretch varies from 180 feet to 200 feet. Additional right-of-way will be required along SR 37 for Alternatives 3B and 3C.

Alternative 3 has several variations near Washington and Mooresville. For Washington, variations include going on the east side close to US 50 and going on the west side of Washington. For Mooresville, variations include using SR 37 and going west of SR 37 to connect to I-465. With regard to the land use impacts of these variations, the acreages are included within the ranges shown in Table 5.2-1. As a general observation, the variations that use SR 37 through Mooresville will require more acres of developed land, while the variations to the west will require more farmland and forest land. Around Washington, the variations on both the east side and west side impact farmland.

Alternatives 3B and 3C will impact land use patterns along SR 37 by eliminating the direct access currently available to residences, businesses, industries, and farms along SR 37. While SR 37 has more access control than US 41, there are driveways that open directly onto SR 37. Similar to US 41, placing an Interstate highway on existing SR 37 will result in the loss of these driveways and possibly the loss or relocation of many of these land uses. Frontage roads will be used to provide access to some of these land uses but the lack of direct access from SR 37 will create an inconvenience. This could result in changes in land use patterns as residences, businesses, and industries relocate to improve access.

Alternatives 3B and 3C have the most indirect impacts upon land use patterns. The growth in residences, businesses, and industries will use an estimated 1,040 to 1,210 acres of existing farmland, forests, and wetlands (see Table 5.2-2) for these alternatives. The tables in Appendix Q show that most of the indirect impacts and resulting land use changes will occur along SR 37 and SR 57 at potential interchanges and in the counties along these highways.

Alternative 4

Among Alternatives 4A, 4B, and 4C, Alternative 4C will have the greatest direct and indirect impacts. The direct impacts of Alternative 4C will be the acquistion of between 6,160 and 6,760 acres for right-of-way (see Table 5.2-1). Alternative 4C would use existing right-of-way for approximately 20 miles of the SR 37 corridor. The proposed right-of-way along SR 37 varies from 290 feet to 420 feet. The existing right-of-way along SR 37 for this stretch varies from 180 feet to 300 feet. Additional right-of-way will be required along SR 37 for Alternative 4C.

Similar to Alternative 3, Alternative 4 has several variations near Washington and Mooresville. For Washington, variations include going on the east side close to US 50 and going on the west side of Washington. For Mooresville, variations include using SR 37 and going west of SR 37 to connect to I-465. With regard to the land use impacts of these variations, the acreages are included within the ranges shown in Table 5.2-1. As a general observation, the variations that use SR 37 through Mooresville will require more acres of developed land, while the variations to the west will require more farmland and forest land. Around Washington, the variations on both the east side and west side impact farmland.

Alternative 4C will impact land use patterns along SR 37 by eliminating the direct access currently available to residences, businesses, industries, and farms along SR 37. There are driveways that

open directly onto SR 37. Similar to US 41, placing an Interstate highway on existing SR 37 will result in the loss of these driveways and possibly the loss or relocation of many of these land uses. Frontage roads will be used to provide access to some of these land uses but the lack of direct access from SR 37 will create an inconvenience. This could result in changes in land use patterns as residences, businesses, and industries relocate to improve access.

Alternative 4C has the most indirect impacts upon land use patterns. The growth in residences, businesses, and industries will use an estimated 940 to 1,110 acres of existing farmland, forests, and wetlands (see Table 5.2-2) for these alternatives. The tables in Appendix Q show that most of the indirect impacts and resulting land use changes will occur along SR 37, SR 57, and US 231 at potential interchanges and in the counties along these highways.

Alternative 5

Alternatives 5A and 5B would have similar direct impacts, while Alternative 5B would have the greater indirect impacts. The direct impacts would require between 5,570 to 6,150 acres for right-of-way needs. Alternatives 5A and 5B use existing right-of-way along the SR 37 corridor. Alternative 5A uses approximately 37 miles of SR 37 while Alternative 5B uses approximately 65 miles of SR 37. The proposed right-of-way along SR 37 varies from 290 feet to 420 feet. The existing right-of-way along SR 37 for this stretch varies from 180 feet to 300 feet. Additional right-of-way will be required along SR 37 for Alternatives 5A and 5B.

The areas of variation for Alternative 5 are Washington and Mooresville south of I-465. For Mooresville, variations include using SR 37 and going west of SR 37 to connect to I-465. With regard to the land use impacts of these variations, the acreages are included within the ranges shown in Table 5.2-1. Again as a general observation, the variations that use SR 37 through Mooresville will require more acres of developed land, while the variations to the west will require more farmland and forest land.

For Washington, variations involve different locations on the east side close to US 50. The closer to existing US 50, the more developed lands would be acquired.

Alternatives 5A and 5B will impact land use patterns along SR 37 by eliminating the direct access currently available to residences, businesses, industries, and farms along SR 37. There are driveways that open directly onto SR 37. Similar to US 41, placing an Interstate highway on existing SR 37 will result in the loss of these driveways and possibly the loss or relocation of many of these land uses. Frontage roads will be used to provide access to some of these land uses but the lack of direct access from SR 37 will create an inconvenience. This could result in changes in land use patterns as residences, businesses, and industries relocate to improve access.

Alternative 5B has the most indirect impacts upon land use patterns. The growth in residences, businesses, and industries will use an estimated 1,045 to 1,280 acres of existing farmland, forests, and wetlands (see Table 5.2-2) for these alternatives. The tables in Appendix Q show that most of the indirect impacts and resulting land use changes will occur along SR 37 and SR 57 at potential interchanges and in the counties along these highways.

No-Build Alternative

The No Build Alternative will have no impact on land use.

5.2.4 Mitigation

Mitigation measures need to focus on coordination with local planning commissions and local elected officials concerning land use controls.

The indirect impacts around areas with karst features are a concern with regard to water drainage and the impacts to the cave systems. While the Indiana Department of Transportation has a Memorandum of Understanding for construction in karst regions (see Appendix U), the indirect impacts would be caused by private developers who are subject to local ordinances and codes. These local ordinances and codes may not address drainage in karst areas. Cave systems may experience changes in drainage patterns as a result of indirect impacts.

Once a preferred alignment is identified and if it traverses karst topography, INDOT will contact local officials to encourage them to initiate planning mechanisms that will review development request in light of impacts to sensitive areas.

5.2.5 Summary

Figures 5.2-1 and 5.2-2 compare the alternatives and show that Alternative 1 would have the fewest direct and indirect impacts of all the alternatives with 1,710 to 2,210 acres for right-of-way and 490 to 650 acres for indirect impacts. Alternative 4C would have the most direct impacts compared to all the alternatives with 6,160 to 6,760 acres for right-of-way.

The alternatives that use portions of the SR 37 corridor have significantly higher indirect impacts than the alternatives that do not use the SR 37 corridor. Of the alternatives using SR 37, Alternative 5B would have the most indirect impacts as a result of I-69 with 1,045 to 1,280 acres.

For farmland, Alternative 1 requires the least amount of farmland while Alternative 4C requires the most farmland for right-of-way. For forests, Alternative 1 requires the least amount of forests while Alternatives 3A and 5A require the most forests for right-of-way. For wetlands, Alternative 1 requires the least amount of wetlands while Alternative 4C requires the most wetland acreage for right-of-way.

For indirect impacts on farmland, forests, and wetlands, Alternative 1 has the least amount of indirect impacts on these resources. The alternatives using the SR 37 corridor have the greatest indirect impacts on these resources. The No Build Alternative will have no impacts on land use resources. For further discussion of indirect impacts, see Section 5.26 Cumulative Impacts.

5.3 Social Impacts

5.3.1 Introduction

The construction of a new Interstate facility whether on new terrain or utilizing existing right-of-way will have both negative and positive social impacts to communities within the limits of the new highway. In general, the changes in accessibility along the new facility will create a number of social impacts to local communities. Local residents wanting to access the new highway will have to use the interchanges to reach the proposed highway. This will alter existing travel patterns, increasing local travel times in some instances and decreasing travel times for longer north-south trips. The new Interstate would cause some splitting of neighborhoods and communities. This will vary from one alternative to another.

The relocation impacts resulting from any of the alternatives are expected to be large and complex. The greatest impacts to residences and businesses generally occurs near the larger urban areas of Evansville, Vincennes, Terre Haute, Washington, Bedford, Bloomington, and Indianapolis.

All acquisitions and relocations required by this project will be completed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act), as amended, Title VI of the Civil Rights Act of 1968 (Title VI), and 49 CFR (Code of Federal Regulations) 24. No person displaced by this project will be required to move from a displaced dwelling unless comparable replacement housing is available to that person. INDOT will 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. Advisory services will be made available to farms and businesses, with the aim of minimizing the economic harm to those businesses and farm establishments.

5.3.2 Methodology

Impacts were assessed using working alignments depicted on aerial photos for the build alternatives. Generally, a 300-foot right-of-way width was used for assessing impacts, however, right-of-way width variations were made depending on terrain and accessibility. These variations generally follow the changes in cross-section widths as described in Appendix E. Some properties that were close but outside of the working alignment were assumed to be taken. The actual right-of-way width will vary depending on terrain, stream crossings and placement of frontage roads. The possible upgrade of US 41 or SR 37 from four-lane divided highways to Interstate facilities would utilize much of the existing right-of-way, although there are locations where additional right-of-way would be required, primarily at proposed interchange locations and for access/frontage roads.

The numbers shown for relocations are based on the working alignment within each corridor. Following the selection of a preferred corridor in the FEIS, the Tier 2 NEPA document will ultimately select an alignment within the corridor. The homes and businesses were field checked.

Neighborhoods and communities that were impacted by the roadway or through lost access were evaluated in the field.

Right-of-way and relocation costs include right-of-way costs for acreage and improvements required for actual construction, relocation costs, costs for acquiring structures and improvements due to lost access, and administrative fees. These costs are estimates only and are based on a field survey. An INDOT approved appraiser evaluated the properties that would be impacted by the various working alignments and categorized properties into a range of values. Utility facility relocation costs have not been included in these estimates. The right-of-way for proposed interchanges has not yet been determined and is only estimated at this time. These costs are for comparison purposes only. They could change after more precise right-of-way requirements have been determined.

5.3.3 Analysis

Road closures will be necessary for many local county roads along the selected route. State highways that intersect the new facility will remain open with either an interchange, an overpass or an underpass. Local residents will have to utilize alternate routes due to road closures. Local county roads with higher traffic volumes which are used as primary through routes will generally be selected to have access over or under the new facility, or in some instances, a new interchange will be provided.

Coordination with local fire and police departments, and with local school districts will take place during Tier 2 NEPA studies when a preferred corridor has been selected. At this point, decisions as to which roads will be closed and which roads will remain open are tentative. Every alternative will cause changes for local bus routes and impact response times for emergency services. Overall, there is likely to be some improvement in emergency medical services in the rural areas that are now serviced only by two-lane state highways. A new Interstate facility will allow faster response times and quicker and safer access to regional hospitals and the larger urban medical centers. Likewise, school bus trips traveling to and from other communities for sporting events and field trips will have a safer four-lane Interstate for traveling to distant sites.

Overall, traveling safety will improve with a four-lane divided Interstate. The current choice of routes between Evansville and Indianapolis requires either the use of two-lane state highways or the US 41 – I-70 route. US 41 currently has many points of access with signalized intersections and at-grade railroad crossings. This increases the crash rates above what would be expected for an Interstate facility. As a result, the crash rate on US 41 exceeds the typical crash rate for an Interstate facility.

Alternative 1

The upgrade of US 41 to an Interstate facility would create many disruptions to the communities located between Evansville and Terre Haute. Beginning at the south terminus, a new directional interchange incorporating I-64 with the new I-69 would require the acquisition of several large commercial operations including three large truck stops with restaurant facilities and a large nursery operation. Continuing toward Fort Branch, the proposed I-69 would continue to utilize the US 41 right-of-way, thus eliminating access to homes, farms and businesses with drives coming off existing US 41 and acquiring new right-of-way at interchange locations and grade separations.

The upgrade of US 41 to an Interstate through Fort Branch would essentially split this community into two halves. It would cut access to the many businesses along both sides of US 41. The

commercial business losses within Fort Branch would include a wide variety of businesses including restaurants, service stations, a bank, machine shops, auto parts stores, an antique mall, concrete plant and an industry that produces burial vaults. The option of a western bypass around Fort Branch would save the loss of over 30 businesses and 20 residences.

US 41 in the Vincennes area is already similar to an Interstate type facility with interchanges located at the major intersecting highways. The use of existing US 41 through Vincennes would result in the fewest residential and business impacts. An eastern bypass in the Vincennes area would require the acquisition of approximately 32 additional homes and the splitting of several neighborhoods.

The Farmersburg community is another area where a possible western bypass is proposed. The upgrade of US 41 in this area would necessitate the purchase or acquisition of approximately 75 homes and 25 businesses. The business losses would include three service stations, a bank, a dentist office, two groceries, three auto parts/hardware stores, a restaurant and several other businesses. There would also likely be a need for an access/frontage road for North Central High School, which currently utilizes US 41 for its primary access. The western bypass of Farmersburg would take 13 homes and two businesses, thus reducing right-of-way acquisition costs and relocation impacts.

The upgrade of US 41 between SR 246 and SR 641 in Terre Haute will require approximately 80 residential and 14 business relocations. The existing right-of-way along US 41 in this area is somewhat narrower and may require some additional right-of-way acquisition on either side of US 41.

Table 5.3-1: Relocation Estimates Alternative 1

Section	Residences	Businesses	Multi-Family	Churches
I-64 to SR 64 in Princeton	32 to 52	10 to 44	0	0 to1
SR 64 in Princeton to US 50 Vincennes	64 to 101	13	0	0
US 50 in Vincennes to SR 641 in Terre Haute	188 to 239	48 to 75	0	2 to 3
TOTAL	264 to 335	70 to 131	0	2 to 4

The US 41 corridor is the home to a large number of farm and produce markets which depend upon the customer traffic and accessibility of US 41 to sell melons and a variety of fruits and vegetables. The upgrade of US 41 to an Interstate facility would cut off the major customer base for these markets. Those markets located at interchange locations would likely continue in business.

Total estimated right-of-way and relocation costs for Alternative 1 are from $128,888,000 to $172,834,000. Table 5.3-1 shows the potential residential and business relocations for Alternative 1.

Alternative 2

Alternative 2 follows the same alignment as Alternative 1 until reaching Vincennes where it cuts to the northeast on a new terrain alignment. There are two variations being considered in the Vincennes area. An eastern bypass of Vincennes would begin at US 50 and cut to the northeast across a residential and agricultural area. This would require the acquisition of nearly 20 homes and

several subdivision lots. The other variation would be to diverge from US 41 farther north near the existing SR 67 interchange. This variation would still require the acquisition of approximately 17 homes in the area and would cut off access to the Thunder Hill Mobile Home Park. This community has approximately 40 to 50 mobile homes that would need to be moved or provided access by a new access road. These mobile homes have not been included in the total number of residences to be acquired since it appears that a new access drive could be provided. Alternative 2 continues to the northeast on a somewhat parallel route to SR 67. From US 41 this alternative would pass to the north and east of Bruceville, Westphalia, Sandborn, Lyons, Switz City, Worthington and Freedom. Most of the homes and farms to be acquired in this area are located in rural settings along county roads.

A possible interchange with SR 159, just south of the Town of Freelandville would be in close proximity to North Knox High School. Impacts to the high school would be further evaluated during Tier 2 NEPA studies, however it is probable that most of the negative impacts will be construction-related and therefore short-term.

It appears that there are several Amish or Mennonite families living near the Worthington area. At this time it appears that the working alignment may require the acquisition of two Amish/Mennonite residences and one Amish or Mennonite business (Freedom Valley Cabinet Shop) in the area near the Greene/Owen county line. Because of their specialized lifestyle and close-knit community, any relocation services provided by the State would consider the unique needs of this community.

The working alignment for Alternative 2 continues to the northeast crossing SR 46 just west of the Town of Spencer. There are then three possible options for Alternative 2. Alternative 2A follows an alignment due north near the US 231 corridor, intersecting I-70 just east of the Cloverdale interchange. This portion of Alternative 2A is also utilized for Alternative 4A. This is a rural area with scattered residences and no major business activity. There would be no major community disruptions along this segment of Alternative 2A. Total estimated right-of-way and relocation costs for alignment 2A are from $111,779,000 to $124,099,000. Table 5.3-2 shows the estimated relocations for Alternative 2A.

Alternative 2B continues parallel to SR 67 toward the Town of Paragon, where it shifts to the north and intersects I-70 just east of the Little Point interchange. This area is also primarily rural although there will be a few businesses impacted near the Town of Paragon. In particular, the Paragon Speedway (a dirt track racing facility) will likely be impacted by this alternative. Alternative 2B between Paragon and I-70 is also utilized for Alternatives

Table 5.3-2: Relocation Estimates Alternative 2A

Section	Residences	Businesses	Multi-Family	Churches
I-64 to SR 64 in Princeton	32 to 52	10 to 44	0	0 to1
SR 64 in Princeton to SR 67 in Vincennes	64 to 101	13	0	0
SR 67 in Vincennes to SR 46 in Spencer	61	6	0	0
SR 46 in Spencer near Cloverdale	22 to 26	0	0	0
TOTAL	179 to 240	29 to 63	0	0 to 1

4B and 3A. It is estimated that right-of-way and acquisition costs for Alternative 2B will be between $121,042,000 and $148,762,000. Table 5.3-3 shows the relocation estimates for Alternative 2B.

Table 5.3–3: Relocation Estimates Alternative 2B

Section	Residences	Businesses	Multi-Family	Churches
I-64 to SR 64 in Princeton	32 to 52	10 to 44	0	0 to1
SR 64 in Princeton to SR 67 in Vincennes	64 to 101	13	0	0
SR 67 in Vincennes to SR 46 in Spencer	61	6	0	0
SR 46 in Spencer I-70 in Morgan County	37	3	0	0
TOTAL	194 to 251	32 to 66	0	0 to 1

Alternative 2C continues to the east from Paragon, crossing farmland and the White River before intersecting SR 37 just south of Martinsville at SR 39. Alternative 2C then follows the same route north along SR 37 as Alternatives 3B, 3C, 4C, and 5B.

The upgrade of SR 37 to Interstate standards from SR 39 south of Martinsville to I-465 in Indianapolis will involve a high number of business and residential relocations. SR 37 through Martinsville is currently a highly developed commercial corridor. Upgrading this section of SR 37 to an Interstate facility will require the acquisition of approximately 40 homes, 1 church, 6 fast food restaurants, 4 gas station-convenience stores and 9 other businesses due to lost access and right-of-way acquisition. The shift from major commercial corridor to limited access Interstate standards will cause a shift in local travel patterns, changes in bus routes and possible changes in emergency response times. There will be some decrease in community cohesion, however, most of the Martinsville population lies west of SR 37.

North of Martinsville, the proposed I-69 would continue to utilize the SR 37 right-of-way, thus eliminating access to homes and businesses with drives coming off existing SR 37 and acquiring new right-of-way at interchange locations. A possible interchange at Maple Turn Road (Morgan CR 350N) may require the acquisition of nearly 30 homes from the Willowbrook Estates subdivision. Alternative 2C has two variations from a point just south of SR 144 to the northern terminus of I-465 in Indianapolis.

From a point approximately 0.6 mile southwest of Morgan CR 850E and SR 37, a variation of Alternative 2C diverges from SR 37 on a new terrain alignment heading north across the White River, west of the Town of Waverly. This route cuts across farm fields and then runs to the northwest, crossing Mann Road near the Marion/Morgan County line. This variation would require the acquisition of a cluster of existing homes at a proposed interchange at Southport Road. North of Southport Road, this route would require the acquisition of as many as 65 homes. The proposed interchange of I-69 with I-465 would be at the existing Mann Road interchange. The reconfigured interchange would likely cut off access to an existing subdivision with 43 homes located in the southeast quadrant of the interchange. For the purposes of this study, these homes have been included in the relocation statistics. This route would disrupt the neighborhoods along Mann Road and require a shift in travel patterns for those who use Mann Road for local trips.

The SR 37 Route of 2C continues on SR 37 all the way to Edgewood Road in Marion County. At this point, the route diverges from SR 37 and continues north to I-465 where a new interchange would tie-in the movements of I-69 and I-465 with the traffic from SR 37/ Harding St. and I-465. The upgrade of SR 37 to Interstate standards through northern Johnson and southern Marion Counties will impact commercial development along existing SR 37. Approximately 14 commercial and/or industrial businesses would be acquired in the area just south of the existing I-465 SR 37 interchange. The Flying J Truck Stop Complex, Milestone Contractors, the Knight's Inn and Royal Spa Manufacturing are just some of the businesses that would be acquired by this alignment.

Table 5.3-4: Relocation Estimates Alternative 2C

Section	Residences	Businesses	Multi-Family	Churches
I-64 to SR 64 in Princeton	32 to 52	10 to 44	0	0 to1
SR 64 in Princeton to SR 67 in Vincennes	64 to 101	13	0	0
SR 67 in Vincennes to SR 46 in Spencer	61	6	0	0
SR 46 in Spencer to SR 39 @ SR 37 in Martinsville	15 to 19	2	0	0
SR 39 to I-465 in Indianapolis	108 to 175	25 to 48	4	2 to 3
TOTAL	280 to 408	56 to 113	4	2 to 3

The estimated right-of-way and relocation costs for Alternative 2C are between $212,522,000 and $251,624,000. The following Table 5.3-4 shows the estimated relocations for Alternative 2C.

Alternative 3

Alternatives 3, 4 and 5 all have their southern terminus at the SR 57 interchange with I-164/I-64. From this point, the working alignment runs parallel on the west side of SR 57, past the Towns of Mackey and Oakland City and across the Patoka River. The working alignment then crosses SR 57 and continues parallel on the east side of SR 57. The working alignment passes east of the Town of Petersburg and then crosses the East Fork of the White River as it enters Daviess County. This area is primarily rural with scattered residences and farms. As can be seen from the Table 5.3-5, 5.3-6, and 5.3-7, this alternative will require the acquisition of 63 to 75 homes between I-64 and US 50 in Daviess County. Approximately 6 of these homes appear to be part of large working farms whose farming livelihood could be negatively impacted by this alignment.

Just south of US 50 near Washington, Indiana Alternative 3 splits to provide four variations around the City of Washington. From a relocation standpoint, the different routes around Washington do not have large differences in the total number of residential or business relocations. The East Route will require approximately 6 additional residential relocations compared to the West and Far East routes. The Far West Route will require approximately 3 additional residential relocations compared to the West and Far East routes.

The four different routes around Washington will have varying effects upon the Amish and Mennonite communities. The East and Far East routes will have the greatest impacts with farm

acreage acquired from five Amish properties and two Mennonite properties. One Amish residence would be acquired along with the associated farm buildings. The West route would split at least two Amish farms, while the Far West route is not expected to impact the Amish community.

Daviess County has approximately 625 Amish families living within its boundaries, primarily in the area between Montgomery and Odon. Greene County also has a cluster of Amish families living near the Worthington area. This area has a variety of Amish businesses including buggy shops, quilt shops, restaurants, craft stores, and woodworking shops. The East and Far East routes around Washington for Alternatives 3 and 4 will have the greatest impact to the Amish community. Access will be provided to the Amish community so that community disruption can be kept to a minimum.

The variations around Washington converge near the Town of Elnora, where Alternative 3 continues to the northeast toward Bloomington. After crossing SR 45 near the Town of Cincinnati, Alternative 3 splits with Alternatives 3A and 3B heading north and Alternative 3C heading to the northeast toward SR 37.

Alternative 3A proceeds to the northeast where it crosses SR 46 just southeast of the Town of Ellettsville. The area between Ellettsville and Bloomington is a more densely populated area than much of the corridor. There is also a good deal of commercial development along SR 46. A proposed interchange at SR 46 would likely take approximately 14 businesses, many of which are located at Jack's Defeat Creek Strip Mall on the south side of SR 46. There are also over 30 homes in this area that will likely be acquired.

Alternative 3A and 3B will require the acquisition of a portion of a mobile home park with about 17 mobile homes near SR 48. In the Ellettsville area, Alternative 3A would also cut through a neighborhood near SR 46, where an interchange is proposed.

Alternative 3A crosses north through a rural area with scattered residences, crossing the White River and combining with the north leg of Alternatives 2B and 4B near Paragon. The alignment then continues north through a rural area and intersects I-70 just east of the Little Point interchange. It is estimated that right-of-way and relocation costs for alignment 3A will run between $90,622,000 and $92,892,000. Table 5.3-5 shows the estimated relocations for Alternative 3A.

Table 5.3–5: Relocation Estimates Alternative 3A

Section	Residences	Businesses	Multi-Family	Churches
I-64 to US 50 in Washington	63 to 75	3 to 4	0	1 to 2
US 50 to US 231 near Crane	20 to 29	0	0	0
US 231 to SR 46 near Elletsville	89	14	0	0
SR 46 near Elletsville I-70 in Morgan County	43	0	0	0
TOTAL	215 to 236	17 to 18	0	1 to 2

Alternative 3B curves to the northeast just north of SR 48 and would intersect the relocated SR 46 (currently under construction), just west of SR 37. The new facility would then cross over SR 37 and curve north running along the east side of SR 37 for a short distance before converging with SR 37 near

Kinser Pike. This working alignment would require the acquisition of three large churches on the east side of SR 37 and would cut through the back parking lot of Ivy Tech on the west side of SR 37. This alternative then follows the SR 37 alignment north to I-465.

The loss of access resulting from upgrading SR 37 to an Interstate will create particular problems in the area between Bloomington and Martinsville. There are several drives with 5 to 7 homes that have their only access point on SR 37. Some of the larger businesses such as Worms Way Garden Center and Oliver Winery will also lose access. The current access drive for Oliver Winery also provides access to Windsor Estates, which has 40 to 50 upscale homes. Due to terrain conditions and the distance to other roadways, it will be difficult to provide some type of access at this location. For purposes of this study, it is assumed that these properties would be acquired. If this corridor is eventually selected as the preferred alternative, further studies would be conducted in Tier 2 NEPA study to further evaluate the possibility and cost of providing access at this location and thus avoiding the taking of these properties. If access cannot be provided to Oliver Winery, it might be difficult to find a replacement site for this unique business.

Another access problem will occur at Legendary Hills Subdivision. This subdivision, with as many as 100 homes, is located just north of Liberty Road and south of SR 39. It has a single access point on SR 37. It is proposed that access will be provided to this subdivision via a new 4,400-foot access road running south from Legendary Hills to Liberty Road.

Alternative 3B follows the same route north along SR 37, with the same optional alignments as Alternatives 2C, 3C, 4C, and 5B. A detailed description of the relocation impacts between Martinsville and I-465 can be found under the description of Alternative 2C. Total estimated right-of-way and relocation costs for 3B are between $191,503,000 and $205,154,000.

Table 5.3–6: Relocation Estimates Alternative 3B

Section	Residences	Businesses	Multi-Family	Churches
I-64 to US 50 in Washington	63 to 75	3 to 4	0	1 to 2
US 50 to US 231 near Crane	20 to 29	0	0	0
US 231 to SR 46 near Elletsville	70	1	0	0
SR 46 near Elletsville to SR 39/SR 37 in Martinsville	85 to 135	14	4	3
SR 39 in Martinsville to I-465 in Indianapolis	108 to 175	25 to 48	4	2 to 3
TOTAL	346 to 484	42 to 66	5	6 to 8

As previously described, Alternative 3C splits from 3A and 3B soon after crossing SR 45 near the small Town of Cincinnati. The alignment then continues to the northeast where it intersects SR 37 south of Bloomington. Alternative 3C would cross some heavily wooded terrain with scattered clusters of homes. There is one small subdivision south of Evans Road where approximately 11 homes would lose access. There is also a cluster of 12 homes southeast of the intersection of Koontz and Rockport Road that would lose access. These homes would either have to be acquired or be provided a new access road.

Alternative 3C then converges with SR 37 just north of Victor Pike and south of Bloomington. The proposed I-69 would then utilize the SR 37 right-of-way, with additional right-of-way required at

proposed interchange locations. In the area from Victor Pike (south of Bloomington) to SR 39 (south of Martinsville) there are as many as 146 homes and 22 businesses that may need to be acquired due to lost access and actual right-of-way acquisition. In particular, a proposed interchange at Fullerton Pike would require the acquisition of several businesses including a boat dealership and golfcart sales business. Interchanges at Kinser Pike and Sample Road would require several residential relocations. It is also likely that residences will be acquired at some of the grade separations such as Rockport Road, Tapp Road, Vernal Pike, Chambers Pike (CR 940N), and Liberty Road.

Table 5.3-7: Relocation Estimates Alternative 3C

Section	Residences	Businesses	Multi-Family	Churches
I-64 to US 50 in Washington	63 to 75	3 to 4	0	1 to 2
US 50 to US 231 near Crane	20 to 29	0	0	0
US 231 to SR 37 south of Bloomington	33	1	0	0
Bloomington to SR 39/SR 37 in Martinsville	146	22	4	1
SR 39 in Martinsville to I-465 in Indianapolis	108 to 175	25 to 48	4	2 to 3
TOTAL	370 to 458	51 to 75	5	4 to 6

As previously described for Alternative 3B, the loss of access resulting from upgrading SR 37 to an Interstate will create particular problems in the area between Bloomington and Martinsville. The impacts to Oliver Winery, Worms Way Garden Center and Windsor Estates would be further evaluated during Tier 2 NEPA studies.

From SR 39 in Martinsville to I-465 in Indianapolis, Alternative 3C follows the SR 37 alignment north to I-465. Alternative 3C follows the same route north along SR 37, with the same variations as Alternatives 2C, 3B, 4C, and 5B. A detailed description of the relocation impacts between Martinsville and I-465 can be found under the description of Alternative 2C. The total approximate cost for right-of-way and relocation for Alternative 3C is between $219,500,000 and $233,152,000. Table 5.3-7 shows the estimated relocations for this alternative.

Alternative 4

Alternative 4 primarily combines the southern section of Alternative 3 (from I-64 to Elnora), with the northern section of Alternative 2 (from Switz City to either I-70 or I-465). The southern portion of Alternative 4 from I-64 to Elnora is the same as previously described for Alternative 3. It parallels SR 57 either on the east or west side, and has the same four variations around the City of Washington. Just north of Elnora, Alternative 4 diverges from Alternative 3 and continues to the north crossing the White River and then crossing SR 67 just north of Lyons. Alternative 4 then combines with the previously described Alternative 2 alignment near SR 54, just west of Switz City. The area between Elnora and Switz City, where Alternative 4 is on its own alignment, is primarily agricultural with scattered residences to be acquired along the alignment.

North of SR 54, Alternative 4A, 4B and 4C are exactly the same as Alternative 2A, 2B and 2C. The route parallels SR 67 on a northeasterly alignment and then splits north of Spencer where the 4A alignment heads north and intersects I-70 just east of Cloverdale. Alternative 4B splits near Paragon and proceeds to the north where it intersects I-70 just east of the Little Point interchange. Alternative 4C continues east of Paragon and combines with SR 37 just south of Martinsville. The total estimated right-of-way and relocation cost for Alternative 4A is between $78,056,000 and $80,791,000. The right-of-way and relocation cost for Alternative 4B is between $86,319,000 to $90,811,000 and the cost for Alternative 4C ranges from $177,799,000 to $193,673,000. Tables 5.3-8, 5.3-9, and 5.3-10 show the relocation estimates for Alternative 4A, 4B, and 4C, respectively.

Table 5.3–8: Relocation Estimates Alternative 4A

Section	Residences	Businesses	Multi-Family	Churches
I-64 to US 50 in Washington	63 to 75	3 to 4	0	1 to 2
US 50 to SR 46 in Spencer	58 to 67	5	0	0
SR 46 in Spencer to I-70 near Cloverdale	22 to 26	0	0	0
TOTAL	143 to 168	8 to 9	0	1 to 2

Table 5.3–9: Relocation Estimates Alternative 4B

Section	Residences	Businesses	Multi-Family	Churches
1-64 to US 50 in Washington	63 to 75	3 to 4	0	1 to 2
US 50 to SR 46 in Spencer	58 to 67	5	0	0
SR 46 in Spencer to I-70 in Morgan County	37	3	0	0
TOTAL	158 to 179	11 to 12	0	1 to 2

Alternative 5

Alternative 5 begins at the same point (I-64 and SR 57) as Alternatives 3 and 4. The alignment is the same as previously described for Alternative 3 from I-64 to a point just south of the City of Washington. From a point near SR 257, Alternative 5 splits from Alternatives 3 and 4 and continues to the east-northeast on a route parallel to US 50. Alternative 5 passes just south of the Town of Montgomery where it cuts through several farm fields that appear to be owned by Amish or Mennonite families.

Table 5.3–10: Relocation Estimates Alternative 4C

Section	Residences	Businesses	Multi-Family	Churches
1-64 to US 50 in Washington	63 to 75	3 to 4	0	1 to 2
US 50 to SR 46 in Spencer	58 to 67	5	0	0
SR 46 in Spencer to SR 39/SR37	15 to 19	2	0	0
SR 39 in Martinsville to I-465 in Indianapolis	108 - 175	2	4	0
TOTAL	247 to 336	35 to 59	4	3 to 5

Between Montgomery and Loogootee, Alternative 5 crosses US 50 where an interchange is proposed. The working alignment then proceeds to follow a route parallel to US 50 on the north side, until intersecting with SR 37 in the City of Bedford. The area between Montgomery and Bedford is an area of transition from flat agricultural land around Montgomery to a hilly, forested area in the vicinity of Loogootee. The working alignment will require the acquisition of scattered rural residences in the area between Montgomery and Bedford. It also crosses through the Martin State Forest after crossing the East Fork of the White River. As Alternative 5 gets closer to Bedford the density of homes increases and therefore the number of relocations is higher near the point where the proposed I-69 intersects SR 37.

Alternative 5 then converges with SR 37 utilizing the existing SR 37 right-of-way from Bedford to Martinsville. The loss of access and the need for right-of-way for interchange locations along SR 37 will cause a fairly high number of residential and commercial relocations in the Bedford area. Commercial relocations may include three restaurants, a Motel 8, and a service station/convenience store. There are also several apartment buildings and 2 churches that may be acquired. There is a subdivision just north of Oolitic with a single access drive onto SR 37. The Woods Subdivision contains approximately 75 to 100 homes. For the purposes of this study, it is proposed that a frontage road or access road will be constructed to avoid the acquisition of these homes. If this route is selected as a preferred alternative, a more detailed study of access requirements will be included with the Tier 2 NEPA studies.

Table 5.3–11: Relocation Estimates Alternative 5A

Section	Residences	Businesses	Multi-Family	Churches
1-64 to SR 257 near Washington	66 to 75	3 to 4	0	1 to 2
SR 257 to SR 37 in Bedford	51	2	0	0
SR 37 in Bedford to Sample Road north of Bloomington	96	28	6	2
Sample Road to SR 39/SR 67 near Martinsville	85 to 135	20	1	0
SR 39 / SR 67 to I-70 near Monrovia	62	0	0	0
TOTAL	360 to 419	53 to 54	7	3 to 4

Alternative 5 continues north through Bloomington, joining Alternative 3 just north of a proposed interchange at Victor Pike. From this point, Alternative 5 continues to a point just south of SR 39 and Martinsville, where Alternative 5A diverges from SR 37 and heads to the north. The route then runs somewhat parallel to SR 39, crossing SR 42 just east of Monrovia and continuing north to intersect I-70 just east of the existing Monrovia interchange. There are scattered residences, one garden center and one church that will potentially be relocated in this area. Total right-of-way and relocation costs for Alternative 5A are between $206,612,000 to $208,155,000. Table 5.3-11 shows the relocation estimates for Alternative 5A.

Alternative 5B continues along SR 37 through Martinsville and on to I-465 with the variations previously described under Alternative 2C. The estimated right-of-way and relocation costs for Alternative 5B range from $216,527,000 to $229,451,000. Table 5.3-12 shows the estimated relocations for Alternative 5B.

Under the No-Build Alternative, there will be no social impacts.

5.3.4 Available Housing and Commercial Sites

The relocation impacts from all of the alternatives under consideration are spread over a very large geographic area. The number of residential relocations increases considerably when the alignment is close to any of the major population centers. Commercial properties are most heavily affected by any alternative that utilizes US 41 or SR 37.

Table 5.3–12: Relocation Estimates Alternative 5B

Section	Residences	Businesses	Multi-Family	Churches
1-64 to SR 257 near Washington	66 to 75	3 to 4	0	1 to 2
SR 257 to SR 37 in Bedford	51	2	0	0
SR 37 in Bedford to Sample Road north of Bloomington	96	28	6	2
Sample Road to SR 39/SR 67 near Martinsville	56 to 106	14	1	0
SR 39 in Martinsville to I-465 in Indianapolis	108 to 175	25 to 48	4	2 to 3
TOTAL	377 to 503	72 to 96	11	3 to 5

The single-family homes to be acquired by the various alternatives represent a wide range of values. It does not appear that any alternative under consideration will disproportionately impact low-income populations or minorities. The following information was taken from multiple listing services and local publications to determine the availability of replacement housing in the various counties that are potentially impacted by the I-69 corridor. Generally, about 75% of the homes on the market are 3 bedroom homes with 2, 4, and 5 bedroom homes making up the remainder. It appears that there is sufficient available housing to accommodate the expected number of relocations, especially if the right-of-way acquisition takes place over an extended period of time. Table 5.3-13 shows the available housing in the project area during the spring of 2002.

Table 5.3–13: Available Housing

County	Residential $0 - $75,000	Residential $75,000 – 150,000	Residential $150,000 – 250,000	Residential $250,000 and up
Daviess	140	78	21	1
Gibson	69	37	23	9
Greene	139	75	10	1
Johnson (White R. Twp)	2	114	121	92
Knox	194	61	24	16
Lawrence	130	126	240	7
Marion (Decatur Twp.)	26	142	14	3
Marion (Perry Twp.)	30	384	78	18
Martin	37	15	5	
Monroe	76	402	200	102
Morgan	44	302	168	62
Owen	37	70	15	5
Pike	52	47	9	
Putnam	72	156	66	10
Sullivan	102	38	3	1
Vigo	348	261	86	50

The availability of commercial real estate varies throughout the corridor. There were approximately 250 available commercial sites available in the Indianapolis area with prices ranging from $50,000 to

$11,000,000. The Terre Haute area had approximately 50 commercial sites available with prices ranging from $70,000 to nearly $3 million. The Bloomington/Bedford area had about 50 commercial sites available with prices ranging from $100,000 to $9.5 million. Greene and Daviess County had approximately 30 available sites ranging from $25,000 to $300,000. The Knox County/Vincennes area had approximately 60 commercial sites ranging from $30,000 to over $500,000.

In general there appears to be adequate availability of commercial property available, but any alternative that utilizes US 41 or SR 37 will reduce the number of available commercial properties as access is eliminated. The Fort Branch and Farmersburg areas will be especially hard hit by business losses if US 41 is upgraded through these towns. It is doubtful that all of these businesses could find adequate replacement sites although the new interchange locations would provide opportunity for some of these businesses. The Martinsville area and to some degree, the Bloomington area might also incur permanent losses in business activity if access points are eliminated.

5.3.5 Mitigation

The mitigation of negative social impacts can be accomplished in the same way as relocation impacts are mitigated. Where reasonable, impacts to neighborhoods and subdivisions can be reduced through the use of frontage and access roads to maintain access to specific properties that are impacted by I-69 construction. Rights-of-way will be minimized, where reasonable, in urbanized areas.

Table 5.3–14: Total Relocations for each Alternative

Alternative	Residences	Businesses	Multi-family	Churches
1	264 - 335	70-131	0	2 -4
2A	179 - 240	29 - 63	0	0 - 1
2B	194 - 251	32 - 66	0	0 –1
2C	280 – 408	56 - 113	4	2 – 3
3A	215 - 236	17 - 18	0	1 – 2
3B	346 - 484	42 - 66	4	6 - 8
3C	370 - 458	51 - 75	5	4 - 6
4A	143 – 168	8 – 9	0	1 - 2
4B	158 - 179	11 - 12	0	1 - 2
4C	247 - 336	35 - 59	4	3 - 5
5A	360 - 419	53 - 54	7	3 - 4
5B	377 - 503	72 - 96	11	3 – 5

No known or unique relocation situations are anticipated. 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 Relocation Act, then housing of last resort will be made available to these persons. Replacement dwellings must meet the requirements of decent, safe, and sanitary standards as established by FHWA.

Table 5.3-15: Total Right-of-Way Acquisition Costs for each Alternative

Alternative	Right-of-Way and Relocation Costs
1	$128,888,000 - $172,834,000
2A	$111,779,000 - $124,099,000
2B	$121,042,000 - $148,762,000
2C	$212,522,000 - $251,624,000
3A	$ 90,622,000 - $ 92,892,000
3B	$191,503,000 - $205,154,000
3C	$219,500,000 - $233,152,000
4A	$ 78,056,000 - $ 80,791,000
4B	$ 86,319,000 - $ 90,811,000
4C	$177,799,000 - $193,673,000
5A	$206,612,000 - $208,155,000
5B	$216,527,000 - $229,451,000

Relocation resources would be available to all residential relocates without regard to race, creed, color, sex, national origin, or economic status, as required by

the Uniform Act and Title VI of 1964. Financial assistance will 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.

5.3.6 Summary

Tables 5.3-14 and 5.3-15 represent a comparison of the total number of relocations and right-of-way acquisition costs for the various build alternatives.

As can be seen from the table, Alternatives 2A, 2B, 3A, 4A and 4B will have the fewest relocation impacts. These alternatives avoid the heavily populated areas around Indianapolis, Terre Haute and Bloomington. The greatest impacts from a relocation standpoint will occur with Alternatives 2C, 3B, 3C, 5A and 5B, all of which utilize portions of SR 37 and have a northern terminus point at I-465. The cost table reflects this conclusion. The No-Build alternative will have no impacts on social resources.

Figure 5.3-1 shows high relocation areas within the Study Area.

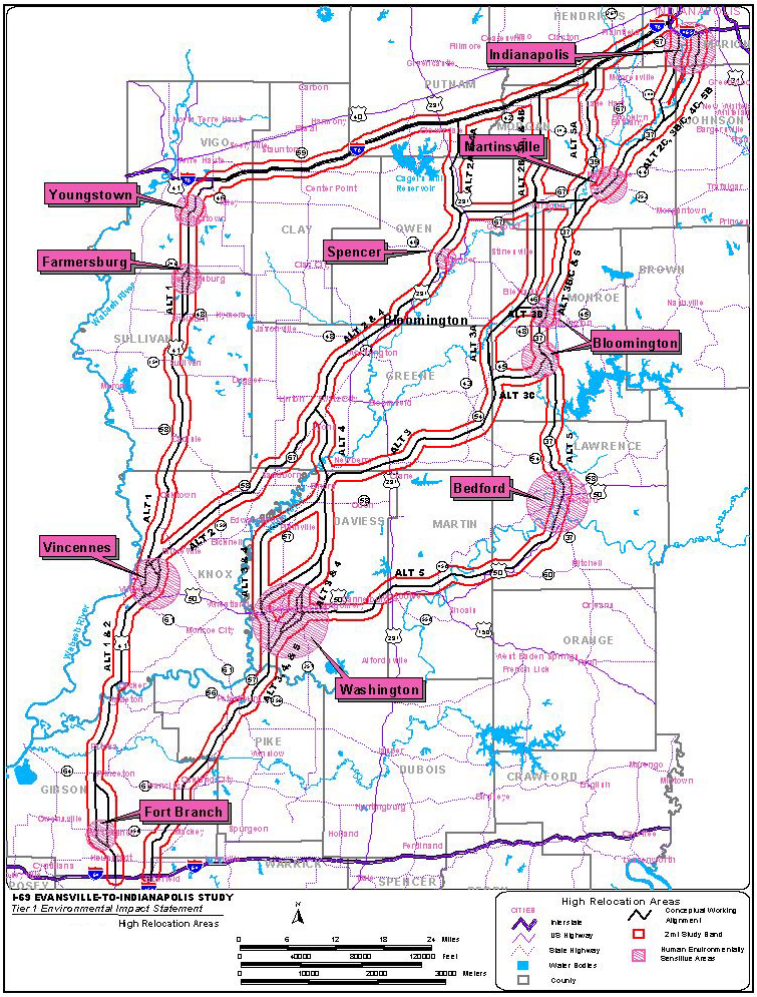


Figure 5.3-1: High Relocation Areas

5.4 Environmental Justice

5.4.1 Introduction

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The executive order states that *"each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."* Pursuant to the executive order, FHWA has adopted *FHWA Order 6640.23, FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* December 2, 1998.

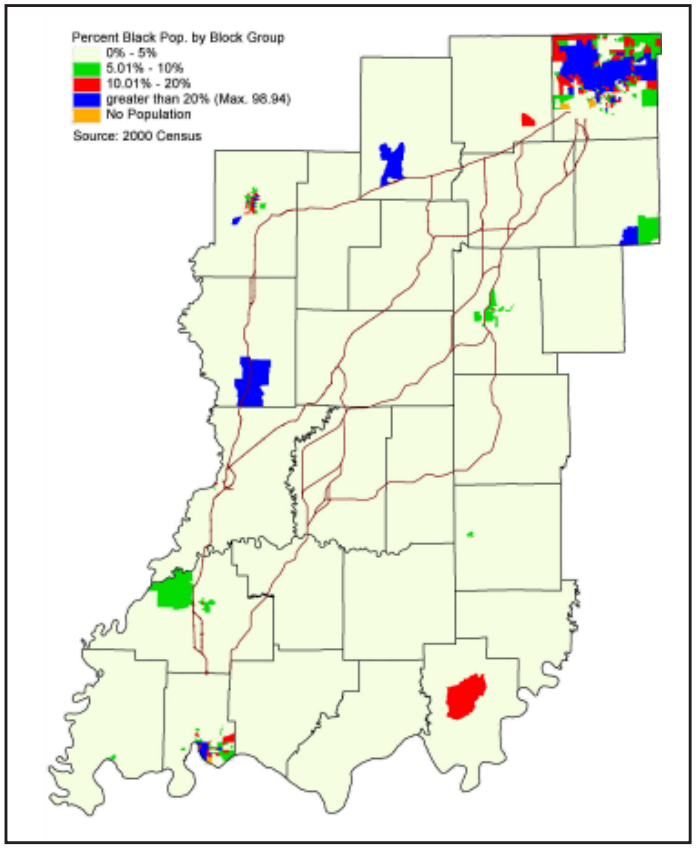


Figure 5.4-1: Percentages of Black Populations by Census Block Group, 2000 Census

5.4.2 Methodology

Compliance with environmental justice requirements was assessed by identifying and analyzing minority and low-income populations within the 26-county Study Area. The following information and statistics were taken from The U.S. Census Bureau's 2000 Census and the Federal Highway Administration's (FHWA) Environmental Justice web page.[1] Based on information from the census, minority and low-income populations were mapped using the GIS to identify the specific locations in which these populations existed[2]. For more information on the use of the GIS and on the methodology, see Section 4.1 and 5.1 respectively. As noted previously in the DEIS, groups of low-income populations are located throughout the Study Area. Minority populations also exist throughout the Study Area; however, these populations are more concentrated (mainly in the larger cities) than the low-income populations. In Tier 2, a more detailed analysis of minority and low-income populations will be included to determine specific effects to these populations.

5.4.3 Minority Populations

Under FHWA Order 6640.23, the following minoity populations must be addressed in an analysis in Environmental Justice issues:

1 Source: Federal Highway Administration Environmental Justice web page (www.fhwa.dot.gov/environment/ej2000.htm).

2 Because the 2000 Census information for income was not available as of May 2002 (scheduled release date is August/September 2002), 1990 Census data was used for low-income information. Race information, however, was available for the 2000 Census, and is used in this analysis. When the 2000 Census income information becomes available, the income information will be updated in the FEIS.

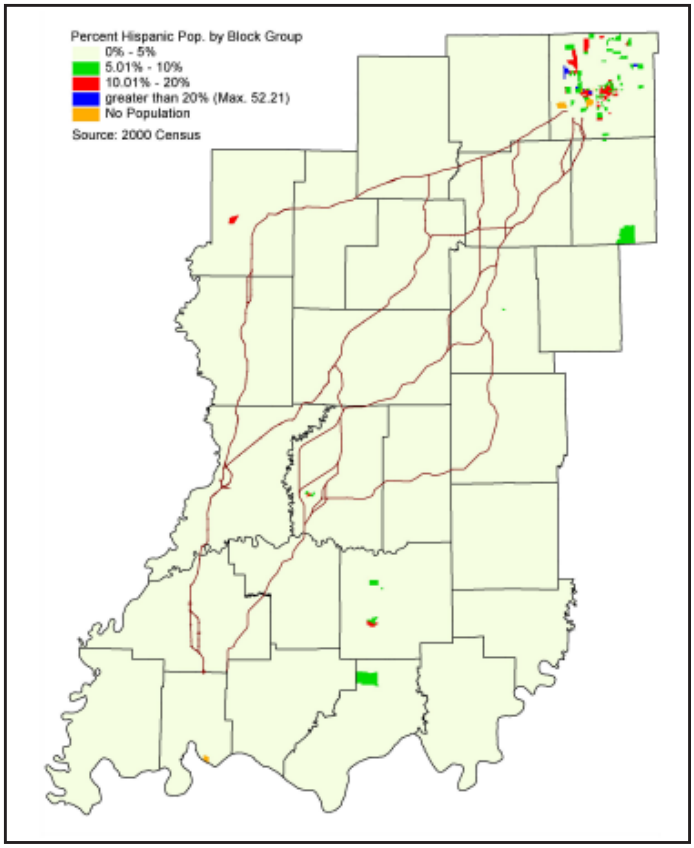


Figure 5.4-2 : Percentages of Hispanic Populations by Census Block Group, 2000 Census

Black - a person having origins in any of the black racial groups of Africa.

Hispanic - a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

Asian - a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.

American Indian and Alaskan Native - a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition.

Native Hawaiian or Other Pacific Islander - a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

The total number of each of the five minority groups in each block group within the Study Area was divided by the total population in that block group and multiplied by 100 to create a percentage. Figures 5.4-1 through 5.4-5 show the Study Area with the proposed alternatives and the percentage of each of the five minority groups by block group. On each figure, the maximum percentage of that minority group is noted in the legend. The maximum percentages of Black, Asian and Hispanic populations are larger in the Study Area than the American Indian/Alaskan Native and Native Hawaiian/Other Pacific Islander population percentages. The highest concentrations of Black populations can be found in Marion, Putnam, and Sullivan counties. Marion County also houses the highest concentrations of Hispanic, Asian, and American Indian and Alaskan Native populations.

5.4.4 Low-income Populations

Low-income populations consist of those people living below the poverty level, as defined in the U.S. Department of Health and Human Services Poverty Level Guidelines. Poverty by age data was used to determine overall poverty levels. For each block group, each age group (from 0 to 75+) of those living in poverty was added together, divided by the total block group population, and turned into a percentage. Figure 5.4-6 shows the 26-county Study Area with the proposed alternatives and the percentage of those living in poverty in each block group. The maximum percent of persons living in poverty in the Study Area is noted in the legend. The highest concentrations of poverty are found in Johnson, Knox, Marion, Vanderburgh, and Vigo counties. It should be noted that some block groups had no population and are identified on Figure 5.4-6 accordingly. Other block groups had populations in which no person or persons qualified as living in poverty and are shown on Figure 5.4-6 as 0%.

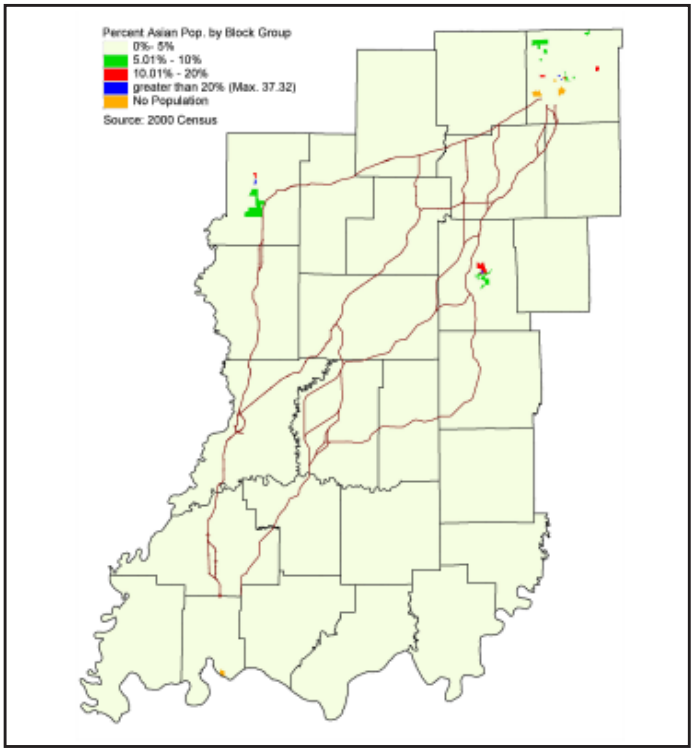


Figure 5.4-3: Percentages of Asian Populations by Census Block Group, 2000 Census

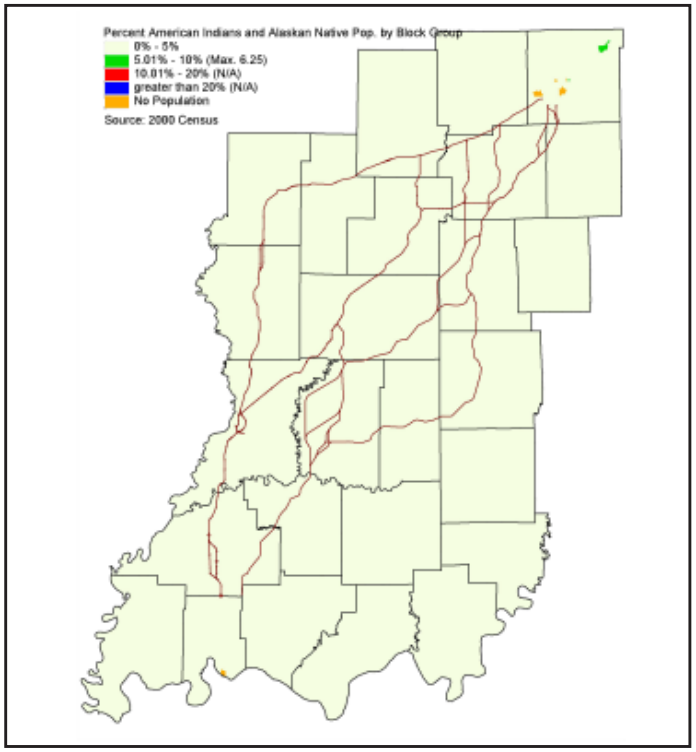


Figure 5.4-4: Percentages of American Indian and Alaskan Native Populations by Census Block Group, 2000 Census

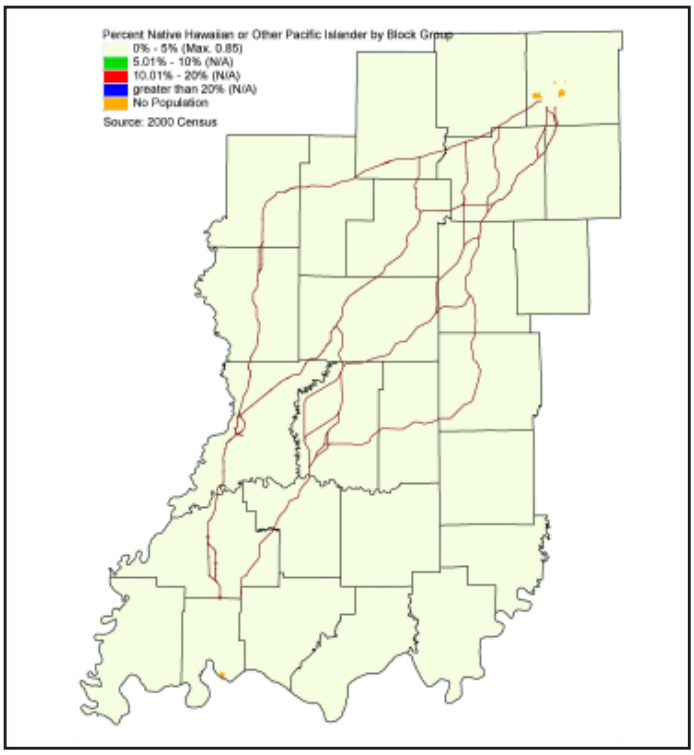


Figure 5.4-5: Percentages of Native Hawaiian or Other Pacific Islander Populations by Census Block Group, 2000 Census

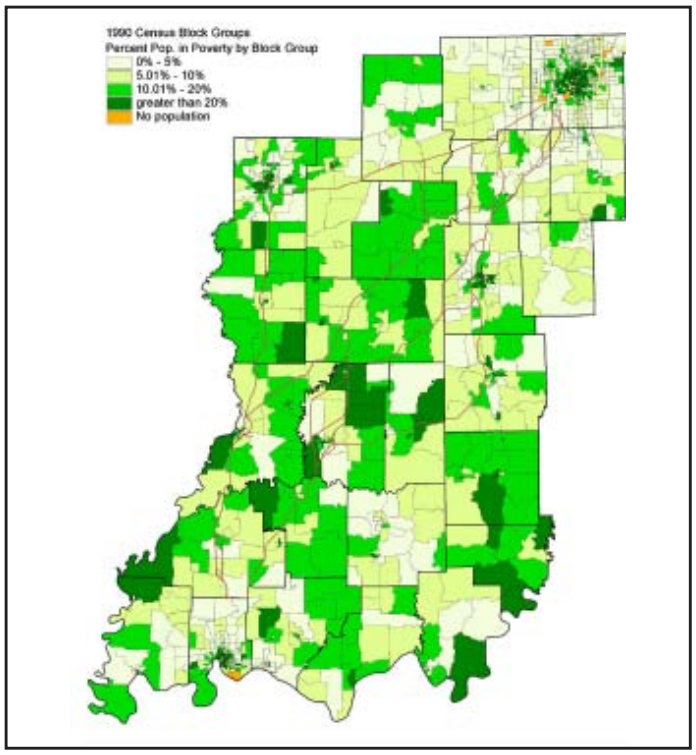


Figure 5.3-6: Percentages of the Population in Poverty by Block Group

5.4.5 Summary

After completing the initial environmental justice review, it was determined that none of the alternatives would have a disproportionately high and adverse effect on minority and low-income populations in the Study Area.

5.5 Economic Impacts

5.5.1 Introduction

Regional economics plays a large role in this DEIS. The relatively poor state of economic growth in Southwest Indiana is one of the identified needs for the project, as described in Section 2.3.2 of Chapter 2, *Purpose and Need*. Supporting regional economic development in Southwest Indiana is one of the goals of the project. Accordingly, as described in Section 3.4.4 of Chapter 3, *Alternatives,* a variety of economic measures have been used in the analysis of alternatives (e.g., net change in annual disposable income, employment growth, employment in high-paying industries). The indirect impact of economic growth associated with the alternatives is also discussed in Chapter 5, Section 5.2, *Land Use Impacts*. In order to comprehend the full economic impacts of I-69, both beneficial and adverse, all of these sections of the DEIS should be read.

This section focuses on one particular aspect of the project's economic impacts: the impacts of the alternatives on businesses that are dependent on pass-by traffic. Two effects are examined. These are:

- **Nearby Business Impacts** which relate to the effects of the alternatives *on abutting businesses*, and
- **Remote Business Impacts** which related to the effects of the alternatives *on remote businesses along US 41 and SR 37*.

Following the methodology section, the results of these two analyses are reported in separate sections.

5.5.2 Methodology

5.5.2.1 Methodology for Nearby Business Impacts

The Nearby Business Impacts focuses on the potential change in sales for businesses abutting the route of each alternative. The measure accounts for two potentially offsetting effects:

- **Access restrictions** – Businesses along a two-lane or four-lane highway that is converted to a limited-access highway may experience losses in sales because access from passing traffic is made more difficult.
- **Increased traffic** – Businesses along the new limited-access freeway may experience gains in sales because of increases in pass-by traffic volumes.

The specific impact on abutting businesses will depend heavily upon the actual alignment of the new freeway as well as the location of interchanges. Since these are not yet precisely known, two distinct scenarios have been evaluated. These scenarios are:

- **Adjacent Scenario** - Assumes the new freeway is built directly adjacent to existing two-lane roads such as SR 57 or US 231 (i.e., the existing highway serves as a "frontage road"). Busineses sales may increase from the additional traffic brought by the freeway, although

these benefits are tempered by the fact that access for this traffic is restricted. These conditions also apply when four-lane highways, including US 41 and SR 37, were assumed to be rebuilt to Interstate standards along the same alignment. Therefore, the impact on businesses along the segment would be an increase in pass-by traffic volume combined with a decrease in access.

- **Non-Adjacent Scenario** Assumes the new freeway is built at enough of a distance (1/4 mile away or more) from the existing road that businesses will not benefit from increased traffic volume on the freeway. The primary impact on business sales will be due to a diversion of traffic from the existing roadway to the parallel facility.

The impacts on specific business will vary based on the dependence of the business on pass-by traffic. Gas stations and convenience stores, for example, are heavily dependent upon pass-by traffic and may benefit from greater traffic volumes but also may be impacted more by access restrictions. More specialized stores are less dependent on highway visibility. Specific business impacts may also vary widely depending upon other factors, such as the local population base served.

The methodology to estimate impacts on nearby businesses of the proposed I-69 project was based on research conducted for National Cooperative Highway Research Program Project 25-4[1], as follows:

- Businesses along each of the state highways that is within the study band of any alternative (e.g., US 41, SR 57, SR 67, US 231, SR 37) were inventoried and classified into eight establishment types with common characteristics, including their dependence on pass-by traffic. The percentage change in business sales due to reduced highway access was calculated for each establishment type based on the relative importance of convenient customer access to each type of business.
- The percent change in business sales due to increased or decreased average daily traffic volume was calculated for establish type based on the percent change in traffic volume along each route segment adjusted for the relative dependence of each type of business on pass-by traffic.
- Finally, the percentage change in business sales due to access restrictions and the percentage change in business sales due to changes in traffic volume were combined to determine an overall percentage impact on sales for each type of business along the proposed alignment.

For all of these analysis steps, data were first analyzed at the county level, and the resulting impacts were then aggregated to produce corridor-level results.

5.5.2.2 Methodology for Remote Business Impacts

In addition to impacts on abutting businesses, the potential impacts on businesses located on segments of US 41 and SR 37 were estimated for those alternatives in which they were not part of a corridor alternative. These are referred to as Remote Business Impacts. In this analysis, the same NCHRP methodology referenced above was used, assuming that the only change to the two relevant corridors (US 41 and SR 37) was the forecasted traffic volume that would use these highways after the alternative being analyzed is built.

[1] Highway Access Restriction Eliminator (HARE) model version 3.0, by Glen Weisbrod, December 1997

5.5.3 Analysis of Results

The results of the Nearby and Remote business impacts are reported separately in the following sections.

5.5.3.1 Nearby Business Impacts

The anticipated range of impacts on local business sales is reported in Table 5.5-1. Negative numbers represent a decrease in sales. Positive numbers represent an increase. Alternatives 2C, 3B, 3C, and 5B are expected to generate increased local business sales as a result of the I-69 project, in both the adjacent and non-adjacent alignment scenarios. All four of these alternatives would utilize a portion of SR 37 between Bloomington and Indianapolis, which is expected to experience a significant increase in traffic volume if the new freeway were built. All of the other alternatives are expected to have negative impacts on local business sales under the non-adjacent scenario (i.e., if the new freeway is built at a distance from the existing road). The highest level of negative impact is expected for Alternative 4A and 4B due to the volume of traffic being diverted from the SR 37 corridor and the high level of retail sales in that corridor.

With the exception of Alternative 1, all of the alternatives are expected to experience positive impacts on local business sales if the proposed new freeway were built adjacent to the existing road. Alternative 1 is unique in that I-69 would make use of the existing alignment of US 41 throughout nearly all of its length from Evansville to Terre Haute. Accordingly, Alternative 1 does not have a separate non-adjacent scenario. US 41 would be rebuilt to Interstate standards under Alternative 1, thereby restricting traffic access and negatively impacting business sales in both the distant and adjacent scenarios. In this case, the increase in traffic along the existing US 41 corridor would not be of a magnitude sufficient to offset access restrictions.

To put these dollar values in perspective, the total estimated Study Area sales are about $11.3 billion dollars. The levels of impact range from 0.1 percent to 2.6 percent of that value.

5.5.3.2 Remote Business Impacts

The potential impacts on businesses located on segments of US 41 and SR 37 were also estimated under the assumption that those roads were not part of a corridor alternative. These remote business impacts reflect the potential change in sales caused by reductions in traffic volumes on these highways resulting from shifts in overall traffic patterns caused by the I-69 project. In most cases, minor losses in sales for businesses affected by pass-by traffic may be anticipated, since some traffic will be diverted to the new highway. As would be expected, routing alignments that completely avoid a given corridor are expected to produce the most significant drop in sales for existing businesses along that corridor (see Table 5.5-2).

5.5 Summary

This analysis of Nearby Business Impacts presents two sets of values corresponding to different assumptions about the proximity of the alternatives in relation to existing highways. The wide range of values reflects two extreme conditions: one in which the projects would be adjacent to all businesses in the corridor and the other in which the projects would be located at least 1/4 mile away

from all businesses in the corridor. It should also be noted that the level of detail in the current analysis of these alternatives is not sufficient to distinguish the local business impacts of specific routing decisions, such as bypasses around Washington.

Given these caveats, it was found that the level of impacts on local businesses might range in size from 0.1 percent to 2.6 percent of total Study Area sales. The SR 37 routing option as an approach to Indianapolis usually results in more positive impacts to local business sales than other options. Assuming the same alignment as the existing four-lane highway, the positive impact of increased traffic volumes would outweigh the negative impact of restricted access.

As might be expected, businesses dependent on pass-by traffic on US 41 and SR 37 would be negatively impacted by alternatives that divert traffic away from these corridors. The analysis probably represents a worst-case condition since the methodology does not take into account such variables as customer loyalty or the composition of pass-by traffic. For example, a gas station that relies mostly on local customers may experience very little impact. Moreover, the construction of I-69 is likely to take place over many years with traffic volume changes happening very gradually. Most businesses tend to adapt to changes in market conditions. These kinds of adaptations are not reflected in this analysis. As a result, the actual impacts are likely to be somewhat lower than the forecasts reflected in this analysis.

Table 5.5-1: Range of Impacts on Local Business Sales

	Level of Impact (Millions of 2001 Dollars)	
Alternative	Non-Adjacent	Adjacent
1	($7.3)	($7.3)
2A	($22.1)	$202.2
2B	($60.0)	$169.8
2C	$33.8	$271.4
3A	($73.2)	$175.0
3B	$18.3	$272.8
3C	$35.9	$297.6
4A	($134.4)	$185.4
4B	($122.3)	$186.5
4C	($18.4)	$279.0
5A	($63.5)	$161.9
5B	$15.3	$235.7

Table 5.5-2: Estimated Impacts on Remote Business Sales

	Remote Business Impacts (Millions of 2001 Dollars)	
Alternative	US 41	SR 37
1	-	($2.0)
2A	($14.0)	($4.0)
2B	($14.0)	($8.8)
2C	($13.9)	$0.3
3A	($24.2)	($19.7)
3B	($24.0)	($14.1)
3C	($21.0)	$2.3
4A	($27.1)	($3.4)
4B	($26.6)	($9.7)
4C	($25.9)	$0.2
5A	($19.3)	($29.0)
5B	($19.0)	-

5.6 Joint Development

The subject of this Tier I EIS is the Evansville-to-Indianapolis section of the National I-69 project. The Evansville-to-Indianapolis section has been designated as Segment of Independent Utility No. 3 in the National I-69 project. The segment of I-69 immediately south of this project will connect Evansville to Henderson. The Evansville-to-Henderson section of I-69 is designated as Segment of Independent Utility No. 4. The southern terminus of the Evansville-to-Indianapolis section is located at I-64 just north of Evansville. The Evansville-to-Henderson section will run from I-64 south to the Breathitt (Pennyrile) Parkway in Kentucky (see Figure 5.6-1)

The *I-69 Evansville to Henderson Engineering Assessment and Environmental Impact Statement* is presently underway for the Evansville-to-Henderson section. In June of 2002, the *Level 1 Alternatives Analysis Report* for I-69 from Evansville to Henderson was issued. Out of eleven (11) initial corridors, the report selected three (3) corridors for further engineering and environmental examination in the Level 2 analysis, along with the No-Build (or no action) alternative. The three remaining build alternatives (Figure 5.6-1) are:

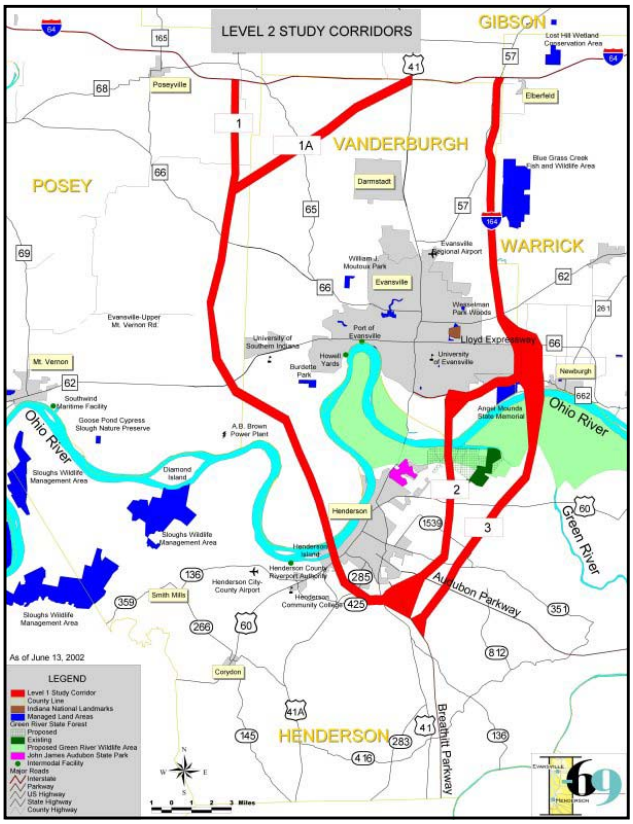


Figure 5.6-1: Evansville to Henderson I-69 Study

- Corridor 1 connects to I-64 in Posey County (Indiana) between the present SR 165 and SR 65 interchanges. It is located on the west side of Evansville and Henderson, and terminates at the existing KY 425 (Henderson Bypass) interchange. Corridor 1A is similar to Corridor 1 except that the northern terminus on I-64 is located at the existing US 41 interchange.
- Corridor 2 utilizes the existing I-164 alignment from its northern terminus at I-64/SR 57 in Warrick County (Indiana) to just east of the Green River Road interchange. It crosses the Ohio River west of Angel Mounds State Memorial Site, and terminates at the Breathitt (Pennyrile) Parkway in the vicinity of KY 425 (Henderson Bypass) interchange.
- Corridor 3 utilizes the existing I-164 alignment from its northern terminus at I-64/SR 57 in Warrick County (Indiana) to just north of the SR 662 (Covert Road) interchange. It crosses the Ohio River east of Angel Mounds State Memorial Site, and terminates at the Breathitt (Pennyrile) Parkway in the vicinity of KY 425 (Henderson Bypass) interchange.

Each of the alternatives under consideration in the Evansville-to-Henderson study is compatible with each of the alternatives under consideration in this study, because all of them connect to I-64 within an acceptable distance of one another. Thus, the selection of a preferred alternative for one project will not influence the selection of a preferred alternative for the other.

5.7 Pedestrian and Bicyclists Impacts

5.7.1 Introduction

Bicycle and pedestrian trails span many miles in Indiana. These trails provide people access to Indiana's outdoors, scenic areas and wildlife. The trails involved in the study area are on public lands.

5.7.2 Methodology

In the study area, various resources were used to investigate pedestrian and bicyclist paths. Resources used were the Indiana Trail Study by the Eppley Institute for Parks and Public Lands at Indiana University (Eppley Institute, 2001) and the IDNR Outdoor Recreation Indiana Bicycling Facilities (Indiana Department of Natural Resources, 2002); and books entitled *Indiana Outdoor Recreation* (Indiana Department of Natural Resources, 1989), and *Mountain Bike America-Indiana* (Cameron, 2000). GIS data on the trails came from the Indiana Department of Natural Resources, Division of Outdoor Recreation. The data included the routes taken by existing trails and if they were county roads, natural trails or single lane paved trails. The information was then compared with the proposed alternatives to determine if any of these trails would be impacted by the proposed I-69 project. The trails impacted as well as location, length, and trail type were recorded. For more information on the GIS and on the methodology, see Section 4.1 and 5.1 respectively.

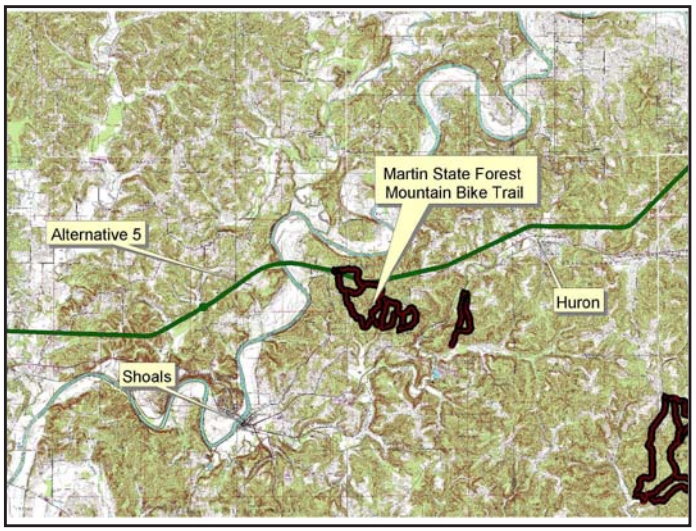


Figure 5.7-1: Martin State forest Mountain Bike Trail

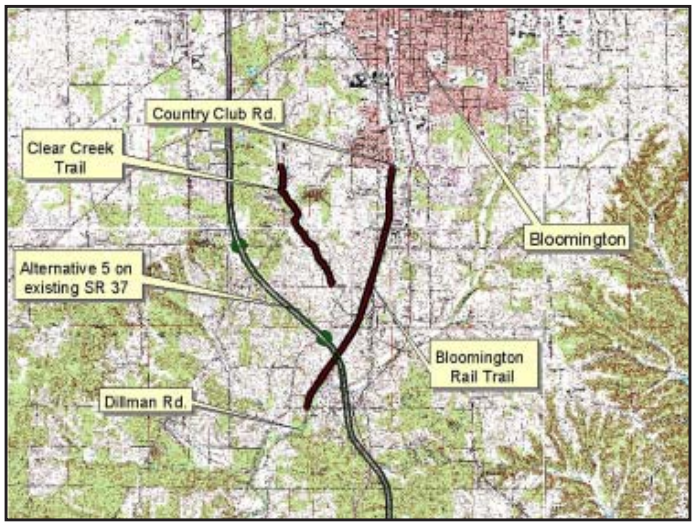


Figure 5.7-2: Bloomington Rail Trail

5.7.3 Analysis

Alternative 5A and 5B will cross the Martin State Forest Mountain Bike Trail (see Figure 5.7-1). The Martin State Forest Mountain Bike Trail is 6.8 miles in length and has a natural surface. It is managed by the Martin State Forest. This trail does not follow an existing roadway.

Alternative 5A and 5B will cross the Bloomington Rail Trail (see Figure 5.7-2). It is 6.2 miles in length and it has a paved surface on part of the trail, which travels along an old railroad route. The rest of the trail is a natural surface and gravel. Bloomington Parks and Recreation manages this trail. Currently, this trail is crossed by bridges on SR 37 and Alternative 5A and 5B will cross at the

same location. No right-of-way will be required from the trail.

Both of these trails are addressed in Chapter 8 - *Draft Section 4(f) Evaluation*. There also could be many bicycle routes on local roads, especially in Monroe County where many bicycle clubs are located and several racing events are held annually. Many of these routes are not formally marked and are not limited to a specific location within the road's right-of-way. Residents and students from the nearby Bloomington area routinely use these routes.

The No-Build Alternative current trends for bicycle and pedestrian impacts are expected to continue. The No-Build Alternative will have no impacts on these bicycle and pedestrian transportation trends.

5.7.4 Mitigation

Mitigation would be implemented if impacts to the paths cannot be avoided. Both of the trails are on 4(f) land, which refers to lands that are publicly owned, public parks, recreation lands, or wildlife and waterfowl refuges. Mitigation measures may include bridging, relocation, or enhancement of the trail.

5.7.5 Summary

At the present time, there will be a direct impact on the Martin State Forest Mountain Bike Trail if Alternative 5A or 5B is selected as the preferred alternative. The Bloomington Rail Trail crosses under the already existing SR 37 and should not have a direct impact. No public owned paths were found in the other four alternatives using the available data. The proposed highway is designated a freeway and as such, pedestrians and bicyclists are prohibited from using the roadway. The strategies mentioned in the mitigation section need to be implemented when ever possible to assure that the people of these areas still have access to these trails. The No-Build will have no impacts on bicycle and pedestrian resources.

5.8 Traffic Impacts

5.8.1 Introduction

This section will address the traffic impacts of I-69 for both the region as a whole and the major highway corridors that would be affected by the project. Detailed traffic operations studies will be undertaken during Tier 2 NEPA studies.

The discussion includes a general description of the traffic modeling methods and analytical tools used to develop the impacts described in this section. Refer to *Technical Report 3.3.3: Model Development and Validation* for further information on these subjects.

The section broadly addresses the issue of traffic "induced" by the national I-69 project as well as new development that would be stimulated by the highway in Indiana. A discussion is also provided of traffic diversions and congestion levels as they relate to major corridors in the region.

5.8.2 Methodology

In the mid-1990s, INDOT undertook a significant effort to develop analytical procedures designed to assess the transportation and economic impacts of large corridor investments. This effort resulted in the *Major Corridor Investment Benefit Analysis System* (MCIBAS). MCIBAS is a suite of programs and technical procedures, which consists of the *Indiana Statewide Travel Demand Model* (ISTDM) linked by post-processors and analytical procedures to a regional econometric simulation model. ISTDM is a computer model that forecasts traffic flow throughout the highway network given a proposed change or changes to the existing system.

In the early phases of this Tier 1 DEIS, significant improvements were made to both MCIBAS and ISTDM. These improvements included:

(1) the expansion of ISTDM into the four neighboring states to allow for improved testing/ modeling of transportation improvements that might draw traffic from neighboring states;

(2) the addition of minor collectors and some local roads into the ISTDM transportation network to permit improved estimates of traffic flows;

(3) the ability to input traffic into the statewide network that would be generated by the completion of I-69 at the national level;

(4) the ability to output some economic and transportation data for five regions within the 26-county study area;[1]

(5) the development of a "feedback loop" from these regions to the starting point of ISTDM to

1 These five regions are: (1) Indianapolis including its western and southern suburbs (Hendricks, Johnson, Marion, and Morgan counties); (2) the Bloomington area (Monroe County); (3) the Terre Haute area (Vigo and Clay counties); (4) the Evansville area (Gibson, Posey, Vanderburgh and Warrick counties); and (5) Rural Southwest Indiana (Brown, Crawford, Daviess, Dubois, Greene, Knox, Lawrence, Orange, Owen, Perry, Pike, Putnam, Spencer, and Sullivan Counties).

determine the effects of the new population and employment "induced" by an improved highway corridor on the transportation network; and

(6) the conversion of new population and employment into estimates of new land development.

It should be noted that this process is the methodological source from which the indirect land use impacts reported in other sections of this document were derived.

It should also be noted that the combination of these improvements – including the national I-69 traffic, the feedback loop and land use estimates – represents a significant step beyond the usual state-of-the-practice for modeling planned transportation improvements. Typically, travel demand models will take into account only the effects of changes in destination choices and route diversions resulting from a prospective improvement to the transportation system (e.g., added speeds and capacity to an existing road and/or the construction of a new road). Most travel demand models are not integrated with an economic model, nor do they allow for the feedback of "generated" or "induced" demand resulting from new development that would occur solely because the highway is built or improved.

In preparation for this chapter, the ISTDM was run assuming two scenarios. In the first scenario, each alternative was run for the forecast year of 2025 *without* the increment of additional national I-69 or highway-induced demand. This scenario effectively assumes that I-69 would *not* be completed outside Indiana and that there would be no additional trips generated by I-69 *inside* Indiana. It was this conservative scenario that was used in the development of the Purpose and Need as well as the initial screening from 14 to 5 alternatives. As a section of independent utility (SIU), it was appropriate to exclude other SIUs and other influences for the purpose of documenting need and assessing the transportation performance of preliminary alternatives.

Under the first scenario, growth in total vehicle-miles of travel (VMT) can still occur despite the potential opportunity for a "shortcut" provided by certain alternatives. This growth is the result of changes that would occur over time in destination choices; longer trips are made within approximately the same travel time.

In the second scenario, both national I-69 and highway-induced demand (per the feedback loop) were included in a set of year 2025 tests for each alternative. Under this scenario, the incremental increases in VMT over scenario 1 are attributable to the national I-69 project and demand induced by new economic development within Indiana. The results of this scenario were utilized for purposes of documenting impacts on air quality, noise, indirect land use and traffic in order to predict the maximum potential impacts to the study area upon completion of I-69 nationally.

In addition to broad, regional traffic impacts, the effects of each alternative on the key Interstates and major arterials in the region were assessed. For purposes of this analysis, the changes effected by the alternate routes on year 2025 traffic volumes (measured in terms of VMT) and levels of service were noted. Level of service (LOS) is a traffic engineering concept that relates to the relative ease of traffic flow on a highway during peak-hour conditions. LOS classifications are given ranging from "A" to "F", where "A" represents completely unhindered, free flow conditions and "F" represents conditions in which traffic volumes are approximately equal to the physical capacity of the roadway.[2] In this discussion, all LOS values represent traffic conditions *during peak-hour conditions on a*

typical weekday in the forecast year, 2025. Accordingly, these values represent the worst-case condition that a motorist would be likely to encounter under ordinary circumstances (i.e., no construction, no traffic crashes, etc.).

In the process of scoping (i.e., defining) each alternative, multiple runs of the travel demand model were undertaken to determine the number of lanes that would be required for each section of the new Interstate. Lanes were successively added wherever sufficient capacity was not provided by the standard 4 lanes. This process was continued until each section of the highway generally achieved a LOS of "C". The specific number of lanes needed to achieve LOS "C" was subsequently used in the estimation of right-of-way widths and construction costs.

5.8.3 Regional and Statewide Traffic Impacts

Under the first scenario in which it is assumed that I-69 will not be completed nationally and that there will be no new trips created as a result of the new Interstate connection between Indianapolis and Evansville, Alternative A shows the lowest overall increase in additional vehicle-miles of travel: an increase of 337,800 vehicle-miles of travel or about 0.7% over the No-Build in 2025.[3] At the other end of the spectrum, Alternative 5B would stimulate an increase in overall VMT of 1,528,700 or about 3.1%. Overall, vehicle-*hours* of travel (VHT) remain about the same, varying within a tight range of -0.5% and +0.8%.

In the second scenario, long-distance I-69 travel that passes through Indiana and additional travel induced by I-69 related economic development were added to the model tests. In this case, the same two alternatives would respectively stimulate the least and the most additional travel. Alternative A would result in a cumulative increase of 679,250 VMT or 1.4% over the No-Build, while an increase of 1,886,400 VMT or 3.9% would be associated with Alternative 5A.

These model tests lead to the conclusion that the combined traffic effects of national I-69 travel and new economic development on the highway network would be minimal. By themselves, these sources of travel demand would account for between 341,500 and 357,700 VMT, a fractional increase of about 0.2% in total travel in the I-69 Study Area.

5.8.4 Impacts on Major Corridors

While I-69 would have a very small effect on traffic volumes throughout the region as a whole, it has the potential to impact individual corridors significantly. These impacts would both increase and decrease traffic levels depending on the specific corridor and the alternative. Table 5.8.1 summarizes the forecasted percentage changes in traffic volumes (for the year 2025) on I-465, SR 37, I-65, US 41, and I-70.

2 The ISTDM has time-of-day modeling capabilities. LOS estimates throughout this section represent worst-hour conditions.

3 All percentage changes are computed on the basis of total VMT within the 26-county I-69 Study Area.

4 A reduction in vehicle-hours can occur, despite an increase in vehicle-miles due to the increased speeds provided by an alternative.

Table 5.8 – 1: Year 2025 Percentage Change in Vehicle-Miles of Travel on Major Corridors

	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
I-465												
Airport Express to I-70	0	1	3	1	5	3	3	1	3	1	7	3
I-70 to SR 67	1	0	-1	5	-1	5	4	0	-1	5	-8	4
SR 67 to SR 37	0	0	2	25	3	25	34	0	2	26	3	23
SR 37 to US 31	0	-1	-1	20	-1	22	21	-1	-1	20	-3	20
SR 37												
SR 46 Blmtn to SR 39 Martinsville	4	-5	-6	2	-19	35	76	-4	-7	2	62	74
SR 39 to SR 44	-7	-3	-15	156	-24	150	143	-3	-18	153	-26	139
SR 44 to Centerton Road	-10	-2	-12	121	-25	102	109	-2	-14	122	-31	107
Centerton Road to SR 144	-5	-1	-13	212	-12	210	194	-1	-12	212	-39	190
SR 144 to Bluff Road	-3	-2	-8	189	-11	176	177	-2	-8	190	-23	174
Bluff Road to I-465	-2	-3	-11	313	-13	332	335	-2	-11	316	-24	333
I-65												
County Line Road to I-465	0	-1	-1	-3	-1	-4	-3	-1	-1	-3	-2	-3
US 41												
I-64 to SR 168	65	66	67	68	-23	-23	-22	-26	-25	-25	-20	-19
SR 168 to SR 64	45	46	46	47	-15	-15	-15	-17	-17	-17	-13	-13
SR 241 to SR 441	31	35	36	37	-28	-28	-27	-31	-30	-30	-25	-24
SR 58 to New Lebanon	41	-46	-45	-45	-50	-49	-41	-56	-55	-54	-35	-35
SR 246 to SR 641 Bypass	39	-32	-32	-32	-35	-35	-29	-39	-38	-38	-26	-25
I-70												
SR 641 Bypass to SR 39	6	-12	-21	-31	-17	-27	-21	-10	-20	-30	-19	-19
SR 39 to SR 267	7	9	25	-26	33	-24	-18	10	26	-26	47	-17
SR 267 to Six Points	1	3	9	-13	12	-11	-9	4	10	-12	23	-8
Six Points to I-465	1	3	8	-11	12	-10	-8	4	9	-10	23	-7

Source: Bernardin, Lochmueller & Associates, Inc. and Indiana Statewide Travel Demand Model

Note: Shaded areas denote sections where I-69 would make use of existing divided highways (e.g., US 41, I-70, and SR 37).

5.8.4.1 Impacts on I-465

All of the alternatives that make use of I-70 would have a small effect on I-465. These are: Alternatives 1, 2A, 2B, 3A, 4A, 4B and 5A. Between the Airport Expressway and US 31, percentage variations in VMT from the forecasted No-Build condition would be negligible, except for Alternative 5A where increases in volume would be in the range of 7-8%.

On the other hand, alternatives that make use of the SR 37 corridor would all have noticeable impacts on I-465. These are Alternatives 2C, 3B, 3C, 4C and 5B. Between the Airport Expressway and US 31, these alternatives would increase forecasted VMT anywhere from 0 to 34% depending on the specific I-465 segment and the alternative.

As Table 5.8.1 shows, the alternatives that approach Indianapolis on SR 37 would increase traffic volumes between the Airport Expressway and SR 67 in the range of 0-5%. Between SR 67 and I-69 (existing SR 37), traffic would increase between 25% and 34%. East of I-69, an increase in VMT of about 20% on I-465 could be expected.

INDOT's Long Range Plan calls for the widening of I-465 to typically 10 lanes around its entire circumference.[5] A model run was conducted with 10 lanes (as opposed to its current 6-8) on I-465 between the Airport Expressway and I-65. While these planned lane additions would increase volumes on I-465 even further, the deterioration in levels of service created by I-69 alternatives that use SR 37 would be more than off-set by the lane additions. *With I-69 and with the added lanes, I-465 would perform at better levels of service than would exist without I-69 and without the added lanes.* East of SR 67 I-465 would operate at LOS "C", which is better than accepted planning LOS standards for urban Interstates (LOS "D"). Between I-70 and SR 67, the forecasted LOS is "D". Without the I-465 widening, however, these segments will operate at LOS "F", even if I-69 is not built.

5.8.4.2 Impacts on SR 37

As might be expected, alternatives that do not use SR 37 would divert traffic away from it to varying degrees, whereas alternatives that involve upgrading SR 37 would attract substantially more traffic to it. Alternative 1 would divert from 2-10% of forecasted traffic (depending on the specific location) away from SR 37. Alternatives 2A and 4A would function very similarly with respect to SR 37, diverting in the range of 1-5% of the traffic. Similarly, 2B and 4B would divert from about 6-18%. Alternative 3A would reduce traffic volumes from 11-25%.

The shaded portions of Table 5.8.1 denote sections of roadway where I-69 would make use of existing divided highways. In these shaded sections of SR 37, large percentage increases in traffic would be expected due to the fact that an Interstate highway would be replacing the existing road.[6] Alternatives 2C and 4C would result in an increase in traffic between about 120% and about 315%, depending on the alternative and the specific section of roadway. Alternative 3B would attract between approximately 35% and 330% more traffic to the upgraded SR 37 corridor, affecting a longer section of the highway than 2C or 4C. Alternative 3C would attract approximately 75% to 335% more traffic to SR 37.

In the section north of Martinsville where Alternative 5A diverges from SR 37, the new highway would divert from about 20-40% of the traffic away from SR 37. From Bloomington to Martinsville, Alternative 5A would attract about 60% more traffic to the upgraded SR 37 corridor. Alternative 5B – which stays on SR 37 throughout its length – would increase traffic on this corridor from about 75% to 335%.

It is important to note that these large increases of traffic on SR 37 do not imply poor levels of service, since Interstate highways have the capacity to carry much higher volumes of traffic than a divided highway with at-grade access. Moreover, in the process of scoping (i.e., defining) each alternative, multiple runs of the travel demand model were undertaken to determine the number of

5 The 10 lanes on I-465 include "auxiliary lanes" connecting interchange on-ramps with downstream off-ramps.

6 Data for alternatives that would use SR 37 are based on model results adjusted for the assumption that I-69 would not substantially deviate from the SR 37 alignment.

lanes that would be required for each section of the new Interstate. Lanes were successively added wherever sufficient capacity was not provided by the standard 4 lanes until each section of the highway generally achieved a LOS of "C". In most cases, 6 lanes would be required between Bloomington and SR 144 and 8 lanes would be needed from SR 144 to I-465. (See Appendix E for typical cross sections.)

The alternatives that would use the SR 37 corridor would generally operate at level of service "C". The large volume of traffic that the Interstate would carry at LOS "C" would provide significant benefits to radial traffic in and out of Indianapolis from the south and southwest.

5.8.4.3 Impacts on I-65

The I-69 alternatives have very little effect on I-65 south of Marion County. From the County Line Road interchange north to I-465, the five alternative/options that make use of the SR 37 corridor would divert between 3-4% of the traffic on I-65. Alternatives 3A and 5A would divert 1.2% and 1.7%, respectively. The remaining alternatives would all divert less than 1%. While these percentages are small, this section of I-65 is forecasted to carry very heavy traffic loads with a correspondingly poor level of service in the No-Build condition. Accordingly, even small percentage diversions in VMT can be helpful and, given the high level of congestion, would have a disproportionately higher percentage reduction in travel times.

5.8.4.4 Impacts on US 41

Alternative 1 would attract between 30% and 65% more traffic to US 41 between I-64 on the south and the planned SR 641 Terre Haute Bypass on the north. Due to the additional capacity that Alternative 1 would provide, levels of service would improve between Evansville and Princeton. Between SR 168 and SR 64 at Princeton, levels of service in 2025 would improve from predominantly "E" to "C". North of Princeton, the level of service would be about the same as the No-Build condition.

Alternatives 2A through C would attract between 35% and 67% more traffic to the US 41 corridor between I-64 and Vincennes. They would have the same improvement on levels of service near Princeton as Alternative 1. Each of the Alternative 2 options would attract approximately comparable volumes of traffic and would improve levels of service in about the same way as Alternative 1. North of Vincennes, approximately 32% to 40% of the traffic on US 41 would be diverted to the new facility. Already good levels of service north of Vincennes would stay the same or improve.

The remaining alternatives all share a southern terminus at SR 57 and I-64. Accordingly, they would all have the effect of diverting traffic from the US 41 corridor. For Alternatives 3A through C and 4A and 4B, diversions in 2025 would range from a low of about 15% just south of Princeton to a high of 56% (Alternative 4A) between SR 58 and New Lebanon. While this is a large percentage diversion, traffic volumes are small to begin with on this relatively remote section of US 41. Consequently, the percentage change would be large. Since Alternatives 5A and 5B follow US 50 to the east at Washington rather than maintain a northeasterly direction, the impact of these alternatives on US 41 is not quite as large as Alternatives 3 and 4. They would effect diversions in the range of 13% just south of Princeton to 35% between SR 58 and New Lebanon in 2025. All of these alternatives would

have the effect of improving or maintaining existing levels of service along most of the length of US 41. In the relatively congested area near the Toyota Plant, Alternatives 3 through 5 (with their various options) would generally improve the level of service.

5.8.4.5 Impacts on I-70

With the exception of Alternative 1, all of the alternatives would divert traffic from I-70 between the planned SR 641 Bypass at Terre Haute and SR 39 near Monrovia in Morgan County. Alternative 1 would increase traffic by about 6%. West of SR 39, diversions for all other alternatives would range from 10% (Alternative 4A) to 31% (Alternative 2C). Since the widening of I-70 from 4 to 6 lanes has been designated as a committed project, this section of highway will operate at a level of service "B" – a condition that would remain unchanged regardless of the alternative.

Between SR 39 and SR 267, the six-lane Interstate shifts from LOS "B" to "C". In this section, all of the alternatives that merge with I-70 – 1, 2A, 2B, 3A, 4A, 4B and 5A – would attract traffic to it. Vehicle-miles of travel on this section of I-70 would increase within a range of about 7% (Alternative 1) to 47% (Alternative 5A). By contrast, all of the alternatives that approach the Indianapolis area via the SR 37 corridor – 2C, 3B, 3C, 4C and 5B –would divert traffic away from I-70. The percentage diversions range from 18% for Alternative 3C to 26% for Alternatives 2C and 4C. The five alternatives that divert traffic away from I-70 would improve the level of service on this stretch of highway from "C" to "B".

Between SR 267 and I-465, alternatives that make use of I-70 would increase traffic volumes from a low of 1% (Alternative 1) to a high of 23% (Alternative 5A). Due to added lanes, none of these alternatives would deteriorate the 2025 level of service of "D". In some cases, the LOS would improve to "C".

For the five alternatives that would divert traffic away from I-70, diversions would range between 7% and 13% between SR 267 and I-465. All of these alternatives would improve the level of service from "D" to "C" between SR 267 and the planned Six Points interchange. Between Six Points and I-465, the LOS would improve from "D" to "C" for Alternatives 2C and 4C.

5.8.5 Summary

Travel demand model tests at a regional level lead to the conclusion that the combined effects of national I-69 travel and new economic development on vehicle-miles of travel (VMT) in the 26-county study area would be less than 1%. When vehicle-miles attributable to route diversion and longer average trips are added to these numbers, the total percentage increase in VMT would grow to between 1.4% and 3.9%. Accordingly, most of the forecasted growth over-and-above the No-Build condition is attributable to changes in route and destination choices as opposed to the national I-69 project or economic development resulting from I-69 in Indiana.

While these relatively "small" percentages may appear to be insignificant, they translate into a significant number of truck-hours saved and other mobility benefits. On a daily basis, over 2,000 hours of highway shipping time would be saved. When these saved hours are multiplied by truck-related travel time costs and savings associated with reduced vehicle operating and accident costs,

the impact on the regional and state economy can be very significant, as reported in other chapters of this document.

The impacts of the alternatives on traffic volumes utilizing the major highway corridors in the study area would vary widely.

Alternatives that approach the Indianapolis area along the SR 37 corridor would add a noticeable amount of traffic to the southern sections of I-465. This additional traffic, however, would be accommodated by planned lane additions to I-465.

Regarding SR 37, alternatives that approach the Indianapolis area on I-70 would divert traffic away from SR 37 to varying degrees, whereas alternatives that involve upgrading SR 37 would attract substantially more traffic to it. Those alternatives that would use SR 37 have the potential to draw heavy travel volumes and provide significant benefits to radial traffic to and from the south and southwest parts of the greater Indianapolis area.

Alternatives that make use of the SR 37 corridor would effect a modest 3-4% reduction in VMT on I-65 in Marion County. The remaining alternatives would have a negligible effect on I-65.

Alternatives that use all or a part of US 41 would attract between 30% and 67% more traffic than would occur in the No-Build condition. These alternatives would relieve forecasted congestion south of Princeton generally better than alternatives that divert traffic away from US 41. Alternatives with a southern terminus at SR 57 and I-64 would divert from 13% to 56% away from the US 41 corridor. These alternatives would maintain or improve levels of service on US 41.

With the exception of Alternative 1, all of the alternatives would divert traffic from I-70 between Terre Haute and SR 39 in Morgan County. These diversions would range from 10% to 31% and maintain a LOS “B”. From SR 39 to SR 267, a level of service “C” is forecasted. The five alternatives that divert traffic away from I-70 would improve the level of service on this segment of highway from “C” to “B”.

All the I-69 alternatives would improve traffic performance on a system-wide basis, as reported in Chapter 3.

5.9 Air Quality Impacts

5.9.1 Introduction

There are two objectives to the air quality analysis for the Tier 1 EIS. First, in accordance with NEPA, the air quality analysis provides information on the mobile source emissions associated with each alternative. Second, in accordance with Section 176(c) of the Clear Air Act, the air quality analysis will be used to demonstrate that the selected alternative is in conformity with applicable air quality plans.

The air quality analysis methodology developed for this DEIS was worked out in a meeting with the Indiana Department of Environmental Management (IDEM) and the Evansville and Indianapolis MPOs in May 2002. The agreed-upon methodology was aimed at: (1) generating comparative emissions data associated with the alternatives, and (2) identifying any alternatives that might have a high likelihood of placing the air quality conformity status of either Vanderburgh or Marion County in jeopardy. Final conformity of the preferred alternative with the applicable mobile source emissions budgets in the State Implementation Plan (SIP) will be documented in the Final EIS per Section 176(c) of the Clean Air Act.

5.9.2 Focus of Analysis

For a Tier 1 EIS, the focus is on a broad analysis of issues appropriate to selecting a corridor for a major transportation investment. Air quality impacts are both regional (i.e., meso-scale concerns) and local (i.e., micro-scale concerns) in scope. The Tier 1 EIS focuses on regional concerns. More detailed local air quality analysis will follow in the Tier 2 NEPA studies to the extent that it is appropriate.

5.9.3 Regulatory Setting

The Clean Air Act and the 1990 Clean Air Act Amendments (CAAA) required the U.S. Environmental Protection (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants that are considered to be harmful to the public health and environment. The U.S. EPA set forth standards for six principal pollutants – particulate matter, sulfur dioxide, carbon monoxide, ozone, oxides of nitrogen, and lead. Generally, when levels of pollutants do not exceed the annual average standards and do not exceed the short-term standards more than once per year, an area is considered in attainment of the NAAQS.

Within the 26-county Study Area, all areas are currently in attainment of the NAAQS. However, because Marion and Vanderburgh counties (the northern and southern termini of the project) were at one time designated marginal nonattainment areas for ozone and have since been redesignated attainment areas, they carry an air quality “maintenance area” designation. This designation requires the Metropolitan Planning Organization (MPO), as the designated agency for transportation planning in the metropolitan area, to demonstrate continuing conformity of their long-range plan (LRP) and short-range transportation improvement program (TIP) with the mobile emission budgets

established in the State Implementation Plan (SIP) for air quality, pursuant to Section 176(c) of the Clean Air Act as amended and the Transportation Conformity Rule (40 CFR Parts 51 and 93). Further, in accordance with the federal transportation metropolitan planning requirements (23 CFR 450 and the Transportation Equity Act for the 21st Century), "regionally significant" transportation projects must be included in a LRP and a TIP that have undergone an emissions analysis to demonstrate conformity with the SIP.

For the northern project terminus, the Long-Range Transportation Plan for the Indianapolis Region already includes significant improvements to I-70 westward from I-465 in Marion County that could accommodate the I-69 project, but does not include upgrading SR 37 to a freeway that could accommodate the I-69 project. For Vanderburgh County, the Long-Range Transportation Plan includes an extension of I-164 across the Ohio River that could accommodate I-69 inside Vanderburgh County, but does not include an interchange at I-64 for the southern terminus of the I-69 project in the US 41 corridor or SR 57 corridor. In fact, the southern terminus of the I-69 project at I-64 in the US 41 corridor is on the Vanderburgh-Gibson County Line, and the southern terminus of the I-69 project in the SR 57 corridor lies entirely in Gibson County (and thus is entirely outside the Vanderburgh "maintenance area".[1] Regardless of whether an I-69 alternative involves new construction in Marion or Vanderburgh Counties, the regional air quality analysis has been conducted for these two areas to identify air quality impacts and to evaluate conformity with the SIP using Mobile 5 emission factors with Tier 2 Motor Vehicle Emissions Standards. Because maintenance of the NAAQS for mobile sources (cars and trucks) in these two counties for ozone is the issue, the regional air quality analysis focuses on the three major precursors to ozone – hydrocarbons (also known as volatile organic compounds or VOCs), carbon monoxide (CO) and oxides of nitrogen (NOX).

After a preferred alternative corridor has been selected, additional air quality analyses will be conducted by the MPO to demonstrate that the preferred alternative will not jeopardize MPO air quality conformity with the applicable mobile source emission budgets established in the State Implementation Plan (SIP) for Marion and Vanderburgh Counties.

5.9.4 Methodology

To assess the regional air quality impacts and demonstrate I-69 project conformity, vehicle-miles of travel for each alternative in Marion and Vanderburgh County were converted to mobile source emissions and compared to the mobile source emission budgets from the SIP for each county.

The specific steps involved:

(1) obtaining the vehicle-miles of travel (VMT) by Federal roadway functional classification for each build alternative from the I-69 Statewide Travel Model to determine the change in VMT from the no build (E+C) alternative for the year 2025;

(2) applying the change for each alternative from the No-Build Alternative to the vehicle-miles of travel (VMT) for the adopted long-range transportation plan in Marion and Vanderburgh

[1] Mobile 5 Information sheet #8: Tier 2 Benefits Using Mobile 5; U.S. Environmental Protection Agency; April, 2000. "Tier 2" in this context, refers to "Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements" that have been enacted subsequent to the release of the Mobile 5 emissions factors.

Counties to reflect the addition of each build alternative to the adopted long-range transportation plan network ;

(3) applying the unique emission rates per VMT from Mobile 5 (with the Tier 2 Motor Vehicle Emissions Standards so as to generally approximate Mobile 6 emissions) for each county to the vehicle-miles of travel (VMT) for the adopted long-range transportation plan network with each of the build alternatives to get total daily emissions; and

(4) comparing the daily emissions for each build alternative to the emission budgets established by the SIP for each county.

