



APPENDIX GG1

Tier 2 Biological Assessment

Tier 2 Environmental Impact Statement

I-69 Section 6

Martinsville to Indianapolis



**I-69 Section 6
(Martinsville to Indianapolis)
Tier 2 Biological Assessment**



June 6, 2017
Revised October 20, 2017



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CHAPTER 1 – Introduction

The 2004 Tier 1 Record of Decision (ROD) selected Alternative 3C as the I-69 corridor between Evansville and Indianapolis. Section 6 of the I-69 Evansville to Indianapolis project (I-69 Section 6) was identified to use the SR 37 corridor between Martinsville and Indianapolis as a part of the Tier 1 ROD. The termini of I-69 Section 6 are SR 37 at Indian Creek south of SR 39 in Morgan County and I-465 in Marion County. The Tier 1 ROD permitted consideration of alternative routes outside the selected corridor to avoid significant impacts. Due to the potential for increased impacts and/or changed conditions along SR 37, a scoping and screening process was initiated in October 2014 to select the route for I-69 in Section 6, which included evaluation of alternative routes outside of the Tier 1 selected corridor.

The screening process for I-69 Section 6 began in early 2015 with 27 conceptual alternatives. With agency and stakeholder input, these were narrowed to five preliminary alternatives in June 2015. The relative performance, cost, and impact was reviewed, and with further agency and stakeholder input, the SR 37 corridor was confirmed as the preferred route for I-69 Section 6 in March 2016, consistent with Alternative C originally identified in the Tier 1 ROD.

The Tier 2 Biological Assessment (BA) study area is approximately 26.9 miles in length, and the geographic extent of the study area varies depending on species and is further defined by the action areas¹ described for each species. The BA study area for both the Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*Myotis septentrionalis*) generally includes portions of four counties (Morgan, Johnson, Marion and Hendricks).

This Tier 2 BA for Section 6 contains updated information on reasonably certain² I-69 Section 6 project impacts and proposed mitigation since the Tier 1 Biological Assessment (BA) Addendum dated March 7, 2006, Tier 1 Biological Assessment (BA) Addendum for the Northern Long-Eared Bat dated October 10, 2014, and the Biological/Conference Opinion for the Northern Long-eared Bat (*Myotis septentrionalis*) dated May 4, 2015 - Amendment 3 to the Tier 1 Revised Programmatic Biological Opinion (dated August 24, 2006, previously amended July 24, 2013 and May 25, 2011) for the I-69, Evansville to Indianapolis, Indiana highway.

This Tier 2 BA provides the U. S. Fish and Wildlife Service (USFWS) with plans and impacts of I-69 Section 6, based on the preferred alternative, including local access roads, interchanges and

¹ USFWS regulations define the “action area” as all areas to be affected directly and indirectly by the Federal Action and not merely the immediate area involved in the action (50 CFR § 402.02). The action areas are further described in Section 3.1 and 4.1.

² We note that the predicted induced growth (approximately 336 acres near interchanges) is anticipated in I-69 Section 6 to be developed based on the National Environmental Policy Act (NEPA) concept of “reasonable foreseeability.” This NEPA standard for predicting indirect/induced growth is significantly broader than the ESA’s “reasonably certain” standard for consideration of indirect/induced growth as defined in 50 C.F.R § 402.02 “Effects of the Action”. If the more limited ESA “reasonably certain” standard were used, none of the predicted induced/indirect growth predicted in the Section 6 Tier 2 DEIS would be recognized in an analysis conducted solely for proceedings under Section 7 of the ESA. However, in order to continue to use the very conservative approach used in the Revised Tier 1 BO, this Tier 2 BA analyzes impacts based on the NEPA required “reasonably foreseeable” induced growth predicted in the Section 6 Tier 2 DEIS.



grade separations. This Tier 2 BA addresses the specific impacts associated with the I-69 Section 6 preferred alternative, and must be reviewed in concert with the Tier 1 documents³, bat survey reports, and the Section 6 Tier 2 DEIS to obtain a full understanding of the proposed actions, mitigation, and findings. A summary of current and past consultation activities with the USFWS is presented in **Table 1-1**.

The content of this Tier 2 BA is governed by paragraph four of the Terms and Conditions imposed in the Incidental Take Statement of the Tier 1 Revised BO, for the Evansville to Indianapolis I-69 project, issued by the USFWS to the Federal Highway Administration (FHWA) on August 24, 2006, and in the Amendments to the Tier 1 Revised BO issued by USFWS on May 25, 2011, July 24, 2013 and May 4, 2015.

As more fully documented below, FHWA and the Indiana Department of Transportation (INDOT), based on a review of the data presented in this Tier 2 BA and other relevant project documents, have reached a determination that the overall impacts to the species as discussed in the Tier 2 BA remain consistent with the findings in the Tier 1 Revised BO and the Amendments to the Tier 1 Revised BO. FHWA and INDOT request formal consultation on a “Likely to Adversely Affect” conclusion for the Indiana bat and northern long-eared bat.

The rusty patched bumble bee (*Bombus affinis*) has only recently been listed (Effective date: March 21, 2017) as a USFWS endangered species under the Endangered Species Act. As such, this species was not previously included in the I-69 Tier 1 BA or in the subsequent Tier 1 Revised BO and Amendments. A review of the current (post-1999) known extant distribution of the species within Indiana indicates that an account of the species has been documented from north-central Marion County, but that there are no records from southern Marion County or from Morgan and Johnson counties within which the I-69 Section 6 alignment is located. Based on the current known distribution of the species within Indiana relative to the I-69 Section 6 alignment and additional information presented in Chapter 5 of this Tier 2 BA, the FHWA and INDOT request concurrence in the finding of “Not Likely to Adversely Affect” for the rusty patched bumble bee.

The bald eagle (*Haliaeetus leucocephalus*) was officially removed (delisted) from the list of threatened and endangered species on August 8, 2007, and is no longer afforded protection under the Endangered Species Act (ESA). The bald eagle continues to be protected under the Bald and Golden Eagle Protection Act (BGEPA). Conservation measures developed for the bald eagle as part of the Tier 1 BA and Tier 1 BA Addendum will be completed despite the species delisting.⁴

³ The Tier 1 documents include: Tier 1 Record of Decision (ROD) issued by the FHWA on March 29, 2004, the Tier 1 FEIS, issued by FHWA on December 7, 2003, the Tier 1 Biological Assessment Addendum, issued by FHWA on March 7, 