Because the Indiana Department of Environmental Management (IDEM) bases the mobile emission budgets on the vehicle-miles of travel (VMT) reported in the INDOT Highway Performance Monitoring System (HPMS), the VMT from the travel model must be reconciled to HPMS estimates of VMT. In the case of Marion County, the total emissions from the Long-Range Transportation Plan are adjusted to the HPMS before comparison to the emission budgets. In the case of Vanderburgh County, the VMT for the Long Range Transportation Plan have been adjusted to HPMS before the emission factors are applied.

Table 5.9-1: Marion County Air Quality Analysis

	2025 LRP	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)
Entry Corridor		I-70	I-70	I-70	SR 37	I-70	SR 37	SR 37	I-70	I-70	SR 37	I-70	SR 37
VOC Emissions													
HPMS Adjusted Total	60.555	60.543	60.589	60.616	60.401	60.658	60.568	60.530	60.621	60.594	60.389	60.443	60.457
SIP Budget	71.70	71.70	71.70	71.70	71.70	71.70	71.70	71.70	71.70	71.70	71.70	71.70	71.70
Rank (low to high)		6	8	10	2	12	7	5	11	9	1	3	4
CO Emissions													
HPMS Adjusted Total	473.876	473.776	474.105	474.243	472.034	474.532	473.296	473.015	474.347	474.074	471.939	472.759	472.470
SIP Budget	521.60	521.60	521.60	521.60	521.60	521.60	521.60	521.60	521.60	521.60	521.60	521.60	521.60
Rank (low to high)		7	9	10	2	12	6	5	11	8	1	4	3
NOX Emissions													
HPMS Adjusted Total	44.895	44.893	44.937	44.991	45.082	45.037	45.205	45.182	44.965	44.974	45.072	44.933	45.123
SIP Budget	63.10	63.10	63.10	63.10	63.10	63.10	63.10	63.10	63.10	63.10	63.10	63.10	63.10
Rank (low to high)		1	3	6	9	7	12	11	4	5	8	2	10

Table 5.9-2: Vanderburgh County Air Quality Analysis

	2025 LRP	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)	Emission (tons/day)
Entry Corridor		US 41	US 41	US 41	US 41	SR 57	SR 57	SR 57	SR 57	SR 57	SR 57	SR 57	SR 57
VOC Emissions													
HPMS Adjusted Total	7.372	7.598	7.629	7.616	7.636	7.550	7.540	7.545	7.530	7.530	7.538	7.522	7.531
SIP Budget	10.91	10.91	10.91	10.91	10.91	10.91	10.91	10.91	10.91	10.91	10.91	10.91	10.91
Rank (low to high)		9	11	10	12	8	6	7	3	2	5	1	4
CO Emissions													
HPMS Adjusted Total	53.334	55.003	55.222	55.127	55.268	54.806	54.736	54.766	54.658	54.661	54.722	54.579	54.648
SIP Budget	77.94	77.94	77.94	77.94	77.94	77.94	77.94	77.94	77.94	77.94	77.94	77.94	77.94
Rank (low to high)		9	11	10	12	8	6	7	3	4	5	1	2
NOX Emissions													
HPMS Adjusted Total	8.159	8.521	8.553	8.545	8.567	8.514	8.509	8.504	8.484	8.489	8.498	8.468	8.476
SIP Budget	11.56	11.56	11.56	11.56	11.56	11.56	11.56	11.56	11.56	11.56	11.56	11.56	11.56
Rank (low to high)		9	11	10	12	8	7	6	3	4	5	1	2

5.9.5 Analysis

The results of the air quality analysis appear in Table 5.9-1 for Marion County and 5.9.-2 for Vanderburgh County. (Refer to Appendix K for more detail.)

The following observations are made concerning the air quality impact analysis for **Marion County**:

(1) The vehicle-miles of travel (VMT) from the I-69 Statewide Travel Model for all build alternatives exceed that of the no build (E+C) alternative. The build alternatives (i.e., Alternatives 1, 2A, 2B, 3A, 4A, 4B and 5A) entering Marion County in the I-70 corridor result in lower VMT than the build alternatives (i.e., Alternatives 2C, 3B, 3C, 4C and 5B) entering Marion County in the SR 37 corridor. Alternative 3B has the highest VMT.

(2) When changes over the No-Build Alternative VMT are applied to the Long-Range Transportation Plan roadway network for the year 2025, two of the build alternatives (i.e., Alternatives 1 and 5A) result in less VMT than the Long-Range Transportation Plan. In comparison to the I-69 Statewide Travel Model network, the Indianapolis Region Long-Range Transportation Plan reflects a more extensive roadway network, includes a representation of "local" roads, and includes major roadway improvements beyond the No-Build Alternative. Thus, the VMT for build alternatives when added to the Long-Range Plan no longer result in build alternatives in the SR 37 always having a higher VMT than those in the I-70 corridor. Yet, Alternative 3B still has the highest VMT.

(3) Because emission rates per VMT for volatile organic compounds (VOCs) and carbon monoxide (CO) increase as one moves from the highest to lowest roadway functional class (due a decrease in speeds), changes in the composition of the total VMT by roadway functional class affect total emissions. Thus, the build alternatives with a greater concentration of interstate VMT have the lowest VOC and CO emissions – Alternatives 2C, 4C, 5A and 5B; these emissions are even below that for the Long-Range Transportation Plan without I-69. In contrast, Alternatives 2B, 3A, and 4A have the highest VOC and CO emissions, exceeding that of the Long-Range Transportation Plan. Overall, Alternate 4C has the lowest VOC and CO emissions and Alternate 3A has the highest VOC and CO emissions.

(4) Because the nitrogen oxide (NOX) emission rates per VMT are higher for urban interstates than other arterials in Marion County, build alternatives in the I-70 corridor have lower NOX emissions than those in the SR 37 corridor because alternatives in the SR 37 corridor add more urban interstate. Thus, Alternative 1 has the lowest NOX emissions (slightly below the Long-Range Transportation Plan), followed by Alternatives 5A, 2A, 4A and 4B (that are slightly higher than the Long-Range Transportation Plan. Alternative 3B has the highest NOX emissions followed by Alternative 3C.

(5) **Because all alternatives fall under the SIP emissions budgets when added to the Indianapolis Long-Range Transportation Plan, the addition of any alternative to the Long-Range Transportation Plan would not jeopardize conformity with the SIP.**

The following observations are made concerning the air quality impact analysis for **Vanderburgh County**:

(1) The vehicle-miles of travel (VMT) from the I-69 Statewide Travel Model for all the build alternatives exceed that of the no build (E+C) alternative. The average VMT of the four build alternatives (i.e., Alternatives 1, 2A, 2B, and 2C) entering Vanderburgh County in the US 41 corridor is higher than the average VMT of the eight build alternatives (i.e., Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B) entering in the SR 57 corridor. Alternative 2C has the highest VMT in the US 41 corridor, followed by Alternative 3B in the SR 57 corridor. Alternatives 5A and 5B had the lowest VMT.

(2) When changes over the No-Build Alternative VMT are applied to the Long-Range Transportation Plan roadway network for the year 2025, all the build alternatives result in more VMT than the Long-Range Transportation Plan. In comparison to the I-69 Statewide Travel Model network, the Evansville Area Long-Range Transportation Plan reflects a more extensive roadway network, includes a representation of "local" roads, and includes major roadway improvements beyond the No-Build Alternative. Adjustments for the HPMS result in all build alternatives in the US 41 corridor having higher VMT than alternatives in the SR 57 corridor.

(3) With the exception of rural interstates, emission rates per VMT for volatile organic compounds (VOCs) and carbon monoxide (CO) increase as one moves from the highest to lowest roadway functional class. However, because the vehicle-miles of travel (VMT) are lower for all Alternatives in the SR 57 corridor than Alternatives in the US 41 corridor, the eight alternatives in the SR 57 corridor (Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B) have lower emissions than the four alternatives in the US 41 corridor (Alternatives 1, 2A, 2B, and 2C). Overall, Alternative 5A had the lowest VOC and CO emissions, followed by Alternative 5B; and Alternative 2C had the highest VOC and CO emissions.

(4) Nitrogen oxide (NOX) emission rates per VMT drop as one moves from the higher to lower roadway functional classes in Vanderburgh County. However, because vehicle-miles of travel (VMT) are lower for all alternatives in the SR 57 corridor than alternatives in the US 41 corridor, all alternatives in the SR 57 corridor (Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B) have lower emissions than the alternatives in the US 41 corridor (Alternatives 1, 2A, 2B, and 2C). Overall, Alternative 5A had the lowest NOX emissions, followed by Alternative 5B; and Alternative 2C had the highest NOX.

(5) **Because all alternatives fall under the SIP emissions budgets when added to the Evansville Area Long-Range Transportation Plan, the addition of any alternative to the Long-Range Transportation Plan would not jeopardize conformity with the SIP.**

5.9.6 Summary

For Marion County, build corridor alternatives entering the county along the SR 37 corridor have the lowest VOC and CO emissions when added to the adopted Long-Range Transportation Plan network, but the highest NOX emissions. Thus, Alternatives 2C, 4C, 5A and 5B have the lowest VOC and CO emissions, even lower than the Long-Range Transportation Plan. Alternative 3A has the highest VOC and CO emissions. For NOX emissions, Alternative 1 had the lowest emissions, followed 5A, 2A, 4A and 4B. Alternative 3B has the highest NOX emissions. Nevertheless, as shown in Table 5.9-1 the addition of any build alternative to the Indianapolis Region Long-Range Plan will not jeopardize conformity with the SIP for Marion County.

For Vanderburgh County, build corridor alternatives entering the county in the SR 57 corridor (Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B) have lower VOC, CO and NOX emissions than the alternatives in the US 41 corridor (Alternatives 1, 2A, 2B, and 2C). Alternative 5A has the lowest emissions and Alternative 2C has the highest emissions in all three categories. **Nevertheless, the addition of any build alternative to the Evansville Area Long-Range Plan will not jeopardize conformity with the SIP for Vanderburgh County.**

Finally, the final EIS will document that the preferred alternative will not jeopardize MPO air quality conformity with the applicable mobile source emissions budgets of the SIP for Marion and Vanderburgh Counties.

5.10 Highway Noise Impacts

5.10.1 Introduction

As Indiana's transportation system expands with new roadways and the traffic capacity of existing roadways increase, the communities through which these facilities run continue to be subjected to higher levels of highway related noise. Such intrusions have become a growing environmental concern, especially in high density urban settings and outlying urban/suburban areas where large numbers of residential properties along high volume Interstates and highways are routinely affected. The FHWA is cognizant of the potential for such adverse off-site effects associated with Type I projects and have taken measures to assess these impacts in noise sensitive environments and establish mitigation procedures as mandated by the Federal-Aid Highway Act. I-69 qualifies as a Type I project because it: 1) proposes to either construct a highway on a new location, or 2) significantly change the alignment and/or number of through-traffic lanes of an existing highway.

5.10.2 INDOT Policy for the Consideration of Highway Traffic Noise

The FHWA requires that all states have an approved policy to identify and address highway traffic noise impacts. INDOT's noise policy (INDOT, 1997) was developed to implement the requirements of 23 CFR 772 and the noise-related requirements of the National Environmental Policy Act of 1969 and received FHWA approval on October 15, 1997. The structure of the policy is based on FHWA's "Highway Traffic Noise Analysis and Abatement: Policy and Guidance" (USDOT, 1995) and focuses on seven principal elements briefly explained below.

A. Identification of Noise-Sensitive Land Uses

B. Determination of Existing Noise Levels

C. Prediction of Future Noise Levels

D. Identification of Traffic Noise Impacts

E. Identification and Consideration of Abatement

F. Consideration of Construction Noise

G. Coordination with Local Government Officials

The Tier 1 EIS assessment will address each of the above seven elements to the extent appropriate for this level of study. The subsequent Tier 2 NEPA studies will implement INDOT's noise policy with regards to site specific impacts in more detail.

5.10.3 Methodology

Typically a highway noise study is designed to quantitatively analyze specific areas for noise impacts along one or more proposed Alternatives, each of which possess a clearly defined alignment with known horizontal and vertical geometry as well as a complete picture of the individual human occupied areas adjacent to the proposed roadway. The goal of the Tier 1 EIS is to select a corridor, as such noise analyses have been undertaken at a level appropriate to compare corridors. The Tier 2

NEPA noise analyses will further evaluate noise impacts by specifically identifying noise receptors of potential noise mitigation.

The process begins by first identifying any and all locations where the proposed roadway would constitute an encroachment adjacent to developed and planned development areas involving human occupation. To assist in this task, five Activity Categories have been established to classify land use for the purposes of assessing impact and for the consideration of traffic noise abatement. Table 5.10 - 1 describes each of these categories. The most common potential noise receiver anticipated for the I-69 project is the single family residence. However, properties supporting apartments, motels/ hotels, schools, churches, public meeting centers, offices, commercial businesses, parks, recreation areas, playgrounds, sports parks, and other types of properties frequented by people are also regarded as potential receiver sites in the Study Area.

For the purposes of assessing potential highway noise impacts in Indiana, the L_{Aeq}(h) descriptor measuring sound pressure levels in decibels is utilized. This descriptor quantifies the equivalent steady-state sound level containing the same acoustic energy as a time varying sound level over the course of an hour. Measurements are presented in A-weighted decibels, a metric which mimics the human ears response to sound pressure levels at different frequencies.

The assessment of potential highway traffic related noise impacts is accomplished by comparing the predicted future noise levels to the appropriate Noise Abatement Criteria (NAC) and existing noise levels. According to INDOT policy, highway noise impacts on Type I projects can occur in one of two ways. First, an "absolute" noise level impact occurs when the predicted level approaches or exceeds the appropriate NAC indicated in Table 5.10-1. INDOT has defined "approach" as meaning within 1 dBA of the NAC. Therefore, in the case of the 67 dBA NAC for Category B lands, a site is considered impacted if its predicted level is 66 dBA or higher. Second, a "relative" impact occurs when the predicted level substantially exceeds the existing ambient level. INDOT defines substantial as 15 dBA or greater. Generally, a substantial increase (>15dBA) can occur, even though the predicted L_{Aeq}(h) does not approach or exceed the appropriate NAC, in quiet rural settings where sites

Table 5.10-1: FHWA Noise Abatement Criteria

Activity Category	NAC, LAeq (h)	Description of Activity Category
A	57 dBA (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 dBA (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches libraries, and hospitals.
C	72 dBA (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	no NAC designated	Undeveloped lands.
E	52 dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

previously unexposed to nearby moderate or high volume traffic are suddenly subjected to such sources, as is the case with Interstate facilities on new alignment through rural areas.

Prediction of future noise levels at specific locations along a proposed roadway was conducted in accordance with the FHWA Highway Traffic Noise Prediction Model (Barry & Reagan, 1978) using the FHWA Traffic Noise Model (TNM 1.1) computer program. The model spatially simulates the 3-D geometry of the proposed roadway and receiver location relative to the roadway, and accepts variable input concerning traffic volume, vehicle speed, vehicle composition (cars, trucks, etc.) and surrounding landscape cover. Although the Tier 1 EIS alternatives lack specific design detail, the TNM 1.1 model was utilized to perform a generic analysis to predict future hypothetical noise levels along the proposed "working" alignments based on two changing variables: traffic volumes and receiver distance from the roadway. Because access to Interstate facilities is restricted to interchanges, the traffic volume from one interchange to the next is fixed. Therefore the proposed interchanges were used to define the beginning and end of discrete traffic volume segments throughout each of the alternatives. Predicted hourly car and truck volumes for the year 2025 used in the analysis can be found in Appendix L Tables 1-12.

The roadway set-up in the TNM model was based on the typical divided 6-lane section which consists of a 60 foot median with three 12 foot northbound and three 12 foot southbound lanes. The three northbound lanes were represented in the model with a single roadway 5000 feet in length placed in the center of the middle lane, or offset 48 feet from the center of the median. The same was done for the three southbound lanes. The 48 feet offset from the centerline was used throughout the entire alignment for each alternative. Nine receivers were placed along a line perpendicular to the midpoint of the roadway at distances of 150, 200, 250, 300, 350, 400, 500, 600, 700 and 800 feet from the centerline of the typical section. With this configuration, each run of the model using different traffic volumes and car/truck mixes would produce a series of nine predicted dBA levels, one for each of the receiver distances. In conducting such a basic analysis the following data input variables and conditions had to be assumed or set to the TNM default:

- both parallel roadways are on flat terrain
- receivers were vertically situated at-grade with the roadways
- I-69 is the sole source of highway noise traffic (no crossroads or potential frontage roads were included)
- balanced bi-directional traffic volumes (i.e. northbound =southbound)
- total hourly truck volume: 30% medium truck; 70% heavy truck
- all vehicle speeds = 70 mph
- no shielding from building rows or tree zones
- default ground type = lawn
- relative humidity = 50%
- temperature = 68° F

The model was run for each interchange-to-interchange traffic volume segment and the resulting $L_{Aeq}(h)$ levels for each of the ten analysis distances have been documented in Appendix L Tables 1-12

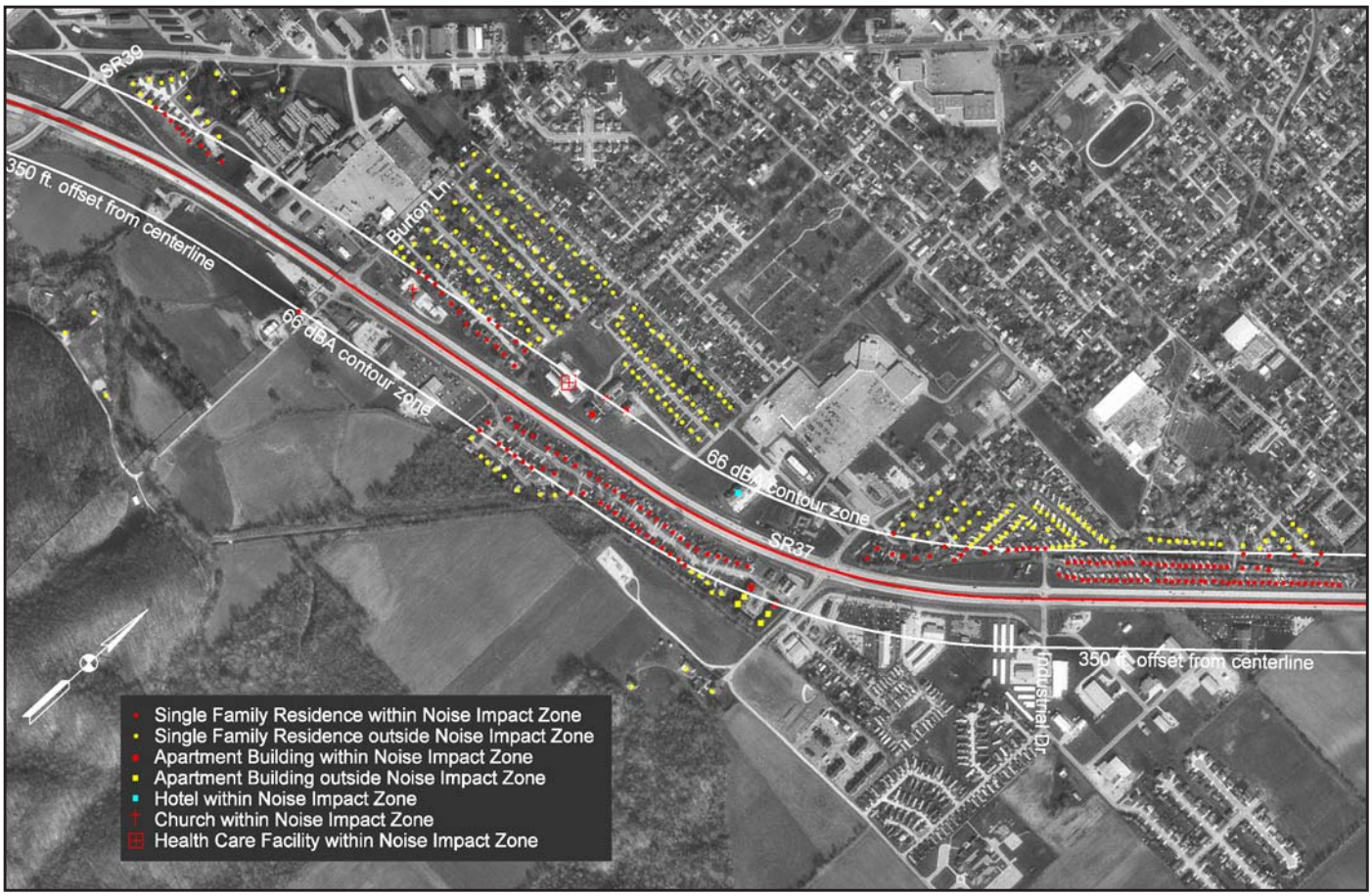


Figure 5.10-1: Example of preliminary noise impact zone along SR 37 through southern part of Martinsville used for I-69 Tier 1 DEIS analysis.

Using the predicted L_{Aeq}(h) at various distances from the proposed centerline for each of the interchange-to-interchange segments it was possible to establish a zone within which the appropriate NAC was approached or exceeded. Figure 5.10-1 illustrates this concept along SR 37 at Martinsville. However, in order to determine the conditions under which a site would not approach the 67 dBA NAC, but yet experience a substantial increase (>15dBA) in highway noise levels over existing conditions due to project implementation, it was necessary to establish a baseline or ambient level with which to compare predicted levels. Since this condition would probably only occur in rural settings, 10-minute field measurements at eleven randomly distributed rural residential sites throughout the I-69 Study Area were taken using a Larson·Davis DSP82 Type 1L sound level meter (serial no. 0152) according to procedures set forth in "Measurement of Highway-Related Noise" (Lee & Fleming, 1996). Table 5.10-2 shows the results of this exercise. The rural sample measurements ranged from 43.0 dBA to 57.3 dBA. The variation was attributed to the nature and proximity of ambient sound sources in the area. Sound sources such as chirping birds, distant barking dogs, farm tractors in the background, distant thunder, and the occasional car or truck passing along the rural road were not excluded from the sampling since these sources are considered a part of the ambient noise environment. An average of the eleven measurements yielded an ambient level of 50 dBA for rural sites that are not already in close proximity to a moderate-to-high volume transportation facility. For the purposes of the Tier 1 analysis, a substantial increase

for a rural site is therefore expected to occur when the predicted $L_{Aeq}(h)$ is 65 dBA (50 dBA + 15 dBA) or greater.

Table 5.10-2: Rural Ambient Noise Measurements for I-69 Teir 1 DEIS Analysis

Sample Site Location	Date	Time	LAeq
Gibson Co. CR900S east of CR650E	6/4/02	11:05am	43.5 dBA
Pike Co. CR300W north of CR200S	6/4/02	11:38am	54.7 dBA
Pike Co. CR150N east of CR50W	6/4/02	12:26pm	52.7 dBA
Greene Co. Mineral-Koleen Rd. east of Koleen	6/4/02	2:37pm	49.8 dBA
Greene Co. CR50S east of CR800E	6/4/02	3:11pm	55.8 dBA
Lawrence Co. CR450S west of Bluespring Cavern	6/4/02	4:34pm	51.5 dBA
Monroe Co. N. Bottom Road west of N. Woodall Road	6/5/02	8:37am	49.0 dBA
Morgan Co. CR850E north of SR144	6/5/02	10:11am	57.3 dBA
Morgan Co. Letterman Rd.	6/5/02	11:04am	49.5 dBA
Owen Co. CR800W north of SR67	6/5/02	12:19pm	45.5 dBA
Greene Co. CR4050W south of CR200S	6/5/02	2:23pm	43.0 dBA
		Average Ambient Level	50.0 dBA

To assess the relative impact of each alternative, the number of potential residential receivers within the 66 dBA zone in urban/suburban settings and the 65 dBA zone in rural settings was determined. Figure 5.10-1 provides an example of how the number of potentially impacted receivers within the 66 dBA zone along SR 37 at Martinsville were determined. For those alternatives utilizing portions of I-70, the assessment of noise impacts ends at the I-70 junction. In other words, no potential receivers within the 66 dBA zone along I-70 are included in the totals. The identification and tallying of noise impacted residential receivers for each of the alternatives was conducted using the querying capabilities of the ArcView GIS platform. For more information on GIS and on the methodology, see Section 4.1 and 5.1 respectively. If a build alternative is selected a more thorough analysis identifying and quantifying impacted sites will be conducted in the subsequent Tier 2 NEPA studies.

5.10.4 Analysis

In general, the risk of noise impacts from any of the study Alternatives naturally increases in situations where the facility encroaches upon land in which higher densities of human occupation occur. As with most highway projects of this size and nature, single family residences will be the primary receiver class of concern with regards to NAC impact and the potential for abatement. Additional sensitive receivers that will occur throughout one or more of the alternatives include churches and schools. In instances where alignments pass through or adjacent to urban and suburban settings, the possibility of exterior and/or interior noise impacts at parks, playgrounds, picnic areas, apartments, motels/hotels, libraries, hospitals and office buildings becomes more evident.

Because many of the alternatives involve new alignment, the location of the alignment within the corridor will be critical in determining which receivers are adversely impacted by highway noise. A simple shift in alignment of a few hundred feet or so away from a densely populated neighborhood may be all that is required to abate a potential noise impact. In other cases, it will become necessary to evaluate the cost effectiveness of noise barrier walls to attenuate noise levels at a cluster of sensitive receivers. Each of the proposed Alternatives have some portion of their alignment traversing through remote rural areas. New alignment through such areas may result in "substantial" (>15 dBA) increases over existing ambient levels, which on the average are 50dBA.

Table 5.10-3: Potential Highway Noise Related Impacts along Tier 1 Alternatives (excludes single family residential)

Receiver Name	County	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Apartments													
Ridgewood Apartments	Lawrence											x	x
Briarwood Apartments	Lawrence											x	x
Wapehani Apartments	Monroe							x				x	x
Brasswood Apartments	Monroe							x				x	x
Bradford Ridge Apartments	Monroe							x				x	x
Canterbury House Apartments	Monroe							x				x	x
Southfield Apartments	Morgan				x		x	x			x		x
Pine Apartments	Morgan				x		x	x			x		x
Williamsburg Colony Apartments	Morgan				x		x	x			x		x
Lighthouse Landing Apartments	Marion				x		x	x			x		x
Churches													
Enon Church	Gibson	x	x	x	x								
Nobles Church	Gibson					x	x	x	x	x	x	x	x
First Baptist Church	Knox	x	x	x	x								
Cornerstone Ministries	Knox	x	x	x	x								
West Side Church	Sullivan	x											
Church of God	Sullivan	x											
Souls Harbor Church	Sullivan	x											
Emmanuel Baptist Church	Sullivan	x											
Taylor Memorial Prayer-Chapel	Sullivan	x											
Breton Chapel Church of Christ	Pike					x	x	x	x	x	x	x	x
Kingdom Hall	Daviess					x	x	x	x	x	x	x	x
Fountain of Life United Pentecostal Church	Daviess					x	x	x	x	x	x	x	x
Crossroads Community Church	Lawrence											x	x
Shiloh Temple	Monroe											x	x
Calvery Baptist Church	Monroe							x				x	x
Life Church	Monroe							x				x	x
Northside Christian Church	Monroe							x				x	x
United Pentecostal Assembly	Monroe						x	x				x	x
New Testament Baptist Church	Morgan						x	x				x	x
Martinsville Baptist Tabernacle	Morgan				x		x	x			x		x
First Church of the Nazarene	Morgan				x		x	x			x		x
Faith Church	Morgan				x		x	x			x		x
Glens Valley United Methodist	Marion				x		x	x			x		x
Schools													
North Central High School	Sullivan	x											
Needmore Elementary School	Lawrence											x	x
Martinsville High School	Morgan				x		x	x			x		x
Hotels/Motels													
Baymont Hotel at I-64 interchange	Gibson	x	x	x	x								
Comfort Suites at Vincennes	Knox	x	x	x	x								
Super 8 Motel at Carlisle	Sullivan	x											
Days Inn at Sullivan	Sullivan	x											
Stonehendge Lodge at Bedford	Lawrence											x	x
Super 8 Motel at Bedford	Lawrence											x	x
Rodeway Inn at Bloomington	Monroe							x				x	x
Hill View Motel at Martinsville	Morgan						x	x					x
Super 8 Motel at Martinsville	Morgan				x		x	x			x		x
Hospitals/Health Care													
Carlisle Medical Center	Sullivan	x											
Heritage Home Health	Morgan				x		x	x			x		x
Grandview Convalescent Center	Morgan				x		x	x			x		x
Center for Behavioral Health	Morgan				x		x	x			x		x
Recreation													
Jack Bishop Park	Gibson	x	x	x	x								
Pyramid Mound Site	Knox	x	x	x	x								
VFW Post 1157 Park	Knox	x	x	x	x								
Vincennes Elks Country Club	Knox	x	x	x	x								
New Vision RV Park	Knox	x											
Shelburn Community Park	Sullivan	x											
Bluespring Caverns	Lawrence											x	x
Dave McIntyre Bike Trail	Lawrence											x	x
Par Putt Mini Golf	Lawrence											x	x
Martinsville Country Club	Morgan				x		x	x			x		x
Whispering Meadows Riding Stables	Morgan				x		x	x			x		x

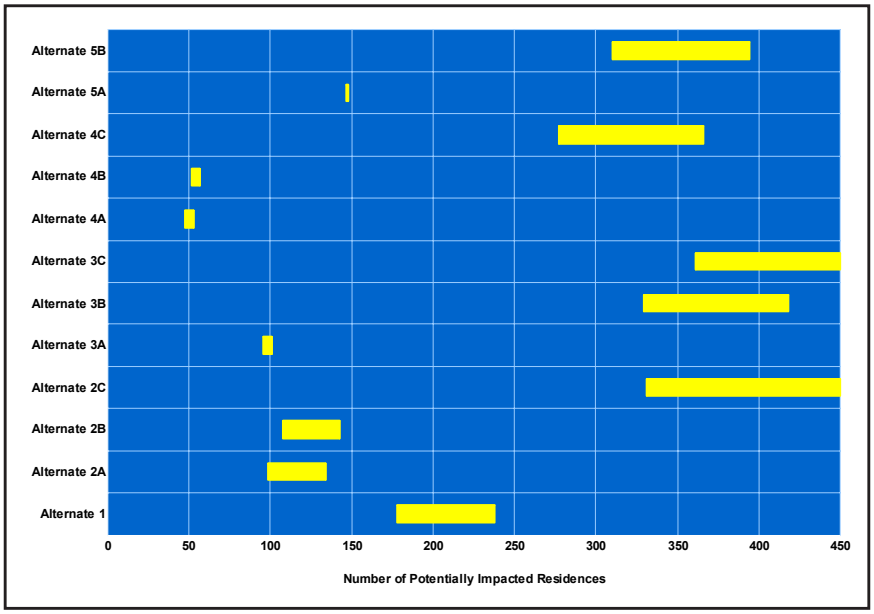


Figure 5.10-2: Summary of Potential Highway Noise Related Impacts for I-69 Tier 1 Alternatives

What follows is a brief summation of the Tier 1 DEIS analysis for each of the study alternatives based on the results shown in Appendix L Tables 1-12. Each analysis focuses on the distance from the centerline at which the Category B 67 dBA NAC is approached (66 dBA) or exceeded, or in rural areas the distance from the centerline at which a substantial increase of 15 dBA is expected over average ambient level of 50 dBA. The analysis also quantifies the number of potential receiver sites that are outside of the variable width right-of-way, yet within the Category B NAC zone predicted. The Category B NAC was selected because it is routinely used to assess exterior impacts at residential properties, the most common activity category encountered. Figure 5.10-2 illustrates the relative noise impacts each alternative based on the total expected number of single family residences that may be affected. In addition to single family residences, Table 5.10-3 provides a list of apartment complexes, churches, schools, hotels/motels, hospitals/health care facilities and recreational sites that are within close proximity to each alternative and may incur highway noise related impacts. Table 5.10-4 summarized residential and select non-residential noise impacts in terms of total numbers of potential sites affected.

Table 5.10-4: Summary of Potential Highway Noise Related Impacts for I-69 Tier 1 Alternatives

Alternative	Single Family Residences	Multiple Family Residences	Churches	Schools	Hotels/ Motels	Hospitals/ Health Care	Recreation Sites
Alt. 1	178 - 238	0	8	1	4	1	5
Alt. 2A	99 - 134	0	2	0	2	0	3
Alt. 2B	108 - 143	0	2	0	2	0	3
Alt. 2C	331 - 450	4	6	1	3	3	5
Alt. 3A	96 - 101	0	4	0	0	0	0
Alt. 3B	329 - 418	4	10	1	2	3	2
Alt. 3C	361 - 450	8	13	1	3	3	2
Alt. 4A	48 - 53	0	4	0	0	0	0
Alt. 4B	52 - 57	0	4	0	0	0	0
Alt. 4C	277 - 366	4	8	1	1	3	2
Alt. 5A	148	6	11	1	3	0	2
Alt. 5B	310 - 394	10	15	2	5	3	4

Figure 5.10-3: North Central High School on US41 between Shelburn and Farmersburg, Sullivan County

Figure 5.10-4: New Vision RV park along US41 at Oaktown, Knox County

Alternative 1

The forecasted traffic volumes for Alternative 1 which follows along US 41 up through or around Vincennes on its way to the SR 641 bypass around the southeast side of Terre Haute indicates that noise levels at 178 to 238 single family residential receivers may approach or exceed the Category B NAC of 67 dBA (Figure 5.10-2). The upper end of the range represents possible impacts of upgrading existing US 41 through Fort Branch, Vincennes and Farmersburg, while the low end reflects anticipated noise impacts for the three bypass variations collectively. Based on the generic TNM analysis residential properties located within 250 to 300 feet of the proposed centerline would likely experience L_{Aeq} levels of 66dBA or greater. Residences which are as close as 200 feet from the centerline could be exposed to L_{Aeq} levels between 69 and 70 dBA (Appendix L, Table 1). The greatest concentration of potential residential impacts would occur where the alignment follows along existing US 41 through towns such as Fort Branch, Princeton, Patoka, Vincennes, Oaktown, Carlisle, Sullivan, Shelburn, Farmersburg and Youngstown. Figure 5.10-2 illustrates that the range of potentially impacted single family residential receivers for Alternative 1 is comparatively greater than that expected for alternatives which do not utilize existing highway facilities (3A, 4A and 4B), or alternatives which follow along shorter and/or less densely populated sections of US 41 and SR 37 (2A, 2B and 5A). In contrast, potential noise impacts along Alternative 1 are predicted to be less than that expected for Alternatives 2C, 3B, 3C, 4C and 5B, each of which follows along SR 37 up through Martinsville and on up to I-465 at Indianapolis.

In addition to residential properties, there are eight churches within close proximity to US 41 which are also likely to experience levels of 66 dBA or greater (Table 5.10-3). North Central High School (Figure 5.10-3) at Farmersburg is the only school identified along US 41 for which highway noise may be a concern. Fort Branch Community School west of US 41 on the south side of Fort Branch is located over 500 feet from the existing centerline, placing it beyond the predicted impact zone. There are currently four hotels/motels along US 41 which fall within the 300 foot Category B NAC impact

Figure 5.10-5: Shelburn Community Park along US41 at Shelburn, Sullivan County

Figure 5.10-6: New subdivisions under construction at Southern Dunes community west of SR37, southern Marion County

zone. Hospitals and/or health care facilities within the potential impact zone of Alternative 1 included the Carlisle Medical Center (an outpatient clinic) and the Sullivan County Community Hospital. The portion of the hospital property within the 300 foot 66 dBA impact zone is green space that does not appear to be utilized for any external activity. The hospital structures are estimated at over 400 feet from the centerline. Outdoor private or public recreational facilities immediately adjacent to US 41 include Jack Bishop Park at Princeton, the Pyramid Mound site at Vincennes (Knox County Parks and Recreation Department), the VFW Post 1157 park at Vincennes, Vincennes Elks Country Club, an RV camping park (Figure 5.10-4) along US 41 outside of Oaktown and the Shelburn Community Park in Sullivan County (Figure 5.10-5).

The increase in traffic along the corridor as the proposed alignment utilizes existing I-70 from Terre Haute to I-465 at Indianapolis has the result of increasing the potential impact to 400 feet from the centerline. However, because the SR 641 bypass at Terre Haute and the improvements to I-70 are committed projects, potential highway noise impacts were not accessed along these corridors.

Alternative 2

The number of single family residences that would potentially be impacted by Alternative 2 varies greatly depending on which optional alignment is considered at the northern end of the project. Alternatives 2A and 2B are comparatively similar with 99 to 134 and 108 to 143 affected households respectively (Figure 5.10-2). The analysis of Alternative 2C on the other hand, predicts single family residence impacts between 331 and 450 homes, over three times that of Alternatives 2A and 2B. There are also portions of four apartment complexes along SR 37 that are located within the Category B NAC zone delineated for Alternative 2C. Because the alignments of Alternatives 2A and 2B follow the existing US 41 corridor up to Vincennes, the number of homes expected to experience levels above 66 dBA is greater than that of Alternatives 4A and 4B, yet less than that of Alternative 1 (Figure 5.10-2). The large disparity in expected noise impacts between the 2C alignment and those of Alternatives 2A and 2B is attributed to two factors. First, the alignment of Alternative 2C, like those

Figure 5.10-7: First Baptist Church along US41 in Vincennes, Knox County

Figure 5.10-8: Martinsville Country Club along SR37 north of Martinsville, Morgan County

of Alternatives 3B, 3C, 4C and 5B, follows along SR 37 northward through Martinsville where several high density residential clusters are located immediately adjacent to the existing facility principally between SR 39 and SR 252. Second, the upper end of the range reflects the 2C2 variation alignment through Johnson and Marion Counties that continues along SR 37 adjacent to a number of small concentrations of homes near the roadway. Included among these are two residential sections of the recently developed Southern Dunes community abutting SR 37 in Marion County (Figure 5.10-6). The range of potentially impacted single family residences for Alternative 2C is comparable to Alternative 3B and 3C, yet slightly higher than Alternatives 4C and 5B (Figure 5.10-2)

Forecasted traffic volumes for the Alternative 2 alignments up through or around Vincennes indicate that potential receivers at or just over 300 feet from the proposed centerline are likely to approach or exceed the 67 dBA Category B NAC (Appendix L Table 2 through 4). Decreases in traffic volumes between Vincennes and the point at which Alternatives 2A, 2B and 2C split in northeastern Owen County (north of Spencer) show that the zone of potential Category B NAC impact, or substantial L_{Aeq} increase, will decrease to 250 feet from the centerline. However, a resurgence in traffic for Alternatives 2A and 2B up to I-70 extends the probable impact zone back out to 300 feet. As with Alternative 1, connection with I-70 will have the effect of expanding the zone to 400 feet from the centerline for Alternatives 2A and 2B. Anticipated increases in traffic for Alternative 2C north of the SR 37 intersection at Martinsville will expand the potential impact zone out to 350 in Morgan and northwestern Johnson Counties and as much as 400 feet from the centerline in Marion County south of I-465.

There are seven churches along Alternative 2C that may experience highway noise levels that constitute an impact (Figure 5.10-7). Only three of these are located along Alternatives 2A and 2B (Table 5.10-4). Martinsville High School is the only educational facility located within the potential noise impact zone for Alternative 2C. It should be noted that the portion of the school property within the 350 foot impact zone along existing SR 37 is currently utilized for parking or open space exclusively, and that external activity areas (i.e., athletic fields) associated with the high school are located 500 feet or more from the centerline and are, for the most part, shielded by the school buildings. There are three hotels/motels that may be affected by Alternative 2C, two of which would

also be impacted by Alternatives 2A and 2B. Although there were no hospitals documented immediately adjacent to Alternative 2, three health care facilities are located within the 350 foot zone along SR 37 in Martinsville. They include Heritage Home Health, Grandview Convalescent Center and Center for Behavioral Health. Alternative 2 would also potentially impact the four recreation sites along US 41 identified at Princeton and Vincennes in the Alternative 1 description. Additional outdoor recreation sites potentially affected by highway noise from Alternative 2C include a small part of the Martinsville Country Club (Figure 5.10-8) clubhouse and a horse riding stable along existing SR 37 in Morgan County.

Figure 5.10-9: Pine Apartments along SR37 at Martinsville, Morgan County

Alternative 3

As with Alternative 2, the collective number of single family residences for the Alternative 3 options differ substantially depending on alignment location in the northern half of the Study Area. Alternative 3A, by virtue of its almost exclusively new alignment up to I-70 is expected to generate highway noise impacts at 96 to 101 residences based on the generic TNM analysis. The vast majority of these residential sites are isolated and widely scattered homes or loosely aggregated clusters of three to five homes. Exceptions to this pattern occur southwest of Stanford in Greene County where the alignment cuts through two moderately dense rural neighborhoods off of SR 45. The range of single family residences predicted to incur highway-related noise impacts by Alternative 3A are the third lowest of the twelve alignments analyzed for the Tier 1 study (Figure 5.10-2). In contrast, Alternatives 3B and 3C which utilize portions of SR37 from Bloomington on up to I-465 are predicted to affect three to four times as many single family homes at 329 to 418 residences and 361 to 450 residences respectively. As with Alternative 2C, this includes the numerous homes in the high-density neighborhoods along SR37 at Martinsville and residences at the Southern Dunes community along SR37 in southern Marion County. The ranges for Alternatives 3B and 3C are among the three highest of the alignments studied in the Tier 1 DEIS. Alternatives 3B and 3C have the potential to affect the same four apartment complexes at Martinsville and southern Marion County as Alternative 2C (Figure 5.10-9). Portions of an additional four apartment complexes along SR37 in Bloomington may also experience L_{Aeq} levels above 66 dBA with Alternative 3C.

The traffic volumes forecasted for the Alternative 3 alignments up to Washington result in Category B NAC impacts at or just over 250 feet from the centerline (Appendix L Tables 5 through 7). Although traffic volumes were not specifically provided for the pair of western bypass variations or the alignment using US 50/US 150 nearer to Washington on the east side, they would most likely be similar to those for the east bypass with an impact zone of 250 feet from the centerline. In crossing US 231, each of the Alternative 3 alignments experience an increase in forecasted traffic volumes of sufficient magnitude to extend the potential zone of impact to 300 feet. Traffic volumes steadily increase along Alternative 3A north of Bloomington expanding the zone of impact to an estimated

Figure 5.10-10: Martinsville High School along SR37, Morgan County

Figure 5.10-11: Lighthouse Landing Apartments, Marion County

350 feet from centerline just prior to connection with I-70. The 66 dBA zone for Alternatives 3B and 3C increase to 350 feet where they join existing SR 37 and steadily approaches 400 feet as each alignment nears I-465 in Marion County.

This analysis revealed that collectively four churches from Gibson, Pike and Daviess Counties in the southern half of the Study Area would be close enough to Alternative 3A to experience L_{Aeq} levels of 66 dBA or greater. The probable number of church impacts increases to ten and thirteen respectively for Alternatives 3B and 3C as these alignments pass through Bloomington, Martinsville, and/or southern Marion County. As described for Alternative 2C, the eastern edge of Martinsville High School (Figure 5.10-10) is also within the 66 dBA Category B NAC zone for Alternatives 3B and 3C. Hotels/motels within 350 feet of SR 37 include one at Bloomington that may be affected by Alternative 3C and two at Martinsville that may be affected by both Alternatives 3B and 3C. The same three health care facilities identified for Alternative 2C at Martinsville would also be potential noise sensitive receivers for Alternatives 3B and 3C. Potential noise-related impacts to recreational sites associated with Alternatives 3B and 3C include Martinsville Country Club and Whispering Meadows Riding Stables.

Alternative 4

Alternative 4 is a hybrid between the southern half of Alternative 3 which passes through Gibson, Pike and Daviess counties up to Washington, and the northern half of Alternative 2 crossing Greene, Owen, Putnam, Morgan and/or Johnson County up to I-70 or I-465. Just as with Alternative 2, the number of single family residences which may potentially experience highway-related noise impacts is dependant on whether the alignment follows an existing highway corridor through heavily populated communities, namely US 41 and/or SR 37, or avoids such locations by traversing cross country. Alternatives 4A and 4B, which are exclusively on new alignment with the possible exception of a short section of US 50/US 150 at Washington, are predicted to produce L_{Aeq} levels above 66 dBA or substantial increases 15 dBA over ambient levels at between 48 to 53 homes for Alternative 4A and 52 to 57 homes for Alternative 4B throughout their entire length up to I-70

(Figure 5.10-2). These impacts occur exclusively at individual widely scattered rural residences or small loosely grouped clusters at road crossings in the Washington area. Neither alignment is within close proximity to multi-family dwellings. The ranges of Alternatives 4A and 4B exhibit the least potential noise impact to single family residential properties relative to the other study alternatives. The 277 to 366 single family residences predicted to be impacted by Alternative 4C which follows SR 37 from Martinsville to I-465 are five to six times as many as that expected for the Alternative 4A and 4B rural routes leading up to I-70. Alternative 4C would impact the same residential neighborhoods in Martinsville and southern Marion County (including the Southern Dunes development) as Alternatives 2C, 3B, 3C and 5B. This alignment also has the potential to affect the same four apartment complexes in Martinsville and southern Marion County as Alternatives 2C and 3B (Figure 5.10-11). While the range of expected residential impacts for Alternative 4C is notably higher than alignments that do not utilize existing highway facilities or less densely populated highways (US 41), it represents the lowest collective range of any of the alternatives that follow along SR 37 from Martinsville north.

Figure 5.10-12: Super 8 Motel along SR37 at Martinsville, Morgan County

Because the forecasted traffic volumes for Alternative 4 up to Washington are nearly the same as those for Alternative 3, the 250 foot zone on either side of the centerline for potential Category B NAC or substantial increase impacts applies to Alternative 4 as well (Appendix L Tables 8 through 10). Again, specific forecasted traffic data for the pair of western bypass variations and the US 50/ US 150 alignment on the east side of Washington are not available, but they are expected to be similar to those for the eastern bypass, in which case the zone of impact would also be just over 250 feet. Expected traffic volumes north of SR 54 in Greene County for the Alternative 4 alignments are comparable to those used for the identical Alternative 2 alignments. The anticipated noise impacts will therefore be the same. For Alternative 4A the rural 65 dBA impact zone will extend just over 250 feet from the centerline up to the junction with I-70. Based on predicted traffic volume increases, the impact zone for Alternative 4B increases from just over 250 feet off the centerline up to SR 67, to 300 feet from SR 67 up to the I-70 junction. As described for Alternative 2C, Alternative 4C along existing SR37 from Martinsville up to I-465 has a potential for noise impacts to high density residential properties at Martinsville and at several small communities or scattered neighborhoods within 350 to 400 feet of SR 37 in northwestern Johnson and southern Marion counties.

Four churches identified along Alternative 4 up to Washington are expected to experience highway noise levels of 66 dBA or greater. An additional four churches, three at Martinsville and another along SR 37 in Marion County, would also be subjected to Category B NAC noise levels for Alternative 4C. The analysis of Alternatives 4A and 4B did not reveal any schools, hotels/motels, hospitals/health care facilities, or any recreational sites within close proximity to the working alignment where highway noise levels would approach or exceed the criteria. The alignment of Alternative 4C through Martinsville would pass by Martinsville High School, be within 350 feet of

Figure 5.10-13: Grandview Convalescent Center along SR37 at Martinsville, Morgan County

the Super 8 hotel (Figure 5.10-12) and three health care facilities on SR 37, and potentially impact the same two recreational sites described for Alternative 2C.

Alternative 5

Alternative 5 shares its alignment with Alternatives 3 and 4 up to Washington in Daviess County. On the east side of Washington, the alignment heads east-northeast across Martin County and into Lawrence County where it connects with SR 37 on the west side of Bedford. Both alignments follow SR 37 through Bedford and Bloomington on up to Martinsville. Alternative 5A splits off SR 37 southwest of Martinsville, follows a portion of SR 39/SR 67 up to their junction, then heads north cross country to I-70. Alternative 5B follows along SR 37 through Martinsville and up to I-465, as does Alternatives 2C, 3B, and 4C. By avoiding the large number of high density residential neighborhoods along SR 37 in Martinsville and southern Marion County, Alternative 5A is expected to generate highway noise impacts at approximately 148 single family residences based on the generic TNM analysis (Figure 5.10-2). The 38 mile section of Alternative 5A along SR 37 in Lawrence and Monroe counties accounts for nearly 60% of the total single family residences impacted. At 310 and 394, the number of single family residence impacts predicted for Alternative 5B are over double that of Alternative 5A. Alternative 5B has the potential to impact the same residential neighborhoods in Martinsville and southern Marion County (including the Southern Dunes development) as Alternatives 2C, 3B, 3C and 4C. The number of potential single family residential impacts for Alternative 5A is comparable to the upper ranges of Alternatives 2A and 2B. Although this alternative utilizes roughly 38 miles of the existing SR 37 alignment, its overall potential for impact to residences is less than that of Alternative 1. Potential residential impacts resulting from Alternative 5B are roughly comparable to those for Alternative 4C and generally involve six to fourteen percent fewer residences than Alternatives 2C, 3A and 3B. In addition to single family residences, highway noise from Alternatives 5A and 5B also have the potential to impact six apartment complexes in Lawrence and Morgan counties. An additional four apartment complexes in Martinsville and southern Marion County may also be impacted by Alternative 5B.

The traffic volumes forecasted for the Alternative 5 alignments up to Washington result in Category B NAC or substantial increase impacts at a distance of approximately 250 feet from the centerline (Appendix L Tables 11 trough 12). As the alignments continue east of Washington, traffic volume increases north of the proposed US 231 interchange are of sufficient magnitude so as to push the Category B NAC or substantial increase zone out to a distance of roughly 300 feet. At Bedford in Lawrence County Alternatives 5A and 5B connect with the existing SR 37 alignment and follow it up through Bloomington and into southern Morgan County where the two alignments split. As expected the probability for noise impacts to high density residential neighborhoods is greater along SR 37 on the west side of Bedford, through Oolitic, and at Bloomington, as well as other smaller isolated

concentrations of homes along SR 37 between these towns. The generic TNM model results indicate that the 66 dBA impact zone is just beyond the 300 foot boundary from US 231 to the point of divergence in southern Morgan County. As Alternative 5A follows SR 39/SR 67 along the White River to the west and northwest of Martinsville the potential of encountering Category B NAC impacts within 300 feet of the proposed alignment continues, including small collections of moderate density residences in or near the communities of Beech Grove, Bunker Hill, Gasburg and Allman. Alternative 5B along SR 37 from Martinsville up to I-465 has forecasted traffic volumes which translate into L_{Aeq} levels of 66 dBA or greater at distances of just over 350 feet from the centerline.

There are eleven churches along Alternative 5A which may experience highway noise levels of 66 dBA or greater (Table 5.10-3). Seven of these are located along SR 37 between Bedford and Martinsville. The total number of churches for Alternative 5B increases by four to fifteen with the addition of three churches in Martinsville and one in Marion County along SR 37. The alignment of Alternatives 5A and 5B along SR 37 from Bedford to Bloomington also has the potential to produce highway noise impacts at Needmore Elementary School in Lawrence County. Although the building is situated just beyond the 300 foot zone used to assess impact, the playground and athletic fields behind the school have the potential to expose people using these facilities to L_{Aeq} levels of 66 dBA or greater. As with Alternatives 2C, 3B, 3C, and 4C, Martinsville High School property also falls within the potential impact zone of Alternative 5B. However, as described earlier, school property within the potential impact zone between the school buildings and existing SR 37 (i.e., parking lots) does not appear to be utilized for exterior human activities that would constitute an impact. There are three hotels/motels along SR 37 in Bedford and Bloomington that may incur highway noise impacts resulting from Alternatives 5A and 5B, with an additional two hotels at Martinsville for Alternative 5B. Potential hospital/health care facilities affected by highway noise for Alternative 5B include three previously identified sites along SR 37 in Martinsville (Figure 5.10-13). None of these would be impacted by Alternative 5A. Recreational sites along Alternatives 5A and 5B for which exterior activity noise impacts are possible included Bluespring Caverns southwest of Bedford and a putt-putt course along SR 37 at Bedford. Martinsville Country Club and Whispering Meadows Riding Stables along SR37 north of Martinsville may also be impacted by highway noise generated by Alternative 5B.

No-Build Alternative

Under the No-Build Alternative there will be no impact to noise.

5.10.5 Mitigation

Highway Noise Impacts

Since site specific impacts are not determined in this Tier 1 EIS study, a detailed discussion of noise impact mitigation is inappropriate. However, some generalities can be made regarding potential mitigation measures. Once highway noise impacted sites have been identified they must be further evaluated to determine whether abatement is both feasible and reasonable. Potential abatement measures include:

- Alteration of horizontal and/or vertical alignments

Figure 5.10-14: Example of Noise Barrier Wall along the Borman Expressway near Hammond, Indiana

- Noise insulation of public use or non-profit institutional structures.
- Construction of highway noise barriers (inside of right-of-way). Potential mitigation in the design phase should take into consideration the shifting of alignments away from densely populated neighborhoods, subdivisions or planned communities, if at all possible, where the majority of noise impacts occur. In hillier terrain changes in the roadway profile may assist in reducing predicted noise levels at impacted sites. When such measures are not possible the use of noise barrier walls will be considered (Figure 5.10-14).

INDOT policy considers abatement to be feasible if it is structurally and acoustically possible to reduce predicted noise levels at a specific receiver by at least 5 dBA. Furthermore, INDOT considers abatement reasonable only if such a measure is prudent based on the following:

- The number of receivers that will experience a benefit of at least 5 dBA at the noisiest hour through implementation of the abatement.
- The cost of abatement on a benefited receiver basis and on a project level basis. INDOT policy states that an acceptable cost for a noise barrier wall is $20,000 to $30,000 per benefited receiver as determined by applying a square footage cost to the total square footage of the wall required to achieve the necessary 5 dBA reduction. In rural areas where the residences are widely scattered the construction of short noise barriers for individual residences or tiny clusters is typically not cost effective and therefore may not be a reasonable solution.
- The severity of existing and future traffic noise levels. Severity is determined by comparing the decibel difference between the predicted level and existing level at a site to that of the decibel difference between the predicted level and the criteria level. Figure 5.10-15 is referenced to determine the severity of impact: no impact, minor impact, moderate impact, severe impact

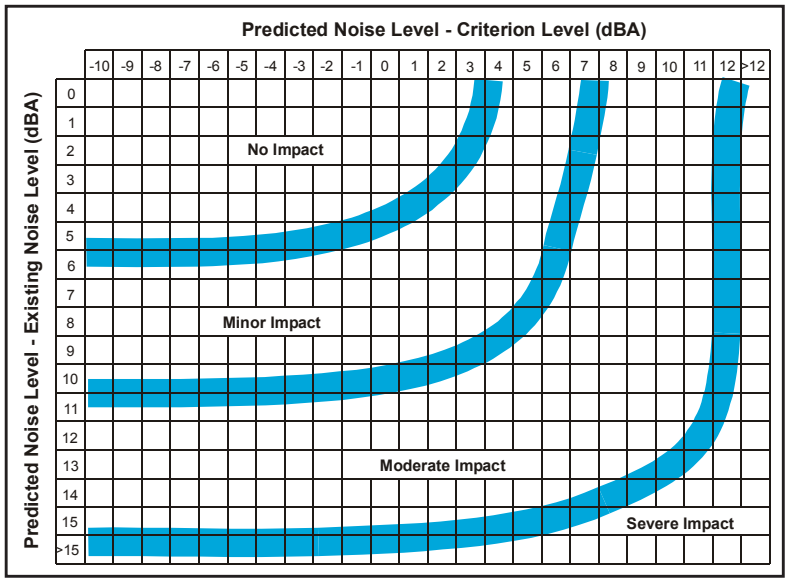


Figure 5.10-15: Impact Criteria for Determining Severity of Noise Impact for the Consideration of Noise Abatement

Table 5.10-5: Potential Residential Sites of Noise Barrier Consideration along Tier 1 DEIS Alternatives

Location	Description	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Fort Branch	west side of existing US41 from CR800S to SR68	x	x	x	x								
	west side of existing US41 from SR68 to CR650S	x	x	x	x								
Princeton	west side of existing US41 south of CR50S	x	x	x	x								
Patoka	east side of existing US41 south of Main Cross St.	x	x	x	x								
Vincennes	east side of Old US41 north of Elkhorn Rd.	x	x	x	x								
	east side of Old US41 south of Brown Rd.	x	x	x	x								
	east & west side of existing US41 south of Wabash Ave.	x	x	x	x								
	east & west side of existing US41 north of Wabash Ave.	x	x	x	x								
	east side of existing US41 from Bruceville Rd. to US41/US50 interchange	x	x	x	x								
	west side of proposed bypass from Herbert Rd. to Old US50	x	x	x	x								
	west side of proposed bypass north of Hillcrest	x	x	x	x								
Carlisle	east side of existing US41 north and south of Ledgerwood St.	x											
Shelburn	east & west side of existing US41 from CR500N to CR575N	x											
Shelburn to Farmersburg	west side of existing US41 north & south of Burnett Dr.	x											
Farmersburg	east & west side of existing US41 south of Cryrus St. & CR1175N	x											
Terre Haute	east side of existing US41 from Dallas Dr. to Eaton Dr.	x											
Southwest of Stanford	vicinity of CR350N and CR375N off SR45					x							
Oolitic	east side of existing SR37 south of Main St.											x	x
Avoca to Harrodsburg	west side of existing SR37 north of Old SR37											x	x
Bloomington	west side of existing SR37 south & north of Tapp Rd.							x				x	x
	east side of existing SR37 south & north of SR45 interchange							x				x	x
Bloomington to Martinsville	east side of existing SR37 north of Wylie Rd.							x				x	x
Northwest of Martinsville	east side of existing SR67/SR39 along High Rock Rd.											x	
Martinsville	north side of existing SR37 east of SR39 interchange				x		x	x			x		x
	north & south side of existing SR37 from Burton Ln. to Ohio St.				x		x	x			x		x
	north side of existing SR37 from Ohio St. to Industrial Dr.				x		x	x			x		x
	west side of existing SR37 from Industrial Dr. to SR252				x		x	x			x		x
	east side of existing SR37 south of SR252				x		x	x			x		x
East of Waverly	west side of existing SR37 north of Banta Rd.				x		x	x			x		x
Northeast of Bluffs	west side of existing SR37 north of Stones Crossing Rd.				x		x	x			x		x
West of Smith Valley	east side of existing SR37 south of Smith Valley Rd.				x		x	x			x		x
Southern Dunes Development	west side of existing SR37 south of County Line Rd.				x		x	x			x		x
Glenns Valley	east side of existing SR37 north of Wicker Rd.				x		x	x			x		x
Southern Dunes Development	west side of existing SR37 south of Southport Rd.				x		x	x			x		x
Lighthouse Landing Apts.	west side of existing SR37 south of Banta Rd.				x		x	x			x		x

Note: Subsequent detailed Tier 2 studies may conclude that some of these areas do not meet the feasible and reasonableness criteria for noise barrier wall abatement and/or may reveal other areas not listed here which do meet the requirements

- The timing of development near the project. The state considers it appropriate to give more consideration for development that occurs before initial highway construction.
- The views of noise impacted residents is of major importance in determining the reasonableness of constructing noise barriers. Although noise barrier walls offer adjacent residents a reduction in highway-related noise levels, negative impacts associated with these walls such as unsightliness, vandalism, degradation by weather, poor air circulation, shortened daylight, reduced safety, and restriction of access for emergency vehicles can be prohibitive in the eyes of the public under certain circumstances.

The Tier 1 level noise analysis makes no attempt to determine where barrier walls would be required and whether they meet the feasible and reasonable criteria. This will ultimately be made after Tier 2 in design. An evaluation using field verified topographic data superimposed onto aerial photographs was conducted to locate areas where residential receivers appear to be of sufficient density and proximity to the proposed working alignment to warrant further evaluation. Table 5.10-5 provides a listing of such locations. This list is not intended to be all-inclusive, yet serves to show the relative potential need for barrier mitigation for each of the alternatives. More detailed analyses in the subsequent Tier 2 NEPA studies may conclude that some of these areas do not meet the criteria and/or may reveal other areas not listed here which do require mitigation.

Highway noise abatement extends beyond construction through coordination with local officials, planning commissions and zoning boards to insure the compatibility of the transportation system with future residential and community land development. Providing information to officials identifying locations susceptible to noise impacts near existing or proposed highways can help to direct the development of property along roadways to the best suited land use. In simplest terms, local officials should be made aware of the noise environment associated with the source highway and should plan new residential development away from such facilities whenever possible.

Construction Noise Impacts

In addition to the noise generated by traffic upon completion of the project, short term noise impacts associated with construction activities are also of concern. Construction noise impacts related to a project are best controlled by establishing community awareness, consideration of construction location and sequencing of operations, controlling the source(s) of noise, and proper site control. Construction noise abatement measures may be required in areas where residences or other sensitive noise receivers are subjected to excessive noise from equipment and construction activities. These may include, but are not necessarily limited to:

- Using portable shields or enclosures for stationary noise producing equipment like drills, augers, cranes, derricks, compactors, pile drivers, on-site mixing plants, etc.
- Using efficient silencers on equipment air intakes.
- Using efficient intake and exhaust mufflers on internal combustion engines.
- Ensure proper maintenance of all machinery to eliminate excessive noise from rattling, vibration and banging.
- Limit construction operations in the vicinity of noise sensitive locations to daytime periods when excessive noise would be least harmful to residents.
- Place heavy truck haul routes away from nearby receivers whenever possible.

Efforts to minimize construction noise are typically implemented thru the use of provisions within the construction contract that require the contractor(s) to make reasonable efforts to prevent construction noise from becoming a public nuisance or detrimental to human health.

5.10.6 Summary

The Tier 1 analysis shows that each of the alternatives studied has the potential to impact single family residences based on the Category B Noise Abatement Criteria of 67 dBA. However, due to their alignments along SR 37, Alternatives 2C, 3B, 3C, 4C and 5B have the potential to impact between 2 and 4.5 times as many residences as Alternatives 2A, 2B, and 3A, or 5 to 9 times as many as 4A and 4B. The 178 to 238 single family residences expected to be impacted along existing US 41 by Alternative 1 represent a range that lies roughly midway within the overall range of 48 to 450 impacted receivers predicted for all of the alternatives studied. The greatest number of potentially impacted single family residential receivers would occur along SR 37 through Martinsville and in southern Marion County (Alternatives 2C, 3B, 3C, 4C and 5B).

In addition to single family residences, the Tier 1 analysis identified a number of apartment complexes, churches, schools, hotels/motels, hospitals/health care facilities and outdoor recreation sites which may also experience highway noise related impacts. Nearly all of these sites occur along existing US 41 from I-64 to Terre Haute, or along SR 37 from Bedford up to I-465 in Indianapolis. Alternatives 3A, 4A and 4B would probably impact the least number of such facilities (all churches), followed by Alternatives 2A and 2B, which also include possible impacts to two hotels/motels and four recreation sites along US 41. Alternative 5B (approx. 40 sites), and to a slightly lesser extent Alternatives 3C (approx. 30 sites), have the potential to affect the greatest number of these receiver types. The remaining five alternatives, including Alternative 1, may impact between 19 and 24 of these receiver types.

An analysis of the number of potentially impacted single family residences clustered along each alternative was used to determine areas where noise barrier abatement may be reasonable based on INDOTs current Noise Abatement Policy. Understandably, the five alternatives which utilize portions of the existing SR 37 facility through Lawrence, Morgan and Marion County (Alternatives 2C, 3B, 3C, 4C and 5B), and the four alternatives which follow along existing US 41 up to Terre Haute (Alternatives 1, 2A, 2B, and 2C) have the greatest potential for noise barrier consideration. Several segments along SR 37 through Martinsville and the Southern Dunes Development in Johnson and Marion counties are two of the most notable areas where potentially long barrier walls may be required. In the case of Alternative 2C, which utilizes portions of US 41 and SR 37, as many as 23 locations were identified where residential densities appeared to be great enough to warrant additional investigation regarding the feasibility and reasonability of abatement via barrier wall construction. In contrast, this analysis did not identify any such areas for Alternatives 4A and 4B, and only one possible location along Alternative 3A where noise barriers might be warranted.

5.11 Wild and Scenic Rivers

5.11.1 Introduction

The rivers of the United States are a valuable resource, which provide a variety of scenic, recreational, geological, wildlife, historic, and cultural values. Many of these rivers are protected under federal and state laws. The National Wild and Scenic Rivers System, which includes the nation's premier rivers, and the Nationwide Rivers Inventory both act to protect rivers from a national level. While lists such as the IDEM Waters Designated for Special Protection and the IDNR Natural and Scenic River Segments act to protect Indiana's rivers at the state level.

The National Wild and Scenic Rivers System was created in 1968 by the Wild and Scenic Rivers Act. The Wild and Scenic Rivers Act states that it "be the policy of the United States that certain of selected rivers the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations" (Department of the Interior, 2002). The National Wild and Scenic Rivers System list is maintained by the National Park Service (NPS).

In addition to the National Wild and Scenic Rivers System, the National Park Service has compiled and maintains the Nationwide Rivers Inventory (NRI). The NRI is a register of rivers that may be eligible for inclusion in the National Wild and Scenic Rivers System. The intent of the NRI is to provide information to assist in making balanced decisions regarding use of the nation's river resources.

Rivers considered to have special importance, and merit special protection, by the state of Indiana must also be taken into account. These rivers are listed in either the Indiana Department of Environmental Management's (IDEM) Waters Designated for Special Protection, and the Indiana Department of Natural Resource's (IDNR) Natural and Scenic River Segments.

5.11.2 Methodology

The National Park Service National Wild and Scenic Rivers System internet web site (http://www.nps.gov/rivers/) was reviewed in order to determine if National Wild and Scenic Rivers were present within the I-69 study area.

The Geographic Information Systems (GIS) data layer, "Designated Rivers in Southwestern Indiana," was used to determine if proposed alternatives crossed rivers listed on: the Nationwide Rivers Inventory, the IDEM Waters Designated for Special Protection, and the IDNR Natural & Scenic River Segments. For a more detailed explanation on how the GIS was used to determine potential impacts, refer to Section 4.1, *GIS Approach*, and Section 5.1, *Methodology*, in this document.

Figure 5.11-1: West Fork of the White River (SR 67 Crossing)

Figure 5.11-2: East Fork of the White River (SR 57 Crossing)

5.11.3 Analysis

There are no rivers listed in the National Wild and Scenic Rivers System in the I-69 study area. Therefore the proposed I-69 project will not adversely affect these resources.

However, some segments of the East and West Forks of the White River are listed in the Nationwide Rivers List (NRI), and crossed by the proposed alternatives. Figure 5.11-1 and Figure 5.11-2 show these two rivers. An approximately 55-mile long segment of the East Fork is included on the NRI because of its scenic, recreational, geologic, fish, and historic values. An approximately 216- mile stretch of the West Fork has been included on the NRI because of its fish, wildlife, historic, and other values. Figure 5.11-3 shows the NRI river segments within the study area, pointing out those crossed by the proposed alternatives. Alternative 2C crosses the West Fork of the White River in 1-2 places, depending on the variation near Indianapolis. Alternative 3A crosses both the East Fork and the West Fork of the White River, for a total of 2 crossings of NRI listed rivers. Alternatives 3B and 3C cross the East Fork of the White River, and may cross the West Fork depending on which variation near Indianapolis is chosen, for a total of 1-2 crossings. Alternatives 4A and 4B cross the East Fork and the West Fork of the White River, for a total of 2 crossings. Alternative 4C crosses the East Fork once, and the West Fork 2–3 times, depending upon the variation near Indianapolis, for a total of 3–4 crossings. Alternative 5A crosses the East Fork and the West Fork of the White River for a total of 2 crossings. And Alternative 5B crosses the East Fork and crosses the West Fork in one variation near Indianapolis, for a total of 1–2 crossings. The No-Build Alternative will have no impacts on wild and Senic River resources.

There are no rivers listed on the IDEM Waters Designated for Special Protection list or the IDNR Natural and Scenic River Segments crossed by the five proposed alternatives. Therefore the proposed I-69 project will not adversely affect these resources.

5.11.4 Mitigation

No Wild and Scenic Rivers are present in the proposed I-69 study area. However, several of the proposed alternatives cross rivers listed on the NPS NRI, the East and West Forks of the White River. The Federal Highway Administration, as a federal agency, seeks to avoid or mitigate adverse effects on rivers identified in the NRI as part of the normal planning and environmental review processes of a project. All federal agencies are required to consult with the NPS prior to taking actions that could effectively foreclose wild, scenic, or recreational status for rivers on the inventory. An Early Coordination letter was sent to the NPS. The NPS provided no response to the Early Coordination letter. Coordination with the NPS on June 25, 2002 indicated that they will review the Draft EIS and provide comments if necessary. Coordination with the NPS will continue in the Tier 2 NEPA studies.

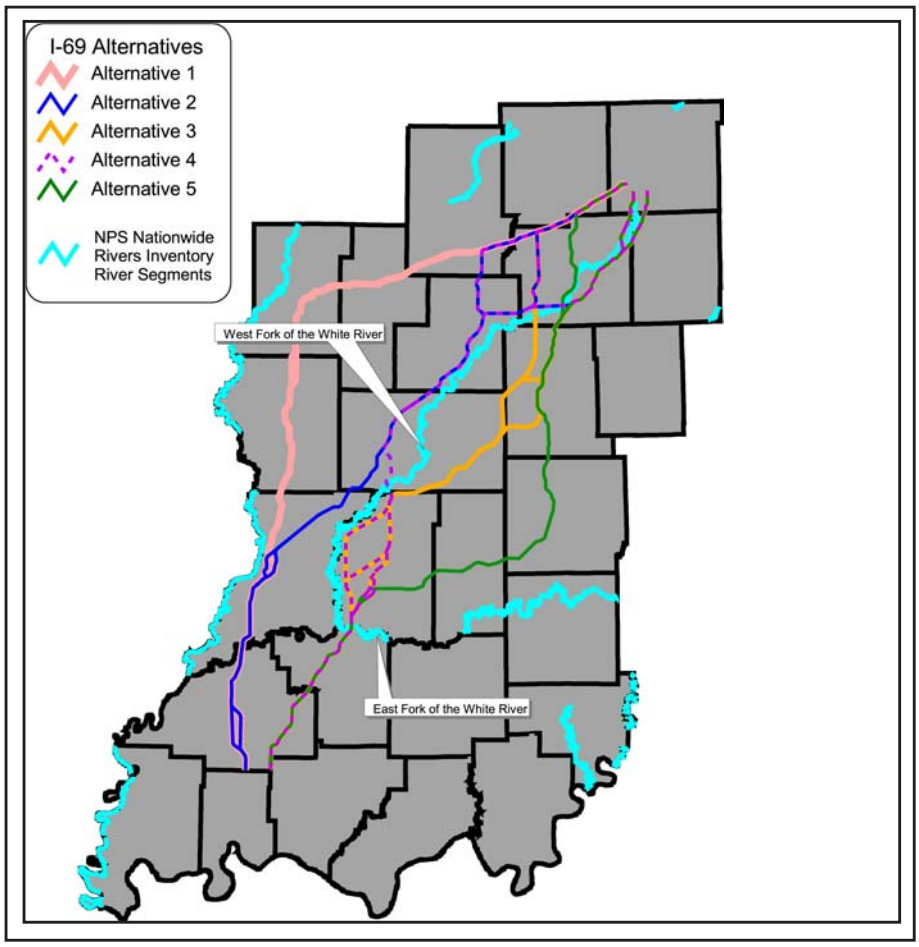


Figure 5.11–3: National Park Service Nationwide Rivers Inventory River Segments and Proposed I-69 Alternatives

5.11.5 Summary

There are no National Wild and Scenic Rivers present within the I-69 study area. Therefore, the proposed project will have no adverse impacts to those resources. No IDEM Waters Designated for Special Protection or IDNR Natural and Scenic River Segments are crossed by the five alternatives; therefore the proposed project will have no adverse impacts to those resources. Segments of the East and West Forks of the White River are listed in the Nationwide Rivers Inventory, and are crossed by a number of alternatives. If one of those alternatives is chosen, further coordination with the NPS will be necessary to determine if the proposed project will adversely affect those resources, and what avoidance or mitigation measures should be taken. The No-Build Alternative will have no impacts on wild and scenic river resources.

5.12 Construction Impacts

5.12.1 Introduction

Construction of any of the build alternatives will impact the existing environment in several ways. The construction impacts for this project may include noise generated by construction equipment; air pollution as a result of construction activities; water pollution due to soil erosion and construction activities; impacts due to heavy blasting; and traffic impacts from detours and motorist inconveniences.

5.12.2 Analysis

Noise

Noise generated by construction equipment may also be an impact of construction. The presence of an impactable noise receptor within close proximity of the construction limits could raise the concern of potential construction noise impacts. Generally speaking, the potential for construction related noise impacts will be much higher where an alternate passes through an urban or suburban area, and where an alternate follows and existing alignment. The potential in these areas is increased due to the higher number of noise receptors in close proximity to the construction activity.

Air Pollution

The main component of air pollution derived from construction activities is fugitive dust. Fugitive dust is the generation of sufficient particulate matter that some portion of the material escapes beyond the right-of-way or construction boundary. Fugitive dust emissions can be created by many construction related activities. Reasonable precautions are typically sufficient to control fugitive dust emissions. INDOT standard specifications include the use of water spraying for the control of fugitive dust, as well as the tarping of vehicles. These specifications will be followed.

Water

Alternatives 3, 5 and to a lesser degree Alternative 4, cross karst areas and would require the following of the Memorandum of Understanding (MOU) dated October 13, 1993 between INDOT, IDNR, IDEM and USFWS for crossing karst areas (see Appendix U). Alternative 2 crosses some karst in the Rattlesnake Creek area, while Alternative 1 does not cross any karst. Tier 2 NEPA studies will determine the best location for the Interstate and will focus in particular on karst impacts and mitigation if an alternative is selected that traverses karst topography. The design of roadside drainage ditches connected to “filter strips” and containment basins for spill prevention/ containment as well as other Best Management Practices (BMP) will be implemented to minimize impacts. Such designs are constructed to prevent contaminants from entering the groundwater.

Because of the rapid transport of runoff into and under the ground in karst areas, groundwater contamination is a primary concern in karst topography. Similar to construction near surface streams, primary construction concerns in karst areas pertain to erosion and sediment

Figure 5.12-1 – Sedimentation Basin BMP on Roadway Construction Project

contamination as well as contamination from servicing of construction vehicles. In addition to groundwater contamination, sediment erosion from a construction site could plug the drainage of a sinkhole causing flooding. The erosion control measures mentioned above as well as peat filters, runoff retention basins, grassed waterways, catch basins and any other BMP available at the time of construction may be implemented. Because drainage features can be difficult to identify in karst areas, timely implementation of erosion control devices is crucial for construction in and around sinkholes. Additionally, particular care must be taken in choosing designated construction vehicle maintenance areas in karst terrain. These areas should not be located within a sinkhole or any area draining directly to a sinkhole.

Construction activities may also impact wetlands within and outside of the proposed right-of-way for this interstate. All efforts to avoid, minimize and mitigate for wetlands shall be implemented as much as possible. The Memorandum of Understanding dated January 28, 1991 between INDOT, IDNR and USFWS for wetlands shall be followed (see Appendix T).

Erosion Control

There are several stream crossings in this proposed highway that could be adversely affected by construction activity. Procedures to reduce the impact of erosion and runoff into streams will be implemented. Temporary erosion control devices such as silt fencing, check dams, sediment basins, inlet protection and sodding will be used. Disturbed soil areas will be revegetated in a timely manner. Any riprap used will be of a large diameter in order to allow space for habitat for aquatic species after placement. In order to reduce the opportunity for spill of fuel or other volatile chemicals into a stream, all servicing of construction equipment will take place away from the streambed in a designated maintenance area. Major streams crossed by the 5 alternatives may be found in the Environmental Atlas in the Comment Box for each sheet of each alternative. Also, Appendix J, Floodplain Impact Details, lists major stream crossings per alternative. Best Management Practices (BMP) shall be used in the construction of this Interstate to minimize impacts of erosion.

Heavy Blasting Impacts

A major concern for limestone is the effects of heavy blasting. The main concern for limestone is shock waves that could travel from the highways sites through the rock and possibly fracture marketable limestone. Strict blasting specifications will be prepared and followed including special excavation measures during blasting. These specifications are included in the Memorandom for Understanding for karst (see Appendix U). Alternatives 3, 5, and to a lesser degree Alternative 4, by the nature of their terrain and the preliminary grades in crossing the Crawford Upland, Mitchell

Plain, and Norman Upland, have the greatest possibility of heavy blasting involving limestone. Alternative 2 should have very little if any heavy blasting, while Alternative 1 is not expected to have any heavy blasting due to its flat terrain.

Figure 5.12-2 – Typical Traffic Impacts

Traffic

Existing travel patterns will be impacted during construction of a new interstate along existing roadways. Motorist inconveniences and safety concerns will be greatest where construction occurs along existing four-lane roadways.[1] There will be more detours and lane restrictions along these routes compared to construction which occurs on new terrain routes.

In order to assess the relative impacts of construction-related delays among alternatives, traffic forecasts were made to estimate the effect of construction-related delays upon existing highway users. These delays will be temporary, and any section of existing highway should be affected for no more than two or three years.

In these forecasts, the existing four lane highways (SR 37 and US 41) which would be upgraded for the various alternatives were assumed to be under construction conditions. The available roadway capacity was reduced to correspond to construction-related conditions. Forecasts were made of the increased costs for travel time, vehicle operating costs, and increased accidents (safety costs). Table 5.12-1 gives the estimated increase in annual user costs for each of the alternatives.

Table 5.12-1: Annual Construction-Related User Costs, by Alternative

	Annual Construction-Related Costs			
Alternative	Mobility	Veh. Op.	Safety	Total
1	$33,000,000	$(3,000,000)	$15,000,000	$45,000,000
2A	$21,000,000	$ 1,000,000	$11,000,000	$33,000,000
2B	$21,000,000	$ 1,000,000	$11,000,000	$33,000,000
2C	$25,000,000	$ 4,000,000	$23,000,000	$52,000,000
3A	$ -	$ -	$ -	$ -
3B	$ 7,000,000	$ 8,000,000	$14,000,000	$29,000,000
3C	$17,000,000	$ 4,000,000	$10,000,000	$31,000,000
4A	$ -	$ -	$ -	$ -
4B	$ -	$ -	$ -	$ -
4C	$ 4,000,000	$ 4,000,000	$13,000,000	$21,000,000
5A	$19,000,000	$(1,000,000)	$ (2,000,000)	$16,000,000
5B	$23,000,000	$ 3,000,000	$11,000,000	$37,000,000

Source: Indiana Statewide Travel Model and NET_BC Program: Bernardin, Lochmueller & Associates

The change in ***travel time*** costs represents the value of additional time travelers spend delayed in traffic and/or diverting to other routes. The change in ***vehicle operating*** costs represents the change in expenditures on fuel, oil, tires, vehicle maintenance and depreciation; since these costs are lower at lower travel speeds, some alternatives provide a vehicle operating cost reduction when they are under construction. The change in ***safety*** costs represent the costs attributable to increased traffic accidents.

1 Existing two-lane roads are generally not proposed for use as rights-of-way for the alternatives. The significant impacts upon existing traffic will be largely concentrated where construction occurs on existing four-lane roads.

These costs are annual costs, assuming that most construction occurs between 2007 and 2017. The total user costs for construction-related impacts would be the total construction-related cost multiplied by the number of years the alternative is under construction. Three alternatives (3A, 4A, and 4B) do not require the upgrading of any existing four-lane road; accordingly, the construction-related user costs for these alternatives are anticipated to be minimal.

These costs must be viewed in context. Once a facility is completed, the annual user benefits are many times the temporary costs incurred during construction. Typically, the annual user benefits are four to ten times these temporary costs. As noted above, these costs will be incurred over two to three years, while the resulting benefits will continue year after year.

5.12.3 Mitigation

Reasonable precautions are typically sufficient to control fugitive dust emissions. These precautions include water spraying and tarping of vehicles carrying particulate matter.

Tier 2 NEPA studies will determine the best location for the Interstate and will focus in particular on karst impacts and mitigation. The design of roadside drainage ditches connected to “filter strips” and containment basins for spill prevention/containment as well as other Best Management Practices will be implemented to minimize impacts if applicable.

Construction activities may also impact wetlands within and outside of the proposed right-of-way for this interstate. All efforts to avoid, minimize and mitigate for wetlands shall be implemented as much as possible. The Memorandum of Understanding dated January 28, 1991 between INDOT, IDNR and USFWS for wetlands shall be followed.

Temporary erosion control devices such as silt fencing, check dams, sediment basins, inlet protection and sodding will be used. Disturbed soil areas will be revegetated in a timely manner. Any riprap used will be of a large diameter in order to allow space for habitat for aquatic species after placement. In order to reduce the opportunity for spill of fuel or other volatile chemicals into a stream, all servicing of construction equipment will take place away from the streambed in a designated maintenance area.

A major concern for limestone is the effects of heavy blasting. The main concern for limestone is shock waves that could travel from the highways sites through the rock and possibly fracture marketable limestone. Strict blasting specifications will be prepared and followed including special excavation measures during blasting.

5.12.4 Summary

Construction of any of the build alternatives will impact the existing environment and require mitigation measures. The No-Build Alternative will have no construction impacts.

5.13 Historic and Archaeology Impacts

5.13.1 Introduction

According to the opening paragraph of the National Historic Preservation Act (NHPA) of 1966, "*the historical and cultural foundations of the Nation should be preserved as part of our community life and development in order to give a sense of orientation to the American people*." Further, the federal government has a responsibility "*to foster conditions under which our modern society and our prehistoric and historic resources can exist in productive harmony*." [16 U.S.C. 470b(2)] As a result of the NHPA, as amended, and 36 CFR Part 800 (Revised January 2001), federal agencies are required to take into account the impact of federal undertakings upon historic properties in the area of the undertaking.

To initiate the investigations and analyses required by Section 106 of the National Historic Preservation Act (NHPA), as amended, a "*Section 106 Compliance Plan for I-69 Evansville to Indianapolis Study*" was developed. Section 106 of the NHPA requires the FHWA and the project applicant INDOT to identify those consulting parties who may be entitled to participate in the historic preservation review process because of their interest in historic properties that may be affected by the project. Consulting parties include representatives of local governments, as well as other individuals or organizations with an interest in the project.

5.13.2 Methodology and Process

The Section 106 process for the I-69 Evansville-to-Indianapolis Study is being carried out in accordance with the "Section 106 Compliance Plan," which was developed for this project and is attached in Appendix P. This section summarizes the elements of the "*Section 106 Compliance Plan*" and then discusses thee actions taken to date to develop and implement the Compliance Plan.

5.13.2.1 Section 106 Compliance Plan

The basic steps in the Section 106 consultation process are the same for all projects. These steps, as defined in the Section 106 regulations, include:

(1) defining the area of potential effect (APE);

(2) identifying historic properties and archaeological sites within the APE that are "listed in or eligible for" the National Register of Historic Places;

(3) determining whether the proposed action has "adverse effects" on any of the listed or eligible properties;

(4) resolving any adverse effects – often by entering into a binding memorandum of agreement (MOA).

To ensure compliance with these regulations in the context of a tiered NEPA study, the Section 106 Compliance Plan was developed, in consultation with the Indiana State Historic Preservation Officer

(SHPO) and the Advisory Council on Historic Preservation. (See below for a chronology of the development of the Compliance Plan.)

As defined in the Compliance Plan, the Section 106 process during Tier 1 will cover each of four steps listed above, at a level of detail appropriate for a Tier 1 study. The Section 106 steps will also be followed, at a higher level of detail, in the Tier 2 NEPA studies. The Section 106 consultation during Tier 2 will build on the information developed in Section 106 consultation during Tier 1. Key elements of the Compliance Plan include the following:

Determining the Area of Potential Effects (APE)

The Compliance Plan states that the Area of Potential Effect (APE) will include the two-mile-wide "study band" along each of the alternatives, with the understanding that the APE may need to be wider than two miles in some places and narrower in others, and that the APE is subject to revision during the Section 106 process.

Identifying Listed or Eligible Resources

The Compliance Plan adopts a "phased" approach to the identification of historic and archaeological resources that are listed in or eligible for the National Register of Historic Places. The use of a phased approach is appropriate for projects, like this one, that involve lengthy corridors or large land areas. Under a phased approach, the Section 106 process focuses initially on the likely presence of historic properties and archaeological resources in an area.

Consistent with the phased approach, the Section 106 process during Tier 1 has involved the identification of (1) all properties that have previously been listed or determined eligible for the National Register, and (2) all properties that are found to be "potentially eligible," following appropriate consultation. This investigation has considered both historic and archaeological resources. It has considered the potential for individually eligible resources, as well as the potential for historic districts.

Potentially eligible properties were initially identified through a review of existing records maintained by each county in the study area. However, the identification of potentially eligible resources was not based solely on a review of existing records. Extensive field reviews were conducted. For historic resources, these reviews focused, in particular, on the counties for which historic property inventories had not previously been completed. These counties include Pike and Martin, as well as, to a lesser extent, Gibson and Warrick.

All "potentially eligible" properties within the APE for the selected alternative will be further investigated in Tier 2 NEPA studies (if a "build" alternative is selected in Tier 1). The Tier 2 NEPA studies will resolve the eligibility status for all "potentially eligible" properties, and will determine the specific boundaries for those that are determined to be eligible.

Evaluating Adverse Effects

Consistent with the phased approach discussed above, the Tier 1 study will focus on evaluating the likelihood of adverse effects for each of the five alternatives under consideration. The ability to evaluate effects at Tier 1 will necessarily be limited, because the location of the highway within the corridor will be unresolved, nor will there be sufficiently detailed engineering to show the horizontal and vertical curvature of the roadway. However, within these constraints, it will be possible to draw preliminary conclusions regarding adverse effects.

The Compliance Plan states that the Draft EIS will identifying any "unavoidable" adverse effects and any "potential" adverse effects within the APE. Based on subsequent consultation with the SHPO, it has been determined that all historic resources within the APE will be treated as "potential" adverse effects. The DEIS and Section 106 documentation has been drafted accordingly.

All "potentially adversely affected" properties within the APE for the selected alternative will be further investigated in Tier 2 studies (if a "build" alternative is selected in Tier 1). The Tier 2 studies will result in determinations of "adverse effect" or "no adverse effect," as appropriate, based on specific information about each property's significant characteristics and boundaries, as well as the alignment and elevation of the proposed project.

Resolving Adverse Effects

As with the evaluation of adverse effects, the discussion of avoidance, minimization, amd mitigation measures will be constrained at Tier 1 by the lack of detail regarding the location and profile of the roadway. However, avoidance, minimization, and mitigation measures wherever possible will be considered at an appropriate level of detail in Tier 1. For example, it may be appropriate to consider "standard treatments" for mitigating certain types of impacts. The appropriate level of detail for addressing mitigation measures in Tier 1 will be determined in consultation with the SHPO and the other consulting parties.

The results of this effort will be documented in the Final EIS. If a programmatic agreement or other document is executed, that document will be included in the Final EIS as an appendix. Alternatively, mitigation conditions could be specified in the Tier 1 ROD. Final decisions on mitigation measures will be made in Tier 2.

5.13.2.2 Chronological Summary of Section 106 Consultation

This chronology summarizes the actions taken as part of the development and implementation of the Section 106 Compliance Plan. For additional information, please refer to the Section 106 materials contained in Appendix P.

January 5, 2000 - The Notice of Intent to prepare an EIS for I-69 is published by FWHA in the Federal Register.

March 16, April 6 and 13, 2000 - An initial round of public information meetings is held throughout the study area. The scope of the project is presented and interested parties are requested to sign-up as consulting parties. No parties sign-up at that time.

April 5, 2001 - Meeting among FHWA, SHPO, and INDOT to discuss the Section 106 process for I-69.

June 5, 2001 - Interagency coordination meeting to discuss the Purpose and Need Statement and possible environmental concerns including Section 106 issues.

August 13, 2001 - Draft Compliance Plan prepared for review.

August 30, 2001 - FHWA sends out letters inviting consulting parties to participate in the process.

November 6, 7, 8, 2001 - Public information meetings are held in the study area to discuss the screening of alternatives from 14 down to 5. FHWA has a booth where the Section 106 process is explained and ACHP literature is distributed regarding how the public can get involved.

November 27, 2001 - Interagency coordination meeting to discuss the screening of alternatives and environmental analysis process including the Section 106 process.

December 19, 2001 - Meeting among FWHA, INDOT, SHPO, and ACHP in Washington, D.C. to discuss the Draft Compliance Plan.

January 31, 2002 - Meeting among SHPO, FHWA, and INDOT to discuss methodological issues for archaeological resources in the Section 106 process and the Area of Potential Effects.

April 19, 2002 - Meeting with SHPO to discuss data collection and identification for individual historic properties and districts.

April 19, 2002 - Section 106 Compliance Plan is revised for submittal to the consulting parties.

April 24, 2002 - FHWA sends invitations to consulting parties to attend Section 106 meetings in the study area.

May 9 and 10, 2002 - Consulting party meetings are held to discuss process, methodology, and how they can participate in the process.

May 20, 2002 - Meeting with SHPO to discuss concurrence procedures for historic properties.

July 2, 2002 - Meeting with SHPO to discuss archaeological resources and GIS analysis.

July 12, 2002 - FHWA sends invitations to consulting parties to attend Section 106 meeting in the study area regarding eligibility and effect.

July 15, 2002 - FHWA issues findings of APE, eligibility, and effect. FHWA will revise the findings should additional properties be discovered.

The "Section 106 Compliance Plan" has been reviewed by the SHPO, the Advisory Council on Historic Preservation (ACHP), and the consulting parties. The plan has been revised to address comments from these agencies and individuals. The final version of the plan is in Appendix P.

There have been two invitations for interested parties to join in the Section 106 process as consulting parties. The first invitation was given at the initial round of informational meetings held on March 16, April 6 and 13 of 2000. At that time, no parties expressed an interest to be part of the process. A second invitation was sent out by FHWA on August 30, 2001 to more than 300 local governments and known historic agencies and groups within the study area. In addition, an invitation was forwarded to the SHPO. The invitation included a post card to be filled out and returned if the invitee wished to participate as a consulting party. Invitations were sent to the parties listed below:

- Representatives of Native American tribes with a possible interest in the study area
- Representatives of local governments in the study area
- County historians and county historical societies in the study area
- Historic Landmarks Foundation of Indiana
- Other stakeholders

On August 30, 2001, the FHWA also initiated nation-to-nation consultation with Native American tribes. This communication invited each tribe to participate as a consulting party, similar to the aforementioned governmental and historical agencies. The invitations were extended to the tribes listed below.

- Kickapoo Tribe of Oklahoma
- Kickapoo Tribe of Kansas
- Delaware Tribe of Western Oklahoma
- Peoria Indian Tribe of Oklahoma
- Miami Tribe of Oklahoma
- Delaware Nation

In September and October of 2001, affirmative responses were received from 58 local governments, historical societies, and interested groups. The SHPO also requested to be a consulting party.

Per the "Section 106 Compliance Plan," one of the first steps in the process is defining the Area of Potential Effects (APE). The APE is "*the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. The area of potential effects is influenced by the scale and nature of an undertaking…*" [36 CFR 800.9(a)].

For this project, FHWA and INDOT consulted on several occasions with SHPO regarding the definition of the APE in this Tier 1 EIS. To verify information collected as part of the Geographic Information System, survey crews field checked this information in a two-mile-wide study band along

each of the 2,000-foot corridors. In consultation with the SHPO and ACHP, the APE was defined to include this two-mile-wide study band with the understanding that the APE may need to be wider than two miles in some places and narrower in others.

An information packet was sent to each of the consulting parties on April 24, 2002. This informational packet included (1) the "Section 106 Compliance Plan"; (2) a list of historic resources that were identified as "Notable" or "Outstanding" in previously published Indiana Department of Natural Resources *Interim Reports* and that were under evaluation as part of the Section 106 process; (3) an agenda for the May 9 and May 10, 2002 consulting party meetings; and (4) a description of the APE.

Table 5.13-1: Historic Properties In the Working Alignment (June 18, 2002)

Criteria	Alternative											
	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
National Historic Landmark	0	0	0	0	0	0	0	0	0	0	0	0
Historic properties listed in the National Register (NR)	0	0	0	0	0	0	0	0	0	0	0	0
Historic properties potentially eligible for NR	3	3	3	4-6	1	3	2-4	0	0	1-2	6	3-5
Historic Districts listed in the NR	0	0	0	0	0	0	0	0	0	0	0	0
Historic Districts potentially eligible for NR	0	0	0	0	1-2	1-2	1-2	0-1	0-1	0-1	0	0

Each consulting party was invited to review the information and attend the May 9 and May 10, 2002 meetings or submit written comments to FHWA or INDOT. Seven consulting parties attended the May 9 meeting, while one consulting party attended the May 10 meeting. Both meetings followed an agenda that included a discussion of Section 106 process and the "Section 106 Compliance Plan"; discussion of the APE; the identification of historic resources within the APE; the identification of archaeological resources within the APE; and an opportunity for questions and comments.

The responses varied from general comments to a discussion of specific historical resources. With regard to the "Section 106 Compliance Plan", the responses were very favorable and consulting parties felt comfortable with the process and the methodology. One recommendation was to change the two mile wide band on I-70 to a narrow APE along I-70 with the understanding that any proposed widening would take little additional right-of-way. A request was made for maps showing the location of the "Notable" or "Outstanding" properties along each of the five alternative corridors. Consulting parties were concerned that archaeological sites might be shown on maps. Appendix P includes the "Section 106 Compliance Plan"; consulting party invitation letters; consulting party information packets; minutes to the May 9 and May 10, 2002 meetings; and coordination letters with the Indiana State Historic Preservation Officer.

Following receipt of these responses, the APE was shown to be 1000 feet on either side of the existing centerline of I-70. A packet of maps showing the location of "Notable" or "Outstanding" properties along each of the five alternative corridors was sent to the attendees as well as the remaining consulting parties who did not attend either meeting. To protect the archaeological resources against looting and possible destruction, specific archaeological site location data was not published.

Additional information received from consulting parties included a feasibility study on a potential Amish Traditional Cultural Landscape district and the location of a possible historic cemetery. This

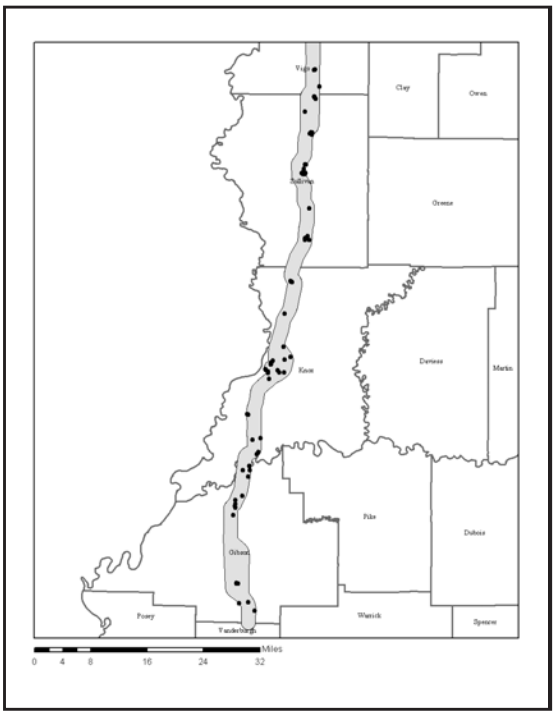


Figure 5.13-1: Potentially Eligible Properties in the APE of Alternative 1

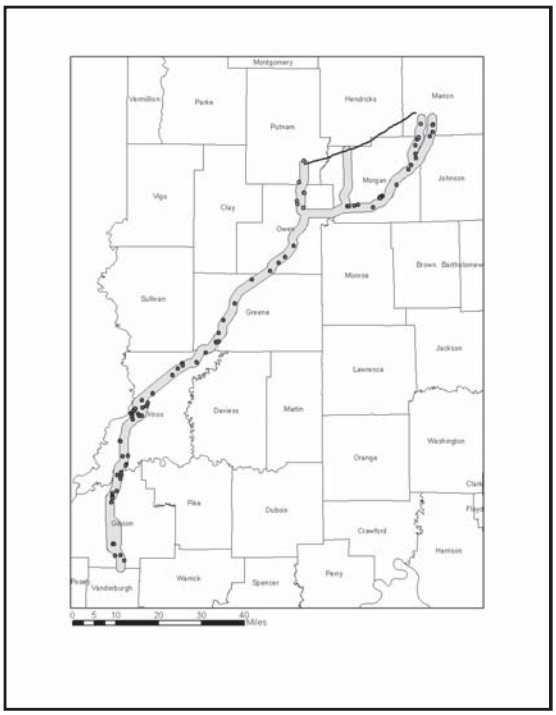


Figure 5.13-2: Potentially Eligible Properties in the APE of Alternative 2A, 2B, and 2C

information was followed up with phone conversations with consulting parties and field research.

The FHWA has scheduled the next consulting party meeting. The consulting parties will be provided the FHWA findings of potentially eligible historic properties and potential adverse effects, which were made on July 15, 2002. Consulting parties will have an opportunity to comment on this information until the closing of the DEIS comment period.

5.13.3 Impacts on Historic Properties

The identification and evaluation of historic properties within the Area of Potential Effects were conducted in accordance with Section 106, National Historic Preservation Act (1966), as amended, and 36 CFR Part 800 (effective January 11, 2001) and Final Rule on Revision of Current Regulations dated December 12, 2000. The work was also conducted in accordance with accepted professional standards common to this type of historic property identification and determination of historic ificance.

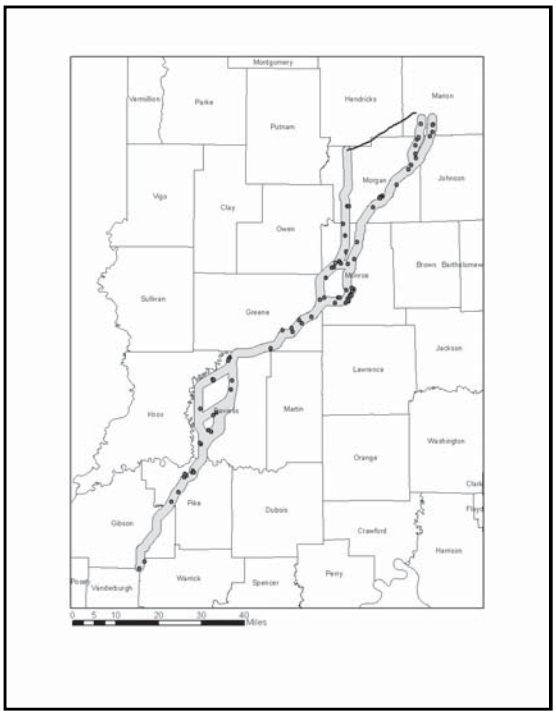


Figure 5.13-3: Potentially Eligible Properties in the APE of Alternative 3A, 3B, and 3C

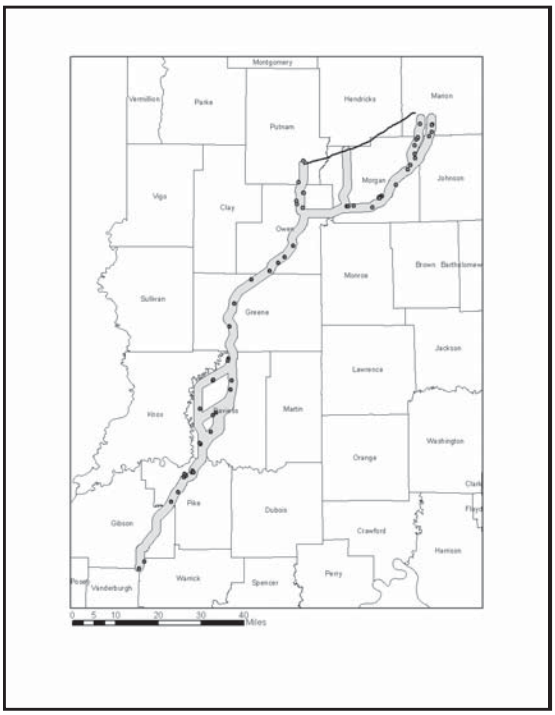


Figure 5.13-4: Potentially Eligible Properties in the APE of Alternative 4A, 4B, and 4C

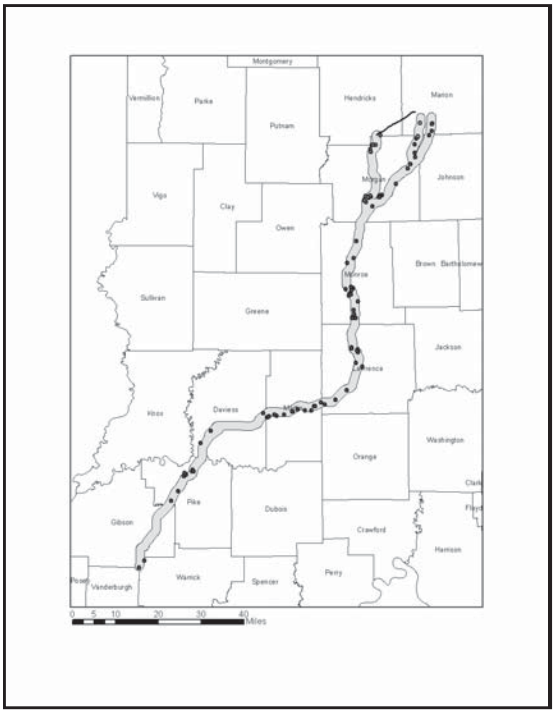


Figure 5.13-5: Potentially Eligible Properties in the APE of Alternative 5A and 5B

This Tier I EIS study included the identification of "potentially eligible" historic properties within the five alternatives through the use of a field review from public thoroughfares by professional historians. A map and database (GIS) of properties identified as either "Notable" or "Outstanding" in previously published Indiana Department of Natural Resources *Interim Reports* was utilized. In the course of this field review of "Notable" and "Outstanding" properties, sometimes potentially eligible properties were located that previously had been listed as "Contributing" or not listed in the *Interim Reports*; these properties were included in the analysis. Martin and Pike counties did not have *Interim Reports* to use as a basis for evaluation; as a result, a field review was conducted of visible historic properties from all public roads within the APE of the proposed corridors.

At the same time, professional historians also identified potentially eligible historic districts. This effort included examining districts previously identified in *Interim Reports*, consulting with consulting parties and other knowledgeable persons, and looking at the results of the field review from public highways.

The resulting list of "potentially eligible" properties is wide-ranging. Appendix N includes the full list and discussion of the properties. These are properties with sufficient integrity to be considered potentially eligible. According to the National Park Service Bulletin 18, integrity means that the property constitutes an entity that illustrates location, design, setting, materials, workmanship, feeling, and association regardless of physical condition. It is not, however, necessary for a property to illustrate all of these attributes to possess integrity.

A preliminary evaluation of significance was made based on the information in the thematic study, using National Register of Historic Places (NR) criteria. This criteria includes properties that are: a) "*associated with events that have made a contribution to the broad patterns of history,*" b) "*associated with the lives of persons significant in our past,*" c) *"embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant or distinguishable entity whose*

components may lack individual distinction," d) "*have yielded, or may be likely to yield, information important in prehistory or history.*"

A list of historic themes was developed in conjunction with the survey. The themes focus on tangible representations of people who lived in southwestern Indiana during the historic period. This task was accomplished through documentary research and consultation with knowledgeable persons.

The Section 106 Report in the Appendix N lists all properties located within the APE for this project. The following discussion focuses 1) on those potentially eligible historic properties in the working alignment, 2) potentially eligible properties in the two-mile wide study corridor (APE), and 3) on areas that constitute a distinct historical setting that should be considered within the framework of Tier 1 analysis in relation to relative adverse effects.

As determined through discussions with the SHPO, all properties located within the APE have the potential for being adversely affected. Adverse effects that may reasonably be foreseen in the future include but are not limited to: physical destruction or damage to the property, altering the property, moving the property, changing of the property's use or characteristics that contribute to its integrity or historic significance, introducing visual, atmospheric or audible elements that affect the property's integrity, neglecting of a property, or transferring, selling or leasing property out of federal ownership or control.

Sheer numbers of potentially eligible properties located within the working alignment tell one facet of the story of the potential for relative adverse effects. In Table 5.13-1 Alternative 5 has more potentially eligible historic properties located within the working alignment than any of the other proposed alternatives, i.e. more "potential" for adverse effects as defined in the "Section 106 Compliance Plan". At the other end of the spectrum, Alternatives 4A and 4B have no individual potentially eligible properties located in the working alignment. Note that Alternatives 3 and 4 each have 1-2 potential historic districts within the working alignment. This range exists because there may be a rural district in Greene County and then there are three routes that may be taken around the city of Washington in Daviess County. Each has the potential of the Amish Traditional Cultural Landscape District being in the eastern-most route.

In the course of the following discussion about the properties located in the working alignment, figures are provided showing the route of each alternative. These figures also demonstrate the dispersion and density of properties located within the APE of each alternative. The detailed information regarding individual properties can be found in Appendix N.

Alternative 1

Alternative 1 has three potentially eligible properties that are located so close the working alignment that their boundaries may be within it: the Deshee Farm or Schenk Farm (Knox 47001), which is significant for its association with New Deal programs. Located next to US 41, the Deshee Farm may experience some loss of its boundary due to the actual need for widening the roadway or for a frontage road. The same is true for an Italianate House (Gibson 10010) and a bungalow located in Carlisle (Sullivan 37038). Until boundaries for these properties are delineated, the full effects cannot be determined. Figure 5.13-1 shows potentially eligible properties in the APE of Alternative 1.

Alternative 2

Alternative 2 has three potentially eligible properties located close to or in the working alignment of Alternative 2A and 2B. These are: the Deshee or Schenk Farm (Knox 47001), which is significant for its association with New Deal programs. The farm, which is located close to the west side of US 41, may experience some loss of boundary due to the actual need for widening the roadway or for a frontage road. The same is true for an Italianate house (Gibson 10010), noted in Alternative 1. Further, the Stoelting Farm (Knox 10037) appears to be located directly in the working alignment. This potentially eligible farm with two houses on site, a double-pen (c.1850) and a bungalow (c. 1920), as well as a privy and numerous other outbuildings, illustrates an evolutionary farmstead and may be significant due to its association with the theme of German Evangelical Settlement. Because this property is located far from public roads, a site inspection is needed to fully assess integrity. In addition to the three properties referenced above, Alternative 2C has two variations with a potentially eligible historic property located next to or in (depending on future boundary determinations) the working alignment: the Henry Farm (Morgan 00001), the Isaac Sutton House (Marion 85330), and the Stutton House (Johnson 10002), an Italianate house with good integrity. Figure 5.13-2 shows potentially eligible properties in the APE for Alternatives 2A, 2B, and 2C.

Alternative 3

Alternative 3 has a several potentially eligible properties located within the working alignment. In both 3A and 3B, the Howard Farm (Monroe 15051) on Howard Road is located directly on the working alignment. This Queen Anne house (c. 1895) with its outbuildings and surrounding field patterns has a moderate to high potential for listing in the National Register. In addition to the Howard Farm in Alternative 3B, a farm on Harstrait Road (Monroe 15041) and depending on the northern connection with I-465, either the Henry Farm (Morgan 00001), the Isaac Sutton House (Marion 85330), and the Stutton House (Johnson 10002), an Italianate house with good integrity, may be in the working alignment. In Alternative 3C, a stone wall (Monroe 35050) may be affected depending on a potential interchange and then again, either the Henry Farm (Morgan 00001), the Isaac Sutton House (Marion 85330), and the Stutton House (Johnson 10002) may have boundaries within the working alignment. Figure 5.13-3 shows the potentially eligible properties in the APE for Alternative 3A, 3B, and 3C.

Alternative 4

There are no National Register or potentially eligible individual properties in Alternative 4A and 4B located within the working alignment, but in Alternative 4C is located the Stutton House (Johnson 10002), an Italianate house with good integrity, which may be affected by a possible interchange and the Isaac Sutton House (Marion 85330) or the Henry Farm (Morgan 00001), depending on the route taken. Figure 5.13-4 shows the potentially eligible properties in the APE for Alternative 4.

Alternative 5

There are no National Register properties but there are potentially eligible properties located in the working alignment of both 5A and 5B. In Alternative 5A, there are the Walter Bain House (Morgan 40025), a Parker pony truss road bridge (Morgan 40057), a Pratt through truss railroad bridge

(Morgan 40029), the Norman T. Cunningham Farm (Morgan 40055), a stone wall (Monroe 35050) that may be affected with a potential interchange, and a farmstead on Harvey Sutton Road (Martin 2005). Alternative 5B has potentially eligible properties located within the working alignment: a farmstead on Harvey Sutton Road (Martin 20005), and depending on the actual route chosen to I-465, either the Henry Farm (Morgan 00001),or the Isaac Sutton House (Marion 85330) and the Stutton house (Morgan 10002) with a possible interchange. Figure 5.13-5 shows the potentially eligible properties in the APE for Alternative 5A and 5B.

No-Build Alternative

The No-Build Alternative will have no impacts to historic and archaeological resources.

Historic Settings in Southwest Indiana

The sheer number of properties within the working alignment tells one story of the impact of this proposed undertaking on historic properties but there is another story to be told about the potential for adverse effects within the two-mile wide study area (APE). This story focuses on settings in southwestern Indiana that exhibit an intangible "feeling" of Indiana's historic past. This is difficult to quantify in numbers. Sometimes these areas do demonstrate a high concentration of "Notable" and "Outstanding" historic properties; at other times, it is more the collection of "Contributing" historic properties along with "Notable" and "Outstanding" properties and landscape features that create the intangible "feeling" of the past.

Vincennes and its environs illustrate an early period of Indiana's history. In the city of Vincennes itself, the Vincennes Historic District has properties that reflect the area's French heritage, such as the Brouillet House (Knox 26069) or date to the territorial era, such as Grouseland (Knox 26069) and to early statehood, such as the Second State Bank of Indiana. The APE of Alternative 1 touches upon the Vincennes Historic District, an area that includes many of these properties.

In addition, in the rolling hills to the east and northeast of the city of Vincennes is another area with historic properties that illustrate the settlement era or the agricultural past. There are numerous historic farmsteads with houses dating to the antebellum era. The buildings and structures alone do not define this area; it is also the dispersion of these properties along historic transportation routes (the Old Louisville Road and the Old Wheaton Road), the rolling terrain, wooded landscape, fenced irregular fields and winding roads that make it distinct.

Also, for Alternative 2 in Knox County there is an area with ties to the post-bellum historical German Evangelical Movement. Here is located the Bethel Evangelical Church and Cemetery (Knox 10034), Carl Diederich Volle Farm (Knox 10035), and the Stoelting Farm (Knox, 10037). Because of the proximity of these building to each other, the church, cemetery, Volle Farm, and another central passage house (Knox 10033) may constitute a small district. These properties are near Freelandville, a town that was not recognized in the *Interim Report* as possessing a historic district. However, there is a core area in Freelandville with a high concentration of nineteenth century homes and commercial buildings. Indeed, the Kixmiller Store in Freelandville is already listed in the National Register. Freelandville is located within the APE but at the edge; however the potentially eligible Bethel Evangelical Historic District is near the center of the APE and the Stoelting Farm is on the present working alignment.

Table 5.13-2: Archaeological Sites in the Working Alignments

Criteria	Alternative											
	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Sites in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Sites Eligible for National Register	0	0	0	0	0	0	0	0	0	0	0	0
Sites Potentially Eligible for National Register	0	0	0	0	0	0	0	0	0	0	0	0
Sites (Historic)	8	6	6	6	2	2	2	2	2	2	2	2
Sites (Prehistoric)	10	19	23	29	45	49	49	46	52	59	44	49
Sites (Historic and Prehistoric)	1	3	3	3	2	2	2	2	2	2	0	0
Sites (Undefined)	0	0	0	0	1	1	0	0	0	0	0	0
Sites Reported Prehistoric	0	0	0	0	0	0	4	3	3	3	1	1
Totals	19	28	32	38	50	54	57	53	59	66	47	52

A portion of the rather large, potential Amish Traditional Cultural Landscape District is located in the eastern variation of Alternatives 3 and 4 around the city of Washington in Daviess County. With a preliminary evaluation, this area does not appear to be a historic district in the conventional sense, and it may be difficult to make a case for a traditional cultural district, simply because the ratio of contributing to non-contributing properties likely will not support a contiguous district. However, small fields, fences, clotheslines, windmills, and dirt roads are further defined by an absence of electrical poles; this is a distinct setting illustrative of a religious group.

Two areas of Greene County in Alternative 3 may qualify as unique settings. Both of these areas contain family cemeteries, a chapel (one log and the other clapboard), roads that wind along a creek bed where settlement first occurred, forested land, small fields, and fenced pastures and fields. In addition, Valhalla located along Plummer Creek is said to date to a land grant issued by Thomas Jefferson in 1810. If this alternative is chosen as the preferred alternative, then in Tier 2 NEPA studies it will be necessary to research Valhalla and the settlement of the area, cross checking family names with census and probate records to develop a portrait of a rural community to ascertain if it is eligible for listing in the National Register as a historic district.

In the APE in Monroe County there will be potential adverse effects on a number of properties resulting from any change in setting, feeling, and patterns of spatial organization. This is an area with farmsteads that have moderate to high integrity, such as the Howard Farm (Monroe 15051) and the nearby Reed Farm (Monroe 15050). The Howard Farm on Howard Road likely would be associated with the Golden Age of Farming in Indiana. Its Queen Anne farmhouse is atypical of other farmhouses in Monroe County. The Reed Farm, which includes an 1860 I-house, numerous barns and other outbuildings, as well as pasture land is a resource with high integrity, illustrates an earlier era of agriculture. Located in that same area is the Reed House (Monroe 40009), a rare, clapboard massed plan house (c. 1870), built in the southern tradition with windows on all four elevations to aid in airflow. This is another area where the ratio of contributing to non-contributing resources does not appear to be favorable and without extensive and intensive research, it would be hard to make a case

for a district. This is, however, an area with a setting that creates a sense of a nineteenth-century, agricultural community.

Just north of these properties in Monroe County are two antebellum farms, the Samuel Harbison Farm (Monroe 15028), which the *Interim Report* identifies as the "oldest remaining brick massed plan" antebellum house in the county, and the James Bratney Farm (Monroe 15039). The Bratney Farm is masked by a stand of trees but closer examination from public roads reveals a house (c. 1835) with some modifications and a few outbuildings. While it does not appear to be as strong a candidate

Table 5.13 –3: Predicted Site Densities for Alternatives

Alternative	Estimated Acreage	Predicted Site Density
1	1,710 – 2,210 acres	285 – 368 sites
2A	4,760 –4,990 acres	793 – 832 sites
2B	5,380 – 5,550 acres	897 – 925 sites
2C	5,500 –6,260 acres	917 – 1,043 sites
3A	6,120 – 6,200 acres	1,020 – 1,033 sites
3B	5,850 – 6,440 acres	975 – 1,073 sites
3C	5,500 – 6,090 acres	917 – 1,015 sites
4A	5,420 – 5,490 acres	903 – 915 sites
4B	5,980 – 6,050 acres	997 – 1,008 sites
4C	6,160 – 6,760 acres	1,027 – 1,127 sites
5A	6,120 – 6,150 acres	1,020 – 1,025 sites
5B	5,570 – 6,130 acres	928 – 1,022 sites

for the National Register as the Harbison Farm, it clearly has some degree of potential eligibility based on its integrity and likely, its contribution to local history. Further, both the Bratney and the Harbison farms are located along a winding wooded road with a railroad located to the side. The area may not have the contributing to non-contributing ratio of historic properties that supports district status. The Harbison Farm alone may possess National Register qualities, but the entire setting of the area certainly creates a sense of relationship of the historic themes of settlement, agriculture, and transportation.

The city of Martinsville has a high concentration of historic properties. There are three individual listings in the National Register: the Burton Lane Bridge (now gone), Martinsville High School, and the Morgan County Courthouse as well as the following districts: East Washington Street Historic District, Northside Historic District, Martinsville Downtown Commercial District, and Morgan County Courthouse Square Historic District. This is a distinct urban setting.

Alternatives traversing though certain settings of southwestern Indiana have a greater challenge in avoiding historical properties. Areas with a high concentration of farmsteads, or those having rural landscapes, such as is found in Knox, Monroe, and Morgan counties, illustrate a part of Hoosier heritage that is vanishing. In these areas, there is the greatest potential for adverse effects.

In other areas, mining and farming techniques have greatly altered the landscape of some areas of southwestern Indiana traversed by several working alignments. For example, strip mining has scoured the landscape and removed historic properties in some areas, such as Pike, Gibson, and Daviess counties. Large farming operations in the flatlands of some counties, such as Greene and Daviess, have reduced the number of farmsteads and made obsolete the use of small barns and outbuildings. As one might expect, there are few potentially eligible historic properties located in these areas, but those that do remain achieve an enhanced status because of their scarcity.

5.13.4 Mitigation for Historic Resources.

An adverse effect occurs when "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property." [36 CFR 800.5(a)(1)] Specifically, the introduction of "visual, audible, or atmospheric elements" constitutes adverse effects. If adverse effects are unavoidable, there are several general ways to mitigate these effects. Please note that these are general mitigation techniques. Specific mitigation will be designed to address the particular affects on each individual property; this will occur in Tier 2.

In Tier 2, an alignment that attempts to avoid all properties on or eligible for the National Register will be developed. However, if an alignment cannot avoid all such properties, or adversely impacts such properties, mitigation will be developed. Plant screenings can be added to mask sight and diminish noise effects of the proposed highway. Earth embankments also create noise and sight buffers. Additionally, ramps and overpasses can be disguised through painting and the use of compatible building materials.

Final eligibility and effect determinations will be made in the Tier 2 NEPA studies. Tier 1 mitigation is general in nature. The Section 106 Compliance Plan, contained in Appendix P, presents the scope for Tier 1 and Tier 2.

5.13.5 Impacts on Archaeological Resources

The identification and evaluation of archaeological resources within the Area of Potential Effect were conducted following guidelines in "The Management of Archaeological Resources, The Airlie House Report" (McGimsey and Davis, 1977) and the "Guidebook: Indiana Historic Sites and Structures Inventory – Archaeological Sites (1989 edition)" issued by the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology. The study is in compliance with recent

amendments to the Indiana Historic Preservation Act (IC-14-21-1). The archaeological records and literature review has been accomplished by, or directly supervised by professional archaeologists meeting the standards set forth by the U.S. Department of the Interior detailed in 36 CFR Part 61 and 66 and the Secretary of Interior's "Guidelines for Historic Preservation and Archaeology" (48 FR 44716).

An archaeological records and literature review was conducted to determine the effect each of the I-69 alternatives would have to known and recorded archaeological resources. In addition to the records and literature review, existing regional models were utilized to determine predicted site densities within each alternative, and new GIS based archaeological database and modeling tools were developed to predict areas where archaeological sites meeting the criteria for inclusion into the National Register of Historic Places were likely to be found.

Over 14,852 recorded prehistoric and historic archaeological sites, plus numerous historic cemeteries, canal structures, abandoned limestone, coal, and gypsum mineral quarries, historic trails, roads and railroads were found in the records within the counties traversed by the five study bands. Paper and computer generated archaeological site records, regional archaeological syntheses, individual archaeological reports and USGS 7.5 minute series maps showing recorded archaeological site locations, were obtained from the "official record holding agency for Indiana archaeological site data" at the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology (IDNR, DHPA). These were supplemented with historic maps and information obtained from the Indiana State Library, county histories, university libraries, private library collections, Landmark Archaeological and Environmental Services files, and peer sources.

This research of records and consultation with knowledgeable peers and consulting parties for the southwestern Indiana study area will be continued through to the FEIS in an attempt to resolve as many problems with the archaeological records of the area as is possible, in order to improve the GIS archaeological database for the area, and to further develop a toolkit for computer modeling of archaeological sites which can be used statewide.

The five study bands with working alignments were examined for recorded prehistoric and historic archaeological resources. Over 2,088 archaeological sites were recorded within the five two mile wide study bands. Within the working alignments, 122 prehistoric and historic archaeological sites were found and are listed below. Since many of the alternatives have common sections, many of the sites are listed more than once.

The totals for Table 5.13-2 include sites that are historic, sites that are prehistoric, sites that are both, and sites whose cultural affiliation is unknown. Some alternatives have more potential for adversely affecting archaeological sites than others. While simply counting sites that may be impacted is one way to evaluate adverse effects, it is also important to consider the significance of sites when assessing the impact on archaeological resources. Appendix M includes the archaeological analysis.

All alternatives, except the No-Build Alternative, will impact archaeological sites. Alternative 1 may impact 19 sites which is the least number of sites of all the alternatives. Alternative 4C may impact 66 sites which is the most number of sites of the alternatives. Alternatives 1, 2A, 2B, and 2C are

located close to, but avoid, a site on the National Register of Historic Places. This site is Pyramid Mound, a Middle Woodland burial mound is located near the Hart Street exit along US 41 and is on the National Register of Historic Places. The Indiana State Historic Preservation Officer will evaluate sites that may be potentially eligible for inclusion to the National Register of Historic Places.

The archaeological analysis also conducted predictive modeling to estimate possible archaeological site densities in areas not surveyed. Predictive modeling of archaeological site densities has been an important part of archaeological method in Indiana since the late 1970's with the Lafayette Lake Archaeological Reconnaissance, (Keller *et al.*, 1977)

More local to the study area, a corridor study for the US 50 Washington Bypass crossing the While River in Knox and Daviess counties obtained a site density of one site every 6 acres in a valley upland setting (Tomak, 1979). A study of US 50 west of Washington into Knox County on upland including recently drained marshy bottomlands only found one site every 17 acres (Anslinger, 1989). Gary Ellis, James R. Jones III, Donna Oliva, Lisa Maust, and Amy Johnson (1989) of the IDNR, DHPA during their Southwest Indiana Site Inventory Preservation and Modeling Project for the Office of Surface Mining obtained an average site density of approximately 1 site per 2.4 ha (6 acres) based upon a reconnaissance survey in Greene County.

Using the IDNR, DHPA archaeological site density predictive model for southwestern Indiana of 1 site every 6 acres, combined with the estimated number of acres within the footprint of each alternative provides predicted site densities within each alternative. Table 5.13-3 shows these predicted site densities.

The site density figures show that all the I-69 alternatives have the potential for numerous sites within the right-of-way of the working alignment.

Appendix M, *Archaeology Analysis*. This report provides the detailed information that is summarized in Tables 5.13-2 and 5.13-3. Although no archaeological sites are shown in detail on maps, this report discusses each site for each alternative.

5.13.6 Mitigation for Archaeological Resources.

As part of the Tier 2 environmental documentation, archaeological investigations will be undertaken. These include Phase 1a field reconnaissances to discover unrecorded prehistoric and historic resources; Phase 1c subsurface investigations for buried archaeological resources; Phase 2 testing of potentially significant archaeological sites, and possibly Phase 3 mitigation/data recovery if archaeological sites determined to be of National or State Registers significance can not be avoided by construction.

5.13.7 Summary

In evaluating these alternatives, several generalizations can be made. First, in general, alternatives that pass through strip mining areas and through highly commercialized agricultural areas have less of an impact on historic properties than other alternatives. Second, care should be taken with alternatives that pass through certain areas of Daviess (Alternatives 3 and 4), Knox (Alternatives 1

and 2), Monroe (Alternatives 3A, 3B, 3C, 5A, and 5B), and Morgan (Alternatives 2C, 3B, 3C, 4C, and 5B) counties with historic farmsteads and landscape features. These are areas that may not warrant district status based on National Register criteria, but they are areas with unique historic settings. Table 5.13-2 shows that there are archaeological sites within the working alignment of all alternatives. The site densities in Table 5.13-3 shows that all the I-69 alternatives have the potential for numerous sites within the right-of-way of the working alignment. Finally, creative mitigation measures can be employed to diminish the adverse effects on listed and potentially eligible historic properties in the alternatives.

5.14 Mineral Resource Impacts

5.14.1 Introduction

Mineral resources played an integral role in society in the past, as they do today, and will in the future. Mineral resources in Southwest Indiana include oil, gas, coal, shale, sand, gravel, limestone, and gypsum. These minerals provide many uses, such as the electricity for homes, offices, gas for transportation, heating & cooling for homes, and building products.

5.14.2 Methodology

Mineral resources were reviewed in this study using the GIS. For each of the alternatives, the working alignment was placed on top of differing GIS layers. For more information on the use of the GIS and on the methodology, see Sections 4.1 and 5.1, respectively. Table 5.14-1 shows the common mineral resources in Southwest Indiana for each of the alternatives. Mineral resources crossed were calculated and summarized for the following mineral resource types by linear miles crossed: oil, gas, coal, gypsum, limestone, clay, and shale. Maps of these resources are provided as a general overview.

Table 5:14 – 1: Description of Mineral Resources (Linear Miles Crossed)

Criteria	Alternative 1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Gas/Oil/Gas Storage Wells	15-18	12-13	12-13	12-13	15-20	16-21	17-22	15-20	15-20	15-20	16-17	16-17
Sand & Gravel	12-13	11-12	13-14	24-28	6-7	12-17	16-22	2-8	4-9	23-28	1-2	18-19
Limestone	0	11-12	9-10	6-7	9-10	5-6	15-16	12-13	12-13	12-13	35-36	35-36
Coal	92-98	62-66	62-66	62-66	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32
Shale/clay & gypsum	0	7-32	9-41	9-75	11-50	9-41	9-75	11-51	13-59	13-94	9-42	9-62

SOURCE: Geographical Information System (GIS) layer titled Gas/Oil Wells SW, Natural Regions SW, Coal Availability DA SW, Coal Availability SP SW, and the Indiana Geological Survey layer titled Petroleum Fields.

5.14.3 Analysis

Coal

Alternative 1 (Figures 5.14-1 & 5.14-2) lies within important coal mining areas, while Alternative 2 provides moderate amounts of coal. The majority of these areas however have been heavily strip and surface mined (Figure

Figure 5.14-1: Surface coal mining.

Figure 5.14-2

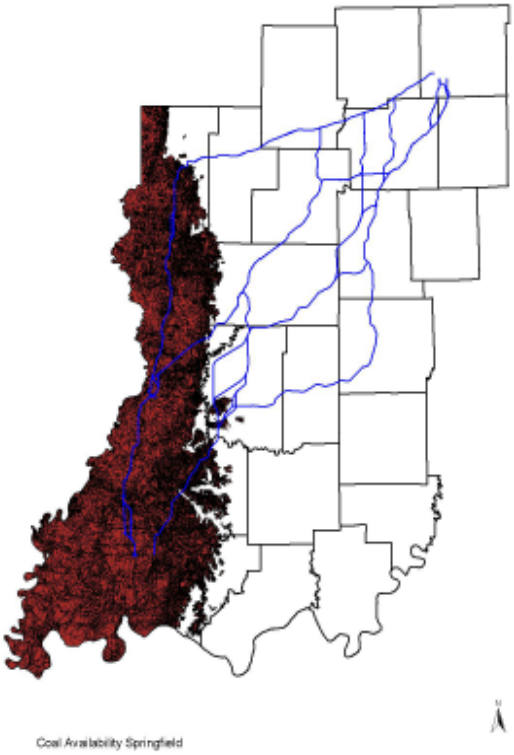


Figure 5.14-3

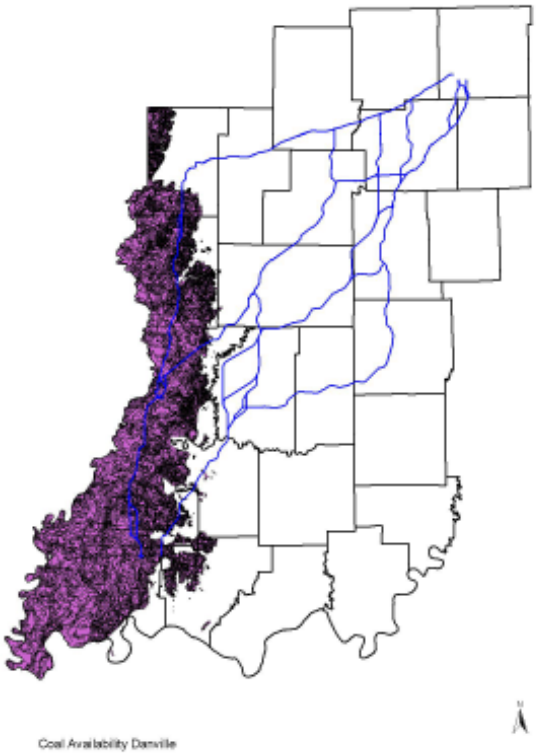


Figure 5.14-4

Figure 5.14-5

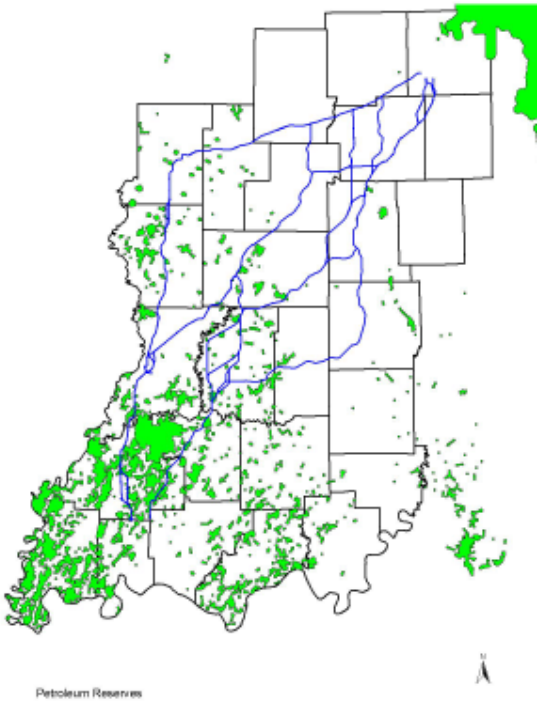
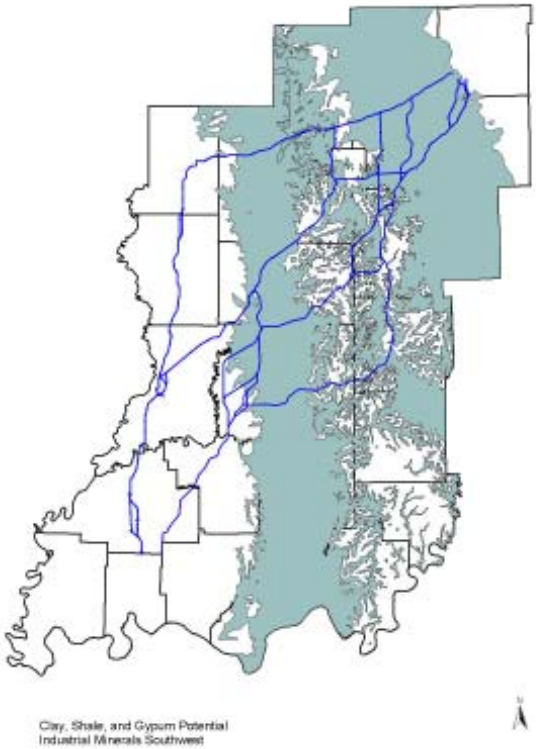


Figure 5.14-6

Figure 5.14-7



5.14-1) during the early part of the 1900s, (Environmental Atlas, Alternative 1, Sheets 2-6). However, coal is currently mined in the vicinity of US 41, near Farmersburg, Indiana. Alternatives 3, 4, and 5 cross coal mine areas near Petersburg, Indiana where coal has been mined in the 1990s and today; however, north of Washington, coal is mined much less. Under the No-Build Alternative current trends for coal resources are expected to continue. The No-Build Alternative will have no impacts on these trends.

Shale, Clay, and Gypsum

Alternative 1 (Figure 5.14-7) does not cross any areas of potential shale, clay or gypsum deposits (Figure 5.14-8). Alternatives 2, 3, 4, and 5 cross areas that contain high concentrations of shale, clay, and gypsum deposits (Table 5.14-1).

However, while it is known that these minerals exist, it may not be cost effective to extract said minerals due to the depth at which they occur. Under the No-Build Alternative, current trends for shale, clay, and gypsum resources are expected to continue. The No-Build Alternative will have no impacts on these trends.

Figure 5.14-8: Gypsum processing

Limestone

The Natural Regions of Southwest Indiana map contains a delineation area of the Mitchell Karst Plain region (Figure 5.14-6). The Mitchell Karst Plain map was used as a way to indicate the presence of limestone. Karst areas are born by the chemical interaction between either limestone (Figure 5.14-3), dolomite, marble; gypsum (to name a few), and carbonic acid. The map was used in an attempt to quantify the amount of miles crossed for limestone per alternative. While the significance is known, the amount of limestone is undetermined.

Alternative 1, 3B, and 4C do not cross any areas of potential limestone deposits. Alternatives 2A, 2B, 2C, 3A, 3C, 4A, 4B, 5A, and 5B pass through areas of containing modest amounts of limestone (Table 5.14-1), with Alternative 5A and 5B passing through the most linear miles of limestone. Under the No-Build Alternative, current trends for limestone resources are expected to continue. The No-Build Alternative will have no impacts on these trends.

Gas, Oil, and Gas Storage Fields

Expansive areas of Southwest Indiana contain known areas of petroleum reserves (Figure 5.14-4). All the Alternatives cross petroleum fields that may contain deposits of natural gas and oil (Fig. 5.14-4), and gas storage fields. However, the construction of any alternative should not impact the extraction of said resources due to improvement of technology & extraction processes. Under the No-Build Alternative, current trends for gas, oil, and gas storage fields resources are expected to continue. The No-Build Alternative will have no impacts on these trends.

Figure 5.14-9: Limestone Quarry

Figure 5.14-10: Oil well pump

Figure 5.14-11: Sand & gravel mining

Sand and Gravel

Large areas of sand and gravel deposits occur adjacent to and along major river areas in Southwest Indiana (Figure 5.14-3) as the result of weathering, while other deposits were formed, for example, as a result of glacial retreat during the last Ice Age. Alternative 1, 2A, 2B, 3A, 3B, 3C, 4C, and 5B cross some sand and gravel deposits (Fig. 5.14-5). Alternative 4A, 4B, and 5A do not cross an important amount of sand and gravel deposits. Under the "No-Build" Alternative current trends for sand and gravel resources are expected to continue. The No-Build Alternative will have no impacts on these trends.

5.14.4 Summary

All the proposed alternatives impact mineral resources to some degree. Alternative 3B impacts the least amount of mineral resources, while Alternative 5B the greatest.

The major resources of Alternative 1 are coal, sand and gravel, gas, oil, and gas storage wells. Sand and gravel is the major mineral resource for Alternative 2, with the additional mineral resources acting as moderate importance. Coal, sand and gravel, and other mineral resources, are moderately significant for Alternative 3. Shale, clay and gypsum, sand and gravel, and coal are major mineral resources for Alternative 4. Limestone and gas, oil, and gas storage wells are major mineral resources for Alternative 5 (Figures 5.14-4 & 5.14-5). The No-Build Alternative will have no impact on mineral resources.

5.15 Visual and Aesthetic Impacts

5.15.1 Introduction

Figure 5.15-1: View of the Road

Visual impacts of the proposed I-69 include the "view from the road" and the "view of the road". Such impacts are assessed to design quality, art, and architecture in the project planning. These values are particularly important for facilities in sensitive environmental settings.

The construction of I-69 will result in both temporary and permanent visual impacts. Temporary impacts are the sighting of construction equipment and the resulting clearing of areas to construct the highway. These will be mitigated by the control of clearing to the area in the construction limits and quick re-vegetation upon completion of construction. Permanent impacts are the conversion of forests, wetlands, farmland, and urban/suburban landscapes to an Interstate highway (Figure 5.15-1).

5.15.2 Methodology

The following descriptions for each alternative provide a general review of possible visual impacts. Information was gathered from driving each alternative, and the use of GIS maps from the Environmental Atlas. Commentaries on each alternative begin in the south, near Evansville, and end at I-465, near Indianapolis. For more information on the GIS and on the methodology, see Sections 4.1 and 5.1, respectively.

Figure 5.15-2: View of Interstate and lake

5.15.3 Analysis Results – View of the Road

Alternative 1

The visual environment of Alternative 1 is comprised of numerous homes and businesses paralleling the roadway. Views of the road would be temporarily altered during the construction phase of I-69 to allow for the upgrade of US 41 from a highway to an Interstate. Rural and remote areas would open up from possible loss of vegetation (Figure 5.15-2) and may experience additional lighting from roadway traffic.

Figure 5.15-3: Rolling Hills

Figure 5.15-4: View of farm and woodland

Figure 5.15-5: View of woodland & topographic alteration

Alternative 2

Alternative 2 would utilize US 41 from Evansville to Vincennes and the SR 37 corridor from Bloomington to I-465 for Alternative 2C. Both areas of US 41 and SR 37 are heavily paralleled by homes and businesses. Areas not utilizing the existing US 41 and SR 37 right-of-way may experience additional lighting from light emitting sources on a temporary and permanent basis; the loss of aesthetic resources, such as vegetation, forest land, farmland, pastures, lakes and/or streams. The scenic view (Figure 5.15-3) of some areas would be altered by the placement of an Interstate. These areas may experience both visual and aesthetic resource impacts in the form of construction equipment during the SR 37 and US 41 upgrade to an Interstate status.

Alternative 3

Alternative 3 would generally use rural terrain (Figure 5.15-4) for I-69. Those living in proximity of the road would experience the loss of aesthetic resources such as vegetation and may experience visual impacts in the form of lighting from roadway traffic. Alternative 3B and 3C would use the SR 37 corridor from Bloomington to I-465. Visual and aesthetic resources, such as woodlands and scenic landscapes, would be both temporary and permanent impacted by the placement of an Interstate.

Alternative 4

Alternative 4A and 4B would generally use rural terrain for I-69. Those living in proximity of the road may experience visual impacts in the loss of woodlands, lakes, streams, wetlands, forest, farmland, and topographic alterations (Figure 5.15-5). Furthermore, those in hilly areas may experience additional lighting from the roadway area. Alternative 4C would use the SR 37 corridor, an area that is densely populated with homes and business. These areas may

Figure 5.15-6: Tincher Pond

experience both visual and aesthetic resource impacts in the form of construction equipment during the SR 37 upgrade to an Interstate status.

Alternative 5

Alternative 5 would use rural terrain from Evansville to SR 37. Visual and aesthetic resources may be impaired in the form of lighting from the roadway, loss of woodlands and wetlands. Areas once forested would appear more open. Alternatives 5A and 5B would use the SR37 corridor. Visual and aesthetic resources, such as woodlands and scenic landscapes, would be both temporary and permanent altered by the placement of an Interstate.

Furthermore, Alternative 5 would pass through the Tincher Special Area. Tincher Special Area is a 4,180 acre region within the Hoosier National Forest. It provides many scenic vistas. Although there are a few developed recreations sites, the area is available for dispersed recreation. Backpacking, hiking, camping, hunting, and fishing are some of the recreational activities in Tincher. There is a trail to Tincher Pond (Figure 5.15-6) and plans for another trail in the future. Berry Pond has good fishing and Georgia Pond now serves as a wetland. The scenic view provided by this area would be affected by the placement of an interstate.

No-Build

Under the No-Build Alternative there will be no visual impacts.

5.15.4 Analysis - View from the Road

Alternative 1 uses US 41 for some 90 miles (Figure 5.15-7). US 41 crosses flat, to gently rolling agricultural/grazing lands. The remainder of Alternative 1 would utilize the SR 641 and I-70 that is flat, to rolling, to hilly.

Towns/cities along Alternative 1 are Fort Branch, Princeton, Vincennes, Sullivan, Terre Haute, Cloverdale, Mooresville and Plainfield.

In the vicinity to US 41 are Quabache Trails Park, Wabash Valley Correctional Institution, Minnehaha State Fish and Wildlife Area, Lake Sullivan, Fowler Park, Chinook Public Fishing

Figure 5.15-7: US 41 due north of I-64.

Area, Owen-Putman State Forest, and Lieber State Recreation Area.

Figure 5.15-8: View of Interstate and row crops

From US 41/I-64 to Princeton, one would see roadside motels, service stations and a nursery, agricultural/grazing lands, a racetrack, oil/gas wells, West Fork of Pigeon Creek, many businesses and homes, trailer parks, schools, Toyota Motors Manufacturing Incorporated and other manufacturing facilities, railroad tracks, pipelines, communication towers, and churches.

From Princeton to Vincennes, there are many businesses, a strip mall, restaurants, railroad tracks, grain silos, a hospital, agricultural/grazing lands, communication towers, the Patoka River, Hull airport, oil/gas wells, farmland and forest, White River, extensive floodplain, INDOT District building, lakes, communication towers, Pyramid Indian Mound, extensive floodplain, and a trailer park.

From Vincennes to Sullivan, there are grain silos, water tanks, many homes and businesses, Wal-mart, churches, schools, Elks Country Club and Golf course, churches, schools, service stations, hotels, forested areas, reclaimed mine areas, wetlands, wetland woods, trailer parks, forested areas, sand and gravel pits, communication towers, Busseron Creek, Wabash Valley Correctional Institution, cemeteries, service stations, golf course, Middle Fork Creek, and railroad.

From Sullivan to Terre Haute, there are many homes and businesses, churches, cemeteries, recreation area, railroad, forests, golf course, school, farmland, floodplains, wetland woods, Honey Creek, reclaimed mine areas, service stations, and Ivy Tech State College.

From Terre Haute to I-465, there are scattered homes, Hulman Regional Airport, farmland (Figure 5.15-8), Honey Creek floodplain, wetland woods, forests, reclaimed mine areas, lakes, wetlands, cemeteries, Chinook Public Fishing Area, stripper pits, Little Birch Creek, bottomland woods, floodplains, Big Walnut Creek, Martin Marietta Aggregates Quarry, truck stops, motels, restaurants, grazing lands, communication towers, and the Indianapolis International Airport.

Alternative 2

Alternative 2 uses approximately 45 miles of US 41 up to Vincennes and includes two variations going through or around Fort Branch and Vincennes. Alternative 2 crosses flat, to gently rolling, to hilly agricultural/grazing lands with some areas of sinkholes.

Towns and cities along Alternative 2 are Fort Branch, Princeton, Vincennes, Bruceville, Westphalia, Sandborn, Lyons, Worthington, Freedom, Spencer, and from there Cloverdale, Little Point, Crown Center, Monrovia, Mooresville, and Plainfield for Alternative 2A; Gosport and Paragon for Alternative 2B; Waverly Woods for Alternative 2C.

Figure 5.15-9: I-70 west of I-465.

In the vicinity of Alternative 2 are Quabache Trails Park, coal mining activities, West Fork of the White River, and Owen-Putman State Forest, Cagles Mill, Amazon Lake, Lake Hollybrook, Morgan-Monroe State Forest, Cikana State Fish Hatchery, and the White River.

From US 41/I-64 to Princeton, one would see roadside motels, service stations and a nursery, agricultural/grazing lands, a racetrack, oil/gas wells, West Fork of Pigeon Creek, many businesses and homes, trailer parks, schools, Toyota Industry and other manufacturing facilities, railroad tracks, pipelines, communication towers, and churches.

From Princeton to Vincennes, there are many businesses, shopping mall, restaurants, railroad tracks, grain silos, a hospital, agricultural/grazing lands, communication towers, the Patoka River, Hull airport, oil/gas wells, farmland and forest, White River, extensive floodplain, INDOT District office building, lakes, communication towers, extensive floodplain, and a trailer park.

From Vincennes to Worthington, there are farmlands, scattered homes and businesses, forestland, floodplains, pipelines, communication towers, reclaimed mine areas, ponds, schools, railroad, gas wells, grain silos, cemeteries, and churches.

From Worthington to US 231/SR 67, there is the Eel River, Wabash-Erie Canal, scattered homes and businesses, communication towers, forests, service stations, agricultural/grazing lands, wetland woods, White River and White River floodplains, railroad, extensive karst topography, lakes, dams, abandoned quarries, and cemeteries.

From US 231/SR 67 to I-465 (Alternative 2A), there are agricultural/grazing lands, forested areas, sparse homes and businesses, Mill Creek, cemetery, and communication towers, farmland, sparse homes and businesses, Mill Creek, Mud Creek floodplain, forest, power lines, grazing lands, communication towers, truck stops, restaurants, motels, dense residential/commercial development between Plainfield and I-465 (Figure 5.15-9), and the Indianapolis International Airport.

From US 231/SR 67 to I-465 (Alternative 2B), there are agricultural/grazing lands, forested and hilly areas offering natural and scenic vistas, agricultural/grazing lands, a private airport, communication towers, dense residential/commercial development between Plainfield and I-465, and the Indianapolis International Airport.

From Paragon to I-465 (Alternative 2C), one would see the White River, agricultural/grazing lands, karst topography with sinkholes, dense residential and commercial development along SR 37, Stotts Creek, churches, cemeteries, communication towers, restaurants, service stations, subdivisions, Mann Hill Park and Little Buck Creek.

Figure 5.15-10: Plainfield Sand Dune Region

Alternative 3

Alternative 3 crosses terrain that is predominately rural, passing through agricultural and grazing lands. The topography is flat, to rolling, to hilly.

Alternative 3 would pass through or near the towns/cities of Oakland City, Petersburg, Washington, Plainville, Elnora, Newberry, Cincinnati, Stanford and from there Stanford, Ellettsville, Paragon, Monrovia, Mooresville, and Plainfield for Alternative 3A; Stanford, Ellettsville, Bloomington, Martinsville for Alternative 3B; and Stanford, Bloomington, Martinsville, Waverly Woods for Alternative 3C.

In the vicinity there is the Patoka River National Wildlife Refuge and Management Area, Wabash-Erie Canal, Amish communities, Thousand Acre Woods, Crane Naval Weapons Support Center, and the American Bottoms or Trout Natural Area, Muscatatuck National Wildlife Refuge, Beanblossom Bottoms Nature Preserve, limestone quarries, and Morgan-Monroe State Forest for Alternative 3A or the Trout Natural Area, Muscatatuck National Wildlife Refuge, Beanblossom Bottoms Nature Preserve, limestone quarries, Morgan-Monroe State Forest, and Mann Hill are with Alternative 3B, or Karst Farm Park, Indiana University, Cascades Community Park, Morgan-Monroe State Forest, Cikana State Fish Hatchery, and Mann Hill for Alternative 3C.

From I-64/I-164 to Washington, one would see churches, cemeteries, Pigeon Creek and floodplains, Big Creek, wetland woods, communication towers, Wabash-Erie Canal, reclaimed mine areas, coal-mine activities, oil/gas wells, agricultural/grazing lands, Patoka River National Wildlife Refuge and Management Area, Patoka River, East Fork of White River, scattered homes and businesses, service stations, and railroads.

Alternative 3 has several variations with regard to Washington. Two variations include going on the east side close to US 50 and two variations to the west. The east and west variations are mostly rural, passing through farmland.

The West Options, include agricultural/grazing lands, scattered homes and businesses, grain silos, churches, oil/gas wells, wetlands, water wells, grain processing plant, and the Plainville Sand Dune Region (Figure 5.15-10) north of Washington.

The East Options, include scattered homes and businesses, agriculture/grazing lands, churches, communication towers, and cemeteries.

From Stanford to I-465 (Alternative 3A), one would see forestland, clustered homes, scattered businesses, agricultural/grazing lands, karst areas with sinkholes, forested and hilly areas offering natural and scenic vistas, the White River, truck stops, motels, restaurants, dense residential/commercial development between Plainfield and I-465, communication towers, churches, cemeteries and the Indianapolis International Airport.

From Stanford to I-465 (Alternative 3B), one would see agricultural/grazing lands, churches, cemeteries, karst areas with sinkholes, Little Richland Creek, communication towers, old limestone quarries, Beanblossom Creek, Trout Natural Area, Beanblossom Nature Preserve, Grieco Natural Area, Beanblossom Bottoms, forested and hilly areas offering natural and scenic vistas, moderate residential and low commercial development near Stanford, roadside rock outcroppings, schools, trailer parks, Morgan-Monroe State Forest, Little Indiana and Jordan Creeks, airport, service stations, restaurants, strip malls, sand/gravel pits, recreation sites, subdivisions, heavy commercial development along SR 37 and near I-465, Cikana State Fish Hatchery, Stotts Creek, White River Floodplain, Honey Creek, truck stops, and Mann Hill.

Figure 5.15-11: Patoka River National Wildlife Refuge and Management Area

From Stanford to I-465 (Alternative 3C), one would see agricultural/grazing lands, karst topography with sinkholes, old limestone quarries, subdivisions, churches, cemeteries, numerous commercial/industrial facilities, roadside rock outcroppings, communication towers, schools, trailer park, forested and hilly areas offering natural and scenic vistas, Morgan-Monroe State Forest, Little Indiana and Jordan creeks, airport, sand/gravel pit, scattered housing with light commercial development, dense residential/commercial areas along SR 37 near I-465, subdivisions, restaurants, service stations, Cikana State Fish Hatchery, Stotts Creek, White River Floodplain, Honey Creek, and Mann Hill.

Alternative 4

Alternative 4 crosses terrain that is predominately rural, passing through agricultural and grazing lands. The topography is flat, to rolling, to hilly.

Alternative 4 would pass through or near the towns/cities of Oakland City, Petersburg, Washington, Plainville, Elnora, Lyons, Worthington, Freedom, Spencer and Cloverdale, Little Point, Crown Center, Monrovia, and Mooresville, and from there Plainfield for Alternative 4A; Gosport, Paragon, Crown Center, Mooresville; and Plainfield for Alternative 4B; Gosport, Paragon, Martinsville, and Waverly Woods for Alternative 4C.

In the vicinity there is the Patoka River National Wildlife Refuge and Management Area, Wabash-Erie Canal, Amish communities, coal-mining activities; the West Fork of the White River, Owen-Putman State Forest, and Cagles Mill for Alternative 4A; for Alternative 4B, Amazon Lake and Lake Hollybrook; for Alternative 4C, Morgan-Monroe State Forest, Cikana State Fish Hatchery, and the White River.

From I-64/I-164 to Washington, one would see churches, cemeteries, Pigeon Creek and associated

floodplain, Big Creek, wetland woods, communication towers, Wabash-Erie Canal, reclaimed mine areas, coal mine activities, oil/gas wells, agricultural/grazing lands, Patoka River National Wildlife Refuge and Management Area (see Figure 5.15-11), Patoka River, East Fork of White River, scattered homes and businesses, service stations, and railroads.

Alternative 4 has several variations with regard to Washington. Two variations include going on the east side close to US 50 and Two variations lie to the west. The east and west variations are mostly rural, passing through farmland.

The West Options include agricultural/grazing lands, scattered homes and businesses, grain silos, churches, oil/gas wells, wetlands, water wells, grain processing plant, and the Plainville Sand Dune Region.

The East Options include scattered homes and businesses, agriculture/grazing lands, churches, communication towers, and cemeteries.

From US 231/SR 67 to I-465 (Alternative 4A) one would see agricultural/grazing lands, forested areas, sparse homes and businesses, Mill Creek, cemetery, communication towers, Mud Creek and floodplain, power lines, truck stops, restaurants, dense residential/commercial development between Plainfield and I-465, and the Indianapolis International Airport.

From US 231/SR 67 to I-465 (Alternative 4B) one would see agricultural/grazing lands, karst sinkholes, forested and hilly areas offering natural and scenic vistas, a private airport, communication towers, truck stops, restaurants, dense residential/commercial development between Plainfield and I-465, and the Indianapolis International Airport.

From Paragon to I-465 (Alternative 4C) one would see dense residential and commercial development, (particularly along the SR 37 corridor), subdivisions, White River, agricultural/grazing lands, limestone quarries, sand/gravel pits, Cikana State Fish Hatchery, karst sinkholes, churches, cemeteries, communication towers, Sinking Creek, service stations, restaurants, Mann Hill, Travis Creek and the Indianapolis International Airport.

Alternative 5

Alternative 5 crosses terrain that is predominately rural, passing through agricultural/grazing lands and forested areas. The topography is karst with sinkholes and is flat, to rolling, to hilly and forested in many places.

Alternative 5 would pass through or near the towns/cities of Oakland City, Petersburg, Washington, Loogootee, Shoals, Bedford, Bloomington and Martinsville, Waverly Woods, and from there Mooresville for Alternative 5A; Smith Valley and Glenns Valley for Alternative 5B.

In the vicinity there is the Patoka River National Wildlife Refuge and Management Area, Wabash-Erie Canal, reclaimed mine areas, coal mine activities, Amish communities, Martin State Forest, gypsum mineral facilities, Avoca State Fish Hatchery, Lake Monroe, Karst Farm Park, Indiana University, Cascades Community Park, Morgan-Monroe State Forest, Cikana State Fish Hatchery, White River, Bradford Woods, and Indianapolis International Airport.

From I-64/I-164 to Washington one would see churches, cemeteries, Pigeon Creek and floodplain, Big Creek, wetland woods, communication towers, Wabash-Erie Canal, reclaimed mine areas, coal-mine activities, oil/gas wells, agricultural/grazing lands, Patoka River National Wildlife Refuge and Management Area, Patoka River, East Fork of White River, scattered homes and businesses, service stations, and railroad.

Figure 5.15-12: Roadside rock outcrop

From Washington to Bedford there are scattered homes and business, churches, cemeteries, golf course, Amish communities, reclaimed-mines, surface-mines, South Fork Prairie Creek, service stations, grain silos, communication towers, West Boggs Creek, East Fork White River, rock outcroppings (Figure 5.15-12), Martin State Forest, hilly areas offering natural and scenic vistas, Tincher Pond/Hoosier National Forest, karst sinkholes, and Blue Springs Cavern.

From Bedford to Bloomington there are many homes and businesses along the SR 37 corridor, strip malls, motels, service stations, restaurants, limestone quarries, karst topography, Salt Creek, Goose Creek, recreation areas, churches, cemeteries, Avoca State Fish Hatchery, farmland, forested areas, Judah Branch, and Clear Creek.

From Bloomington to Old SR 37/SR 37 one would see dense commercial development, strip malls, restaurants, motels, communication towers, karst topography, schools, old limestone quarries, Ivy Tech State College, churches, Beanblossom Creek, Bryant Creek, and Morgan-Monroe State Forest.

From Old SR 37/SR37 to I-465 (Alternative 5A) one would see the White River, forested areas, agricultural/grazing lands, cemeteries, churches, sand/gravel pits, communication towers, Bradford Woods, service stations, residential and commercial development, West Fork of White Lick Creek, truck stops, restaurants, dense residential/commercial development between Plainfield and I-465, and the Indianapolis International Airport.

From Old SR 37/SR37 to I-465 (Alternative 5B), one would see the White River, agricultural/grazing lands, forested areas, and dense residential and commercial development, Cikana State Fish Hatchery, churches, cemeteries, schools, sand/gravel pits, subdivisions, communication towers, Mann Hill, and Travis Creek.

Alternative 5 Option B has two variations that include using SR 37 and going west of SR 37 to connect to I-465. The SR 37 variation area is mostly urban low density and would use SR 37 right-of-way. The west variation crosses the West Fork of the White River.

No-Build Alternative

Under the No-Build Alternative there will be no visual impacts.

5.15.5 Mitigation

Mitigation for visual impacts may include vegetative screening, a depressed highway, wide medians, and use of independent alignments both vertically and horizontally, or the shifting of the whole alignment.

This project should use context sensitive designs to create positive impacts and reduce negative impacts without compromising safety. Visual and aesthetic resource issues will be addressed in greater detail in Tier 2 NEPA studies.

5.15.6 Summary

All alternatives except for the No-Build Alternative will have visual and aesthetic impacts. In areas of new road construction these maybe: more open spaces attributable to woodland loss, increased lighting from light emitting sources such as interchange lighting, vehicles or new signage. Where current highways are up-graded to Interstate standards visual and aesthetic impacts maybe attributed to: construction, temporary loss of vegetation, additional signage and interchanges. The No-Build Alternative will have no impacts on visual resources.

5.16 Hazardous Waste Site Impacts

5.16.1 Introduction

During the early development of transportation projects, the proposed right-of-ways undergo an investigation for the presence of hazardous waste. If found, attempts are made to have the sites cleaned-up prior to the purchase of the property. Although it is desirable, hazardous materials cannot always be taken care of prior to the construction of a transportation project. It may be necessary to deal with known and/or unknown hazardous waste sites on purchased right-of-way during the construction phase.

Hazardous waste sites are defined in this analysis as properties that may require additional clean up of contaminated soils and/or the removal of hazardous materials. Early identification of these sites are important because additional work may be required to remediate these sites prior to any construction. This additional work can increase the cost of construction substantially, depending on the amount of contamination at these sites.

Twelve separate databases were used to identify possible hazardous waste sites in this analysis (1) RCRIS, (2) CERCLIS, (3) Superfund, (4) TRI, (5) Voluntary Remediation Program sites, (6) Active Landfills, (7) Active Permitted Solid Waste sites, (8) Abandoned/Inactive Landfills and Open Dumps, (9) Industrial Waste sites, (10) Brownfield sites, (11) State Cleanup Program sites, (12) Commissioner's Bulletin sites, (13) UST sites, and (14) LUST sites.

(1) RCRIS stands for Resource Conservation and Recovery Information System and is provided by the United States Environmental Protection Agency (USEPA). RCRIS is a national computerized management information system in support of the Resource Conservation and Recovery Act (RCRA). RCRA requires that generators, transporters, treaters, storers, and disposers of hazardous waste materials provide information concerning their activities to state environmental agencies. This database is used primarily to track handler permits or closure status, compliant with federal and state regulations, and cleanup activities.

(2) CERCLIS stands for Comprehensive Environmental Response, Compensation, and Liability Information System, or Superfund and is provided by the USEPA. CERCLIS is a national computerized management information system that automates entry, updating, and retrieval of data from the Comprehensive Environmental Response, Compensation, and Liability Information System. It also tracks site and non-site specific Superfund data in support of the Comprehensive Environmental Response, Compensation, and Liability Act. It contains information on hazardous waste site assessment and remediation.

(3) Superfund data were collected by the Federal Cleanup, Superfund, and NRDA section within the Office of Land Quality, the Indiana Department of Environmental Management (IDEM). This database contains information that represents what had been recorded, processed, and archived by IDEM personnel at a time previous to this project. It contains information on hazardous waste site assessment and remediation.

(4) TRI stands for Toxic Release Inventory Facilities and is compiled by the USEPA. This database contains data on annual estimated releases of over 300 toxic chemicals to air, water, and land by manufacturing companies. Industrial facilities provide the information, which includes: the location of the facility where the chemicals are manufactured, processed, or otherwise used; amounts of chemicals stored on-site; estimated quantities of chemicals released; on-site source reduction and recycling practices; and estimated amounts of chemicals transferred to treatment, recycling, or waste facilities. The TRI data for chemical releases to land are limited to releases within the boundary of a facility. Releases to land include: landfills, land treatment/application farming, and surface impoundments, such as topographic depressions, man-made excavations, or diked areas. Air releases are identified as either point source releases or as non-point (*e.i.* fugitive) releases, such as those occurring from vents, ducts, pipes, or any confined air stream. Surface water releases include discharges into rivers, lakes, streams, and other bodies of water. In addition, the database covers releases to underground injection wells (where chemicals are injected into the groundwater) and off-site transfers of chemicals to either publicly owned treatment works (POTWs) or any other disposal, treatment, storage, or recycling facility.

(5) The Voluntary Remediation Program (VRP) established by the state legislature in 1993, provides a mechanism for site owners, operators, or purchasers to voluntarily enter into an agreement with IDEM to cleanup contaminated property. Most site owners or operators, or prospective owners or operators, who wish to cleanup property contaminated with petroleum or hazardous waste or hazardous constituents, are potentially eligible to participate in the Voluntary Remediation Program.

(6) The active landfills database was provided by IDEM and consists of landfills monitored by IDEM on a quarterly basis. Only the sites that have been recorded, processed, and achieved by IDEM personnel previous to this project were identified in the database.

(7) The active permitted solid waste site database was provided by IDEM and consists of locations of active permitted solid waste sites within the state of Indiana. Only the sites that have been recorded, processed, and archived by IDEM personnel previous to this project were identified in the database.

(8) The Abandoned and inactive landfills and open dump sites database was provided by IDEM and consists of the location of abandoned and inactive landfills and open dumps recorded on file at IDEM. The database contains information that represents only what was recorded, processed, and archived by IDEM personnel previous to this project were identified in the database.

(9) Industrial waste sites consist of known sites with industrial waste. Industrial Waste Compliance personnel located the entrance to facilities that generate and/or manage hazardous waste, non-hazardous industrial waste, and solid waste and recorded them using geographical positioning systems. The majority of sites are large quantity generators (LQGs). Treatment Storage and Disposal facilities (TSDs) are also being located. Occasionally, a Small Quantity Generator (SQG) or Conditionally Exempt Small Quantity Generator (CESQG) may be located if it has significant environmental issues.

(10) Brownfield sites are defined as industrial or commercial properties that are abandoned, inactive, or underutilized, on which expansion or redevelopment is complicated due to the actual or perceived environmental contamination. Redevelopment of Brownfield properties benefits communities by rejuvenating vacant buildings, increasing the tax base, and reducing blight.

(11) State Cleanup sites are those sites that do not qualify for coverage under Superfund but may be addressed by the state. Like Superfund, state cleanup sites rely on establishing the liability of a potentially responsive party(s) to assume the costs of, or to conduct, the actual cleanup activities. If no responsible party can be determined, cleanups may be conducted by IDEM and paid for by the Indiana Hazardous Substance Response Trust Fund (IC 13-25-4-1). However, unlike Superfund, state cleanups can target petroleum pollution as well as hazardous waste or hazardous substance contamination.

(12) Commissioner's Bulletin sites are state cleanup sites that have been given a high priority by the commissioner. These sites also are included in the state cleanup sites database.

(13) Underground Storage Tank (UST) program is responsible for registering all regulated underground storage tanks. It assures that all regulated underground storage tanks meet Indiana's requirements for release detection, spill and overflow prevention, and corrosion protection, and to ensure that tanks not meeting those requirements are properly closed. The UST program assures that these protection systems are operated and maintained properly. Regulated underground storage tanks are those USTs that have 10 percent or more of the tank and piping buried beneath the ground and contain a regulated substance, which includes either petroleum products or hazardous substances.

(14) Leaking Underground Storage Tanks (LUSTs) are defined as regulated underground storage tanks (USTs) that contain regulated substances including petroleum and hazardous substances, such as those typically found at gasoline stations, fleet fueling facilities, and industrial sites and are suspected or confirmed of having a leak.

5.16.2 Methodology

The data used to identify the hazardous waste sites and UST/LUST sites within the working alignment came from the Geographical Information System (GIS) layers:

(1) **RCRIS_EPA** – Provided by the United States Environmental Protection Agency (EPA)

(2) **CERCLIS_EPA** – Provided by EPA

(3) **Superfund** – Provided by the Indiana Department of Environmental Management (IDEM)

(4) **TRI_EPA** – Provided by EPA

(5) **VRP_sites** – Provided by IDEM

(6) **Landfill_sw** – Provided by IDEM

(7) **Active_Permitted_sw_sites** – Provided by IDEM

(8) **Landfills_Active_&_Permitted_sites** – Provided by IDEM

(9) **Abandoned_&_Inactive_Landfills_&_Open_Dumps** – Provided by IDEM

(10) **Industrial_Waste** – Provided by IDEM

(11) **Commissioners_Bulletin** – Provided by IDEM

(12) **State_Cleanup_Commissioners_Bulletin** – Provided by IDEM

(13) **UST_sites** – Provided by IDEM

(14) **UST_IDEM_sw** – Provided by IDEM

(15) **LUST_sites** – Provided by IDEM

(16) **LUST_sw** – Provided by IDEM

For more information on the use of the GIS and on the methodology, see sections 4.1 and 5.1 respectively. Two additional sources were used to identify possible hazardous waste sites within the proposed working alignment. A database search for the Indiana Brownfield sites and the State Cleanup Sites, both provided by IDEM, were searched for possible hazardous waste facilities. All of the sites that fell within the working alignment were counted and identified.

5.16.3 Analysis Results

The five alternatives were compared for (1) RCRIS, (2) CERCLIS, (3) Superfund, (4) TRI (5) Voluntary Remediation Program sites, (6) Active Landfills, (7) Active Permitted Solid Waste sites, (8) Abandoned/Inactive Landfills and Open Dumps, (9) Industrial Waste sites, (10) Brownfield sites, (11) State Cleanup Program sites, (12) Commissioner's Bulletin sites, (13) Underground Storage Tanks (USTs), and (14) Leaking Underground Storage Tanks (LUSTs).

Table 5.16 -1: Hazardous Waste Site Impact Comparison

Alternatives	Criteria			
	RCRA Sites	Brownfield Sites	UST Sites	LUST Sites
Alternative 1	0	0-1	8-13	0-1
Alternative 2A	0-1	0-1	2-5	0
Alternative 2B	0-1	0-1	2-5	0
Alternative 2C	6-7	0-1	3-9	0
Alternative 3A	0	0	0	0
Alternative 3B	8-9	0	1-4	1-2
Alternative 3C	11-12	0	2-5	1-2
Alternative 4A	0-1	0	0	0
Alternative 4B	0-1	0	0	0
Alternative 4C	11-12	0	1-4	0-1
Alternative 5A	4-5	0	2-3	0
Alternative 5B	15-16	0	1-4	1-2

Table 5.16-1 shows a hazardous waste site impact comparison of the five alternatives. According to the GIS none of the five Alternatives will impact any IDEM recorded Active Landfills, Abandoned / Inactive Landfills / Open Dumps, Active Permitted Solid-Waste sites, Industrial Waste sites, Commissioner's State List Cleanup Sites, Voluntary Remediation sites, or recorded CERCLA sites or TRI sites. Under the No-Build Alternative, current trends for hazardous waste site impacts are expected to continue. This alternate will have no impacts on these trends.

The Environmental Protection Agency database identified the following 16 facilities located along the 5 alternatives as RCRA sites:

	Facility Name	Facility ID Number
(1)	Amoco Oil	IND984899773

(2)	Speedway	IND984889246
(3)	Morris Machine Company	IND006413637
(4)	Royal Spa Manufacturing	IND985075639
(5)	Contractors United Incorporated	IND981194640
(6)	TRI-AX Incorporated	INR000003723
(7)	Moon Frieght Lines Incorporated	IND778904289
(8)	Dillman Road Collection Site	IND984898007
(9)	Minton Body Shop	IND982626756
(10)	Speedway	IND984887885
(11)	Hazardous Waste Haulers of Indiana	IND984896191
(12)	Larry Bird Ford	IND984862036
(13)	Magic, Inc.	IND984957704
(14)	IN State Of McCormicks Creek State Park	IND984876409
(15)	Onkins Amaco Oil	IND984909903
(16)	Weliever Olds Pontiac GMC	IND016512642

Fifteen of the 16 RCRA sites that may be impacted by the alternatives are small quantity generator sites or LUST sites (Appendix S). The exception is the Dillman Road Waste Water Treatment Plant Landfill. The Dillman Road Landfill is the site where the non-hazardous ash from the incinerator used for cleaning up the Westinghouse Electric Corporation's hazardous materials is placed. This site is located along SR 37 at the intersection of Dillman Road and SR 37 (Figure 5.16-1).

One Brownfield site that may be impacted by Alternatives 1 and 2 is located at the corner of US 41 and CR 350 South in Gibson County, Indiana. It appears to be an old service station (Figure 5.16-2).

From an environmental impact standpoint, the RCRA sites, Brownfield sites, UST sites, and LUST sites that are located within this project are not as significant as CERCLA and Landfill sites (Figure 5.16-3). There are no CERCLA and/or Landfill sites that are directly impacted by the proposed

Figure 5.16-1: Dillman Road Landfill Site

Figure 5.16-2: Brownfield site

Figure 5.16-3: Typical UST facility

Figure 5.16-4: Prestolite Battery Division

working alignments (except for the Dillman Road Waste Water Treatment Plant Landfill which is located along Alternatives 5 and 3A) as identified from consultation with the EPA and from the Southwestern Indiana GIS. However, there are both CERCLA and Landfill sites located within one mile of the working alignment centerlines that may be of importance.

The following is a list of CERCLA sites that are located within one mile of the working alignment centerlines followed by the alignments that are close to them. None of the proposed working alignments will directly impact any of these sites. Further investigations on these sites may be required in the future to identify their exact limits (Appendix S).

(1) **Prestolite Battery Division**
Alternatives 1 and 2

(2) **Elmer Carrico Drum Site**
Alternatives 3 and 4

(3) **Indiana Woodtreating**
Alternatives 3 and 5

(4) **Lemon Lane Landfill**
Alternatives 3 and 5

(5) **Bennett Stone Quarry**
Alternatives 3 and 5

(6) **Davenport Open Dump**
Alternative 5

(7) **Neal's Landfill** Alternative 3

The Prestolite Battery Division (Huffers Garage today) is located approximately 0.5 miles west of Highway 41 in the city of Vincennes between 2nd and 6th streets (Figure 5.16-4). Confirmation with IDEM indicated that most of the site has been cleaned-up, but there are still some issues that must be addressed before it will be taken off of the CERCLA list. This site is currently on the National Priorities List.

The Elmer Carrico Drum Site is located on the corner of Locust Street and Bernard Avenue in the city of Washington, Indiana. This site was an unpermitted dump for various types of waste materials. Wastes included solids, construction debris, scrap metal and abandoned vehicles. The primary contaminants were solvents. A removal action plan was previously completed at this site (Superfund Emergency Response Actions Library). This site is no longer on the National Priorities List.

Indiana Woodtreating is located at 5700 Rogers Street in Bloomington, Indiana. This site is not on the National Priorities List.

The Lemon Lane Landfill is located at the corner of SR 37 and Vernal Pike Road in Bloomington, Indiana (Figure 5.16-5). The landfill has been capped and consultation with the Environmental Protection Agency representative indicated that the extent of the landfill with contamination is limited to the area with the cap on it shown in the aerial photograph (Appendix S). This site is on the National Priorities List.

Figure 5.16-5: Lemon Lane Landfill

The Bennett Stone Quarry is located approximately 0.5 miles southwest of SR 37 in Bloomington, Indiana (Figure 5.16-6). A removal action plan has been completed on this site and consisted of: removal and disposal in an approved facility of 252 capacitors located on the surface along with 14 cubic yards of contaminated soils. The removal also included placement of a clay cap over the main site to prevent surface runoff of contaminants, and construction of a security fence around the site. Consultation with the EPA representative identified that the site was close to completion with the exception of the contamination levels in Stout's Creek. Once this stream is remediated this site may be removed from the CERCLA list. Appendix S provides a more detailed description of the cleanup activities. This site is on the National Priorities List.

Figure 5.16-6: Bennett's Stone Quarry

Davenport Open Dump site is located at 6965 Beech Grove Road in Martinsville, Indiana. The two-acre site operated from 1960 until January 1986. An inspection by IDEM personnel determined that the site was an unpermitted open dump containing domestic waste, auto parts, and drums of unknown contents. In 1986, IDEM removed the drums from the site. In the summer of 2001, additional drums were discovered and further cleanup efforts were scheduled for the spring of 2002 (Appendix S). This site is not on the National Priorities List.

Neal's Landfill site is located just off SR 48 between Oard Road and Vernal Pike west of Bloomington, Indiana. The eighteen-acre site operated from 1949 until 1972. Between approximately 1962 until 1970, Westinghouse Electric Corporation, now doing business as CBS Corporation, dumped waste electrical equipment and parts including electric capacitors containing polychlorinated biphenyls (PCBs), and PCB-contaminated capacitor insulation material, rags and filter clay at the site. The cleanup process began in 1987 and on April 19, 1999, the first phase of the cleanup at Neal's Landfill began by CBS Corporation. The cleanup process reduced the size of the

site from 18 acres to 10 acres. This site is on the National Priorities List.

The following is a list of Active and/or Abandoned Landfill sites that are located within one mile of the working alignment centerlines followed by the alignments that are close to them. None of the proposed working alignments will directly impact any of these sites. Further investigations of these sites may be required in the future to identify their exact limits.

(1)	Cinergy Ellerman and Adams	Alternatives 1 and 2
(2)	Jamax Transfer Station	Alternatives 1 and 2
(3)	Thais Landfill	Alternative 1
(4)	Secptor RWS 1	Alternative 2
(5)	Wicker C/D Site	Alternative 2
(6)	Washington Dump	Alternatives 3 and 4
(7)	Dillman Road Waste Water Treatment Landfill	Alternatives 3 and 5
(8)	Bloomington Transfer Station	Alternatives 3 and 5
(9)	Martinsville Transfer Station	Alternative 5
(10)	Moore Open Dump	Alternative 5

5.16.4 Mitigation

Appropriate cleanup of hazardous materials and/or removal of USTs may be required. INDOT will coordinate with the appropriate agencies to see that proper cleanup of any contaminated sites are completed.

5.16.5 Summary

Avoidance of hazardous waste sites by the Indiana Department of Transportation (INDOT) for proposed construction projects is handled in a case-by-case basis. Just because a site is contaminated does not necessarily mean that it must be missed. Economic considerations are often the guiding principle for whether a contaminated site “must be missed”. INDOT has in the past, and continues to remediate sites such as LUST (leaking underground storage tanks) and mildly contaminated Brownfield sites as long as ground water contamination is not involved. However, INDOT avoids sites involving significant cleanup costs such as RCRA and CERCLA sites. Likewise, if possible, INDOT avoids the functioning elements of wastewater treatment plants.

Alternatives 1-5 will not impact any IDEM recorded Active Landfills, Abandoned / Inactive Landfills / Open Dumps, Active Permitted Solid Waste sites, Industrial Waste sites, Commissioner’s State List Cleanup sites, Voluntary Remediation sites, or EPA recorded CERCLA sites or TRI sites. The results of this analysis show that Alternative 1 may have the fewest number of hazardous waste sites. These results also show that Alternative 5 may have the greatest number of hazardous waste sites. The No-Build Alternative will have no impacts on hazardous waste sites.

5.17 Threatened and Endangered Species Impacts

5.17.1 Introduction

Endangered and threatened species are recognized by federal and state agencies as being in danger of extinction or being sufficiently compromised that they are at risk of becoming endangered, either nationally or in a state. The assessment of endangered and threatened species is concerned with the preservation and conservation of such species and their sustainability. The following federal and state definitions for threatened, endangered, special concern, and extirpated species are provided:

Federal Classifications

Endangered Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Indiana Classifications

Endangered Any animal or plant species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.

Special Concern Any animal or plant species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

Extirpated Any animal or plant species that has been absent from Indiana as a naturally occurring population for more than 15 years.

Federally listed species are protected by law. Section 7 of the Endangered Species Act directs all Federal agencies to use their existing authorities to conserve threatened and endangered species, and in consultation with the United States Fish and Wildlife Service (USFWS), to ensure that their actions do not jeopardize listed species or significantly impact or adversely modify critical habitat. Section 7 consultation with the United States Fish and Wildlife Service has been initiated.

5.17.2 Methodology

This Tier 1 EIS reviewed the potential impacts to federally listed and state listed species in the

study area by locating recorded occurrences of such species, and avoiding such recorded occurrences as much as possible. Locations for such species came from environmental resource agencies, use of experienced naturalists (field biologists), development of a GIS database, and development of species lists from an extensive literature search. For more information on the use of the GIS and the methodology, see Section 4.1 and 5.1 respectively.

Tier 2 NEPA studies will use information from the Tier 1 EIS along with any future recorded occurrences to study threatened and endangered species. Biological Assessments may be needed in the Tier 2 NEPA studies depending upon Section 7 consultation with the United States Fish and Wildlife Service. For state listed species, coordination with the Indiana Department of Natural Resources has been initiated.

Early in the process, a database of threatened, endangered and special concern (TES) species was obtained from the Indiana Heritage Database of the Indiana Department of Natural Resources (IDNR), as updated in May of 2002. The database contains the locations of all recorded species within the 26 county study area in southwestern Indiana. The information in this database was placed upon aerials with other data layers to develop an Environmental Atlas, which is Volume III of this EIS. At the request of USWFS and IDNR site-specific locations for TES species are not disclosed in the Atlas.

The information on TES species is considered sensitive, and the FHWA and INDOT have entered into an agreement with IDNR and USFWS that includes strict guidelines on its use. The general TES maps in this section have been approved for distribution by IDNR (Figures 5.17-1 and 5.17-2). Figure 5.17-1 shows the general location of federal and state listed species in the study area, while Figure 5.17-2 shows only the location of the 6 federal species to be evaluated in the Tier 1 EIS. In addition, a map on environmentally sensitive areas that have a high potential to harbor such species is shown in Figure 5-17-3. From such information, all efforts were made to avoid threatened and endangered species, high quality natural communities, and environmentally sensitive areas.

After development of the Environmental Atlas, TES species were reviewed and appropriate tables constructed with species, their number and status. This information was presented to the United State Fish and Wildlife Service in their Bloomington office on March 14, 2002, and there has been ongoing communication since. The federally endangered and threatened species (USFWS letter – dated July 1, 2002) that should be considered in the environmental evaluation for the I-69 project are:

1) Indiana bat (*Myotis sodalis*)	Endangered
2) Bald eagle (*Haliaeetus leucocephalis*)	Threatened
3) American burying beetle (*Nicrophorus americanus*)	Endangered
4) Eastern fanshell mussel (*Cyprogenia stegaria*)	Endangered
5) Fat pocketbook mussel (*Potamilus capax*)	Endangered
6) Rough pigtoe mussel (*Pleurobema plenum*)	Endangered

Recovery Plans are available for these species. The only critical habitat in the study area is a Priority 1 hibernaculum for the Indiana bat.

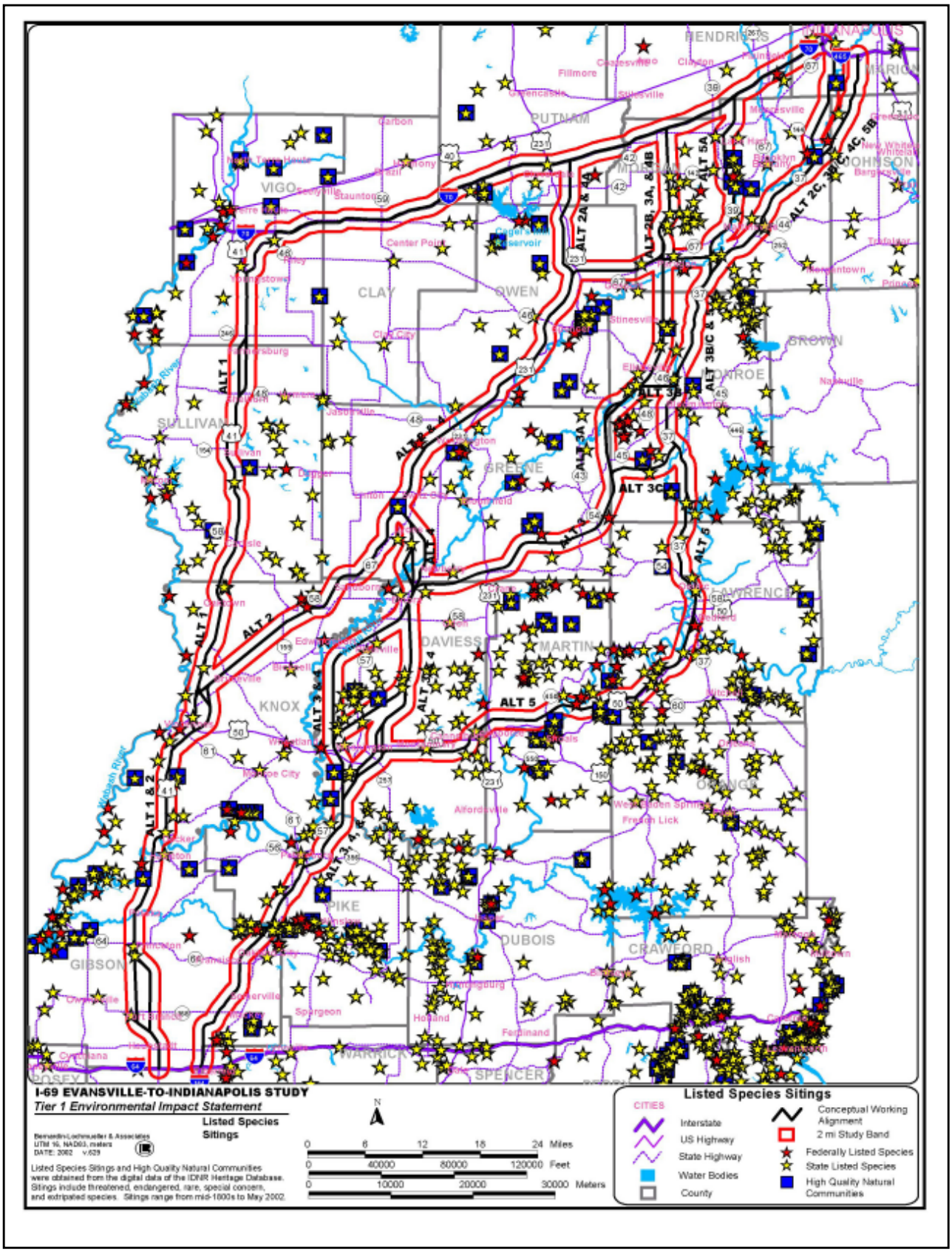


Figure 5.17-1: Listed species sitings

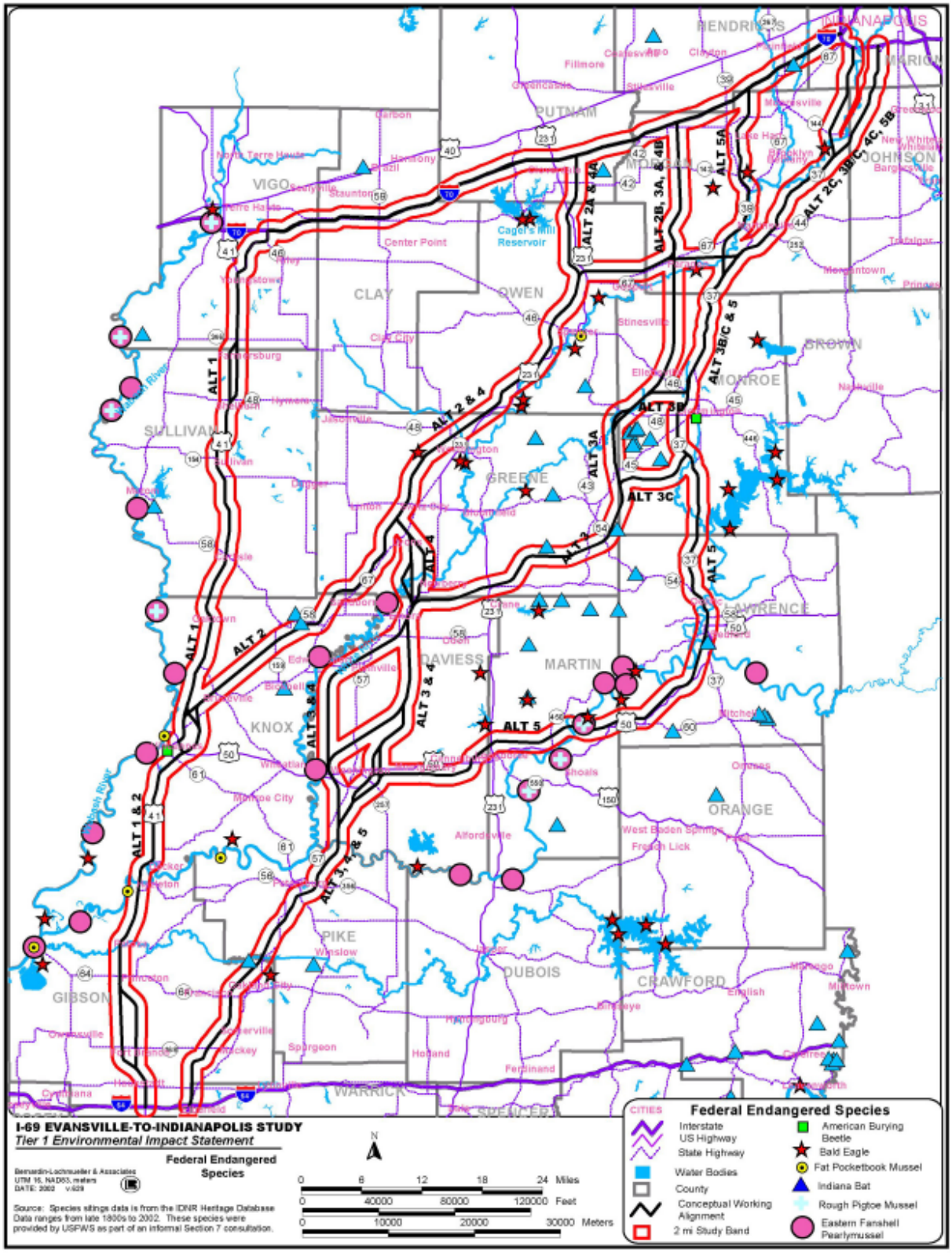


Figure 5.17-2: Federal endangered species

Species descriptions in the study area for other federally listed animals and plants were compiled (Appendix I – Parts 1-2) along with state listed animals and plants (Appendix I - Parts 3-4). Such information may also be found in the Environmental Atlas.

Unique to this study is the "Wetland, Habitat and Trophic Response Guilds for Mammals, Birds, Reptiles, Amphibians, and Fishes in Indiana" as developed for 606 species that are reasonable residents or usual migrants of Indiana (Appendix I – Part 5). These lists provide an opportunity to code each of the species as to their wetland dependency, habitat specificity, trophic level, seasonality (birds only), status, pollution tolerance for fishes, and sensitivity of some birds for grassland and forest fragmentation.

These tools were developed so as to avoid critical habitat for the Indiana bat, and avoid and minimize impacts to environments that harbor both federal and state listed species. All efforts have been made by way of these tools and coordination with agencies to better understand Indiana's biodiversity as related to threatened and endangered species and their dependency on specific ecosystems.

The major cause for extirpation of a species is loss of habitat. This study found that of 120 TES vertebrates in southwestern Indiana, 78% are fully or partially dependent upon wetlands, 12% are sensitive to grassland fragmentation, 9% are sensitive to forest fragmentation, and about 1% are associated with caves. For some 200 state listed plants that have been recorded from the study area, 60% were fully or partially dependent on forests; 47% fully or partially dependent of wetlands; 35% fully or partially dependent on primary habitats (e.g., glades, bluffs, lake shores); and 27% fully or partially dependent on prairies.

5.17.3 Analysis Results

From Section 7 Consultation with the USFWS, the following six federal species should be considered in the environmental evaluation for this Tier 1 EIS within the study area. They are the Indiana bat, bald eagle, American burying beetle, eastern fanshell mussel, fat pocketbook mussel, and rough pigtoe mussel. Their recorded occurrences within the study area are shown in Table 5.17-2. The No-Build Alternative will have no impacts on threatened and endangered species. The following descriptions discuss each of these species.

5.17.4 Federal Species

Indiana Bat

The Indiana bat (*Myotis sodalis*) is an endangered bat that occurs throughout much of the United States. They winter in a few large caves and mines for hibernation. Nearly 85% of the known population winters in only seven caves and mines in Missouri, Indiana, and Kentucky, and approximately one-half of the population uses only two of these hibernacula (Brady et al., 1983).

The Indiana myotis is a medium-sized bat with usually a dull, dark pinkish gray color above and

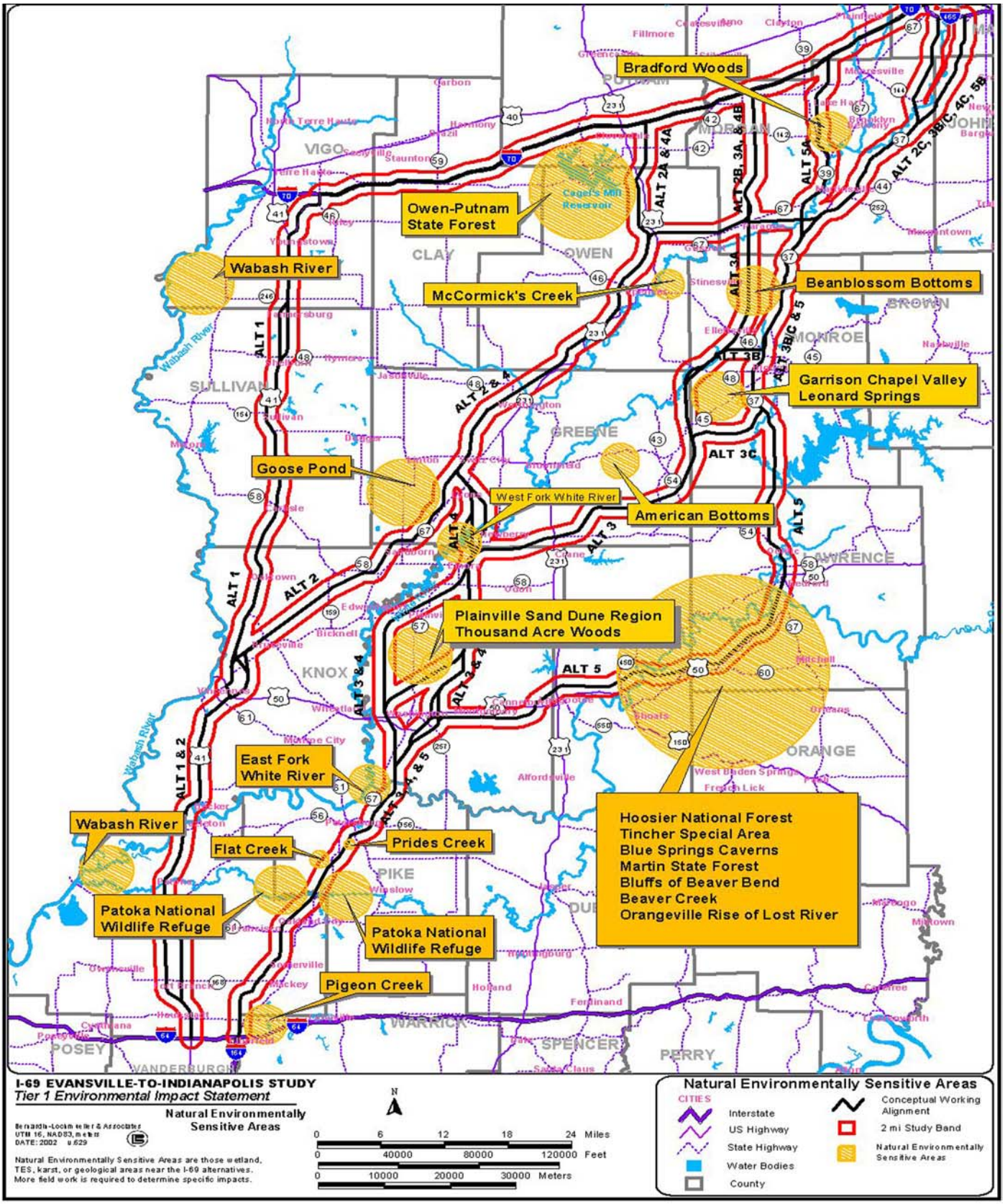


Figure 5.17-3: Natural Environmental Sensitive Areas

Figure 5.17-4: Indiana Bat
Photo taken by: John MacGregor

paler below. A few individuals have a brownish cast to the dorsal fur. It resembles the little brown bat, but differs in having a duller color to the dorsal fur, smaller feet, fewer and shorter hairs on the toes, and has a calcar (Mumford and Whitaker, 1982). Figure 5.17-4 shows a photograph of the Indiana bat.

The Indiana bat has hibernacula (winter habitat) and a summer habitat. In spring, females migrate north from their hibernaculum and form maternity colonies in predominantly agricultural areas of Missouri, Iowa, Illinois, Indiana, and Michigan. These colonies consist of 50 to 150 adults and their young. They normally roost under the loose bark of dead, large-diameter trees throughout summer; however, living shagbark hickory (*Carya ovata*) and tree cavities are also used occasionally (Brack, 1988-1989; Brack and Tyrell, 1990; Brack and LaVal, 1985; Cope and Humphrey, 1977; Cope et al., 1974, 1977; Humphrey et al., 1977; Gardner et al., 1991; Garner et al., 1992; Callahan, 1993; and Kurta et al., 1993).

Upon returning to their hibernacula in the fall, they spend much of their time swarming in the vicinity of the cave entrance. The foraging range for the Indiana Bat during fall and early spring is within five miles of the hibernacula. Bats mate at this time and females enter into hibernation as early as October. Males hibernate a little later (late November). The females store sperm through the winter and become pregnant in the spring. Females emerge from hibernation in late March or early April, followed by males. Females give birth to one young in June or early July, and at that time, they join together in nursery colonies beneath the loose bark of trees in riparian and floodplain areas (Humphrey et al., 1977; Cope et al., 1978; Sparling et al., 1979; Gardner and Gardner, 1980). A few Indiana bats have been captured in upland sites (Easterla and Watkins, 1969; Bowles, 1980). The young are capable of flight within a month of birth.

As a consequence of their limited distribution, specific summer and winter habitat requirements, and tendency to congregate in large numbers during winter, Indiana bats are particularly vulnerable to rapid population reductions resulting from habitat change, environmental contaminants, and other human disturbances (Brady et al., 1983). Additionally, because females produce only one young per year, recovery following a population reduction occurs slowly.

Before the 1970's, the population status of Indiana bats was poorly understood. A 1975 census established a benchmark of nearly 450,000 bats using Priority 1 hibernacula. Since 1983, the number of bats tallied has declined significantly, reaching a low of 347,890 in 1993 (Drobney and Clawson – http://biology.usgs.gov/s+t/frame/c164.htm).

Causes for decline in the Indiana bat are many, but the primary reason is human disturbance during hibernation. The disturbance of a hibernating Indiana bat may cause a loss of 10 to 30 days fat supply per average disturbance (Brady et al., 1983). These fat reserves are needed to get the bat through hibernation. Other causes are natural hazards (e.g., flooding, ceiling collapse, and freezing); deforestation from stream channelizations and surface mining; and pesticide poisoning.

The national trend for the Indiana bat indicates a 22% decline during the past 10 years. Most of the decline can be accounted for by a decline in the number of bats counted in Missouri. A more favorable pattern has been noted in Indiana, where numbers have increased. Since the 1990 recovery report, the Indiana population of Indiana bats has increased 18% (Drobney and Clawson – http://biology.usgs.gov/s+t/frame/c164.htm). Many increases per state have dealt with finding new caves with Indiana bats.

Recovery efforts have included placing gates or fences across cave entrances to eliminate disturbances to hibernating bats. These exclusion devices have not halted population declines, and it is thought that loss of habitat used by maternity colonies is cause for such declines. Maternity roost sites in dead trees exposed to sunlight as located in upland forests and near streams are particularly important. Loss of these sites through streamside deforestation and stream channelization pose significant threats to population recovery.

The majority of records for the Indiana bat come principally from the Crawford Upland and Mitchell Karst Plain regions (Figure 5.17-2). The only "critical habitat" in the study area is one cave or hibernaculum (winter home) for the Indiana bat. This cave became a Priority 1 cave in 1991, which means ***that it is a cave where winter populations exceed 30,000 bats.*** It was designated as "critical habitat" for the Indiana bat on September 24, 1976. Critical habitat is a term used in the Endangered Species Act, and means that it is ***a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection.***

Counts for the Indiana bat in this Priority 1 cave was about 12,500 in 1981 and increased in 2001 to about 48,200. This cave is not only important for Indiana, but important for Indiana bat populations in the United States. There are only 7 known Priority 1 caves, and this cave is one of the 7. For this reason, Alternatives 3A, 3B and 3C (all common in Gibson, Pike, Daviess, and Greene counties) were deliberately shifted away from this cave to avoid this Indiana bat hibernacula. The working alignments for Alternatives 3A, 3B, and 3C are 6 miles from this cave which is beyond the five mile foraging range. This cave is the only critical habitat in the study area (USFWS letter - dated June 25, 2002).

The avoidance of this Priority 1 cave is most important; however, there are Indiana bats using caves elsewhere, also. Alternatives 3A and 3B are located 1 to 1.5 miles from the nearest of a group of caves west of Bloomington. Alternatives 3A, 3B, and 3C are located approximately 1 mile from a cave in eastern Greene County.

Summer habitat would be expected within each of the alternatives. Alternative 1 follows existing US 41 and would be expected to have the least impact on summer habitat for this species. Alternatives 3, 4, and 5 appear to have the greatest potential for impacting summer habitat. Indiana bats roost in maternity colonies in Indiana from April 15 to September 15. Alternative 2 shows two records of the Indiana bat near Sandborne that are most likely related to mines, while Alternative 1 shows no records for the Indiana bat.

A 1993 survey for threatened and endangered bats was conducted between June 3 and August 10 within the study area. Sites netted for bats in **Gibson County** were Pigeon Creek, Patoka River Ditch, and Patoka River Woods; in **Pike County** were Patoka River Slough, Flat Creek, and

White River South; in **Daviess County** were White River NW, White River NE, Thousand Acre Woods, and Weaver Ditch; in **Greene County** were First Creek, Doans Creek, Dowden Branch, Taylor Ridge, Koleen 1 (Black Ankle Creek), Koleen 2 (Plummer Creek), Little Clifty Creek, and Big Clifty Creek; and in **Monroe County** were Indian Creek, Clear Creek West, and Clear Creek East. Results showed 62 bats from seven species.

The most common bat netted was the big brown bat at 21 individuals followed by the northern myotis, pipistrelle and the red bat. In that survey, two Indiana bats were taken approximately 1.5 miles west of SR 57 in the Patoka River bottoms at the Patoka River Ditch site in Gibson County on June 10, 1993. Both of the Indiana bats were lactating females, indicating the presence of a maternity colony not too far away. These were the only bats taken during the project belonging to threatened or endangered species. Other bats were the little brown bat and hoary bat. Calls of the evening bat were possibly heard north of the East Fork of the White River.

Bald Eagle

Figure 5.17-5: Bald Eagle
Photo by Herb Lang

The bald eagle (*Haliaeetus leucocephalus*) is a federally threatened species in Indiana. The study area does not have any critical habitat for the bald eagle. A number of records are available for the bald eagle (Figure 5.17-2).

The Indiana Department of Natural Resources Non-game Wildlife Program is working to restore bald eagle populations in Indiana. Between 1985 and 1989, 73 young eagles were released at the Monroe Reservoir (Castale, 1991). The number of active nests and young fledged has increased yearly since 1988 attesting to the program's success. Since 1988, a total of 67 eagles have been fledged in Indiana. In the 2001 breeding season, Indiana had 27 occupied territories, 27 active nests, and a total of 27 eagles fledged from 20 nests. In contrast, surveys in 1989 showed only 2 nesting territories, 1 active nest, and no young fledged. The number of bald eagles in Indiana has increased 35 percent since 1989. The 1992 winter state survey reported 101 bald eagles.

Within the 26 county study area today, there are 3 nests in Martin County, 2 nests in Monroe County, 1 nest in Greene County, and 1 recent nest in Vigo County. Most nests are located in south central Indiana and are found along larger reservoirs and the Wabash River and White River.

The adult bald eagle is named for its white head. The rest of the bird is dark brown with the exception of the tail feathers which are white. Males and females are identical in color. Maturity is reached at 4 to 5 years. The body of an adult bird is 3 to 3 ½ feet in length, and the wingspan is 6 to 7 ½ feet. Eagles mate for life and select nesting sites near where they were raised as young. A photograph of the bald eagle is shown in Figure 5.17-5.

Indiana's Bald Eagle Restoration Program has hacked many bald eagles around the Monroe

Reservoir. If the interstate were located on SR 37 (Alternative 5), it would be three to five miles from the Monroe Reservoir. Similarly, if the interstate were to parallel the West Fork of the White River (Alternatives 2 and 4), it would be from one to three miles from a number of recorded sites. The Owen Putnam State Forest shows two recorded sites. Alternative 3 shows only 1 recorded site near its crossing of the West Fork of the White River, while Alternative 1 shows no recorded sites for the bald eagle.

Adult bald eagles do not begin to nest until they are 4 to 5 years old. Eagles select nest sites close to where they were raised as young. The life span of a bald eagle is quite long, living up to 48 years in captivity and 21 years in the wild. Their nesting period is usually from October 1 to May 15 in the Southeast; however, in the northern portion of the range, nesting has occurred as late as August (USFWS, 1987).

Appropriate breeding habitat for bald eagles includes isolated large bodies of clear, clean water (i.e., lakes, bays, marshes, rivers) with adjacent mature, tall trees for nesting and roosting. Lakes with more than seven miles of shoreline have been reported as primary breeding habitat (Peterson, 1991). Nest trees may be living or dead and branches are added in the uppermost crotch year after year, prior to breeding. Eagles may also build nests in several trees and then alternate nest trees from year to year. Nests are usually located within one mile of water (Peterjohn amd Rue, 1991) and within open forests.

The Northern States Bald Eagle Recovery Plan (USFWS, 1983) provides management zones from each bald eagle nest. The primary zone (or circular ring around nest) is the most critical area and must be maintained to promote acceptable conditions for eagles. The size of this zone should be 330 feet from the nest. All land use activities are prohibited in this primary zone except, actions necessary to protect or improve the nest site. Human entry and low-level aircraft operations should be prohibited during the most critical and moderately critical periods, unless performed in connection with eagle research or management by qualified individuals. Motorized access into this zone should be prohibited. Restrictions on human entry at other times should be addressed in the breeding area management plan, considering the types, extents, and durations of proposed or likely activities.

The secondary management zone should extend 660 feet from the nest. Restrictions for this zone are land use activities that result in significant changes in the landscape, such as clearcutting, land clearing, or major construction, should be prohibited. Actions such as thinning tree stands or maintenance of existing improvements can be permitted, but not during the most critical and moderately critical periods. Human entry and low-level aircraft operations should be prohibited during the most critical period unless performed in connection with necessary eagle research and management by qualified individuals

The third zone or tertiary zone is the least restrictive zone. It should extend one-quarter mile from the nest, but may extend up to one-half mile if topography and vegetation permit a direct line of sight from the nest to potential activities at that distance. The configuration of this zone, therefore, may be variable. Some activities are permissible in this zone except during the most critical period. Each breeding area management plan may identify specific hazards that require additional constraints.

The most critical period is defined as that time when bald eagles engage in courtship activities and nest building, egg laying, and incubation. During this period, they are most intolerant of external disturbances and may readily abandon the area. The most critical period for disturbances therefore extends from approximately one month prior to egg laying through the incubation period. The moderately critical period includes the time interval from approximately one month prior to the critical period and about 4 weeks after hatching.

A survey for threatened and endangered birds was conducted in 1993 within the Wabash Lowland, Crawford Upland, and Mitchell Karst Plain. From a total of 30 different locations (reviewed twice, July and September), 101 species of birds from 34 different families were observed or heard. The average number of species per site was 20 ± 6. The station that showed the lowest richness (i.e., number of species) was Flat Creek in September, while the station that showed the highest richness was in the Patoka River bottoms in September. No federally listed bird species were seen or heard. State listed birds seen were the northern harrier (State Endangered), red-shouldered hawk (Special Concern), black and white warbler (Special Concern), and the worm eating warbler (Special Concern).

American Burying Beetle

The American Burying Beetle (*Nicrophorus americanus*) is a member of the carrion beetle family Siphidae. Carrion beetles are scavengers. The American burying beetle has been recorded historically from 35 states in the eastern and central United States, but now found in only 4 states: Nebraska, Rhode Island, Oklahoma, and Arkansas (Raithel, 1991). In Indiana, it is considered extirpated or extinct. In the United States, it was proposed as an endangered species in 1988, and placed on the endangered list in 1989.

The American Burying Beetle is the largest carrion insect in North America. It may reach a length of 1 and ½ inches. Like many other carrion beetles in the genus *Nicrophorus*, it is shiny black in color with the wing covers showing four, relatively large red, yellow or orange markings (spots). Unlike any other species; however, the pronotum (the shield-like area just behind the head) of the American burying beetle is red or reddish-orange, and there may be a small orange patch on the face between the eyes (Figure 5.17-6). The following photograph of the American burying beetle comes from the web page http:// 2es.fws.gov/Oklahoma/beetle.htm.

Figure 5.17-6: American Burying Beetle

Brett Ratcliff (http://www.ngpc.state.ne.us/wildlife/beetle.html) describes the habits of adult beetles as nocturnal and, they search widely for carrion. They are remarkably adept at detecting the odor of recent death. Using the organs of smell located on their antennae, they can find a

dead mouse within an hour of death, and from as far as away as two miles. After flying to the vicinity of the carcass, they drop to the ground and crash through the litter to it. They go under the body, turn over onto their backs and move the carcass to a spot with soft soil to bury it. After burial, the beetles strip away fur or feathers and work the mass into a compact ball.

The larvae receive parental care during the entire time they are feeding and growing. This is extremely rare and highly developed behavior in insects. Both adults feed the larvae. The adults continually tend the carcass, and if the size of the brood is too large to be successfully reared, both adults will cannibalize small larvae. After about a week, the larvae have consumed all but the bones of the carcass, and the adults fly away. Living only one season, the adults soon die. The young pupate in the nearby soil and emerge as adults about a month later.

Today, the American burying beetle seems to be largely restricted to areas most undisturbed by human influence. Contrary to the earlier belief that the insects were associated with eastern deciduous woodlands, it now seems that carrion availability (appropriate in size and numbers) is more important than the type of vegetation or soil structure. Specific habitat requirements are unknown, and critical habitat for this species has not been designated.

There are no recent records for this species from southwestern Indiana and no records are in the vicinity to any of the alternatives. There are two records of this species in the study area. One record is from Vincennes (no date), and the other is from Monroe County (1906). More recent records come from outside the study area in Posey County in 1965 (Mt. Vernon, Indiana), and in Evansville in 1927.

Mussels

There are 3 federally endangered mussels that should be considered in the environmental evaluation for this Tier 1 EIS. They are the fat pocketbook mussel (*Potamilus capax*), eastern fanshell mussel (*Cyprogenia stegaria)*, and the rough pigtoe mussel (*Pleurobema plenum*).

The fat pocketbook mussel inhabits large rivers in slow-flowing water in mud or sand. Key physical characters for the fat pocketbook mussel is a rounded, greatly inflated shell, thin to moderately thick, S-shaped hinge line, tan or light brown, rayless, and shiny (Cummings and Mayer, 1992). Figure 5.17-7 shows a photograph of the fat pocketbook mussel (http://www.agfc.com/critters/endangered_species_p4.html).

Figure 5.17-7: Fat Pocketbook Mussel

It has a few records in southwestern Indiana (Figure 5.17-2). The United States Fish and Wildlife Service (Region 3) reports that today, the fat pocketbook mussel is found only within the lower Wabash and Ohio rivers, and in the lower Cumberland River (http://midwest.fws.gov/endangerd/clams/fatpo_fc.html). From the few older records available, records are closer to the

western routes (Alternatives 1 and 2). There is one record in the West Fork of the White River near Spencer. No records are available for the East Fork of the White River.

The eastern fanshell mussel inhabits medium to large rivers in gravel riffles. Key physical characters for the eastern fanshell mussel are round shape, numerous pustules, elevated growth lines, and broken green rays (Cummings and Mayer, 1992). Figure 5.17-8 shows a photograph of an eastern fanshell mussel (http://endangered.fws.gov/i/f14.html).

Of interest, records of the eastern fanshell mussel within the study area are from the West Fork and East Fork of the White River, but no records are available for the mainstem of the White River. Recent records are from 1988 to 1995.

Figure 5.17-8: Eastern Fanshell Mussel
Photo by the Illinois Natural History Survey

Figure 5.17-9: Rough Pigtoe Mussel
Photo taken by Illinois Natural History Survey

The rough pigtoe mussel inhabits medium to large rivers in sand or gravel. Key physical characters for the rough pigtoe mussels are a shell shaped like an equilateral triangle, with a brown, satinlike appearance and a moderately deep beak cavity (Cummings and Mayer, 1992). Figure 5.17-9 shows the rough pigtoe mussels (http://endangered.fws.gov/i/f0j.html).

Records for the rough pigtoe mussel are solely from the East Fork of the White River near Shoals. Alternative 5 is in proximity to such locations. The other 4 alternatives are in areas where there have been no records of this species.

A mussel survey for threatened and endangered species was completed within the study area in 1993. From forty-one stream crossings (including the East Fork of the White River and the Patoka River), 78% of the streams showed no mussels. The survey demonstrated 12 species of mussels. The only species found alive were the giant floater, yellow sandshell, and lilliput. Weathered (relict) shells were found of the pondhorn, little spectaclecase, white heelsplitter, fragile papershell, pocketbook, cylindrical papershell, and squawfoot. No federal or state listed endangered, threatened or special concern mussels were found in that study.

5.17.5 State Listed Species

State listed animals and plants in the study area are provided in Appendix I – Parts 3 and 4 respectively. Coordination with the Indiana Department of Natural Resources indicated that for this Tier 1 EIS, recent record occurrences (1980 to Present) of state listed species within 1 mile of the centerline of the alternatives would be appropriate for evaluation and comparison of the alternatives. In addition, a letter from IDNR (Comments and Coordination – letter dated June 25, 2002) provided a comparison of the alternatives that also identified the crayfish frog (*Rana aerolata circulosa*), loggerhead shrike (*Lanius ludovicianus*), blackfoot quillwort (*Isoetes melanopoda*), and the roundleaf water-hyssop (*Bacopa rotundifolia*). These and other state listed species within 1 mile of the centerline for each alternative may be found in Table 5.17-1. Descriptions for each of these species, including others in the study area, may be found in Appendix I – Parts 3 and 4. Records for the two plants in IDNR's letter were in the vicinity of Alternative 1; records for the crayfish frog were from the Beanblossom Bottoms (Alternative 3A); and records for the loggerhead shrike were for Alternatives 3, 4 and 5 as they would cross Daviess County. IDNR considers Daviess County a population stronghold for the loggerhead shrike. Recent and older records of the loggerhead shrike, listed as a state endangered species in Indiana, may be found in Figure 5.17-10.

In addition, the Indiana Department of Natural Resources recognized the bald eagle, northern cavefish, neotropical migrant birds, and troglobitic (cave dwelling) species as very important. The northern cavefish has one of its largest populations in the Blue Springs Caverns. Alternative 5 crosses over this cave. Neotropical migrant birds are heavily dependent on core forest habitat, i.e., forest habitat greater than 100 meters from the edge of the forest. Losses to core forest habitat would be the greatest for Alternatives 3 and 5 (Section 5.23 – Ecosystem Impacts). Troglobitic species are principally in the Mitchell Karst Plain Region. Alternative 5 followed by Alternative 3 showed the highest occurrences for such cave dwelling species.

A comparison of the alternatives for state listed species (Table 5.17-1) showed Alternative 5 with the greatest number of records of state listed species (27-30 species) followed by Alternative 3 (18-20 species) and Alternative 4 (14-22 species). Alternative 2A showed the lowest with 8 species followed by Alternative 1 (13 species) and Alternative 2B (13 species). Alternative 2C was similar to Alternatives 3A and 4B. State listed species increased from west to east when comparing the different options for the alternatives.

5.17.6 Previous Studies on TES Species

A 1993 survey for threatened and endangered fishes within the Wabash Lowland, Crawford Upland and Mitchell Karst Plain showed 7,911 fishes of 71 species. The most common fishes in the Wabash Lowland Region were the mosquitofish, silverjaw minnow, bluntnose minnow, spotfin shiner, stoneroller, blackstripe topminnow, ribbon shiner, redfin shiner and creek chub. In the Crawford Upland and the Mitchell Karst Plain, the most common fishes were the redfin shiner, creek chub, striped shiner, bluntnose minnow, central stoneroller, spotfin shiner and emerald shiner. No federal or state listed endangered, threatened or special concern fishes were collected in that study. Many of these species are common indicators of stressed habitats.

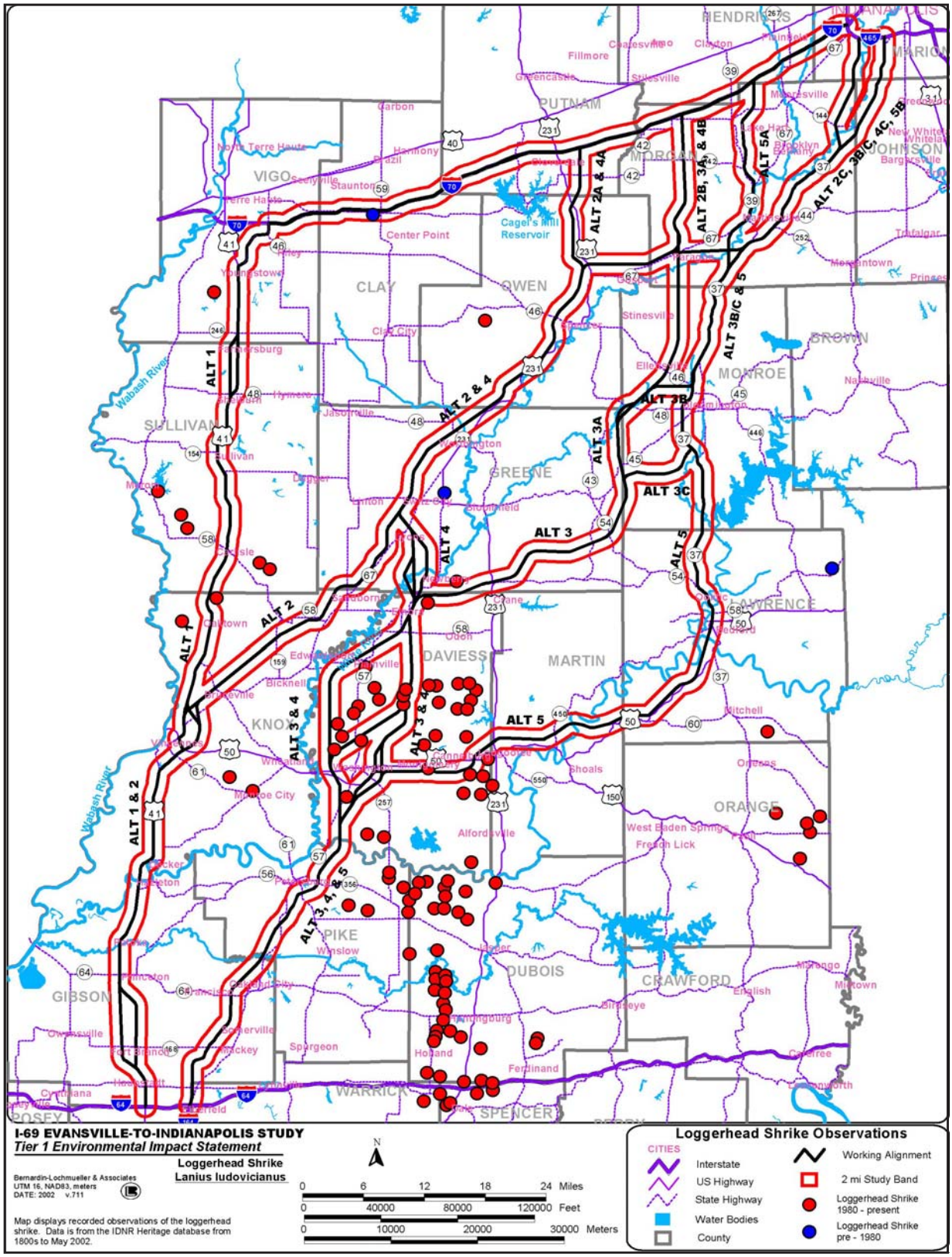


Figure 5.17-10: Loggerhead Shrike Observations

Table 5.17-1: Recent Records (post 1980) of State Listed Animals and Plants within 1 mile of the centerline for the I-69 Alternatives.

Scientific Name	Common Name	Type	Status	Alternatives											
				1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Lynx rufus	Bobcat	Mammal	SE	X		X	X	X	X	X	X	X	X	X	X
Myotis austroriparius	Southeastern Bat	Mammal	SE											X	X
Myotis sodalis	Indiana Bat	Mammal	SE	X	X	X	X	X	X	X	X	X	X	X	X
Nycticeius humeralis	Evening Bat	Mammal	SE	X											
Taxidea taxus	Badger	Mammal	SE	X	X	X	X	X	X	X	X	X	X	X	X
Mustela nivalis	Least Weasel	Mammal	SSC					X	X	X				X	X
Ammodramus henslowii	Henslow's Sparrow	Bird	SE				X						X		
Bartramia longicauda	Upland Sandpiper	Bird	SE	X	X	X		X			X			X	
Circus cyaneus	Northern Harrier	Bird	SE					X	X	X	X	X	X	X	X
Cistothorus platensis	Sedge Wren	Bird	SE											X	X
Haliaeetus leucocephaus	Bald Eagle	Bird	SE		X	X	X		X	X	X	X	X	X	X
Lanius ludovicianus	Loggerhead Shrike	Bird	SE	X				X	X	X	X	X	X	X	X
Tyto alba	Barn Owl	Bird	SE				X						X	X	X
Buteo lineatus	Red-shouldered Hawk	Bird	SSC			X		X				X			
Buteo platypterus	Broad-winged Hawk	Bird	SSC			X		X				X			
Helmitheros vermivorus	Worm-eating Warbler	Bird	SSC			X	X					X	X		
Clonophis kirtlandii	Kirtland's Snake	Snake	SE			X	X	X	X	X		X	X		X
Macroclemys temminckii	Alligator Snapping Turtle	Turtle	SE											X	
Opheodrys aestivus	Rough Green Snake	Snake	SSC					X	X						
Rana areolata	Northern Crawfish Frog	Frog	SE					X						X	
Cyprogenia stegaria	Eastern Fanshell Mussel	Mussel	SE											X	X
Epioblasma torulosa	Northern Riffleshell	Mussel	SE				X		X	X			X		X
Pleurobema clava	Clubshell	Mussel	SE				X		X	X			X		X
Pleurobema plenum	Rough Pigtoe	Mussel	SE											X	X
Pleurobema pyramidatum	Pyramid Pigtoe	Mussel	SE				X		X	X			X		X
Quadrula cylindrica	Rabbitsfoot	Mussel	SE				X		X	X			X		X
Carychium exile	Ice Thorn	Mussel	ST											X	X
Obovaria subrotunda	Round Hickorynut	Mussel	SSC				X		X	X			X		X
Pleurobema cordatum	Ohio Pigtoe	Mussel	SSC											X	X
Amblyopsis spelaea	Northern Cavefish	Fish	SE											X	X
Etheostoma histrio	Harlequin Darter	Fish	SE					X	X	X	X	X	X	X	X
Ammocrypta pellucida	Eastern Sand Darter	Fish	SSC	X											
Lepomis symmetricus	Bantam Sunfish	Fish	SSC								X	X	X		
Orconectes inermis	Troglobitic Crayfish	Crustacean	SE							X				X	X
Crangonyx packardi	Cave Amphipod	Crustacean	SR											X	X
Sinella alata	Springtail	Insect	SE											X	X
Bacopa rotundifolia	Roundleaf Water-hyssop	Plant	SE	X											
Carex gravida	Heavy Sedge	Plant	SE	X	X	X	X								
Carya texana	Black Hickory	Plant	SE	X	X	X	X								
Isoetes melanopoda	Blackfoot Quillwort	Plant	SE	X											
Chrysopsis villosa	Hairy Golden Aster	Plant	ST	X	X	X	X								
Diodia virginiana	Buttonweed	Plant	ST					X	X	X	X	X	X	X	X
Taxodium distichum	Bald Cypress	Plant	ST	X	X	X	X								
Cyperus pseudovegetus	Green Flatsedge	Plant	SR					X	X	X	X	X	X	X	X
Didiplis diandra	Water Purslane	Plant	SR					X	X	X	X	X	X	X	X
Sagittaria australis	Longbeak Arrowhead	Plant	SR					X	X	X	X	X	X	X	X
Trachelospermum difforme	Climbing Dogbane	Plant	SR					X	X	X	X	X	X	X	X
TOTAL				**13**	**8**	**13**	**17**	**18**	**20**	**20**	**14**	**17**	**22**	**27**	**30**

Note: (1) There are no recent records for the Indiana Crayfish (*Orconectes indianensis*), but is expected in alternatives within the Wabash Lowland Region.
(2) There are no dates for the Northern River Otter.

SE – State Endangered ST – State Threatened SSC – Special Concern SR – State Rare

Two drift fence arrays (a trapping technique) were set up in the Patoka River bottoms and reviewed daily for 30 days in June-July of 1993. Results for mammals showed 168 individuals of 6 species. The white-footed mouse followed by the short tailed shrew were the most common small mammals. Results for amphibians showed 105 individuals of 5 species. The most common amphibian was the southern leopard frog followed by the green frog. Results for reptiles showed the garter snake, northern banded water snake, five-lined skink, and eastern box turtle. No federal or state listed endangered, threatened or special concern fishes were collected in that study.

A 1993 survey for threatened and endangered plants was conducted within the study area. A total of 362 species of plants were recorded in the Wabash Lowland, Crawford Upland, and Mitchell Karst Plain regions. The Patoka River bottoms showed 240 species. No federally listed species of plants were observed in that study; however, 2 state threatened (*Diodia virginiana* – Virginia Buttonweed, and *Taxodium distichum* – Bald cypress), and 1 rare species (*Carex socialis* – Social sedge) were observed. The bald cypress were located south of US 50 near Washington, while the Virginia buttonweed and social sedge were found in the Patoka River bottoms.

5.17.7 Summary

The six federal species that were considered for environmental evaluation in this study are the Indiana bat, bald eagle, American burying beetle, fat pocketbook mussel, eastern fanshell mussel, and rough pigtoe mussel. The only critical habitat found in the study area was an Indiana bat hibernaculum (winter habitat). The closest alternatives (Alternatives 3A, 3B and 3C) are 6 miles from this hibernaculum.

A comparison of the alternatives for federally threatened and endangered species showed that Alternative 1 with the fewest recorded occurrences, while Alternative 5 showed the highest number.

Consultation with the USFWS has been initiated for the six federal species and will be ongoing throughout the life of the project. All efforts will be made to avoid federally listed species locations. Similarly, coordination with the Indiana Department of Natural Resources for state listed plants and animals has been initiated and all efforts will be made to avoid state listed species and high quality natural communities.

Many state listed species have been recorded within 1 mile of the centerline for the alternatives. A comparison of the alternatives for state listed species showed the fewest recorded occurrences in Alternatives 2A, 2B and Alternative 1, while Alternative 5 showed the greatest number of recorded occurrences followed by Alternatives 3 and 4. Some species of interest are the loggerhead shrike, northern cavefish, bald eagle, crayfish frog, neotropical migrant birds, and troglobitic (cave dwelling) species.

Results from information on both federal and state listed species shows that forests, wetlands, and caves serve as prime habitat for many of them. Avoidance and minimizing impacts to these three ecosystems is correlated with reducing impacts to federal and state listed species. The No-Build Alternative will have no impact on threatened and endangered species.

5.18 Floodplain Impact

5.18.1 Introduction

Floodplains are a vital part of the river or stream ecosystem. They are important because they act as flood buffers, water filters, nurseries, and are major centers of biological life in the river or stream ecosystem. They are important for maintenance of water quality as they provide fresh water to wetlands and backwaters, dilute salts and nutrients, and improve the overall health of the habitat of many species of birds, fish, and plants. They are important biologically as they represent areas where many species reproduce and are important for breeding and regeneration cycles.

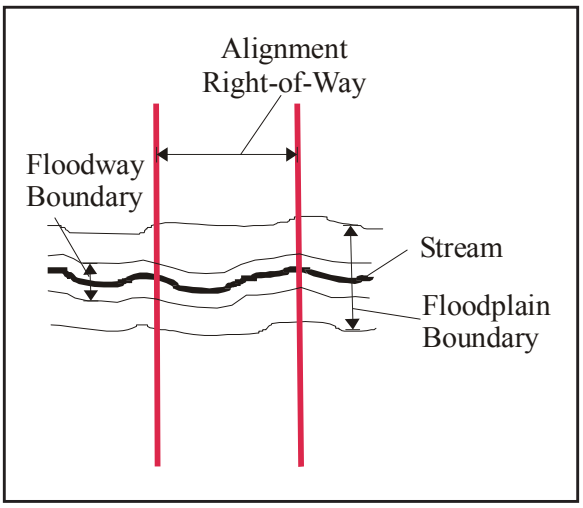


Figure 5.18-1: Latitudinal Floodplain Encroachment

A floodplain is defined as the area around a stream or river that frequently floods during heavy rain. The 100-year floodplain was analyzed for this project. This is the area around the streams and rivers that will be under water whenever the 100-year storm occurs. Floodplains are composed of two general areas (see Figures 5.18-1 and 5.18-2). The first area is the floodway, which is the channel of a river or stream and those portions of the floodplain adjoining the channel which are reasonably required to efficiently carry and discharge the peak flow of the regulatory flood (100-year flood) of any river or stream. The second area is the remaining area of the floodplain, which is often referred to as "backwater". This "backwater" area is essentially a holding area providing storage of floodwater. Figure 5.18-3 shows a typical example of a "backwater" floodplain area.

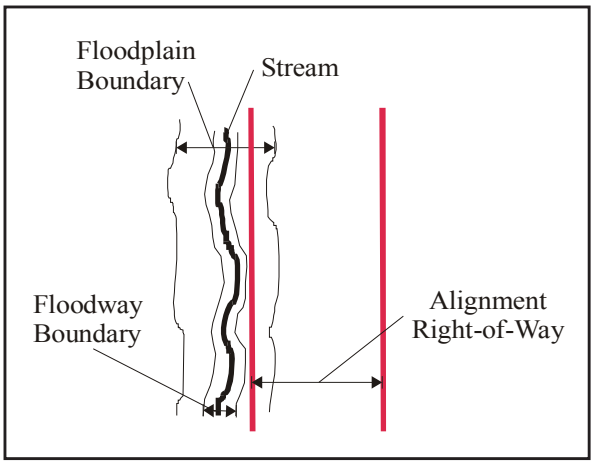


Figure 5.18-2: Longitudinal Floodplain Encroachment

Projects that directly cross or are adjacent to a stream or river will have some kind of floodplain encroachment. When a project crosses directly over a stream or river, it is referred to as a latitudinal floodplain encroachment (Figure 5.18-1). Likewise, when a project is located adjacent to a stream or river it is referred to as a longitudinal floodplain encroachment (Figure 5.18-2). Each of the alternatives has both latitudinal and longitudinal floodplain encroachments. Because a latitudinal floodplain encroachment has a higher probability of affecting the floodway of a stream or river, latitudinal floodplain encroachments have a greater overall impact than longitudinal floodplain encroachments. Impacts to floodplains require various permits which are described in Section 5.25.

5.18.2 Methodology

Figure 5.18.3: Photograph of the White River "Backwater" Floodplain

The approximate linear feet of each floodplain crossed by each of the five alternatives was derived from measuring the approximate length of floodplain crossed by the working alignment. This data came from the Geographical Information System (GIS) layer titled floodplain_sw, which was derived from the book titled The Indiana Water Resource: Availability, Uses and Needs published by the Indiana Department of Natural Resources (Clark, 1980). To verify the floodplain areas used for this analysis, the larger floodplain areas were cross referenced with the Federal Emergency Management Agency (FEMA) maps and showed approximately the same floodplain area. For more information on the use of the GIS and on the methodology, see Section 4.1 and 5.1, respectively.

The floodplains were split into two different categories i.e., (1) floodplains with a latitudinal encroachment (alignment goes across the stream or river) and (2) floodplains with a longitudinal encroachment (alignment is located adjacent to the stream or river, but never crosses it). In general, the latitudinal floodplain encroachments will have a greater potential for floodplain impacts than the longitudinal encroachments because the latitudinal encroachments have a much greater chance of affecting the floodway.

In addition, each floodplain encroachment within the working alignment was analyzed to identify the potential amount of acres that may be impacted in each of the five alternatives. The GIS flooplain_sw layer was used for this calculation. The working alignment for each alternative ranged from approximately 240 to 470 feet, and included a 500-foot radius for potential interchanges. These areas did not include floodplain encroachments located within the existing US 41 and/or SR 37 right-of-way.

5.18.3 Analysis

The five alternatives were compared for (1) latitudinal floodplain encroachments measured in linear miles, (2) longitudinal floodplain encroachments measured in linear miles, and (3) potential floodplain acres to be impacted measured within the working alignment, excluding the areas within the existing US 41 and/or SR 37 right-of-way. Table 5.18 - 1 shows the results of the analysis. A map showing the alternatives and floodplains along with individual tables showing the potential floodplain impacts of each alternative may be found in Appendix J.

The results of this analysis show that Alternatives 2, 4, and 5 have the highest amount of potential floodplain impacts followed by Alternative 3. Alternative 1 has the lowest amount of potential floodplain impacts. The No-Build Alternative would have no impacts on floodplains.

Table 5.18-1: Potential Floodplain Impacts

Alternatives	Criteria		
	Latitudinal Impacts (linear miles)	Longitudinal Impacts (linear miles)	Potential Impacts* (acres)
Alternative 1	20-21	15-16	370-470
Alternative 2A	21-22	17-18	1010-1100
Alternative 2B	20-21	18-19	1070-1160
Alternative 2C	23-24	29-30	1540-1850
Alternative 3A	23-24	1-2	860-900
Alternative 3B	22-23	7-8	800-1060
Alternative 3C	23-24	7-8	820-1080
Alternative 4A	27-28	4-5	1010-1068
Alternative 4B	27-28	5-6	1080-1120
Alternative 4C	29-30	10-11	1550-1810
Alternative 5A	29-30	2-3	1200
Alternative 5B	25-26	9-10	980-1190

* Floodplains areas measured from the GIS that are located within the working alignment excluding the floodplains located within the existing US 41 and/or SR 37 right-of-ways

5.18.4 Mitigation

Impacts to floodplains, where reasonable, will be avoided. In areas that are located adjacent to streams or rivers and have a longitudinal floodplain encroachment, the alignments may be shifted to avoid these floodplain impacts in reasonable. In areas that have latitudinal floodplain encroachments, the alignment can be shifted to cross the stream or river in a narrow floodplain area and at a right angle to the stream or river, if reasonable. Also, in areas of latitudinal floodplain encroachments, the alignments may be raised and longer bridges utilized to avoid affecting the floodplain areas.

Proposed bridges over waterways will be designed to perform hydraulically in a manner equal to or greater than the backwater surface elevations, and would not be expected to increase these backwater surface elevations. The new bridges will be designed to “pass” the 100-year floodway volume with adequate clearance under the structures. As a result, there would be no material impacts on natural and beneficial floodplain values, there would be no material change in flood risks, and there will be no material increase in potential for interruption or termination of emergency service or emergency evacuation routes. Hydraulic design studies addressing various structure sizes will be completed during the design phase of the selected alternative.

5.18.5 Summary

The results of this analysis show that of the five alternatives, Alternative 1 encroaches the least amount of linear miles of latitudinal floodplains, while Alternative 4 encroaches the greatest amount of linear miles of latitudinal floodplains. This analysis also shows that Alternative 4 encroaches the least amount of longitudinal floodplains, while Alternative 2 encroaches the greatest amount of longitudinal floodplains. This analysis indicates that as the topography increases from a flat landscape to a more hilly landscape, the amount of longitudinal floodplain encroachments decreases.

The overall results of the floodplain analysis show that Alternative 1 has the potential to encroach upon the least amount of floodplains compared to the other four alternatives. This analysis also showed that Alternative 1 has the least amount of potential floodplain within the working alignment and that Alternative 2 has the highest amount of potential floodplain acres within the working alignment. This analysis does not take into consideration the amount of floodplain areas located within the existing US 41 and/or SR 37 right-of-way. The No-Build Alternative will have no impacts on floodplains.

Because the proposed bridges over waterways will be designed to perform hydraulically in a manner equal to or greater than the backwater surface elevations, they would not be expected to increase these backwater surface elevations. The new bridges will be designed to “pass” the 100-year floodway volume with adequate clearance under the structures. The I-69 project is not expected to have any material impacts to the floodplains located within the alternatives. After Tier 2 NEPA studies, during design, permits will be obtained from the appropriate resource agencies.

5.19 Wetlands

5.19.1 Introduction

Wetlands are important ecologically, socially, and economically to the health of Indiana's environment. Some ecological functions of wetlands are:

- Primary Production and Nutrient Transport
- Habitat for Animals
- Sanctuary for Animals
- Hydrological Support for Adjacent Communities
- Shoreline Protection
- Storm/Flood Storage
- Storm/Flood Peak Reduction
- Groundwater Recharge
- Water Purification
- Water Supply
- Effects Climatic Conditions (Temperature, Oxygen, and Carbon Dioxide Cycles)
- Isolated Genetic Population Pools
- Reproduction and Development

Wetlands cover about 3.5% of Indiana.

In addition, wetlands provide many human values. Some values are as follows:

- Commercial Fisheries
- Recreation (Hunting, Fishing, Boating, and Swimming)
- Sites for Development
- Forestry Products
- Agricultural Products
- Aesthetics
- Educational Centers
- Peat Mining
- Cranberry Production

Wetlands cover about 813,000 acres (3.5 % of total area) of Indiana. Wetlands are an important natural resource because they support rich biological communities across the state, especially in southwestern Indiana. Because of their functions and values, there are several federal and state laws that regulate activities that affect wetlands. The major laws protecting wetlands include the Federal Clean Water Act, the River and Harbors Act, and Indiana's Flood Control Act. There are a number of definitions for a wetland; however, all definitions have three common criteria. They are:

- **wetland's vegetation** plants that are adapted to a wet environment
- **hydric soils** soils that are characterized by anaerobic conditions
- **hydrology** an area that is inundated or saturated to the surface for at least 5% of the growing season in most years

Wetlands provide a transition zone from aquatic habitat to upland habitat. There are many different types of wetlands. The following are definitions of some of the typical wetlands found in Indiana.

Figure 5.19-1: Emergent

Figure 5.19-2: Scrub/Shrub

Figure 5.19-3: Forested

Emergent Wetlands

Wetlands characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens (Figure 5.19-1). Emergent wetlands are also known as marshes. The vegetation in emergent wetlands is present for most of the growing season in most years (USFWS, 1979). Emergent wetlands are usually dominated by perennial plants. All water regimes are included except subtidal and irregularly exposed. Bogs and fens are two of the high quality emergent wetlands that occur as thick peat deposits in old lake basins or as blankets across the landscape (USGS, 1998). These two wetlands are primarily found in northern Indiana. Plants characteristic of emergent wetlands include: soft-stem bulrush, carex, spikerush, and arrowhead.

Scrub/Shrub Wetlands

Wetland areas dominated by woody vegetation less than 6 meters (20 feet) tall (Figure 5.19-2). The species include shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions (USFWS, 1979). All water regimes, except subtidal are included (USGS, 1998). Many of the scrub/shrub wetlands in the Midwest develop into forested wetlands. Plants characteristic of scrub/shrub wetlands include: willows, buttonbush, rose mallow, and spicebush.

Forested Wetlands

Forested wetlands are wetlands that are characterized by woody vegetation that is 6 meters (20 feet) tall or taller (Figure 5.19-3). Forested wetlands are the most common wetland in southwestern Indiana where moisture is abundant particularly along rivers and steams (USFWS, 1979). Forested wetlands normally possess an upper canopy of trees, an understory of young trees and shrubs, and a

herbaceous ground layer (USGS, 1998). Most of the wetlands within this project are forested wetlands. Plants characteristic of forested wetlands include: silver maple, sycamore, cottonwood, and pin oak.

Wetlands represent about 3 to 4 percent of Indiana; however, harbor an unusually large concentration of our wildlife and plants. "For example, 900 species of wildlife in the United States require wetland habitats at some stage in their life cycle, with an even greater number using wetlands periodically. Representatives from almost all avian groups use wetlands to some extent and one third of North American bird species rely directly on wetlands for some resource" (Hammer, 1992).

> "Due to the diversity of habitats possible in these transition environments, the Nation's wetlands are estimated to contain 190 species of amphibians, 270 species of birds, and over 5,000 species of plants. Many wetlands are identified as critical habitats under provisions of the Endangered Species Act, with 26% of the plants and 45% of the animals listed as threatened or endangered either directly or indirectly dependent on wetlands for survival" (Hammer, 1992).

Wetlands along riverbanks (riparian wetlands) are receiving more attention because of their valuable role in helping to stabilize banks. One of the benefits of riparian wetlands is that they act as a natural flood control or buffering for downstream areas by slowing the flow of floodwater, and reducing peak flows on main rivers (Mitch and Gooselink, 1986).

Some wetlands may function as groundwater recharge areas, allowing water to seep slowly into and replenish underlying aquifers. Other wetlands represent discharge areas for surfacing groundwaters. Both may occur within close proximity depending upon local and regional patterns of ground water distribution (Hammer, 1992).

5.19.2 Methodology

This project has been developed in conformity to Executive Order 11990 and USDOT Order 5660.1A. An estimate of wetland impacts was accomplished using the Geographic Information System (GIS). For more information on the use of the GIS and on the methodology, see Section 4.1 and 5.1 respectively. For each of the alternatives, a working alignment was placed on top of the United States Fish and Wildlife Service National Wetland Inventory (NWI) maps that included wetland points (very small wetlands), lines (linear wetland areas), and polygons (any type of wetland shape). Wetland acres were calculated and summarized for the following wetland types: forested, emergent, and scrub-shrub. Calculations of wetland points were assumed to have an area of 0.1 acres, and wetland lines were assumed to have a width of 50 feet. **The total wetland acres calculated did not include any wetlands that were located within the existing US 41 and/or SR 37 right-of-ways.**

It is important to note that the NWI uses infrared aerials for classifying wetlands and such a methodology may not meet all of the criteria used by the Army Corps of Engineers for permitting decisions under Section 404 of the Clean Water Act. Therefore the wetlands listed on the NWI maps may not necessarily be jurisdictional wetlands. NWI data was used in this analysis because it is the best available; however, the wetland acres given should be used for a general comparison of the alternatives, rather than as an exact calculation of jurisdictional wetlands. Jurisdictional wetlands require wetland delineations. Jurisdictional wetlands that are impacted will require the appropriate permit(s).

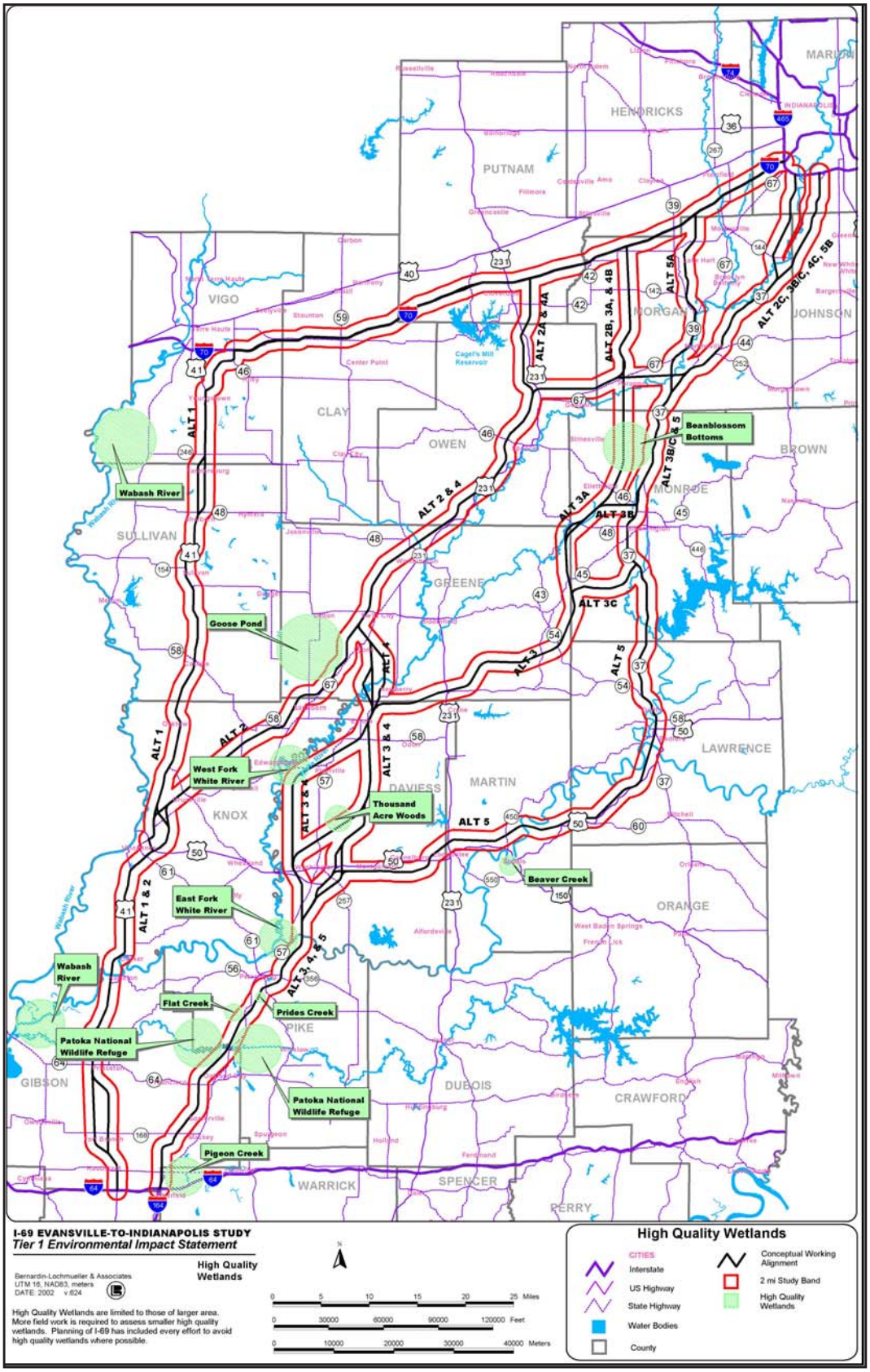


Figure 5.19-4: High Quality Wetlands

5.19.3 Wetland Analysis

There are four major wetland complexes located within the area of this project. They include the Patoka River National Wildlife Refuge, Goose Pond Wetlands Creation Project, Beanbossom Bottoms, and the Pigeon Creek Wetland Complex . Other high quality wetland areas within the area of this project include: Pigeon Creek, Flat Creek, Prides Creek, Thousand Acres Woods, along the Wabash River near Terre Haute, along the Wabash River where the White and Patoka Rivers merge into the Wabash River, White River East Fork, Beaver Creek, and White River West Fork (Figure 5.19-4).

Figure 5.19-5: Patoka River National Wildlife Refuge.

The Patoka River National Wildlife Refuge is located in Southwestern Indiana (Figure 5.19-5). Alternatives 3, 4, and 5 all cross the Patoka River near land owned for the National Wildlife Refuge. The Refuge and Management Area was established on September 7, 1994 and will encompass 22,083 acres of bottomland forested wetland, scrub-shrub wetland, emergent wetland, ag-modified wetland, upland forest, and farmland (USFWS, 1994). These lands form a riverine corridor along 30 miles of the Patoka River. It is one of the most significant bottomland hardwood forests remaining in the State and supports over 380 species of wildlife. It also encompasses one of the best-known habitats for the northern copperbelly water snake (IDNR, 1992). The primary goal of the Patoka River National Wildlife Refuge is to restore the floral and faunal diversity of this forested wetland ecosystem (Simon et al, 1995). The primary emphasis will be on bottomland reforestation. The Patoka River National Wildlife Refuge is nationally unique in that it is the first unit of the National Wildlife Refuge System to be established in an area of active mining (coal). A portion of the project (approximately 1,500 acres) was designated a Wildlife Management Area in order to assure the long-term protection of important forested wetlands while permitting continued utilization of the coal resources (USFWS, 2002).

Goose Pond Wetlands Creation Project is located in west central Greene County just to the south of Linton, Indiana (Figure 5.19-6). Alternative 2 is located close to the Goose Pond Wetlands Creation Project. The lead agency in the Goose Pond project is the Natural Resource Conservation Service. This project is expected to influence bird migration patterns in the

Figure 5.19-6: Goose Pond Wetlands Creation Project.

Figure 5.19-7: Beanblossom Bottoms

Figure 5.19-8: Pigeon Creek Wetland Near SR 57

Midwest, based on its size. The goal of the Goose Pond Wetlands Creation Project is to restore 7,100 acres of farmland to wetlands (INDOT, 2002).

The Beanblossom Bottoms represents a high quality hardwood wetland, and harbors many unique plants and animals (Figure 5.19-7). Alternative 3A crosses the Beanblossom Bottoms and the Beanblossom Nature Preserve. The Nature Preserve is owned by the Sycamore Land Trust. The IDNR has an easement on this property. Access to the Nature Preserve is from Woodall Road just south of Bottoms Road in northwest Monroe County. Beanblossom Bottoms includes acres owned by the Sycamore Land Trust, the U.S. Fish and Wildlife Service (Muscatatuck National Wildlife Refuge), and privately owned restored wetlands. Nearly 520 acres are protected in the Beanblossom Bottoms. The Beanblossom Bottoms Nature Preserve, Restle Natural Area, Grieco, Trout, Brummett, Baugh, and Anderson properties are all land trust properties in this complex. This property was purchased by the Sycamore Land Trust with funds raised from individuals, several foundations, and from the Indiana Heritage Trust program (Bloomingnews, 1999).

The **Pigeon Creek** wetland complex is located in northwest Warrick County, Indiana. It includes Lost Hill Wetland and Marchand Wildlife area (Figure 5.19-8). Alternatives 3, 4, and 5 are located west of and avoids the Pigeon Creek wetland complex. The Pigeon Creek wetlands include a high biodiversity of plants and animals, e.g., the swamp rabbit, copperbelly water snake, great blue herons, and a mosaic of obligate to facultative wetland plants.

The **Flat Creek** wetland complex is located within a coal mining reclamation area in northwest Pike County southwest of Petersburg, Indiana. Alternatives 3, 4, and 5 are located east of this wetland complex. The Flat Creek wetlands show varied habitats with a high degree of biodiversity, e.g., a very nice wetland, a large blue heron rookery, beaver dams, and open grass lands. Various wetland and upland communities occur in this area.

Prides Creek wetland complex is located in Pike County southwest of Petersburg and receives floodwaters from Prides Creek. Alternatives 3, 4, and 5 cross the Prides Creek wetland complex. This area includes a mixture of emergent, scrub/shrub, and forested wetlands. It is located in lowland areas along Prides Creek north of the coal mining area. Rails, warblers, and amphibians characteristically use this wetland.

Thousand Acre Woods is located in Daviess County northeast of Washington, Indiana between the North Fork of Prairie Creek and the South Fork of Prairie Creek. Alternatives 3 and 4 are located close to Thousand Acre Woods. This area includes an extensive amount of bottomland woods with medium to large size trees. A good variety of bird life has been observed at this site including yellow-billed cuckoo, Kentucky warbler, crested flycatcher, and the yellow-breasted chat.

The **Wabash River** wetland complex located near the area where the White River and the Patoka River merge into the Wabash River in northern Gibson County includes a high biodiversity area with many different wetland types. Alternatives 1 and 2 are located east of this Wabash River wetland complex. This area has recorded occurrences for a number of federal and state listed threatened and endangered species, and state significant wildlife habitats. It is not uncommon for bald eagles to nest in this area.

The **East Fork of the White River** wetland complex is located near the area where the East Fork and West Fork of the White River merge together in northern Pike County, southeastern Knox County, and southwestern Daviess County. Alternatives 3, 4, and 5 are located east of this wetland complex. This area is primarily located on the east side of SR 57 north of the Gil Hodges Bridge over the East Fork of the White River. It retains floodwaters from the East Fork of the White River. Turtles, bats and amphibians are commonly observed in this area.

Beaver Creek wetland complex is located between Shoals and Huron, Indiana. Alternative 5 is located north of the Beaver Creek wetland complex. Most of the high quality wetland complexes are located between US 150 and the small town of Huron. This area includes a mixture of emergent and scrub/shrub wetlands along with many inundated bottomland wetland woods. Many different federally and state listed threatened and endangered species have been recorded from this area along with state significant habitats. Habitat along Beaver Creek is most attractive as located in the Crawford Upland region. Martin State Forest is located in the vicinity of the Beaver Creek wetland complex.

The **West Fork of the White River** wetland complex located in northwestern Daviess County east of Plainville, Indiana, is unique because of its backwater sloughs or oxbows. Alternatives 3 is located east of this wetland complex, while Alternative 4 could go through it. Oxbows located in this area are important for the unique plants and animal that utilize them. They also offer an ecosystem that is very much connected with the White River. Mussels, fishes, amphibians, reptiles, birds, and mammals depend upon such areas for survival.

The **Wabash River** wetland complex located near Terre Haute, Indiana, is significant for the many different types of wetlands located within this area. Alternative 1 is located east of this wetland complex. A number of federally and state listed threatened and endangered species have been reported from this area along with state significant habitats. Prior to the selection of the Muscatatuck National Wildlife Refuge some 50 years ago, this particular area was a candidate for a National Wildlife Refuge. Of the 12 species of bats known from Indiana, 10 species have been reported from this area.

All of these areas are of high quality wetland complexes. Avoidance of these high quality wetland complexes during the conceptual design was considered a high priority. There are no bogs or fen that will be impacted by any of the alternatives.

The alternatives were compared for (1) palustrine forested wetlands, (2) palustrine emergent wetlands, and (3) palustrine scrub/shrub wetlands. The total amount of acres of each type of wetland

Table 5.19-1 - Comparison of Alternatives for Wetland Acres

Alternatives	Criteria				
	Forested Wetlands	Scrub/Shrub Wetlands	Emergent Wetlands	Total	Estimated Mitigation
Alternative 1	20-25	1-5	5-10	25-40	75-135
Alternative 2A	50-55	5-10	5-10	60-75	175-270
Alternative 2B	55-60	5-10	5-10	65-80	190-290
Alternative 2C	70-80	5-10	15-20	90-110	255-390
Alternative 3A	100-145	5-10	5-10	120-165	325-630
Alternative 3B	90-135	5-10	5-10	100-155	295-590
Alternative 3C	80-130	5-10	5-10	90-150	265-570
Alternative 4A	100-140	5-10	5-10	110-160	325-610
Alternative 4B	105-145	5-10	5-10	115-165	340-630
Alternative 4C	115-160	5-10	15-20	140-190	390-710
Alternative 5A	115-120	5-10	5-10	125-140	370-530
Alternative 5B	100-110	5-10	5-10	110-130	325-490

that fell within the working alignment were calculated to compare each of the alternatives for potential wetland impacts. Table 5.19-1 shows the results of the analysis.

All efforts were made to avoid impacting wetlands during the development of the working alignments for the Tier 1 EIS. The Tier 2 NEPA studies will attempt to further avoid wetlands. Where avoidance is not possible, all efforts will be made to minimize the impacts. The high quality wetland areas were all closely studied to avoid or minimize impacts. **For example, Alternative 3B was shifted to avoid taking any land from the Beanblossom Bottom Nature Preserve.** Coordination with review agencies identified all of these areas as high quality wetland complexes and suggested that efforts be made to avoid or minimize the impacts in these areas. Alternatives 3, 4, and 5 cross the Patoka River between areas that have been purchased for the Patoka River National Wildlife Refuge. Coordination with the refuge showed the proposed crossing as an area with the least environmental impacts. Wetlands to the east and west of the proposed Patoka River crossing near SR 57 are much more extensive and show better wildlife habitat. For further discussion of these resources please see Section 5.23 - Ecosystem Impacts.

There are wetland impacts within all the alternatives, but the impacts have been minimized by efforts to avoid them. Most of the impacted wetlands are small wetland areas (usually less than 5 acres) that are not directly connected to larger wetland complexes. Whenever possible, the alternatives were designed to effect only the edge of the larger wetland areas and not impact the core (middle) of these wetland areas. An estimate of the total wetland acres impacted for all the alternatives ranged from 1.2% to 2.9% of the total acres of land impacted by each working alignment. For a discussion of cumulative wetland impacts refer to Section 5.26 - Cumulative Impacts.

Based on NWI mapping Alternatives 3, 4, and 5 have the highest potential for wetland impacts followed by Alternative 2. Alternatives 3A and 5A traverse the high quality wetlands in the Beanblossom Bottoms wetland complex. Alternatives 3, 4, and 5 traverse the high quality wetlands in the vicinity of the Patoka River National Wildlife Refuge. All wetland impacts would be mitigated as discussed below.

Many high quality wetlands have been avoided in the location for the 5 alternatives. Such wetlands are located along Pigeon Creek, Flat Creek, Thousand Acres Woods, Wabash River near Terre Haute, Wabash River where the White and Patoka Rivers merge into the Wabash River, White River East

Fork, Beaver Creek, Goose Pond. The crossing of the West Fork of the White River for Alternative 4 has three variations. The eastern variation avoids many of the wetlands in this crossings. The No-Build Alternative will have no impacts to wetlands.

Figure 5.19-9: Before Mitigation

Figure 5.19-10: After Mitigation

5.19.4 Mitigation

One option in avoiding and/or minimizing wetland impacts is by bridging over them. Building a bridge over a large area of wetlands may minimize the impacts to the overall wetland. For example, it is anticipated that the floodplain of the Patoka River will be bridged to minimize impacts to the wetlands in the Patoka River Bottoms. This would decrease the amount of wetland acres impacted by the I-69 project. Bridging wetland areas are possible avoidance/ mitigation measures that will be further evaluated in the Tier 2 NEPA studies. Furthermore, bridging the floodplain will maintain existing wildlife corridors.

Permits are required for the placement of fill in wetlands (see Section 5.25 - Permits). Conditions of these permits will require the construction of replacement wetlands at various mitigation ratios. The different types of wetlands require different mitigation ratios. A "Wetland Mitigation and Monitoring Plan" is usually developed that documents in the deed, the property will remain as a wetland in perpetuity. This means that the land is protected from future development. The overall goal of wetland mitigation is to have no net loss of wetlands. Figures 5.19-9 and Figure 5.19-10 show what a typical mitigation site looks like before and after the mitigation has been completed. Possible areas for wetland mitigation are shown in Figure 5.19-11.

The potential wetland acres impacted within the working alignment of the 5 alternatives were calculated for possible mitigation acres. Estimated wetland mitigation acres are shown in Table 5.19-1. Low range numbers were calculated by multiplying the forested and scrub/shrub acres impacted by three, and the emergent acres impacted by two. High range numbers were calculated by multiplying the forested acres impacted by four, the scrub/shrub acres impacted by three, and the emergent acres impacted by two. These numbers were added for a total number of estimated acres for mitigation. INDOT will follow the Wetland Memorandum of Understanding signed on January 28, 1999 with the IDNR and USFWS for wetland mitigation.

Enhancing existing wetlands by adding to them will provide a better habitat for wildlife and improve the existing wetlands and also improve the chance of success of the mitigation site. Coordination

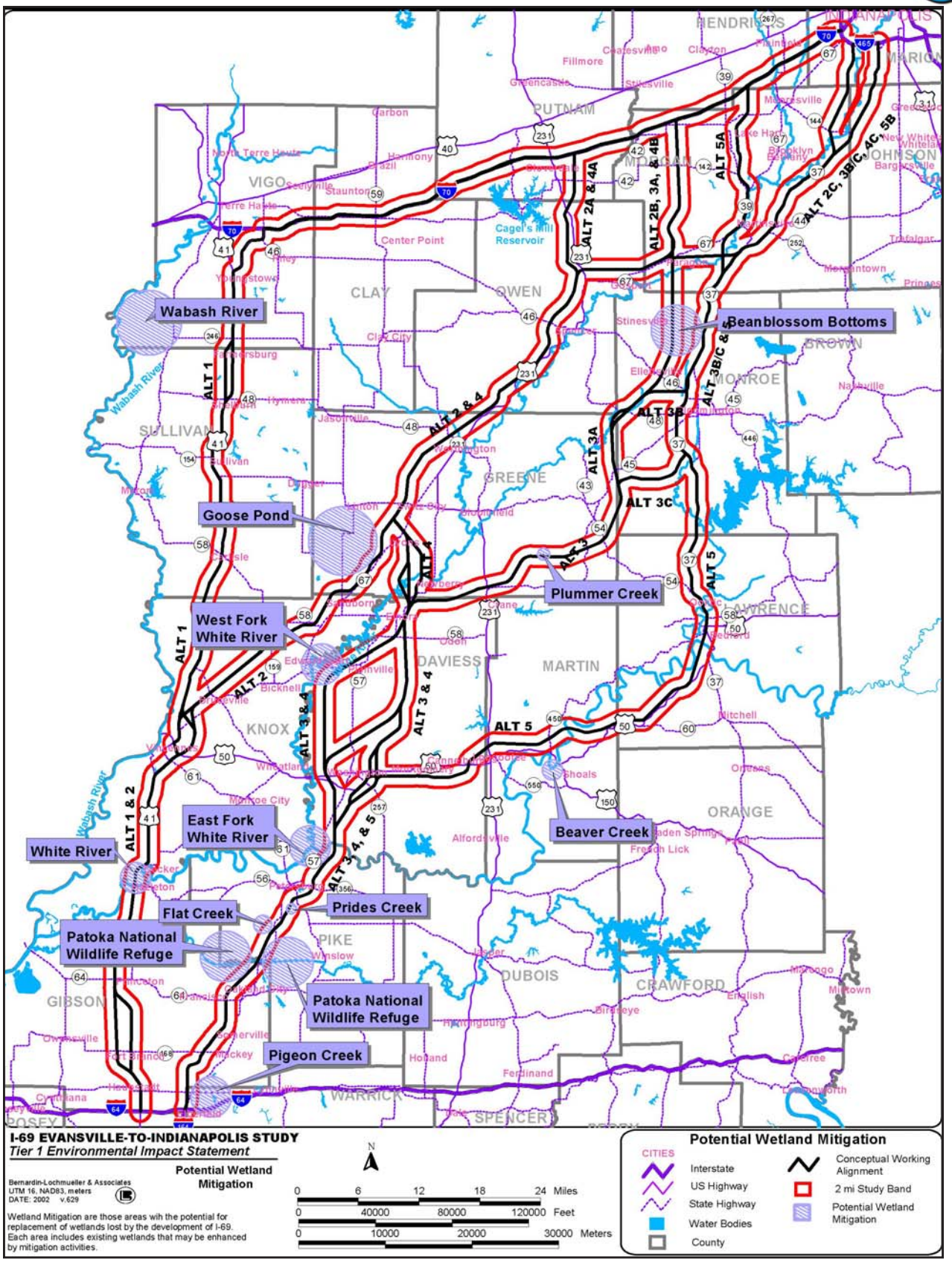


Figure 5.19-11: Potential Wetland Mitigation Sites

with review agencies will assure that the wetland mitigation sites are suitable, and that they are located in excellent areas for successful ecosystems for wildlife, plants, and humans.

5.19.5 Summary

The results of this analysis shows that Alternative 1 has the lowest potential for wetland impacts because it is located within existing US 41 right-of-way for much of its length. Alternatives 3, 4, and 5 have the potential for the highest amount of wetland impact. Close coordination with review agencies and local agencies would avoid and minimize many wetland impacts. The No-Build Alternative will have no impacts on wetlands. For a discussion of cumulative wetland impacts refer to Section 5.26 - Cumulative Impacts.

5.20 Agricultural Impacts

5.20.1 Introduction

Since early settlement, agricultural land in Indiana has been, and continues to be, one of the most valuable natural resources within the state. There is a continued loss of farmland, specifically prime farmland, as cities expand and rural development for industry and housing becomes more attractive. Data from the 1997 census of agriculture indicated that just over 15.1 million acres, or 66% of Indiana's 22.9 million acres was farmland (Indiana Agricultural Statistics Service, 1999). The state's cropland and pastureland accounted for 12.8 million (56%) and 1.3 million (5%) acres respectively. The remaining 1.0 million acres exists as miscellaneous agricultural property including woodland.

In 1997, 12.9 million acres of Indiana was considered rural prime farmland, placing it eighth in the country in total acreage of this resource. Only three states have more than 50 percent of their land area classified as prime farmland: Indiana, Illinois, and Iowa (Indiana Land Resources Council, 1999). In fact, at 58 percent, Indiana ranks second only to Illinois in the percent of its land that is considered prime farmland. However, with 124,200 acres of prime farmland converted to developed land from 1992 to 1997, Indiana ranks second in the highest percent of prime farmland conversion in the nation and seventh in the average annual rate (24,800 acres/year) of prime farmland converted to developed land (United States Department of Agriculture, 1997). Eighty-four percent of Indiana's prime farmland in 1997 was utilized for cropland, six percent was devoted to pastureland, and the remaining 10 percent was in the form of forestland, Conservation Reserve Program (CRP) land or miscellaneous rural land.

Farmland preservation and the conversion of prime and unique farmland to urban development is very important in Indiana. Continued population growth, increases in transportation systems and efficiency, and communication flexibility are some of the factors which make it increasingly easier to live and work in widely-dispersed communities today. The Hoosier Farmland Preservation Task Force indicates that from 1978 to 1992 an average of 88,714 acres of farmland per year have been lost to other uses (Indiana Land Resources Council, 1999). The Natural Resource Conservation Service (NRCS) estimates that prime and important agricultural soils are being converted at a rate three to four times that of less productive non-prime farmland (United States Department of Agriculture, 2002). In light of this trend, one of the goals of the Farmland Protection Program is to protect and slow the loss of farmland. The concern is not so much the overall acreage of cropland converted to urban development, but the quality and pattern of cropland conversion. Preservation strategies are not intended to be anti-development or anti-growth, but instead concentrate efforts to direct industrial, residential and commercial growth to areas less suitable for farming, thus preserving more valuable prime farmland, and ultimately achieve a balanced utilization of rural, suburban and urban land resources (Indiana Land Resources Council, 1999). Figure 5.20-1 shows a photograph of a family farm located outside the city of Washington in Daviess County, Indiana.

Total land area for the 26 county I-69 Tier 1 Study Area accounts for approximately 28.9% of the total land area in Indiana; the total land in farms for these 26 counties represents 24.0% of that reported for the state in the 1997 census of agriculture. Figure 5.20-2 illustrates corn, soybean and wheat production in 2001 for the 26 county southwestern Indiana study area and shows that Knox, Gibson, Posey, Daviess, and Hendricks counties are the most productive within this region based on the total

number of bushels produced. Collective corn production (194.4 million bushels) and soybean production (52.3 million bushels) for the 26 county study area accounted for 22.0% and 19.1% of the states total production respectively. Although the combined production of these 26 counties is seven to ten percent less than their total land area percentage within the state, three of the study area counties within the Lower Wabash basin (Knox, Gibson and Posey) rank among the top 20 for combined corn and soybean production in the state. Knox County was in fact ranked second for combined production for Indiana in 2001. Individually, Knox ranked second for corn production and eighth for soybean production, but did not rank within the top ten counties for yield (bushels per acre) in either crop. At 172 bushels/acre and 168 acres/bushel respectively, Daviess County (ranked fourth) and Vanderburgh County (ranked tenth) were the only study area counties to rank among the top ten in the state for corn yield. None of the study area counties ranked among the top ten for soybean yield. Posey, Gibson, Knox and Vanderburgh counties ranked first, third, fourth and tenth respectively for winter wheat production for the state in 2001. However, at 77 bushels/acre Hendricks County was the only study area county to rank in the top ten for yield.

Figure 5.19-1 – Family farm outside Washington, Daviess County

Although the efficiency and productivity experienced in today's farming community continues to increase, the returns to farmers for their investment in dollars is less than 20 years ago (Indiana Land Resources Council, 1999). 1997 cash receipts for crops in the 26 counties comprising the I-69 Tier 1 DEIS study area ranged from $1.4 million for Brown County to $90.0 million for Knox County. The $661.5 million total cash receipts for crops generated by the study area counties in 1997 represents 18.7% of the total crop cash receipts ($3.51 billion) reported for the state during that census year. An even better indicator of the return on farmland within each county is the crop cash receipts per harvested acre (Figure 5.20-3). The statewide average of $291.42/acre harvested was exceeded by eight of the 26 study area counties: Marion, Knox, Vanderburgh, Johnson, Hendricks, Gibson, Posey and Vigo. The average value of land per acre for the 26 county study area in southwestern Indiana range from $1,288/acre to $4,369/acre. Eighteen, or 70 percent, of the 26 study area counties are

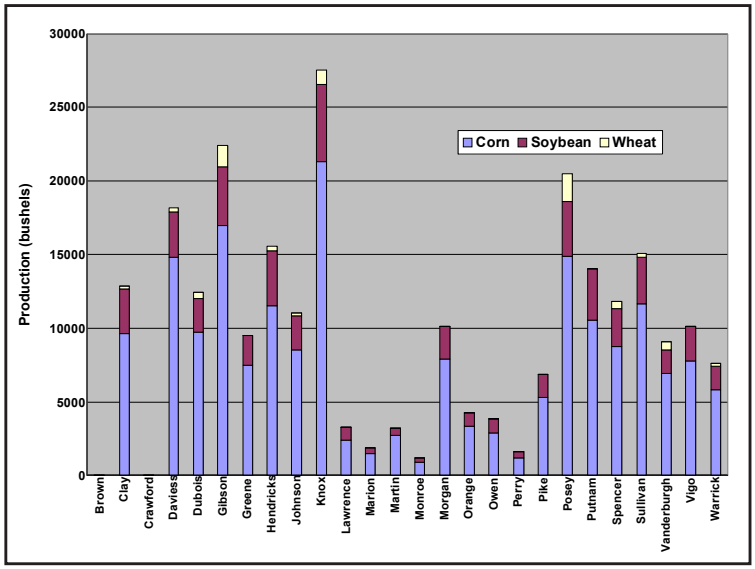


Figure 5.20-2–2001 Crop Production for Study Area Counties

reported below the state average of $2,064/acre (Figure 5.20-4).

5.20.2 Farmland Protection Policy Act

The U.S. Department of Agriculture oversees the Farmland Protection Policy Act (FPPA). The Act's ultimate goal is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. The FPPA establishes the protocol and criteria to be used by federal agencies to (a) identify and take into account the adverse effects of their programs on the preservation of farmland, (b) consider alternative actions, as appropriate, that could lessen adverse effects, and (c) ensure that their programs are compatible with state and units of local government and private programs and policies to protect farmland. The FPPA does not provide authority to withhold Federal assistance for projects that convert farmland to nonagricultural uses.

For the purposes of implementing the FPPA, farmland is defined as prime or unique farmlands or farmland that is determined by the State or unit of local government agency to be farmland of statewide or local importance (7 CFR 658.2(a)). The NRCS defines prime farmland as:

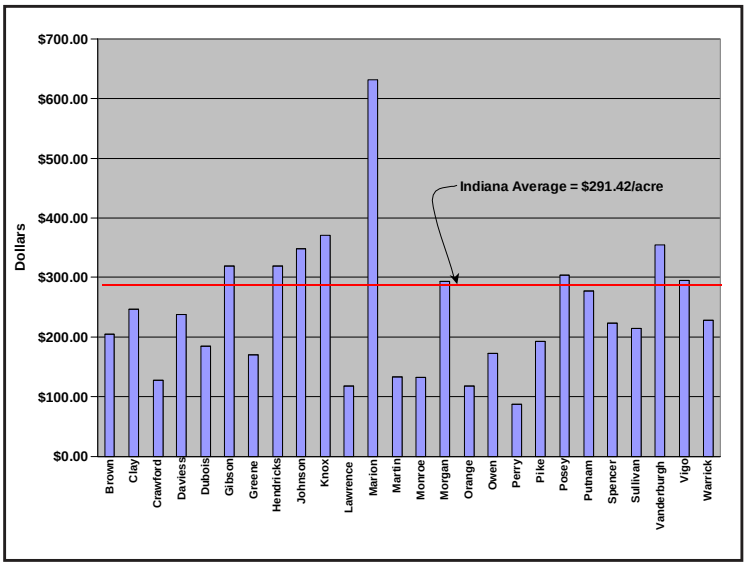


Figure 5.20-3: 1997 Crop Cash Receipts Per Acre Harvested for Study Area Counties

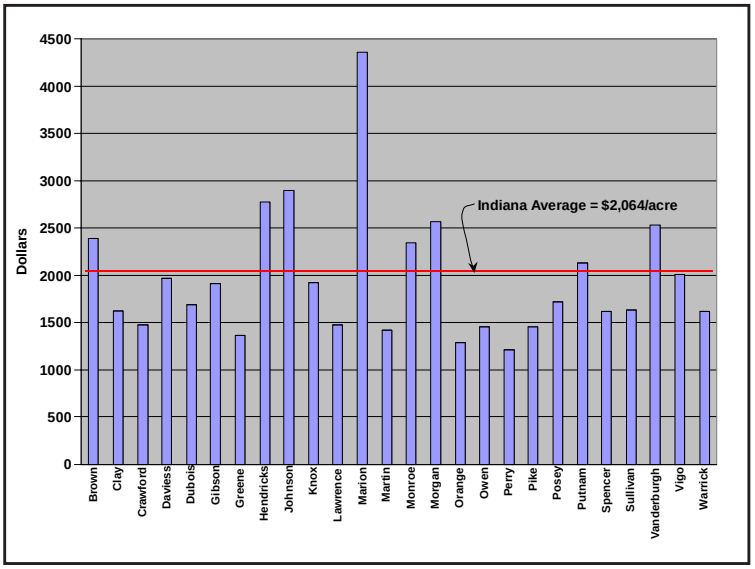


Figure 5.20-4: 1997 Average Value of Farmland Per Acre for Study Area Counties

> "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it

either does not flood frequently during the growing season or is protected from flooding." [SSM, USDA Handbook No. 18, October 1993]

The Natural Resources Conservation Service generally identifies prime farmland in terms of the soil series and phase depicted as map units in each of the county soil surveys. In some instances, the series or a phase of the series is considered to be conditionally prime farmland only if it is drained, irrigated, or protected from frequent flooding. Figure 5.20-5 is an example of Haymond silt loam, frequently flooded farmland along US 41 within the West Fork White River floodplain in Knox County. This soil type is considered conditionally prime where protected or not frequently flooded.

Figure 5.20-5: Conditionally prime floodplain farmland along US41 in Knox County

Prime farmland does not include land already in or committed to urban development or water storage. Land utilized or designated for commercial, industrial or residential purposes is therefore categorically excluded from consideration. For instance, the residential and commercial properties along SR 37 at Martinsville were developed on large expanses of Martinsville loam, Rensselaer clay loam and Whitaker loam, each of which is classified as prime or conditionally prime soil types. However, since this land is not available for agricultural production, it is not regarded as prime farmland. In such cases expansion of the existing right-of-way would not be considered an impact to prime farmland, regardless of the soil type.

5.20.3 Methodology

Impacts to agricultural lands resulting from direct conversion to transportation use were assessed using three different methodologies. The first assessment concerns the total number of farmland acres converted. The second addresses impacts specifically involving prime farmland. The third focuses on the potential annual loss in crop production.

The guidelines for evaluation of program or project compliance with the FPPA using the Farmland Conversion Impact Rating (Form AD 1006) system are outlined in 7 CFR 658.4. The Natural Resource Conservation Service is designated as the USDA agency responsible for providing assistance in the evaluation. 7 CFR 658.4(e) state that it is advisable that evaluations and analyses of prospective farmland conversion impacts be made early in the planning process before a site or design is selected, and that, where possible, agencies make the FPPA evaluations part of the National Environmental Policy Act (NEPA) process." Coordination with the NRCS Indiana headquarters on April 29, 2002 included a discussion of the Farmland Conversion Impact Rating system (Form AD 1006) and its suitability as a means to evaluate prime farmland impacts at the Tier 1 level for the

I-69 study. This discussion concluded that due to the enormity of the project and the complexity of the alternatives, options and bypass variations contained within the study, that the Farmland Conversion Impact Rating system would not provide a clear and meaningful assessment of potential prime farmland impacts at this stage in the process. Additional consultation with the NRCS led to the development of an alternative methodology to be used in the I-69 Tier 1 DEIS. This methodology was designed to accurately assess expected prime farmland impacts using GIS data in a manner that would produce results allowing for comparisons between alternatives.

For the purposes of determining the total area of impact for each of the alternatives, a working alignment was utilized. The width characteristics of each working alignment segment were established by taking into consideration the location of the alignment (i.e. along an existing highway versus new alignment), type of terrain crossed (i.e. flat, gently rolling, hilly), as well as other factors. The estimation of farmland acreage to be directly converted within the working alignment of each alternative was based on the United States Geological Survey (USGS) Land Cover data layer in the GIS. This data layer is a subset of the National Land Cover Data (NLCD) developed by the USGS with the United States Environmental Protection Agency (EPA) to produce a consistent, land-cover data layer for the continental U.S. The land-cover layer is based on 30 x 30 meter squares. For more information on the use of the GIS and on the methodology, see Section 4.1 and 5.1 respectively.

In general, the land cover layer includes 21 categories of land use grouped into nine classes. The herbaceous planted/cultivated class is characterized as areas of herbaceous vegetation that have been planted or are intensively managed for the production of food, feed, or fiber; or are maintained in developed settings for specific purposes. This class includes the following five categories:

- Pasture/Hay - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops.
- Row Crops - Areas used for the production of crops, such as corn, soybeans, vegetables, tobacco, and cotton.
- Small Grains - Areas used for the production of small grain crops such as wheat, barley, oats, and rice.
- Fallow - Areas used for the production of crops that are temporarily barren or with sparse vegetative cover as a result of being tilled in a management practice that incorporates prescribed alternation between cropping and tillage.
- Urban/Recreational Grasses - Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.

For the purposes of determining direct farmland impact the first three categories of the herbaceous planted/cultivated class were included in the analysis. The fallow category was excluded simply because it was not encountered within the working alignment for any of the alternatives. The urban/recreational grasses was excluded because, by definition, this category is not related to agriculture.

The working alignments were superimposed onto the GIS land cover layer representing the distribution and location of farmland (pasture/hay, row crops and small grains) within the 26 county study area to estimate the area of farmland to be converted by each of the five alternatives and their options. The data were also itemized by county for comparison purposes.

Methodology for the assessment of prime farmland impacts for the I-69 Tier 1 EIS was developed through coordination with the NRCS Indiana headquarters on April 29, 2002. The resulting methodology was based on the STATSGO (State Soil Geographic) dataset for Southwestern Indiana. In general, this data set spatially represents a collection of map units or soil associations, each of which is defined and named in terms of their soil and/or nonsoil areas. Each soil association is comprised of up to 21 components or soil series phases. STATSGO data further indicates the relative percent composition of a soil series phase within the association, and characterizes each series as prime farmland, conditional prime farmland or non-prime farmland. This makes it possible to determine what portion or percentage of a specific association is prime or conditional prime farmland.

Using the STATSGO spatial data and the GIS, estimates of prime farmland within each of the working alignments was determined through the following procedures.

1. Determine the total acreage of farmland within each working alignment.
2. Determine how much of this farmland exists within each soil association.
3. Using the percent of each soil series within each association, determine the acreage of each prime farmland soil series phase expected within the working alignment. This step assumes that each alignment will encounter each soil series phase within an association unit in proportions synonymous to the percent composition of each soil series phase within the association. To illustrate the potential worse case scenario, all conditional prime farmland soil series phases were included as prime farmland.
4. Because the NRCS does not regard each prime farmland series phase as equal with respect to its production potential and overall value to agriculture in the state, corn production yields for each prime farmland soil series phase were used to calculate a weighted production value, in bushels, which better assesses the varying value of each prime farmland soil series phase. This was accomplished by multiplying the estimated acreage for each prime farmland series phase by its corn yield (Indiana NRCS maximum = 155 acres/bushel) to calculate its potential annual production. The NRCS recognizes that in many cases a farmer may be capable of producing more yield per acre for a specific soil series than that used in this analysis; however, this annual potential "bushels of corn" produced by prime farmland within the working alignment can serve as an index for comparing relative prime farmland impacts between alternatives.
5. Total the annual "bushels of corn" produced by each individual soil series phase for each alignment to get an overall weighted estimate of prime farmland impacts.

The subsequent Tier 2 NEPA studies will assess prime farmland impacts via the USDA Farmland Conversion Impact Rating system (Form AD-1006).

The methodology employed to assess the impact of each alternative on agricultural production follows the general outline provided in INDOT's Procedural Manual for Preparing Environmental Studies (1996). This approach looks at each county as an agricultural unit for which statistical data for production, cultivation and commodity sales price can be averaged and used to calculate an annual crop loss estimate for acreages of farmland within each working alignment alternative. All raw data used in this analysis was taken directly from the most recent three issues of the Indiana Agricultural Statistics (1998-99, 1999-2000 and 2000-2001). The latest three years of data available for acres of

Table 5.20-1 - Agricultural Harvest and Production Statistics for I-69 Tier I Counties

County	Crop	Harvested Area (acres) x1000				Production (bushels or tons) x1000				Average Yield (bushels or tons/acre)
		1998	1999	2000	Average	1998	1999	2000	Average	
Daviess	corn	83.9	81.7	84.3	83.30	10936.0	12008.0	13978.1	12307.37	147.7
	soybeans	63.7	62.0	58.9	61.53	2319.9	2529.8	2933.1	2594.27	42.2
	wheat	13.5	4.9	6.9	8.43	602.0	316.9	415.4	444.77	52.7
	hay (tons)	11.3	9.8	12.4	11.17	33.6	26.6	38.4	32.87	2.9
Gibson	corn	96.2	101.6	103.0	100.27	13103.7	13017.6	16497.8	14206.37	141.7
	soybeans	97.3	87.4	88.4	91.03	3629.0	2937.7	3842.2	3469.63	38.1
	wheat	33.7	32.2	28.6	31.50	1712.3	2016.3	1984.9	1904.50	60.5
	hay (tons)	5.6	5.3	5.4	5.43	21.0	17.0	20.2	19.40	3.6
Greene	corn	44.0	46.0	45.5	45.17	5050.5	5682.5	7035.4	5922.80	131.1
	soybeans	42.2	46.0	49.8	46.00	1462.7	1754.2	2184.0	1800.30	39.1
	wheat	3.8	3.4	3.1	3.43	168.4	201.1	162.2	177.23	51.6
	hay (tons)	22.1	19.2	20.2	20.50	64.9	55.7	62.8	61.13	3.0
Hendricks	corn	65.5	72.8	69.6	69.30	9204.8	10183.0	10140.2	9842.67	142.0
	soybeans	75.6	70.8	76.7	74.37	3254.3	2895.5	3700.8	3283.53	44.2
	wheat	5.5	3.6	4.7	4.60	329.9	268.3	328.7	308.97	67.2
	hay (tons)	6.7	6.1	6.2	6.33	20.5	21.1	26.4	22.67	3.6
Johnson	corn	62.1	59.3	56.4	59.27	7799.4	8115.5	8668.7	8194.53	138.3
	soybeans	54.2	46.5	45.6	48.77	2215.4	2009.3	2273.1	2165.93	44.4
	wheat	5.6	4.2	3.8	4.53	348.2	280.9	271.9	300.33	66.3
	hay (tons)	5.3	6.2	6.2	5.90	19.9	19.6	22.9	20.80	3.5
Knox	corn	100.3	121.0	126.8	116.03	13241.0	16915.7	20980.9	17045.87	146.9
	soybeans	111.8	112.0	113.7	112.50	4173.2	4144.4	4871.0	4396.20	39.1
	wheat	40.3	32.2	5.9	26.13	1934.7	1973.3	1629.4	1845.80	70.6
	hay (tons)	5.8	6.1	5.9	5.93	17.9	16.4	19.1	17.80	3.0
Lawrence	corn	18.6	18.0	17.0	17.87	2013.5	1799.1	2403.2	2071.93	116.0
	soybeans	18.5	22.3	21.4	20.73	641.9	612.6	902.2	718.90	34.7
	wheat	3.4	2.3	0.0	1.90	175.4	148.0	0.0	107.80	56.7
	hay (tons)	24.7	22.4	25.2	24.10	75.6	60.0	78.0	71.20	3.0
Marion	corn	9.9	9.6	8.6	9.37	1245.2	1242.4	1335.0	1274.20	136.0
	soybeans	12.7	11.3	12.3	12.10	482.2	406.2	602.2	496.87	41.1
	wheat	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.00	0.0
	hay (tons)	1.5	1.4	1.3	1.40	5.1	4.6	4.7	4.80	3.4
Martin	corn	15.4	14.5	14.5	14.80	1656.1	1646.7	2261.3	1854.70	125.3
	soybeans	16.4	11.7	12.7	13.60	569.9	350.5	687.8	536.07	39.4
	wheat	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.00	0.0
	hay (tons)	7.4	7.5	8.2	7.70	23.6	18.9	26.0	22.83	3.0
Monroe	corn	6.2	5.7	5.0	5.63	769.8	628.3	743.1	713.73	126.7
	soybeans	6.0	6.6	7.1	6.57	205.6	207.2	340.6	251.13	38.2
	wheat	0.7	0.6	0.0	0.43	28.6	30.8	0.0	19.80	45.7
	hay (tons)	12.6	14.0	15.3	13.97	40.5	39.5	47.0	42.33	3.0
Morgan	corn	48.9	50.9	48.9	49.57	6098.2	6930.1	7760.0	6929.43	139.8
	soybeans	50.3	46.5	43.7	46.83	1982.4	1857.8	2195.3	2011.83	43.0
	wheat	0.0	3.7	0.0	1.23	0.0	231.1	0.0	77.03	62.5
	hay (tons)	8.6	8.8	8.4	8.60	31.8	29.8	32.0	31.20	3.6
Owen	corn	19.1	17.6	17.7	18.13	1949.4	2088.1	2604.7	2214.07	122.1
	soybeans	18.8	16.8	18.8	18.13	620.1	613.9	876.1	703.37	38.8
	wheat	0.0	2.4	2.5	1.63	0.0	122.0	146.3	89.43	54.8
	hay (tons)	13.0	11.6	11.8	12.13	40.4	33.4	38.1	37.30	3.1
Pike	corn	25.9	31.4	33.6	30.30	3194.0	3667.5	5272.2	4044.57	133.5
	soybeans	34.1	36.7	34.2	35.00	1184.8	1116.6	1641.3	1314.23	37.5
	wheat	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.00	0.0
	hay (tons)	3.4	3.5	3.5	3.47	11.2	9.0	9.3	9.83	2.8
Putnam	corn	66.7	63.4	65.8	65.30	9346.3	9380.3	9929.8	9552.13	146.3
	soybeans	70.6	65.2	65.2	67.00	3143.7	2942.1	3232.7	3106.17	46.4
	wheat	5.6	4.7	4.9	5.07	337.9	297.0	334.0	322.97	63.7
	hay (tons)	11.7	12.3	12.9	12.30	32.2	39.5	43.6	38.43	3.1
Sullivan	corn	71.4	71.1	71.1	71.20	9665.2	9499.7	11432.1	10199.00	143.2
	soybeans	71.6	71.8	70.2	71.20	2611.8	2775.7	3261.7	2883.07	40.5
	wheat	0.0	9.8	6.3	5.37	0.0	517.4	417.0	311.47	58.0
	hay (tons)	5.5	6.0	6.8	6.10	15.0	18.7	19.0	17.57	2.9
Vandergurgh	corn	33.1	40.3	39.6	37.67	4126.2	5114.1	6318.8	5186.37	137.7
	soybeans	33.2	33.9	36.0	34.37	1178.9	1105.4	1570.6	1284.97	37.4
	wheat	11.4	no data	9.5	10.45	549.3	no data	632.0	590.65	56.5
	hay (tons)	1.7	1.5	1.5	1.57	6.7	4.7	5.3	5.57	3.6
Vigo	corn	38.2	50.7	51.9	46.93	4106.2	6612.7	7702.6	6140.50	130.8
	soybeans	46.0	52.8	53.9	50.90	1625.2	1839.3	2346.1	1936.87	38.1
	wheat	4.9	5.8	5.8	5.50	245.5	336.5	333.7	305.23	55.5
	hay (tons)	3.5	3.3	3.5	3.43	10.2	10.2	13.1	11.17	3.3
Warrick	corn	35.4	37.6	37.2	36.73	3390.2	4195.5	5738.7	4441.47	120.9
	soybeans	37.7	35.8	37.7	37.07	1191.9	1065.5	1581.9	1279.77	34.5
	wheat	8.1	6.2	6.3	6.87	325.1	292.3	389.0	335.47	48.9
	hay (tons)	59.0	5.8	5.8	23.53	17.1	13.3	16.0	15.47	0.7

corn, soybean, wheat and hay harvested in each of the 18 counties traversed by at least one of the study alternatives was averaged (Table 5.20-1). Next, the latest three years of production data for these four commodities was averaged for each of the 18 counties (Table 5.20-1). Using the average acreage harvested and the average production, the average yield for each commodity was calculated. Average sale prices (dollars/bushel or dollars/ton) were determined by averaging three years of statewide annual averages for each commodity (Table 5.20-2).

Table 5.20-2: Average Crop Sales Prices for Indiana

Crop Type	1998-1999	1999-2000	2000-2001	Average
Corn	$2.11/bushel	$1.88/bushel	$1.85/bushel	$1.95/bushel
Soybean	$5.05/bushel	$4.71/bushel	$4.75/bushel	$4.84/bushel
Wheat	$2.36/bushel	$2.13/bushel	$2.10/bushel	$2.20/bushel
Hay	$88.00/ton	$91.00/ton	$86.00/ton	$88.33/ton

Because a certain percentage of farmland in a county is harvested as corn, a certain percentage is harvested as soybean and so on for wheat and hay, these percentages for each county were applied to the farmland within the working alignment of each alternative to reflect a proportional impact to each of the four principal farmland commodities. The four prorated percentages were calculated by taking the three-year average harvest acreage for each crop commodity and dividing it by the total three-year average harvest acreage for all four crops. Added together, the four prorated percentages for these crops within each county equal 100%. Calculating the dollar loss for each commodity within an individual county based on a specific farmland acreage take can then be achieved through the following equation:

$$CCL_{com} = CFA \times CPF_{com} \times CYR_{com} \times SAP_{com}$$

where:

CCL_{com} is the county crop loss for a specific commodity (dollars)

CFA is the county farmland area within the right-of-way (acres)

CPF_{com} is the county prorate factor for a specific commodity

CYR_{com} is the county yield rate for a specific commodity (bushels/acre of tons/acre)

SAP_{com} is the state average price for a specific commodity (dollars/bushel or dollars/ton)

Finally, the total production loss in dollars for each alternative was achieved by adding the appropriate commodity subtotals for each county and then adding the county subtotals. Tables 5.19-6 through 5.19-10 for Alternatives 1 through 5 respectively can be found in the following Farmland Impact Results and Interpretation section. Again, because each of the alternative alignments include one or more bypass variations, the data is presented in the form of a range.

To determine the annual percent loss in crop cash receipts for each affected county it was necessary to determine the average annual crop cash receipts for the 18 counties crossed by the alternatives, using three years of recent data (Table 5.20-3). Using this county average data, the loss of crop cash receipts resulting from the direct take of farmland by each alternative can be translated into a percent loss for each county (Table 5.20-4).

5.20.4 Farmland Impact Results and Interpretation

Table 5.20-3: Average Crop Cash Receipts for Counties Crossed by I-69 Tier 1 Alternatives

County	1998	1999	2000	Average
Daviess	$38,730,000	$43,955,000	$46,302,000	$42,996,000
Gibson	$59,963,000	$49,476,000	$55,692,000	$55,044,000
Greene	$18,480,000	$22,046,000	$24,570,000	$21,699,000
Hendricks	$35,435,000	$37,814,000	$38,389,000	$37,213,000
Johnson	$30,803,000	$32,481,000	$32,965,000	$32,083,000
Knox	$70,408,000	$81,364,000	$85,711,000	$79,161,000
Lawrence	$9,728,000	$9,253,000	$11,073,000	$10,018,000
Marion	$17,370,000	$18,674,000	$20,808,000	$18,951,000
Martin	$5,873,000	$5,222,000	$7,278,000	$6,124,000
Monroe	$4,704,000	$4,602,000	$5,370,000	$4,892,000
Morgan	$23,295,000	$25,884,000	$26,727,000	$25,302,000
Owen	$6,702,000	$7,287,000	$8,633,000	$7,541,000
Pike	$13,250,000	$14,616,000	$18,857,000	$15,574,000
Putnam	$32,746,000	$34,157,000	$33,487,000	$33,463,000
Sullivan	$39,193,000	$42,510,000	$45,109,000	$42,271,000
Vanderburgh	$15,934,000	$18,097,000	$21,427,000	$18,486,000
Vigo	$16,868,000	$24,010,000	$26,200,000	$22,359,000
Warrick	$14,668,000	$16,473,000	$20,537,000	$17,226,000

The results of the assessment for the alternatives allow for general comparisons of potential total farmland impacted, estimated prime farmland area, prime farmland corn production index and loss of crop production. For a discussion on cumulative farmland impacts refer to Section 5.26. Table 5.20-5 highlights the impact ranges for each of the alternatives studied. Figure 5.20-6 illustrates farmland acreage loss for each of the alternatives. Figure 5.20-7 illustrates prime farmland conversion acreages for the study alternatives. Figure 5.20-8 illustrates the assessment of prime farmland impacts as a function of corn production. Figure 5.20-9 illustrates estimated crop production loss in dollars per year. Table 5.20-5 includes an itemized list of farmland ranges within each county and a summary total of total farmland, prime farmland, prime farmland production, and crop production loss for each alternative.

Table 5.20-4 - Percent of Annual Crop Cash Receipt Loss for I-69 Tier I Alternatives

County	Average (dollars)	Percent of Crop Cash Receipt Loss Through Direct Right-of-Way Conversion											
		1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
		Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High
Daviess	$42,996					0.78 0.81	0.78 0.81	0.78 0.81	0.69 0.72	0.69 0.72	0.69 0.72	0.50 0.52	0.50 0.52
Gibson	$55,044	0.19 0.25	0.19 0.25	0.19 0.25	0.19 0.25	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25
Greene	$21,699		1.20	1.20	1.20	0.71	0.71	0.56	1.09	1.09	1.09		
Hendricks	$37,213											0.02	
Johnson	$32,083				0.001 0.15		0.001 0.15	0.001 0.15			0.001 0.15		0.001 0.15
Knox	$79,161	0.11 0.15	0.29 0.32	0.29	0.29 0.32								
Lawrence	$10,018			0.32								1.20	1.20
Marion	$18,951				0.18 0.31		0.18 0.31	0.18 0.31			0.18 0.31		0.18 0.31
Martin	$6,124											1.22	1.22
Monroe	$4,892					3.40	3.31	2.81				2.51	2.51
Morgan	$25,302			0.63	0.70 0.94	0.61	0.30 0.56	0.30 0.56		0.63	0.70 0.95	0.74	0.31
Owen	$7,541		2.25	2.45	2.45				2.25	2.45	2.45		
Pike	$15,574					0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Putnam	$33,463		0.20						0.20				
Sullivan	$42,271	0.12 0.22											
Vanderburgh	$18,486	0.001	0.001	0.001	0.001								
Vigo	$22,359	0.18 0.22											
Warrick	$17,226					0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08

0 – 0.5%
0.5 – 1.0%
1.0 - 2.0%
2.0 - 3.0%
3.0% <

Alternative 1

Alternative 1 would involve the loss of between 1,270 and 1,780 acres of farmland from Vanderburgh, Gibson, Knox, Sullivan, and Vigo counties, with 65 to 70% occurring in Gibson and Knox (Figure 5.20-6). The 500 plus acre difference in the range reported for farmland is attributed to the bypass

variations at Fort Branch, Vincennes, and Farmersburg, where the working alignment involves new alignment away from existing US41.

With an estimated 800 to 1,300 acres of potential prime farmland directly affected (Figure 5.20-7) and a prime farmland corn production index ranging from 96,000 to 162,000 bushels (Figure 5.20-8), prime farmland impacts are also relatively low compared to the other four alternatives and their options. Collectively, it is estimated that just over 780,800 acres of these five counties are considered prime farmland; therefore the anticipated direct loss of prime farmland represents 0.16 percent of the collective total.

Table 5.20-5 - Summary of Farmland Impacts for I-69 Tier I Study Alternatives

	Farmland Conversions by County (acres)											
	Alternatives											
Counties	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High	Low High
Daviess					1298.2 1349.9	1298.2 1349.9	1298.2 1349.9	1143.0 1195.1	1143.0 1195.1	1143.0 1195.1	829.3 867.6	829.3 867.6
Gibson	495.9 660.7	495.9 660.7	495.9 660.7	495.9 660.7	662.6	662.6	662.6	662.6	662.6	662.6	662.6	662.6
Greene		1074.1	1074.1	1074.1	639.3	639.3	502.9	978.3	978.3	978.3		
Hendricks											25.4	
Johnson				0.7 146.2		0.7 146.2	0.7 146.2			0.7 146.2		0.7 146.2
Knox	381.1 532.3	1022.2 1124.1	1022.2 1124.1	1022.2 1124.1								
Lawrence											499.8	499.8
Marion				125.2 219.6		125.2 219.6	125.2 219.6			125.2 219.6		125.2 219.6
Martin											283.0	283.0
Monroe					582.5	563.0	478.9				427.6	427.6
Morgan			669.7	741.7 1014.0	647.2	321.5 593.9	321.5 593.9		669.7	741.7 1014.0	792.9	328.6 601.0
Owen		767.2	835.3	835.3				767.2	835.3	835.3		
Pike					600.2	600.2	600.2	600.2	600.2	600.2	600.2	600.2
Putnam		274.3						274.3				
Sullivan	198.1 357.7											
Vanderburgh	0.4	0.4	0.43	0.43								
Vigo	195.1 231.7											
Warrick					78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
Total Farmland Acreage Range (acres)	1,271 1,783	3,634 3,901	4,098 4,364	4,295 5,074	4,509 4,560	4,289 4,853	4,069 4,633	4,504 4,556	4,968 5,020	5,166 5,730	4,199 4,238	3,836 4,386
Total Prime Farmland Acreage Range (acres)	808 1,326	2,496 2,928	2,934 3,366	3,138 4,099	2,524 3,406	2,302 3,754	2,281 3,732	2,854 3,693	3,287 4,126	3,477 4,881	2,629 2,790	2,328 3,059
Total Prime Farmland Corn Prod. Index (bu.)	96,570 161,888	294,386 350,375	356,176 412,166	379,572 496,494	298,076 404,057	266,731 438,204	264,849 436,234	329,606 431,021	390,782 492,166	412,550 579,066	307,778 328,314	270,404 356,352
Annual Crop Production Loss Range (dollars)	285,675 402,125	828,917 888,750	939,803 999,680	986,749 1,168,379	1,056,245 1,068,943	1,001,631 1,138,812	950,597 1,087,778	1,033,561 1,046,357	1,144,491 1,157,287	1,197,437 1,328,688	971,418 980,823	880,185 946,083

The estimated loss of farmland for Alternative 1 translates into an annual crop production loss of between $285,000 and $402,000 (Figure 5.20-9). At $109,000 to $145,000, Gibson County would sustain the greatest annual loss (Table 5.20-6), yet this represents 0.19 to 0.25 percent of the county's $57.5 million average annual cash receipts for crops in the late 1990s (Table 5.20-4). This alternative has the lowest relative impact to farmland, prime farmland and crop production of all the alternatives studied.

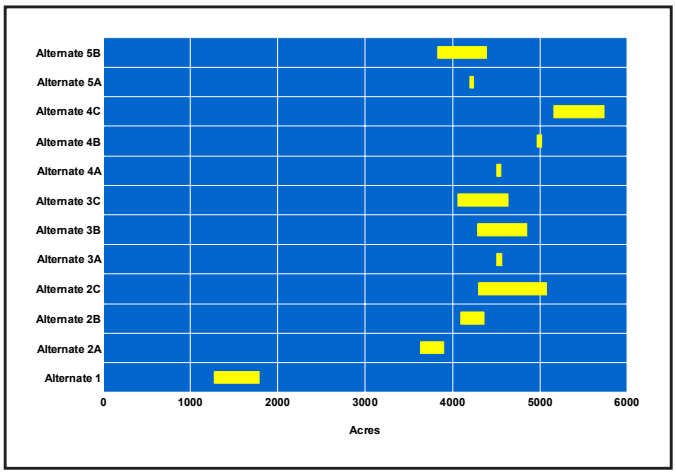


Figure 5.20-6: Total Farmland Area Ranges for I-69 Tier 1 Alternatives

Alternative 2

The differences in farmland impacts for the three Alternative 2 alignments are directly related to the length of new alignment between the split and I-70 or I-465. The estimated farmland acreage for Alternatives 2A and 2B range from 3,630 to 3,900 acres and 4,100 to 4,360 acres

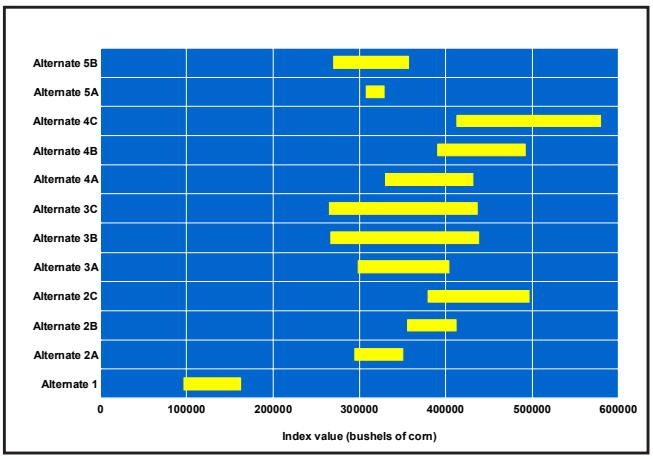


Figure 5.20-7: Total Prime Farmland Area Ranges for I-69 Tier 1 Alternatives

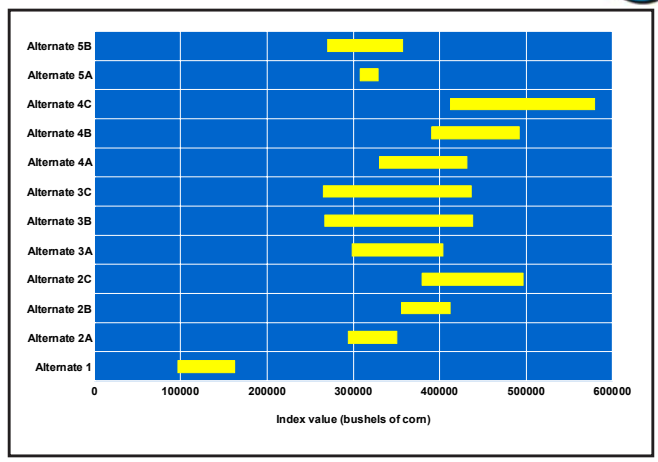


Figure 5.20-8: Prime Farmland Corn Production Index Ranges

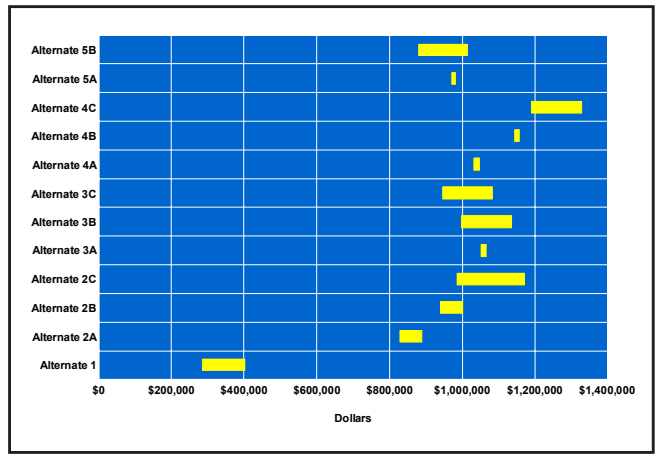


Figure 5.20-9: Annual Crop Production Loss Ranges

respectively (Figure 5.20-6). The 460 acre average difference between these two alignments reflects the fact that Alternative 2A joins I-70 11 miles west of Alternative 2B and therefore entails fewer miles of new alignment. The 260 plus acre range for each of these alternatives is attributed to bypass variations along US41 at Fort Branch and Vincennes. Alternative 2C would result in farmland impacts ranging from 4,300 to 5,070 acres. The lower end of the range represents an alignment with no bypasses at Fort Branch and Vincennes, and the variation that follows along existing SR 37 from Martinsville all the way up to I-465. The upper end of the range represents an alignment using both bypass alignments and the variation that diverges from SR 37 in northeastern Morgan County on its way up to I-465. Although Alternative 2C follows along SR 37, the expansion of the right-of-way for the interstate typical section on one or both sides of the existing facility will still incur some farmland impacts. These impacts would be limited to relatively narrow strips along agricultural fields bordering existing SR 37. Relative to the other alternatives proposed in the Tier 1 Study, farmland impacts for Alternatives 2A and 2B are

Table 5.20-6 - Agricultural Crop Production Loss Estimates for Alternative 1

County	Crop	Yield	Sales Price	Prorate Factor	Alternative 1 Acreage Low	Alternative 1 Acreage High	Alternative 1 Crop Loss (in dollars) Low	Alternative 1 Crop Loss (in dollars) High
Gibson	corn	141.7	1.95	0.4393	495.9	660.7	60088	80057
	soybeans	38.1	4.84	0.3989			36462	48579
	wheat	60.5	2.20	0.1380			9089	12110
	hay (tons)	3.6	88.33	0.0238			3723	4960
Knox	corn	146.9	1.95	0.4453	381.1	532.3	48526	67778
	soybeans	39.1	4.84	0.4317			31094	43431
	wheat	70.6	2.20	0.1003			5929	8281
	hay (tons)	3.0	88.33	0.0228			2299	3211
Sullivan	corn	143.2	1.95	0.4627	198.1	357.7	25562	46155
	soybeans	40.5	4.84	0.4627			17953	32417
	wheat	58.0	2.20	0.0349			880	1590
	hay (tons)	2.9	88.33	0.0396			1997	3607
Vanderburgh	corn	137.7	1.95	0.4481	0.4		48	
	soybeans	37.4	4.84	0.4089			29	
	wheat	56.5	2.20	0.1243			6	
	hay (tons)	3.6	88.33	0.0186			2	
Vigo	corn	130.8	1.95	0.4396	195.1	231.7	21843	25940
	soybeans	38.1	4.84	0.4767			17118	20329
	wheat	55.5	2.20	0.0515			1225	1455
	hay (tons)	3.3	88.33	0.0322			1802	2140
	Gibson						109,362	145,706
	Knox						87,848	122,701
	Sullivan						46,392	83,769
	Vandergurgh						85	
	Vigo						41,988	49,864
Alternative Totals							285,675	402,125

considered moderate. In fact, excluding Alternative 1, Alternative 2A would cause the least farmland acreage impact of the remaining ten alignments. Because Alternative 2C has the potential to impact over 4,500 acres of farmland, its severity of impact is considered moderate to high relative to the other alternatives. Each of the Alternative 2 alignments would potentially require more than 500 acres from Gibson, Greene, Knox and Owen counties. Alternatives 2B and 2C would also impact more than 500 acres in Morgan County. Greene and Knox counties would sustain the greatest acre impacts.

Prime farmland acreage impacts estimated for Alternatives 2A and 2B range from 2,500 to 2,930 acres and 2,930 to 3,370 acres respectively. They are considered moderate in severity compared to the other alternatives (Figure 5.20-7). The prime farmland annual corn production index, which provides a better picture of the relative value of the prime farmland impacted, shows a similar relative range for these alignments, 294,000 to 350,000 bushels for Alternative 2A and 356,000 to 412,000 bushels for Alternative 2B (Figure 5.20-8). As with overall farmland, the potential for prime farmland impacts (acreage and/or corn production index) associated with Alternative 2C is considered moderate-to-high relative to the other study alternatives. Collectively, it is estimated that just over 1,086,000 acres of the six counties crossed by Alternative 2A, 1,037,000 acres of the six counties crossed by Alternative 2B and 1,384,000 acres of the eight counties crossed by Alternative 2C are considered prime farmland. Alternative 2 may convert approximately 0.23 to 0.32 percent of the prime farmland located within the counties it crosses.

The estimated annual crop production loss range of $829,000 to $889,000 for Alternative 2A, and $940,000 to $1.0 million for Alternative 2B are regarded as moderate relative to the other Tier 1 study alternatives (Figure 5.20-9). The Alternative 2C range of $867,000 to $1,169,000 is considered relatively moderate-to-high relative to other alternatives. The potential exists for at least four or five of the counties directly impacted by the Alternative 3 alignments to experience a production loss in excess of $100,000 annually (Table 5.20-7). Greene, Knox, and Morgan (Alternative 2C only) would each conceivably sustain losses in excess of $200,000 annually. For Gibson, Johnson, Knox, Lawrence, Marion, Morgan, Putnam and Vanderburgh counties, this represents a reduction of less than one percent in their average annual cash receipts for crops in the late 1990s (Table 5.20-4). However, for Green County the reduction would be approximately 1.2 percent, and as much as 2.5 percent for Owen County (Table 5.20-4).

Alternative 3

Estimated farmland acreage for Alternative 3A ranges from 4,510 to 4,560 acres (Figure 5.20-6). The relative reduction in farmland encroachment experienced by Alternative 3A using a portion of I-70 compared to Alternatives 3B and 3C is offset by the fact that all this alternative is on new alignment from Monroe County up to I-70. Portions of Alternatives 3B (4,290 to 4,850 acres) and 3C (4,500 to 4,560 acres) utilize varying lengths of SR 37, therefore also reducing farmland acreage. Among the Alternative 3 alignments, 3C represents the relative low end of the potential farmland impact because it utilizes a longer stretch of existing SR 37 than Alternative 3B. Alternative 3B represents the relative high end of this group. Alternative 3A is more indicative of the overall mean anticipated farmland impact of the group. In comparison to the other four study alternatives, the Alternative 3 group is considered relatively moderate with respect to overall farmland impact, although the upper end of the 3B range is regarded as relatively moderate-to-high. On the average, Alternative 3

acreage impacts are slightly higher than those estimated for Alternatives 2A, 5A and 5B. They are comparable to Alternatives 2B and 4A and potentially lower than those for Alternative 2C, yet appreciably lower than those estimated for Alternatives 4B and 4C. Although the Alternative 3 alignments have the potential to impact 500 plus acres of farmland in Daviess, Gibson, Greene, Monroe, Morgan and Pike counties, roughly 30 percent of the farmland for these alignments is located in Daviess County.

Prime farmland acreage impacts are estimated to range from 2,280 acres for Alternative 3C to 3,754 for Alternative 3B (Figure 5.20-7). The prime farmland annual corn production index for Alternatives 3B and 3C range from 265,000 to 438,000 bushels (Figure 5.20-8). The broad range for Alternatives 3B and 3C is considered moderate-to-high in comparison to the other alternatives and depends on which Washington bypass variation and which I-70 connector variation is selected. The narrower corn production index range of 298,000 to 404,000 for Alternative 3A is considered moderate for prime farmland impacts relative to the other study alternatives. Collectively, it is estimated that just over 1,063,000 acres of the seven counties crossed by Alternative 3A and 1,411,000 acres of the nine counties crossed by Alternatives 3B and 3C are considered prime farmland. Alternative 3A prime farmland conversion therefore represents 0.24 and 0.32 percent of the seven county total. On the other have, Alternatives 3B and 3C may convert approximately 0.16 to 0.27 percent of the prime farmland located within the nine counties it crosses.

The estimated annual crop production loss range of $1,056,000 to $1,068,000 for Alternative 3A, and $981,000 to $1,088,000 for Alternative 3C are regarded as moderate relative to the other Tier 1 study alternatives (Figure 5.20-9). The Alternative 3B range of $1,002,000 to $1,139,000 is considered moderate-to-high relative to the other study alternatives. The potential exists for at least six of the counties directly impacted by the Alternative 3 alignments to experience a production loss in excess of $100,000 annually. However, at $319,000 to $332,000 Daviess County

Table 5.20-7 - Agricultural Crop Production Loss Estimates Alternative 2

County	Crop	Yield	Sales Price	Prorate Fact	Alternative 2A Acreage Low	Alternative 2A Acreage High	Alternative 2A Crop Loss (in dollars) Low	Alternative 2A Crop Loss (in dollars) High	Alternative 2B Acreage Low	Alternative 2B Acreage High	Alternative 2B Crop Loss (in dollars) Low	Alternative 2B Crop Loss (in dollars) High	Alternative 2C Acreage Low	Alternative 2C Acreage High	Alternative 2C Crop Loss (in dollars) Low	Alternative 2C Crop Loss (in dollars) High
Gibson	corn	141.7	1.95	0.4393	495.9	660.7	60088	80057	495.7	660.7	60064	80057	495.9	660.7	60064	80057
	soybeans	38.1	4.84	0.3989			36462	48579			36447	48579			36447	48579
	wheat	60.5	2.20	0.1380			9089	12110			9086	12110			9086	12110
	hay (tons)	3.6	88.33	0.0238			3723	4960			3721	4960			3721	4960
Greene	corn	131.1	1.95	0.3924	1074.1		107594		1074.1		107594		1074.1		107594	
	soybeans	39.1	4.84	0.3997			81256				81256				81256	
	wheat	51.6	2.20	0.0298			3633				3633				3633	
	hay (tons)	3.0	88.33	0.1781			50393				50393				50393	
Johnson	corn	138.3	1.95	0.5003									0.7	146.2	94	19086
	soybeans	44.4	4.84	0.4116											61	12928
	wheat	66.3	2.20	0.0383											3	814
	hay (tons)	3.5	88.33	0.0498											10	2267
Knox	corn	146.9	1.95	0.4453	1022.2	1124.1	130158	143133	1022.2	1124.1	130158	143133	1022.2	1124.1	130158	143133
	soybeans	39.1	4.84	0.4317			83403	91717			83403	91717			83403	91717
	wheat	70.6	2.20	0.1003			15904	17489			15904	17489			15904	17489
	hay (tons)	3.0	88.33	0.0228			6167	6782			6167	6782			6167	6782
Marion	corn	136.0	1.95	0.4096									125.2	219.6	13580	23820
	soybeans	41.1	4.84	0.5292											13157	23078
	wheat	0.0	2.20	0.0000											0	0
	hay (tons)	3.4	88.33	0.0612											2321	4071
Morgan	corn	139.8	1.95	0.4666					669.7		85037		741.7	1014.0	94179	128755
	soybeans	43.0	4.84	0.4409							61341				67936	92878
	wheat	62.5	2.20	0.0116							1066				1181	1615
	hay (tons)	3.6	88.33	0.0810							17373				19241	23604
Owen	corn	122.1	1.95	0.3624	767.2		66089		835.3		71955		835.3		71955	
	soybeans	38.8	4.84	0.3624			52164				56795				56795	
	wheat	54.8	2.20	0.0326			3012				3279				3279	
	hay (tons)	3.1	88.33	0.2425			50522				55006				55006	
Putnam	corn	146.3	1.95	0.4363	274.3		34079									
	soybeans	46.4	4.84	0.4477			27534									
	wheat	63.7	2.20	0.0339			1300									
	hay (tons)	3.1	88.33	0.0822			6222									
Vandergurgh	corn	137.7	1.95	0.4481	0.4		48		0.4		48		0.4		48	
	soybeans	37.4	4.84	0.4089			69				69				69	
	wheat	56.5	2.20	0.1243			6				6				6	
	hay (tons)	3.6	88.33	0.0186			2				2				2	
County Subtotals	Gibson						109,362	145,706			109,318	145,706			109,318	145,706
	Greene						242,876				242,876				242,876	
	Johnson														168	35,695
	Knox						235,632	259,121			235,632	259,121			235,632	259,121
	Marion														29,058	50,969
	Morgan										164,817				182,537	246,852
	Owen						171,787				187,035				187,035	
	Putnam						69,135									
	Vanderburgh						125				125				125	
Alternative Totals							828,917	888,750			939,803	999,680			986,749	1,168,379

accounts for roughly one-third of the total annual loss expected for these alternatives and would sustain more than twice the loss of any other county affected (Table 5.20-8). For Daviess County this represents approximately 0.8 percent of its average annual cash receipts for crops in the late 1990s (Table 5.20-4). In contrast the estimated $135,000 to $139,000 loss in annual cash receipts for Alternatives 3A and 3B in Monroe County represents 3.3 to 3.4 percent of the counties average annual production (Table 5.20-4).

Alternative 4

Alternative 4A, with an estimated farmland acreage range of 4,500 to 4,560 acres, represents the lower end of the Alternative 4 spectrum. It is for the most part comparable to estimates for Alternative 2C and the Alternative 3 group and is therefore considered relatively moderate in severity of impact to this resource (Figure 5.20-6). On the other hand, Alternative 4B with a range of 4,970 to 5,020 acres and Alternative 4C, ranging from 5,170 to 5,730 acres, represent two of the three alternatives with the highest potential to impact farmland, the other being Alternative 2C. Potential farmland impacts of 500 plus acres are expected in Daviess, Gibson, Greene, Owen and Pike counties for each of the Alternative 4 options. In addition, Morgan County is estimated to sustain a direct farmland conversion loss in excess of 500 acres for Alternatives 4B and 4C. As with Alternatives 3 and 5, Daviess County would incur the greatest overall farmland loss.

Prime farmland acreage impacts estimated for Alternative 4 range from 2,850 to as much as 4,880 acres. Alternative 4A has the lowest overall range in the group and is considered to have a moderate-to-high relative impact comparable to that of Alternatives 3B and 3C (Figure 5.20-7). The Alternative 3B range is slightly higher at 3,290 to 4,160 acres. It is comparable to Alternative 2C and is considered relatively moderate-to-high compared to the other study alternatives. At 3,480 to 4,880 acres, Alternative 4C represents the greatest overall impact to prime farmland acreage of all the Tier 1 study alignments. The conversion of prime farmland assessed for Alternative 4A represents 0.25 to 0.32 percent of the

Table 5.20-8 - Agricultural Crop Production Loss Estimates for Alternative 3

County	Crop	Yield	Sales Price	Prorate Factor	Alternative 3A Acreage Low	Alternative 3A Acreage High	Alternative 3A Crop Loss (in dollars) Low	Alternative 3A Crop Loss (in dollars) High	Alternative 3B Acreage Low	Alternative 3B Acreage High	Alternative 3B Crop Loss (in dollars) Low	Alternative 3B Crop Loss (in dollars) High	Alternative 3C Acreage Low	Alternative 3C Acreage High	Alternative 3C Crop Loss (in dollars) Low	Alternative 3C Crop Loss (in dollars) High
Daviess	corn	147.7	1.95	0.5066	1298.1	1349.9	189150	196683	1298.2	1349.9	189150	196683	1298.2	1349.9	189150	196683
	soybeans	42.2	4.84	0.3742			99063	103008			99063	103008			99063	103008
	wheat	52.7	2.20	0.0513			7713	8020			7713	8020			7713	8020
	hay (tons)	2.9	88.33	0.0679			22920	23833			22920	23833			22920	23833
Gibson	corn	141.7	1.95	0.4393	662.6		80287		662.6		80287		662.6		80287	
	soybeans	38.1	4.84	0.3989			48719				48719				48719	
	wheat	60.5	2.20	0.1380			12145				12145				12145	
	hay (tons)	3.6	88.33	0.0238			8975				8975				4975	
Greene	corn	131.1	1.95	0.3924	639.3		64039		639.6		64039		502.9		50376	
	soybeans	39.1	4.84	0.3997			48363				48363				38044	
	wheat	51.6	2.20	0.0298			2162				2162				1701	
	hay (tons)	3.0	88.33	0.1781			29993				29993				23594	
Johnson	corn	138.3	1.95	0.5003					0.7	146.2	94	19686	0.7	146.2	94	19686
	soybeans	44.4	4.84	0.4116							61	12928			61	12928
	wheat	66.3	2.20	0.0383							3	814			3	814
	hay (tons)	3.5	88.33	0.0498							10	2267			10	2267
Marion	corn	136.0	1.95	0.4096					125.2	219.6	13580	23820	125.2	219.6	13580	23820
	soybeans	41.1	4.84	0.5292							13157	23078			13157	23078
	wheat	0.0	2.20	0.0000							0	0			0	0
	hay (tons)	3.4	88.33	0.0612							2321	4071			2321	4071
Monroe	corn	126.7	1.95	0.2118	582.5		30425		563.0		29407		478.9		25014	
	soybeans	38.2	4.84	0.2469			25598				25708				21868	
	wheat	45.7	2.20	0.0163			952				920				783	
	hay (tons)	3.0	88.33	0.5251			81888				79146				67324	
Morgan	corn	139.8	1.95	0.4666	647.2		82180		321.5	593.9	40823	75412	321.5	593.9	40823	75412
	soybeans	43.0	4.84	0.4409			59281				29448	54398			29448	54398
	wheat	62.5	2.20	0.0116			1030				512	946			512	946
	hay (tons)	3.6	88.33	0.0810			16790				8340	15407			8340	15407
Pike	corn	133.5	1.95	0.4406	600.2		68719		600.2		68719		600.2		68719	
	soybeans	37.5	4.84	0.5090			55480				55480				55480	
	wheat	0.0	2.20	0.0000			0				0				0	
	hay (tons)	2.8	88.33	0.0504			7581				7581				7581	
Warrick	corn	120.9	1.95	0.3525	78.7		6530		78.7		6530		78.7		6530	
	soybeans	34.5	4.84	0.3557			4675				4675				4675	
	wheat	48.9	2.20	0.0659			556				556				556	
	hay (tons)	0.7	88.33	0.2258			1031				1031				1031	
County Subtotals	Daviess						318,846	331,544			318,846	331,544			318,846	331,544
	Gibson						150,126				150,126				150,126	
	Greene						144,557				144,557				113,715	
	Johnson										168	35,695			168	35,695
	Marion										29,058	50,969			29,058	50,969
	Monroe						138,863				135,181				114,989	
	Morgan						159,281				79,123	146,168			79,123	146,168
	Pike						131,780				131,780				131,780	
	Warrick						12,792				12,792				12,792	
Alternative Totals							1,056,245	1,068,943			1,001,631	1,138,812			950,597	1,087,778

prime farmland within the seven counties crossed by the alignment. For Alternatives 4B and 4C this represents 0.29 to 0.37 percent and 0.24 to 0.33 percent respectively. The annual prime farmland corn production index shows similar relative ranges as prime farmland acreage. Annual bushel estimates of 329,000 to 431,000 bushels for Alternative 4A are comparable to those of Alternatives 2B, 3B and 3C. Bushel estimates for Alternative 4A are slightly less than that expected for Alternative 2C, but more than that of Alternatives 1, 2A, 5A and 5B (Figure 5.20-8). Annual bushel estimates of 397,000 to 492,000 for Alternative 4B are comparable to those of Alternative 2C and are considered high, but not as high as the potential for Alternative 4C (413,000 to 579,000 bushels).

The estimated annual crop production loss range of $1,034,000 to $1,046,000 for Alternative 4A is regarded as moderate relative to the other Tier 1 study alternatives (Figure 5.20-9). The Alternative 4B range of $1,144,000 to $1,157,000 and the Alternative 4C range of $1,197,000 to $1,329,000 are considered high. The potential exists for at least five of the counties directly impacted by the Alternative 4A and six counties affected by Alternatives 4B and 4C to experience a production loss in excess of $100,000 annually (Table 5.20-9). While production loss for Morgan and Greene counties could exceed $200,000, Daviess County could approach $300,000 for each of the Alternative 4

Table 5.20-9 - Agricultural Crop Production Loss Estimates for Alternative 4

County	Crop	Yield	Sales Price	Prorate Factor	Alternative 4A Acreage Low	Alternative 4A Acreage High	Alternative 4A Crop Loss (in dollars) Low	Alternative 4A Crop Loss (in dollars) High	Alternative 4B Acreage Low	Alternative 4B Acreage High	Alternative 4B Crop Loss (in dollars) Low	Alternative 4B Crop Loss (in dollars) High	Alternative 4C Acreage Low	Alternative 4C Acreage High	Alternative 4C Crop Loss (in dollars) Low	Alternative 4C Crop Loss (in dollars) High
Daviess	corn	147.7	1.95	0.5066	1143.0	1195.1	166537	174129	1143.0	1195.1	166537	174129	1143.0	1195.1	166537	174129
	soybeans	42.2	4.84	0.3742			87220	91195			87220	91195			87220	91195
	wheat	52.7	2.20	0.0513			6791	7100			6791	7100			6791	7100
	hay (tons)	2.9	88.33	0.0679			20180	21100			20180	21100			20180	21100
Gibson	corn	141.7	1.95	0.4393	662.6		80287		662.6		80287		662.6		80287	
	soybeans	38.1	4.84	0.3989			48719				48719				48719	
	wheat	60.5	2.20	0.1380			12145				12145				12145	
	hay (tons)	3.6	88.33	0.0238			4975				4975				4975	
Greene	corn	131.1	1.95	0.3924	978.3		97997		978.3		97997		978.3		97997	
	soybeans	39.1	4.84	0.3997			74009				74009				74009	
	wheat	51.6	2.20	0.0298			3309				3309				3309	
	hay (tons)	3.0	88.33	0.1781			45898				45898				45898	
Johnson	corn	138.3	1.95	0.5003									0.7	146.2	94	19686
	soybeans	44.4	4.84	0.4116											61	12928
	wheat	66.3	2.20	0.0383											3	814
	hay (tons)	3.5	88.33	0.0498											10	2267
Marion	corn	136.0	1.95	0.4096									125.2	219.6	13580	23820
	soybeans	41.1	4.84	0.5292											13157	23078
	wheat	0.0	2.20	0.0000											0	0
	hay (tons)	3.4	88.33	0.0612											2321	4071
Morgan	corn	139.8	1.95	0.4666					669.7		85037		741.7	1014.0	94179	128755
	soybeans	43.0	4.84	0.4409							61341				67936	92878
	wheat	62.5	2.20	0.0116							1066				1181	1615
	hay (tons)	3.6	88.33	0.0810							17373				19241	26306
Owen	corn	122.1	1.95	0.3624	767.2		66089		835.3		71955		835.3		71955	
	soybeans	38.8	4.84	0.3624			52164				56795				56795	
	wheat	54.8	2.20	0.0326			3012				3279				3279	
	hay (tons)	3.1	88.33	0.2425			50522				55006				55006	
Pike	corn	133.5	1.95	0.4406	600.2		68719		600.2		68719		600.2		68719	
	soybeans	37.5	4.84	0.5090			55480				55480				55480	
	wheat	0.0	2.20	0.0000			0				0				0	
	hay (tons)	2.8	88.33	0.0504			7581				7581				7581	
Putnam	corn	146.3	1.95	0.4363	274.3		34079									
	soybeans	46.4	4.84	0.4477			27534									
	wheat	63.7	2.20	0.0339			1300									
	hay (tons)	3.1	88.33	0.0822			6222									
Warrick	corn	120.9	1.95	0.3525	78.7		6530		78.7		6530		78.7		6530	
	soybeans	34.5	4.84	0.3557			4675				4675				4675	
	wheat	48.9	2.20	0.0659			556				556				556	
	hay (tons)	0.7	88.33	0.2258			1031				1031				1031	
County Subtotals	Daviess						280,728	293,524			280,728	293,524			280,728	293,524
	Gibson						146,126				146,126				146,126	
	Greene						221,213				221,213				221,213	
	Johnson														168	35,695
	Marion														29,058	50,969
	Morgan										164,817				182,537	249,554
	Owen						171,787				187,035				187,035	
	Pike						131,780				131,780				131,780	
	Putnam						69,135									
	Warrick						12,792				12,792				12,792	
Alternative Totals							1,033,561	1,046,357			1,144,491	1,157,287			1,197,437	1,328,688

alignments. Roughly 23 to 28 percent of the production loss would be in Daviess County. This however, represents less than one percent of Daviess Counties average annual cash receipts. As with Alternative 2, the estimated reduction in crop cash receipts for Alternative 4 in Greene County is 1.1 percent of the average annual, and as much as 2.5 percent for Owen County (Table 5.20-4).

Alternative 5

Estimated total farmland impacts for Alternatives 5A and 5B collectively range from 3,830 to 4,390 acres within nine or ten counties (Figure 5.20-6). Relative to the other study alternatives, this is considered moderate in severity. The small variance in acreage for Alternative 5A is attributed to the bypass variation at Washington. The much larger 560 acre range reported for Alternative 5B primarily reflects the difference between the 5B2 variation which continues to follow along SR 37 through Johnson and into Marion County, versus the 5B1 variation which establishes new alignment through northeast Morgan County on up to I-465 in Marion County. Anticipated farmland conversion totaling 500 acres or more is expected from each of the following counties: Gibson, Pike, Daviess, Lawrence, and Morgan (Table 5.20-5). On average, farmland impacts based on acreage estimates for Alternative 5 are comparable to those expected for Alternative 2B, slightly greater than those estimated for Alternative 2A, less than those expected for Alternatives 2C, 3A, 3B, 3C and 4A, and much less than those predicted for Alternative 4B and 4C.

With a prime farmland acreage loss estimate of 2,300 to 3,000 acres (Figure 5.20-7), and a prime farmland corn production index ranging from 880,000 to 946,000 bushels (Figure 5.20-8), the impacts of these alternatives are moderate in comparison to the other four alternatives. Collectively, it is estimated that just over 1,245,000 acres of the nine Alternative 5A counties and 1,355,000 acres of the ten Alternative 5B counties are

Table 5.20-10 - Agricultural Crop Production Loss Estimates
Alternative 5

County	Crop	Yield	Sales Price	Prorate Factor	Alternative 5A Acreage Low	Alternative 5A Acreage High	Alternative 5A Crop Loss (in dollars) Low	Alternative 5A Crop Loss (in dollars) High	Alternative 5B Acreage Low	Alternative 5B Acreage High	Alternative 5B Crop Loss (in dollars) Low	Alternative 5B Crop Loss (in dollars) High
Daviess	corn	147.7	1.95	0.5066	829.3	867.6	120831	126411	829.3	867.6	120831	126411
	soybeans	42.2	4.84	0.3742			63282	66204			63282	66204
	wheat	52.7	2.20	0.0513			4927	5154			4927	5154
	hay (tons)	2.9	88.33	0.0679			14642	15318			14642	15318
Gibson	corn	141.7	1.95	0.4393	662.6		80287		662.6		80287	
	soybeans	38.1	4.84	0.3989			48719				48719	
	wheat	60.5	2.20	0.1380			12145				12145	
	hay (tons)	3.6	88.33	0.0238			4975				4975	
Hendricks	corn	142.0	1.95	0.4483	25.4		3147					
	soybeans	44.2	4.84	0.4810			2609					
	wheat	67.2	2.20	0.0298			111					
	hay (tons)	3.6	88.33	0.0410			328					
Johnson	corn	138.3	1.95	0.5003					0.7	146.2	94	19686
	soybeans	44.4	4.84	0.4116							61	12928
	wheat	66.3	2.20	0.0383							3	814
	hay (tons)	3.5	88.33	0.0498							10	2267
Lawrence	corn	116.0	1.95	0.2766	499.8		31205		499.8		31205	
	soybeans	34.7	4.84	0.3209			26901				26901	
	wheat	56.7	2.20	0.0294			1832				1832	
	hay (tons)	3.0	88.33	0.3731			48659				48659	
Marion	corn	136.0	1.95	0.4096					125.2	219.6	13580	23820
	soybeans	41.1	4.84	0.5292							13157	23078
	wheat	0.0	2.20	0.0000							0	0
	hay (tons)	3.4	88.33	0.0612							2321	4071
Martin	corn	125.3	1.95	0.4100	283.0		28303		283.0		28303	
	soybeans	39.4	4.84	0.3767			20325				20325	
	wheat	0.0	2.20	0.0000			0				0	
	hay (tons)	3.0	88.33	0.2133			15811				15811	
Monroe	corn	126.7	1.95	0.2118	427.6		22334		427.6		22334	
	soybeans	38.2	4.84	0.2469			19525				19525	
	wheat	45.7	2.20	0.0163			699				699	
	hay (tons)	3.0	88.33	0.5251			60112				60122	
Morgan	corn	139.8	1.95	0.4666	792.9		100680		328.6		41724	76313
	soybeans	43.0	4.84	0.4409			72626				30098	55049
	wheat	62.5	2.20	0.0116			1262				523	957
	hay (tons)	3.6	88.33	0.0810			20570				8524	15591
Pike	corn	133.5	1.95	0.4406	600.2		68719		600.2		68719	
	soybeans	37.5	4.84	0.5090			55480				55480	
	wheat	0.0	2.20	0.0000			0				0	
	hay (tons)	2.8	88.33	0.0504			7581				7581	
	hay (tons)	3.3	88.33	0.0322								
Warrick	corn	120.9	1.95	0.3525	78.7		6530		78.7		6530	
	soybeans	34.5	4.84	0.3557			4675				4675	
	wheat	48.9	2.20	0.0659			555				556	
	hay (tons)	0.7	88.33	0.2258			1031				1031	
County Subtotals	Daviess						203,682	213,087			203,682	213,087
	Gibson						146,126				146,126	
	Hendricks						6,195					
	Johnson										168	35,695
	Knox											
	Lawrence						108,597				108,597	
	Marion										29,058	50,969
	Martin						64,439				64,434	
	Monroe						102,670				102,680	
	Morgan						195,138				80,869	
	Pike						131,780				131,780	
	Sullivan											
	Vandergurgh											
	Vigo											
	Warrick						12,791				12,791	
Alternative Totals							971,418	980,823			880,185	1,014,069

considered prime farmland. Therefore, the anticipated direct loss of prime farmland would be 0.21 to 0.22 percent of the nine county total for Alternative 5A and 0.17 to 0.23 percent of the ten county total for alternative 5B.

An estimated annual crop production loss of between $971,000 to $980,000 is expected for Alternative 5A with a broader range of $880,000 to $1,014,000 for Alternative 5B (Figure 5.20-9). At 0.5 percent of its average annual cash receipts for crops, the $200,000 plus loss for Daviess County (Table 5.20-10) is the largest for any of the counties crossed by these alternatives (Table 5.20-4). In contrast, the estimated $102,000 loss in annual cash receipts for Monroe County represents 2.5 percent of its average annual production (Table 5.20-4).

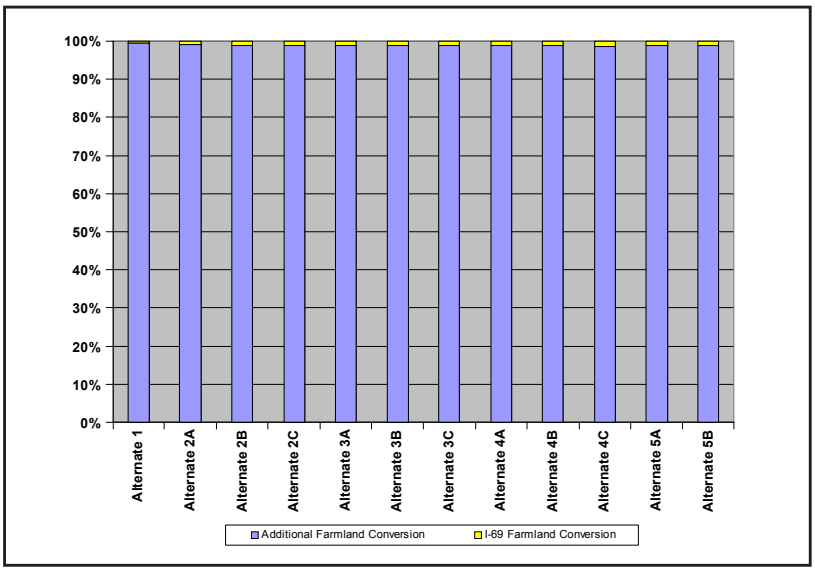


Figure 5.20-10: I-69 Contribution to Predicted Farmland Conversion in the Study Area Over the Next 20 Years

Based on data from the previous four agricultural censuses, farmland in southwestern Indiana is currently being lost at a rate of approximately 20,800 acres/year. Assuming this trend continues, it is estimated that over the next twenty years (2002 to 2022) roughly 415,300 acres of farmland will have been converted to non-farmland uses. For Alternative 1, this regional trend translates into expected farmland conversions that represent 6% to 9% of the annual loss in farmland for southwestern Indiana, or 0.3% to 0.4% of the loss projected over the next 20 years (Figure 5.20-10). For the eleven other alternatives that involve varying lengths of new alignment, direct farmland conversion is estimated to account for 17% to 28% of that expected to occur in southwestern Indiana in a single year, or 0.9% to 1.4% of that projected for southwestern Indiana over the next 20 years (Figure 5.20-10).

No-Build Alternative

The No-Build Alternative will have no impacts to agricultural resources.

5.20.5 Mitigation of Agricultural Impacts

Agricultural impacts in the form of permanent conversion of farmland to non-farmland use generally cannot be mitigated easily by the creation of new farmland elsewhere. For this reason, the mitigation of agricultural impacts tends to focus on those practices that assist in avoiding and/or minimizing conversion, or designing alignments to minimize disruption to existing agricultural patterns. A detailed discussion of specific farmland mitigation measures for each of the study alternatives will be conducted in the Tier 2 NEPA studies. The following lists a few general practices that can be taken into consideration to avoid and/or minimize farmland impacts.

- Where reasonable, corridors should follow existing property lines and minimize dividing or splitting of large tracts of farmland.
- Follow agricultural property lines as much as possible or cross fields at perpendicular angles to reduce point rows and the creation of uneconomic remnants.
- Work with local officials to control assess through interchange location. In so doing, subsequent development can possibly be directed away from large expanses of prime farmland, thus preserving this resource.

5.20.6 Summary

The analysis of the overall direct farmland conversion, prime farmland impacts and the potential crop production loss for the study alternatives reveals a few basic conclusions for the project. Alternative 1, utilizing the existing US 41 and I-70 alignments, represents the least impact alternative with regards to farmland. The total estimated farmland acreage and crop production loss is less than half that of any other alternative studied. Furthermore, the maximum prime farmland impact expected for Alternative 1 is roughly 60% of the minimum expected for the next lowest range (Alternative 3C). At the other end of the spectrum, Alternatives 4C and 4B, and to a slightly lesser extent, Alternative 2C exhibited the highest potential for farmland acreage impact and overall crop production loss. The potential for impacts to prime farmland were also considered high, at least 10% greater than other alternatives. Alternatives 2A and 4A, which use lengthy segments of I-70, had reduced impacts compared to other alternatives within the same group. Likewise, the use of the existing SR 37 alignment for Alternative 3C has the potential to reduce farmland impacts lower than all of the alternatives except Alternative 1, 2A and possibly 5B. The No-Build Alternative will have no impacts on agricultural resources. The I-69 project would impact approximately 1,270 (Alternative 1) to 5,730 (Alternative 4C) acres of farmland. **When compared to the 1997 census, the I-69 project may directly impact from 0.01% to 0.04% of the farmland located throughout the state.** For a discussion of cumulative farmland impacts refer to *Section 5.27 Cumulative Impacts*.

5.21 Forest Impacts

5.21.1 Introduction

Figure 5.21-1: Martin State Forest

Forests are a large and important resource in Indiana. Indiana's forests make significant environmental and economic contributions, including: timber, employment, outdoor recreation, protection of soil and water resources, and habitat for many plant and animal species. Approximately 4.5 million acres, or 20%, of Indiana is forested. Most forests are located in the southern half of the state (Tormoehlen et al., 2000). The majority of Indiana's forests are composed of hardwood species. The primary hardwood forest types in Indiana are oak-hickory and maple-beech (Schmidt, 2000). Impacts to forests resulting from the proposed project could be significant, depending upon the alternative selected. In addition to the direct taking of forests, the project may result in fragmentation of forested land and may affect core forest habitat, which in turn may adversely affect neotropical migratory birds and those resident to Indiana. Neotropical migratory birds are those that breed in the U.S. and Canada, but migrate south to the southern U.S. and Mexico to spend the winter.

Fragmentation can be defined as the steady transformation of once large and continuous tracts of natural landscape into smaller and more isolated patches or fragments surrounded by disturbed areas (Temple and Wilcox, 1986). Habitat fragmentation is perhaps the most pervasive type of habitat alteration taking place in the world today. Forest fragmentation and core forest habitat are discussed in greater detail in Section 5.23 - *Ecosystem Impacts*. Figure 5.21-1 shows the entrance from US 50 to the Martin State Forest, that is located within a large contiguous track of woods. Alternative 5 goes through the Martin State Forest.

5.21.2 Methodology

Identifying the estimated impacts to forests was accomplished using the Geographic Information System developed for Southwest Indiana (Southwest Indiana GIS). For each of the five alternatives, a proposed working alignment was placed on top of the United States Geological Survey (USGS) Land Cover data layer in the GIS. This data layer is a subset of the National Land Cover Data (NLCD). The NLCD was developed by the USGS with the United States Environmental Protection Agency (EPA) to produce a consistent, land-cover data layer for the continental U.S. The land-cover layer is based on 30 X 30 meter squares. It includes 21 land cover types, of which only 18 are present in Southwest Indiana. For more information on the use of the GIS and on the Methodology, see Section 4.1 and 5.1, respectively.

Four land cover types were aggregated to form the forest category. The four types are: (1) deciduous forest; (2) evergreen forest; (3) mixed forest; and (4) woody wetlands. Both upland and bottomland forests are included in the analysis. The total acreages include the right-of-way needs for the mainline of the Interstate highway, as well as the potential interchanges.

Ranges are provided due to the variations within alternatives. Variations are the ways an alternative may pass through or around a community. Generally, the variations that use an existing highway, such as US 41 or SR 37, through the community have lower forest impacts, while those that bypass the community will have higher forest impacts.

For a more detailed explanation on how the GIS was used to determine potential impacts, refer to the Section 4.1, *The GIS Approach*, and Section 5.1, *Methodology*, in this document. For a core forest habitat loss discussion, refer to Section 5.5, *Ecosystem Impacts*.

5.21.3 Analysis

Table 5.21-1 shows the impacts to forests due to the proposed I-69 project. For a discussion on cumulative and indirect forest impacts refer to Section 5.26, *Cumulative Impacts*. The potential impacts are shown as total impacts by alternative, and are divided by forest survey unit and by county. Indiana was divided into four forest survey units during the first Forest Inventory Analysis completed by the U.S. Department of Agriculture (USDA) Forest Service in 1950. Forest survey units have remained consistent throughout the years in order to more accurately track changes in forests from survey to survey. Each unit contains approximately one-fourth of the state's forests (Tormehlen et al., 2000). The proposed I-69 study area contains three forest survey units: the Lower Wabash Unit, the Knobs Unit, and the Northern Unit. Figure 5.21-2 shows a bottomland woods in the Lower Wabash Unit. Figure 5.21-3 shows the survey units and the proposed I-69 alternatives.

Figure 5.2-2: Bottomland Woods in the Lower Wabash Unit

The potential impacts to forests due to the proposed I-69 project vary considerably depending on the alternative. Alternative 1 has the fewest potential impacts with 110 to 170 acres. All of the forest impacts for Alternative 1 occur in the Lower Wabash survey unit. Approximately 90 miles of Alternative 1 uses US 41. The remaining portion of Alternative 1 consists of two committed projects, the construction of SR 641 (Terre Haute bypass) and improvements to I-70 from Indianapolis to Terre Haute. Among the five alternatives, Alternative 1 impacts the least amount of forest because it will be located primarily along the existing right-of-way along US 41. Also, because this alternative follows an existing highway, forest fragmentation and effects to core forest habitat are expected to be the lowest among the five alternatives.

Alternatives 3A and 5A have the greatest potential forest impacts with 1505 to 1580 acres and 1525 to 1565 acres, respectively. The remaining alternative options fall somewhere between Alternative 1 and Alternatives 3A and 5A in terms of potential forest impacts. The majority of the impacts for all

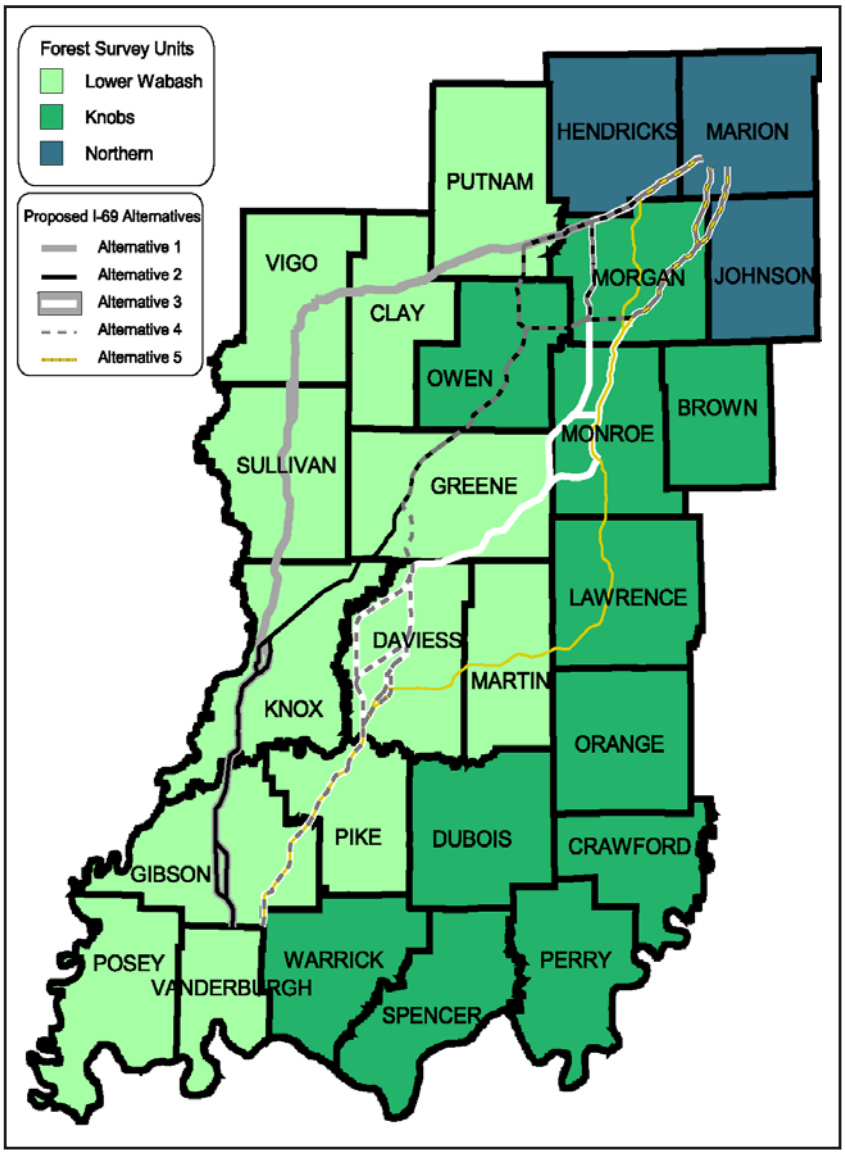


Figure 5.21-3: Forest Survey Units and Alternatives

Alternative 3 options occur in the Lower Wabash unit, specifically in Greene County. However there are also considerable forest impacts in the Knobs unit for this alternative, particularly in Monroe County, and in Morgan County for Alternative 3A. The majority of impacts for Alternative 5A occur in the Knobs unit, specifically in Lawrence and Morgan Counties, and in Martin County in the Lower Wabash unit. The forest impacts from Alternative 5B occur primarily in Martin County in the Lower Wabash unit and in Lawrence County in the Knobs unit. The majority of the forest impacts to forests from Alternatives 2 and 4 occur in the Knobs unit, particularly in Owen County. The No-Build Alternative will have no impacts on forest resources.

The higher forest impacts in counties such as Greene and Martin in the Lower Wabash unit, and Owen, Monroe, Morgan, and Lawrence in the Knobs unit, are expected due to the physiographic regions they comprise. These physiographic regions are the Crawford Upland, the Martinsville Hills, the Mitchell Plateau, and the Norman Upland, and are characterized by hilly topography and forested land use.

The majority of the forest impacts for the alternatives occur in the Lower Wabash and Knobs units. The total forest area within these units is approximately 2,637,700 acres (Schmidt et al., 2000). Alternative 1 has the lowest forest impacts with < 0.01% of this total forest area, while Alternatives 3A and 5A have the highest with 0.06% of the total forest area.

In addition to the direct taking of forested land, some proposed alternatives pass through forested land that are specially managed by federal or state agencies. Alternatives 3A and 3B may or may not impact the Keisler Forest Legacy Property in Monroe County, depending upon the variation selected in this area. The western variation avoids the property, while the eastern variation impacts it. The Forest Legacy Program is a Federal program that attempts to identify and protect environmentally important forest lands that are threatened by present or future conversion to non-forest use. This program is managed by the IDNR Division of Forestry. The Keisler Forest Legacy Property was the first Legacy acquisition property in Indiana. The Program began in Indiana in 1999. The easement for the property is owned by the state of Indiana, but there is no recreational use accompanying it.

Table 5.21–1: Impacts to Forests Due to the Proposed I-69 Project By Forest Survey Unit and County

	Alternative											
Forests (acres)	1	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Lower Wabash Unit	110 - 170	205 - 235	190 - 215	190 - 215	970-1030	970-1030	745 - 805	165 - 225	150 - 205	150 - 205	605 - 625	605 - 625
Posey	-	-	-	-	-	-	-	-	-	-	-	-
Vanderburgh	<1	<1	<1	<1	-	-	-	-	-	-	-	-
Gibson	40 - 45	40 - 45	40 - 45	40 - 45	20 - 25	20 - 25	20 - 25	20 - 25	20 - 25	20 - 25	20 - 25	20 - 25
Pike	-	-	-	-	65 - 70	65 - 70	65 - 70	65 - 70	65 - 70	65 - 70	65 - 70	65 - 70
Knox	35 - 55	110 - 125	110 - 125	110 - 125	-	-	-	-	-	-	-	-
Daviess	-	-	-	-	30 - 75	30 - 75	30 - 75	25 - 65	25 - 65	25 - 65	20 - 25	20 - 25
Martin	-	-	-	-	-	-	-	-	-	-	500 - 505	500 - 505
Sullivan	15 - 40	-	-	-	-	-	-	-	-	-	-	-
Greene	-	40 - 45	40 - 45	40 - 45	855 - 860	855 - 860	630 - 635	40 - 45	40 - 45	40 - 45	-	-
Vigo	20 - 25	-	-	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-	-	-	-
Putnam	-	15 - 20	-	-	-	-	-	15 - 20	-	-	-	-
Knobs Unit	-	680 - 685	780 - 790	635 - 675	535 - 550	330 - 375	380 - 425	685 - 695	785 - 800	640 - 685	920 - 940	645 - 695
Warrick	-	-	-	-	5 - 10	5 - 10	5 - 10	5 - 10	5 - 10	5 - 10	5 - 10	5 - 10
Spencer	-	-	-	-	-	-	-	-	-	-	-	-
Perry	-	-	-	-	-	-	-	-	-	-	-	-
Dubois	-	-	-	-	-	-	-	-	-	-	-	-
Crawford	-	-	-	-	-	-	-	-	-	-	-	-
Orange	-	-	-	-	-	-	-	-	-	-	-	-
Lawrence	-	-	-	-	-	-	-	-	-	-	520 - 525	520 - 525
Monroe	-	-	-	-	230 - 235	270 - 275	320 - 325	-	-	-	65 - 70	65 - 70
Brown	-	-	-	-	-	-	-	-	-	-	-	-
Owen	-	680 - 685	555 - 560	555 - 560	-	-	-	680 - 685	555 - 560	555 - 560	-	-
Morgan	-	-	225 - 230	80 - 115	300 - 305	55 - 90	55 - 90	-	225 - 230	80 - 115	330 - 335	55 - 90
Northern Unit	-	-	-	15 - 45	-	15 - 45	15 - 45	-	-	15 - 45	<1	15 - 45
Hendricks	-	-	-	-	-	-	-	-	-	-	<1	-
Marion	-	-	-	10 - 35	-	10 - 35	10 - 35	-	-	10 - 35	-	10 - 35
Johnson	-	-	-	5 - 10	-	5 - 10	5 - 10	-	-	5 - 10	-	5 - 10
TOTAL	110 - 170	885 - 920	970 - 1005	840 - 935	1505-1580	1315-1450	1140-1275	850 - 920	935 - 1005	805 - 935	1525-1565	1265- 1365

Alternatives 3B and 3C pass through a portion of the Morgan-Monroe State Forest in northern Monroe County, while using the existing SR 37. Alternative 5 passes through Martin State Forest in Martin County and the Hoosier National Forest in Lawrence County. The federally owned area of the Hoosier National Forest to be impacted is a special management area called the Tincher Special Area. The Tincher Special Area is the largest special area in the Hoosier National Forest. The majority of the area is subterranean drained and consisting of active and extensive karst, including caves, pits, sinkholes, swallow holes, cave springs, and the longest free-drop pit in Indiana. This area also provides habitat for a number of troglobitic (cave) species. It may provide foraging and roosting habitat for the Indiana Bat (*Myotis sodalis*), a federal and state endangered species. In addition to the direct taking of forested land in Martin State and the Hoosier National Forests, Alternative 5 would result in additional fragmentation of these two resources. This alternative also passes through Morgan-Monroe State Forest while using the existing SR 37.

5.21.4 Mitigation

INDOT will consult with appropriate resource agencies regarding forest mitigation measures. Coordination with the United States Fish and Wildlife Service will be undertaken in Tier 2 NEPA studies pursuant to the Migratory Bird Treaty Act of 1918.

5.21.5 Summary

Indiana's forests are an important resource which provide a number of important values such as: timber, wildlife habitat, protection of soil and water, and outdoor recreation. The potential impacts to forests vary depending on the particular alternative. For a discussion on cumulative and indirect forest impacts refer to Section 5.26, *Cumulative Impacts*.

Alternative 1 would have the fewest forest impacts among the five alternatives with 110 to 170 acres. Because Alternative 1 uses the existing US 41 and includes two committed projects, SR 641 and improvements to the existing I-70, it will result also in the least amount of forest fragmentation and impacts to core forest habitat. Alternative 3A and Alternative 5A have the greatest forest impacts among the five alternatives, with 1505 to 1580 acres and 1525 to 1565, acres respectively. Alternative 5 has the greatest impacts to state and federally owned forest lands because it passes through the Martin State Forest, the Tincher Special Area of the Hoosier National Forest, and the Morgan-Monroe State Forest. However, Alternative 5, as with Alternative 3, is on the existing SR 37 while passing through the Morgan-Monroe State Forest. Alternatives 3A and 3B may impact the Keisler Forest Legacy Property depending on the selected variation. The No-Build Alternative will have no impacts on forest resources.

5.22 Water Body Impacts

5.22.1 Introduction

Indiana's river and streams serve as a water supply for irrigation and consumption, centers for recreation, and habitats for wildlife both terrestrial and aquatic. These waterways are also aesthetically pleasing and promote tourism, which provides revenue for the surrounding areas. Riparian woods along these waterways provide a filtration system for the water that resides within their banks.

A water body modification as defined in this document is an intentional alteration to a body of water due to encroachment of the proposed highway by construction of bridges, corrugated culverts or concrete box culverts. A water body may consist of a lake, pond, oxbow, stream, or river that contains water for most of the year. Types of modifications that may occur include water impoundment, relocation, channel deepening, and cutting of trees and other vegetation that may cause erosion of stream banks.

5.22.2 Methodology

Information on stream crossings was taken from the most recent United States Geological Society (USGS) quadrangles. Each crossing was counted and then sorted into the categories of open water habitat, perennial, intermittent, and impaired streams (on the basis of PCB's). Each alternative was reviewed to determine the number of stream crossings. A range was developed because of the different variations in the alternatives. A Hydrological Unit Category Map (HUC) was used to define which drainage areas the proposed highway crossed. The Patoka River National Wetlands Project Final EIS (July 1994) was used to obtain information concerning the Patoka River. The information for PCB impaired waters came from the IDEM 303 (d) list (Indiana Department of Environmental Management, 1998). These streams appear on (Figure 5.22-1).

Figure 5.22-1: PCB Impaired Waterways

5.22.3 Analysis

The alternatives travel through eight different drainage basins. These basins are the Highland Pigeon, Lower Wabash, Patoka,

Figure 5.22-2: Patoka River

Figure 5.22-3: White River

Figure 5.22-4: Eel River

Lower White, Middle Wabash Busseron, Eel, Lower East Fork White and the Upper White (Table 5.22-1). Many of the major rivers and streams crossed contain PCB's. The impaired streams and rivers consist of the East Fork White River, West Fork White River, White River, Eel River, Patoka River, White Lick Creek, East Fork White Lick Creek, Richland Creek, Clear Creek, Stout Creek, and Salt Creek (Appendix R).

Alternative 1 crosses the least amount of Open Water Habitat and is similar to the other alternatives for number of crossed perennial and intermittent streams. Most of the area that Alternative 1 crosses is the Middle Wabash Busseron. The Middle Wabash Busseron drainage area makes up 42% of Alternative 1. The major streams/rivers crossed are the Patoka River (Figure 5.22 - 2) and White River (Figure 5.22-3). PCB impaired waters crossed are the Patoka River, White River, East Fork White Lick Creek, and White Lick Creek.

Alternative 2 is similar to other alternatives for possible stream impacts; however, it appears high for open water impacts. It travels primarily through the Lower White drainage area (35%-36%). The major stream/rivers crossed are the Patoka River, White River, West Fork White River, and Eel River. PCB impaired waters crossed included Patoka River, White River, Eel River (Figure 5.22-4), West Fork White River, White Lick Creek and East Fork White Creek.

Alternative 3 travels through the Lower White drainage area (46% to 53%) on its journey northward, and is similar to other alternatives for stream crossings, but appears low for open water impacts. This alternative's major crossings include the East Fork White River, West Fork White River, and the Patoka River. PCB impaired crossings include Patoka River, West Fork White River, Richland Creek (Figure 5.22-5), Stout Creek (Figure 5.22-6), White Lick Creek, and East Fork White Lick Creek.

Alternative 4 is for the most part in the Lower White drainage area (46%-48%). It too is similar for stream crossings when compared to the other alternatives. Major crossings are Pigeon Creek, Patoka River, Eel River, East Fork White River (Figure 5.22-7), and West Fork White River. PCB impaired crossings include Patoka River, Eel River, West Fork White River (Figure 5.22-8), and Richland Creek.

Figure 5.22-5: Richland Creek

Figure 5.22-6: Stout Creek

Figure 5.22-7: East Fork White River

Figure 5.22-8: West Fork White River

Figure 5.22-9: Salt Creek

Figure 5.22-10: Clear Creek

Table 5.22-1: Number of Water Body Crossings			
	Impact Type		
Alternatives	Open Water Habitat	Perennial Stream Crossing	Intermittent Stream Crossings
Alternative 1	5-10	15-20	50-55
Alternative 2A	20-25	25-30	70-80
Alternative 2B	25-30	35-40	75-85
Alternative 2C	25	40-45	80-95
Alternative 3A	15-20	35-40	80-90
Alternative 3B	5-10	35-45	80-90
Alternative 3C	5-10	30-40	65-80
Alternative 4A	15-20	30-40	70-80
Alternative 4B	20-25	35-40	70-80
Alternative 4C	20-25	45-50	85-95
Alternative 5A	20	35-40	70-75
Alternative 5B	15-20	35-40	70-80

Alternative 5 travels predominantly through the Lower East Fork White drainage area (36%). This alternative is similar to the other alternatives in regard to number of streams crossed. Major streams/rivers crossed include the East Fork White River, Pigeon Creek, and the Patoka River. PCB impaired crossings include Patoka River, East Fork White River, Salt Creek (Figure 5.22-9), and Clear Creek (Figure 5.22-10).

The No-Build Alternative will have no impact to waterbodies.

The Patoka River National Wetland Project area is one of only a few remaining Bottomland hardwood forests in Indiana and the Midwest (Department of Interior U.S. Fish and Wildlife Service, 1994). The oxbow lakes in this area serve as habitats for waterfowl, and a variety of other animals. In many parts of the channel there is little in-stream structure due to channelization that occurred in the early 1900's. Nonetheless, there are 70 species of fish that inhabit the waters of this river. (Simon et al., 1995).

Another issue is the Mitchell Karst plain. This karst plain extends across parts of Putnam, Owen, Morgan, Monroe, Greene, Lawrence, Martin, Orange, Washington, Crawford, Harrison, and Perry Counties. A karst is a hilly landscape of caves and sinkholes that develops on some dissolving limestone formations (Camp, 1999). These areas are sources of recharge for underground aquifers and play a significant role in groundwater supplies for human consumption. Karst areas are very sensitive to runoff and sinkhole issues related to the construction of a new highway. Contaminated runoff can cause many problems in karst areas. These problems include groundwater pollution; cave habitat, and wildlife degradation. The eroded sediments may affect groundwater flow by filling cave and karst entrances and inducing floods in these areas. Karst areas are also susceptible to sinkhole collapses, and for Indiana, karst represents an unique and highly sensitive geological and environmental area. Many endemic species in Indiana are dependent on caves.

5.22.4 Mitigation

Water body modification mitigation measures for potential water quality impacts should be followed where reasonable. Some such measures are:

(1) Karst areas will follow the mitigation practices stated in the Karst Memorandum of Understanding, (Appendix U).

(2) DO NOT DISTURB signs shall be posted at the construction zone boundaries.

(3) Tree clearing shall be kept to a minimum and limited to the construction limits within the permanent right-of-way.

(4) Trees or under story vegetation outside the boundaries shall not be cleared.

(5) Low-water work shall be restricted to placement of piers, pilings and/or footings, shaping of the spill slopes around the bridge abutments, and placement of riprap.

(6) Channel work and vegetation clearing shall be restricted to within the width of the normal approach road right-of-way.

(7) The extent of artificial bank stabilization will be minimized to provide for adequate scour protection.

(8) If riprap is utilized for bank stabilization, it shall be a minimum average of six inch graded stone and extended below low-water elevation to provide aquatic habitat.

(9) Temporary erosion control devices such as straw bales, burlap, jute mattering, grading, seeding and sodding shall be used to minimize sediment and debris in tributaries of the project.

(10) Culverts and other devices will be used to preserve existing drainage patterns.

(11) It is anticipated that the Patoka River channel, backwaters and floodplain will be spanned.

5.22.5 Summary

The alternative that appears to have the least impact on water body modification is Alternative 1. Alternative 1 has a low number of stream crossings. In addition, Alternative 1 would have fewer water body modifications because it is on an existing four lane roadway. Existing bridges on US 41 will be used and modified as needed for an I-69 freeway. Any new routes will have a greater impact because many of these areas have not been disturbed prior to the new construction. Channel impacts and relocations potentially will occur on each alternative. The No-Build Alternative will have no impacts on waterbodies.

5.23 Ecosystem Impacts

5.23.1 Introduction

An ecosystem is defined as "a biotic community and its abiotic environment, functioning as a system" (Smith, 1996). Biotic refers to the living components, while abiotic refers to the non-living components of the ecosystem. Ecosystems include the plants, animals, and microbes of an area plus nonliving components such as minerals, nutrients, soils, water, and energy, and the interactions of all of these components. Ecosystems may be aquatic or terrestrial; and ecosystems may be large or small. Many ecosystems within the I-69 study area are environmentally sensitive areas. Forests, wetlands, springs, prairies, streams, glades, barrens, and lakes are all examples of ecosystems.

Fragmentation: the steady transformation of once large and continuous tracts of natural landscape into smaller and more isolated patches or fragments surrounded by disturbed areas.

In addition to impacts from the direct taking of land, ecosystems such forests, prairies, wetlands and others may be adversely affected by habitat fragmentation. Habitat fragmentation is perhaps the most pervasive type of habitat alteration taking place in the world today. It can be defined as the steady transformation of once large and continuous tracts of natural landscape into smaller and more isolated patches or fragments surrounded by disturbed areas (Temple and Wilcox, 1986). Figure 5.23–1 shows a forest before fragmentation and one after fragmentation occurs. Many species that require continuous landscape are sensitive to edge habitat (the junction of two different habitat types). Studies have shown that birds requiring large tracts of forest are adversely affected by fragmentation because of nest predation and parasitism that follow the influx of edge species. Nest predators like raccoons, skunks, crows, and blue jays are often associated with edges, as well as the parasitic brown-headed cowbird which lays eggs in the nests of other birds, often to the detriment of the host's young.

A number of species vulnerable to nest predation, brood parasitism, and competition from edge habitat have been observed in the study area. These species are the: pileated woodpecker, hairy woodpecker, acadian flycatcher, tufted titmouse, wood thrush, blue-gray gnatcatcher, chestnut-sided warbler, and ovenbird. Research in this area of study has shown neo-tropical migrant populations of interior

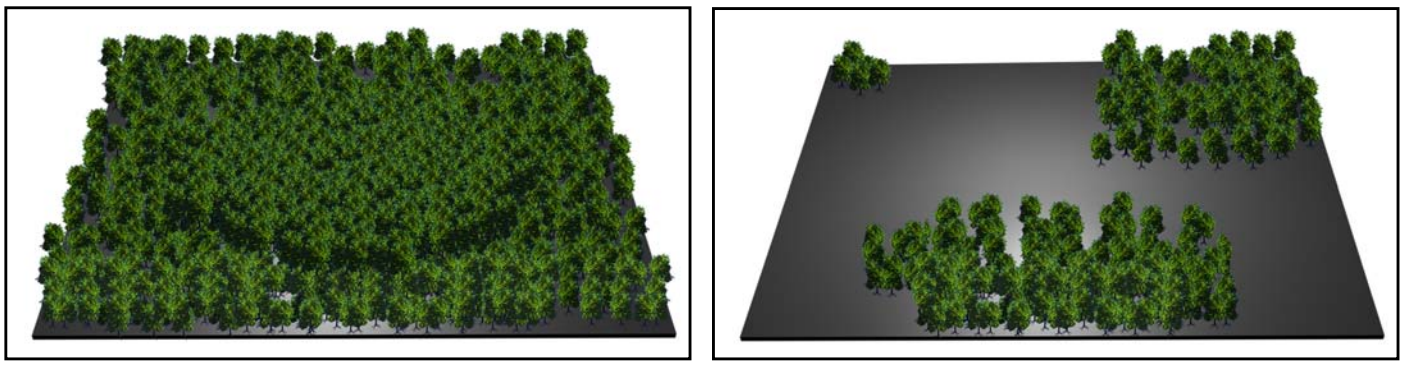


Figure 5.23–1: Left: Forest Prior to Fragmentation. Right: Forest After Fragmentation

Core Forest: the interior portion of a forest, generally accepted to be 100 meters from the edge

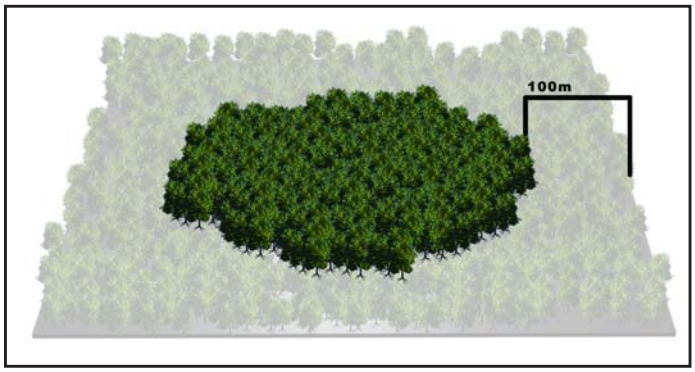


Figure 5.23–2: Diagram of Core Forest Habitat

woodland birds are adversely affected by fragmentation of large tracts of forests. These interior birds would be reduced and consequently may affect population densities. Core habitat is interior portion of that particular habitat. Habitat fragmentation and core habitat can be associated with different ecosystem types, such as forest and prairies. However, in southern Indiana most core habitat is generally associated with forests because no large tracts of prairie remain. Core forest is generally accepted to be the portion of the forest that is 100 meters from the edge (Temple, 1986). The outer portion of forest is considered the edge habitat. Figure 5.23–2 diagrams core forest habitat.

Core forest can be directly affected by impacting the core area, or indirectly affected by impacting the edge of the forest, which in turn redefines the core area. Impacts to core forest were estimated for each alternative in order to determine relative impacts to this resource. (Figure 5.23-3)

5.23.2 Methodology

A Geographic Information System (GIS) data layer containing the locations of State Significant (SG) high quality natural communities was compared to the proposed I-69 corridors in order to see those communities potentially affected by the project. The data layer was provided from the Indiana Department of Natural Resources, Division of Nature Preserves Natural Heritage Data Center. High quality natural communities in southwestern Indiana included in the data layer are: caves, cliffs, forests, flatwoods, prairies, wetlands, glades, barrens, seeps, and sand flats. The layer is current through May 2002. For more information on the use of the GIS and on the methodology, see Section 4.1 and 5.1 respectively.

In addition to the Natural Heritage Data GIS layer, information taken from field reviews and coordination with resource agencies were also used to identify other important natural communities and environmentally sensitive areas that could be potentially impacted by the proposed alternatives. Once environmentally sensitive areas were identified and mapped, effort was made, where possible, to avoid or

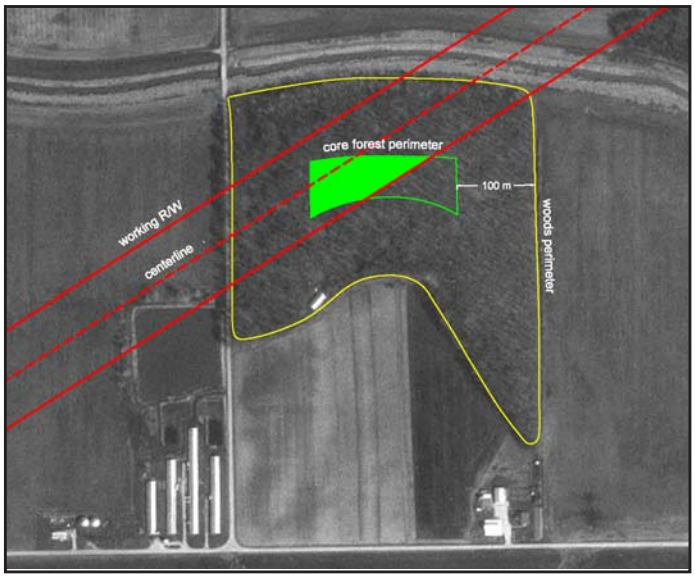


Figure 5.23–3: Diagram Showing: Working Alignment Right-of-Way and Core Forest Directly Impacted

minimize impacts to high quality ecosystems. Because some high quality ecosystems cover so large an area in southwest Indiana, avoidance of all of these areas was not possible.

In addition to direct impacts from land use conversion, habitat fragmentation and effects to core habitat are also important ecological considerations. Impacts to core habitat were estimated by overlaying the conceptual working alignment right-of-way onto 1998 Digital Ortho Quarter Quads (DOQQs), or aerial photographs. The ground cover along each alignment was screened for wooded areas that measured 200 meters by 200 meters, the minimum dimensions needed to create core forest habitat based on a 100 meter wide edge habitat distance. When a forested area large enough to support core forest habitat was encountered along the alignment, the outer edge of the area was traced on the aerial using Computer Aided Design (CAD) software. Large streams, rivers, and roads were used to delineate the edge of the area. Once the perimeter of the forested area was established, the core habitat was determined by delineating an area 100 meters from the edge. The area of this core habitat within the working alignment was calculated in order to estimate potential direct impacts.

5.23.3 Analysis

IDNR High Quality Natural Communities

The results for the IDNR high quality natural communities, listed as state significant (SG) in the IDNR Natural Heritage Data Center, refer to those that fall within the corridor. The corridor is approximately 2000 feet wide in most places, but has been narrowed in some instances to avoid environmentally sensitive areas. Although a natural community may fall within the corridor, it may potentially be avoided by shifting the alignment within the corridor in future studies.

Corridors for Alternatives 2 and 4 include a listed state significant mesic prairie ecosystem. A mesic ecosystem is one that is moderately moist, not very wet or dry. This small area is located in Greene County, southeast of Linton. A field review of this area on June 6, 2002 showed no prairie remnants. The area was a mowed cemetery surrounded by agricultural fields. The prairie ecosystem is characterized by tall grasses as the dominant vegetation. The prairie ecosystem made up approximately 13% of Indiana prior to settlement, however most of this has now been reduced to small remnants along railroads, in cemeteries, and other isolated patches (Parker, 1997). State law prohibits INDOT from purchasing land from within 100 feet of a dedicated cemetery plot. Therefore any prairie remnants within cemeteries will not be impacted by this project.

Alternatives 2C, 3B, 3C, 4C, and 5B may impact a state significant circumneutral seep ecosystem in the far western variation that ties into I-465. A seep is a wet area at the base or along the slope of a hill, usually with emergent plants. A circumneutral seep is a wet area with a pH value of 5.5 to 7.4 (Cowardin *et al.*, 1979). The pH scale is used to determine how acidic or basic a solution is. The pH range for the circumneutral seep is around neutral, neither highly acidic or basic.

Endemic Species: A species that are restricted to a particular region. These species are often very rare.

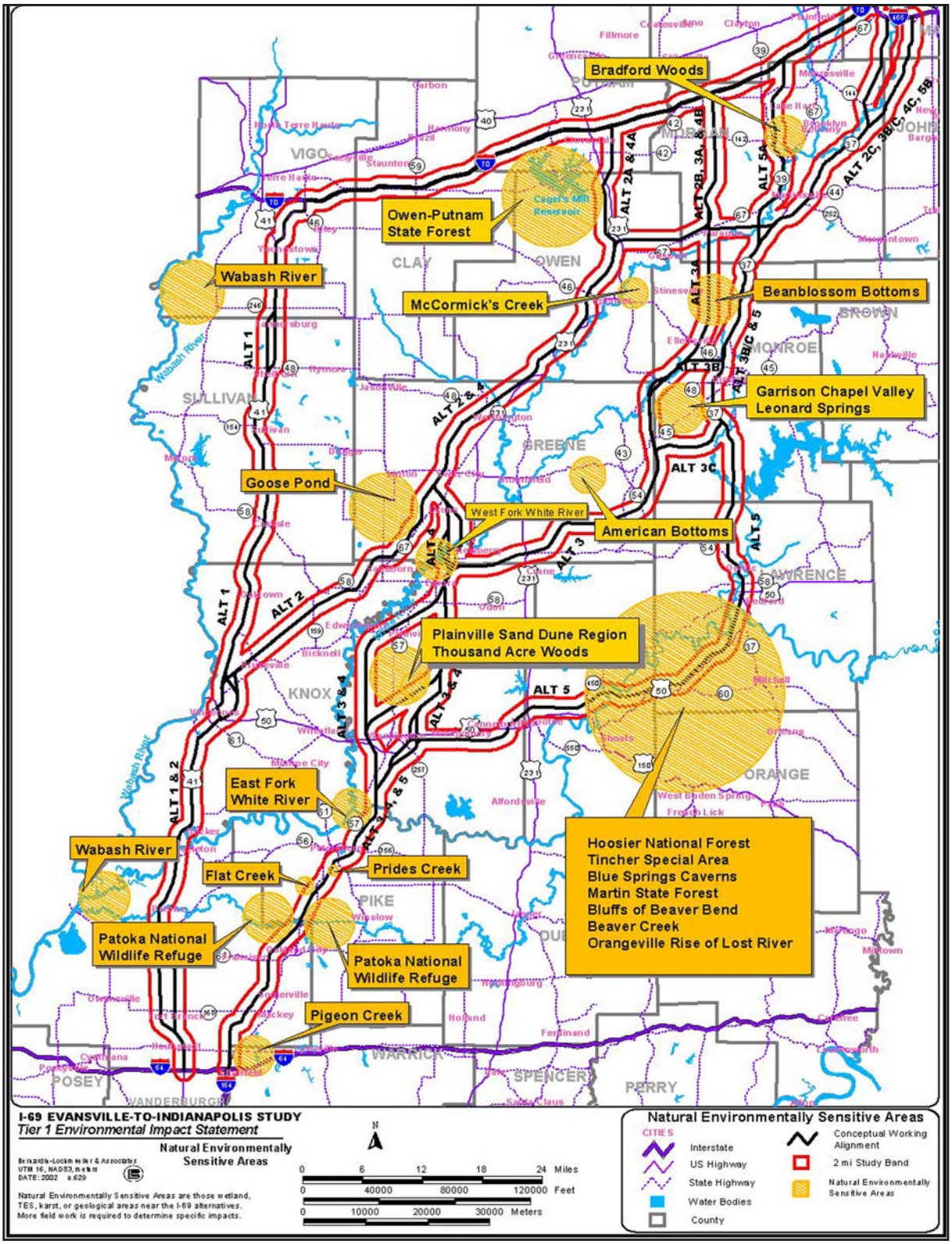


Figure 5.23-4 Natural Environmentally Sensitive Areas

Troglobite: An organism that must live its entire life underground.

Different plant species are often found in environments with different pH values. If an alternative is selected that potentially could impact this seep, during the Tier 2 NEPA documentation, avoidance of this site, if possible, will be a priority.

Figure 5.23–5: Tincher Pond in the Tincher Special Area

Additional Natural Environmentally Sensitive Areas

In addition to the high quality natural communities listed in the GIS layer, there are several other important ecosystems that could be considered environmentally sensitive areas within the proposed I-69 study area. These areas are high quality examples of forest, wetland, and karst ecosystems. They are important because of the habitat they provide; the rare, threatened, and endangered species found there; biodiversity; and/or unique geological features present. Environmentally sensitive areas are shown in Figure 5.23–4.

The **Tincher Special Area** is a specially managed area of the Hoosier National Forest in Lawrence County. Alternatives 5A and 5B will unavoidably pass through this area. The Tincher Special Area is the largest special area in the Hoosier National Forest. It is a unique ecosystem in terms of karst and the number of rare, threatened, and endangered endemic species found there. Endemic species are those that are restricted to a particular region.

The Hoosier National Forest developed a Plan Amendment to their Land and Resource Management Plan in April 1991. The Forest Plan Amendment is intended to "guide all natural resource management activities and establishes management activities and establishes management guidance for the Hoosier National Forest. It describes resource management opportunities and the availability and suitability of lands for resource management."

Tincher Special Area is listed in the Plan Amendment (1991) as one of twenty-four "Special Areas" which are designated in Management Area 8.2. The plan amendment describes "Special Areas" as follows:

> "These are designated special areas, which include unique or unusual ecological, botanical, zoological, geological, scenic, historic, prehistoric, and other areas which merit special recognition and management. Management of these areas will emphasize the protection, perpetuation, or restoration of their special features and values. Management of these areas will also emphasize management for

> Federally listed threatened, endangered, proposed, Regional Forester's sensitive, and state listed species if the species or habitat exists or has potential to exist.
>
> "These regionally or locally significant areas must meet one or both of the following criteria:
>
> "1. Be representative of unique or unusual geological, ecological, cultural, or other scientific values; or
>
> "2. Have the potential to be a regional or national landmark based on natural or cultural values.
>
> "Special areas are found throughout the forest where unique or special characteristics occur. They include cultural history, scientific, and scenic values as well as a variety of ecosystems and forest conditions. Plant and animal species and communities will vary depending upon the characteristics of each area.
>
> "The rare or outstanding values of the areas are the primary consideration. Other resource values and uses are secondary to the protection, maintenance, and restoration of an area's special values for public education, enjoyment, and study."

In November 1995 the Hoosier National Forest adopted Special Area Management Plan for Tincher Special Area. A copy of the Management Plan is included in Appendix BB. The management plan contains information on the existing condition, desired future condition, and management practices for the following resource areas; Karst/geology, ecosystem, heritage, visual resource, recreation and interpretation, landbase, and human and community development. The management plan includes the following polices for managing the Tincher Special Area:

> "The Tincher Karst Special Area shall be managed in a near natural condition with minimal manipulative disturbance. Emphasis is on preservation of the karst environment and conservation of the biological resources. Recreation at the primitive end of the spectrum and recreation geared to protection through interpretation of karst resources are emphasized. Responsible scientific studies are encouraged."

Written correspondence from the Hoosier National Forest includes letters dated January 18, 2002 and June 14, 2002 and a four page report dated January 8, 2002, Tincher Special Area (see Appendix Y). In addition, a meeting was held on June 6, 2002 with the Hoosier National Forest on Tincher Special Area.

The letter dated June 14, 2002 reported the following:

> "The Hoosier National Forest would prefer I-69 not go through the Tincher Special Area... The Tincher Area, as well as the rest of the Hoosier National Forest, is public land owned by the United States."

"The Tincher Special Area is subterranean drained, with caves, pits, sinkholes, swallow holes, cave springs, and the longest free-drop pit in Indiana. Because the area is subterranean drained and cave ecosystems are fragile, ground-disturbing activity in the area could have far-reaching consequences. The area may be a recharge area for Blind Fish Spring, which contains blind cavefish. Groundwater contamination could have severe consequences to blind cavefish and other subterranean species in the special area. Only one dye trace has been done and the dye showed up 5 miles away and a second reported 7 miles away is probably true.

"There are 15 known caves and over 32 other karst features in this special area. Only a few of the caves have been inventoried for species and all inventories have been north of Highway 50. Eighteen cave species, three of which are new to science, have been found since the inventory work started in 2000. (Another species was found, and we expect they will be, Tincher Special Area will be a global subterranean hotspot.

"There are 13 species considered sensitive by the USDA Forest Service, which are known to occur in Tincher; 10 cave species, two plants, and one animal. There is habitat in Tincher for 19 other sensitive species. Most USDA Forest Service endangered species.

"Habitat for many other species of concern (24) or management indicator species (22) in this special concern area."

"The Tincher Special Area is truly a jewel in the Hoosier National Forest. We are interested in learning more about the area and protecting the area to maintain habitat for all species in Tincher. We stated on page 21 of the Tincher management plan, "Protection of the karst features takes precedence over other values in planning and implementation of management activities.

"While we do not know everything about the Tincher Special Area, we do know that cave ecosystems are fragile. These systems depend on stable levels of air, water, detritus, temperature, and humidity. The kinds of disturbance caused by activity such as road construction could have serious negative impacts to those ecosystems and the species that depend on them."

Another unique karst resource and environmentally sensitive area within the study area is the **Blue Springs Caverns.** This cave has been known since about the mid-1940's after a heavy rain caused a sinkhole to collapse. The cave includes underground streams and tributaries that flow into the East Fork of the White River. The Blue Springs Caverns offers a guided boat tour and other recreational activities. It also provides habitat to a number of troglobitic (cave) species including the largest known population in the state of northern cavefish, a state endangered species (Richards, 2002). Alternatives 5A and 5B will unavoidably pass over the Blue Springs Caverns.

Martin State Forest is a high quality forest ecosystem and environmentally sensitive area. This is an approximately 7,023 acre area of rugged forested hills, including three lakes. It provides high quality habitat for a number of plant and animal species. The forest also offers educational and recreational opportunities such as a woodland management trail and arboretum, hiking, biking, camping, fishing, and hunting. Alternatives 5A and 5B will unavoidably pass through the middle of a portion of this forest.

The **Beaver Creek** wetland complex is located between Shoals and Huron. Most of the high quality wetland complexes are located between US 150 and the small town of Huron. This environmentally sensitive area includes a mixture of emergent and scrub shrub wetlands along with many inundated bottomland wetland woods. Many different federally and state listed species have been recorded from this area along with state significant natural communities. This area is an environmentally attractive area of Indiana within the Crawford Upland Region. All alternatives avoid the Beaver Creek wetland complex.

The **Bluffs of Beaver Bend** is a natural area and environmentally sensitive area owned by The Nature Conservancy in Martin County. This is a very scenic area where Beaver Creek empties into the White River at a sharp curve. A sandstone cliff extends south of the confluence of the creek and river, and provides habitat for several rare fern species. All five alternatives avoid the Bluffs of Beaver Bend.

The **Orangeville Rise of the Lost River** is a spring in Orange County. This unique karst area is where the Lost River, which flows underground in this area, comes back to the surface. The Orangeville Rise is a National Natural Landmark and is owned by the Indiana Karst Conservancy. The property consists of approximately 3 acres. This area is "world renown to students of karst landscapes, and is of significance to hydrologists and geologists" (Malott, 1952). All proposed alternatives avoid this unique area.

The **Garrison Chapel Valley** area is a third unique and important karst ecosystem within the study area. The Garrison Chapel Valley area includes a large karst valley, just east of the Monroe County Airport. There are approximately 17 miles of known cave in this area (National Speleological Society, 1973). This karst ecosystem includes a number of caves that provide habitat to troglobitic (cave) species such as the Indiana bat, salamanders, blind crayfish, and blind cavefish. Several hibernacula for the Indiana bat, a federal endangered species, are known in this area. Alternatives 3A and 3B are west of the Garrison Chapel Valley area. The U.S. Fish and Wildlife Service (USFWS) has requested the exact location of caves not be shown due to the sensitive nature of the habitat.

The **Leonard Springs Nature Park** offers a fourth important karst ecosystem. Leonard Springs Nature Park is located west of Bloomington in Monroe County. This area was previously a reservoir, but has since been drained and is now a wetland. In addition to the wetland, the park includes springs, caves, and forested slopes. Leonard Springs Nature Park offers a wide variety of plant and animal species, and was designed to provide nature observation and educational opportunities. All alternatives within the I-69 study area avoid this park.

The only critical habitat in the study area is a hibernaculum for the Indiana bat. This is an environmentally sensitive area and provides habitat for about 48,000 Indiana bats. This cave is one

of seven Priority 1 caves in the United States. A Priority 1 cave is defined as a hibernaculum with more than 30,000 Indiana bats. It has one of the largest populations of the Indiana bat in Indiana. A critical habitat designation for an area means that it is believed to be essential for the conservation of a species and it requires special protection under the Endangered Species Act. Because of its importance to the Indiana bat, Alternative 3 was shifted away from this cave, and now is approximately six miles away. The exact location of this cave is not provided due to the sensitive nature of this habitat. Coordination with the USFWS has and will be an ongoing process for federally listed species.

Figure 5.23–6. Land in the Beanblossom Bottoms area

The **American Bottoms** is located just south of SR 54 in Greene County. The American Bottoms is an environmentally sensitive ecosystem that consists of an elevated glacial lake, with springs and caves at its base. This area is a unique geological formation, and provides habitat to a number of plant and animal species. All proposed alternatives within the I-69 study area avoid the American Bottoms.

The **Beanblossom Bottoms** complex includes property owned by The Sycamore Land Trust (a state nature preserve) as well as the Restle Unit of the Muscatatuck National Wildlife Refuge. The Restle Unit is located in Beanblossom Bottoms, and not part of the larger Refuge near the Muscatatuck River. A portion of the Beanblossom Bottoms area is a state dedicated nature preserve. This environmentally sensitive area is along Beanblossom Creek in Monroe County. It extends from SR 37 to the White River, although not all of it is currently owned by the Refuge or the Sycamore Land Trust. This property is an excellent example of high quality forested and wetland ecosystems, including great blue heron rookeries, rare amphibians, and many unique plants. Beanblossom Bottoms is considered a High Biodiversity Area by The Nature Conservancy. It is the intention of a number of agencies and groups to preserve this high quality ecosystem throughout the Beanblossom Creek valley, from SR 37 to the White River. Alternative 3B has been shifted approximately 5 miles south to avoid this high quality ecosystem. Alternative 3A passes through Sycamore Land Trust property, and cannot be shifted to avoid this area. Because Alternative 3A most go north to connect to I-70, any shifts would still impact land within the valley, which runs east and west. Land within the Beanblossom Bottoms complex is shown in Figure 5.23-6.

The **Patoka River Bottoms** associated with the Patoka National Wildlife Refuge represents another high quality wetland complex and environmentally sensitive area. It is located in Pike and Gibson Counties, near Oakland City, along the Patoka River. The refuge was established in 1994 and consists of approximately 2670 acres, within an ultimate acquisition boundary of 22,083 acres (United States Fish and Wildlife Service, 2002). The ultimate acquisition boundary is the outer boundary of the refuge, although not all of the land within this area is federally owned. The area is a high quality bottomland hardwood forest ecosystem. It supports over 380 species of wildlife, including the federal threatened bald eagle, federal endangered Indiana bat , state threatened

copperbelly water snake, and a high biodiversity in birds reptiles, amphibian, mammals, and plants. Alternatives 3, 4, and 5 pass through the refuge, however do not impact land currently owned by the refuge. Coordination with the U.S. Fish and Wildlife Service (USFWS) has been an ongoing process. The proposed I-69 crossing is at the narrowest width with the fewest impacts to wetlands and forests. This corridor has been reserved by the USFWS (United States Fish and Wildlife, 1994). Alternatives 3, 4, and 5 are expected impact approximately 7–8 acres of wetlands in the Patoka River Bottoms area.

Figure 5.23–7: Pigeon Creek Wetlands

The **Goose Pond** area is the site of a proposed wetland restoration area south of Linton in Greene County. Goose Pond is privately owned and the owner, as a willing participant of the Wetland Reserve Program (WRP), gave rights for the Natural Resource Conservation Service (NRCS) to purchase an easement for slightly less than 7100 acres for wetland restoration. There are two parcels, one in the Beehunter Ditch area and the second along SR 59 between Black Creek and Brewer Ditch. This land was formerly a wetland, but had been ditched and tiled in order to provide drainage for agriculture. Land around Beehunter Ditch has already been planted, while the area around Black Creek and Brewer Ditch is in the planning stages. The NRCS is providing technical assistance for this project. When complete, this area could become a high quality wetland ecosystem, including open water, emergent, scrub shrub, and forested wetlands. This area has been avoided by all proposed I-69 alternatives.

The **Pigeon Creek** wetland complex is located in northwest Warrick County and is an environmentally sensitive wetland ecosystem. It includes the Lost Hill Wetland and Marchand Wildlife area. The Pigeon Creek wetlands include a high biodiversity of plant and animal species including the: swamp rabbit, copperbelly water snake, great blue heron, and a number of wetland plants. Figure 5.23–7 shows an area of the Pigeon Creek wetland complex. Alternatives 3, 4, and 5 have been shifted to the west to avoid this environmentally sensitive area.

Disjunct Species: a species found growing in a natural setting separated by a relatively large distance from other populations of that species

The **Flat Creek** wetland complex is located within a coal mining reclamation area in Pike County, southwest of Petersburg. This wetland complex is also an environmentally sensitive area. It provides habitat for a number of federally and state listed threatened and endangered species. This area encompasses a high quality wetland and a large blue heron rookery. Various wetland and upland communities occur in this area. Alternatives 3, 4, and 5 are expected to impact approximately 0.5–1 acre of wetlands west of this complex.

Prides Creek wetland complex is an environmentally sensitive area located southwest of Petersburg in Pike County. This area

receives floodwaters from Prides Creek and includes a mixture of emergent, scrub shrub, and forested wetlands. It is located in lowland areas along Prides Creek. Rails, warblers, and amphibians characteristically use this wetland. Alternatives 3, 4, and 5 are expected to impact approximately 2–2.5 acres of this wetland complex.

There are two areas along the **Wabash River** within the study area that are environmentally sensitive high quality wetlands. The first wetland complex is located near the area where the White River and the Patoka River merge into the Wabash River in northern Gibson County. This area includes contains high biodiversity and includes many different wetland types. It provides habitat to many different federally and state listed threatened and endangered species and state significant natural communities. It is not uncommon for bald eagles to nest in this area. The second area along the Wabash River is located near Terre Haute in the northwestern part of the study area. This environmentally sensitive are is significant because of the many different wetland types located there. A number of federally and state listed species also have been reported from this area along with state significant natural communities. Prior to the selection of the Muscatatuck National Wildlife Refuge some 50 years ago, this particular area was a candidate for a National Wildlife Refuge. Of the 12 species of bats known from Indiana, 10 species have been reported from this area. All proposed alternatives are east of the Wabash wetland complexes.

Figure 5.23–8. Entrance to McCormick's Creek State Park

The **East Fork of the White River** wetland complex is located near the area where the East Fork and West Fork merge together in northern Pike County, southeastern Knox County, and southwestern Daviess County. This area is primarily located on the east side of SR 57 north of the Gil Hodges Bridge over the East Fork of the White River. It harbors a number of state listed threatened and endangered species, and state significant natural communities. Turtles, bats, and amphibians are commonly observed in this area. This high quality area is not expected to be impacted by the proposed alternatives.

Figure 5.23–9. Entrance to Bradford Woods

The **West Fork of the White River** wetland complex is located in northern Daviess County and southern Greene County. This environmentally sensitive area is unique because of its backwater sloughs, oxbow wetlands, and floodplain forest remnants. Oxbows such as the

ones located in this area are important for the unique plants and animals that utilize them. They also offer an ecosystem that is very much connected with the White River. Mussels, fish, amphibians, reptiles, birds, and mammals depend upon these areas for survival. Alternative 4 may impact this high quality area at its crossing of the West Fork of the White River. Additional variations have been added at this crossing in an attempt to minimize the impacts to this high quality area.

McCormick's Creek State Park is located east of Spencer in Owen County. McCormick's Creek is an example of a high quality forest ecosystem and environmentally sensitive area. The park includes two nature preserves, the Wolf Cave and the McCormick's Cove Nature Preserves. The state park offers a number of hiking, biking, and horseback riding trails, camping, picnic areas, an inn, cabins, swimming, a nature center, and a number of other recreational features. Figure 5.23–8 shows the entrance to McCormick's Creek State Park. All proposed I-69 alignments avoid McCormick's Creek State Park.

Bradford Woods is another example of a high quality mixed hardwood forested ecosystem and environmentally sensitive area in Morgan County. This area has been described as a combination park, camp, forest, farm, nature preserve, bird sanctuary, and game refuge (Lindsay *et al.*, 1969). This 2400 acres tract of land is owned and managed by the Department of Recreation and Park Administration at Indiana University. Bradford Woods offers an Outdoor and Leadership Center designed to provide environmental education, camping, and other educational programs for children and adults. Figure 5.23–9 shows the entrance to Bradford Woods. Alternative 5A passes to the west of Bradford Woods and was intentionally placed to avoid the area.

The **Lieber State Recreation Area** and the surrounding **Owen-Putnam State Forest** are yet another example of a high quality forested ecosystem and environmentally sensitive area. This area includes the Cages Mill Reservoir, an approximately 1400 lake. A number of bald eagle (*Haliaeetus leucocephalus*) sightings, a federally threatened species, have been made in the area. This ecosystem also includes Cataract Falls, one of a few waterfalls in the state. All alternatives avoid this environmentally sensitive area.

Thousand Acres Woods is natural area and environmentally sensitive area owned by The Nature Conservancy. Thousand Acre Woods is located north of Washington in Daviess County. This area is an example of a high quality bottomland woods. A variety of bird species has

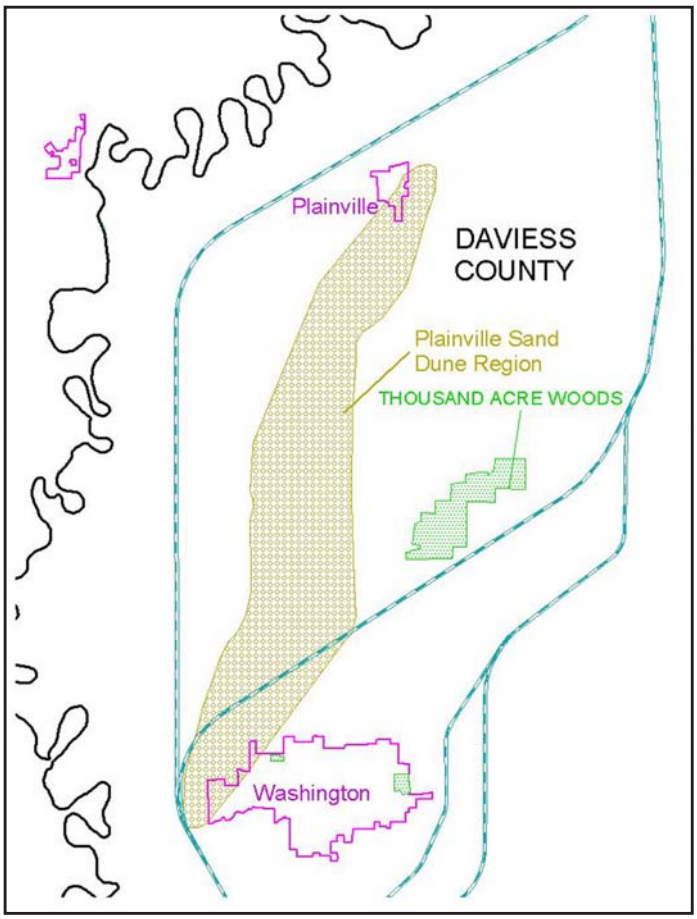


Figure 5.23–10. Plainville Sand Dune Region, Thousand Acre Woods, and Alternatives 3 & 4

been observed at this area including the: yellow-billed cuckoo, Kentucky warbler, crested flycatcher, and the yellow-breasted chat. One variation of Alternatives 3 and 4 passes approximately 400 feet to the southeast of Thousand Acre Woods, but is not expected to directly impact this ecosystem.

The **Plainville Sand Dune Region** west and northwest of Washington in Daviess County is another unique ecosystem an environmentally sensitive area that could be impacted by this project. This region is just to the west of Thousand Acre Woods. The Plainville Sand Dune Region is considered to be an "extremely significant ecological area" by the IDNR. In a coordination letter dated January 31, 1992, the IDNR states the area "consists of wind deposited sand dunes that formerly supported a complex mosaic of dry, savanna and prairie-like vegetation. Small wetlands

Table 5.23-1: Significant, Ecological, and Protected Properties from IDNR in the vicinity to Alternative 1.

Alternative 1
Patoka Swamp Natural Area
Sugarloaf Mound IHT acquisition site
McClure Park Property (Division of Forestry)
Quabache Trails Knox County Park
Knox County Park
Rare Plant Site (*Isoetes melanopoda, Bacopa rotundifolia)*
Busseron Bottoms Natural Area
Chinook Fish and Wildlife Area (Division of Fish and Wildlife)

Table 5.23-2: Significant, Ecological, and Protected Properties from IDNR in the vicinity to Alternatives 2A, 2B and 2C.

Alternative 2A	Alternative 2B	Alternative 2C
Patoka Swamp Natural Area	Patoka Swamp Natural Area	Patoka Swamp Natural Area
Sugarloaf Mound IHT acquisition site	Sugarloaf Mound IHT acquisition site	Sugarloaf Mound IHT acquisition site
McClure Park Property (Division of Forestry)	McClure Park Property (Division of Forestry)	McClure Park Property (Division of Forestry)
Quabache Trails Knox County Park	Quabache Trails Knox County Park	Quabache Trails Knox County Park
Knox County Park	Knox County Park	Knox County Park
Buzan Cemetery prairie remnant (Natural Area Registry Site)	Buzan Cemetery prairie remnant (Natural Area Registry Site)	Buzan Cemetery prairie remnant (Natural Area Registry Site)
Arney great blue heron rookery (100 +/- active nests)	Arney great blue heron rookery (100 +/- active nests)	Arney great blue heron rookery (100 +/- active nests)
Bald eagle sites / White River	Bald eagle sites / White River	Bald eagle sites / White River
Core Forest habitat in Owen County (Fragmentation)	Core Forest habitat in Owen County (Fragmentation)	Core Forest habitat in Owen County (Fragmentation)
Russel Hamm Natural Area (DePauw University)		Waverly Bog Natural Area Registry Site (circumneutral seep wetland)
		Bargersville great blue heron rookery (500 + active nests
		Mann Hill County Park and IHT acquisition sites

Table 5.23-3: Significant, Ecological, and Protected Properties from IDNR in the vicinity to Alternatives 3A, 3B and 3C.

Alternative 3A	Alternative 3B	Alternative 3C
Patoka River & NWR	Patoka River & NWR	Patoka River & NWR
Notable seep wetland	Notable seep wetland	Notable seep wetland
Notable seep wetland	Notable seep wetland	Notable seep wetland
Stronghold for the loggerhead shrike in Daviess County	Stronghold for the loggerhead shrike in Daviess County	Stronghold for the loggerhead shrike in Daviess County
Capeheart Sandflats Nature Preserve (extensive view of White River valley bottoms)	Capeheart Sandflats Nature Preserve (extensive view of White River valley bottoms)	Capeheart Sandflats Nature Preserve (extensive view of White River valley bottoms)
Thousand Acre Woods Nature preserve (TNC)	Thousand Acre Woods Nature preserve (TNC)	Thousand Acre Woods Nature preserve (TNC)
Core Forest Habitat in Greene County (Fragmentation)	Core Forest Habitat in Greene County (Fragmentation)	Core Forest Habitat in Greene County (Fragmentation)
Unnamed Spring	Unnamed Spring	Unnamed Spring
Combs Property (Division of Forestry)	Combs Property (Division of Forestry)	Combs Property (Division of Forestry)
Rock Springs	Rock Springs	Rock Springs
Ashcraft Cave	Ashcraft Cave	Ashcraft Cave
Keisler Forestry Legacy Property	Keisler Forestry Legacy Property	Smith Springs Cave
Beanblossom Bottoms Nature Preserve (Sycamore Land Trust)	Beanblossom Bottoms Nature Preserve (Sycamore Land Trust)	Waverly Bog Natural Area Registry Site (circumneutral seep wetland)
	Waverly Bog Natural Area Registry Site (circumneutral seep wetland)	Bargersville great blue heron rookery (500 + active nests)
	Bargersville great blue heron rookery (500 + active nests)	Mann Hill County Park & IHT acquisition sites
	Mann Hill County Park & IHT acquisition sites	

occurred in the poorly drained sand flats. Numerous species of southern and western affinities occurred in the dunes, while ephemeral wetlands often contained rare disjunct plant species of coastal Atlantic origins. Despite almost complete conversion to agriculture, numerous small remnants remain which are usually characterized by state listed plant species and other species of exceptional interest." The IDNR also feels that "due to the area's small size, its past and present ecological significance, and the paucity of these natural remnants, negative impacts will likely represent significance losses to the state's natural diversity." The IDNR letter can be found in Appendix Y, *Agency Coordination Materials*. The western variation around Washington that crosses SR 57 north of Washington for Alternatives 3 and 4 could potentially adversely impact this region. The far western variation and two eastern variations do not pass through the region. Figure 5.23–10 shows the location of Alternatives 3 and 4, the Plainville Sand Dune Region, and Thousand Acre Woods.

Table 5.23-4: Significant, Ecological, and Protected Properties from IDNR in the vicinity to Alternatives 4A, 4B and 4C.

Alternative 4A	Alternative 4B	Alternative 4C
Patoka River crossing & NWR	Patoka River crossing & NWR	Patoka River crossing & NWR
Notable seep wetland	Notable seep wetland	Notable seep wetland
Notable seep wetland	Notable seep wetland	Notable seep wetland
Stronghold for the loggerhead shrike in Daviess County	Stronghold for the loggerhead shrike in Daviess County	Stronghold for the loggerhead shrike in Daviess County
Capeheart Sandflats Nature Preserve (extensive view of White River valley bottoms)	Capeheart Sandflats Nature Preserve (extensive view of White River valley bottoms)	Capeheart Sandflats Nature Preserve (extensive view of White River valley bottoms)
Thousand Acre Woods Nature preserve (TNC)	Thousand Acre Woods Nature preserve (TNC)	Thousand Acre Woods Nature preserve (TNC)
White River crossing (numerous sloughs, wetlands, floodplain forest remnants)	White River crossing (numerous sloughs, wetlands, floodplain forest remnants)	White River crossing (numerous sloughs, wetlands, floodplain forest remnants)
Arney great blue heron rookery (100 +/- nests)	Arney great blue heron rookery (100 +/- nests)	Arney great blue heron rookery (100 +/- nests)
Bald eagle sites / White River	Bald eagle sites / White River	Bald eagle sites / White River
Core Forest habitat in Owen County (Fragmentation)	Core Forest habitat in Owen County (Fragmentation)	Core Forest habitat in Owen County (Fragmentation)
Russel Hamm Natural Area (DePauw University)	Core Forest habitat (fagmentation) and watershed impacts north of Paragon	Waverly Bog Natural Area Registry Site (circumneutral seep wetland)
		Bargersville great blue heron rookery (500 + active nests)
		Mann Hill County Park & IHT sites

In addition to those environmentally sensitive areas discussed above, coordination with the IDNR has provided significant, ecological, and protected properties in the vicinity of the alternatives. This letter dated July 16, 2002, may be found in Appendix Y, *Agency Coordination Materials*. Tables 5.23–1 through 5.23–5 list such areas for each alternative.

The significant, ecological, and protected properties listed in the above tables are those determined by the IDNR to be in the vicinity of the alternatives. Of those, two properties additional to those previously discussed, are may be directly impacted by the proposed alternatives. Alternatives 3A and 3B may or may not impact the Keisler Forest Legacy Property in Monroe County, depending upon the variation selected in this area. The western variation avoids this property, while the eastern variation impacts it. The Forest Legacy Program is a federal program that attempts to identify and protect environmentally important forest lands that are threatened by present or future conversion to non-forest use. This program is managed by the IDNR Division of Forestry. The Keisler Forest Legacy Property was the first forest legacy acquisition property in Indiana. The program began in

Table 5.23-5 : Significant, Ecological, and Protected Properties from IDNR in the vicinity to Alternatives 5A & 5B.

Alternative 5A	Alternative 5B
Patoka River crossing & NWR	Patoka River crossing & NWR
Notable seep wetland	Notable seep wetland
Stronghold for the loggerhead shrike in Daviess County	Stronghold for the loggerhead shrike in Daviess County
Core Forest habitat in Martin Southeast Lawrence Counties (Fragmentation)	Core Forest habitat in Martin Southeast Lawrence Counties (Fragmentation)
Chalybeate seep spring	Chalybeate seep spring
McBrides Bluff natural area (USFWS easement)	McBrides Bluff natural area (USFWS easement)
Martin State Forest (including Gibson Rockshelter site)	Martin State Forest (including Gibson Rockshelter site)
Rizer Cave	Rizer Cave
Chalybeate seep spring	Chalybeate seep spring
Impacts on karst geological region	Impacts on karst geological region
Tincher Special Interest Area (Hoosier National Forest)	Tincher Special Interest Area (Hoosier National Forest)
Fuzzy Hole Natural Area (Hoosier National Forest)	Fuzzy Hole Natural Area (Hoosier National Forest)
Blue Springs Caverns (longest cave in state, one of four largest northern cavefish populations)	Blue Springs Caverns (longest cave in state, one of four largest northern cavefish populations)
Core Forest habitat adjacent to Bradford Woods (Fragmentaion)	Waverly Bog Natural Area Registry Site (Circumneutral seep wetland)
Bradford Woods	Bargersville great blue heron rookery (500 + active nests)
	Mann Hill County Park & IHT acquisition sites

Indiana in 1999. Alternative 4 may impact numerous sloughs, Alternative 5 will pass directly through the Fuzzy Hole Natural Area in the Hoosier National Forest. This natural area is located within the Tincher Special Area, previously discussed in more detail.

In addition to those specific environmentally sensitive areas discussed above, glades, and barrens are unique ecosystems found in southern Indiana. Glades and barrens are natural openings within a forest. Glades are typically those with bedrock at or near the surface, and are usually on steep south, southwest, or west facing slopes. In southern Indiana most glades occur on limestone, although sandstone glades are also known to occur. Barrens are found on relatively deep soils, sometimes with little slope. Prior to European settlement, barrens were rather extensive in southern portions of the state. However, now these communities are found only in remnants. These areas often contain species that are considered rare in Indiana. Glades and barrens are typically found in hilly, forested areas characteristic of the Crawford Upland and Mitchell Plateau physiographic regions, especially Perry and Crawford Counties. Most glade and barren remnants have been located in these regions (Bacone *et al*., 1983).

Springs are also unique natural communities found in southern Indiana. A spring is a concentrated discharge of ground water appearing at the ground surface as a current of flowing water. Springs differ from seeps because they have a more continuous, faster water flow. Water from seeps may pond or evaporate when it reaches the ground, while this is not typical for springs. The Orangeville Rise of the Lost River discussed earlier is an example of a spring. Springs are typically found in karst areas in southern Indiana, particularly in the Crawford Upland and Mitchell Plateau physiographic regions.

Glades, barrens, and springs may be located in alternative corridors that cross the Crawford Upland and Mitchell Plateau, especially Alternative 5, and to a lesser extent Alternative 3. Further studies at the Tier 2 level will involve walking alternatives in the field and identifying these resources. All efforts will be made to avoid these unique ecosystems.

Wetlands and forests are discussed in more detail under their individual sections, and in the Appendix H, Wetlands Baseline and Trends, and Appendix G, Forested Land Baseline and Trends.

Habitat Fragmentation and Core Forest Habitat

The potential direct impacts to core forest habitat vary between alternatives. Figure 5.23–11 shows the estimated acres of core forest habitat impacted by each alternative.

Estimated acres of direct impacts to core habitat were determined to provide a relative comparison between alternatives. Additional affects to core habitat resulting from impacts to edge habitat, i.e. redefining the area of the core forest, can also occur. It is expected that alternatives with greater direct impacts to core forest will also have relatively greater indirect impacts to the core forest area from edge habitat impacts.

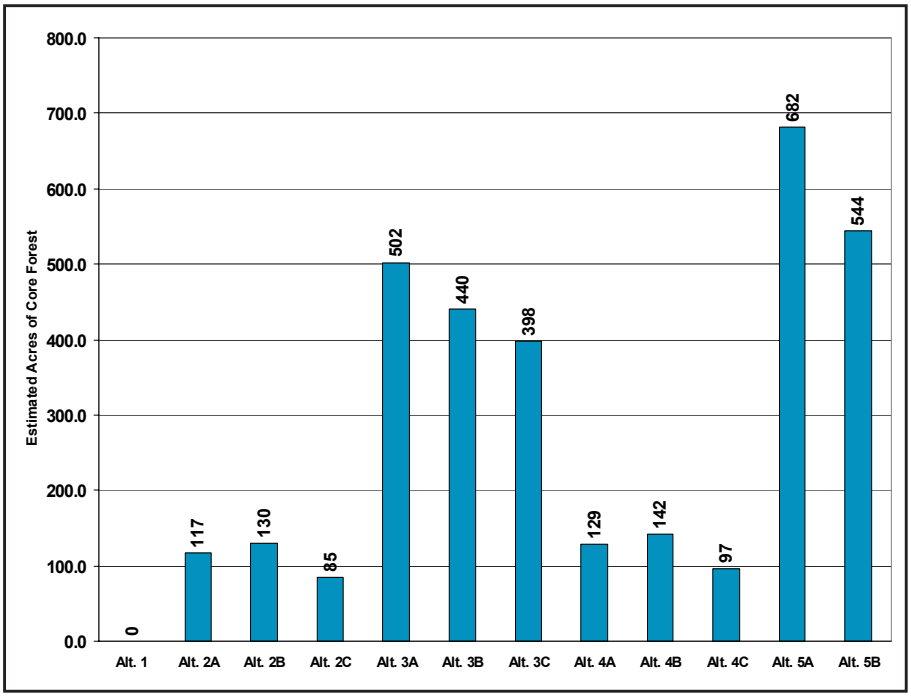


Figure 5.23–11: Estimated Acres of Core Forest Directly Impacted by the Proposed I-69 Alternatives

Alternative 1 has no expected direct impacts to core forest habitat. Alternative 1 uses the existing right-of-ways of US 41 and I-70, therefore impacts to core forest, if any, will result only from impacts to edge habitat. Alternatives 5A and 5B had the highest direct impacts to core forest habitat, with 682 and 544 acres respectively. Alternative 3A, 3B, and 3C were not too far behind with 502, 440, and 398 acres respectively. Alternatives 3 and 5 had the highest direct core habitats because they pass through areas of hilly terrain with larger areas of continuous forest tracts. Alternative 5 in particular, passes directly through areas of Martin State Forest and the Hoosier National Forest, which are large, continuous forest tracts. Alternatives 2 and 4 had similar direct impacts, and were relative lower than Alternatives 3 and 5. The estimated direct impacts for Alternatives 2A, 2B, and 2C were 117, 130, and 85 acres respectively. The estimated direct impacts for Alternatives 4A, 4B, and 4C were 129, 142, and 97 acres respectively. The direct impacts for Alternatives 2 and 4 are relatively lower because larger portions of these alternatives are in flat, glaciated land that has been converted to farmland, and because the forests impacted have already been fragmented and there are not as many continuous forested areas large enough to provide core forest habitat. Generally the

Options, B and/or C depending on the alternative, that use a portion of SR 37 will have slightly lower direct impacts than the other Options within that alternative. Under the No-Build Alternative current trends for core forest habitat impacts are expected to continue. The No-Build Alternative will have no impacts on these trends.

5.23.4 Mitigation

All efforts have been made to minimize ecosystem impacts by identifying such resources and avoiding them as much as possible. Existing GIS layers, resource agency consultation, and field reviews have been used to identify, avoid, and minimize impacts. This is an ongoing process and will continue throughout the project. Wetland, stream, and forest impacts will be mitigated as determined by consultation with resource agencies.

5.23.5 Summary

Ecosystems represent all the living and nonliving portions of a natural community, as well as their interactions. Forests, wetlands, prairies, springs, seeps, glades, and barrens are examples of ecosystems within the study area. Two high quality natural communities, listed as state significant (SG) in the IDNR Natural Heritage Data Center have been identified within proposed alternative corridors. However, only one, a circumneutral seep, could potentially be impacted by the project. This ecosystem could possibly be avoided by choosing a different alternative, choosing a different variation, or shifting the alignment within the corridor. The other listed natural community, a mesic prairie, is located at a cemetery and cannot by law be impacted by this project. In addition, a number of high quality ecosystems and environmentally sensitive areas are located within the study area. All efforts have been made to avoid these ecosystems. However, some environmentally sensitive areas, and significant, ecological, and protected areas determined by the IDNR may be unavoidably impacted by this project depending on which alternative is selected. Alternative 5 will impact the Tincher Special Area, the Fuzzy Hole Natural Area, Blue Springs Caverns, and Martin State Forest. Alternatives 3, 4, and 5 will impact the Patoka River Bottoms wetlands, and Prides Creek wetlands. Alternatives 3A and 3B may or may not impact the Keisler Forest Legacy Property, depending upon the variation selected in this area. Alternative 3A will impact the Beanblossom Bottoms wetlands. Alternative 4 may impact high quality wetlands at its crossing of the West Fork of the White River depending upon the variation used in the crossing of the West Fork. The eastern variation avoids many of these back water and oxbow wetland ecosystems. The No-Build Alternative will have no impacts on environmentally sensitive areas. Coordination with the environmental review agencies will be ongoing to determine appropriate mitigation if necessary.

Habitat fragmentation and effects to core forest habitat are also important considerations. Estimates of direct impacts to core forest habitat were determined to provide a relative comparison between alternatives. Alternative 1 had no direct impacts, while Alternatives 5 and 3 had the highest. The estimated direct impacts were lower for Alternatives 2 and 4. The No-Build Alternative will have no impacts on core forest habitat.

5.24 Water Quality Impacts

5.24.1 Introduction

The Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-217) establishes the standards for water quality in Indiana. The Indiana Water Pollution Control Board is responsible for water quality management and has established a program to work with the federal and local governments to implement water quality standards.

Water quality impacts are an important consideration in any proposed action. To determine such probable impacts, the following criteria were evaluated for:

(1) ambient conditions of rivers/streams which are likely to be impacted by the proposed action;

(2) any sole source aquifer under Section 1414(e) of the Safe Drinking Water Act;

(3) water quality issues such as public water supply sites, public water supply wells, and wellhead protection areas as authorized under the 1986 Amendments to the Safe Drinking Water Act, and a comparison of potential impacts upon open water ponds and lakes, impaired streams, sinking basins, and sinkholes per each alternative;

(4) environmentally sensitive areas for each alternative, such as karst related caves, sinking stream basins, sinkholes, and management lands for wildlife.

5.24.2 Methodology

Water quality impacts were evaluated by reviewing GIS information from a number of sources. Information on public drinking water supply sites, both surface and underground water supplies, comes from the United States Environmental Protection Agency (USEPA), while information on impaired streams, wellhead protection areas, and public water supply wells comes the Indiana Department of Environmental Management (IDEM). Information on springs and seeps comes from the National Hydrography Dataset by the United States Geological Survey (USGS) and the USEPA. Locations for caves (Source – Indiana Cave Survey), sinkhole areas, and sinking stream basins was provided by the Indiana Geological Survey.

In addition to these GIS sources, Indiana 305(b) Report (1994-1995), and a number of local studies and papers have been reviewed for ambient conditions coupled with previous biotic sampling. The combination of the GIS information with the references provides a general review for water quality issues.

Impacts to aquatic resources and water quality were evaluated for both short term impacts resulting from the construction of the highway as well as long term impacts of runoff and continual maintenance of the highway.

The methodology followed in this Tier 1 EIS included research of available sources to identify potential karst areas that may be affected by the project. A review of existing dye-tracing, cave density and spring location information was conducted, and corridors have been altered to minimize impacts to these potentially sensitive karst features. Additional, more detailed, studies will be conducted in Tier 2, if applicable.

5.24.3 Results Analysis

The major rivers and streams crossed by the alternatives are Pigeon Creek, Patoka River, White River, East Fork of the White River, West Fork of the White River, and the Eel River. In addition to these, the proposed alternatives also cross some substantial groundwater flow routes. Based on inferred groundwater flow paths determined from previous dye tracings, significant subsurface drainages near Bedford are crossed by Alternative 5 and subsurface drainages near Bloomington are crossed by both Alternatives 3 and 5 where they utilize the existing SR 37. In addition to these subsurface drainages, additional subterranean drainages may be identified in the Tier 2 NEPA studies if applicable.

Previous biotic sampling of rivers and streams in the counties of Warrick, Pike, Gibson, Daviess, Greene, and Monroe varied, but many showed low to average aquatic diversity indices suggesting poor to average water quality. Low indices have been found in Weaver Ditch, Hanna Creek, Big Creek, Smothers Creek, Tributary of Hawkins Creek, Hurricane Branch, Unnamed Tributary of Jackson Pond, East Fork of Keg Creek, Veale Creek, First Creek, Dowden Branch, Burcham Creek, and Plummer Creek. The streams that showed the highest indices were Smith Fork, Halfmoon Ditch, Ore Branch, and Indian Creek.

A review of the impaired stream layer of the IDEM showed an impaired status of high for Pigeon Creek, the upper section of the East Fork of the White River and the upper section of the West Fork of the White River. A medium impaired status was documented for the mainstem for the Patoka River, the middle section of the East Fork of the White River, and the whole stretch of the West Fork of the White River. The Lower Section of the East Fork of the White River showed no impaired status. These impaired status rankings were identified in the 1998 303 (d)

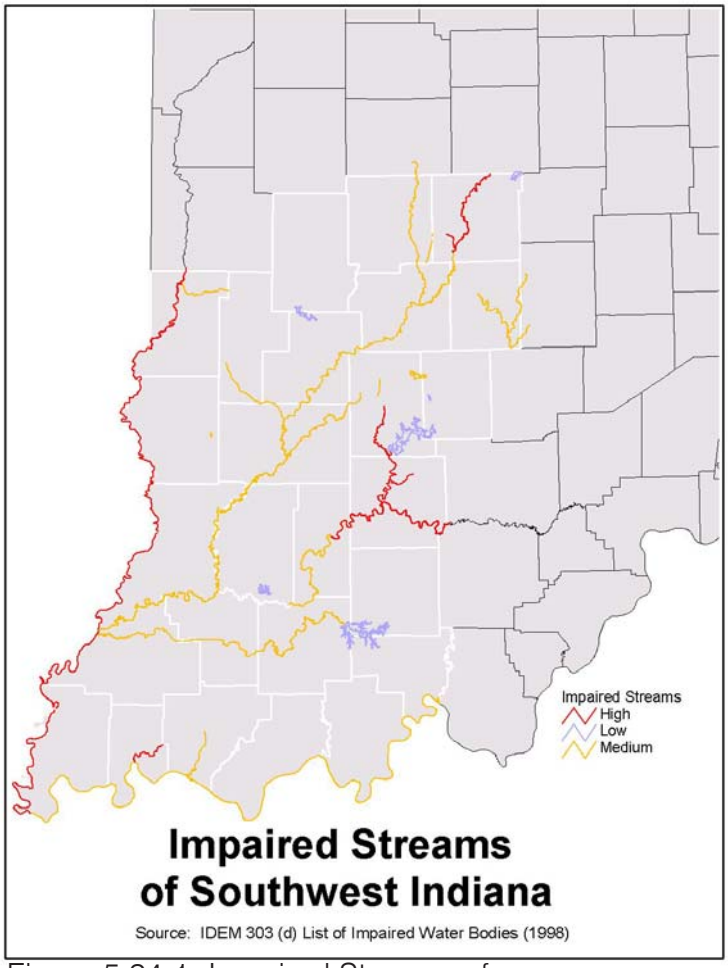


Figure 5.24-1: Impaired Streams of Southwest Indiana

List of Impaired Water Bodies, and is a qualitative rating from IDEM. Please review the Environmental Atlas for the crossing of these rivers by each alternative. The following paragraphs provide information on these major drainages.

Pigeon Creek is a low-gradient stream with turbid waters. The substrate is primarily deep calcitic to organic mud with some headwater tributaries displaying streambeds of gravel and sand. Its banks are steep throughout its length. Historically, it has been considered by many residents as polluted, and fish are not common occurrences. It is classified as a legal drain which makes dredging an acceptable method of channelizing the stream. Stream channelization increases soil erosion, turbidity (with siltation), water temperature, risks to public health, and degradation to habitat and water quality. These factors along with sewage, agricultural, mine acid, and landfill run-off depict Pigeon Creek as a drainage in need of investigation and protection (Schultheis *et al.*, 1987). Alternatives 3, 4 and 5 cross the upper mainstem of Pigeon Creek and its headwaters, while Alternatives 1 and 2 crossed its headwaters only.

The Patoka River and the South Fork of the Patoka River are acid-mine affected streams (Renn, 1989). From the 1800's to the early 1900's almost all coal produced in Indiana was from underground mines. Surface mining has steadily increased and is currently the only mining practice (Powell, 1972). From 1941– 1980, 16% of Pike County's acres were disturbed by surface mining. A significant portion of Pike County (62%) was mined prior to 1968 resulting in 186 acres of refuse piles, 129 acres of slurry ponds, 3,113 acres of land with less than 75% vegetative cover, and 375 acres of surface water impoundments (Allen et al., 1978). Acid-load flushouts especially from the South Fork of the Patoka River were a problem in the Patoka River drainage. Corbett (1969) found a range in pH from 2.6 to 5.5, alkalinity 0 to 4 mg/l, acidity 38 to 554 mg/l, and sulfate 188 to 4,400 mg/l from 37 water samples of the South Fork of the Patoka River at SR 57 from April 9, 1962 to July 8, 1968. Also, conductivity and salt concentrations in the South Fork were very high.

Figure 5.24-2: Stream Showing Acid Mine Drainage Contamination

The South Fork of the Patoka River was investigated in 1994 by EPA, IDEM, IDNR and USFWS and showed no fish from 6 different locations in the South Fork (Simon *et al.*, 1995). Documentation in their paper entitled Historical and Present Distribution of Fishes in the Patoka River Basin: Pike, Gibson, and Dubois County, Indiana (1995) showed that communities in the Patoka River have been dramatically altered by historical land use practices. Changes have resulted from coal mining and associated acid mine drainage, channelization, siltation, and oil exploration. At present, efforts to reclaim the lands in the South Fork are operative and the pH has increases from such efforts. Recent collections in this drainage appear to show that former species appear to be returning to the South Fork and the Patoka River. Alternatives 3, 4 and 5 cross the channelized portion of the Patoka River and the South Fork of the Patoka River. Alternatives 1 and 2 cross the Patoka River near it mouth with the Wabash River.

The White River and its East Fork and West Fork showed temperature, dissolved oxygen, and pH values in compliance with State Standards. The fecal coliform levels exceeded the state standards for streams designated for partial body contact. Recently, there has been some concern over the polychlorinated biphenyl (PCB) levels found in water and fish in the East Fork of the White River near Bedford (Clark, 1980). PCB's are persistent in the environment and have a long half life. The Indiana 305(b) Report (1994-1995) showed PCB's and pesticides in tissue analysis of fish collected in 1983 indicating a potentially serious PCB and pesticide contamination in the East Fork of the White River and other streams. As a result, fish consumption advisories were issued for certain reaches of these streams.

In 2001, the fish consumption advisory included Clear Creek in Monroe County, Pleasant Run Creek near Bedford, and Salt Creek downstream of Monroe Reservoir Dam in Monroe and Lawrence counties. No fish species from these streams should be consumed. The PCB's in Clear Creek, Salt Creek, Pleasant Run Creek and portions of the East Fork of the White River were associated with identified industrial inputs. Westinghouse Corporation in Bloomington began court-ordered hydro vacuuming of contaminated sediments in Clear Creek and Salt Creek during 1987. This clean up has helped to reduce the PCB contamination of fish in these streams and in the East Fork of the White River below Bedford. However, the PCB content of fish tissue in these streams is still high enough that no fish should be consumed (Clark, 1980). Alternative 5 crosses the East Fork, Salt Creek and Clear Creek.

A water quality survey was conducted on White Lick Creek and West Fork of the White River (from Perkinsville to Martinsville) in 1994-1995. A fish consumption advisory due to PCB's or mercury exists for all waters in the basin. The White River north of I-465 did not support aquatic life or full body contact standards due to mercury levels above 0.012 micrograms/L and E. coli (fecal contamination indicator) counts above 235/100 ml. Downstream of this station, E. coli concentrations were 1000/100 ml. The White River from Little Buck Creek in Marion County to Pleasant Run Creek in Johnson County did not meet aquatic life or full body contact recreation uses due to cyanide levels above 5.2 micrograms/L, dissolved oxygen below 4.0 mg/L, and E. coli counts above 235/100 ml. E. coli counts were high to very high downstream. The western variation south of Indianapolis for Alternatives 2C, 3B, 3C, 4C, 5A, and 5B cross the West Fork of the White River north of Martinsville.

The Eel River and its tributaries were relatively pollution free and supported good fish populations. Some high coliform values have been reported in these streams, but these values have fluctuated widely (Clark, 1980). Some of the smaller streams located in this region have had dissolved oxygen and pH values which were often far below the require minimums. These low values were probably due to extensive acid mine drainage into these smaller streams.

In karst areas through which some alternatives cross, such as the Bedford and Bloomington Areas (Mitchell Karst Plain), there is concern in an accumulation of contaminant concentrations over time in the groundwater. Water quality in karst areas is very important and the possibility of accumulation over time of different chemicals, e.g., chlorides, polychlorinated biphenyls, and others need evaluated by investigating baseline conditions with monitoring during and after construction. Filippini and Krothe (1983) found that floodplain and beneath-stream ground waters showed the beneath-stream ground waters to contain significantly higher concentrations of chloride, sodium and potassium, thus indicating that due to their coarser nature, streambed sediments allow infiltration of stream waters to some depths. Polychlorinated biphenyls (PCB's) however were detected in the

stream surface waters but none were detected in the floodplain ground waters or in waters beneath the stream above the level of detection (0.08 microgram/liter). This indicates that due to their low water solubilities and their affinity for particulates, PCB's are filtered out of the water quickly by the sediment column. Basick in the late 1970's found the major pollutants in the surface waters of Bloomington, Indiana were PCBs and heptachlor epoxide, along with several volatile compounds such as methane, ethane, propane, hydrogen sulfide, chloroform and methylene sulfide. Occasional constituents were n-butane, carbon tetrachloride, oils, pesticides, fatty acids, and coal-tar derivatives. Per point 9 of the Karst MOU (see Appendix U), any route crossing karst areas will incorporate a low salt and no spray strategy with appropriate signing to minimize runoff contamination.

The Clean Water Act Amendments of 1987 mandated the development of biological criteria for evaluating the quality of the nation's surface waters. The U.S. Environmental Protection Agency in cooperation with the Indiana Department of Environmental Management completed a study on the White River, East Fork of the White River, and the West Fork of the White River entitled Biological Criteria Development for Large Rivers with an Emphasis on an Assessment of the White River Drainage, Indiana (Simon, 1992). A total of 49 sites were sampled in the White River Drainage in order to develop and calibrate an Index of Biotic Integrity for use in Indiana large rivers. Three sub-basins were recognized and include the major drainage units of the White River, i.e., the Lower White River, West Fork of the White River, and the East Fork of the White River. Biological integrity is defined as *"the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitats of a region"* (Karr and Dudley, 1981). Although unimpaired waterbodies may no longer exist, an estimate of expected biological integrity in surface waters based upon "least-impacted" conditions can be used to guide restoration and protection programs and answer the ecological equivalent of "how clean is clean." (Davis and Simon, 1994).

The water resources of the three drainages were evaluated based on criteria calibrated for the White River drainage using the Indiana large river index. A normal curve distribution was observed for the River drainages with respect to site biological resource classification. A trend towards decreasing biological quality with increasing drainage area was evident. The Lower White River drainage showed a highly skewed site distribution towards the lower extremes of biological quality. The trend was towards declining biological integrity with increasing drainage area in both the East and West Forks, although the East Fork White River possessed considerably better fish community at the headwaters.

Sole Source Aquifer

Currently in Indiana, only the St. Joseph Aquifer has the designation of "sole source aquifer" (SSA). St. Joseph County is in the far reaches or northern Indiana on the Michigan border and will not be affected by the I-69 project located in southwestern Indiana.

Water Quality Issues

A comparison of the open water, impaired streams, sinking basins, sinkholes, public water supplies, public wells and wellheads GIS layers shows that open water impacts would be greatest for Alternative 2B followed by Alternatives 2A and 4B, and would be fewest on Alternative 1 (Table 5.24-1). Impaired stream crossings would be greatest for Alternative 5 followed by Alternative 4C, 2C, 3A, and 3B with the remaining alternatives between 2-3. The crossing of sinking stream basins and sinkholes is significantly greater for Alternative 5, while conversely, potential public well and wellhead impacts are greatest for Alternatives 1 and 2.

Table 5.24-1: Comparison of alternatives for potential water quality impacts.

Alternatives	Open Water	Impaired Streams	Sinking Basins (acres)	Sinkholes (acres)	Public Water Supplies	Public Wells	Wellheads
1	7-9	2	0	0	0	1-4	4
2A	23-24	3	20	45	0	1-4	3
2B	28-29	3	20	120	0	1-4	3
2C	25	4-5	20	90	0	1-4	4
3A	13-16	4	0	60	0	0	0
3B	7-10	4-5	0	30	0	0	0
3C	7-10	1-2	15	35	0	0	0
4A	17-20	3	20	45	0	0	0
4B	22-25	3	20	120	0	0	0
4C	19-22	4-5	20	90	0	0	0
5A	18	7	315	360	0	0	0
5B	17-18	7-8	315	360	0	0	0

Note: this table identifies potential impacts for comparison; it does not incorporate mitigation potential

Roadway Runoff

In addition to these water quality concerns, many of the streams crossed by the proposed Interstate are intermittent and ephemeral in nature. Roadway runoff can have significant impacts to the water quality of these streams as well as water quality downstream. Numerous constituents may be found in roadway runoff from multiple sources. These constituents include: particulates, nitrogen, phosphorus, metals, salts, petroleum, pesticides, PCBs, rubber, pathogenic bacteria, rubber and asbestos. These constituents are originated by many different sources, some of the primary sources include: deicing chemicals, tire wear, wear of engine parts and other moving parts, exhaust, motor lubricant leaks and blow-by, roadside fertilizing and spraying, and atmospheric deposition.

Of the identified runoff constituents, a point of primary concern is the build-up of deicing chemicals in the atmosphere, due to the seasonally large volumes of this contaminant. Salting of the proposed Interstate in winter with the drainage from the road could cause changes in the water quality of a number of streams, especially those with little volume or flow. Salting of any road may lead to

adverse effects for aquatic and terrestrial organisms. Osmoregulatory problems in plants and animals along with toxicity are the two main problems. A variety of environmental consequences have been associated with the use of deicing chemicals and their associated additives. Road salting affects water quality, soil properties, plants and animals. Salt inhibits plant growth by changing soil structure, changing the osmotic gradient and through chloride ion toxicity (NCHRP, 1976). Excess salinity causes moisture stress in plants, suppresses proper nutrient uptake, and leads to deficiencies in plant nutrition (NCHRP, 1978). In addition, additives can contribute to eutrophication in wetlands and toxicity to its inhabitants.

Little is known about the response of freshwater aquatic plants to increased salinity. Salt concentrations greater than 1% will endanger health, reproduction and longevity in all species adapted to freshwater environments (Terry, 1974). Freshwater organisms lack effective means of eliminating salt from their bodies and have difficulty adapting to sudden increases in salinity. Salt introductions increase the suspended solid load and thus, increase water temperatures with usually reductions in dissolved oxygen.

Analysis of salt concentrations in runoff which could emanate from the proposed interstate were conducted for the Southwest Indiana Highway Corridor (DEIS, 1996). The constants were a 300 foot roadway width called (r); ¼ ton of salt per mile per roadway lane (since the proposed interstate is a 4-lane facility) or 1 ton per mile called (S); and a drainage length of 1 mile. Assumptions used in this analysis were : (1) 100% precipitation runoff (no absorption); 100% of applied salt is dissolved in precipitation runoff; (3) no overland flow (runoff) from adjacent land; (4) density of runoff water carrying dissolved salt is 1 mg/l; (5) concentration of salt equals concentration of chloride; and (6) 1 inch of liquid (water) equals approximately 10 inches of snow.

Calculations of runoff from a 10-inch to 1-inch snowfall (which melts to an approximate 1 inch and 0.1 inch of water respectively) will have in excess of 243 to 2,427 ppm of salt respectively. Results are considered for a worse case scenario.

Assumptions 1, 2, and 3 simplify the analysis but do not take into consideration factors such as runoff from areas adjacent to the roadway, absorption of a certain amount of salt in the soil before it can reach the affected waterway, and the amount of water in the waterway. These factors would reduce the salt concentration below given results. All design and Best Management Practices are required to limit contaminant runoff from roadways.

“Water Quality Criteria” by California State Water Quality Control Board indicated salt concentrations of 2,000 to 3,000 ppm could be tolerated by freshwater fish such as largemouth bass and brown trout. Similarly, McKee and Wolf (California State Water Quality Board) have indicated that water containing a concentration of 1,500 ppm of salt is suitable to drink by livestock and wildlife.

Results of 243 to 2,427 ppm from a 10-inch to 1-inch snowfall are not considered significant, and based on the above information, it seems unlikely that chloride concentrations would be elevated from the project to levels that would harm fish, wildlife or livestock. The use of de-icing chemicals is the most economical method available to provide bare pavement conditions. The use of abrasives, generally sand, has been successful in reducing the amounts of de-icing chemicals.

The pollutant loadings in surface water runoff have been analyzed by the FHWA "Predictive Procedure for Determining Pollutant Characteristics in Highway Runoff" (Kobriger *et al.*, 1981). This procedure is based on extensive study, research and development to analyze water quality impacts caused by highway stormwater runoff. The study has shown that highway facilities with low to medium traffic volumes [approximately 30,000 ADT (average daily traffic) or less] exert minimal to no impact on receiving waters. All of the streams crossed by the interstate will have peak AADT (annual average daily traffic) volumes of less than 30,000 in the design year 2025. The ADT for the proposed interstate (year 2025) ranges between 12,600 to 21,100. Consequently, the conclusion of minimal impact from stormwater discharges on receiving waters appears justified.

5.24.4 Mitigation

Mitigative measures for potential water quality impacts are:

(1) Where reasonable, cross rivers and streams at their narrowest floodway width, and reduce the number of stream relocations and floodplain encroachments where reasonable,

(2) develop stream mitigation plans,

(3) disturbed in stream habitat should be returned to its original condition when possible upon completion of construction in the area,

(4) minimize tree clearing near streams and rivers,

(5) avoid wetlands as much as possible and follow the Memorandum of Understanding dated January 28,1991 between INDOT, IDNR and USFWS for wetlands,

(6) replace all wetlands at an appropriate mitigation ratio,

(7) follow Best Management Practices for erosion control in the project,

(8) avoid sinking basins and sinkholes as much as possible and follow the Memorandum of Understanding dated October 13, 1993 between INDOT, IDNR, IDEM and USFWS for crossing karst areas, and

(9) provide in the highway design for "filter strips" and detention basins in karst areas.

5.24.5 Summary

Water quality conditions in Southwestern Indiana range from moderately to severely degraded with but few exceptions. A review of the alternatives for the water quality issues shows a high probability of potential impacts for karst areas, such as Tincher Special Area and Blue Springs Cavern, near Bedford, and the crossing of impaired streams (East Fork of the White River, Salt Creek, Clear Creek, and the West Fork of the White River between Martinsville and I-465 in Indianapolis) with Alternatives 5A and 5B. In addition, there is a high probability of water quality impacts to wetlands in the Beanblossom Bottoms area for Alternative 3A.

Alternatives 2 and 4 cross karst areas northwest of Spencer County in glaciated terrain. Water quality issues in this area are expected to be moderate to low because of the glacial till overlying such areas.

Alternative 1 crosses the least amount of open water ecosystems, impaired streams and crosses no karst areas. Ajacent to US 41 there are 1-4 public wells and 3-4 wellheads. Roadway runoff for Alternative 1 would be similar to that existing today. The No-Build Alternative will have no impact on water quality.

5.25 Permits

Each of the I-69 build alternatives will impact numerous waterways. Permits that will be required include: the United States Army Corps of Engineers' (USACE) Section 404 and Section 10 permit; Section 401 Water Quality Certification (WQC) from the Indiana Department of Environmental Management (IDEM); Construction in a Floodway Permit from Indiana Department of Natural Resources (IDNR); IDEM Section 402 permit; IDEM National Pollution Discharge Elimination System (NPDES); Rule 5 permit; United States Coast Guard (USCG) Section 9 Bridge Permit; and Class 5 Injection Well Permit.

The Section 404 permit, Section 401 WQC and Section 402 permit are authorized under the federal Clean Water Act (CWA), and the decisions are subject to the state of Indiana's water quality standards under IAC Title 327 of the Water Pollution Control Board (WPCB). Also, IDNR will require permit approvals for floodplain impacts under the State of Indiana's Flood Control Act IC 14-28-1 and Navigable Waterways Act IC 14-29-1. Rule 5 of the National Pollution Discharge Elimination System (NPDES) regulates contaminant discharge via storm water runoff. Sections 9 and 10 of the Rivers and Harbors Act 1899 authorized regulation of navigable waters of the United States pertaining to bridge crossings, and dredging and filling respectively.

All necessary permits will be applied for and obtained prior to the construction of this project, and the terms and conditions of these permits will be adhered to during the construction and maintenance of this facility.

5.25.1 Section 404 and Section 10 Permit

For projects involving excavation and/or discharges of dredged or fill material into waters of the U S, or placement of structures or any activity that disturbs soil / sediments below the ordinary high water elevation of a navigable waterway, and not authorized under either a general or a nationwide permit, an Individual U S Army Corps of Engineer's Section 404 / Section 10 Permit or letter of permission must be obtained prior to the commencement of construction. Section 404/ Section 10 Permit(s) will be applied for during the design phase of the project (Figure 5.25-1).

Figure 5.25-1: Typical Wetland Subject to Regulation

5.25.2 Section 401 Water Quality Certification

The Section 401 Water Quality Certification is a state's review of applications for Section 404 U S Army Corps of Engineer's permits for compliance with water quality standards. Any activity involving dredging, excavation, or filling within waters of the United States may need a Section 401 Water Quality Certification. The Indiana Department of Environmental Management

(IDEM) is responsible for the Section 401 Water Quality Certifications review process in Indiana. Section 401 Water Quality Certifications will be applied for during the design phase of the I-69 project.

While the USACE 404 permit concerns broad national waterway issues, the IDEM review focuses on how the project may impact the water quality of the waters of the United States as applied under the Clean Water Act within the jurisdiction of Indiana's water quality standards under IAC 327. Indiana's water quality standards have been reviewed and approved by the United State Environmental Protection Agency who maintains oversight of the IDEM's approvals of 401 water quality certifications. The IDEM review of water quality impacts, while focusing primarily on wetland impacts, also must include a review of the physical, biological, and chemical impacts to the water quality.

5.25.3 Construction within a Floodway Permit

Figure 5.25-2: Typical Floodplain Impact

The Flood Control Act (IC 14-28-1) requires that any person proposing to construct a structure, place fill, or excavate material at a site located within the floodway of any river or stream, unless that activity is exempted, must obtain the written approval of the Indiana Department of Natural Resources prior to initiating the activity. This law was originally enacted to protect Indiana citizens from the loss of lives and property caused by floods, and ensure that floodway channels are not inhabited and kept free and clear of interference or obstruction that will result in undue restriction to the capacity of the floodway. Since then it has been expanded to protect Indiana's natural resources located in the floodway. Construction in a Floodway Permit(s) will be applied for during the design phase of this project (Figure 5.25-2).

The Indiana Department of Natural Resources (IDNR) has the jurisdictional responsibility within the State of Indiana for approving any construction within a floodway or navigable waterway under Indiana Code 14. The proposed I-69 highway will have numerous stream and river crossing requiring approval of construction within a floodway and a navigable waterway.

5.25.4 Section 402 Permit – Rest Areas

The proposed I-69 highway will require rest areas and may require a Section 402 permit for a point source discharge (40 CFR 122) if the rest area cannot be discharged into a Publically Owned Treatment Works. Since the location of rest areas are not known, potential impacts resulting from such proposed facilities will be identified in Tier 2 NEPA studies with proposed mitigation measures. Once these locations have been identified in Tier 2 NEPA studies, this permit(s) will be applied for and obtained prior to construction.

5.25.5 National Pollution Discharge Elimination Permit

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

5.25.6 Rule 5 – Erosion Control

The requirements of Rule 5 (327 IAC 15-5) apply to all persons who are involved in construction activity that results in the disturbance of 5 acres or more of total land area. Contractors disturbing more than five acres of land from a non-commercial borrow site are also required to comply with Rule 5. IDEM is the agency that governs over Rule 5.

The erosion control plan is developed during the design phase. This plan, after being filed and reviewed by the appropriate Soil and Water Conservation District is incorporated into the plans and is included in the contract documents. A Notice of Intent is submitted to IDEM (Figure5.25-3).

Figure 5.25-3: Typical Eroding Bank on Roadway Construction Project

5.25.7 Section 9 Permit – Crossing a Navigable Waterway

The River and Harbors Act of 1899 and the General Bridge Act of 1946 gives the U S Coast Guard the authority to protect navigable waters of the United States. Navigable waters are those waters that at some time, in the past, present, or future are used or will be used to transport interstate or foreign commerce. The 9th and 2nd Coast Guard Districts regulate activities for the State of Indiana. The Section 9 Permit will be applied for during the design phase of the I-69 project.

5.25.8 Class V Injection Well Permit

A Class V Injection Well permit(s) may be required for various types of projects. For example such a permit may be needed if a project is located within the karst region of the state or a sole source aquifer area, or where the Indiana Department of Transportation proposes to discharge stormwater runoff to a drywell. Injection wells are "any dug hole or well that is deeper than its largest surface

dimension, where the principal function of the hole is emplacement of fluids." Class V Injection Well permit(s) will be applied for during the construction phase of this project.

A Class V Injection Well permit may be required for I-69 if the alternative selected traverses karst areas. Alternates 2, 3, 4 and 5 could potentially require notification of EPA Region 5 and completion of a Class V Well Inventory Form for sinkholes that receive storm water runoff from construction sites or facilities located in karst areas. The Class V Injection Well permit will also cover drywells or injection wells constructed to discharge storm water. Conditions of the permit may include some type of pretreatment (peat filter, grassed waterway, detention basins, etc.) for the storm water prior to discharge to the sinkhole or drywell. This permit will be applied for and obtained prior to construction.

5.26 Cumulative Impacts

5.26.1 Introduction

Cumulative impacts are defined by the Council on Environmental Quality (CEQ) Regulations 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.*" (CEQ Regulations) Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Direct impacts are defined by the CEQ Regulations as "*effects which are caused by the action and occur at the same time and place.*" (CEQ Regulations) For this project, an example of a direct impact would be the taking of a wetland for right-of-way for an interchange.

Indirect impacts are defined by the CEQ Regulations as "*effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate…*" (CEQ Regulations) For this project, an example of an indirect impact would be the development of farmland as a result of new access provided by the project.

The impacts of reasonably foreseeable future actions of others not associated with the I-69 project include the impacts of other federal, state, and private actions with the No-Build alternative for I-69. For this project, an example would be a forest located several miles away from I-69 that would be bought by a developer to construct a subdivision. This subdivision would not be associated with I-69, but it would be a reasonably foreseeable future action.

The assessment of cumulative impacts is required by the CEQ Regulations. These regulations ensure that the proposed I-69 project and other federal, state, and private actions will be evaluated with regard to cumulative impacts.

5.26.2 Methodology

The methodology for determining cumulative impacts of the proposed I-69 project is described in detail in *Task 4.2 – Technical Report of Methods for Cumulative Effects Analysis for the I-69 Evansville to Indianapolis Study*. That technical report outlines an eleven step process for conducting the cumulative impacts analysis.

1. Identify the significant cumulative effects issues associated with I-69
2. Establish the geographic scope for the analysis
3. Establish the time frame for the analysis
4. Identify other actions affecting the resources, ecosystems, and human communities of concern

5. Characterize the resources, ecosystems, and human communities identified in scoping and explain how they have historically changed
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds
7. Define a baseline condition for the resources, ecosystems, and human communities
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human community
9. Determine the magnitude and significance of cumulative effects by identifying the changes as a result of I-69
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative impacts
11. Monitor the cumulative effects of the alternatives and provide documentation

The eleven step process was developed in accordance with "Considering Cumulative Effects Under the National Environmental Policy Act" (Council on Environmental Quality, 1997).

The direct and indirect impacts of the various alternatives were calculated using the Geographic Information System (GIS) and the economic and transportation planning modeling combination. This Section discusses the GIS and how this tool is used in identifying impacts for the alternatives.

In the mid-1990s, INDOT undertook a significant effort to develop analytical procedures designed to assess the transportation and economic impacts of large corridor investments. This effort resulted in the *Major Corridor Investment Benefit Analysis System* (MCIBAS). MCIBAS is a suite of programs and technical procedures, which consists of the *Indiana Statewide Travel Demand Model* (ISTDM) linked by post-processors and analytical procedures to a regional econometric simulation model. ISTDM is a computer model that forecasts traffic flow throughout the highway network given a proposed change or changes to the existing system.

In the early phases of this Tier 1 DEIS, significant improvements were made to both MCIBAS and ISTDM. These improvements included:

(1) the expansion of ISTDM into the four neighboring states to allow for improved testing/ modeling of transportation improvements that might draw traffic from neighboring states;

(2) the addition of minor collectors and some local roads into the ISTDM transportation network to permit improved estimates of traffic flows;

(3) the ability to input traffic into the statewide network that would be generated by the completion of I-69 at the national level;

(4) the ability to output some economic and transportation data for five regions within the 26-county study area;

(5) the development of a "feedback loop" from these regions to the starting point of ISTDM to determine the effects of the new population and employment "induced" by an improved highway corridor on the transportation network; and

(6) the conversion of new population and employment into estimates of new land development.

It should be noted that the combination of these improvements – including the national I-69 traffic, the feedback loop and land use estimates – represents a significant step beyond the usual state-of-the-practice for modeling planned transportation improvements. Typically, travel demand models will take into account only the effects of changes in destination choices and route diversions resulting from a prospective improvement to the transportation system (e.g., added speeds and capacity to an existing road and/or the construction of a new road). Most travel demand models are not integrated with an economic model, nor do they allow for the feedback of "generated" or "induced" demand resulting from new development that would occur solely because the highway is built or improved.

Figure 5.26-1: Economic Regions within the Study Area

Both national I-69 and highway-induced demand (per the feedback loop) were included in a set of year 2025 model runs for each alternative. The incremental increases in VMT are attributable to the national I-69 project and demand induced by new economic development within Indiana. The results of this scenario were utilized for purposes of documenting impacts on air quality, noise, indirect land use and traffic in order to predict the maximum potential impacts to the resourses in the study area upon completion of I-69 nationally.

This information was computed for each of the five economic analysis regions. These five regions are shown on Figure 5.26-1 and include:

1. Indianapolis and western and southern counties (Hendricks, Johnson, Marion and Morgan counties);
2. Bloomington (Monroe County);
3. Greater Terre Haute (Clay and Vigo counties);
4. Greater Evansville (Gibson, Posey, Vanderburgh, and Warrick counties);
5. Rural Southwest Indiana (Brown, Crawford, Daviess, Dubois, Greene, Knox, Lawrence, Martin, Orange, Owen, Perry, Pike, Putnam, Spencer, and Sullivan counties).

In addition to computing the indirect impacts for the economic regions, the indirect impacts of the I-69 alternatives were computed for groups of potential interchanges. This was done using models developed from a national study of commercial development at rural and small town interstate exits (Hartgen and Kim, 1998). Using these models, forecasts of commercial activity was computed and this activity was converted into acres using standard land use densities.

This methodology uses a combination of transportation and economic models to forecast population and employment activity. This activity is converted into land use acreages so that the impacts upon environmental resources can be determined.

5.26.3 Analysis

The following analysis presents each of the eleven steps and discusses the results of the cumulative impacts.

1. Identify the significant cumulative effects issues associated with I-69 - For the proposed I-69 project, three major resources, ecosystems and human communities were identified that are being analyzed for cumulative impacts. These three areas are farmland, forests, and wetlands. These three resources were selected based upon their importance in southwestern Indiana as well as input from various resource agencies. These resources were discussed at a November 27, 2001 meeting with various resource agencies. (See Appendix Y, *Agency Coordination Materials*, and Novermber 27, 2001 review Meeting)

Initially a fourth resource, threatened and endangered species, was considered for the cumulative impacts analysis. As information on threatened and endangered species was obtained, it became apparent that threatened and endangered species are very wetland dependent. Of the threatened and endangered species, 93 of 120 (78%) of the threatened and endangered species (including watch list species) are fully or partially wetland dependent. Wetlands make up only 4-5% of the surface area of Indiana and such high occurrences of threatened and endangered species for wetlands shows the value and importance of wetland habitats to Indiana's biota. Of the remaining 27 threatened and endangered species, 10 are forest species.

These two ecosystems make up the majority of the environmentally sensitive habitat for threatened and endangered species in Indiana. This direct correlation would apply to 103 of 120 threatened and endangered species (86%) in Indiana. As a result of this information, projections for threatened and endangered species would follow trend lines for wetlands and forests. Since wetlands and forests provide excellent correlation to threatened and endangered species, threatened and endangered species will not be analyzed separately from wetlands and forests.

2. Establish the geographic scope for the analysis - The geographic scope of the cumulative impacts analysis is at its broadest level the entire state of Indiana. The baseline information on the three resources covered the entire state. The direct and indirect analysis was computed using the economic and the transportation models (see previously discussed methodology for a description of the models) to produce information for the total 26 county study area and for 5 separate economic regions within that study area. Cumulative impacts covered these five regions. Lastly, direct and indirect impacts were computed for interchanges and groups of interchanges along particular I-69 alternatives.

3. Establish the time frame for the analysis - The time period studied for this cumulative impacts analysis includes past years to present day. Impacts were forecasted to the reasonably foreseeable year of 2025. Forecasting impacts beyond the year 2025 is speculative. Available information has guided the extent of the past analysis. Information for farmland was available back to 1900. Information for forests and wetlands were estimated back 200 years ago. For the future

analysis, the year 2025 is also the future analysis year for the economic modeling and the transportation modeling.

4. Identify other actions affecting the resources, ecosystems, and human communities of concern - The analysis of cumulative impacts for the proposed I-69 project considered the cumulative effects on the resources of farmland, forests, and wetlands. This included I-69 (direct and indirect impacts) as well as impacts from other major federal, state and private actions in the study area not related to I-69. The major federal and state projects identified as other actions to be considered are shown in Figure 5.26-2 and include:

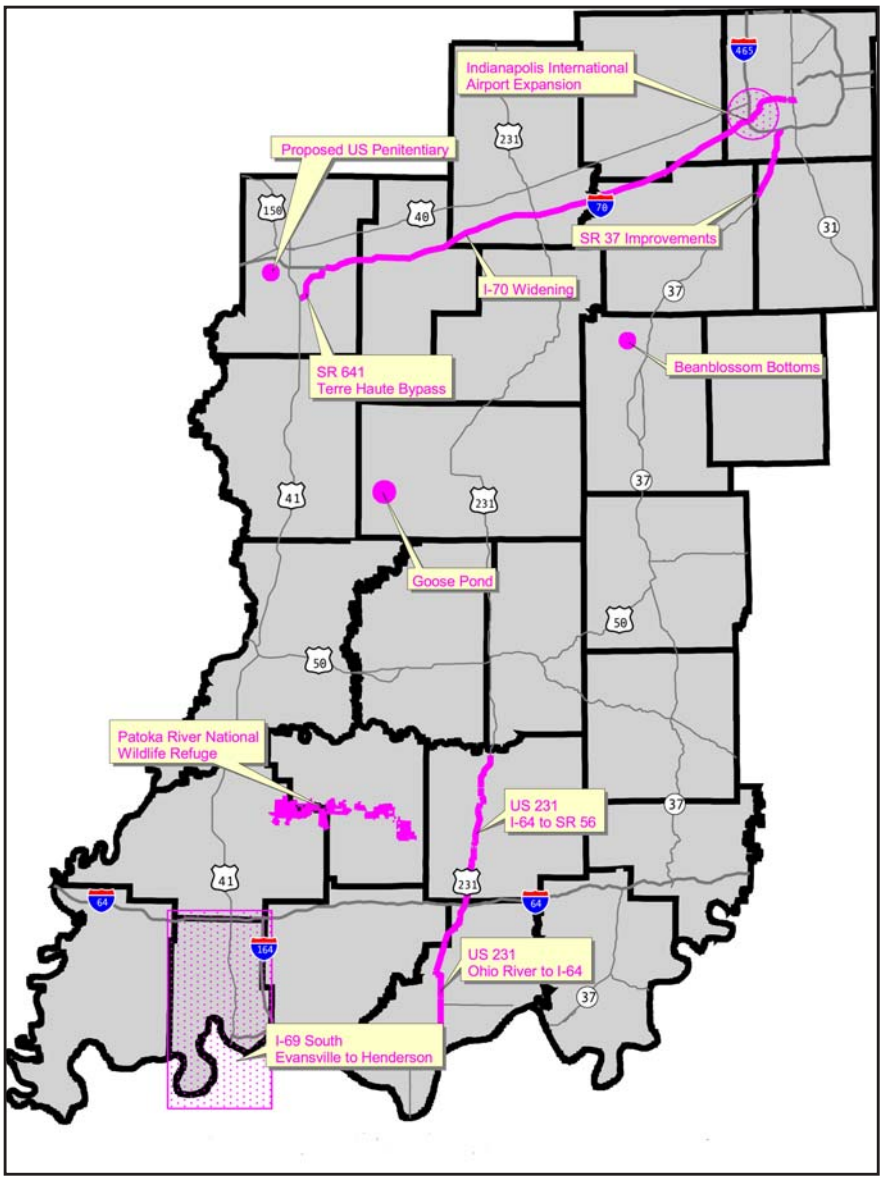


Figure 5.26-2: Major Federal and State Projects in the Study Area

- Proposed United States Penitentiary at Terre Haute
- S.R. 641 – Terre Haute Bypass from U.S. 41 to I-70
- Patoka River National Wildlife Refuge
- U.S. 231 Relocation from the Ohio River to I-64 in Spencer County
- Indianapolis Airport Expansion
- U.S. 231- I-64 to S.R. 56 (commonly called the Jasper/Huntingburg Bypass)
- Beanblossom Bottoms Nature Preserve
- I-69 from Evansville south to Henderson, Kentucky
- Goose Pond – Natural Resources Conservation Service project
- S.R. 37 added travel lanes from I-465 to S.R. 144
- I-70 widening from the Illinois/Indiana State line to SR 267 outside Indianapolis

Proposed United States Penitentiary at Terre Haute – This project would involve the construction and operation of a United States Penitentiary to consist of 960 beds along with a Special

Confinement Unit to be incorporated consisting of 100-120 beds. This project is slated for development within the grounds of the existing Terre Haute Penitentiary. No additional land will need to be acquired (United States Department of Justice, 2000).

S.R. 641 Terre Haute Bypass from U.S. 41 to I-70 - The Indiana Department of Transportation is proposing a new 4-lane, divided, full control of access highway as a bypass of Terre Haute in Vigo County. A Final Environmental Impact Statement (FEIS) was signed on January 3, 2000 (United States Department of Transportation, 2000). As a 4-lane, divided, access controlled highway, the mainline of S.R. 641 would be used for part of Alternative 1 of the proposed I-69 project. This project would take 466 acres of land including 261 acres of farmland, 107 acres of forests, and 30 acres of wetlands. Twenty residences, two tenant-occupied units, two businesses, one vacant commercial location, two part time farms and five farms would be relocated.

Patoka River National Wildlife Refuge - The U.S. Fish and Wildlife Service has established the Patoka River National Wildlife Refuge in Gibson and Pike Counties in southwest Indiana. A Final Environmental Statement was prepared in July of 1994 for this project. The U.S. Fish and Wildlife Service propose to acquire 22,083 acres of land from willing sellers. Full acquisition may take 20 years or more. Currently the refuge consists of approximately 2,670 acres. The projected land use changes are to convert upland farmland and bottomland farmland into upland forests and bottomland forested wetlands. Upland forests would increase by approximately 2,163 acres and bottomland forested wetlands would increase by approximately 4,108 acres. (United States Fish and Wildlife Service, 1994)

US 231 Relocation from the Ohio River to I-64 in Spencer County - The Indiana Department of Transportation and the Kentucky Transportation Cabinet are constructing a new 4-lane, divided, highway with a new bridge over the Ohio River that would replace US 231 from Owensboro Kentucky to I-64. This new highway will have partially controlled access. It will be part of a transportation corridor that connects Owensboro, Kentucky with Jasper and Huntingburg in Indiana. US 231 currently is a 2-lane highway with uncontrolled access. The new bridge over the Ohio River will be open to traffic in the summer of 2002. The project would take 1,110 acres of land including 432 acres of farmland, 264 acres of forests, and 15 acres of wetlands. The relocations include 23 residences (United States Department of Transportation, 1999).

Indianapolis Airport Expansion - The Indianapolis Airport Authority, the Indiana Department of Transportation, the City of Indianapolis, and Hendricks County are part of a task force working to improve access to the Indianapolis International Airport by improving I-70 beginning west of SR 267 and continuing to I-465. The environmental studies have been completed and the project is in the design phase. The project would take 570 acres of land including 464 acres of farmland, 62 acres of forests, and approximately 1 acre of wetlands. There would be three relocations (United States Department of Transportation, 2001). A portion of I-70 will be relocated south of its present location by several hundred feet. A new interchange is under design at Six Points Road on the west edge of the airport. The maximum number of lanes for I-70 for this project includes 10-12 lanes between Interstate lanes and collector-distributor lanes. Various alternatives of the I-69 project would use this reconstructed portion of I-70. The number of lanes proposed for the I-70 project could handle I-69 and its proposed traffic. An accompanying project is the Six Points Road Interchange. This project involves an improvement to Six Points Road from I-70 north to US 40 and the extension of Six Points Road southeast to SR 67. The Additional Information Document was completed on April 2, 2002. The project would take approximately 510 acres of land including 385 acres of farmland, 9.23 acres of

wetlands, and 47.8 acres of forests. There would be three single family residences and ten mobile homes to be relocated (United States Department of Transportation, 2002).

US 231- I-64 to SR 56 (commonly called the Jasper/Huntingburg Bypass) - The Indiana Department of Transportation and Federal Highway Administration is preparing a Draft Environmental Impact Statement for the relocation of US 231 from I-64 to SR 56 in Dubois County. This project is commonly called the Jasper/Huntingburg Bypass because the alternatives for relocation include bypasses of both Jasper and Huntingburg. The relocated US231 will be a 4-lane, divided highway with partially controlled access.

Beanblossom Bottoms Nature Preserve – The Sycamore Land Trust and the Muscatatuck National Wildlife Refuge have purchased property along Beanblossom Creek in Monroe County creating this Nature Preserve. Beanblossom Bottoms is considered a High Biodiversity Area by The Nature Conservancy. Nearly 520 acres are protected. The Beanblossom Bottoms Nature Preserve, Restle Natural Area (Muscatatuck National Wildlife Refuge), Grieco, Trout, Brummett, Baugh, and Anderson properties are all land trust properties in this complex.

I-69 from Evansville south to Henderson, Kentucky - The National I-69 project connects Canada to Mexico via the United States. Along the National I-69 corridor, sections of independent utility were identified. This Draft Environmental Impact Statement covers Section 3 of the National I-69 project. Section 4 of the National I-69 project is a section that extends from Evansville, Indiana south to Henderson, Kentucky. A Draft Environmental Impact Statement is currently being written for this section.

The Indiana Department of Transportation, the Kentucky Transportation Cabinet, the Evansville Urban Transportation Study, and Vanderburgh County are joint sponsors of the I-69 project from Evansville to Henderson. This project begins at I-64 (the southern terminus of I-69 from Indianapolis to Evansville) and continues south across the Ohio River and ends south of Henderson. There are currently 3 build alternatives under consideration. The highway will have 4 to 6 lanes with a median and total control of access. See Section 5.6 *Joint Development* for more information.

Goose Pond – Natural Resources Conservation Service project - Indiana claims one of the Nation's largest Wetlands Reserve Program (WRP) easements with a 7,068-acre site in Greene County. This one-landowner easement area, historically known as Goose Pond, was cleared for farming in the late 1800s. The shallow glacial lakebed provides a natural resting site for waterfowl during spring and fall migrations. The dominant silty clay loam soils limit drainage of the property. Natural Resources Conservation Service personnel are currently evaluating the site to plan the restoration work. Goose Pond is currently under construction. Practices will likely include tile cuts, ditch plugs, water control structures, low-level dikes, tree planting, and warm and cool season grass plantings. The restored site will provide a significant resting and nesting site for a variety of migratory waterfowl, shorebirds, and other wetland dependent species.

SR 37 added travel lanes from I-465 to SR 144 – This project involves constructing an additional lane to SR 37 in each direction from I-465 south to SR 144, a distance of approximately 10 miles. This project is in the 2000-2025 Long Range Plan for the Indiana Department of Transportation.

I-70 from SR 641 in Terre Haute to SR 267 outside Indianapolis - This project involves constructing an additional lane to I-70 from S.R 641 in Terre Haute to SR 267 where the Indianapolis Airport Improvements begin. When constructed, I-70 will be a 6-lane highway. This project is

included in the 2000-2025 Long Range Plan for the Indiana Department of Transportation.

Table 5.26-1 shows the estimated impacts for adding a lane to I-70 from SR 641 to SR 267. When adding a lane to I-70, approximately 360 feet of right-of-way will be needed to accommodate the entire facility. Currently, the right-of-way varies along I-70 from 200 feet to over 450 feet. The additional right-of-way in areas with less than 360 feet was estimated and the impacts shown in Table 5.26-1.

Table 5.26-1: Estimated Impacts for an Additional Lane to I-70 from SR 641 to SR 267

Criteria	I-70 – SR 641 to SR 267
Total Length	55 miles
Total Acres Impacted	450 acres
Interchanges – Existing and Proposed	7 existing, no proposed
Farmland	300 acres
Forests	100 acres
Wetlands	10 acres
Section 4(f) Resources	Chinook State Fishing Area
Section 106 Resources	2 potentially eligible historic properties
Potential Hazardous Material Sites	No sites
Total Streams Crossed	41
Floodplains Crossed	10 miles of latitudinal encroachment and 4 miles of longitudinal encroachment
Federal Threatened & Endangered Species	0
State Threatened & Endangered Species	1
Potential Relocations – Homes and Businesses	No homes and no businesses

The total length of the I-70 improvement would be 55 miles. The total acres impacted would be approximately 450 acres. Farmland would be approximately 300 acres while forests would account for 100 acres. The additional right-of-way needed from farmland and forests would be in long narrow sections 50-75 feet wide. Since I-70 is an east-west facility, these long, narrow strips of right-of-way should create a minimal impact for point rows for farmers. In forest areas these strips of right-of-way would impact the edges of existing forests.

Approximately 10 acres of wetlands along existing I-70 could be impacted by adding travel lanes. These impacted wetlands would be in the median of the existing I-70 and along the edges of the existing right-of-way. There would need to be mitigation to replace the wetlands lost for right-of-way needs.

The Chinook State Fishing Area is located just west of the SR 59 interchange with I-70. This area may be a potential Section 4(f) resource depending on ownership and use. There are no sites listed on the National Register of Historic Places that would be impacted by the I-70 widening. There are two potentially eligible historic properties that would need to be analyzed under the Section 106 process.

There are no potential hazardous material sites that would be impacted by the I-70 widening. Approximately 41 streams would be impacted by the widening of I-70. Bridges would need to be widened and culverts extended. Approximately 10 miles of latitudinal encroachment and 4 miles of longitudinal encroachment for floodplains would result from this project.

No federal threatened and endangered species would be impacted. For state threatened and endangered species, one species, the badger, has been sited along I-70. No residential or commercial relocations are estimated to occur as a result of the widening of I-70.

Many of the alternatives for this I-69 project would utilize a portion of an improved I-70 with additional lanes. As a committed project in the 2000-2025 Long Range Plan, environmental

documentation will be prepared for this I-70 additional lanes project.

5. Characterize the resources, ecosystems, and human communities identified in scoping and explain how they have historically changed - Baseline reports on farmland, forests, and wetlands have been completed and are found in the Appendices F, G, and H for this document. These reports discuss the past and present status of the resources. The baseline reports also forecast reasonably foreseeable future trends and their anticipated impacts upon the resource.

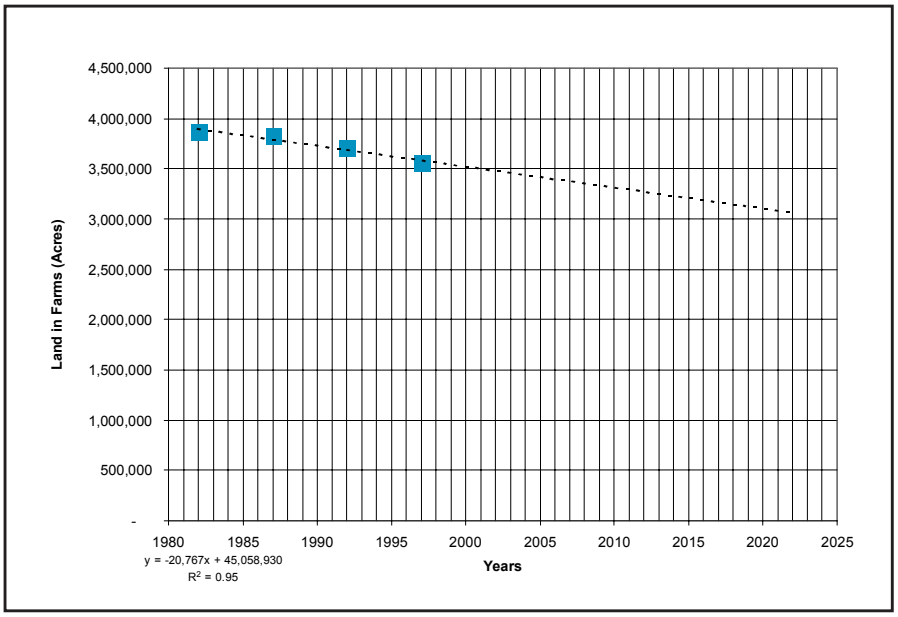


Figure 5.26-3: Southwestern Indiana Farmland

Farmland - The baseline report in Appendix F shows that in Indiana farmland has declined from 21,619,623 acres in 1900 to 15,111,022 acres in 1997. Since 1982 to 1997, the acreage for Indiana has declined 7.2 %. For farmland in southwestern Indiana, the figures show that farmland has declined from 3,869,542 acres in 1982 to 3,563,505 acres in 1997 (see Figure 5.26-3). This is a 7.9% loss of farmland in 15 years. While farmland acres are declining, production has been and continues to increase. From 1982 to 2001, corn yields have increased in Indiana from 126 to 156 bushels per acre, an increase of almost 24%. Likewise soybeans have increased from 38.5 to 49 bushels per acre during this time period, an increase of over 27%.

Forests – The forest baseline report in Appendix G shows that in Indiana the past history of forest loss since 1800 began to change in 1950 and possibly was reached a plateau by the 1990's. Almost 200 years ago, forests covered about 85% of Indiana's land area, a total of approximately 19,500,000 acres. By 1900 forests were down to approximately 1,500,000 acres in Indiana. From 1950 to 1998 forests increased from 4,140,000 to 4,501,300 acres, an increase of 8.7%. While forests have increased over the past 50 years, the volume of trees growing on timberland acres has substantially increased. The average timberland volume per acre has increased from 683 cubic feet per acre to 1,589 cubic feet per acre. This is an increase of 133% over 50 years. In southwestern Indiana, 1950 to 1998 showed an increase in forests from 1,904,000 to 2,026,500 acres, an increase of 6.4%. However, the period from 1986 to 1998 showed a slight decline in total acreage which suggests that forest acreage may have reached a plateau (see Figure 5.26-4).

Wetlands – The wetlands baseline report in Appendix H shows the history of wetlands has been a loss from an estimated 5,600,000 acres to a low of 267,100 acres with a resurgence up to a present day level of 813,032 acres. There were an estimated 5,600,000 acres of wetland in Indiana prior to European settlement (around 1780). By 1906 the wetland acreage in Indiana was 625,000 acres. In

1954 only 267,100 acres remained. The changes in Federal and State policies starting in the 1970's changed that downward trend. By the mid-1980's wetlands had grown to 813,032 acres according to the most recent and complete analysis by the Department of Natural Resources in 1991 (see Figure 5.26-5). Southwestern Indiana accounts for approximately 245,817 acres.

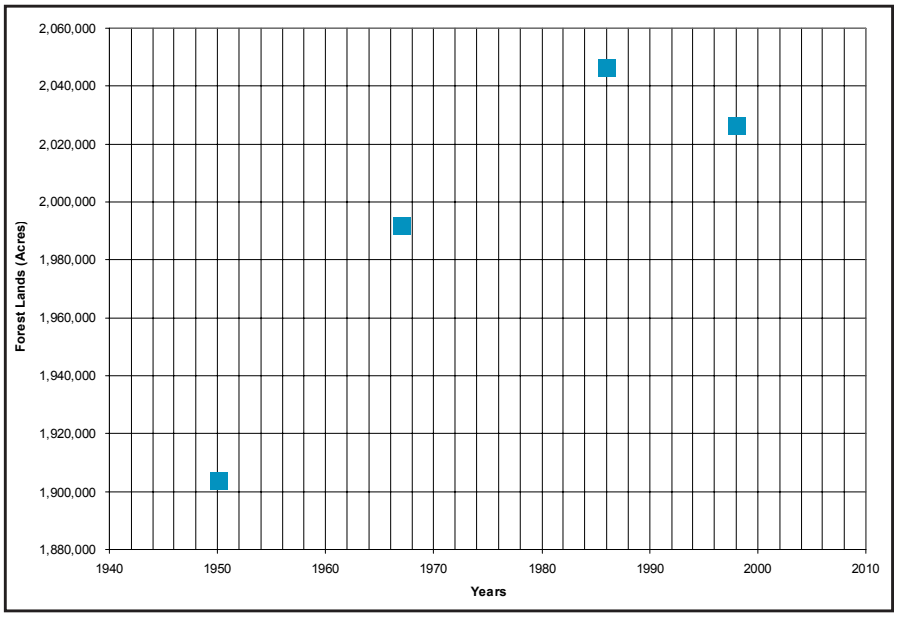


Figure 5.26-4: Southwestern Indiana Forest Lands

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds –

Farmland - The conversion of farmland to urban development has been the result of several demographic trends including more single person households, smaller households, bigger commercial facilities and larger, single level industrial plants. As Appendix F shows, the rate of loss of farmland from 1982 to 1997 for Indiana is approximately 78,883 acres per year. While some of this loss reflected population and employment growth, the stresses on farmland are the demographic trends towards more single person households and smaller households. These trends mean more housing units and more land but not more people (Turner, 1996). In commercial development the trend is towards bigger stores in suburban areas. In industrial development the trend is towards larger, single story plants (Jerry Glassberg, 1998).

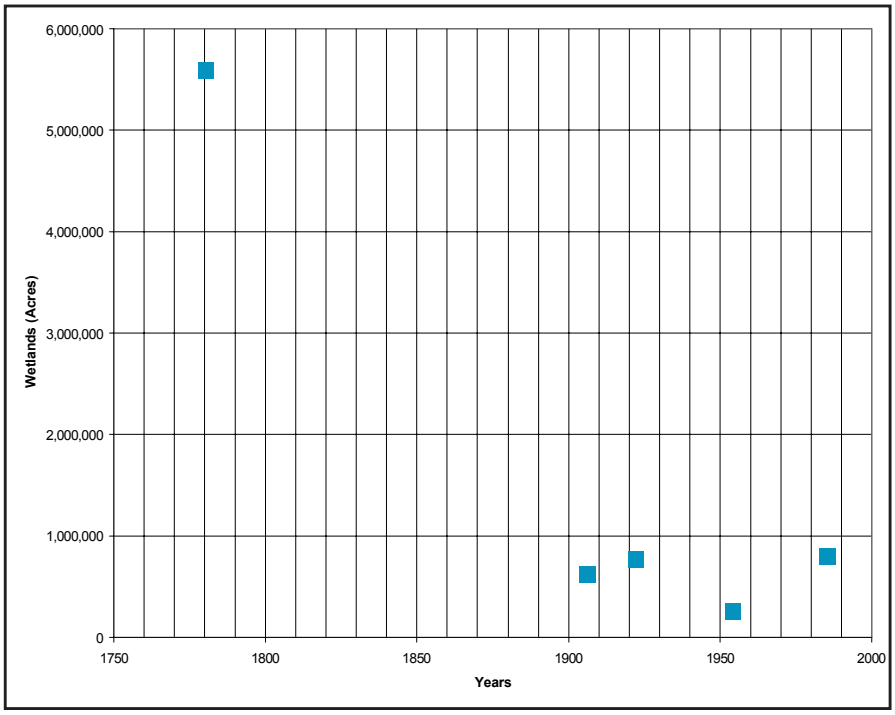


Figure 5.26-5: Wetlands in Indiana

In light of these trends, one of

the goals of the Natural Resources Conservation Service Farmland Protection Program is to protect and slow the loss of farmland. Preservation strategies concentrate effects to direct industrial, residential and commercial growth to areas less suitable for farming.

Forests - Over the past 50 years forests have been increasing in Indiana. Changing land management practices are contributing to this trend of increased forestation as some cropland and pasture are allowed to revert to forest and existing narrow wooded strips are allowed to expand. The increase in forests due to these changing practices has been greater than losses from the conversion of forests to agriculture, urban/suburban expansion and other uses in the past 50 years.

The stress on forests is the fragmentation of forest areas. Fragmentation of forests may affect core forest habitat which in turn may adversely affect a variety of species living in this core habitat. Wildlife dependent upon this habitat will be affected should these forests decline or continue to become fragmented. The goal of the Forest Service of the U.S. Department of Agriculture is to continue the conservation programs and protect the forests. Southwestern Indiana has the most continuous forests in the state (Schmidt, Hansen, and Solomakos, 1998).

Wetlands – Even though the functions of wetlands are well known, the U.S. Fish and Wildlife Service estimates that Indiana has lost millions of acres of wetlands. Current wetland figures show 813,000 acres remaining by the mid-1980's according to the most recent and complete analysis by the Department of Natural Resources in 1991. The Indiana Wetlands Conservation Plan states that with the majority of wetland resources having been lost or converted, all remaining wetlands are important and should be considered important for conservation (Indiana Department of Natural Resources, 1996).

The stresses on wetlands include impacts to water quality, alterations of water levels, and other surface disturbances. As a result, the biological diversity of Indiana's natural wetlands has been degraded. The seriousness of this degradation is best recognized by the large numbers of plants and animals listed as either endangered, threatened, or of special concern by the Indiana Department of Natural Resources that occur naturally in wetlands (Indiana Department of Natural Resources, 1994). Of all wetland types, the palustrine forested wetlands (bottomland hardwoods) have been identified in Indiana as the state wetland priority type (Indiana Department of Natural Resources, 1988).

7. Define a baseline condition for the resources, ecosystems, and human communities without I-69

Farmland - The future trend for farmland in Indiana and southwestern Indiana is continued loss of land. A linear regression analysis for land in farms for Indiana from 1900 to 1997 shows a significant downward trend (see Figure 5.26-6). At this rate the land in farms in Indiana for 2025 would be approximately 13,570,000 acres, representing a loss of 10.2% of the total farmland since 1997. The future trend for land in farms for southwestern Indiana also shows a significant downward trend (see Figure 5.26-3). At this rate the land in farms in southwestern Indiana would be approximately 3,483,400 acres in 2002 and 3,005,800 acres in the year 2025. This would be a decline of approximately 477,600 acres, or approximately 20,800 acres per year.

Forests - The future trend for forests in Indiana and southwestern Indiana seems to indicate that the amount of forest loss is reaching a plateau. A linear regression analysis for forests is less accurate as a forecast tool as a result of the recent fluctuations in acreages for southwestern Indiana.

Information from the Forest Service indicates that we have achieved a balance between forest interests and users (see Figure 5.26-4). With such a balance, there may be little change in the amount of forests in the next few years.

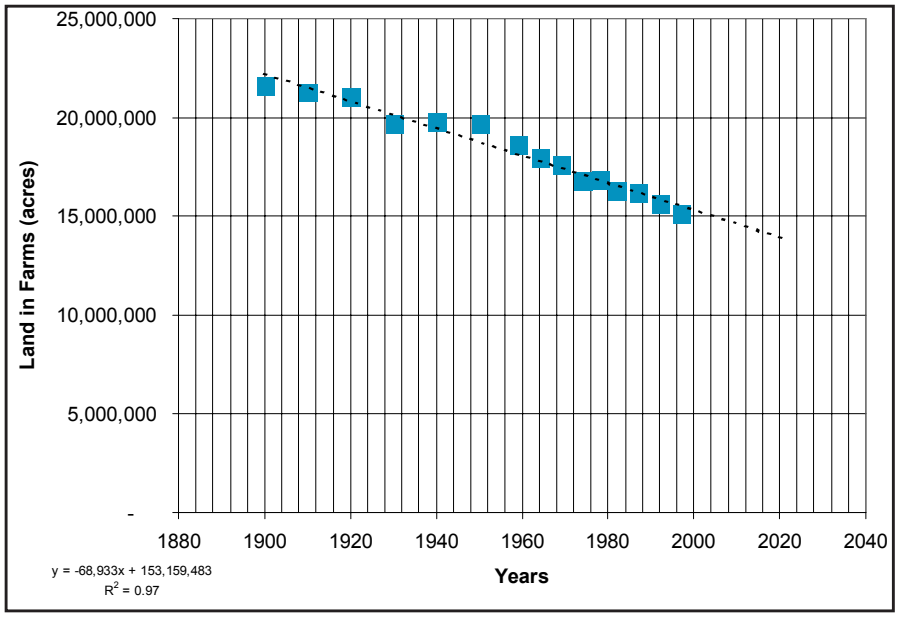


Figure 5.26-6: Indiana Farmland

Wetlands – Recent legislation in the 1970's and 1980's coupled with the need for permits in wetland areas has reversed the downward trend in wetlands. While trend line analysis for Indiana did not result in accurate forecast information (see Figure 5.26-5), the goals at both the federal level and the state level are "no net loss of wetlands". Conversations with officials at the state level indicate that this statement currently provides the best information as to the future direction of wetlands.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human community - The three major resources considered in this cumulative effects analysis are farmland, forests, and wetlands. The most often cause-and-effect issue is land conversion from farmland, forests, and wetlands to other uses of which the primary use is urbanization. Transportation projects can influence this land use conversion process. Direct impacts are defined by the CEQ Regulations as "*effects which are caused by the action and occur at the same time and place.*" (CEQ Regulations). For this project, direct impacts would be the taking of a wetland for right-of-way for an interchange.

Indirect impacts are defined by the CEQ Regulations as "*effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate…*" (CEQ Regulations). For this project, an indirect impact would be farmland bought by a developer to build a service station at an interchange.

9. Determine the magnitude and significance of cumulative effects by identifying the changes as a result of I-69 – The methodology section of this cumulative effects analysis presented the steps in generating the direct and indirect impacts of the various alternatives. These impacts were calculated using the Geographic Information System and the economic and transportation planning modeling combination.

The results are shown in a set of three tables. Each table shows the current acreage of the resource, the direct impacts to the resource, the indirect impacts to the resource, and the other impacts (determined by the trend analysis). The total of these impacts results in a forecasted 2025 acreage for the resource. The impacts upon farmland, forest, and wetlands are shown in Table 5.26-2, Table 5.26-3, and Table 5.26-4, respectively. The supporting information for these three tables is in Appendix Q.

Farmland

Table 5.26-2 and Figure 5.26-7 show that the I-69 alternatives, including both direct and indirect impacts, account for at most 1.4% of the cumulative farmland loss that is forecasted to occur in the Study Area between 2002 and 2025.[1] The loss from direct and indirect impacts of the I-69 alternatives accounts for at most 0.2% of the total estimated 2002 farmland acreage for Southwest Indiana.[2]

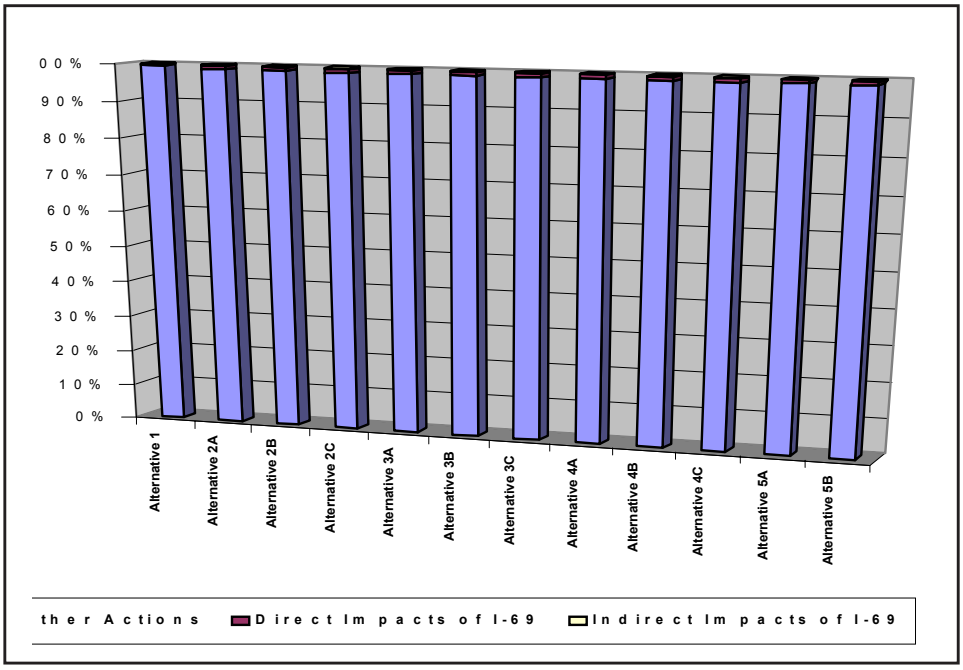


Figure 5.26-7: Cumulative Impacts of I-69 upon Farmland

Approximately 477,600 acres of farmland will be lost to production from 2002 to 2025. For the I-69 alternatives, the direct farmland loss ranges from 1,270 acres (Alternative 1) to 5,730 acres (Alternative 4C). The indirect farmland loss ranges from 420 acres (Alternative 1) to 820 acres (Alternative 2C). Figure 5.26-7 shows that the loss from direct and indirect impacts for all the alternatives is a small percentage of the total loss from other actions.

The analysis of the direct impacts of farmland conversion and crop production loss for the alternatives in the agricultural impacts section of this DEIS reveals that Alternative 1 has the least impact while Alternatives 4C, 4B and to a slightly lesser extent 2C had the highest potential for farmland acre impact and crop production loss.

Table 5.26-2 and Figure 5.26-8 totals the direct and indirect impacts on farmland for the alternatives to the year 2025. The indirect impacts include all development in southwestern Indiana estimated to be caused by or result from I-69 through the year 2025. With the addition of the indirect impacts on farmland, Alternative 1 remains with the least impacts with 1,690 to 2,270 acres of farmland impacted. Alternative 4C had the most farmland impacts with 5,885 to 6,530 acres of farmland impacted. With the exception of Alternative 2A (4,155 to 4,495 acres of farmland lost), the farmland acreage impacts for the remaining alternatives are estimated to range from 4,530 to 5,890 acres impacted. The indirect impacts upon farmland range from Alternative 1 with 420 to 490 acres impacted to Alternatives 2C, 3B, 3C, 4C, and 5B within a range of 690 to 820 acres impacted.

The land development trends that have led to the stresses upon farmland will continue in the reasonably foreseeable future. The conversion of farmland to accommodate homes on bigger tracts of land, bigger stores with bigger inventories, and bigger single story industrial plants will continue. Commercial development in suburban areas will continue to be more attractive to developers than in downtown areas.

1 5,730 acres of direct impact + 800 acres of indirect impact / 477,600 acres to be lost.

2 5,730 acres of direct impact + 800 acres of indirect impact / 3,483,000 total acres

Table 5.26-2: Forecasted 2025 Farmland Acreage for Southwest Indiana												
	Alternative 1	Alternative 2			Alternative 3			Alternative 4			Alternative 5	
		2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Estimated 2002 Farmland Acreage for Southwest Indiana	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000	3,483,000
Direct Impacts to Farmland	(1,270-1,780)	(3,630-3,900)	(4,100-4,360)	(4,300-5,070)	(4,510-4,560)	(4,290-4,850)	(4,070-4,630)	(4,500-4,560)	(4,970-5,020)	(5,170-5,730)	(4,200-4,240)	(3,840-4,390)
Indirect Impacts to Farmland	(420-490)	(525-595)	(580-650)	(735-820)	(595-665)	(720-800)	(710-790)	(510-575)	(530-595)	(715-800)	(615-705)	(690-790)
Other Impacts from Trend Analysis	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)	(477,600)
Forecasted 2025 Farmland Acreage for Southwest Indiana	3,003,000	3,001,000	3,001,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	2,999,000	3,001,000	3,001,000

Forests

Table 5.26-3 shows that the I-69 alternatives, including both direct and indirect impacts, account for between 180 acres and 2,005 acres of forests taken for I-69. Since the trend shows forests reaching a plateau, it is anticipated that while some other actions will take forest acres, this will be offset by other actions that increase forest acres (for example, the gains in forest acres from the Patoka River National Wildlife Refuge). **This loss from direct and indirect impacts of the I-69 alternatives accounts for at most 0.1% of the total forest acreage in 1998 for Southwest Indiana.**[3]

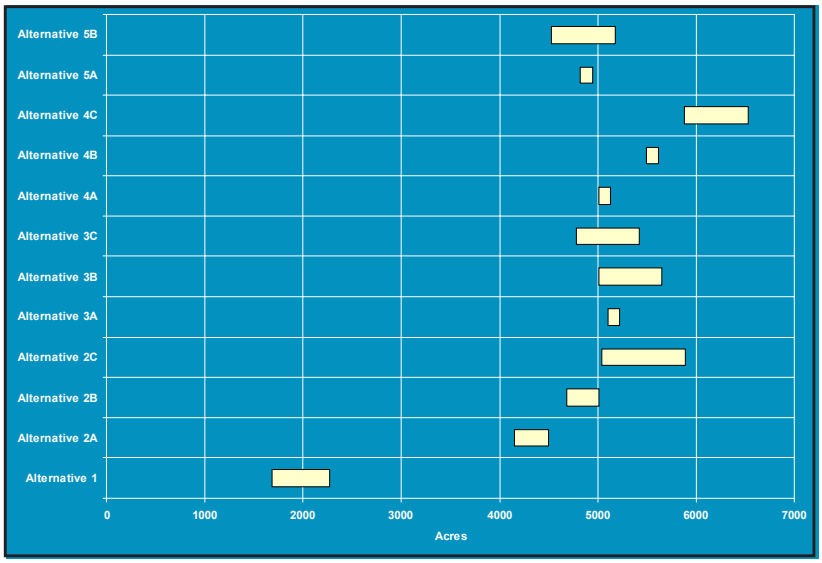


Figure 5.26-8: Direct and Indirect Farmland Loss Impacts for I-69

The analysis of the direct impacts of the I-69 alternatives upon forests in the forest impacts section of this DEIS reveals that Alternative 1 has the least impact while Alternative 3A and Alternative 5A had the greatest forest impacts.

Table 5.26-3 and Figure 5.26-9 total the direct and indirect impacts on forests for the alternatives to the year 2025. The indirect impacts include all development in southwestern Indiana estimated to result from I-69 through the year 2025. With the addition of the indirect impacts on forests, Alternative 1 remains with the least impacts with 180 to 310 acres of forest impacted. Figure 5.26-8 shows Alternative 5A impacting the most acres of forest with 1,875 to 2,005 acres impacted. Alternatives 3A, 3B, and 5B are close to Alternative 5A with impacts ranging from 1,605 to 1,880 acres. The indirect impacts upon forests range from Alternative 1 with 70 to 140 acres impacted to Alternative 5B with 340 to 455 acres impacted.

Alternatives 5A and 5B result in impacts to state and federally owned lands in the Martin State Forest, the Tincher Special Area of the Hoosier National Forest and the Morgan-Monroe State Forest. Appendix Q shows the impacts by economic region and for groups of interchanges in these regions. Alternatives 5A and 5B are estimated to have indirect impacts for future land development at interchanges in Martin County and in Lawrence County in Region 5; interchanges in Monroe County

3 1,565 acres of direct impacts + 440 acres of indirect impacts / 2,026,500 total acres.

Table 5.26-3: Estimated 2025 Forest Acreage for Southwest Indiana

	Alternative 1	Alternative 2			Alternative 3			Alternative 4			Alternative 5	
		2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
1998 Forest Acreage for Southwest Indiana	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500	2,026,500
Direct Impacts to Forests	(110-170)	(885-920)	(970-1,005)	(840-935)	(1,505-1,580)	(1,315-1,450)	(1,140-1,275)	(850-920)	(935-1,005)	(805-935)	(1,525-1,565)	(1,265-1,365)
Indirect Impacts to Forests	(70-140)	(125-185)	(190-205)	(215-285)	(245-300)	(310-380)	(325-400)	(145-200)	(150-205)	(220-290)	(350-440)	(340-455)
Other Impacts from Trend Analysis	-	-	-	-	-	-	-	-	-	-	-	-
Estimated 2025 Forest Acreage for Southwest Indiana	2,026,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000	2,025,000

and around Bloomington in Region 2; and interchanges in Morgan County in Region 1. These interchange locations will be in close proximity to these state and federally owned lands.

The loss of these forest acres will result in forest fragmentation and could effect state and federally owned forests in Martin State Forest, the Tincher Special Area of the Hoosier National Forest and the Morgan-Monroe State Forest.

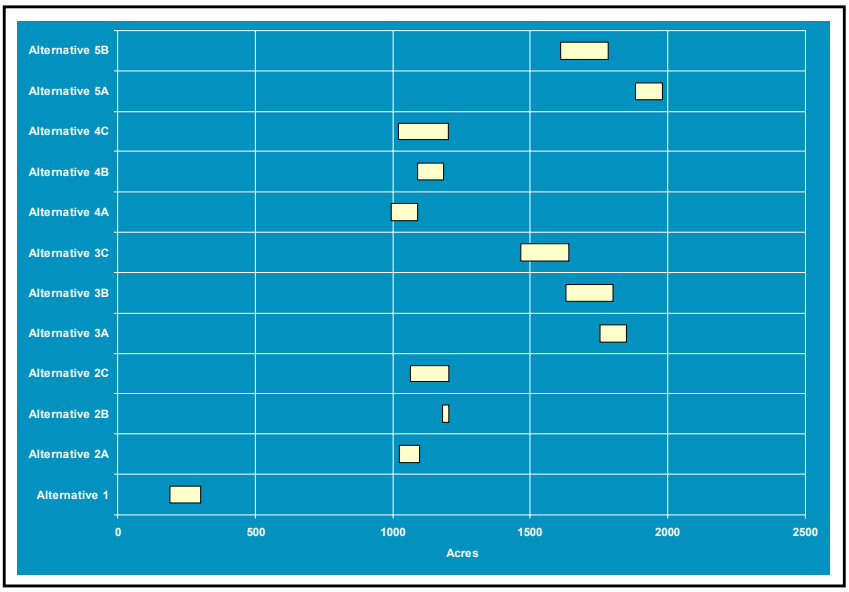


Figure 5.26-9: Direct and Indirect Forest Loss Impacts for I-69

Wetlands

Table 5.26-4 shows that the I-69 alternatives, including both direct and indirect impacts, account for between 25 acres and 220 acres of wetlands taken for I-69. With federal and state policies of "no net loss of wetlands", the impacts of other actions should not involve the net loss of wetlands. In fact the Patoka River National Wildlife Refuge should result in the increase in wetlands in southwestern Indiana. **This loss from direct and indirect impacts of the I-69 alternatives accounts for at most 0.09% of the total wetland acreage in the mid 1980's for Southwest Indiana**[4].

The analysis of the direct impacts on wetlands for the alternatives in the wetland impacts section of this DEIS reveals that Alternative 1 has the least impact while Alternatives 4C has the greatest impact on wetlands and specifically on palustrine forested wetlands.

Table 5.26-4 and Figure 5.26-10 total the direct and indirect impacts on wetlands for the alternatives to the year 2025. The indirect impacts include all development in southwestern Indiana estimated to be caused by or result from I-69 through the year 2025. With the addition of the indirect impacts, Alternative 1 remains with the least wetland impacts with 25 to 65 acres of wetland impacted. Alternative 4C remains with the greatest wetland impacts with 145 to 220 acres of wetland impacted. Looking at Figure 5.26-10, many of the alternatives fall in the same range with 95 to 195 acres impacted. With the exception of Alternatives 5A and 5B, all the alternatives have indirect impacts on wetlands within a range of 0 to 35 acres. Alternatives 5A and 5B have between 15 and 45 acres of wetlands impacted.

The major wetland complex that will be impacted is the Patoka River National Wildlife Refuge.

Table 5.26-4: Estimated 2025 Wetland Acreage for Southwest Indiana

	Alternative 1	Alternative 2			Alternative 3			Alternative 4			Alternative 5	
		2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Mid 1980's Wetland Acreage for Southwest Indiana	245,817	245,817	245,817	245,817	245,817	245,817	245,817	245,817	245,817	245,817	245,817	245,817
Direct Impacts to Wetlands	25-40	60-75	65-80	90-110	120-165	100-155	90-150	110-160	115-165	140-190	125-140	110-130
Indirect Impacts to Wetlands	0-25	5-30	5-25	5-35	10-20	10-25	10-30	5-30	5-30	5-30	20-45	15-45
Other Impacts from Trend Analysis	-	-	-	-	-	-	-	-	-	-	-	-
Estimated 2025 Wetland Acreage for Southwest Indiana	246,000	246,000	246,000	246,000	246,000	246,000	246,000	246,000	246,000	246,000	246,000	246,000

Coordination with the U.S. Fish and Wildlife Service has worked to minimize the impacts to the refuge from the I-69 alternatives that cross the refuge. The refuge is part of the other actions that are considered in this cumulative analysis. According to the Final Environmental Impact Statement for the refuge, approximately 4,105 acres of wetlands will be created as part of the refuge (United States Fish and Wildlife Service, 1994).

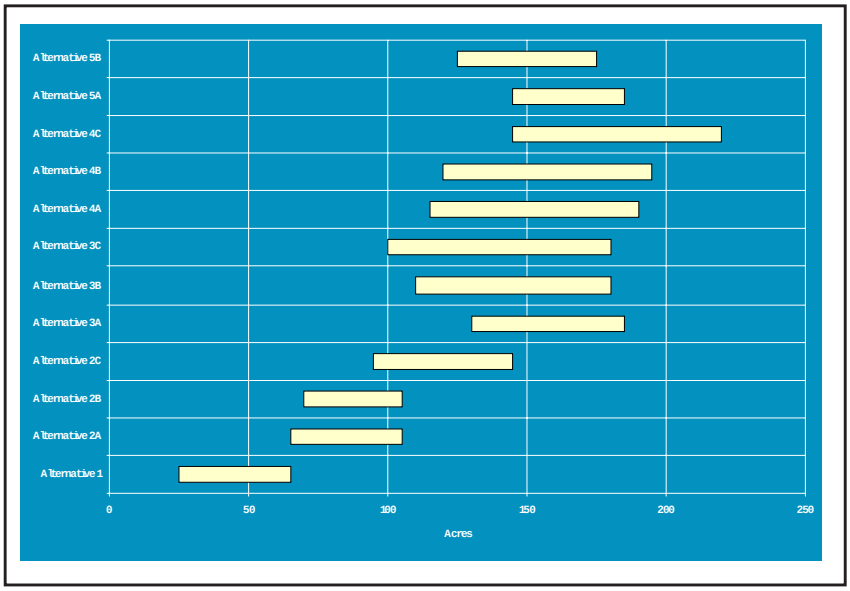


Figure 5.26-10: Direct and Indirect Wetlands Loss Impacts for I-69

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative impacts – The alternatives impacting the Patoka River National Wildlife Refuge have been modified in consultation with the U.S. Fish and Wildlife Service to minimize the impacts to the refuge. Alternative 3B has been adjusted to minimize the impacts to the Beanblossom Bottoms Nature Preserve.

Impacts to farmland may be reduced by working with local officials concerning land use controls.

11. Monitor the cumulative effects of the alternatives and provide documentation – The Tier 2 NEPA studies for the various sections of independent utility will identify the location of the alignment that will be designed and constructed.

5.26.4 Summary

The I-69 Alternatives, including both direct and indirect impacts, account for at the most :

- 1.4% of the cumulative farmland loss forecasted to occur in Southwestern Indiana between 2002 and 2025.
- 0.2% of the total estimated 2002 farmland acreage for southwestern Indiana
- 0.1% of the total forest acerage in 1998 for Southwestern Indiana
- 0.09% of the total wetland acreage in the mid 1980's for Southwestern Indiana

[4] 190 acres of direct impacts + 30 acres of indirect impacts / 245,817 total acres

5.27 Energy Impacts

5.27.1 Introduction

The energy impacts of the various I-69 alternatives will be assessed in this section. First, a brief description of the methodology used to calculate energy consumption is provided. Second, the comparative energy consumption data are summarized and discussed. Finally, the conclusions of the analysis are given.

5.27.2 Methodology

As a part of the transportation and economic analysis of the I-69 alternatives, a "post-processing" program was written that analyzes data produced by the Indiana Statewide Traffic Demand Model (ISTDM). The travel demand model simulates overall traffic conditions throughout the highway network, which encompasses all of Indiana and large parts of the four abutting states. This model was run for each alternative and option for the study's forecast-year, 2025. Data that were output by the model included auto and truck volumes-per-day, vehicle-miles of traffic, and typical daily speeds on each link in the highway system. The post-processor used all of these outputs to compute the gallons of gasoline and diesel fuel that are forecasted to be consumed in the year 2025 under each scenario. Factors were then used to convert from gallons of fuel to BTUs. One million BTUs is approximately equivalent to 8.007 gallons of gasoline or 7.201 gallons of diesel fuel. For the purposes of this analysis, it is assumed that passenger vehicles and single-unit trucks use gasoline and heavy-duty trucks use diesel fuel.

It should be noted that the analysis includes all elements of induced travel resulting from: (1) longer average trip lengths; (2) more trips based on the assumption that I-69 will be completed nationally and; (3) more trips generated regionally as a result of new economic and residential development stimulated by I-69.

5.27.3 Energy Impacts

The Table 5.27-1 summarizes the results of the energy analysis. Additional energy consumed by the alternatives range from a low of approximately 33,000 gallons of combined gasoline and diesel fuel-per-day for Alternative 4A to 71,000 gallons-per-day for Alternative 5B. As a percentage of total forecasted daily fuel consumption in the modeled area, this represents 0.15% and 0.33% for Alternatives 4A and 2C, respectively.

In descending order from the largest energy consumption to the least, the top energy-consuming alternatives are: 5B, 2C, 5A, 3C, and 4C. These routes make heavy use of SR 37, where the attendant speed increases provided by I-69 would affect relatively large volumes of traffic, resulting in high fuel consumption. Even Alternative 5A - which deviates off of SR 37 near Martinsville – would divert enough traffic away from SR 37 to produce the same effect.

At the opposite end of the spectrum, the lowest energy-consuming alternatives (in descending order from largest to least) are: 2A, 4B, 3A, and 4A. These are routes that approach Indianapolis on I-70 and affect lower volumes of traffic than the SR 37 alternatives. The No-Build Alternative will have no impacts on energy resources.

Table 5.27-1: Gallons of Fuel Consumed in Excess of the No-Build Condition in 2025 by Build Alternatives

	Additional Energy Consumed	
Alternative	Gallons	BTUs (in thousands)
1	50,779	6,243,333
2a	43,074	5,169,213
2b	50,622	6,119,934
2c	67,745	8,253,439
3a	33,499	3,951,209
3b	43,982	5,252,516
3c	57,897	7,018,113
4a	33,050	3,942,650
4b	37,829	4,552,671
4c	52,630	6,392,804
5a	66,178	8,099,156
5b	71,397	8,761,831

Source: Bernardin, Lochmueller & Associates, Inc.

5.27.4 Summary

Energy impacts are a function of several variables including: average running speed, vehicle-miles of travel, and the mix of vehicle types in the system (i.e., autos versus heavy trucks). Generally, those alternatives that make intensive use of the SR 37 corridor would consume more energy than those that would not. The No-Build Alternative will have no impact on energy resources.

5.28 The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

There will be a considerable amount of resources allocated to the creation of the proposed highway from Indianapolis to Evansville. Resources such as rock, cement, steel, sand, earth, fossil fuels, and labor. As with any construction come temporary disturbances. Such disturbances would consist of construction noise and visual impacts; wildlife, wetland and forest disturbances, along with home and business relocations.

The negative short-term effects stated above are of minor concern when compared with the positive effects of the proposed project. The long-term effects will be a shorter and safer route from Indianapolis to Evansville, and an environment for economic growth. The long-term benefits of the proposed I-69 highway are consistent with the use of resources and the short-term impacts upon the areas involved and by far outweigh negative aspects.

5.29 Irreversible and Irretrievable Commitment of Resources

Constructing the I-69 from Indianapolis to Evansville will involve a commitment of many resources. Some of these resources include land, construction materials, and manpower. Land used in the construction of the proposed highway is considered an irretrievable resource that includes everything below the surface as well.

Resources in the study area that are in the category of irretrievable include coal, oil, and limestone deposits. Other resources affected are farmland, karst and cave areas. Karst and cave regions are a source of limestone, recreation and habitat. A karst is a hilly landscape of caves and sinkholes that develops on some dissolving limestone formations (Camp, 1999). Unlike wetlands replacement, the loss of karst and caves is non-replaceable. Karst areas are sources of recharge for underground aquifers and play an important role in groundwater supplies for human consumption. It is not only the overlaying roadways that will make these resources irretrievable, it is a host of secondary impacts that will follow from construction of the highway.

Secondary development issues are the construction of business and residential areas along the roadside. Development in the vicinity of the road will cause greater runoff problems that could effect karst and cave areas. Runoff would come from parking lots, roads, and other non-point discharges and cause water quality issues with the possible degradation of an irretrievable resource. Most groundwater in karst areas moves through openings in the rock, its flow is often faster, more concentrated and less predictable than groundwater movement in non-karst areas. It is difficult to determine the locations and directions of flow of all the groundwater conduits in an area, and in the event of a spill, the effects could be rapid and unpredictable. Pollutants can travel many miles underground in an unknown direction, in a single day, in a relatively undiluted state, making containment, cleanup, and public protection virtually impossible (Keith and Powell, 1997). Secondary impacts from development will take more land that has mineral resources and prime farmland as well.

Limestone is another resource of concern. Indiana produces about 60% of the limestone in the United States. A number of the alternatives cross the Michell Karst Plain, which is known for its limestone deposits. This karst plain extends across parts of Putnam, Owen, Morgan, Monroe, Greene, Lawrence, Martin, Orange, Washington, Crawford, Harrison, and Perry Counties. As long as the land above the deposits is used for a highway and surrounding development takes place, these deposits will no longer be available for use. There is a possibility of below ground extraction that could access these deposits, while keeping a sufficient overburden above the limestone to ensure the stability of the road. One limestone company presently has the capability to do that type of mining.

The use of these resources is warranted in this project because the construction of this highway will produce an overall improved transportation system. All efforts will be made to minimize the covering of limestone deposits for the proposed alternatives. Such mitigation would include the avoidance of intersections in sensitive karst areas, and efforts to encourage planned development with the proper infrastructure for future development.

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Chapter 6 – Comparison of Alternatives

Table 6-1: Summary of Key Performance Measures and Environmental Impacts[1]

Criteria	Alternative 1	Alternative 2			Alternative 3			Alternative 4			Alternative 5	
		A	B	C	A	B	C	A	B	C	A	B
Alternatives												
Total Length (miles)	154 - 156	147 - 148	145 - 146	145 - 147	142 - 144	140 - 143	140 - 143	143 - 145	141 - 143	141 – 144	149 - 152	146 - 147
Total Impact Length (miles)	87 - 89	122 - 123	133 - 134	145 - 147	136 - 138	140 - 143	140 - 143	118 - 120	129 - 131	141 – 144	148 - 151	146 - 147
Total New Right-of-Way Impacted (acres)	1710 - 2210	4760 - 4990	5380 - 5550	5500 - 6260	6120 -6200	5850 - 6440	5500 - 6090	5420 - 5490	5980 - 6050	6160 - 6760	6120 - 6150	5570 - 6130
Estimated Cost (billions of dollars; to the nearest 10 million)	0.81 – 1.04	1.09-1.27	1.17-1.37	1.47-1.74	1.29-1.38	1.65-1.82	1.64-1.81	0.96-1.04	1.04-1.12	1.34-1.50	1.61-1.81	1.67-1.85
Potential Bridges Over Water	19	36	44	48 - 54	49 - 50	59	58 - 59	44 - 49	52 - 57	56 – 62	52 - 55	52 - 58
Potential Interchanges	23 - 25	23 - 26	24 - 27	29 - 32	18 - 19	22 - 27	28 - 31	19	20	25 – 28	35 - 37	35 - 37
Potential Grade Separations for Roads/Railroads	37 - 40	58 - 60	62 - 64	66 - 70	51 - 60	52 - 58	57 - 64	51 - 56	55 - 60	59 – 61	56 - 59	56 - 59
Purpose & Need Performance[2]												
Indy-Evv Connection - Freeflow Travel Time Savings (min.)	11	16	19	17	20	24	21	20	21	20	15	14
Indy-Evv Connection - Typical Travel Time Savings (min.)	12	18	21	19	25	29	26	22	27	26	21	20
Accessibility - Increase in # of People Within 1 Hr of Indy	0	8000	8000	37000	25000	46000	60000	0	8000	37000	60000	60000
Accessibility - Increase in # of People Within 2 Hrs of Indy	18000	32000	33000	42000	61000	46000	40000	32000	32000	42000	24000	24000
Accessibility - Increase in # of People Within 3 Hrs of Indy	58000	85000	100000	85000	232000	216000	166000	112000	112000	112000	150000	123000
Accessibility - Increase in # of People Within 1 Hr of Educ Inst	0	0	58000	243000	253000	286000	360000	0	58000	243000	417000	372000
Accessibility - Increase in # of People Within 1/2 Hr of Major Urban Area	9000	4000	4000	13000	5000	12000	37000	0	0	9000	28000	37000
National I-69 - Daily Truck-Hours Saved	2000	2400	2500	3600	3800	4500	4300	3200	3000	4000	3500	4100
Environmental Consequences												
Potential Relocations[3]												
Homes	264 - 335	179 - 240	194 - 251	280 - 408	215 - 236	346 - 484	370 - 458	143 - 168	158 - 179	247 – 336	360 - 419	377 - 503
Businesses	70 - 131	29 - 63	32 - 66	56 - 113	17 - 18	42 - 66	51 - 75	8 - 9	11 - 12	35 – 59	53 - 54	72 - 96
Farmland (acres)	1270 - 1780	3630 - 3900	4100 - 4360	4300 - 5070	4510 - 4560	4290 - 4850	4070 - 4630	4500 - 4560	4970 - 5020	5170 - 5730	4200 - 4240	3840 - 4390
Prime Farmland (acres)	810 - 1330	2500 - 2930	2930 - 3370	3140 - 4100	2520 - 3410	2300 - 3750	2280 - 3730	2850 - 3690	3290 - 4130	3480 - 4880	2630 - 2790	2330 - 3060
Forest (acres)	110 - 170	885 - 920	970 - 1005	840 - 935	1505 - 1580	1315 - 1450	1140 - 1275	850 - 920	935 - 1005	805 – 935	1525 - 1565	1265 - 1365
Estimated Core Forest Habitat (acres)	0	117	130	85	502	440	398	129	142	97	682	544
Wetlands (acres)	25 - 40	60 - 75	65 - 80	90 - 110	120 - 165	100 - 155	90 - 150	110 - 160	115 - 165	140 – 190	125 - 140	110 - 130
Estimated Wetland Mitigation (acres)	75 - 135	175 - 270	190 - 290	255 - 390	325 - 630	295 - 590	265 - 570	325 - 610	340 - 630	390 – 710	370 - 530	325 - 490
Section 4(f) Resources												
Historic Sites/Districts[4]	0	0	0	0	0	0	0	0	0	0	0	0
Archaeological Sites[4]	0	0	0	0	0	0	0	0	0	0	0	0
Public Parks, Refuges, Recreation Areas	0	0	0	0	1	0	0	0	0	0	1	1
Potential Hazardous Material Sites[5]	8-15	2-7	2-7	9-17	0	10-15	14 - 19	0 - 1	0 - 1	12-17	6-8	17 - 22
Total Streams Crossed	65 - 75	95 - 110	110 - 125	120 - 140	115 - 130	115 - 135	95 - 120	100 - 120	105 - 120	130 – 145	105 - 115	105 - 120
Perennial Streams	15 - 20	25 - 30	35 - 40	40 - 45	35 - 40	35 - 45	30 - 40	30 - 40	35 - 40	45 – 50	35 - 40	35 - 40
Intermittent Streams	50 - 55	70 - 80	75 - 85	80 - 95	80 - 90	80 - 90	65 - 80	70 - 80	70 - 80	85 – 95	70 - 75	70 - 80
Floodplains Crossed (acres)	370 - 470	1010 - 1100	1070 - 1160	1540 - 1850	860 - 900	800 - 1060	820 - 1080	1010 - 1060	1080 - 1120	1550 - 1810	1200	980 - 1190
Federal Threatened & Endangered Species[6]	1	2	2	2	1	2	2	2	2	2	4	4
State Threatened & Endangered Species[6]	12	8	10	15	10	13	14	9	9	15	20	22
Sinkhole Areas & Sinking Stream Basins (acres)[7]	0	65	140	110	60	30	50	65	140	110	675	675
Indirect Impacts												
Farmland (acres)	420-490	525-595	580-650	735-820	595-665	720-800	710-790	510-575	530-595	715-800	615-705	690-790
Forest (acres)	70-140	125-185	190-205	215-285	245-300	310-380	325-400	145-200	150-205	220-290	350-440	340-455
Wetlands (acres)	0-25	5-30	5-25	5-35	10-20	10-25	10-30	5-30	5-30	5-30	20-45	15-45

1 Does not include committed projects such as SR 641 (Terre Haute Bypass) and improvements to I-70, includes impacts within the Working Alignment Right-of-Way unless otherwise noted.
2 This section of the table summarizes only those performance measures that relate to core project goals.
3 Structures only
4 Identifies direct impacts to sites listed on or determined eligible for the National Register of Historic Places (see Section 5.13, for further evaluation of potentially eligible sites).
5 Includes Underground Storage Tanks (USTs), Leaking Underground Storage Tanks (LUSTs), Resource Conservation and Recovery Act (RCRA) sites, and Brownfield sites
6 Represents the number of species reported within a 2-mile wide study band
7 Indicate karst features

SOURCE: Bernardin, Lochmueller & Associates, Inc.

A summary of key data developed in this study is presented in Table 6-1. It includes data on Purpose and Need performance and environmental consequences. The companion document, *Environmental Atlas,* maps potential impacts for each alternative and also includes an expanded summary table of the environmental consequences. The following sections present evaluation summaries of each alternative identifying the respective advantages and disadvantages of each alternative. **All advantages and disadvantages listed for each alternative are relative to the other build alternatives.** *References to core goals are italicized.*

The Council on Environmental Quality (CEQ) regulations state that an agency's "preferred alternative or alternatives, if one or more exists" should be identified in the Draft Environmental Impact Statement, and a single preferred alternative must be identified in the Final Environmental Impact Statement (40 CFR § 1502.14(e)). The identification of a "preferred alternative" is not a decision to *approve* an alternative. Rather, as the name suggests, a preferred alternative reflects an agency's *preference* based upon existing information. The actual approval of an alternative occurs in a issuance of a Record of Decision (ROD), which is not issued until after publication of the Final EIS.

The identification of a preferred alternative (or alternatives) does not foreclose further consideration of alternatives that have not been identified as preferred. All alternatives considered in detail in the Draft EIS remain under consideration until the of the NEPA process.

In this Draft EIS, the lead agencies – FHWA and INDOT – have identified a range of preferred alternatives. After the conclusion of the comment period on this Tier 1 Draft EIS, and after further coordination with resource agencies, a single preferred corridor will be identified, and that corridor will be documented in the Tier 1 Final EIS. After the Tier 1 Final EIS, there will be a review period of at least 30 days before issuance of a Tier 1 Record of Decision (ROD). If a build alternative is selected, it is FHWA's intention to approve a ROD for a corridor at the end of Tier 1 rather than approving a specific alignment in the corridor. An alignment would be selected and approved in Tier 2 NEPA studies.

6.1 Alternative Advantages and Disadvantages

Alternative 1

Alternative 1 is the longest route being considered (154 to 156 miles). However, the total impact length for Alternative 1 is 87 to 89 miles because this alternative uses a substantial length of I-70. Preliminary cost estimates range from $0.81 to $1.04 billion. Alternative 1 utilizes the existing US 41 and I-70.

Advantages:

- Lowest natural environmental impacts (e.g. forest, wetland, farmland, floodplain, threatened and endangered species)
- Lowest impacts to High Quality Natural Communities
- Lowest construction cost ($0.80-$1.04 billion) and operation and maintenance costs[1]

1 Construction costs include construction, right-of-way and engineering costs.

- No karst features impacted (e.g. caves, sinkholes, sinking stream basins; 0 acres)
- Lowest number of streams crossed (65-75)

Disadvantages:

- *Poorest travel time savings between Indianapolis and Evansville – 12 minutes (core goal)* (See Figure 6-1, Travel Time Savings)
- *Poorest improvements in regional accessibility (core goal).*
- *Poorest improvements of Interstate and international movement of freight (core goal)*

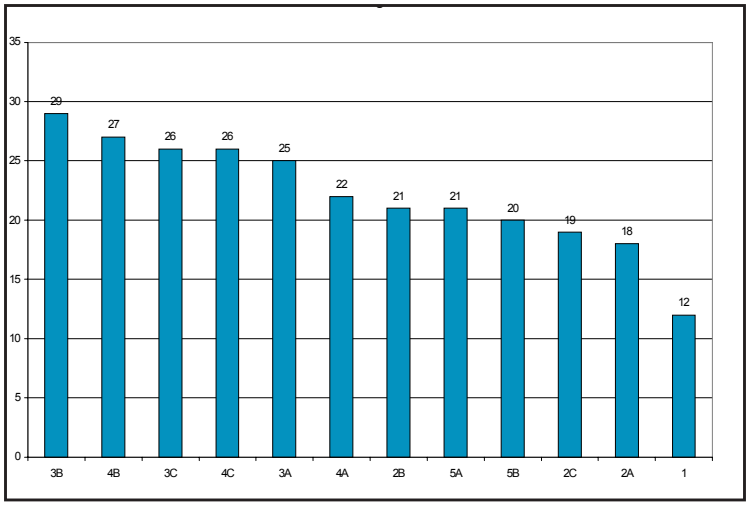

Figure 6-1: Travel Time Savings

- Poorest improvements to personal economic performance
- Lowest improvements to business accessibility
- Low potential for reduction of crashes and congestion
- Highest potential business relocations (70-131)
- Highest disruption of existing traffic during construction
- No improvement in access to Crane Naval Surface Warfare Center

Given the markedly inferior performance in meeting the Purpose and Need, Alternative 1 is not among the preferred alternatives.

Alternative 2A

Alternative 2A is approximately 147 to 148 miles long. Preliminary cost estimates range from $1.09 to $1.27 billion. Alternative 2A utilizes the existing US 41 to Vincennes then generally follows SR 67 to US 231 which it generally follows to I-70.

Advantages:

- Low natural environmental impacts (e.g. forest, wetland, farmland)
- Low impacts to High Quality Natural Communities
- Low construction cost ($1.09-$1.27 billion) and operation and maintenance costs
- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 65 acres)
- Low potential residential relocations (179-240).

Disadvantages:

- *Low improvements of interstate and international movement of freight (core goal)*
- Low improvements to regional economic performance
- Low improvements to business accessibility
- Low potential for reduction of crashes and congestion
- Low improvement in access to Crane Naval Surface Warfare Center

Due to poor performance on Purpose and Need evaluation, Alternative 2A is not among the preferred alternatives.

Alternative 2B

Alternative 2B is approximately 145 to 146 miles long. Preliminary cost estimates range from $1.17 to $1.37 billion. Alternative 2B utilizes the existing US 41 to Vincennes then generally follows SR 67 to Paragon where it turns north to connect to I-70. Alternative 2B is a moderate performer for Purpose and Need as well as Environmental Consequences.

Advantages:

- Low impacts to High Quality Natural Communities
- Low potential residential relocations (194-251) (see Figure 6-2, Populated Density)

Disadvantages:

- *Low improvements of Interstate and international movement of freight (core goal)*
- Low improvements to accessibility of labor and consumer markets
- Low potential for reduction of crashes
- Low improvement in access to Crane Naval Surface Warfare Center

Due to poor performance on Purpose and Need evaluation, Alternative 2B is not among the preferred alternatives.

Alternative 2C

Alternative 2C is approximately 145 to 147 miles long. Preliminary cost estimates range from $1.47 to $1.74 billion. Alternative 2C utilizes the existing US 41 to Vincennes then generally follows SR 67 to Martinsville, then utilizes SR 37. Alternative 2C is a moderate performer for Purpose and Need.

Advantages:

- *Moderately high improvements of Interstate and international movement of freight (core goal)*
- Moderately high performance for long-term economic growth
- Moderately high potential for reduction of crashes and congestion
- Moderately high improvement in business accessibility
- High economic improvements for wide spectrum of Southwest Indiana residents
- Low impacts to High Quality Natural Communities

Disadvantages:

- High farmland impacts (4,300-5,070 acres)
- Moderately high construction cost ($1.47-$1.74 billion) and operation and maintenance costs
- High potential for business relocations (56-113)
- Highest disruption of existing traffic during construction (on US 41 and SR 37)
- Highest potential floodplain impacts
- Low improvement in access to Crane Naval Surface Warfare Center

Alternative 2C is among the preferred alternatives.

Alternative 3A

Alternative 3A is approximately 148 to 150 miles long. Preliminary cost estimates range from $1.29 to $1.38 billion. Alternative 3A generally follows SR 57 to Newberrry then turns toward

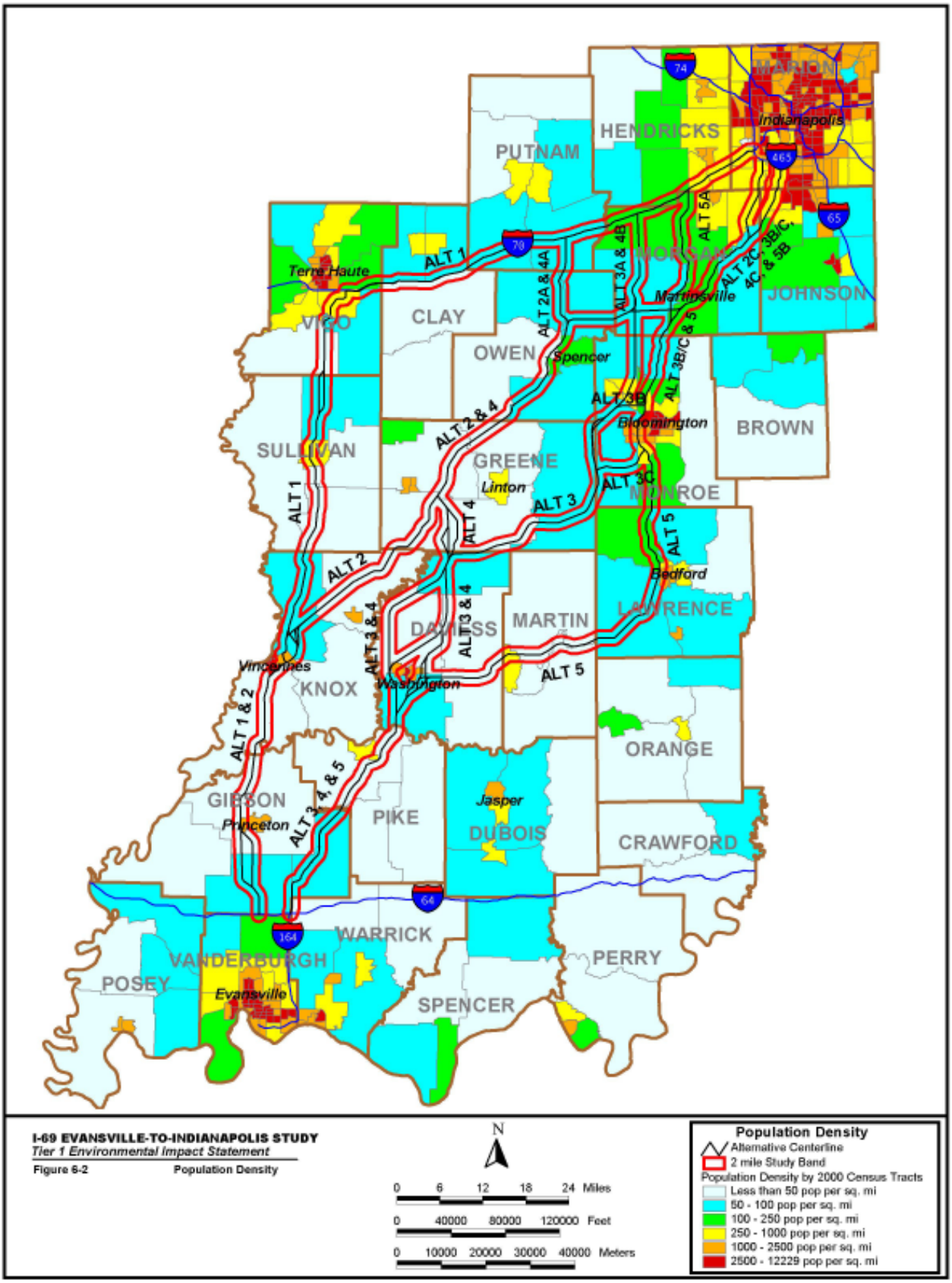

Figure 6-2 Populated Density

Bloomington, and then turns north to Paragon and on to I-70. Alternative 3A is a moderate performer for Purpose and Need.

Advantages:

- *High travel time savings between Indianapolis and Evansville - 25 minutes (core goal)*
- *High improvements in personal accessibility (core goal)*
- *High improvements of Interstate and international movement of freight (core goal)*
- High performance for long-term economic growth
- Highest improvements to connections to intermodal facilities
- High economic improvement for wide spectrum of Southwest Indiana residents
- Low potential for business relocations (17-18)
- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 60 acres)
- Low potential floodplain impacts (860-900 acres)
- High improvement to access of Crane Naval Surface Warfare Center

Disadvantages:

- High unavoidable impacts to High Quality Natural Communities (e.g. Beanblossom Bottoms) (See Figure 6-3 Environmentally Sensitive Areas)
- Proximity to hibernacula (caves) for the federally endangered Indiana Bat
- High forest impacts (1,505-1,580 acres) including high impacts to core forest (502 acres)
- High wetland impacts (120-165 acres)
- Low improvements to accessibility of labor and consumer markets
- High operation and maintenance costs
- Low potential for reduction of crashes

Given the impacts crossing the Beanblossom Bottom Nature Preserve and associated High Quality Natural Communities, Alternative 3A is not among the preferred alternatives.

Alternative 3B

Alternative 3B is approximately 140 to 143 miles long. Preliminary cost estimates range from $1.65 to $1.82 billion. Alternative 3B generally follows SR 57 to Newberrry then turns toward Bloomington and connects to SR 37 on the northwest side of Bloomington and continue on SR 37.

Advantages:

- *High improvements in personal accessibility (core goal)*
- *High improvements of Interstate and international movement of freight (core goal)*
- *Highest travel time savings between Indianapolis and Evansville – 29 minutes. (core goal)*
- High performance for long-term economic growth
- High economic improvements for wide spectrum of Southwest Indiana residents
- High potential for reduction of crashes and congestion
- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 30 acres)
- High improvement to access of Crane Naval Surface Warfare Center

Disadvantages:

- High construction cost ($1.66-$1.82 billion) and operation and maintenance costs

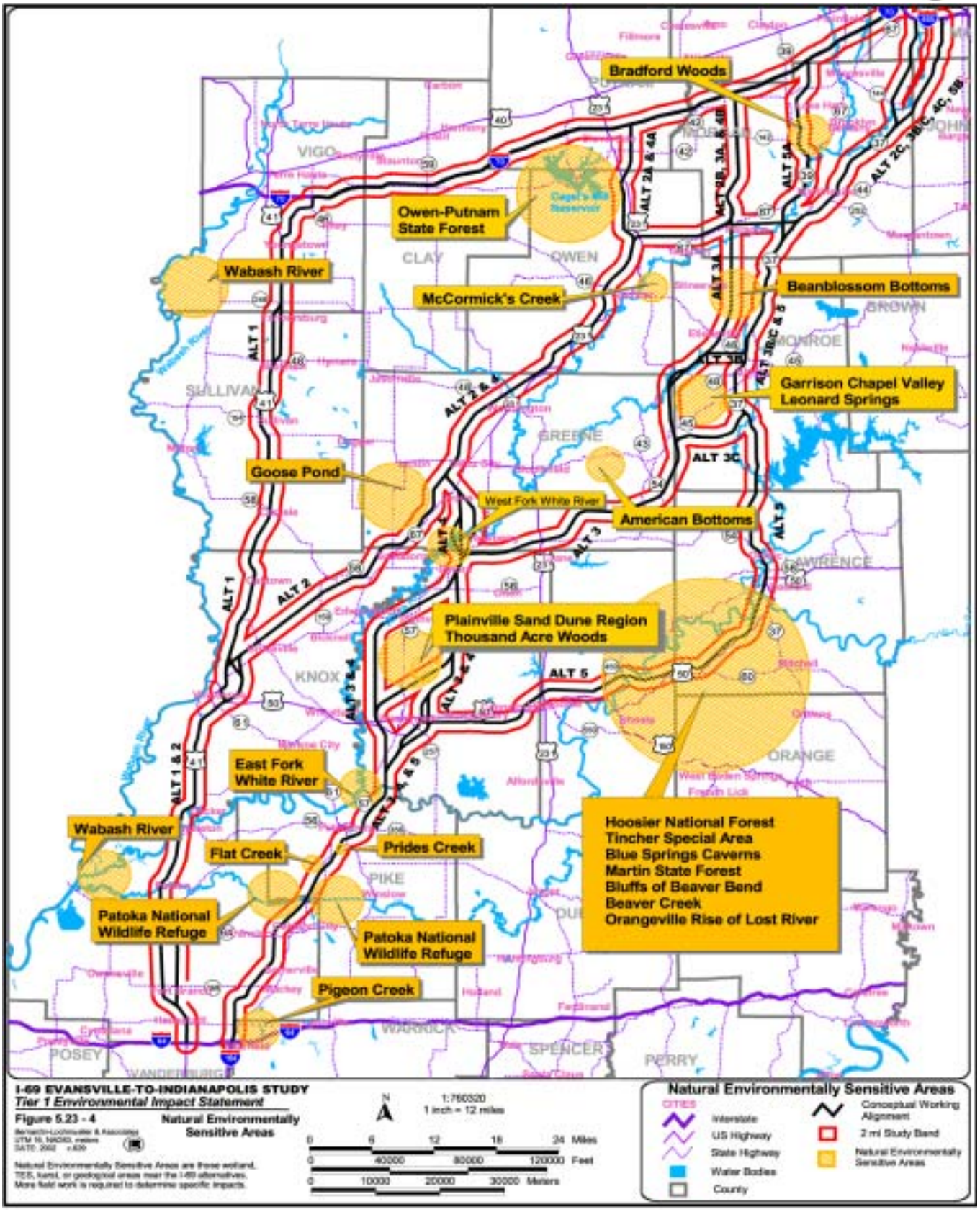

Figure 6-3 Environmentally Sensitive Areas

- High total new right-of-way impacts (5,850-6,440 acres)
- High potential for residential relocations (346-484)
- High forest impacts (1,315 - 1,450 acres) including high core forest impacts (440 acres)

Alternative 3B is among the preferred alternatives.

Alternative 3C

Alternative 3C is approximately 140 to 143 miles long. Preliminary cost estimates range from $1.64 to $1.81 billion. Alternative 3B generally follows SR 57 to Newberrry then turns toward Bloomington and connects to SR 37 on the southwest side of Bloomington and continue on SR 37.

Advantages:

- *High improvements in personal accessibility (core goal)*
- *High improvements of Interstate and international movement of freight (core goal)*
- *High travel time savings between Indianapolis and Evansville – 26 minutes. (core goal)*
- High performance for long-term economic growth
- High economic improvements for wide spectrum of Southwest Indiana residents
- Highest improvements to accessibility of labor and consumer markets
- High potential for reduction of crashes
- High improvement to access of Crane Naval Surface Warfare Center

Disadvantages:

- High potential for residential relocations (370-458) (see Figure 6-4, High Relocation Areas)
- High construction costs ($1.64-$1.81 billion)
- High forest impacts (1,140 - 1,275 acres) including high core forest impacts (398 acres)
- High disruption of existing traffic during construction
- Proximity to hibernaculum (cave) for the Federally endangered Indiana Bat

Alternative 3C is among the preferred alternatives.

Alternative 4A

Alternative 4A is approximately 143 to 145 miles long. Preliminary cost estimates range from $0.96 to $1.04 billion. Alternative 4A generally follows SR 57 to SR 67, and then generally follows SR 67 to US 231 which it generally follows to I-70.

Advantages:

- Low potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 65 acres)
- Low construction costs ($0.96-$1.04 billion)
- Lowest potential for business relocations (8-9)
- Lowest potential for residential relocations (143-168)

Disadvantages:

- *Low improvements to personal accessibility (core goal)*
- Low improvements to accessibility of labor and consumer markets
- Low potential for reduction of crashes
- Low improvement in access to Crane Naval Surface Warfare Center

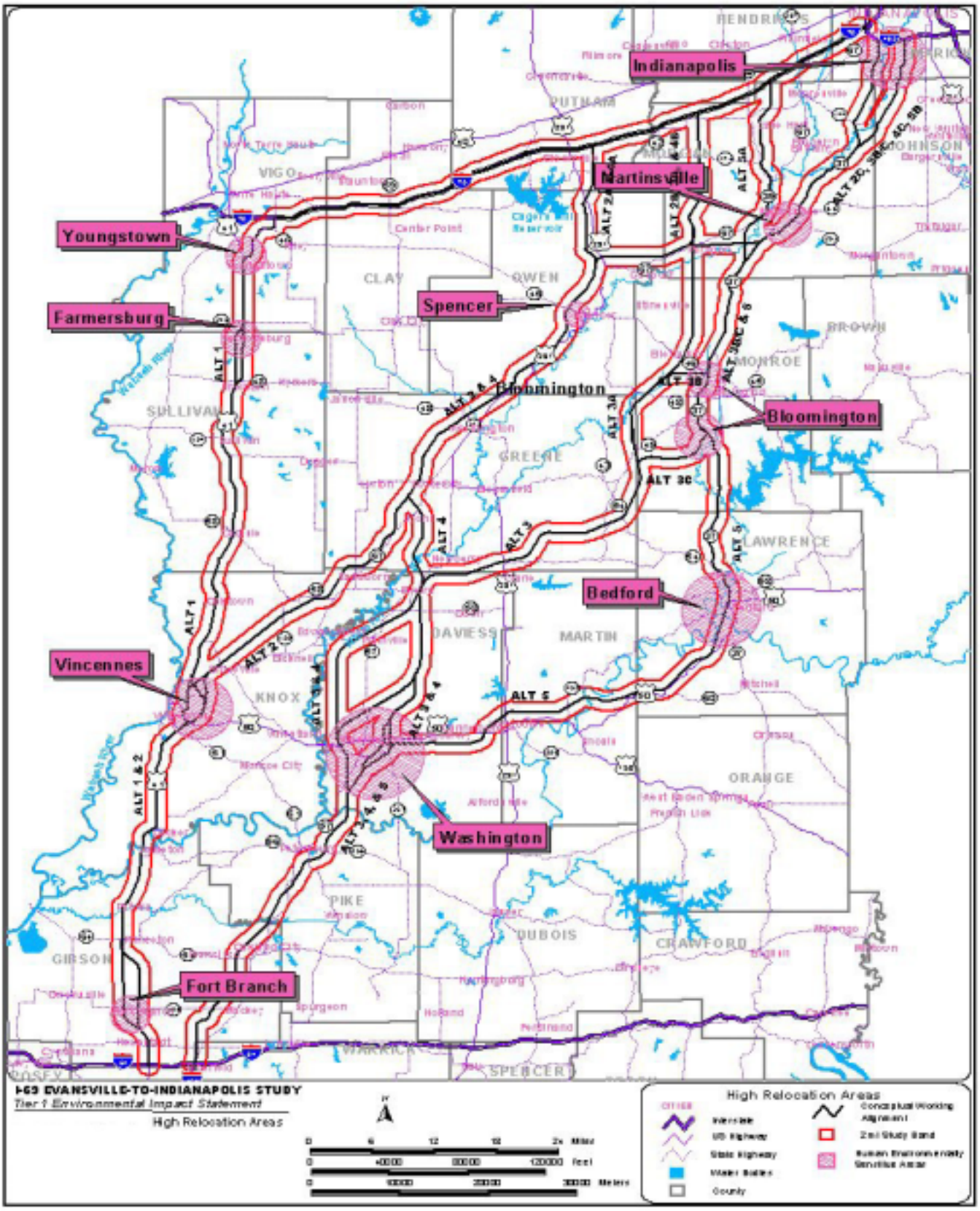

Figure 6-4: High Relocation Areas

Due to poor performance on Purpose and Need evaluation, Alternative 4A is not among the preferred alternatives.

Alternative 4B

Alternative 4B is approximately 141 to 143 miles long. Preliminary cost estimates range from $1.04 to $1.12 billion. Alternative 4B generally follows SR 57 to SR 67, and then generally follows SR 67 to Paragon where it turns north to connect to I-70.

Advantages:

- *High travel time savings between Indianapolis and Evansville – 27 minutes. (core goal)*
- High improvements to connections to intermodal facilities
- Low construction costs ($1.04-$1.12 billion)
- Low potential for residential relocations (158-179)
- Low potential for business relocations (11-12)

Disadvantages:

- *Low improvements to personal accessibility (core goal)*
- Low improvements to accessibility of labor and consumer markets
- High farmland impacts (4,970-5,020 acres)
- High wetland impacts (115-165 acres)
- High operation and maintenance costs
- Low improvement in access to Crane Naval Surface Warfare Center

Alternative 4B is the best performing alternative that approaches Indianapolis on I-70. It is among the preferred alternatives.

Alternative 4C

Alternative 4C is approximately 141 to 144 miles long. Preliminary cost estimates range from $1.34 to $1.50 billion. Alternative 4C generally follows SR 57 to SR 67, then generally follows SR 67 to Martinsville, then utilizes SR 37.

Advantages:

- *High travel time savings between Indianapolis and Evansville – 26 minutes. (core goal)*
- *High improvements of Interstate and international movement of freight (core goal)*
- High performance for long-term economic growth
- High potential for reduction of crashes and congestion
- High improvements to business accessibility
- High economic improvements for wide spectrum of Southwest Indiana residents
- Low impacts to forest (805-935 acres) core forest (87-97 acres)

Disadvantages:

- Highest farmland impacts (5,170-5,730 acres)
- Highest wetland impacts (140-190 acres)
- Highest total new right-of-way impacts (6,160-6,760 acres)
- High floodplain impacts (1,550-1,810 acres)
- Highest number of stream crossings (130-145)

- Low improvement in access to Crane Naval Surface Warfare Center

Alternative 4C is among the preferred alternatives.

Alternative 5A

Alternative 5A is approximately 149 to 152 miles long. Preliminary cost estimates range from $1.61 to $1.81 billion. Alternative 5A generally follows SR 57 to Washington, then generally follows US 50 to Bedford, then utilizes SR 37 to Martinsville where it goes generally due north to connect to I-70.

Advantages:

- *High improvements in personal accessibility (core goal)*
- *High improvements of Interstate and international movement of freight (core goal)*
- High performance for long-term economic growth
- High potential for reduction of crashes
- High improvements to business accessibility
- High economic improvements for wide spectrum of Southwest Indiana residents
- High improvement to connections to intermodal facilities

Disadvantages:

- High unavoidable impacts to High Quality Natural Communities (e.g. Tincher Special Area, Blue Springs Cavern)
- Proximity to Blue Springs Cavern Natural Area, nominated for National Natural Landmark status
- Unavoidable impacts to Section 4(f) resources (Martin State Forest)
- Highest potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 675 acres) (see Figure 6-5, Karst Features)
- Highest forest impacts (1,525-1,565 acres) including highest core forest (682 acres) impacts
- High construction cost ($1.61-$1.81 billion) and operation and maintenance costs
- High potential for residential relocations (360-419)
- Potential increased construction cost due to mitigative measures for karst

Given the impacts crossing the Tincher Special Area, Martin State Forest and associated High Quality Natural Communities, Alternative 5A is not among the preferred alternatives.

Alternative 5B

Alternative 5B is approximately 146 to 147 miles long. Preliminary cost estimates range from $1.67 to $1.85 billion. Alternative 5B generally follows SR 57 to Washington, then generally follows US 50 to Bedford, then utilizes SR 37 to I-465.

Advantages:

- *High improvements in personal accessibility (core goal)*
- *High improvements of Interstate and international movement of freight (core goal)*
- High performance for long-term economic growth
- High economic improvements for wide spectrum of Southwest Indiana residents
- Highest improvements to business accessibility
- High potential for reduction of crashes and congestion

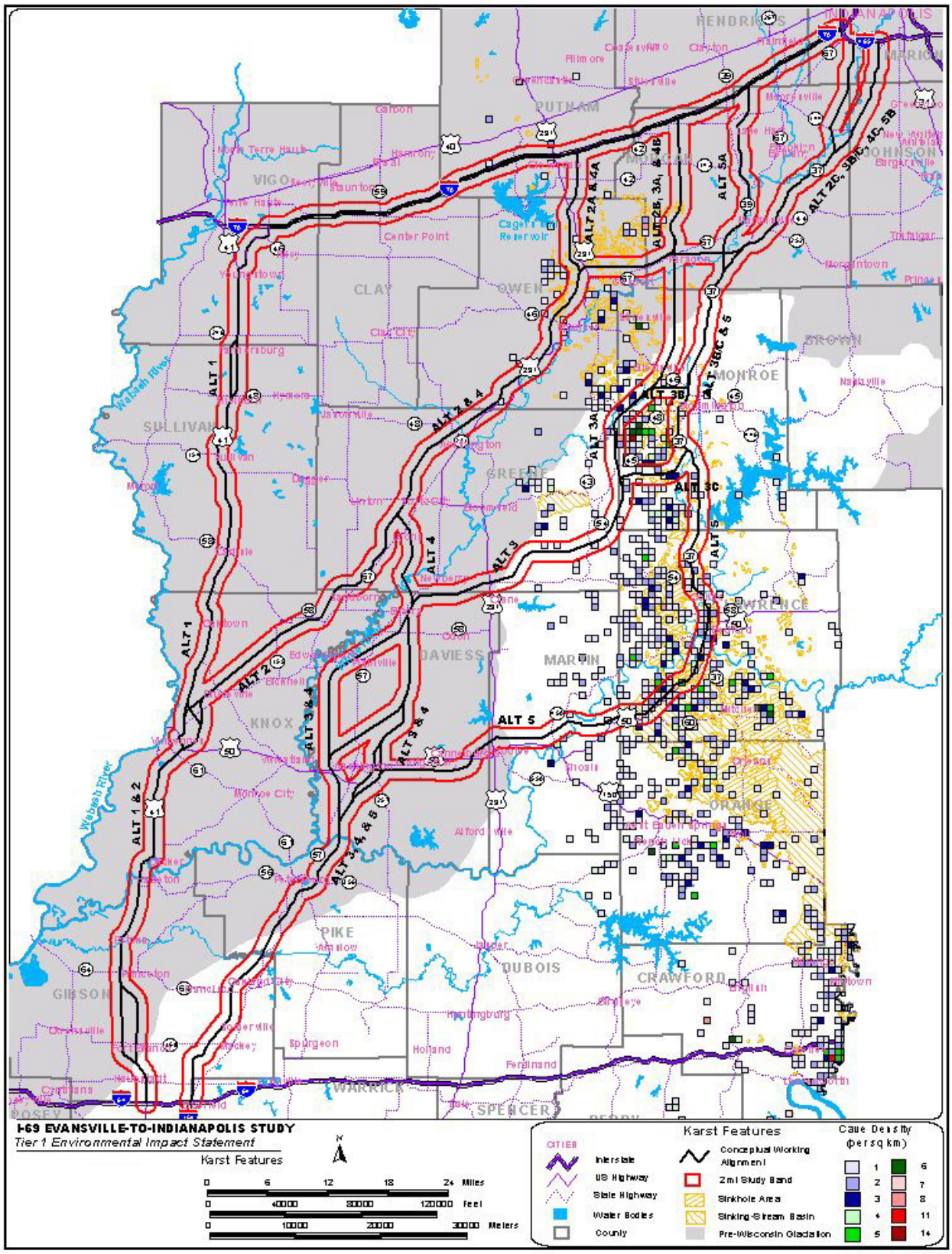

Figure 6-6 Karst Features

Disadvantages:

- High unavoidable impacts to High Quality Natural Communities (e.g. Tincher Special Area, Blue Springs Cavern) (See Figure 6-6, Environmentally Sensitive Areas)
- Proximity to Blue Springs Cavern Natural Area, nominated for National Natural Landmark status
- Unavoidable impacts to Section 4(f) resources (Martin State Forest) (See Figure 6-6, Section 4(f) Lands, Parks, Recreation Areas, Refuges)
- Highest potential impacts to karst features (e.g. caves, sinkholes, sinking stream basins; 675 acres)
- High forest impacts (1,265 - 1,365 acres) including high core forest impacts (544 acres)
- Highest construction costs ($1.67-$1.85 billion)
- High potential for residential relocations (377-503)
- High potential for business relocations (72-96)
- Potential increased construction cost due to mitigative measures for karst

Given the impacts crossing the Tincher Special Area, Martin State Forest and associated High Quality Natural Communities, Alternative 5B is not among the preferred alternatives.

No–Build Alternative

Advantages:

- No adverse environmental impacts
- No construction costs or increase in operation and maintenance costs

Disadvantages:

- *No travel time savings between Indianapolis and Evansville (core goal)*
- *No improvement in personal accessibility (core goal)*
- *No improvement in Interstate and international improvement in freight (core goal)*
- No reduction in traffic crashes or congestion
- No improvement in business accessibility
- No improvement in long-term economic growth
- No economic improvements to Southwest Indiana residents
- No improvement in connections to intermodal facilities

6.2 Preferred Alternatives

At this stage, a single preferred alternative has not been identified. However, some important preliminary conclusions have been reached. Table 6-2 groups the alternatives into two categories. The top row identifies “preferred alternatives”. The bottom row identifies those alternatives that are not preferred.

The non-preferred alternatives fall into two groups: (1) alternatives that are not preferred for environmental reasons; and (2) alternatives that are not preferred because of their inability to satisfy the goals of the project as defined in Chapter 2, *Purpose and Need*.

Alternatives 3A, 5A, and 5B are not preferred for environmental reasons, even though they are among the better performers in terms of achieving the project’s goals. These three alternatives have such serious impacts on critical, high quality natural areas that they present virtually

Table 6-2: Preferred versus Non-Preferred Alternatives	
Preferred Alternatives	2C, 3B, 3C, 4B, 4C
Non-Preferred Alternatives	1, 2A, 2B, 3A, 4A, 5A, 5B

insurmountable obstacles to selection as a preferred alternative, particularly in light of the availability of other alternatives with similar or better performance that avoid these highly sensitive resources. Alternative 3A would traverse the Beanblossom Bottoms Nature Preserve, a very high quality natural area northwest of Bloomington. Alternatives 5A and 5B would bisect the Tincher Special Area of the Hoosier National Forest west of Bedford. Tincher is a unique ecosystem with a high likelihood of being designated a habitat of "global significance." Moreover, Alternatives 5A and 5B would pass over Blue Springs Cavern, a privately owned cave that is a unique karst resource. In the process of coordinating with federal and state resource agencies, Tincher Special Area and Beanblossom Bottoms were identified as particularly important among the ecosystems in the state. Accordingly, FHWA and INDOT have identified Alternatives 3A, 5A, and 5B as non-preferred alternatives.

While Alternative 1 would have relatively low impacts on the natural environment, it performs much more poorly than any other alternative in terms of satisfying the goals of the project. Alternative 1 is the only alternative with low performance on all project goals, including the three core goals. This poor performance can be explained in terms of the factors most frequently associated with high performing alternatives. These factors are: (1) service to Bloomington, (2) service to the SR 37 corridor, (3) short Evansville to Indianapolis mileage, and (4) service to Western Morgan County. While few alternatives have all these characteristics associated with high performance, Alternative 1 does not provide any.

Moreover, while Alternative 1 would have comparatively low impacts on the natural environment, it would result in the largest number of business building relocations.

Alternatives 2A, 2B, and 4A are also not preferred due to poor overall performance in terms of meeting the project's Purpose and Need. These three alternatives are unable to provide any "high" performance ratings for the nine project goals. 2A and 4A each have five "medium" ratings and four "low" ratings, while 2B has six "medium" ratings and three "low". These three alternatives each provide a "medium" level of performance for two of three core goals and "low" performance for the third.

Alternatives 2C, 3B, 3C, 4B and 4C are among the preferred alternatives. These alternatives are generally high performers that are not fatally flawed from an environmental perspective. Alternatives 2C, 3B, 3C and 4C have "high" performance ratings on at least 6 out of 9 project goals. Alternative 3B scores "high" on all nine project goals, while Alternative 3C scores "high" on eight of the nine.

Unlike 3A, it was possible to shift the working alignment of Alternatives 3B to avoid Beanblossom Bottoms. This was not an issue for Alternative 3C, since it joins SR 37 on the south side of

Bloomington. Adjustments were also made in the working alignment of Alternative 3 (A, B, and C) to avoid an important hibernacula for the Indiana Bat. All of the preferred alternatives that make use of SR 37 (2C, 3B, 3C, and 4C) also benefited from a shift in the working alignment that avoids major housing developments near the northern terminus of the project.

Alternative 4B is also a reasonably strong performer. It is second only to 3B in travel time savings between Indianapolis and Evansville (one of the core goals). It also scores highly on improved access to intermodal facilities due to its proximity to the Indianapolis International Airport and it scores in the "medium" range on four other goals.

For all these reasons, Alternates 2C, 3B, 3C, 4B, and 4C are preferred Alternatives, and Alternatives 1, 2A, 2B, 3A, 5A, and 5B are the non-preferred Alternatives.

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Chapter 7 - Mitigation

7.1 Summary

In this study, effort has been made to avoid environmentally sensitive resources. One purpose of the Tier 1 Environmental Impact Statement is to identify these resources and their significance. This information is used in the decision process to identify a preferred alternative to be advanced into the final Environmental Impact Statement. In the Tier 2 NEPA studies, the mitigation identified in Tier 1 (and summarized in Table 7-1) will be refined with greater detail.

The following discussion presents the mitigation sections from the impacts described in Chapter 5, *Environmental Consequences*.

Table 7-1: Mitigation for I-69

Impacts	Mitigation
Land Use	Coordination with local officials concerning land use controls
Social and Neighborhood	Where reasonable, use frontage roads and access roads to maintain accessibility for neighborhoods
	Minimize right-of-way needs, where reasonable, in urbanized areas through the use of design practices, including retaining walls
Pedestrians and Bicyclists	If bike trails in Martin State Forest are impacted, mitigation may include bridging, relocation, or enhancement of the trails
Air Quality	Conformity of the preferred corridor with the mobile source emission budgets will be demonstrated
Noise	Abatement measures including noise barriers will be analyzed in the Tier 2 environmental documentation
	Coordination with local officials to identify areas susceptible to noise impacts for guidance in future land use decisions
	Fugitive dust emissions shall be controlled through water spraying and tarping of vehicles
	Temporary erosion control devices such as silt fencing, check dams, sediment basins, and sodding shall be used
	MOU of October, 1993 for karst shall be followed
Section 106 – Historic Resources	Consideration will be given to mitigation such as plant screenings, earth embankments, and painting and the use of compatible building materials for bridges and overpasses
Hazardous Waste Sites	Coordination with appropriate agencies to insure proper clean-up of contaminated sites
Floodplain	Impacts to longitudinal and latitudinal floodplain encroachments will be minimized, where reasonable, through design practices such as longer bridges and right-angle stream crossings
Wetlands	MOU of January 28, 1991 for wetlands
	Wetland Mitigation and Monitoring Plans will be prepared as part of the wetland loss replacement
	One possible method of wetland mitigation is wetland banking
Agriculture	Corridors should follow existing property lines and minimize dividing or splitting of large tracts of farmland where reasonable
Forest	INDOT will consult with appropriate resource agencies regarding forest mitigation measures
Water Body Modifications	Best Management Practices (BMP) should be used to avoid and minimize impacts to rivers and streams

Land Use Impacts

Mitigation measures need to focus on coordination with local planning commissions and local elected officials concerning land use controls.

The indirect impacts around areas with karst features are a concern with regard to water drainage and the impacts to the cave systems. While the Indiana Department of Transportation has a memorandum of

understanding for construction in karst regions (see Appendix U), the indirect impacts would be caused by private developers who are subject to local ordinances and codes. These local ordinances and codes may not address drainage in karst areas. Cave systems may experience changes in drainage patterns as a result of indirect impacts. Once a preferred alignment is identified and if it traverses karst topography, the Indiana Department of Transportation will contact local officials to encourage them to initiate planning mechanisms that will review development requests in light of impacts to sensitive resources.

Social Impacts

The mitigation of negative social impacts can be accomplished in the same way as relocation impacts are mitigated. Where reasonable, impacts to neighborhoods and subdivisions can be reduced through the use of frontage and access roads to maintain access to specific properties that are impacted by I-69 construction. Rights-of-way will be minimized, where reasonable, in urbanized areas.

Pedestrians and Bicyclists

At the present time, there will be a direct impact on the Martin State Forest Mountain Bike Trail. The Bloomington Rail Trail crosses under the already existing SR 37 and should not have a direct impact. No public owned paths were found in the other four alternatives using the available data. The proposed highway is designated a freeway and as such, pedestrians and bicyclists are prohibited from using the roadway. Mitigation would be implemented if impacts to the paths cannot be avoided. Both of the trails are on 4(f) land, which refers to lands that are publicly owned, public parks, recreation lands, or wildlife and waterfowl refuges. Mitigation measures may include bridging, relocation, or enhancement of the trail.

Air Quality Impacts

Conformity of the preferred alternative corridor with the mobile source emissions budgets of the SIP will be demonstrated per Section 176 of the Clean Air Act Amendments.

Noise Impacts

Since site specific impacts are not determined in this Tier 1 EIS study, a detailed discussion of noise impact mitigation is inappropriate. However, some generalities can be made regarding potential mitigation measures. Once highway noise impacted sites have been identified, they must be further evaluated to determine whether abatement is both feasible and reasonable. Abatement measures include:

- Alternation of horizontal and/or vertical alignments.
- Noise insulation of public use or non-profit institutional structures.
- Construction of highway noise barriers (inside of right-of-way).

INDOT policy considers abatement to be feasible if it is structurally and acoustically possible to reduce predicted noise levels at a specific receiver by at least 5 dBA. Furthermore, INDOT considers abatement reasonable only if such a measure is prudent based on the following:

- The number of receivers that will experience a benefit of at least 5 dBA at the noisiest hour through implementation of the abatement.
- The cost of abatement on a benefited receiver basis and on a project level basis. INDOT policy states that an acceptable cost for a noise barrier wall is $20,000 to $30,000 per benefited receiver as determined by applying a square footage cost to the total square footage of the wall required to achieve the necessary 5 dBA reduction. In rural areas where the residences are widely scattered, the construction of short noise barriers for individual residences or tiny clusters is typically not cost effective and therefore, may not be a reasonable solution.
- The severity of existing and future traffic noise levels. Severity is determined by comparing the decibel difference between the predicted level and existing level at a site to that of the decibel difference between the predicted level and the criteria level. Figure 5.9-14 is referenced to determine the severity of impact: no impact, minor impact, moderate impact, or severe impact.
- The timing of development near the project. The state considers it appropriate to give more consideration for development that occurs before initial highway construction.
- The views of noise impacted residents. Although noise barrier walls offer adjacent residents a reduction in highway-related noise levels, negative impacts associated with these walls such as, unsightliness, vandalism, degradation by weather, poor air circulation, shortened daylight, reduced safety, and restriction of access for emergency vehicles, can be prohibitive in the eyes of the public under certain circumstances.

Although the Tier 1 level noise analysis makes no attempt to determine where barrier walls would be required and whether they meet the feasible and reasonable criteria; a table top evaluation using field verified topographic data was conducted to locate areas where residential receivers appear to be of sufficient density and proximity to the proposed working alignment to warrant further evaluation. More detailed analyses in the subsequent Tier 2 studies may conclude that some of these areas do not meet the criteria and/or may reveal other areas not listed here which do require mitigation.

Wild and Scenic Rivers

No Wild and Scenic Rivers are present in the proposed I-69 Study Area. However, several of the proposed alternatives cross rivers listed on the NPS NRI, the East and West Forks of the White River. The Federal Highway Administration, as a federal agency, is required to try and avoid or mitigate adverse effects on rivers identified in the NRI as part of the normal planning and environmental review processes of a project. All federal agencies are required to consult with the NPS prior to taking actions that could effectively foreclose wild, scenic, or recreational status for rivers on the inventory. An Early Coordination letter was sent to the NPS, along with a number of environmental review agencies, on May 12, 2002. The NPS provided no response to the Early Coordination letter. Coordination with NPS will continue in the Tier 2 NEPA studies.

Construction Impacts

Reasonable precautions are typically sufficient to control fugitive dust emissions. These precautions include water spraying and tarping of vehicles carrying particulate matter.

Tier 2 NEPA studies will determine the best location for the Interstate and will focus in particular on karst impacts and mitigation. The design of roadside drainage ditches connected to "filter strips" and containment basins for spill prevention/containment, as well as other Best Management Practices will be implemented to minimize impacts if applicable.

Construction activities may also impact wetlands within and outside of the proposed right-of-way for this Interstate. All efforts to avoid, minimize and mitigate for wetlands shall be implemented as much as possible. The Memorandum of Understanding dated January 28,1991 between INDOT, IDNR and USFWS for wetlands shall be followed.

Temporary erosion control devices such as silt fencing, check dams, sediment basins, inlet protection and sodding will be used. Disturbed soil areas will be revegetated in a timely manner. Any riprap used will be of a large diameter in order to allow space for habitat for aquatic species after placement. In order to reduce the opportunity for the spill of fuel or other volatile chemicals into a stream, all servicing of construction equipment will take place away from the streambed in a designated maintenance area.

A major concern for limestone is the effects of heavy blasting. The main concern for limestone is shock waves that could travel from the highway sites through the rock and possibly fracture marketable limestone. Strict blasting specifications will be prepared and followed including special excavation measures during blasting.

Section 106 Impacts - Historic Resources

An adverse effect occurs when "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property." [36 CFR 800.5(a)(1)] Specifically, the introduction of "visual, audible, or atmospheric elements" constitutes adverse effects. If adverse effects are unavoidable, there are several general ways to mitigate these effects. Please note that these are general mitigation techniques. Specific mitigation will be designed to address the particular affects on each individual property; this will occur in Tier 2.

In Tier 2, an alignment that attempts to avoid all properties on or eligible for the NRHP will be developed. However, if an alignment cannot avoid all such properties, or adversely impacts such properties, mitigation will be developed. Plant screenings can be added to mask sight and diminish noise effects of the proposed highway. Earth embankments also create noise and sight buffers. Additionally, ramps and overpasses can be disguised through painting and the use of compatible building materials.

Final eligibility and effect determinations will be made in the Tier 2 NEPA studies. Tier 1 mitigation is general in nature. The Section 106 Compliance Plan presents the scope for Tier 1 and Tier 2.

Section 106 Impacts - Archaeological Resources

As part of the Tier 2 environmental documentation, archaeological investigations will be undertaken. These include Phase 1a field reconnaissances to discover unrecorded prehistoric and historic resources; Phase 1c subsurface investigations for buried archaeological resources; Phase 2 testing of potentially significant archaeological sites, and possibly Phase 3 mitigation/data recovery if archaeological sites determined to be of National or State Registers significance cannot be avoided by construction.

Visual Impacts

Mitigation for visual impacts may include vegetative screening, a depressed highway, wide medians, and use of independent alignments both vertically and horizontally, or the shifting of the whole alignment.

This project should use context sensitive designs to create positive impacts and reduce negative impacts without compromising safety. Visual and aesthetic resource issues will be addressed in greater detail in Tier 2 NEPA studies.

Hazardous Waste Sites Impacts

Appropriate cleanup of hazardous materials and/or removal of USTs will be required. INDOT will coordinate with the appropriate agencies to see that proper cleanup of any contaminated sites are completed.

Floodplain Impacts

Impacts to floodplains, where reasonable, will be avoided. In areas that are located adjacent to streams or rivers and have a longitudinal floodplain encroachment, the alignments may be shifted to avoid these floodplain impacts. In areas that have latitudinal floodplain encroachments, the alignment can be shifted to cross the stream or river in a narrow floodplain area and at a right angle to the stream or river if reasonable. Also, in areas of latitudinal floodplain encroachments, the alignments may be raised and longer bridges utilized to avoid affecting the floodplain areas.

Wetlands

Mitigation for wetland losses is an important process for “no net loss” of wetlands in the United States. Recommendations of the National Governor’s Association Provision (Senate Bill 1304) of the Wetlands stated “that regulatory policies should include a clear preferred sequence of mitigation options that begins with avoidance of adverse impacts on wetlands and the reduction of unavoidable adverse impacts and allows the use of environmental compensation only as a last resort, while allowing regulators sufficient flexibility to approve practical options that provide the most protection to the resource and that balance the effects of such actions on the total human environment,

recognizing socioeconomic factors." Section 7 of the Watershed Management Act of 1993 provides for a clear sequence of mitigation options.

Conditions of the permit(s) typically include mitigation measures. Typical conditions include (but are not limited to): do not change hydrology of wetlands' areas, do not allow discharge of fill materials into the wetlands, and adhere to strict erosion control methods adjacent to wetlands. Permits will often require construction of replacement wetlands as a mitigation measure. The different types of wetlands require different mitigation ratios. All impacted wetlands will require a "Wetland Mitigation and Monitoring Plan" for their replacement at another location within the same watershed. The "Wetland Mitigation and Monitoring Plan" will report that in the deed, the property will remain as a wetland in perpetuity. This means that the land is protected from future development. The overall goal of wetland mitigation is to have no net loss of wetlands.

Enhancing existing wetlands by adding to them will provide a better habitat for wildlife and improve the existing wetlands and also improve the chance of success of the mitigation site. Coordination with review agencies will assure that the wetland mitigation sites are suitable, and that they are located in excellent areas for successful ecosystems for wildlife, plants, and humans.

Agricultural Impacts

Where reasonable, corridors should follow existing property lines and minimize dividing or splitting of large tracts of farmland.

Forest Impacts

INDOT will consult with appropriate resource agencies regarding forest mitigation measures.

Water Body Modifications

Mitigative measures for potential water quality impacts should be followed, where reasonable. Some such measures are:

(1) DO NOT DISTURB signs shall be posted at the construction zone boundaries.

(2) Tree clearing shall be kept to a minimum and limited to the construction limits within the permanent right-of-way.

(3) Trees or under story vegetation outside the boundaries shall not be cleared.

(4) Low-water work shall be restricted to placement of piers, pilings and/or footings, shaping of the spill slopes around the bridge abutments, and placement of riprap.

(5) Channel work and vegetation clearing shall be restricted to within the width of the normal approach road right-of-way.

(6) The extent of artificial bank stabilization will be minimized to provide for adequate scour protection.

(7) If riprap is utilized for bank stabilization, it shall be a minimum average of six inch graded stone and extended below low-water elevation to provide aquatic habitat.

(8) Temporary erosion control devices such as straw bales, burlap, jute mattering, grading, seeding and sodding shall be used to minimize sediment and debris in tributaries of the project.

(9) Culverts and other devices will be used to preserve existing drainage patterns.

(10) It is anticipated that the Patoka River channel, backwaters and floodplain will be spanned.

Ecosystem Impacts

All efforts have been made to minimize ecosystem impacts by identifying such resources and avoiding them as much as possible. Existing GIS layers, resource agency consultation, and field reviews have been used to identify, avoid, and minimize impacts. This is an ongoing process and will continue throughout the project. Wetland, stream, and forest impacts will be mitigated as determined by consultation with resource agencies.

Water Quality Impacts

Mitigative measures for potential water quality impacts are:

(1) cross rivers and streams at their narrowest floodway width, and reduce the number of stream relocations and floodplain encroachments where reasonable,

(2) develop stream mitigation plans that provide for the relocated stream “in like kind or better kind” with the impacted stream,

(3) disturbed in stream habitat should be returned to its original condition when possible upon completion of construction in the area,

(4) minimize tree clearing near streams and rivers,

(5) avoid wetlands as much as possible and follow the Memorandum of Understanding dated January 28,1991 between INDOT, IDNR and USFWS for wetlands,

(6) replace all wetlands at an appropriate mitigation ratio at mitigation sites that provide the best opportunities for successful and functional wetlands that include both human and natural values and goals,

(7) follow Best Management Practices for erosion control in the project,

(8) avoid sinking basins and sinkholes as much as possible and follow the Memorandum of Understanding dated October 13, 1993 between INDOT, IDNR, IDEM and USFWS for crossing karst areas, and

(9) provide in the highway design for “filter strips” and detention basins in karst areas.

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Chapter 8 – Draft Section 4(f) Evaluation

Section 4(f) of the Department of Transportation Act of 1966, Title 49 USC Section 303, requires that prior to the use of any land from a publicly owned park, recreational area, wildlife or waterfowl refuge, or land from a historic property on or eligible for inclusion in the National Register of Historic Places, it must be determined that there are no prudent and feasible alternatives which avoid such use and that the project includes all possible planning to minimize harm to such resources.

According to the Section 4(f) regulations of the Federal Highway Administration (FHWA), 23 CFR 771.135 (p), a "use" occurs when (1) land from a Section 4(f) site is permanently incorporated into a transportation project; (2) there is a temporary occupancy of Section 4(f) property that is adverse in terms of the statute's preservationist purposes; or (3) the proximity impacts of the transportation project on the Section 4(f) site are so severe that the protected activities, features, or attributes that qualify the resource for protection under Section 4(f) are substantially impaired.

In order for a park, recreation area, or wildlife or waterfowl refuge to qualify for protection under Section 4(f), it must be publicly owned. When these areas are owned by private institutions and individuals, even if such areas are open to the public, Section 4(f) does not apply. The FHWA does however, strongly encourage the preservation of such privately owned lands (USDOT, 1989).

Historic resources that are listed in, or eligible for listing in, the National Register of Historic Places are not required to be publicly owned in order to be protected under Section 4(f). Archaeological sites must also be on or eligible for the National Register and important for preservation in place in order to be considered a Section 4(f) site.

According to the regulations discussing the NEPA project development process (23 CFR 771.135),

> "When the Tier 1 EIS is prepared, the detailed information necessary to complete the Section 4(f) evaluation may not be available at that stage in the development of the action. In such cases, an evaluation should be made on the potential impacts that a proposed action will have on Section 4(f) land and whether those impacts could have a bearing on the decision to be made. A preliminary determination may be made at this time as to whether there are feasible and prudent locations or alternatives for the action to avoid the use of Section 4(f) land. This preliminary determination shall consider all possible planning to minimize harm to the extent that the level of detail available at the Tier 1 EIS stage allows. It is recognized that such planning at this stage will normally be limited to ensuring that opportunities to minimize harm at subsequent stages in the development process have not been precluded by decisions made at the Tier 1 stage."

In accordance with these regulations, this draft Section 4(f) evaluation is intended to: (1) evaluate the potential impacts of the alternatives on Section 4(f) resources as those impacts relate to the decision to be made at Tier 1; and (2) ensure that opportunities to minimize harm to Section 4(f) resources in Tier 2 are not precluded by decisions made at Tier 1.

8.1 Proposed Action

This project has been described in detail in previous chapters. The Purpose and Need for the project and the alternatives evaluated are briefly summarized in the following text.

Purpose and Need

The purpose of the I-69 Evansville-to-Indianapolis project is to provide an improved transportation link between Evansville and Indianapolis which:

- Strengthens the transportation network in Southwest Indiana;
- Supports economic development in Southwest Indiana; and
- Completes the portion of the National I-69 project between Evansville and Indianapolis.

The purpose and need is presented in Chapter 2.

Alternatives Selected for Study in the DEIS

The following alternatives were carried forward for detailed study.

Alternative 1

Alternative 2A, 2B, and 2C

Alternative 3A, 3B, and 3C

Alternative 4A, 4B, and 4C

Alternative 5A and 5B

The evaluation process for identifying these alternatives is presented in Chapter 3. Since the alternatives connect to Indianapolis in various ways, these various options are shown for each alternative.

8.2 Section 4(f) Resources – Parks, Recreation Areas and Wildlife Refuges

With development of all the alternatives, efforts were made to avoid and/or minimize Section 4(f) impacts to parks, recreational areas, waterfowl and wildlife refuges wherever possible. As a result of these efforts, many potential Section 4(f) resources were avoided. Figure 8-1 shows the location of these resources in relation to the alternatives under consideration. This figure shows publicly owned lands that may be protected as parks, recreation areas, or refuges.

Section 4(f) will not apply to all lands shown on Figure 8-1. For example, Morgan/Monroe State Forest is shown on Figure 8-1 as a potential Section 4(f) site but coordination with the Property Specialist for the Indiana Department of Natural Resources, Division of Forestry, stated that the State Forest has dispersed recreational activities. According to the FHWA Section 4(f) Policy Paper,

publicly owned multiple-use lands with dispersed recreational activities are not subject to the requirements of Section 4(f) (USDOT, 1989). The areas shown in Figure 8-1 were then investigated for their potential applicability for Section 4(f).

In addition, privately owned lands that are subject to a publicly owned easement in perpetuity may be subject to Section 4(f). For example, the Keisler Forest Legacy Property is privately owned but has an easement to the Indiana Department of Natural Resources for perpetuity. Further analysis of this property shows that it is not open to the public and is not for recreational activities. This resource is not subject to Section 4(f) (for further discussion of the Keisler Forest Legacy, see Section 5.21). The Beanblossom Bottoms Nature Preserve is privately owned by the Sycamore Land Trust but has an easement to the Indiana Department of Natural Resources in perpetuity and is open to the public and is used for recreation. This property is subject to Section 4(f) and is discussed later in this section.

Having shifted the corridor and working alignment to avoid Section 4(f) impacts to many parks, recreational areas, waterfowl and wildlife refuges, there remain areas that may be impacted by the I-69 alternatives. For these areas more detailed analysis was conducted to identify the extent of the impact and the type and magnitude of the activities occurring in those areas as well as attempts to avoid or minimize impacts. Coordination has been conducted with the U.S. Fish and Wildlife Service, the Hoosier National Forest, Knox County Parks and Recreation, the Indiana Department of Natural Resources Division of Forestry, the Morgan-Monroe State Forest, the Bedford City Parks Department, and the State Historic Preservation Officer to help assist in this analysis. These areas where more detailed analysis was conducted are listed as follows.

1. Patoka River National Wildlife Refuge and Sugar Ridge Fish and Wildlife Area
2. Pyramid Mound
3. Tincher Special Area of the Hoosier National Forest
4. Martin State Forest Bike Trail
5. Morgan/Monroe State Forest
6. Beanblossom Bottoms Nature Preserve
7. Smalls Creek Park
8. Bloomington Rail Trail
9. Bradford Woods

1. Patoka River National Wildlife Refuge and Sugar Ridge Fish and Wildlife Area

Description: The Patoka River National Wildlife Refuge is located in Pike and Gibson Counties, near Oakland City, along the Patoka River. The refuge was established in 1994 and consists of approximately 2,670 acres within an ultimate acquisition boundary of 22,083 acres (USFWS,1994). The Sugar Ridge Fish and Wildlife Area is owned by the IDNR Division of Fish and Wildlife and consists of approximately 7,300 acres primarily around Winslow in Pike County. While much of this area is several miles east of the I-69 alternatives, there are several parcels bought in the 1930s that are within the Patoka River National Wildlife Refuge and within the study band of the I-69

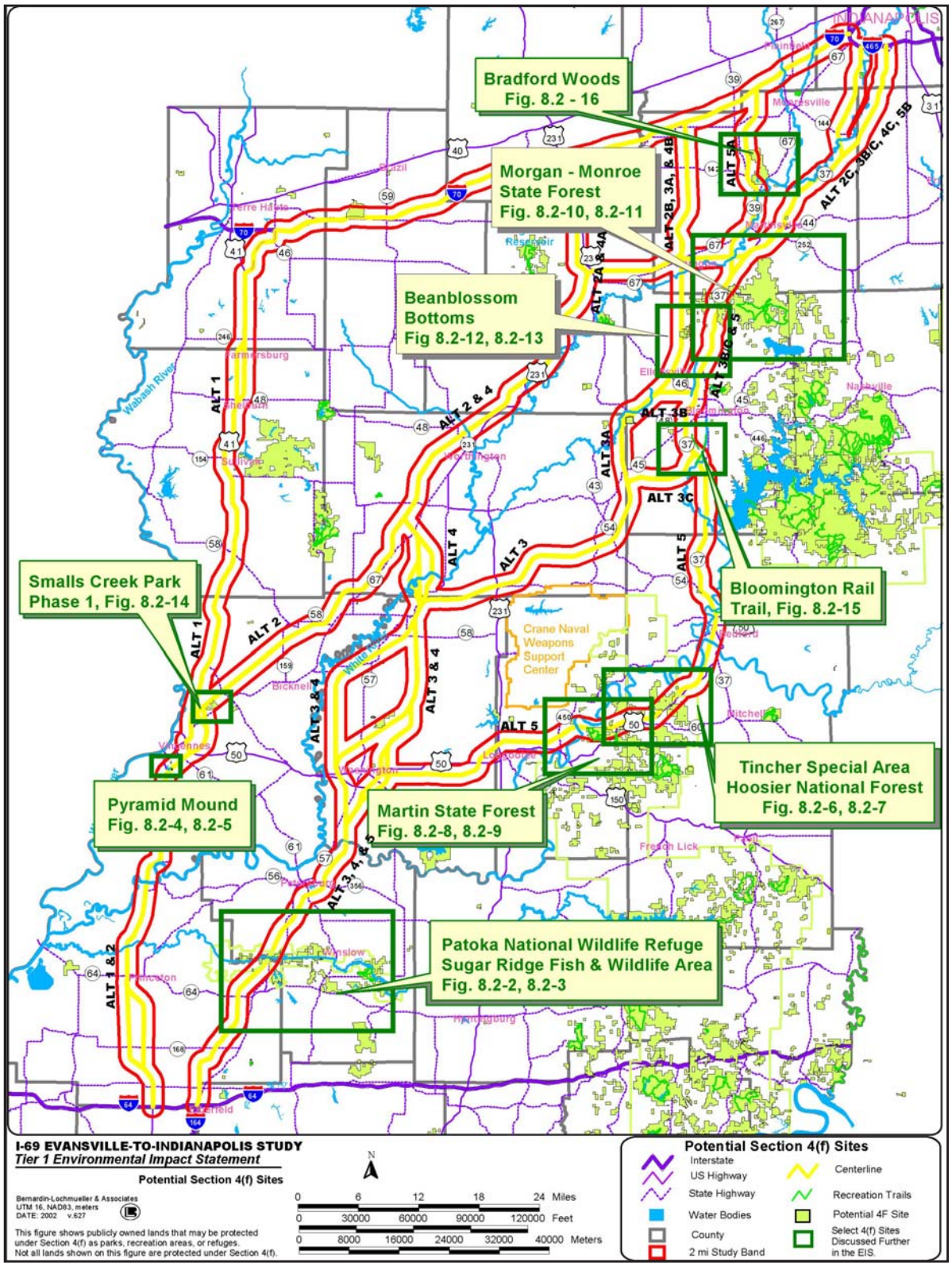

Figure 8-1: Parks, Recreational Areas, Waterfowl and Wildlife Refuges within the Study Area

This figure shows publicly owned lands that may be protected under Section 4(f) as parks, recreation areas, or refuges. Not all lands shown on this figure are protected under Section 4 (f).

alternatives. Figure 2-2 shows the boundary of the refuge and of the fish and wildlife area in relation to the Alternatives 3, 4, and 5 that are located in the refuge area.

The refuge is one of the higher quality bottomland hardwood forest ecosystems in the state. It supports over 380 species of wildlife and a high biodiversity in birds, reptiles, amphibians, mammals, and plants.

The Final Environmental Impact Statement for the Patoka River National Wildlife Refuge prepared by the U.S. Fish and Wildlife Service in 1994 discussed I-69 and states that "*Construction of the proposed Evansville to Indianapolis highway (I-69) would not be stopped by any of these (Patoka Refuge) alternatives…the Service would attempt to avoid buying lands within the chosen alignment, thereby avoiding or minimizing the applicability of Section 4(f).*"

During the development of the corridors and working alignments for Alternatives 3, 4, and 5, regular coordination occurred with the U.S. Fish and Wildlife Service (USFWS) to maintain an open area for these I-69 alternatives should one of them be ultimately selected. Figure 8-3 shows this area through which the corridor and working alignment for the Alternatives 3, 4, and 5 would pass. During the June 4 and 5, 2002 bus tour, a meeting was held with the Property Manager of the Patoka River National Wildlife Refuge of the USFWS at the location of the crossing of the refuge by I-69. It was agreed that this location was crossing the refuge at its narrowest width with the fewest impacts if an alternative was selected that traversed the area within the refuge's boundary. Interestingly, this location is also the location where the Wabash and Erie Canal crossed the Patoka River bottoms over 150 years ago because of the narrow width of the bottomlands at this place.

This coordination has enabled a corridor to be preserved for the highway through the refuge area. As a result of this coordination, the completion of I-69 through the reserved corridor would not be considered a use of a Section 4(f) resource.

The location of the corridor that crosses the refuge at its narrowest width also avoids all parcels of the Sugar Ridge Fish and Wildlife Area. Therefore, this is not considered a use of a Section 4(f) resource.

2. Pyramid Mound

Description: Pyramid Mound is a site in the National Register of Historic Places. It is located along US 41 on Ramsey Road in Vincennes near the Hart Street interchange. The site is approximately 2 acres. A trail takes visitors to the top of the site. The site is a Middle Woodland burial mound with Late Woodland components.

The Pyramid Mound is an Indian burial and sacred ground and was placed in the National Register of Historic Places in 1975. The Pyramid Mound is a Knox County Park and Recreational Area. Coordination with the Manager of the Knox County Parks and Recreation Department revealed that they do not maintain the site and they have no boundary description of the site. Figure 8-4 shows the location of Pyramid Mound and the proposed right-of-way for Alternatives 1, 2A, 2B, and 2C. Figure 8-5 is a detailed view of the area. The boundary shown for Pyramid Mound is an estimate based upon vegetative growth.

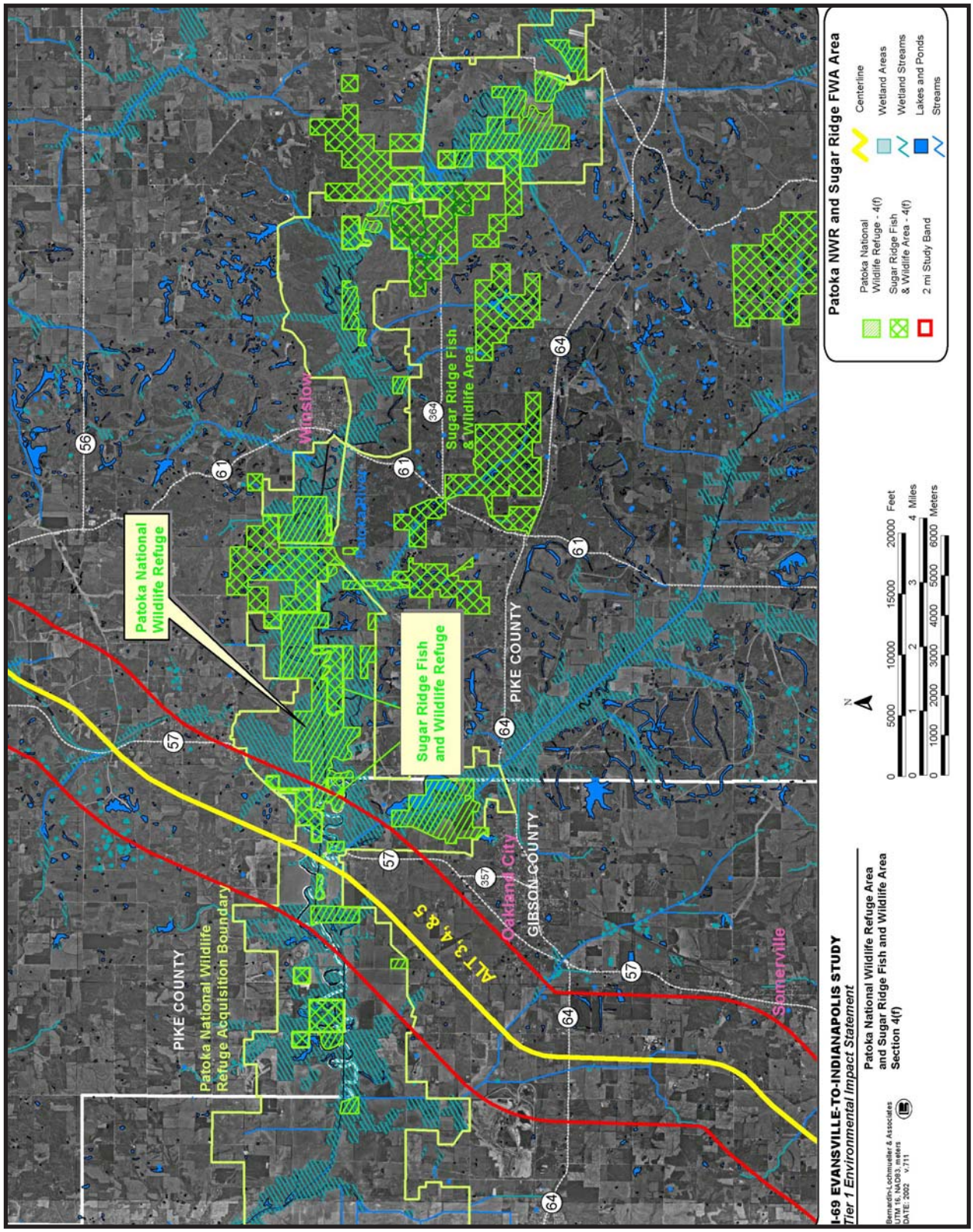

Figure 8-2: Patoka River National Wildlife Refuge and the I-69 Alternatives

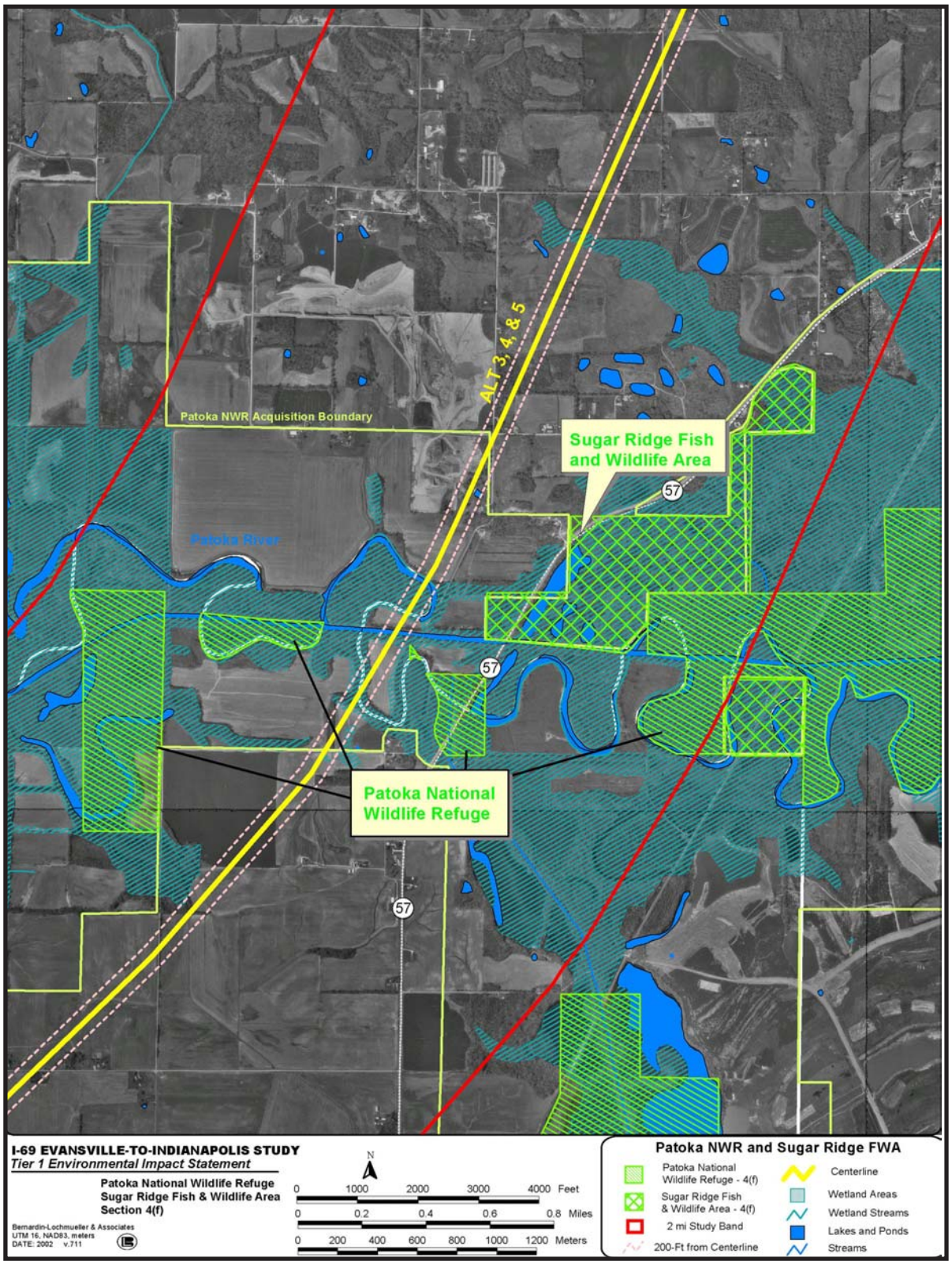

Figure 8-3: I-69 Corridor through the Patoka River National Wildlife Refuge

Impacts: Alternatives 1, 2A, 2B, and 2C are located close to, but avoid, Pyramid Mound (see Figure 8-5).

Avoidance Alternatives: The working alignment avoids Pyramid Mound.

Measures to Minimize Harm: The working alignment could be shifted further to the north.

3. Tincher Special Area of the Hoosier National Forest

Description: The Hoosier National Forest is managed by the U.S. Forest Service in accordance with the Hoosier National Forest Resource Management Plan (1991). In the Resource Management Plan, the Forest Service has established Management Areas. For each Management Area, the Plan defines specific management objectives.

The Tincher Special Area has been designated as Management Area 8.2. This designation applies to "regionally or locally significant areas" that are (1) "representative of unique or unusual geological, ecological, cultural, or other scientific values," or (2) "have the potential to be a regional or national landmark based on natural or cultural values." In these areas, the "rare or outstanding values are the primary consideration. Other resource values and uses are secondary..."

The Tincher Area has been designated as a special area because of its karst features and cave fauna. In addition, the Tincher Special Area also is used for recreational purposes, including fishing and hiking. The U.S. Forest Service has described the recreational activities within the Tincher Special Areas as "dispersed," except for a designated recreation site at Tincher Pond. (See Appendix BB, *Special Area Management Plan for Tincher Special Area)*

Based on existing information, Section 4(f) does not apply to the Tincher Special Area as a whole, because the recreational functions of this area are secondary and dispersed. However, Tincher Pond itself does qualify for protection under Section 4(f), because it has been designated and is managed as a recreational area.

Figure 8-6 shows the location of the Tincher Special Area and the proposed right-of-way for Alternatives 5A and 5B. Figure 8-7 is a detailed map showing the area impacted by the I-69 alternatives.

Impacts: Alternatives 5A and 5B would use approximately 75 to 100 acres of the Tincher Special Area, which is not protected under Section 4(f). These alternatives would avoid the Tincher Pond designated recreation site, which is protected under Section 4(f). Therefore, these alternatives would not use any Section 4(f)-protected land within the Hoosier National Forest.

While most of the Tincher Special Area is not protected under Section 4(f), it is a unique ecosystem in terms of karst and the number of rare, threatened, and endangered endemic species found there. Further discussion of this area can be found in Section 5.23, *Ecosystem Impacts*.

4. Martin State Forest Bike Trail

Description: The Martin State Forest is located in Martin County along US 50. The forest has 7,023 acres of land and is a recreational area with hiking, camping, fishing, and hunting. The forest

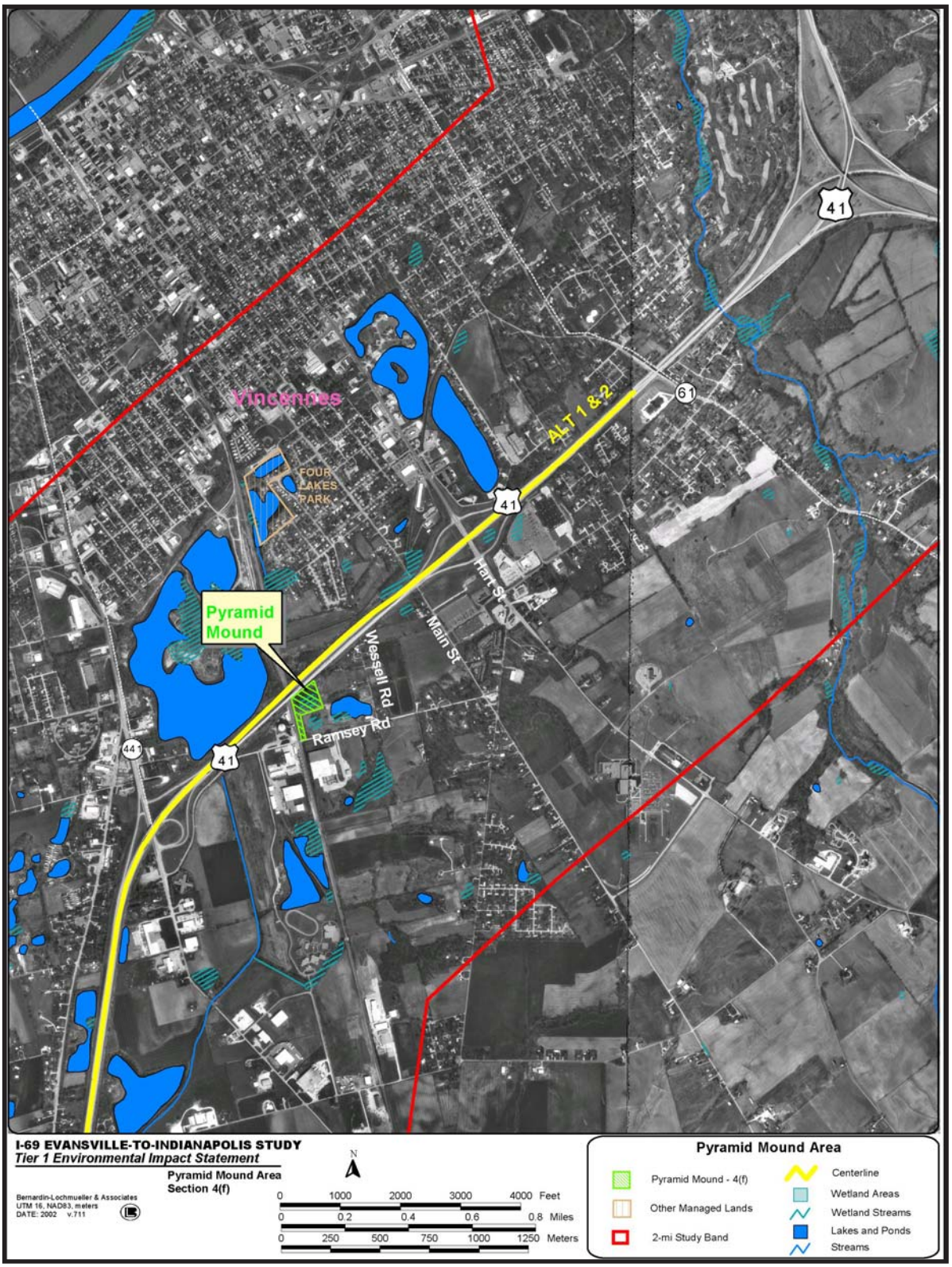

Figure 8-4: Pyramid Mound and the Proposed Right-of-Way for I-69 Alternatives

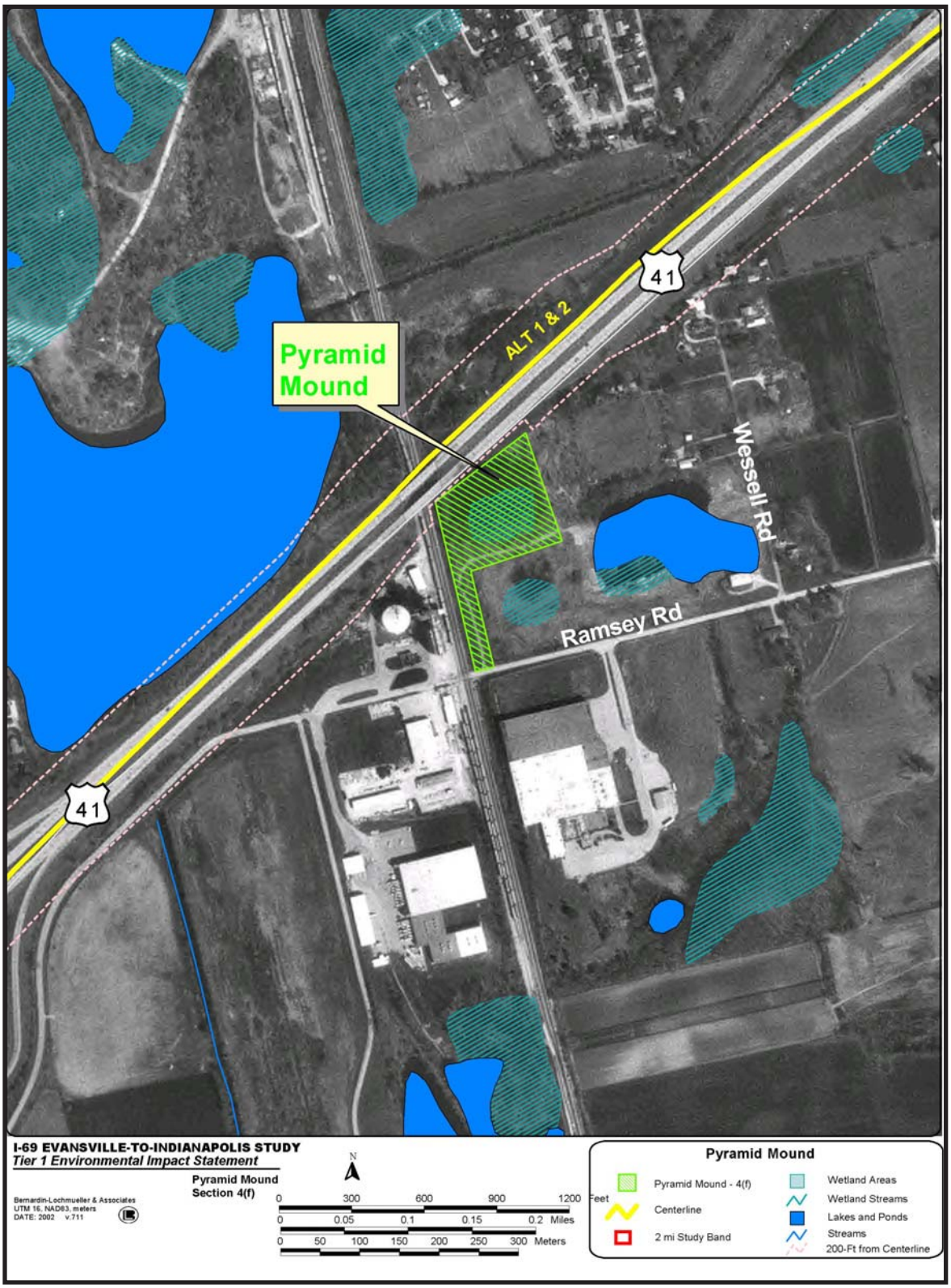

Figure 8-5: Detailed View of Pyramid Mound

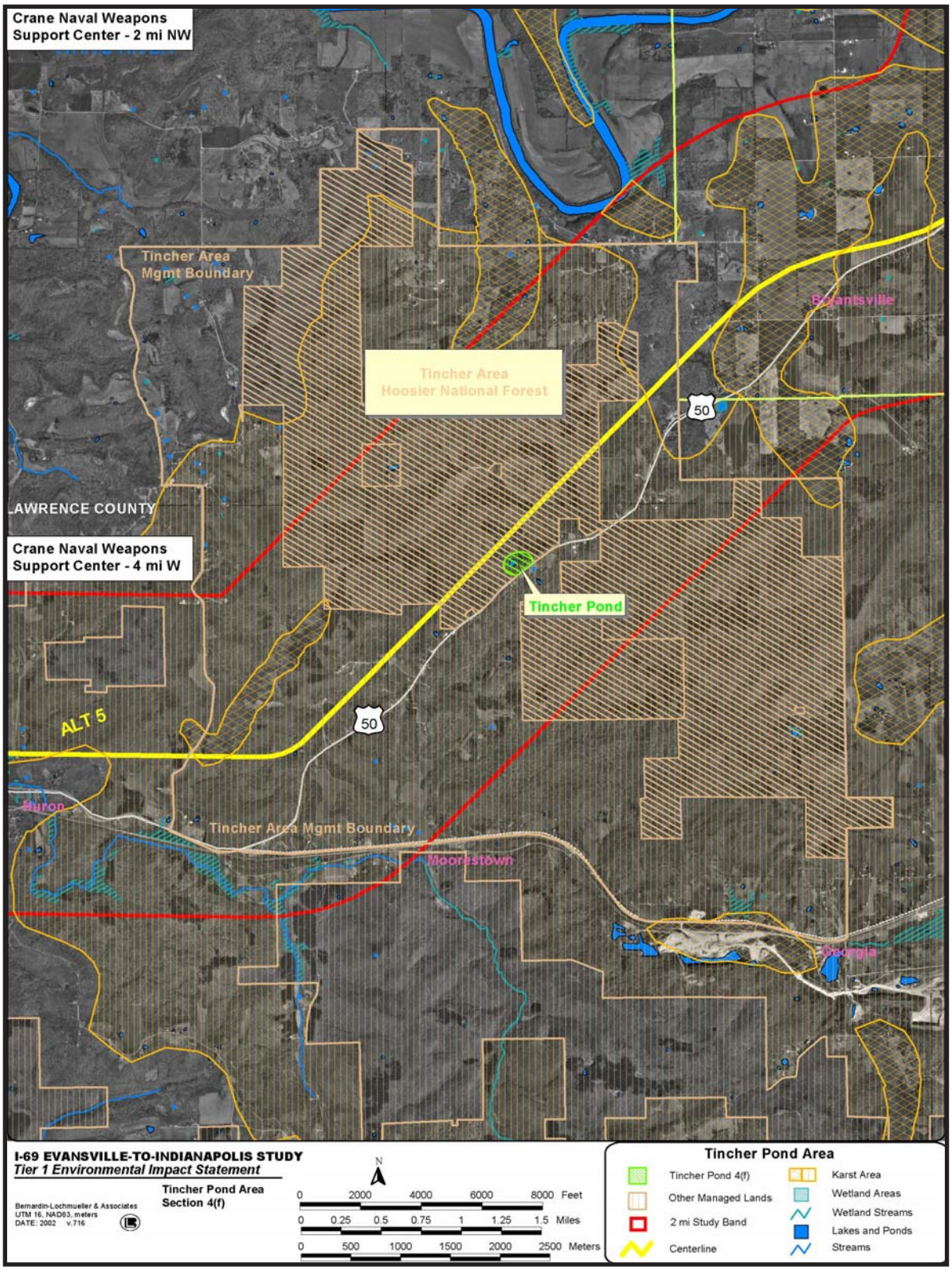

Figure 8-6: Tincher Special Area and the Proposed Right-of-Way for Alternatives

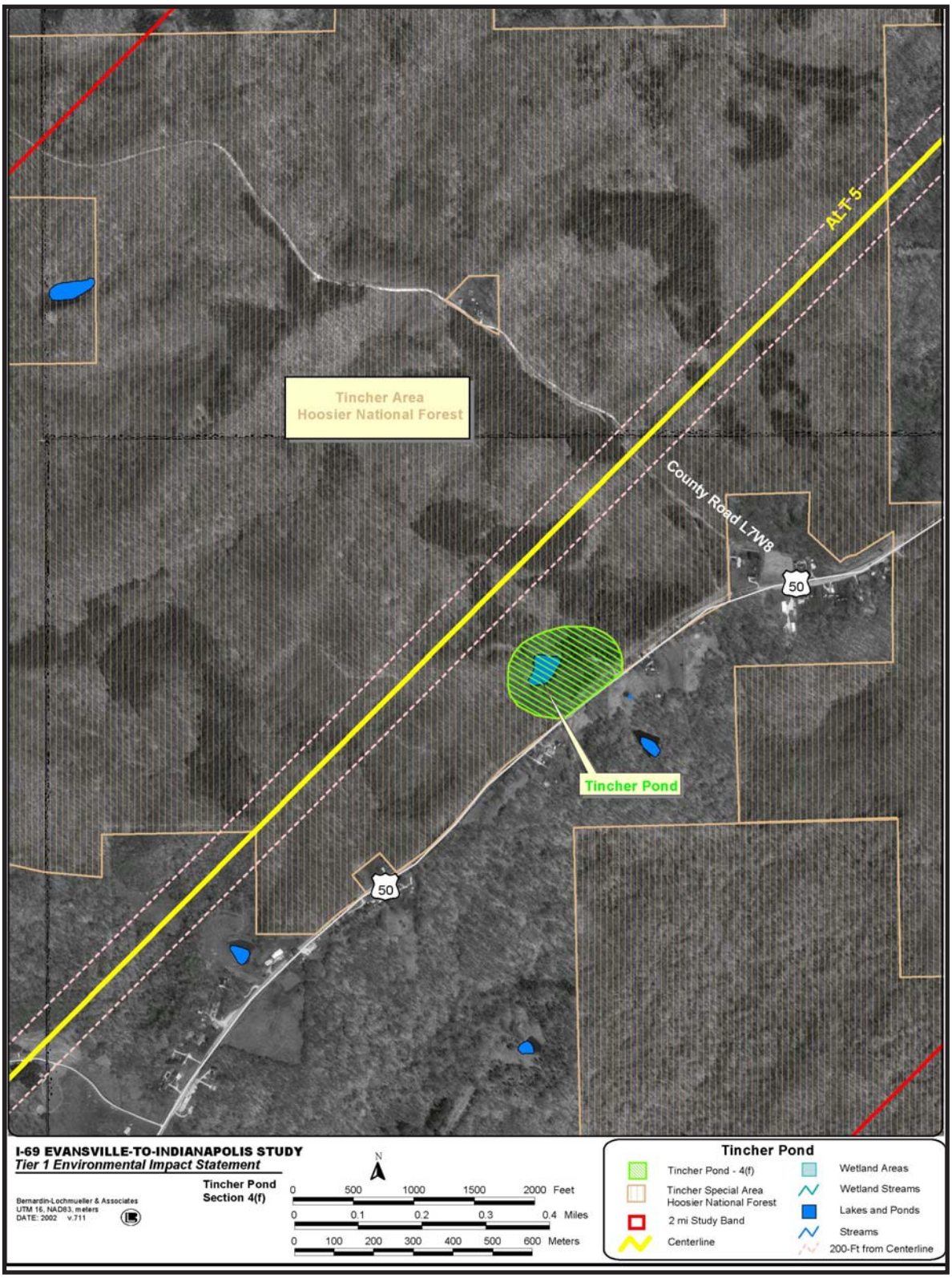

Figure 8-7: Detailed View of Tincher Special Area

contains 13.4 miles of bike trails. While the forest as a whole is not a Section 4(f) resource, the recreational parts of the forest including bicycle trails are considered a Section 4(f) resource.

The Martin State Forest encompasses an arboretum and an education center. There are 26 primitive camping sites. Figure 8-8 shows the location of the Martin State Forest and the proposed right-of-way for Alternatives 5A and 5B. Figure 8-9 is a detailed view of the state forest showing the bicycle trails.

Impacts: Alternatives 5A and 5B would use approximately 75 to 150 acres of the Martin State Forest. The alternatives would go through several of the bike trails.

Avoidance Alternatives: North of Martin State Forest is the Crane Naval Surface Warfare Center and the East Fork of the White River. South of the forest is the Hoosier National Forest with its recreational areas. The large size of the Martin State Forest and the large area encompassed by the bicycle trails precludes many avoidance options. Shifting the working alignment to the north to miss the recreational portion of the forest places the alignment in the drainage area of the East Fork of the White River. The avoidance alternatives include Alternatives 1, 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B, and 4C.

Measures to Minimize Harm: If this alternative is chosen, the corridor and working alignment could be shifted to the north to pass along the East Fork of the White River and the northern edge of Martin State Forest. Floodplains impacts would be substantial and there would still be impacts to the forest. However, these impacts would not be to the bicycle trails. These impacts would not be considered use of a Section 4(f) resource.

5. Morgan/Monroe State Forest

Description: The Morgan/Monroe State Forest encompasses more than 24,000 acres in Monroe and Morgan Counties. SR 37 goes through the forest between Bloomington and Martinsville. Coordination with the Property Specialist for the Indiana Department of Natural Resources, Division of Forestry, revealed that the recreation is dispersed throughout the forest lands.

According the Section 4(f) Policy Paper of the Federal Highway Administration (FHWA) "publicly owned land is considered to be a park, recreation area, or wildlife and waterfowl refuge when the land has been officially designated as such or when the Federal, State or local official having jurisdiction over the land determine that one of its major purposes or functions is for park, recreation, or refuge purposes. Incidental, secondary, occasional or dispersed recreational activities do not constitute a major purpose."(USDOT, 1989) According to the FHWA Section 4(f) Policy Paper, the dispersed recreational activities of Morgan/Monroe State Forest do not make it subject to the requirements of Section 4(f).

Figure 8-10 shows the location of the forest and the proposed right-of-way for Alternatives 3B, 3C, 5A, and 5B. Figure 8-11 is a detailed view of the state forest.

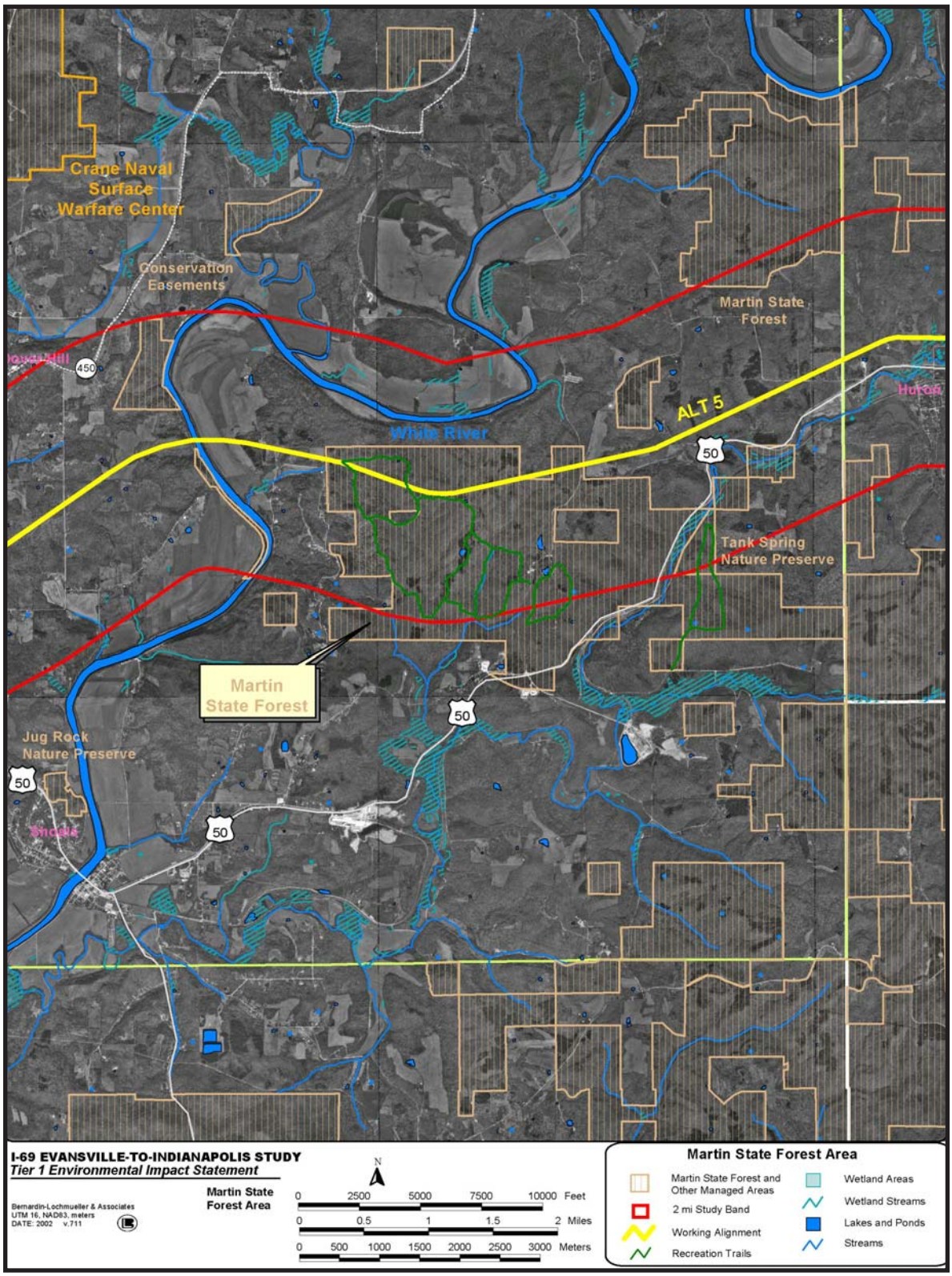

Figure 8-8: Martin State Forest and the Proposed Right-of-Way for Alternatives

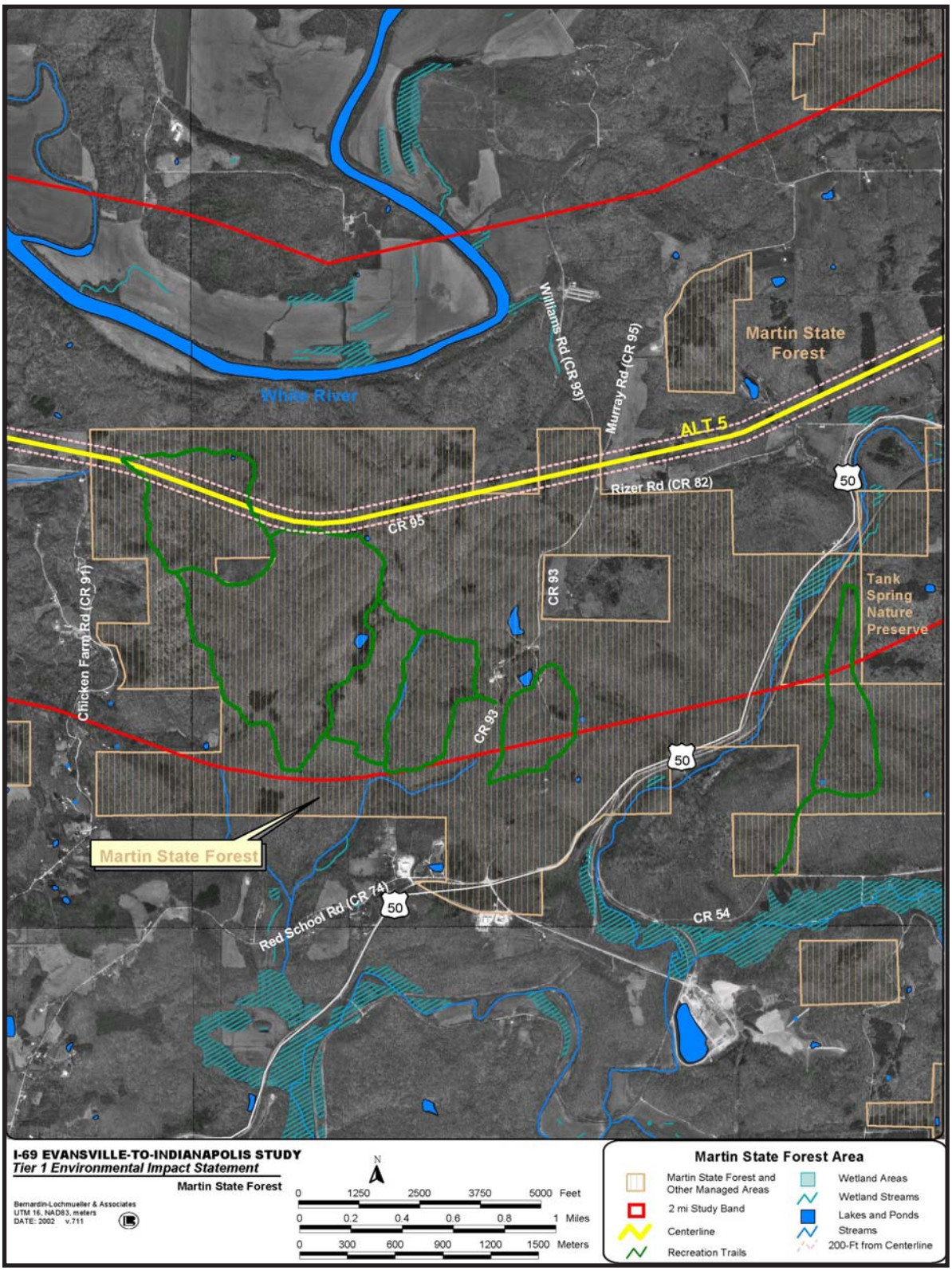

Figure 8-9: Detailed View of Martin State Forest

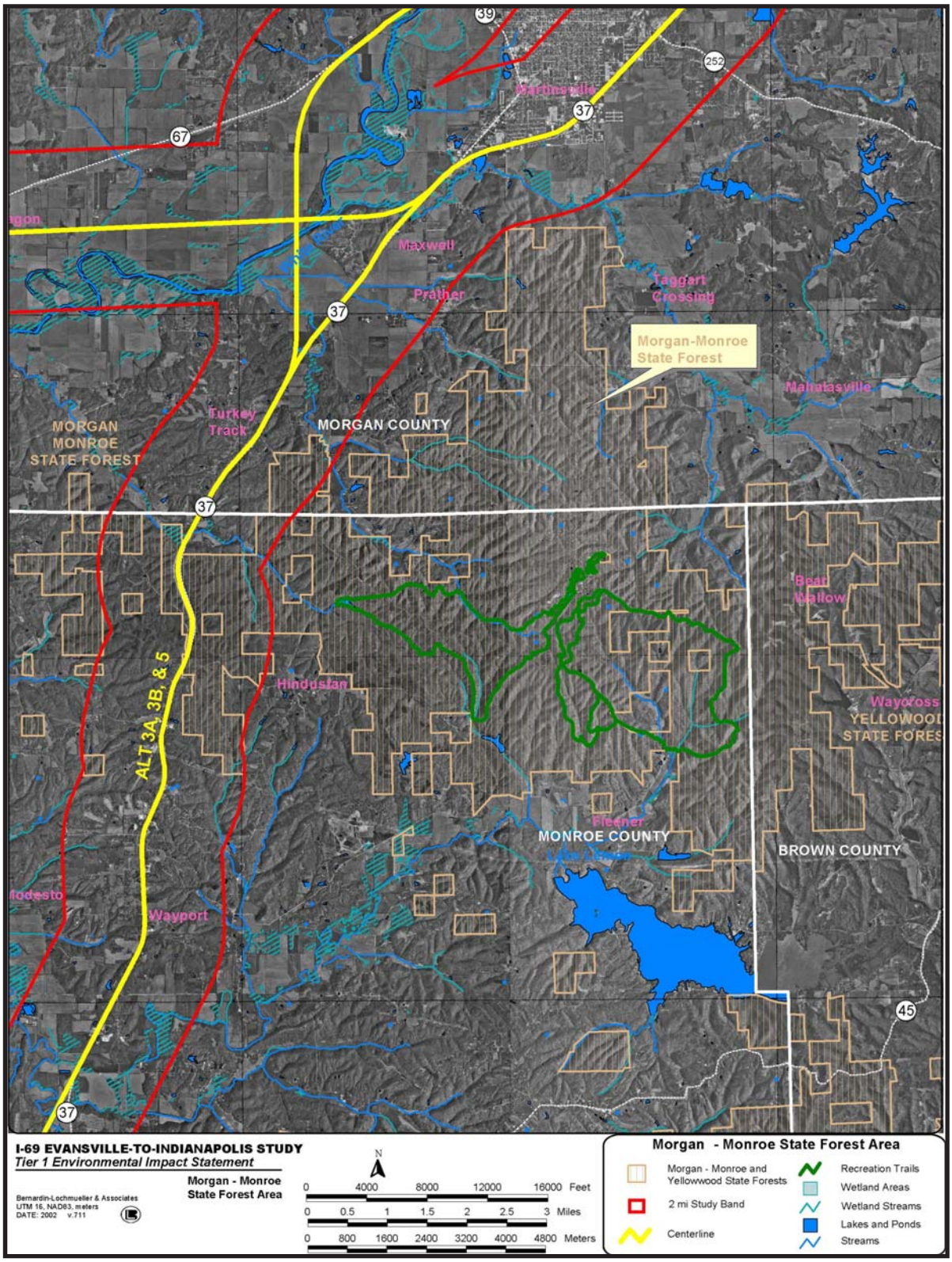

Figure 8-10: Morgan/Monroe State Forest and the Proposed Right-of-Way for Alternatives

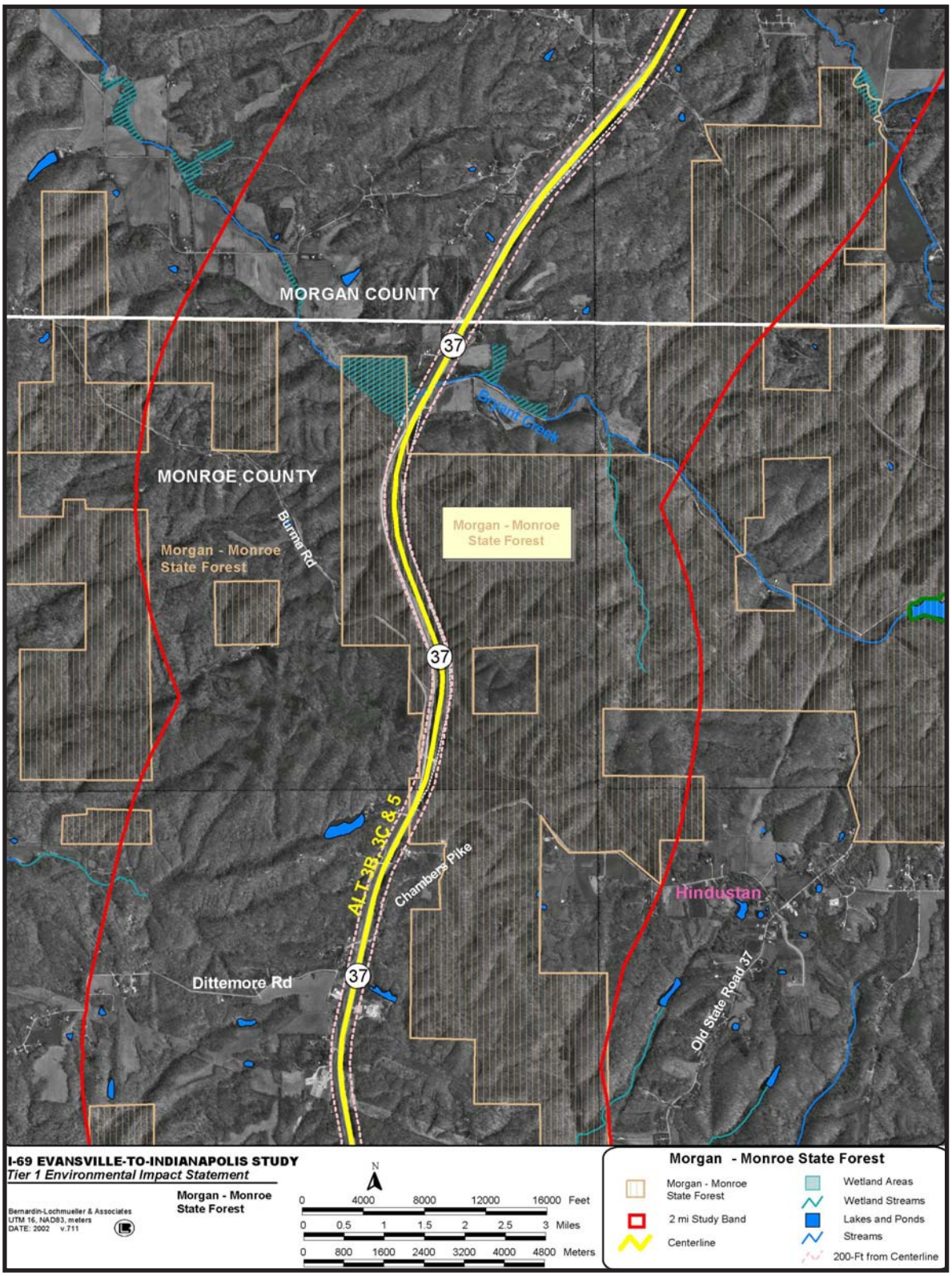

Figure 8-11: Detailed View of Morgan/Monroe State Forest

6. Beanblossom Bottoms Nature Preserve

Description: The Beanblossom Bottoms complex includes property owned by The Sycamore Land Trust as well as the Restle Unit of the Muscatatuck National Wildlife Refuge. The Beanblossom Bottoms complex represents a high quality wetland and forested ecosystems including two great blue heron areas. The complex is considered a High Biodiversity Area by The Nature Conservancy. According to a member of the Board of Directors of The Sycamore Land Trust, it is the intention of a number of agencies and groups to preserve this land throughout the Beanblossom Valley and extend to the White River. Access to the Beanblossom Bottoms is from Woodall Road just south of Bottom Road in northwest Monroe County.

The Beanblossom Bottoms complex has three types of ownership that affects its designation as a Section 4(f) resource. One part of the complex is a publicly owned refuge, the Restle Unit of the Muscatatuck National Wildlife Refuge. This part is a Section 4(f) resource. A second part of the complex is privately owned by The Sycamore Land Trust. This part of the complex is managed as a wildlife preserve and is subject to an easement held in perpetuity by the Indiana Department of Natural Resources. According to the Section 4(f) Policy Paper of the Federal Highway Administration (FHWA), Section 4(f) applies to a wildlife preserve if it "*primarily functions as a sanctuary or refuge for the protection of species*." It also states that "*land subject to public easement in perpetuity can be considered to be publicly owned land for the purpose which the easement exists.*" Using these definitions, the land subject to the IDNR easement is also considered a Section 4(f) resource. The third part of the complex is privately owned by The Sycamore Land Trust and is not subject to the requirements of Section 4(f).

Figure 8-12 shows the location of the Beanblossom Bottoms with the types of ownership and the proposed right-of-way for Alternatives 3A which directly impacts Section 4(f) land within the complex. Figure 8-12 also shows the right-of-way for Alternatives 3B, 3C, 5A, and 5B which utilize existing SR 37 in this area and avoid the complex. Figure 8-13 is a detailed view of the complex.

Impacts: Alternative 3A would require between 20 and 30 acres of land from the complex. Of that area, less than 2 acres would be taken from land protected by Section 4(f). Alternative 3B has been shifted to avoid the Beanblossom Bottoms complex.

Avoidance Alternatives: Alternative 3A could be shifted to the west to miss the Section 4(f) protected land within the Beanblossom Bottom complex. During the bus tour on June 4 and 5 of 2002, a member of the Board of Directors of The Sycamore Land Trust stated that there are plans to continue to purchase land to the west and the east of the existing Beanblossom Bottoms complex. The land to the west has a similar ecological system as the land in the Beanblossom Bottoms complex. Therefore, while a western alignment shift would avoid the Section 4(f) protected lands, it may not significantly reduce impacts to the Beanblossom Bottoms resource. Alternatives that completely avoid the Beanblossom Bottoms complex are Alternatives 1, 2A, 2B, 2C, 3B, 3C, 4A, 4B, 4C, 5A, and 5B.

Measures to Minimize Harm: Alternative 3A could be shifted to the west to reduce the impacts on the Beanblossom Bottoms complex. In addition, design modifications and mitigation measures could be developed.

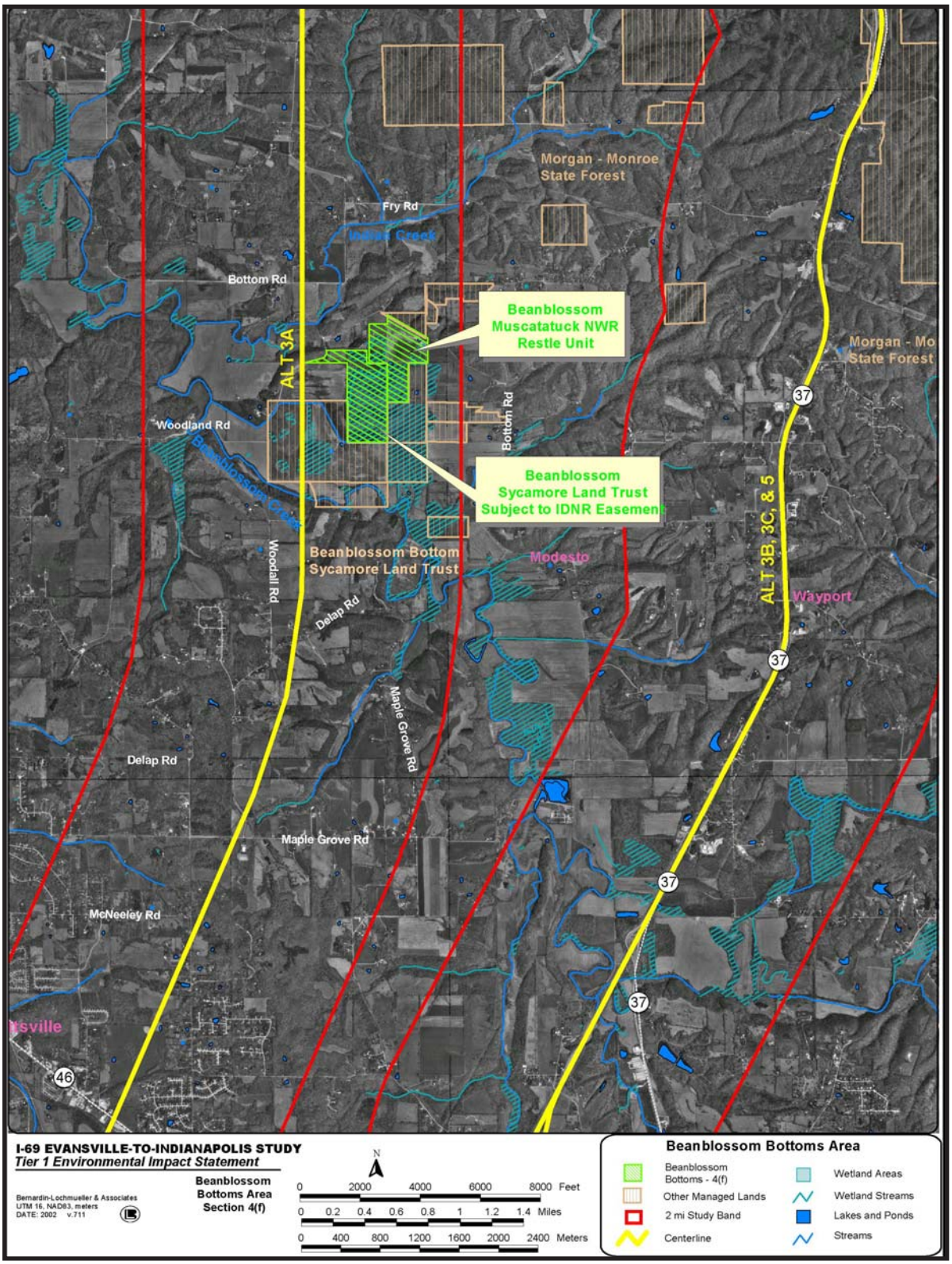

Figure 8-12: Beanblossom Bottoms Nature Preserve

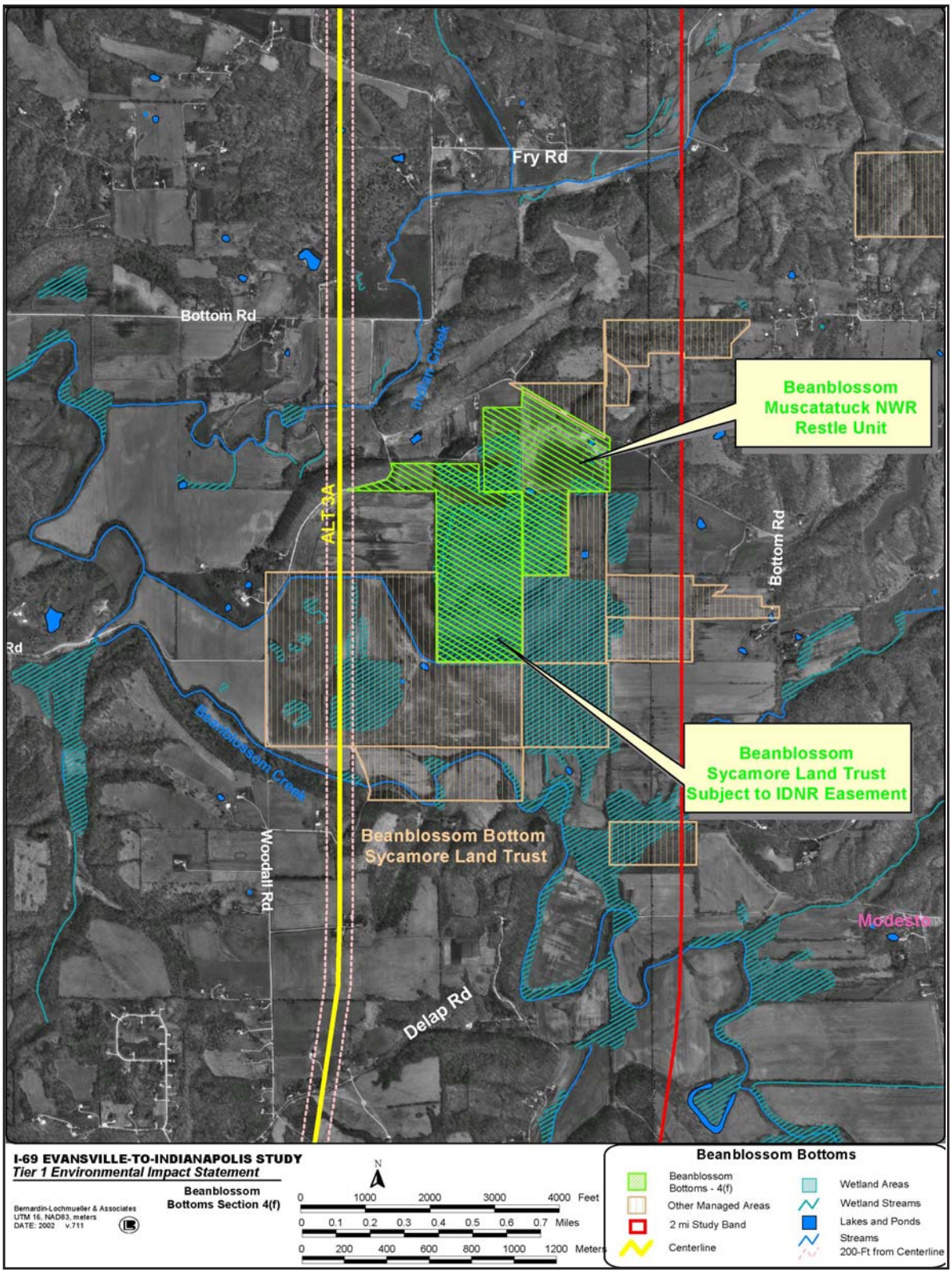

Figure 8-13: Detailed View of Beanblossom Bottoms Nature Preserve

7. Smalls Creek Park

Description: The Smalls Creek Park is listed in the IDNR database as a park under management of the Knox County Parks and Recreation Department. A portion of Smalls Creek Park is listed as a Land and Water Conservation Fund site. Coordination with the Manager of the Knox County Parks and Recreation Department revealed that Smalls Creek Park is not under their management and is shown on the Knox County plat books as privately owned by an individual. He knows of no easement granted for governmental use for the property. According to the regulations on Section 4(f), this property is not subject to the Section 4(f) requirements. Alternative 2 was shifted to miss this site (see Figure 8.2-14).

8. Bloomington Rail Trail

Description: The Bloomington Rail Trail is a bicycle and walking trail on an old railroad bed. The Rail Trail is approximately 6.2 miles in length. Two of the trail miles are regularly maintained while the remaining miles are just occasionally maintained. The Bloomington Rail Trail is managed by the Bloomington Parks and Recreation Department. According to the Operations Director of the department, they have a quit claim from the railroad to use the railroad bed for the bicycle and walking trail. The Rail Trail passes under SR 37 south of Bloomington on the old railroad bed that has about 60 feet of right-of-way.

Currently, the Rail Trail is crossed by bridges on SR 37 and Alternative 5A and 5B will cross at the exact same location (see Figure 8-15). No right-of-way will be acquired from the trail. With no right-of-way needed, this is not considered a use of a Section 4(f) resource.

Table 8-1: Summary of Section 4(f) Analysis For Parks, Recreation Areas, and Wildlife Refuges

Resource	Is It a Section 4(f) Resource?	Do any Alternatives impact the Section 4(f) resource?	Can the Alternative be shifted to avoid the Section 4(f) Resource?
Patoka River National Refuge and Sugar Ridge Fish and Wildlife Area	Yes	No	N/A
Pyramid Mound	Yes	No	N/A
Tincher Special Area of Hoosier National Forest	Yes* *Tincher pond only	No	N/A
Martin State Forest Bike Trail	Yes	Yes Alternatives 5A and 5B	Low potential for avoidance
Morgan/Monroe State Forest	No	N/A	N/A
Beanblossom Bottoms Nature Preserve	Yes	Yes Alternative 3A	High potential for avoidance
Smalls Creek Park	No	N/A	N/A
Bloomington Rail Trail	Yes	Yes Alternatives 5A and 5B	High potential for avoidance
Bradford Woods	Yes	No	N/A

9. Bradford Woods

Description: Bradford woods is a combination park, camp, forest, farm, nature preserve, bird sanctuary, and game refuge. This 2400 acre tract of land is owned and managed by the Department of Recreation and Park Administration at Indiana University. Figure 8-16 shows Bradford Woods in relation to Alternative 5A. According to the regulation on Section 4(f), Bradford Woods is subject to the Section 4(f) requirements. Alternative 5A was shifted to avoid this site (see Figure 8-16).

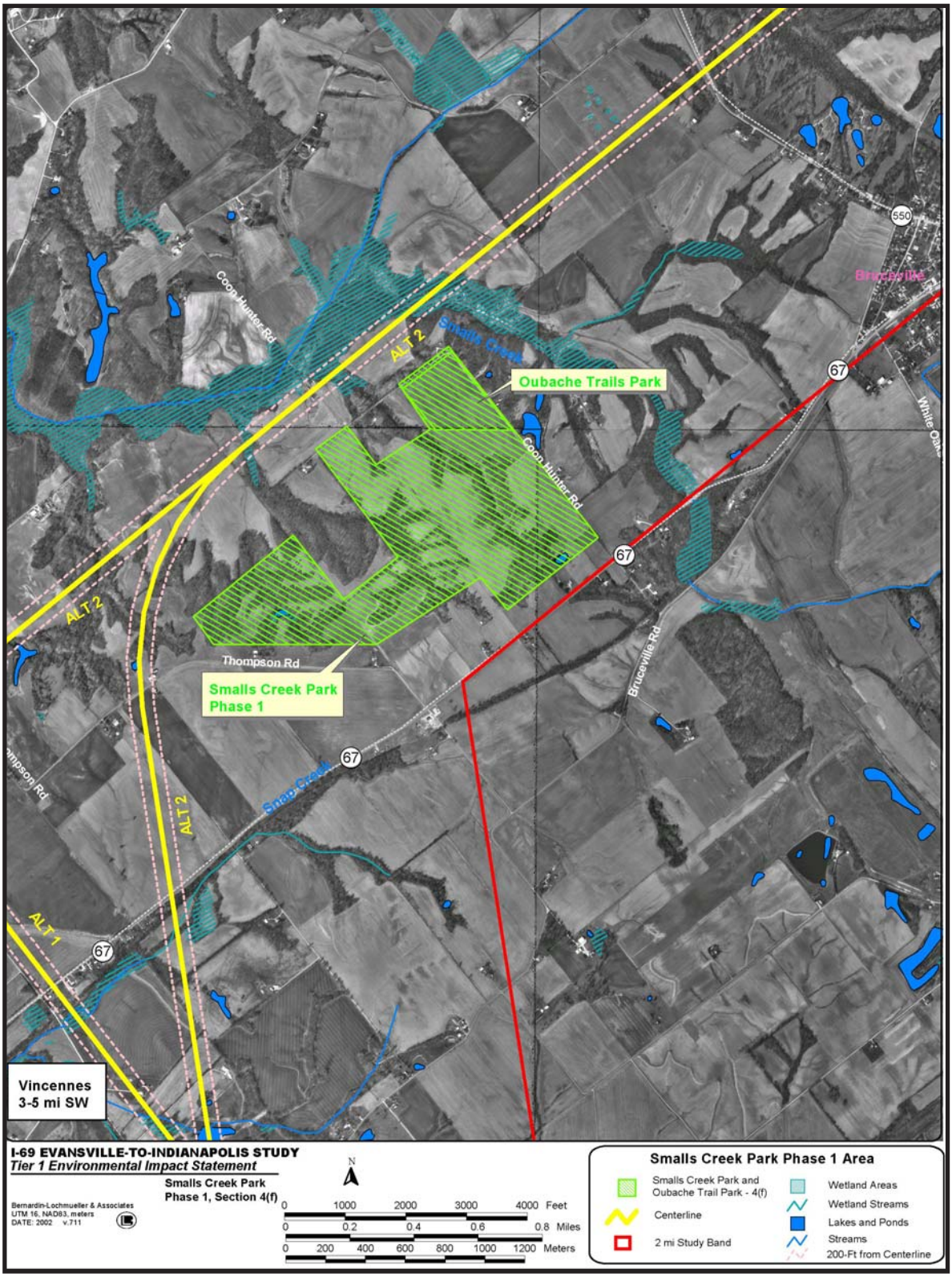

Figure 8-14: Smalls Creek Park and the Proposed Right-of-Way for Alternatives

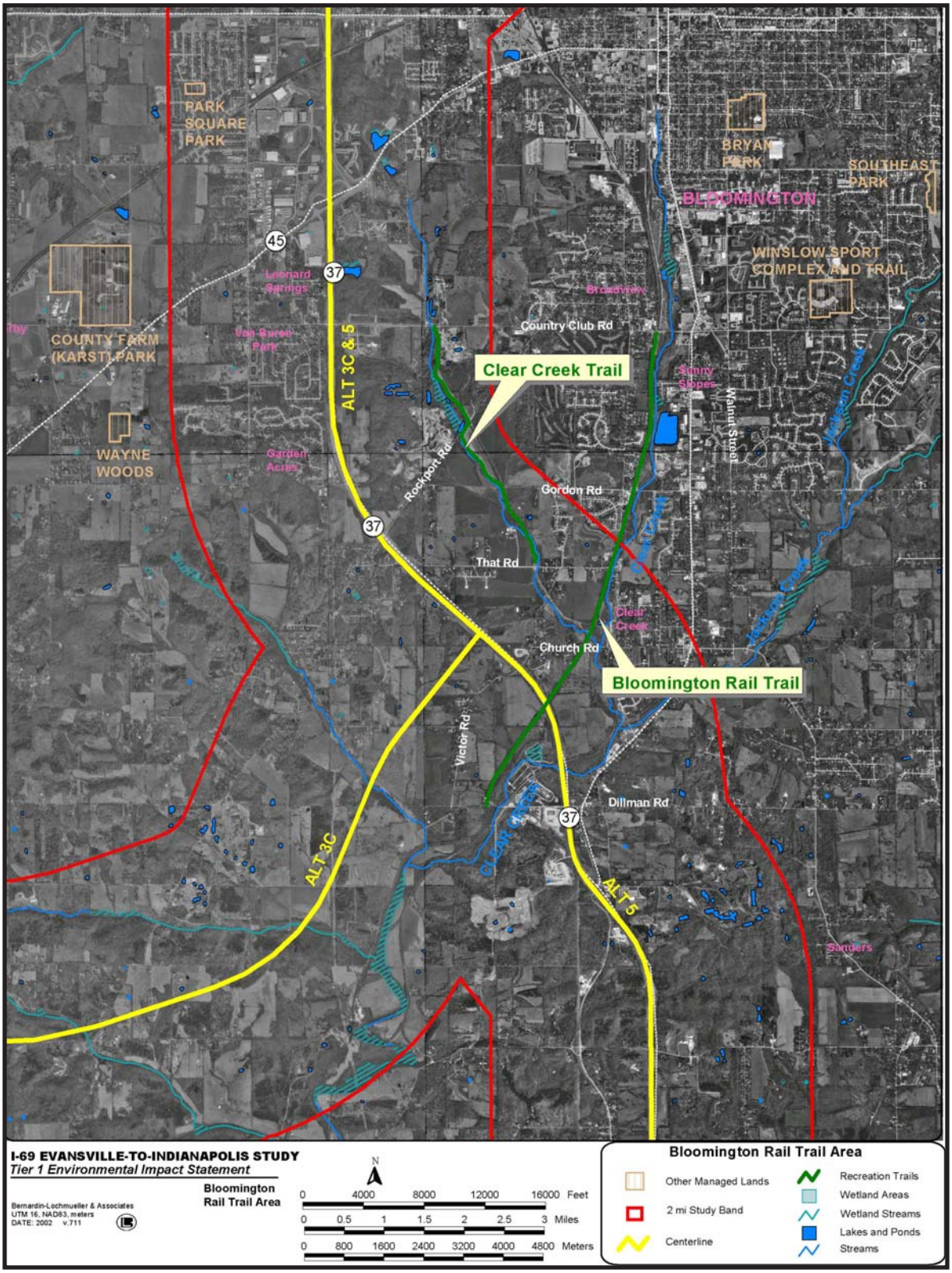

Figure 8-15: Bloomington Rail Trail and the Proposed Right-of-Way for Alternatives

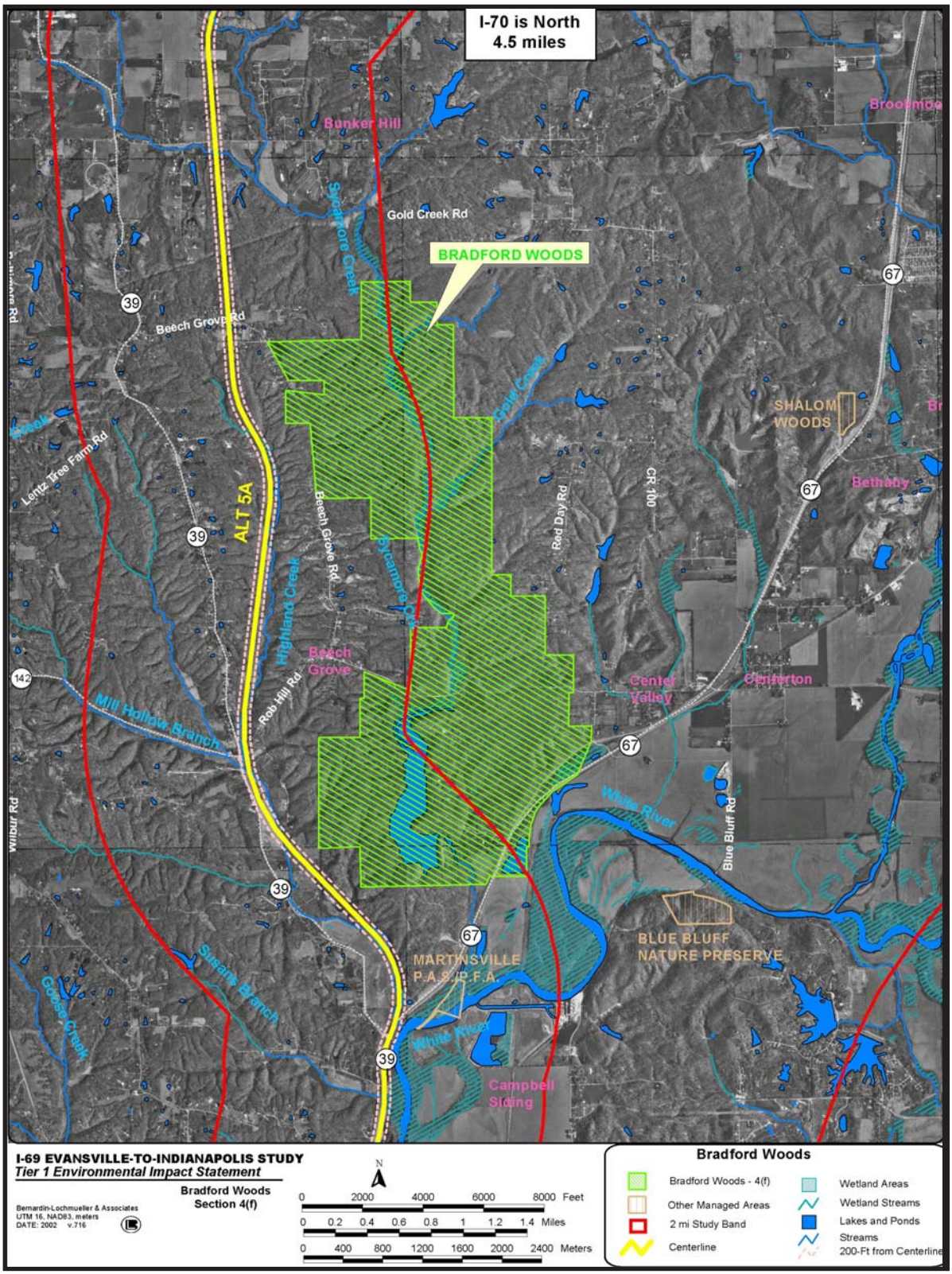

Figure 8-16: Bradford Woods in Relation to Alternative 5A

Summary

Table 8-1 provides a summary of the section 4(f) analysis. Martin State Forest Bike Trail is shown as section 4(f) resource with a low potential for avoidance by Alternative 5A and 5B. Beanblossom Bottoms Nature Preserve and the Bloomington Rail Trail have a high potential for avoidance by I-69 Alternatives.

8.3 Section 4(f) Resources – Historic and Archaeological Resources

Section 4(f) applies to historic properties and archaeological sites that are listed in or eligible for the National Register of Historic Places. Section 106 is the process that identifies listed and eligible historic and archaeological resources. In this Tier 1 document, the Section 106 process is being conducted using a phased approach to the identification of historic resources. See Section 5.13.1, Section 106 *Process and Methodology*. This phased approach is consistent with the Section 106 regulations and has been developed in consultation with the SHPO and ACHP. In accordance with that process, an inventory of the historic and archaeological resources in the Study Area has been developed. All historic and archaeological resources listed in or determined eligible for the NRHP within the 2 mile wide study bands have been identified in the GIS database (see Table 8-2).

8.3.1 Historic Resources

As shown in Table 8-2, none of the alternatives impact any historic structure or districts that are listed in or determined eligible for the NRHP within the working alignment.

As shown in Table 8-3, potentially eligible structures and districts within the 2 mile wide study band (APE) have been identified by a professional historian. The results of this inventory are documented in Appendix N. Because boundaries for these structures and potential districts have not yet been established, it is not possible to determine at this stage which of the potentially eligible structures and districts would be used by a particular alternative.

Therefore, potential impacts on these potentially eligible structures and districts have been shown in three ways: (1) the total number of potential structures and districts within the 2 mile wide study band (APE); (2) the total number of potential structures and districts within the corridor; and (3) the total number of potential structures and districts in the working alignment. This information is shown in Table 8-3.

Based on the information developed to date, each of the alternatives has the potential for impacts on Section 4(f) protected historic properties. It is not possible at this stage to draw firm conclusions as to the relative impacts of the alternatives on historic properties.

Therefore, in accordance with FHWA regulations, the objective in this Tier 1 process is to avoid known Section 4(f) resources if possible; to minimize impacts where avoidance is not possible; and to preserve opportunities for further consideration of avoidance and minimization options in Tier 2.

Table 8-2: Listed and Determined Eligible Historic and Archaeological Sites within Working Alignment

4(f) Resources	Alternative 1	Alternative			Alternative			Alternative			Alternative	
		2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Historic Properties												
Properties in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Properties Determined Eligible but not in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Historic Districts												
Districts in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Districts Determined Eligible but not in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Archaeological Sites												
Sites in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Sites Determined Eligible but not in the National Register	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0	0	0	0	0

Table 8-3: *Potential* Historic Properties and Districts within the Area of Potential Effects

4(f) Resources	Alternative 1	Alternative			Alternative			Alternative			Alternative	
		2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B
Historic Properties Potentially Eligible for National Register												
Properties in the Study Band/Area of Potential Effects	83	79	74	99-100	38-42	64-69	74-79	30-34	25-29	53-58	64	65-66
Properties in the Corridor	17	12	12	17-18	7	14-15	13-14	2	2	12	15	14-15
Properties in the Working Alignment	3	3	3	4-6	1	1	2-4	0	0	1-2	6	3-5
Historic Districts Potentially Eligible for National Register												
Districts in the Study Band/Area of Potential Effects	3	2	2	4	2	3	4	2	2	3	4	4
Districts in the Corridor	0	0	0	0	1	2	2	1	1	1	1	1
Districts in the Working Alignment	0	0	0	0	1-2	1-2	1-2	0-1	0-1	0-1	0	0

8.3.2 Archaeological Resources

As discussed in Section 5.13.5, *Impacts on Archaeological Resources*, there are no archaeological sites listed in or determined eligible for the National Register within any of the working alignments. One listed site – Pyramid Mound – is located within the 2,000 foot corridor for Alternatives 1, 2A, 2B, and 2C but is avoided by the working alignment for those alternatives.

In addition to identifying listed and determined-eligible archaeological sites, the archaeological investigations for this project also have included a comprehensive records check and archaeological predictive modeling. These tools have been used to evaluate the potential impact of the alternatives on archaeological sites that have not yet been identified or have not yet been fully evaluated. As stated in Section 5.13.5- *Impacts on Archaeological Resources,* the analysis conducted to date indicates that all of the alternatives have the potential to impact archaeological resources. It is not possible at this stage to draw firm conclusions as to the relative impacts of the alternatives on archaeological sites.

Finally, it should be noted that archaeological sites, even if eligible for the National Register, are not necessarily protected by Section 4(f). The FHWA Section 4(f) Policy Paper states that, "*Section 4(f) does not apply if FHWA after consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation determines that the archaeological resource is important chiefly because of what can be learned by data recovery… and has minimal value for preservation in*

place." Determinations regarding the eligibility of specific archaeological sites, as well as the need for preservation in place, will be made in Tier 2.

8.3.3 Summary

Based on the information developed to date in the Section 106 process it has been determined that:

- None of the Alternatives would directly impact any historic property or archaeological resource that is currently listed in or determined eligible for the National Register of Historic Places. Therefore, at this stage, none of the alternatives involves the use of any Section 4(f)-protected historic or archaeological property (see Figure 8-2).
- Each of the alternatives has the potential to impact historic properties (including historic districts) that have been preliminarily identified in this Tier 1 study as "potentially" eligible for the National Register.
- Each of the Alternatives has the potential to impact archaeological sites that have not yet been identified or have not been fully evaluated.

Further investigations of historic properties and archaeological sites will be conducted in Tier 2 NEPA studies of the selected corridor. The additional studies conducted in Tier 2 will definitively determine the presence and exact location of any historic properties or archaeological resources that may be present in the selected corridor.

If the Tier 2 studies confirm that Section 4(f)-protected historic properties and/or archaeological sites are present within the selected corridor, avoidance alternatives will be investigated. The analysis of avoidance alternatives will consider shifts within the selected corridor. Where avoidance alternatives within the selected corridor are not available, the analysis of potential avoidance alternatives may be expanded as appropriate. Decisions regarding the scope of the Section 4(f) analysis in Tier 2 rest with FHWA.

In summary, the alternatives under consideration in this Tier 1 EIS avoid all listed and determined-eligible historic properties and archaeological sites. The possibility exists that additional impacts on such properties will be identified in Tier 2. If such impacts are identified, they will be avoided or minimized as required by Section 4(f).

8.4 Coordination

This project has been coordinated with the agencies and officials having jurisdiction over the Section 4(f) resources that will be affected. Agency coordination is described in Chapter 11 *Comments, Coordination, and Public Involvement*. Archaeological and historical reports were coordinated with the SHPO for determination of eligibility. Parks, preserves, recreational areas, and refuges were coordinated with the agencies and officials having jurisdiction over each resource. In addition to formal coordination meetings, there were numerous informal meetings, discussions and telephone conversations with local officials and park representatives to solicit information and concerns about individual resources. A summary of formal coordination efforts follows.

1. Discussion of Section 106 process and Section 4(f) resources on April 5, 2001

   The following agencies with jurisdiction over Section 4(f) resources were in attendance at this meeting. The Indiana State Historic Preservation Officer was in attendance at this meeting.

2. Interagency Coordination Meetings on June 5, 2001 and November 27, 2001

   These two coordination meetings involved numerous federal and state agencies in discussing the Purpose and Need, the evaluation of alternatives, and the environmental process

   including Section 4(f). The Hoosier National Forest and the Indiana State Historic Preservation Officer were in attendance at these meetings.

3. Section 106 and Section 4(f) Meetings on January 31, 2002 and April 19, 2002

   These two meetings involved the Indiana State Historic Preservation Officer in discussions on methodological issues, the Area of Potential Effect, and on data collection and identification of historic sites and districts.

8.5 Section 6(f) Resources

The Land and Water Conservation Fund Act of 1965 established grants-in-aid fund to assist states in the planning, acquisition, and development of outdoor recreational land and water areas and facilities. Section 6(f) of the Act prohibits the conversion of any property acquired or developed with the assistance of the fund to anything other than public outdoor recreation use without the approval of the Secretary of the Department of the Interior.

8.5.1 Methodology

The Geographic Information Systems (GIS) information “Public Recreation Facilities in Southwestern Indiana” and “Trails for Recreation in Southwestern Indiana,” provided by the Indiana Department of Natural Resources Division of Outdoor Recreation, and “Managed Lands in Southwestern Indiana”, based on information provided by the Indiana Department of Natural Resources Natural Heritage Data Center, were used in this analysis. This information as well as field reviews were used to determine if proposed alternatives impacted outdoor recreation facilities.

8.5.2 Results

For the I-69 alternatives, there are no known resources funded by the Land and Water Conservation Fund Act that would be impacted.

Chapter 9 - List of Preparers

Name	Position	Credentials
Federal Highway Administration		
Robert Dirks, P.E.	EIS Project Manager	B.S.C.E. 8 years experience in environmental studies
Larry Heil, P.E.	Manager of planning, research, and environmental activities in Indiana.	B.S. and M.E., Civil Engineering, 15 years experience in planning and environmental studies.
Anthony DeSimone	Field Operations Engineer	5 years experience in project development and construction oversight. B.S., Civil Engineering and a Minor in Environmental Engineering
Indiana Department of Transportation		
Janice Osadczuk	Chief, Division of Environment, Planning, and Engineering	B.A., Biology / MA., Ecology / NEPA, Environmental related experience- 27 years
Lyle Sadler	Project Manager	21 years experience in management and administration. B.S. in Management and Administration
Jim Juricic	Manager, Environmental Services	B.S., Forestry, 30 years NEPA / Environmental related experience
Bob F. Buskirk	Environmental Planning (Review)	31years experience with INDOT, 25 years Experience reviewing EIS. B.S. Wildlife Mgt.
Brad Steckler	Manager, Engineering Services	B.S.C.E., M.E. Civil Engineering 17 years experience
Steve Smith	Manager, Long Range Planning	B.S. Urban-Regional Planning M.S. City Planning Trans. 27yrs. experience trans. planning
Bernardin-Lochmueller & Associates, Inc.		
Keith Lochmueller	President, Principal	40 years experience in transportation and land use planning; consultant on numerous planning and environmental related studies, consultant to INDOT, A.D. Construction Technology.
Vincent Bernardin, A.I.C.P.	Vice President, Principal	28 years experience in planning and traffic analysis. M.U.P. Transportation, B.A. Sociology/Economics

Name	Position	Credentials
David Isley	Director of Environmental Studies, Principal	26 years in land use and transportation modeling and air quality analysis; consultant to INDOT; B.S., Computer Science and Mathematics, M.U.P., in Urban and Regional Planning
James Gulick, P.E., S.E.	Chief Engineer, Principal	8 years location engineering, 24 years bridge design B.S., C.E., P.E., M.S., C.E.
Michael Grovak	Chief, Transit Planning and Economics	19 years experience in transit planning. B.S., C.E. (Transportation Systems)
Thomas H. Cervone, Ph.D.	Environmental Manager	30 years experience in environmental studies; B.S., Ph.D., Post Doctorate in Biology
Rusty Yeager	Senior Field Biologist	12 years experience in environmental studies, B.S. Biology
Jeremy Kieffner	Field Biologist	9 years experience in environmental studies. B.S., Public and Environmental Affairs
Kia Gillette	Environmental Biologist	4 years experience in environmental studies. M.S., E.S. (Environmental Chemistry)
Neal Schroeder	Environmental Planner	15 years experience in construction engineering and 5 years in GIS. B.A., Geography
Jason DuPont	Project Engineer	4 years experience in environmental engineering. B.S., C.E.
Josh Sherretz	Field Biologist	B.S., Public and Environmental Affairs
Cinda Bonds	Environmental Biologist	6 years experience in environmental studies. M.S., Wildlife and Fisheries Science
Brian Litherland, P.E.	Manager, Highway Design	11 years experience in highway design. B.S., C.E.
David Ripple, Ph.D., P.E., A.I.C.P.	Chief of Transportation and Land Use Planning	31 years experience in transportation and land use planning. Ph.D., Urban and Transportation Engineering, M.S., C.E., B.S., C.E.
Matthew Rueff	Administrator Water/Waste Water Services	16 years experience in water and waste water services. M.P.A., B.S., Political Science
Trisha Dudala	Transportation Engineer / Planner	3 years experience in transportation engineering and planning. M.S., Civil and Environmental Engineering
Dan Townsend	Transportation Engineer	5 years engineering experience. B.S., C.E.
Kyeil Kim, Ph.D.	Transportation Planner / Engineer	10 years of engineering experience. Ph.D., Civil and Transportation Engineering, M.S., Civil and Transportation Engineering, B.S., Urban Planning

Name	Position	Credentials
Sridhar Sunkanapalli	Transportation Engineer/Planner	4 years of engineering experience. B.S., C.E., M.S., Transportation Engineering.
Cheryl R. Brown	Project Engineer	5 years experience in engineering. B.S., C.E.
Dominick Romano, Jr.	Project Engineer	4 years experience in engineering. B.S., C.E.
Valerie Paul	Transportation and Land Use Planner	2 years experience in transportation and land use planning. Bachelor of Urban Planning and Development
Daniel McGee	Transportation Planner	17 years experience in planning. M.P.A., B.S. Political Science
Vince Bernardin, Jr.	Transportation Planner	1 year experience in transportation planning. B.A., Philosophy and Physics
Ginny Wortz	Manager, Graphic & Data Division	25 years experience in management, administration, and marketing.
Brenda Stewart	Project Coordinator	25 years experience in administration and public relation.
Harmony Otahal	Graphic Designer	3 years experience in graphic design. B.S., Journalism and Computer Publishing
Jane Mosby	Manager, Administrative Services	15 years in office administration and management.
Michael Howery	Graphic Designer	5 years experience in graphic design. B.S. Telecommunications
Indiana State University		
John O. Whitaker, Jr., Ph.D.	Mammalogist	Research concentrations include vertebrate ecology, mammaloy, invertebrate zoology, and natural history. Ph.D., Cornell University
Peter E. Scott, Ph.D.	Ornithologist	Research concentrations include plant-pollinator interactions and avian ecology. Ph.D., Louisana State University
Marion T. Jackson, Ph.D.	Ecologist	Research concentrations include plant ecology, landscape ecology, and natural history. Ph.D., Purdue University
Biotic Consultants, Inc.		
Robert H. Mohlenbrock, Ph.D.	Botanist	Has been involved in plant indentification and recognition for over 50 years and has authored over 40 books. Ph.D. ,Washington University
Cambridge Systematics, Inc.		
John Kaliski	Principal	Experienced in intermodal transportation planning, policy, and economic development. Bachelor's, Government
Brian Ten Siethoff	Senior Transportation Analyst	Experienced in transportation planning, land use, and economic analysis, B.S., C.E., Master's in Transportation Engineering

Name	Position	Credentials
Cambridge Systematics, Inc.		
Jeffery N. Buxbaum, A.I.C.P.	Senior Associate	20 years experience as transportation-planning consultant. B.S., C.E.
Dyer Environmental, Inc.		
Sara Dyer	President	23 years experience in environmental studies. B.S. in Real Estate and Urban Studies
The Appraisal Network		
Robert Neal Sanders	Appraiser	Indiana certified general appraiser, INDOT Approved Fee Appraiser, INDOT Approved Fee Buyer, Bachelor's concentration in RealEstate Administration, A.D. in Economics
Akin, Gump, Strauss, Hauer & Feld		
Bill Malley	Legal Counsel	Experience in public and private sectors on matters involving the preparation of environmental impact statements NEPA, federal and state regulatory, specializes in environmental and land use practices

Chapter 10 - List of Agencies and Groups Asked to Comment on the Tier I DEIS

- U.S. Department of Interior, Fish and Wildlife Service, Bloomington, Indiana
- Natural Resource Conservation Service, Indianapolis, Indiana
- Indiana Geological Survey, Bloomington, Indiana
- Indiana Department of Natural Resources, Division of Fish and Wildlife Indianapolis, Indiana
- Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology, Indianapolis, Indiana
- Indiana Department of Environmental Management, Indianapolis, Indiana
- U.S. Environmental Protection Agency, Chicago, Illinois
- Environmental Protection Agency, Office of Federal Activities, Washington, D.C.
- Hoosier National Forest, Bedford, Indiana
- U.S. Department of Interior, Regional Director of National Parks, Omaha, Nebraska
- Department of Housing and Urban Development, Indianapolis, Indiana
- U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky
- U.S. Coast Guard, St. Louis, Missouri
- Advisory Council on Historic Preservation, Washington, D.C.
- U.S. Department of Interior, Office of Environmental Policy and Compliance, Washington, D.C.
- Natural Resources and Environment, U.S. Department of Agriculture, Washington, D.C.
- Office of Environmental Compliance, Department of Energy, Washington, D.C.
- Office of Policy and Strategic Planning, U.S. Department of Commerce, Washington, D.C.
- Federal Emergency Management Agency, Chicago, Illinois
- Indiana State Board of Health, Indianapolis, Indiana
- Center for Disease Control, Center for Environmental Health and Injury Control, Special Programs Group, Atlanta, Georgia
- Planning Staff, Great Lakes Region, Federal Aviation Administration, Des Plaines, Illinois
- State Representatives, House and Senate
- Congressional Representatives, House and Senate
- Metropolitan Planning Organization, Terre Haute, Indiana

- Metropolitan Planning Organization, Evansville, Indiana
- Metropolitan Planning Organization, Indianapolis, Indiana
- Attorney General, Indianapolis, Indiana
- Brown County Commissioners, Nashville, Indiana
- Clay County Commissioners, Brazil, Indiana
- Crawford County Commissioners, English, Indiana
- Daviess County Commissioners, Washington, Indiana
- Dubois County Commissioners, Jasper, Indiana
- Gibson County Commissioners, Princeton, Indiana
- Greene County Commissioners, Bloomfield, Indiana
- Hendricks County Commissioners, Danville, Indiana
- Johnson County Commissioners, Franklin, Indiana
- Knox County Commissioners, Vincennes, Indiana
- Lawrence County Commissioners, Bedford, Indiana
- Marion County Commissioners, Indianapolis, Indiana
- Monroe County Commissioners, Bloomington, Indiana
- Morgan County Commissioners, Martinsville, Indiana
- Orange County Commissioners, Paoli, Indiana
- Owen County Commissioners, Spencer, Indiana
- Perry County Commissioners, Tell City, Indiana
- Pike County Commissioners, Petersburg, Indiana
- Posey County Commissioners, Mt. Vernon, Indiana
- Putnam County Commissioners, Greencastle, Indiana
- Spencer County Commissioners, Rockport, Indiana
- Sullivan County Commissioners, Sullivan, Indiana
- Vanderburgh County Commissioners, Evansville, Indiana
- Vigo County Commissioners, Terre Haute, Indiana
- Warrick County Commissioners, Boonville, Indiana
- Nashville Public Library, Nashville, Indiana
- Brazil Public Library, Brazil, Indiana

- English Public Library, English, Indiana
- Washington Public Library, Washington, Indiana
- Jasper Public Library, Jasper, Indiana
- Princeton Public Library, Princeton, Indiana
- Bloomfield Public Library, Bloomfield, Indiana
- Danville Public Library, Danville, Indiana
- Franklin Public Library, Franklin, Indiana
- Vincennes Public Library, Vincennes, Indiana
- Bedford Public Library, Bedford, Indiana
- Indianapolis Public Library, Indianapolis, Indiana
- Shoals Public Library, Shoals, Indiana
- Bloomington Public Library, Bloomington, Indiana
- Martinsville Public Library, Martinsville, Indiana
- Paoli Public Library, Paoli, Indiana
- Spencer Public Library, Spencer, Indiana
- Tell City Public Library, Tell City, Indiana
- Petersburg Public Library, Petersburg, Indiana
- Mt. Vernon Public Library, Mt. Vernon, Indiana
- Greencastle Public Library, Greencastle, Indiana
- Rockport Public Library, Rockport, Indiana
- Sullivan Public Library, Sullivan, Indiana
- Evansville Public Library, Evansville, Indiana
- Terre Haute Public Library, Terre Haute, Indiana
- Boonville Public Library, Boonville, Indiana
- Mayor of Brazil, Brazil, Indiana
- Mayor of Washington, Washington, Indiana
- Mayor of Huntingburg, Huntingburg, Indiana
- Mayor of Jasper, Jasper, Indiana
- Mayor of Oakland City, Oakland City, Indiana
- Mayor of Princeton, Princeton, Indiana
- Mayor of Jasonville, Jasonville, Indiana

- Mayor of Linton, Linton, Indiana
- Mayor of Franklin, Franklin, Indiana
- Mayor of Greenwood, Greenwood, Indiana
- Mayor of Bicknell, Bicknell, Indiana
- Mayor of Vincennes, Vincennes, Indiana
- Mayor of Bedford, Bedford, Indiana
- Mayor of Mitchell, Mitchell, Indiana
- Mayor of Beech Groove, Beech Groove, Indiana
- Mayor of Indianapolis, Indianapolis, Indiana
- Mayor of Lawrence, Lawrence, Indiana
- Mayor of Southport, Southport, Indiana
- Mayor of Loogootee, Loogootee, Indiana
- Mayor of Bloomington, Bloomington, Indiana
- Mayor of Martinsville, Martinsville, Indiana
- Mayor of Cannelton, Cannelton, Indiana
- Mayor of Tell City, Tell City, Indiana
- Mayor of Petersburg, Petersburg, Indiana
- Mayor of Mt. Vernon, Mt. Vernon, Indiana
- Mayor of Greencastle, Greencastle, Indiana
- Mayor of Rockport, Rockport, Indiana
- Mayor of Sullivan, Sullivan, Indiana
- Mayor of Evansville, Evansville, Indiana
- Mayor of Terre Haute, Terre Haute, Indiana
- Mayor of Boonville, Boonville, Indiana
- Town of Nashville, Indiana
- Town of Carbon, Indiana
- Town of Center Point, Indiana
- Town of Clay City, Indiana
- Town of Harmony, Indiana
- Town of Staunton, Indiana
- Town of Alton, Indiana

- Town of English, Indiana
- Town of Leavenworth, Indiana
- Town of Marengo, Indiana
- Town of Milltown, Indiana
- Town of Alfordsville, Indiana
- Town of Cannelburg, Indiana
- Town of Crane, Indiana
- Town of Elnora, Indiana
- Town of Montgomery, Indiana
- Town of Odon, Indiana
- Town of Plainville, Indiana
- Town of Birdseye, Indiana
- Town of Ferdinand, Indiana
- Town of Holland, Indiana
- Town of Fort Branch, Indiana
- Town of Francisco, Indiana
- Town of Haubstadt, Indiana
- Town of Hazelton, Indiana
- Town of Mackey, Indiana
- Town of Owensville, Indiana
- Town of Patoka, Indiana
- Town of Somerville, Indiana
- Town of Bloomfield, Indiana
- Town of Switz City, Indiana
- Town of Worthington, Indiana
- Town of Amo, Indiana
- Town of Brownsburg, Indiana
- Town of Clayton, Indiana
- Town of Coatesville, Indiana
- Town of Danville, Indiana
- Town of Lizton, Indiana

- Town of North Salem, Indiana
- Town of Pittsboro, Indiana
- Town of Plainfield, Indiana
- Town of Edinburgh, Indiana
- Town of New Whiteland, Indiana
- Town of Prince's Lake, Indiana
- Town of Trafalgar, Indiana
- Town of Whiteland, Indiana
- Town of Bruceville, Indiana
- Town of Decker, Indiana
- Town of Edwardsport, Indiana
- Town of Monroe City, Indiana
- Town of Oaktown, Indiana
- Town of Sandborn, Indiana
- Town of Wheatland, Indiana
- Town of Oolitic, Indiana
- Town of Clermont, Indiana
- Town of Crows Nest, Indiana
- Town of Cumberland, Indiana
- Town of Homecroft, Indiana
- Town of Meridian Hills, Indiana
- Town of North Crows Nest, Indiana
- Town of Rocky Ripple, Indiana
- Town of Speedway, Indiana
- Town of Spring Hill, Indiana
- Town of Warren Park, Indiana
- Town of Williams Creek, Indiana
- Town of Wynnedale, Indiana
- Town of Shoals, Indiana
- Town of Ellettsville, Indiana
- Town of Stinesville, Indiana

- Town of Bethany, Indiana
- Town of Brooklyn, Indiana
- Town of Monrovia, Indiana
- Town of Mooresville, Indiana
- Town of Morgantown, Indiana
- Town of French Lick, Indiana
- Town of Millersburg, Indiana
- Town of Orleans, Indiana
- Town of Paoli, Indiana
- Town of West Baden Springs, Indiana
- Town of Gosport, Indiana
- Town of Spencer, Indiana
- Town of Troy, Indiana
- Town of Spurgeon, Indiana
- Town of Winslow, Indiana
- Town of Griffin, Indiana
- Town of Poseyville, Indiana
- Town of Bainbridge, Indiana
- Town of Cloverdale, Indiana
- Town of Fillmore, Indiana
- Town of Roachdale, Indiana
- Town of Russellville, Indiana
- Town of Chrisney, Indiana
- Town of Dale, Indiana
- Town of Gentryville, Indiana
- Town of Grandview, Indiana
- Town of Santa Claus, Indiana
- Town of Carlisle, Indiana
- Town of Dugger, Indiana
- Town of Farmersburg, Indiana
- Town of Hymera, Indiana

- Town of Merom, Indiana
- Town of Shelburn, Indiana
- Town of Darmstadt, Indiana
- Town of Riley, Indiana
- Town of Seelyville, Indiana
- Town of West Terre Haute, Indiana
- Town of Chandler, Indiana
- Town of Elberfeld, Indiana
- Town of Lynnville, Indiana
- Town of Newburgh, Indiana
- Town of Tennyson, Indiana
- County School Corporation of Brown County
- Clay Community Schools
- Crawford County Community School Corporation
- Washington Community Schools, Inc.
- Northeast Dubois County School Corporation
- Gibson-Pike-Warrick School
- Bloomfield School District
- North West Hendricks Schools
- Center Grove Community School Corporation
- North Knox School Corporation
- North Lawrence Community Schools
- Indianapolis Pubic Schools
- Loogootee Community School Corporation
- Monroe County Community School Corporation
- MSD Martrinsville School
- Paoil Community School Corporation
- Spencer-Owen Community Schools
- Perry Central Community Schools Corporation
- Pike County School Corporation

- MSD Mt. Vernon
- Paoli Community School Corporation
- Spencer-Owen Community Schools
- Perry Central Community Schools Corporation
- Pike County School Corporation
- Evansville-Vanderburgh School Corporation
- Vigo County School Corporation
- Warrick County School Corporation
- Indianapolis International Airport, Indianapolis, Indiana
- Hulman Regional Airport, Terre Haute, Indiana
- Evansville Dress Regional Airport, Evansville, Indiana
- Issue Involvement Team Members
- Hoosier Environmental Council, Indianapolis, Indiana
- Sierra Club, Indiana Chapter, Indianapolis, Indiana
- CARR, Bloomington, Indiana
- Voice of I-69, Evansville, Indiana
- Environmental Law and Policy Center, Chicago, Illinois

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Chapter 11 – Comments, Coordination, and Public Involvement

11.1 Introduction

The Federal Highway Administration (FHWA) and Indiana Department of Transportation (INDOT) have provided opportunities for agency and public involvement in the development of this *Purpose and Need* statement (See Figure 11-1). In addition to the usual scoping meetings, as well as the ongoing opportunities to provide input through the project hotline, web site, and other means, there have been two specific opportunities to provide input on the *Purpose and Need* statement.

1. First, in August 2000, FHWA and INDOT circulated a *Purpose and Need* Discussion Paper. The Discussion Paper provided a general, conceptual description of the project's *Purpose and Need*, and identified a series of specific objectives and performance measures based on that preliminary statement of the project's objectives. The Discussion Paper was made available for public review via the project web site. It was the subject of three public meetings held in August, 2000 in Jasper, Vincennes, and Indianapolis. It also was the subject of a meeting with the U.S. Environmental Protection Agency in August 2000.
2. A draft of the purpose-and-need statement was made available for public review in April, 2001. This draft was the subject of three public meetings held in May, 2001 in Martinsville, Oakland City, and Sullivan. In addition, it was provided to federal and state environmental resource agencies for review and comment. A formal agency review meeting to receive comments on the draft *Purpose and Need* statement was held on June 5, 2001, in compliance with Indiana's Streamlined EIS Procedures.

The *Purpose and Need* Statement as shown in Chapter 2, was modified in may respects to be responsive to input received in this process. The screening criteria shown in Sections 3.1 through 3.3 incorporate these modifications. Key issues are addressed below.

11.2 Major Themes

11.2.1 Connection to Bloomington

Comments were made that the federal legislation designating Corridor 18 requires a connection to Bloomington. FHWA and INDOT have reviewed this issue, and have determined that the legislation requires a connection to Evansville and Indianapolis, but not to Bloomington. The basis for this conclusion was explained to the I-69 Issue Involvement Team (a group of stakeholders representing a wide range of viewpoints) on July 26, 2000. A memorandum outlining the factors considered in reaching this conclusion was provided to the Issue Involvement Team and was posted on the project web site. The material remains posted on the project web site as part of the "Frequently Asked Questions" (FAQ) Section, under *Funding/Legislative Issues*. The memorandum will is included in the Appendix in this Draft EIS.

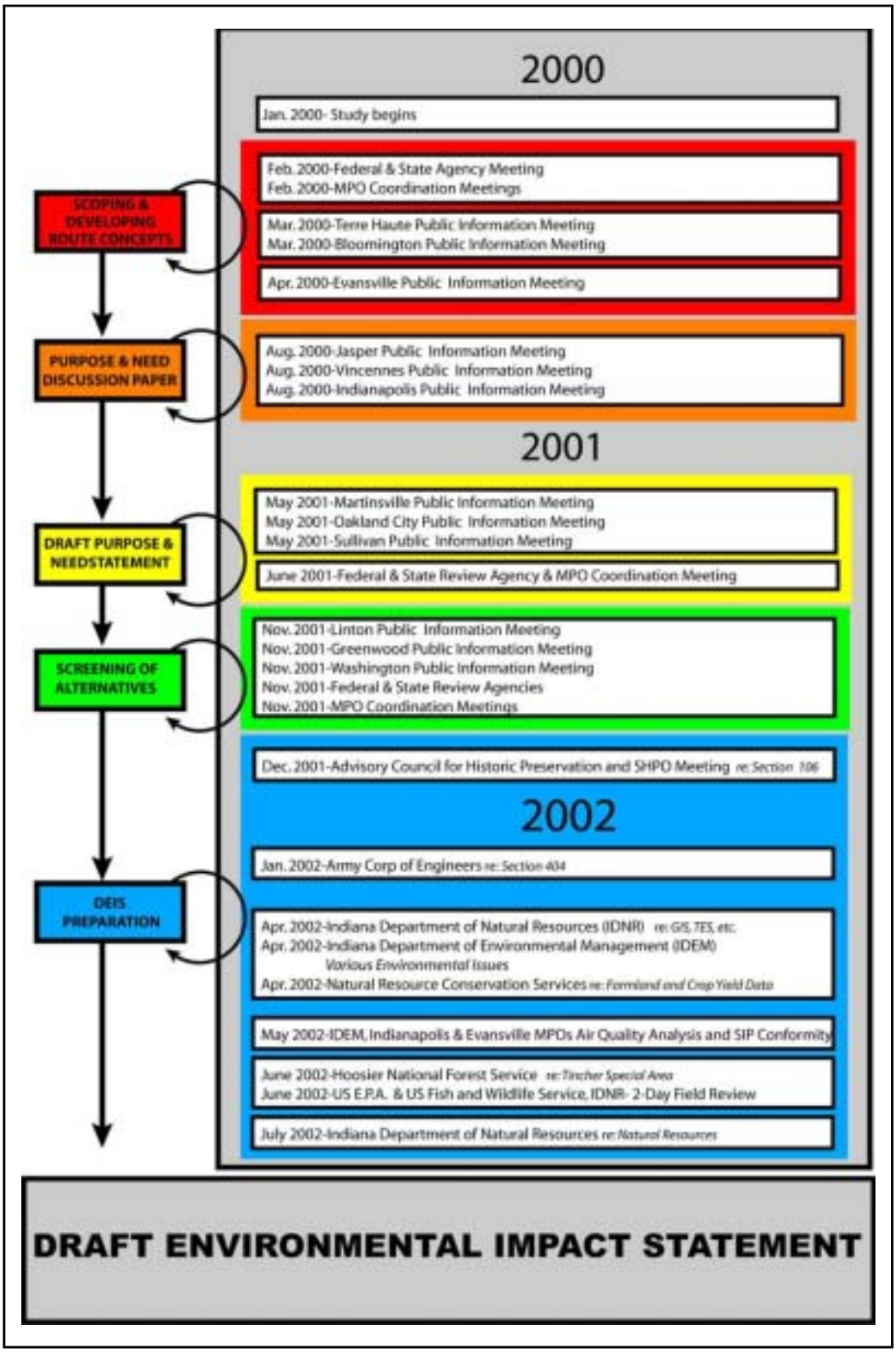

Figure 11-1: Public Outreach

11.2.2 National and International I-69 Goals

Comments were made that regarding the emphasis in this purpose-and-need statement on the need to complete I-69 from Evansville to Indianapolis as part of a national and international trade corridor. In light of federal legislation and national FHWA policies, FHWA and INDOT have concluded that this study should focus on the proposal to complete I-69 as an Interstate highway between Evansville and Indianapolis. Accordingly, this study will consider a wide range of alternatives for completing this section of I-69; it will lay out the benefits, impacts, and costs of each of those alternatives. In addition, this study will explain the consequences of the No Action alternative – that is, the option of *not* completing this section of I-69. Thus, while this study focuses on the proposed completion of I-69 from Evansville to Indianapolis, it does *not* assume that this section of I-69 must be built. Rather, this study is intended to assist government decision-makers in deciding (1) whether to complete I-69 as an Interstate between Evansville and Indianapolis and if so, (2) which corridor should be selected for this project.

11.2.3 Consideration of Environmental Factors

Comments were made that the purpose-and-need statement should be expanded to incorporate environmental objectives and/or that environmental factors should be considered along with purpose-and-need in the screening of alternatives. The purpose-and-need statement has been modified in two ways in response to these comments: (1) it specifically recognizes that INDOT's established statewide transportation policies require this project – like all INDOT projects – to be developed in a manner consistent with INDOT's commitment to protecting the environment and promoting energy efficiency in all modes of travel; and (2) it clarifies that, while environmental factors are not included among the project's goals, environmental factors will be considered in screening and selecting a preferred alternative. Specifically, requiring that a geographically diverse range of alternatives be carried forward for final study ensures that alternatives will have a diverse range of environmental impact types, since they traverse environmentally diverse regions.

11.2.4 "Double-Counting" of Goals/Performance Measures

Comments were made that several of the goals and/or performance measures identified in the Discussion Paper measured the same characteristics, and therefore could lead to double-counting of certain benefits. The performance measures simply provide a set of factors to consider collectively in assessing alternatives. If two different performance measures correlate closely with one another, the two measures still could be used in order to provide the widest possible array of analytical tools for understanding the needs and for evaluating the alternatives. Moreover, related performance indicators were combined into single indices for screening purposes.

11.2.5 Analysis of Non-Transportation Alternatives

Comments were made that non-transportation alternatives should be studied in conjunction with highway alternatives to address the region's economic problems. Some suggested that other types

of projects (e.g., tax increment financing, rail alternatives, and fiber optics) be built instead of or to complement a highway project.

This is a transportation project, with economic development as a related objective. Economic development is a consideration because the Needs Analysis demonstrated an economic need in the region. Further, a transportation project could address some of these economic needs.

National objectives (as determined by the Congress and the Federal Highway Administration) specify that this Evansville to Indianapolis connection should be an Interstate Highway project. Federal policy has determined that the Evansville-to-Indianapolis corridor should be served by an Intestate Highway.

A core purpose of this project is to address transportation problems and strengthen the transportation network in Southwest Indiana. Another core objective is to complete a section of the National I-69 Project. Alternatives which do not meet these core objectives (e.g., non-transportation alternatives) are not reasonable, and are excluded from consideration.

11.2.6 Safety Analysis

Comments were made that the safety analysis was flawed. The points made in these comments included that the study's safety analysis considered an inadequate amount of data. Further, the comments suggested that safety problems should be analyzed by counting the number of highway fatalities in different counties, and comparing the number of fatalities in different counties.

The study's safety analysis (See *Task Report 3.3.4.1, Regional Safety Analysis*) analyzed over 155,000 accidents over a three year period of time. An alternative approach suggested by some stakeholders considered less than 10,000 accidents which occurred over a period of 11 years. The study team considered all fatal and injury-causing accidents during this three year period, while the alternative approach considered only accidents involving fatalities.

In addition, it is inappropriate to simply count the number of accidents. The procedure used in the study's analysis computed the number of accidents per hundred million miles of vehicle travel, which is the accepted procedure among transportation engineering professionals. If accidents simply are counted without considered the amount of travel associated with them, any comparison or analysis is without merit.

The approach used by the Study Team is much more complete, and follows accepted engineering practice for accident analysis. It demonstrates that rural parts of the Study Area have somewhat higher accident rates than rural areas elsewhere in Indiana.

11.2.7 Economic Needs Analysis

Comments were made that the economic needs analysis was flawed, because it omitted four counties in the Study Area (Marion, Johnson, Morgan, and Hendricks). Comments also were made that INDOT's use of the United States Department of Agriculture's (USDA) *Rural Strategic Development Plan* reflects an institutional bias against rural counties. Comments also were made that unemployment is not a significant problem in the Study Area. Comments also were made that population and employment trends in the Study Area were mischaracterized.

The Indianapolis Metropolitan Statistical Area (MSA) was generally excluded from this analysis. As an economic region, the highly urbanized Indianapolis MSA is not typical of Southwest Indiana, which is largely rural, interspersed with small to mid-sized urban communities. In order to ensure a fair comparison between Southwest Indiana and the rest of the state, counties in the Indianapolis MSA were *excluded from both* areas. In other words, Marion, Hendricks, Johnson, and Morgan counties were excluded from the Southwest Indiana counties. At the same time, Boone, Hamilton, Madison, and Hancock counties were excluded from the "rest of the state".

The USDA report was used because it was a neutral source of information with no relationship to INDOT or the Study Team. Its primary use is to compare rural counties in the Study Area with rural counties elsewhere in Indiana. It showed that rural counties in the Study Area overall are more stressed than rural counties elsewhere in the state. This is true for measures of overall stress, as well as household income, poverty, and unemployment. These are basic measures of economic well-being, and the USDA report is a neutral, unbiased source of this information

Unemployment is a notoriously volatile economic indicator, and using of unemployment rates at one point in time can be very misleading. The statistics cited in the *Purpose and Need* consider average unemployment over a period of a decade, and accurately reflect long-term trends in the Study Area's economy.

The *Purpose and Need* analysis considers population and employment statistics over a 25 - 40 year period. Information offered by some stakeholders looks at trends over a much shorter period of time (10 years). It is appropriate to analyze population and employment trends over a longer period of time, as is done in the *Purpose and Need* Analysis.

11.2.8 Conclusion

The preceding represents key input to the purpose-and-need, which was incorporated into its used in the Screening of Alternatives. For a detailed report of comments received in response to the *Purpose and Need* Discussion Paper, please refer to Task Report 3.5.1 – *Summary of Comments Received, Purpose and Need Discussion Paper*.

11.3 Public and Community Outreach

At all key points in the study process, public outreach meetings were conducted to seek public input before key decisions were made. At each juncture draft study documents were released (including being posted on the project web site, www.i69indyevn.org). At each meeting, formal presentations were made, and a public comment period was provided. Citizens also were able to make written or taped comments. Project staff were available to discuss any matters of concern or to answer questions. Beginning with the third round of meetings, display areas (showing project findings) were provided. These display areas had project staff present to explain the information, answer questions, and receive input. These meetings, and topics covered, included:

- **Agency Scoping Meeting** On February 3, 2000, the agency scoping meeting for the I-69 Tier 1 EIS was held at the INDOT Greenfield District office. There were a total of 23 people from 13 different agencies at this meeting. The agencies that participated in this meeting included: Bernardin Lochmueller and Associates, Cambridge Systematics, Cutler

and Stanfield, Dyer Environmental Services, Federal Highway Administration, Hoosier National Forest, Indiana Department of Environmental Management, Indiana Department of Transportation, Indiana Geological Survey, United State Army Corps of Engineers, United States Environmental Protection Agency, United States Fish and Wildlife Service, and Winning Communities. The three major topics discussed at this meeting were (1) study approach and scope, (2) alternatives to be studied, and (3) Particular questions or concerns about the tiered environmental process. Meeting minutes may be found in Appendix Y.

- **MPO Scoping Meeting**, On February 23, 2000, a scoping meeting was held for Metropolitan Planning Organizations (MPO's) for the I-69 Tier 1 EIS. There were a total of 14 people from 8 different agencies at this meeting. The agencies that participated in this meeting included: City of Bloomington – Planning Department, Evansville Urban Transportation Study, City of Indianapolis – Department of Metropolitan Development, West Central Indiana Economic Development District, Federal Highway Administration, Indiana Department of Transportation, Bernardin Lochmueller and Associates, and Winning Communities. The major topics discussed at this meeting included (1) history of the I-69 project in the 1990's, (2) benefit-cost analysis, (3) record of decision (ROD) from the Secretary of Transportation, (4) consulting parties, (5) segments of independent utility, (6) air quality, (7) watershed analysis, (8) socio-economic analysis, and (9) land use. Meeting Minutes may be found in Appendix Y.

- **Project Kickoff and Scoping Meetings** A total of six meetings were held in Terre Haute, Bloomington, and Evansville in March and April of 2000. At these meetings, the study team described the study process, and asked for input on alternatives to be studied. Nearly 2,000 people attended these meetings, which were held in the late afternoon and early evening at each venue. Meeting minutes may be found in Appendix Y.

- ***Purpose and Need* Discussion Paper Meetings** In August of 2000, a Purpose and Need Discussion Paper was issued. This paper included a draft statement of purpose. It also gave Transportation, Economic Development and National I-69 research issues (including possible performance measures). That same month, three meetings were held to receive public input regarding this paper. These meetings were held in Jasper, Vincennes, and Indianapolis. Nearly 400 people attended these meetings. Meeting minutes may be found in Appendix Y.

- ***Purpose and Need* Meetings (May, 2001)** Using the input received at the previous round of public involvement meetings, a Draft *Purpose and Need* Statement was issued in April, 2001. In May, 2001, a series of public involvement meetings was held in Martinsville, Oakland City, and Sullivan to receive input on the paper. Over 300 people attended these meetings. These meetings also featured a display session, with numerous charts and graphs depicting findings of the *Purpose and Need* analysis. Exhibits featuring the study's Geographic Information System (GIS) and travel model were also included. Study team staff were available to discuss these exhibits. Input received at these meetings was used to modify the *Purpose and Need* statement which is included in this document. Meeting minutes may be found in Appendix Y.

- ***Purpose and Need* Meeting With Agencies** On June 5, 2001, a meeting was held in the Indiana Government Center South. There were 29 people from 12 different agencies in

attendance at this meeting. The agencies included: Bloomington MPO, Indiana Department of Commerce, Indiana Department of Environmental Management, Indiana Department of Natural Resources, United States Fish and Wildlife Service, United State Forest Service, West Central Indiana Economic Development District, Akin-Gump-Strauss-Hauer and Feld, Bernardin Lochmueller and Associates, Cambridge Systematics, Indiana Department of Transportation, and Federal Highway Administration. The major topics discussed in this meeting included: (1) Tiered NEPA EIS, and how it differs from a typical EIS, (2) the key findings of the Draft *Purpose and Need* Statement, (3) the next steps – where do we go from here? Using the project GIS as a key resource, what kind of environmental analysis will be done in this Tier 1 study, and what will occur in a follow up Tier 2 study. Meeting minutes may be found in Appendix Y.

- **Screening of Alternatives Public Meetings (November 2001)** In October, 2001, a Draft Screening of Alternatives report was issued. This report recommended that five of the 14 Route Concepts be carried forward for further study. In November, 2001, a series of public involvement meetings were held in Linton, Greenwood, and Washington to receive input on the screening recommendations. Nearly 500 people attended these meetings. These meetings also featured a display session, with numerous charts and graphs showing the analysis which led to the recommendation of which routes should be carried forward for detailed analysis. As a result of the input received at these meetings and at subsequent meetings with review agencies, several modifications were made to the alternatives carried forward for further study. Meeting minutes may be found in Appendix Y.
- **Additional Community Outreach Meetings** In addition to the above mentioned meetings, individual meetings were held with each of the following organizations on the following dates:
  - Voices for I-69 on February 10, 2000
  - I-69 Mid-Continent Coalition on February 21, 2000
  - Citizens for Appropriate Rural Roads (CARR) on February 25, 2000
  - Terre Haute Chamber of Commerce on February 20, 2000
  - West Central Economic Development District, Inc. on February 29, 2000
  - Indiana State Chamber of Commerce on March 2, 2000
  - Indiana Association of Cities and Towns on March 2, 2000
  - Indiana University on March 3, 2000
  - Evansville Urban Transportation Study on March 6, 2000
  - Metropolitan Evansville Chamber of Commerce on March 6, 2000
  - Voices of I-69 on March 6, 2000
  - Environmental Law and Policy Center on March 8, 2000
  - Bloomington Chamber of Commerce on March 30, 2000
  - CARR on March 30, 2000
  - Mayor John Fernandez – Bloomington Mayor, Indiana on March 30, 2000
  - City Councilman Andy Ruff on March 30, 2000
  - Mayor – City of Bloomington, Indiana on March 31, 2000
  - IU Town / Gown Committee on April 6, 2000
  - Indianapolis Metropolitan Planning Organization on April 11, 2000
  - Corporation for Educational Communications on April 17, 2000
  - Central Indiana Regional Citizens League on April 17, 2000

- Mayor John Fernandez – City of Bloomington on April 20, 2000
- Corporation for Educational Communications on May 2, 2000
- Evansville Metropolitan Planning Organization (MPO) on May 4, 2000
- Indianapolis Chamber of Commerce on May 31, 2000
- Indianapolis MPO Technical Committee on June 7, 2000
- Evansville School Superintendent on June 14, 2000
- Indianapolis MPO on June 21, 2000
- Evansville Catholic School Representatives on July 7, 2000
- Evansville Chamber of Commerce on July 7, 2000
- Mayor of Bedford on July 13, 2000
- Mayor of Terre Haute on July 21, 2000
- Central Indiana Corp. Partnership on August 7, 2000
- 231 Coalition on August 23, 2000
- Terre Haute Chamber of Commerce on August 23, 2000
- Terre Haute Chamber of Commerce on August 24, 2000
- Terre Haute Chamber of Commerce on September 7, 2000
- Indiana Association of Cities and Towns on September 13, 2000
- CARR on September 18, 2000
- Indianapolis Chamber of Commerce on September 18, 2000
- Sunshine Gardens Neighborhood Association on October 2, 2000
- Daviess County Chamber of Commerce on October 5, 2000
- Mr. And Mrs. Gillooly on October 2, 2000
- Mayor Lloyd – Evansville Mayor on October 10, 2000
- Evansville Chamber of Commerce and Voices for I-69 on October 10, 2000
- Indiana Association of Manufactures on October 17, 2000
- Mayor John Fernandez – Bloomington on October 25, 2000
- Indiana Wildlife Federation on November 1, 2000
- Indiana Motor Truck Association on November 2, 2000
- Indiana Hospital and Health Association on November 2, 2000
- Valley Watch on November 15, 2000
- IACT mayor's roundtable on November 16, 2000
- Corporation for Educational Communications on November 16, 2000
- Indiana Audubon Society Chipperwoods Bird Obervatory on November 29, 2000
- Indianapolis Chamber of Commerce Infrastructure Committee on December 13, 2000
- Indiana University Professor Morton Marcus on December 26, 2000
- Issue Involvement Team Steering Committee on May 11, 2000
- Issue Involvement Team Steering Committee on June 7, 2000
- Issue Involvement Team on July 6, 2000
- Issue Involvement Team on July 26, 2000
- Issue Involvement Team on December 1, 2000
- Mayor Jimmie K. Wright – Linton Mayor on January 15, 2001
- Spencer Evening World on January 13, 2001
- Corporation for Educational Communications on February 8, 2001
- Voices for I-69 on February 19, 2001
- Mayor's Office – City of Indianapolis on February 20, 2001
- Martinsville Chamber of Commerce on March 6, 2001

- Princeton Chamber of Commerce on March 7, 2001
- Association of Indiana Counties on March 13, 2001
- Indianapolis Chamber of Commerce on March 14, 2001
- CEC and the Statehouse Rotunda Day on March 14, 2001
- Voices for I-69 Board of Directors on March 19, 2001
- Indianapolis MPO on March 21, 2001
- Issue Involvement Team on April 10, 2001
- Bedford Exchange Club on April 11, 2001
- Vincennes Kiwanis on April 12, 2001
- Indiana Legislator's Briefing on April 17, 2001
- Indiana Department of Commerce on May 1, 2001
- Jasper Kiwanis on May 8, 2001
- Linton Rotary on May 9, 2001
- Corporation for Educational Communications on May 15, 2001
- Rockport Chamber of Commerce on May 17, 2001
- Mooresville Chamber of Commerce on May 17, 2001
- Spencer Exchange Club on May 17, 2001
- Terre Haute Chamber of Commerce on May 22, 2001
- Terre Haute Rotary Club on May 22, 2001
- Bloomington Exchange Club on May 23, 2001
- Indianapolis Chamber of Commerce on June 5, 2001
- Evansville Rotary Club on June 5, 2001
- Daviess County Chamber of Commerce on June 6, 2001
- Vincennes Chamber of Commerce on June 6, 2001
- Owen County Banking Representative on June 6, 2001
- Corporation for Educational Communication on June 7, 2001
- Frankfort Rotary Club on June 8, 2001
- Washington Rotary Club on June 13, 2001
- Terre Haute Mayor Judy Anderson on August 8, 2001
- Crawfordsville Rotary on August 8, 2001
- Martinsville Chamber of Commerce on August 9, 2001
- Bedford Mayor John Williams on August 9, 2001
- Indianapolis Kiwanis on August 10, 2001
- Muncie Rotary Club on August 14, 2001
- Fishers Chamber of Commerce on August 15, 2001
- Indiana State Chamber of Commerce on August 15, 2001
- Indianapolis Chamber of Commerce on August 20, 2001
- Terre Haute Chamber of Commerce on August 23, 2001
- North Central MPO on August 23, 2001
- Indiana University on September 6, 2001
- Bloomington Chamber of Commerce on September 6, 2001
- Mayor Fernandez – City of Bloomington on September 6, 2001
- City of Huntingburg on September 20, 2001
- Voices of I-69 on September 24, 2001
- Corporation for Educational Communities on September 25, 2001
- Indiana Society of Professional Appraisers on September 26, 2001

- Washington / Daviess County Chamber of Commerce on October 9, 2001
- Issue Involvement Team on October 17, 2001
- Issue Involvement Team on October 24, 2001
- Indiana State Farm Bureau on October 24, 2001
- Mid-continent Consortium on October 30, 2001
- Corporation for Educational Communications on October 30, 2001
- Indianapolis MPO on November 1, 2001
- Indiana State Chamber of Commerce on November 6, 2001
- Terre Haute Chamber of Commerce on December 6, 2001
- Ellettsville Economic Development Council on December 11, 2001
- South Bend / St. Joseph County Chamber of Commerce on December 19, 2001
- Bedford Mayor John Williams on January 15, 2002
- Loogootee Mayor Brian Ader on January 15, 2002
- Vincennes Chamber President Troy Woodruff on January 16, 2002
- Tom Tucker, new President of the Washington/Daviess County Chamber of Commerce on January 16, 2002
- Interested business and agricultural leaders from Daviess County on February 1, 2002
- Terre Haute Chamber Rod Henry and Issue Involvement Team member Bert Williams on February 1, 2002
- Deb Beavin, Executive Director Of Region 15 Planning Agency on February 7, 2002
- Prof. Shorna Broussard, and Purdue University class on February 22, 2002
- John Goss, Indiana Department of Natural Resources on March 5, 2002
- Indianapolis Chamber of Commerce President John Myrland on March 15, 2002
- Reggie Williams, V.P. of Small Business and Economic Development for the Indiana State Chamber of Commerce on March 28, 2002
- Corporation for Educational Communication on April 10, 2002
- New Indiana State Chamber of Commerce President, Kevin Brineger on April 19, 2002
- Indiana Motor Truck Association President, Ken Cragen on May 6, 2002
- Harrison (Indianapolis) Sertoma Club dinner meeting on June 3, 2002
- Washington mayor Tom Baumart on June 11, 2002
- Vincennes Mayor on June 11, 2002
- Bedford Mayor Tom Williams on June 11, 2002
- Terre Haute Mayor Judy Anderson on June 20, 2002
- Indiana University Director of Business Research, Morton Marcus on July 1, 2002

- **Project Website** An official project website has been provided since the outset of this study at www.i69indyevn.org. This website features: a Frequently Asked Questions section, which provides official statements on dozens of key study issues; a Reports section, where all study reports are posted for information; a Newsroom section, where media advisories are posted; a "Contact Us" section, where citizens may submit comments to the INDOT and consultant team project managers; and a "Question of the Month" section, where issues of current interest are addressed. Through the end of July 2002, there have been over 27,000 visitors to the project website. Some documents (such as the Draft Statement of *Purpose and Need*) were viewed and/or downloaded over 1,000 times.

- **Toll Free Hot Line.** A 24-hour toll free hot line (1-877-INDYEVN) is available to provide information about upcoming meetings, to allow people to subscribe to the project

newsletter, and to leave comments for the study team. During times of peak activities (such as when meetings are upcoming) dozens of calls are received each week.

- **Speakers Bureau** Since the beginning of the study, senior INDOT decision-makers and consultant staff have given talks to numerous groups and civic organizations about the study.

- **Newsletter** Beginning with the second round of public involvement meetings, a project newsletter was distributed. Each issue was sent to by over 3,000 individual and groups. Copies also were distributed at public involvement meetings. These newsletters described the key issues regarding which public input was sought and contained other information about the study.

- **Community Outreach Coordinator** This study has included the services of a community outreach coordinator who has been responsible for day-to-day communication with public officials, concerned citizens, and community leaders. Over 150 such meetings have been held to date. Summaries of these meetings for 2000 and 2001 have been posted on the project website on the Reports page under Public & Community Outreach Summary.

- **Issues Involvement Team** A group of stakeholders was assembled , and not periodically to review the progress of the study and discuss major issues. This group was particularly helpful at the outset of the study at gauging public opinion and advising INDOT and FHWA regarding aspects of the public meetings and citizen outreach.

11.4 Agency Review and Coordination

11.4.1 Agency Coordination Meetings

- **Federal Highway Administration and Environmental Review Agencies Meeting** On May 18, 1999 a meeting was held by INDOT and FHWA at the State Capitol Building to discuss the transition to a Tiered Environmental Impact Statement for an Evansville-to-Indianapolis highway. In attendance were numerous environmental review agencies. These review agencies included the United States Environmental Protection Agency, the U S Fish and Wildlife Service, the Army Corps of Engineers, the Indiana Department of Environmental Management, the Indiana Department of Natural Resources, and the Indiana Department of Commerce.

  FHWA and INDOT prepared a Draft Working Paper for this meeting. Major issues which it discussed, and the tentative approach to these issues provided by INDOT, included:

  - **Should the *Purpose and Need* be confined to regional economic development?** No. Possible purposes would be regional transportation needs, regional economic needs throughout Southwest Indiana, and completing a portion of the National Corridor 18 project.

  - **What range of highway alternatives should be studied?** All potentially reasonable alternatives to connect Evansville and Indianapolis should be studied.

- **Should this be a conventional or a tiered EIS?** It was recommended that this project be studied using the tiered NEPA process. Tier 1 could study different corridors and modes to determine a preferred mode and corridor. Tier 2 would study the corridor chosen in Tier 1 to select a specific alignment.
- **How will comments on the 1996 DEIS for an Evansville-to-Bloomington Highway be addressed in this study?** Some type of response to the comments made for the 1996 Study will be made in the current study.

- **Agency Review Meeting** On November 27, 2001, two meetings were held in the Indiana Government Center North with review agencies. A total of 32 people from 18 different agencies attended these meetings. The agencies in attendance included: Hoosier National Forest Service, Indiana Department of Commerce, Indiana Department of Environmental Management, Indiana Department of Natural Resources Division of Historic Preservation and Archaeology, Indiana Geological Survey, United States Army Corps of Engineers, United States Environmental Protection Agency, United State Fish and Wildlife Service, Akin-Gump-Strauss-Hauer and Feld, Bernardin Lochmueller and Associates, Federal Highway Administration, HNTB Corporation, Indiana Department of Transportation, Weintraut and Associates, Bloomington MPO, Evansville Urban Transportation Study (Evansville MPO), Indianapolis MPO, and West Central Indiana Economic Development District. Major topics discussed at this meeting included: (1) The presentation of the screening of alternatives process and results, and (2) The introduction of the Level 3 environmental analysis. Meeting minutes may be found in Appendix Y.
- **Field Review of the Study Area** All environmental resource agencies listed in the Procedural Manual for Preparing Environmental Studies (INDOT, 1996) were invited to a 2-day tour of the 5 alternatives and the study area for June 4 and 5, 2002. Participants in the 2-day tour were the United States Fish and Wildlife Service, United States Environmental Protection Agency, and the Indiana Department of Natural Resources. Activities included on-site visits to a number of environmentally sensitive areas with a guest speaker(s) available at the crossing of the Patoka River near SR 57 (Bill McCoy, Manager of the Patoka River National Wildlife Refuge), Tincher Special Area in the Hoosier National Forest (Ken Day, Forest Supervisor of the Hoosier National Forest, and Wilma Marine and Kelle Reynolds), Blue Springs Caverns (Jim Richards, General Manager), and Bean Blossom Bottoms including the Muscatatuck Wildlife Refuge in Monroe County (Dave Hudak, Sycamore Land Trust). These two days were spent discussing TES species, habitats, alternatives, wetland mitigation, and other issues. The meeting minutes of the 2-day field tour may be found in Appendix Y.
- **Meeting with Hoosier National Forest Service** On June 6, 2002, a meeting with the Hoosier National Forest Service was held at their office in Bedford, Indiana. The Hoosier National Forest Service Management Plan was described and discussed by the Forest Service. Tincher Special Area was described in depth and it was concluded that it had a recreational use and it is public owned land. The Forest Service reviewed their letter dated January 18, 2002, and indicated that a more current letter would be provided to INDOT on the use of the Tincher Special Area with any recent information on Tincher Pond. The GIS Atlas was also reviewed with them for familiarity of the alternatives and land use impacts.

- **Indiana Department of Natural Resource (IDNR) Meeting** The meeting with IDNR was held on April 29, 2002 in IDNR's boardroom in the Indiana Government Center South building. Agencies in attendance were IDNR and Bernardin Lochmueller and Associates. Topics for discussion included the GIS atlas, familiarization with the study area, and the Tier 1 process. TES species maps were discussed and later, approval was give for distribution of these maps. Forests, including classified forests, were one of the major topics discussed at this meeting. Wetland mitigation was also discussed.
- **IDEM Meeting** The meeting was held on April 29, 2002 in the IDEM boardroom on the 10th floor of the Indiana Government Center North building. Agencies in attendance included IDEM, INDOT, FHWA, and Bernardin Lochmueller and Associates. The purpose of the meeting was to familiarize IDEM with the project area and the remaining 5 alternatives. These alternatives were described using physiographic and natural region maps. Topics discussed were wetland mitigation, permitting, water quality, and hazardous material sites. Permitting for wetlands was an important issue along with IDEM's coordination with the Army Corps of Engineers.
- **Indiana Department of Environmental Management (IDEM) Meeting** The meeting was held on May 9, 2002 on the 10th floor of the Indiana Government Center North building. Agencies in attendance at this meeting include IDEM Hazardous Waste Branch, Bernardin Lochmueller and Associates, and INDOT. The topics that were discussed included Hazardous Material Sites and the information used to identify these sites. Coordination with IDEM allowed the use of the IDEM database on Hazardous Material Sites to be incorporated into the Tier 1 EIS.
- **Natural Resource Conservation Service (NRCS) Meeting** The NRCS meeting was held on April 29, 2002. Agencies in attendance at this meeting included the NRCS and Bernardin Lochmueller and Associates. The major topic discussed at the meeting was the suitability of using the farmland conversion impact rating system to assess prime farmland impacts for the Tier 1 EIS. It was concluded that the AD 1006 form was not the appropriate means by which to assess prime farmland for the Tier 1 study. As a result, GIS information and corn yields provided by the Indiana NRCS headquarters were used to evaluate prime farmland impacts based on varying yield rates for different prime farmland soil types.
- **Metropolitan Planning Organizations (MPO) and IDEM Meeting** This meeting was held on May 9, 2002 in the IDEM boardroom on the 10th floor of the Indiana Government Center North building. Agencies in attendance included the Indiana Department of Environmental Management (IDEM), the MPO of Indianapolis, the MPO of Evansville, the Federal Highway Administration, and INDOT. The major topic discussed in the meeting was the methodology of the air quality analysis to use for the Tier 1 EIS. The conclusion of the meeting was that a spreadsheet analysis of all the Level 3 alternatives would be conducted for the DEIS and that formal conformity of the alternative proposed for a record of decision in the Final EIS would be determined using the respective MPOs' travel models and emissions estimating procedures.
- **Army Corps of Engineers Meeting** A meeting was held on January 9, 2002 at the Indianapolis Offices of the Army Corps of Engineers at Fort Benjamin Harrison. The

purpose of the meeting was to discuss the Section 404 permitting process, as it affects the I-69, Evansville to Indianapolis Tier 1 EIS. Agencies attending this meeting included Akin-Gump-Strauss-Hauer and Feld, Bernardin Lochmueller and Associates, Federal Highway Administration, HNTB Corporation, INDOT, and the U.S. Army Corps of Engineers. The major topics discussed at the meeting were: (1) what kind of recommended alternative will emerge from a Tier 1 EIS, (2) how will the permitting process occur within the context of a Tiered EIS, and (3) what environmental information will the Study Team have available in Tier 1, and how useful will this information be to the Corps?

- **Indiana Department of Natural Resources (IDNR) Meeting** A meeting was held on July 8, 2002 with the Indiana Department of Natural Resources at the Division of Nature Preserves. The major topics of discussion were the distribution of TES maps and outline at the end of each alternative section in the Environmental Altas. Both the maps and the outline were reviewed and permission was granted for distribution to the public. In addition, a table of state listed species recorded within one mile of each alternative was reviewed in the Tier 1 DEIS along with their location in comparison to the alternatives from the letter dated June 25, 2002 from IDNR. Each of the areas in their letter was located relative to each alternative.

11.4.2 Agency Correspondence

Agency	Date of Response
U S Department of the Interior	
Fish and Wildlife Service	October 16, 2000
Fish and Wildlife Service	July 1, 2002
U S Department of Agriculture	
Forest Service	October 10, 2000
Forest Service	January 18, 2002
Forest Service	June 14, 2002
Indiana Department of Natural Resources	
Division of Outdoor Recreation	February 4, 1992
Division of Historic Preservation and Archaeology	November 29, 2000
	May 28, 2002
	May 29, 2002
	June 7, 2002
	June 10, 2002
	June 10, 2002
	June 10, 2002
	June 13, 2002
	June 26, 2002
	July 12, 2002

Division of Water July 16, 2002

U S Department of Transportation
U S Coast Guard July 11, 2001

U S Department of the Interior – Fish and Wildlife Service Comments from Oct. 16, 2000

The U S Department of the Interior Fish and Wildlife Service (USFWS) suggested that it is absolutely critical to begin the process with an unbiased Statement of Purpose. They believe that the Statement of Purpose should be simplified to read as follows: "The purpose of the I-69, Evansville to Indianapolis Project is to improve the transportation linkage between Evansville and Indianapolis.

The U S Department of the Interior Fish and Wildlife Service is also highly concerned that minimizing environmental impacts was not identified as an issue or even as a factor to consider in the analysis of *Purpose and Need*, and the Alternative Analysis. Certainly, environmental impacts must be a factor to consider in assessing and selecting a transportation route; they must also be considered in any economic benefit/cost analysis, especially if negative environmental impacts may result in economic losses. Minimizing environmental impacts should be considered as an issue for analysis. The entire letter dated October 16, 2000 from the USFWS may be found in Appendix Y.

U S Department of the Interior – Fish and Wildlife Service Comments from July 1, 2002

The U S Department of the Interior Fish and Wildlife Service (USFWS) identified six species that are federally listed and one designated area of critical habitat that is federally listed. The entire letter dated July 1, 2002 from the USFWS may be found in Appendix Y. The six species and one critical habitat are as follows:

- Indiana bat (*Myotis sodalis*), Endangered
- Bald eagle (*Haliaeetus leucocephalus*), Threatened
- Fanshell mussel (*Cyprogenia stegaria*), Endangered
- Rough pigtoe mussel (*Pleurobema plenum*), Endangered
- Fat pocketbook mussel (*Potamilus capax*), Endangered
- American burying beetle (*Nicrophorus Americana*), Endangered

U S Department of Agriculture – Forest Service Comments from Oct. 10, 2000

The U S Department of Agriculture Forest Service letter dated October 10, 2000 encourages that the *Purpose and Need* section consider adding environmental criteria to attain the widest range of beneficial uses of the environment without degradation of natural aspects as envisioned by section 101(b) of the National Environmental Policy Act (NEPA). The entire letter dated October 10, 2000 may be found in Appendix Y.

U S Department of Agriculture – Forest Service Comments from Jan. 18, 2002

The U S Department of Agriculture (USDA) Forest Service letter dated January 18, 2002, states

that after the alternatives were narrowed to five, Alternative 5 crosses the National Forest by utilizing part of the Highway 50 corridor. This part of the Hoosier National Forest has been designated as a special area due to its karst features and cave fauna. The Tincher Special Area consists of 4,180 acres and is split by the Highway 50 corridor.

Enclosed with this letter is a copy of the Hoosier National Forest Management Plan with all amendments, a copy of the 1995 management plan for the Tincher Special Area, a 4-page update on the Tincher Special Area dated January 8, 2002 prepared by the Forest Service wildlife biologist/karst coordinator.

The Forest Service stated that the Tincher Special Area is the largest special area in the Hoosier National Forest. Nearly the entire area is subterranean drained and comprised of active and extensive karst, including caves, pits, sinkholes, swallow holes, cave springs, and the longest free-drop pit in Indiana.

Even with only a partial inventory of species, Tincher is one of the most significant karst areas in Indiana. There are 17 known troglobitic species in this area. Areas with 20 or more known troglobites are considered to be global subterranean hotspots. In addition, there is the potential for Indiana bats to occur in the Tincher Special Area. The entire letter dated January 18, 2002 from the USDA Forest Service may be found in Appendix Y.

U S Department of Agriculture – Forest Service Comments from June 14, 2002

The U S Department of Agriculture Forest Service stated in the letter dated June 14, 2002, that the Hoosier National Forest Service would prefer that I-69 not go through the Tincher Special Area. The Tincher Special Area, as well as the rest of the Hoosier National Forest, is public land owned by the United States. One of the six major goals of the United States Department of Agriculture (USDA) Forest Service in managing these lands is to "Provide for Recreation Use in Harmony with Natural Communities."

Although there are few developed recreation sites, the area is available for dispersed recreation. Backpacking, hiking, camping, hunting, and fishing are some of the recreational activities in the Tincher Special Area. There is a trail to Tincher Pond and plans for another trail in the future. Berry Pond has good fishing and Georgia Pond now serves as a wetland.

In addition to recreation, special areas are managed to protect their special or unique features. The Tincher Special Area is subterranean drained, with caves, pits, sinkholes, swallow holes, cave springs, and the longest free-drop in Indiana. Because the area is subterranean drained and cave ecosystems are fragile, ground-disturbing activity in the area could have far-reaching consequences.

The Forest Service stated that the Tincher Special Area has a variety of habitats in addition to the caves. There are dry, open woodlands; moist forest; early successional, shrub-dominated habitat; and open lands, dominated by herbaceous cover.

Although, Federal Threatened and Endangered species have not been seen in the Tincher Special Area, there is available habitat for bald eagle, gray bat, and Indiana bat. There are 13 species considered sensitive by the USDA Forest Service, which are known to occur in Tincher; 10 cave species, two plants, and one animal.

The USDA Forest Service indicated that the Tincher Special Area is truly a jewel in the Hoosier National Forest. They are interested in learning more about the area and protecting the area to maintain habitat for all species in Tincher. The entire letter dated June 14, 2002 from the USDA Forest Service may be found in Appendix Y.

Indiana Department of Natural Resources Division of Outdoor Recreation Comments from Jan. 31, 1992

Regardless of the route designed or chosen, it appears that the proposed project will impact hundreds of acres of forest lands. At present, forest lands comprise less than 17% of Indiana's land use. Therefore, a loss of this magnitude will be significant and include lost timber resources and annual timber growth, decreased wildlife and biodiversity, and the loss of air and water quality contributions that forests provide. Among other issues, planning should focus on minimizing impacts so that forest resources may be managed properly for the benefit of current and future generations. In addition, the following points should be considered during formulation of this project.

- Public forest lands constitute lands held in the public trust. Corridor selection should avoid all such lands.
- Both direct and indirect impacts of right-of-way clearings should be addressed.
- Classified Forests should be avoided.
- Mitigation for forest losses should be incorporated into the plan and should include, but not be limited to, reforestation of open acreages in the region.
- Employment of a professional forester to manage the sale and utilization of timber.
- Inclusion of plans to provide access to lands rendered inaccessible due to the project.

The Indiana Department of Natural Resources (IDNR) Division of Outdoor Recreation has particular concerns for the portion of the project between the East Fork of the White River and Plainville, Indiana. This extremely significant ecological area consists of wind deposited sand dunes, which formerly supported a complex mosaic of dry, savanna and prairie-like vegetation. The entire letter dated January 31, 1992 from the IDNR Division of Outdoor Recreation may be found in Appendix Y.

Indiana Department of Natural Resources Division of Historic Preservation and Archaeology Comments from Nov. 29, 2000 to July 12, 2002

Attached to the letter dated November 29, 2000 is the "Summary of the Key Steps for Carrying Out the Section 106 Review Process In Indiana". The summary of the this document states that the best way to reduce the time for Section 106 review is for the Federal agency or its delegatee and the applicants for funding or licensing to plan their projects so as to avoid adverse effects on historic properties. This can be done if the Federal agency or its delegatee or its applicant identify all historic properties or important archaeological sites at the beginning of the project planning, use The Secretary of the Interior's Standards for Historic Preservation Projects as a guide to designing a project that will affect historic properties, and contact the State Historic Preservation Officer (SHPO) before reaching any final decisions on project design. The entire letter dated November 29, 2000 from IDNR Division of Historic Preservation and Archaeology may be found in Appendix Y.

The letters dated May 28, 2002 to July 12, 2002 documented the SHPO response in the Section 106 process. In these letters, the SHPO agrees with the preliminary evaluations of potential eligibility of properties in the study bands. The entire letters from IDNR – DHPA dated May 28, 2002 to July 12, 2002 may be found in Appendix P.

Indiana Department of Natural Resources Division of Water Comments from July 16, 2002

The letter dated July 16, 2002 from the Indiana Department of Natural Resources Division of Water stated that the Flood Control Act (IC 14-28-1) requires the prior formal approval of the Department of Natural Resources for any proposal to construct, excavate, or fill in or on the floodway of a stream or other flowing water body which has a drainage area greater than one square mile.

This letter states that the Indiana Department of Natural Resources Division of Water does support using areas within or adjacent to the Patoka River National Wildlife Refuge and Beanblossom Bottoms as mitigation sites. The idea of using Goose Pond may or may not be acceptable for mitigation depending upon the details. In general, they support the idea of acquiring mitigation lands adjacent to existing publicly owned land with the intent to transfer the land to public ownership. This practice would not only provide habitat within the mitigation area, but would greatly enhance the publicly owned lands adjacent to it. Transferring the property to an entity such as the Patoka River National Wildlife Refuge would also better ensure its future protection.

Enclosed with the letter is a list of specific areas of concern regarding each alternative, along with a corresponding numbered map of each alternative. They are listed in a south to north sequence for each alternative. Many of the sites listed are merely within the study corridor and are not directly affected. The major areas of concern are indicated with asterisks. The entire letter dated July 16, 2002 from IDNR Division of Water may be found in Appendix Y.

U S Department of Transportation – U S Coast Guard Comments from July 11, 2001

The letter dated July 11, 2001 from the U S Department of Transportation (USDOT) – U S Coast Guard stated that after reviewing the *Purpose and Need* presentation that they received, they have determined that this project does not cross waterways over which the Coast Guard exercises jurisdiction for bridge administration purposes. The entire letter dated July 11, 2001 from USDOT U S Coast Guard may be found in Appendix Y.

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Chapter 13 - Glossary, Acronyms, and Index

13.1 Glossary of Terms

Accessibility – The ability of people to reach desired destinations (such as employment, shopping, recreational facilities, medical facilities, cultural centers, airports, etc.). Accessible regions allow residents to reach many such destinations in a shorter period of time. Inaccessible regions allow residents to reach fewer destinations, and requiring longer periods of time.

Alternatives – five possible routes for I-69 to connect Evansville to Indianapolis, plus a No Build alternative

CERCLA Site – a site contaminated with a hazardous substance and being remediated as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System - is a database that includes all sites currently on the National Priorities List, or being considered for it.

Committed Project – A project that is expected to occur regardless of the proposed I-69 project. Improvements to I-70 from Indianapolis to Terre Haute, and the construction of SR 641, the Terre Haute bypass, are examples of committed projects.

Congestion – A condition in which the number of vehicles using a road approaches the capacity of that road. It is characterized by reduced travel speeds and (at high levels of congestion) stop-and-go conditions.

Corridor – approximately 2000-ft wide in most areas, for each alternative. The decision will be made on a corridor, rather than an alignment. The corridor has been narrowed in some instances around committed projects and to avoid sensitive areas, and widened in some areas to provide ample room for future alignments.

Cumulative Impacts – Are defined by the Council on Environmental Quality (CEQ) Regulations 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."* (CEQ Regulations) Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Direct Impacts – are defined by the CEQ Regulations a *"effects which are caused by the action and occur at the same time and place."* (CEQ Regulations) For this project, an example of a direct impact would be the taking of a wetland for right-of-way for an interchange.

Economic Model – A computerized representation of the economy of a region. It models the interaction of components such as labor, capital, markets, and government policy. The model used in this study (the Regional Economic Model Inc. - REMI Model) analyzes the interaction of 53 industry categories with available markets, labor, and capital resources. It is used to forecast the economic effects of a significant change in policies which affect the economy - such as the construction of a new Interstate highway between Evansville and Indianapolis.

13.1 Glossary of Terms, continued

EIS – Environmental Impact Statement. A detailed document prepared as part of the NEPA process. A draft EIS (DEIS) is published to seek agency and public input. A final EIS (FEIS) adds (1) the comments and responses to the DEIS and (2) selects a preferred alternative.

Forecast Year – A year, 20 - 25 years into the future, for which traffic forecasts are made. The design of any transportation facility must accommodate travel which would occur in the forecast year. For this study, the Forecast Year is 2025.

Geographic Information System (GIS) – A computer representation of data which is geographically distributed. These data can be generated and displayed to show their physical location. Each data set with a certain type of information (e.g., the location of wetlands) constitutes a "layer" in the GIS. GIS layers can be superimposed to show the relationship between the location of different items.

Grade Separation – overpass or underpass

Grid – raster data format depicting the feature in pixel squares

Historic Properties – Buildings, structures, sites, objects or districts which are an important part of the historical and cultural heritage of the United States.

Horizontal Alignment – location of the road as it can be moved from side to side, usually done by using curves

Impact Length – length of an alternative that does not include the length of committed projects within the alternative. It represents the length of the alternative that will be new right-of-way for the proposed I-69 project.

Impaired Stream – a stream listed in the IDEM 1998 303 (d) List of Impaired Waterbodies. These streams do not meet Indiana's water quality standards. Streams may be impaired due to chemical or biological contaminants.

Indirect Impact – are defined by the CEQ Regulations as *"effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate..."* (CEQ Regulations) For this project, an example of an indirect impact would be farmland bought by a developer to build a service station at an interchange.

Jurisdictional Wetland – A wetland regulated by the Army Corps of Engineers as a "water of the United States" under the Clean Water Act. Jurisdictional wetlands must be mitigated for (recreated, restored, or enhanced) if impacted.

Karst – landscapes characterized by caves, sinkholes, underground streams, and other features formed by slow dissolving, rather than mechanical eroding of bedrock. Karst areas can be especially sensitive to groundwater pollution.

Layer – individual digital GIS data file. Many layers (aerial photo, roads, churches) are used in a project to create one map.

13.1 Glossary of Terms, continued

Level of Service (LOS) Ratings – A scale measures the level of congestion on a road. It goes from A (free flowing traffic) to F (the highest level of congestion).

National Highway System (HRS) – A national system of highways, consisting of all Interstate Highways and other principal arterial highways. Federal policy is to focus Federal highway investments on these roads. The NHS includes 5% of the national roadway network but serves approximately 4% of the Nation's highway travel.

National Natural Landmark – a site that is one of the best examples of a type of biotic community or geologic features in its physiographic province

Natural Region – a major, generalized unit of the landscape where a distinctive assemblage of natural features is present. The natural region classification system includes several natural features, such as: climate, soils, glacial history, topography, exposed bedrock, pre-settlement vegetation, species composition, physiography, and plant and animal distribution.

NEPA (National Environmental Policy Act) – Legislation passed by the Congress in 1969 that requires preparation of an environmental impact statement (EIS) for Federal actions that may significantly impact the environment.

"No-Build" Scenario – The scenario in which a proposed project is not built. All benefits and impacts are forecasted with reference to the "no-build" scenario (also called the "No-Action" alternative). The "No-Build" scenario must remain under consideration throughout the study process.

Notable Sites/Structures – property did not quite merit an "Outstanding" rating, but still is above average in its importance. Further research or investigation may reveal that the property could be eligible for National Register listing. The property may be eligible for the Indiana Register of Historic Sites and Structures. Most surveys were done by the Indiana Historic Landmark Foundation as part of the Indiana Historic Sites and Structures Inventory.

Map Sheet – a single atlas sheet within the series of sheets that makes up an atlas of an entire alternative

Managed Lands – lands that are actively managed by federal, state, and local, agencies and private land trusts. Includes areas such as state parks, refuges, nature preserves, local parks, river access and fishing sites**.**

NWI (National Wetland Inventory) – a portion of the U.S. Fish & Wildlife Service that produces information on the characteristics of the nation's wetlands and deepwater habitats.

Options – various ways a single alternative may approach Indianapolis. For example, Alternative 2 has three options - 2A, 2B, and 2C.

Outstanding Sites/Structures – property has enough historic or architectural significance that it is already listed, or should be considered for individual listing, in the National Register of Historic Places. Most surveys were done by the Indiana Historic Landmark Foundation as part of the Indiana Historic Sites and Structures Inventory.

13.1 Glossary of Terms, continued

Performance Measure – A rating (typically numerical) which assesses the degree to which an alternative satisfies a project goal.

Physiographic Region – An area characterized by consistency in soil and geology.

Populated Area – general boundary where there is some density of residential development, similar to city limits

Prime Farmland – 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 (the landuse could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water)**.**

Purpose and Need – The section of an environmental project that discusses the needs and defines the goals (purposes) of the project.

RCRA Site – a site that is regulated by the Resource Conservation and Recovery Act to either generate, transport, store, or dispose of hazardous waste.

Relocation – The purchase of private property (land and/or structures) for a public purpose, such as a transportation facility. The purchase price includes the costs of relocating residents or businesses - hence the name "relocation."

Route Map – a single map showing one entire alternative in relation to some specific environmental issue.

Scoping – The initial step of an environmental study. It includes the determination of a range of possible alternatives, and analysis of Purpose and Need for the project.

Screening– The second step of an environmental study. It applies Purpose and Need criteria to all alternatives to arrive at a set of alternatives for detailed study.

Section 4(f) – FHWA will not approve any program or project which requires the use of any publicly owned public park, recreation area, or wildlife or waterfowl refuge, or any land from an historic site of national, state, or local significance unless: (1) there is no feasible and prudent alternative to the use, and (2) all possible planning to minimize harm resulting from such use is included.

Study Band – 2-mile wide band around the conceptual working alignment.

Superfund Sites – uncontrolled or abandoned places where hazardous waste is located, possibly affecting local ecosystems or people.

Tier 1 EIS – an Environmental Impact Statement that may be completed for large studies that require certain major questions to be answered before a more detailed study (Tier 2 EIS) can be done.

Tier 2 NEPA Studies – more detailed NEPA studies completed after the Tier 1 EIS has been done.

Total Length – length of an alternative from Evansville to Indianapolis, including committed projects

13.1 Glossary of Terms, continued

Travel Demand Model – A computerized representation of the population, employment, socioeconomic characteristics, and transportation network of a region. Travel on the transportation network is forecasted as a function of population, employment, and socioeconomic characteristics. If proposed projects (such as an alternative of I-69) can be added to the transportation network, the model can forecast the effects of that proposed project.

Typical Section – a section cut through a roadway that shows the typical configuration and design features. This will usually include lane and shoulder widths, profile grade and construction centerline location, roadway cross slopes, side slopes, ditches and clear zones. Right-of-way width estimations were developed from typical sections.

Variations – various ways a single alternative may bypass or traverse a city/town. For example, there are four variations for Alternatives 3 and 4 near Washington.

Vertical Alignment – location of the road as it can be moved up or down through hills and valleys

Volume-to-Capacity (V/C) Ratio – The ratio of volume of traffic on a roadway to the capacity of that roadway. As the volume approaches the capacity, the roadway becomes congested.

Wellhead Protection Area – the surface and subsurface area which contributes water to a public water supply well and through which contaminants are likely to move through, and reach, the well over a specified period of time. A wellhead protection area may be delineated by a fixed radius, hydrogeologic/geomorphic mapping, analytical, semi-analytical, or numerical flow/ solute transport methods.

Wetland – A type of land use protected by various state and federal laws. Wetlands are characterized by plants adapted to a wet environment, soils which are characterized by anaerobic conditions, and which is inundated or saturated to the surface for at least 5% of the growing season in most years.

Working Alignment – A conceptual footprint of the right-of-way within a corridor used solely to estimate and compare the environmental impacts of the various alternatives. This is not a final alignment which would be determined in the design phase.

13.2 Acronyms

13.2.1 Terms

AML ..... Abandoned Mine Lands
APE ..... Area of Potential Effect
CERCLA..... Comprehensive Environmental Response, Compensation, and Liability Act (Hazardous Waste Sites)
CERCLIS ..... Comprehensive Environmental Response, Compensation, and Liability Information System (Hazardous Waste Sites)
CWNS ..... Clean Water Needs Survey (wastewater collection/treatment)
DOQQ ..... Digital Orthographic Quarter-Quadrangle (registered aerial photograph)
DRG ..... Digital Raster Graphic (often refers to digital USGS 7.5' quadrangles)
EIS ..... Environmental Impact Statement
GIS ..... Geographic Information System
LUST..... Leaking Underground Storage Tanks
NEPA ..... National Environmental Policy Act
NPL ..... National Priorities List (Hazardous Waste Sites)
RCRA..... Resource Conservation and Recovery Act
RCRIS ..... Resource Conservation and Recovery Information System
TES ..... Threatened and Endangered Species
UST ..... Underground Storage Tank

13.2.2 Agencies

CILTI ..... Central Indiana Land Trust Inc.
DHPA..... Indiana Department of Natural Resources, Division of Historic Preservation & Archaeology
ESRI ..... Environmental Systems Research Institute, Inc.
FAA ..... Federal Aviation Administration
FGDC..... Federal Geographic Data Committee
FHWA ..... Federal Highway Administration
FCC ..... Federal Communications Commission
FEMA..... Federal Emergency Management Agency
IDEM ..... Indiana Department of Environmental Management
IDNR..... Indiana Department of Natural Resources
IDOR..... Indiana Department of Reclamation
IGS ..... Indiana Geological Survey
INDOT ..... Indiana Department of Transportation
IU..... Indiana University
NPS ..... National Park Service
NRCS ..... Natural Resource Conservation Service
USACE ..... US Army Corps of Engineers
USDA ..... US Department of Agriculture
USEPA..... US Environmental Protection Agency
USFWS ..... US Fish and Wildlife Service
USGS ..... US Geological Service

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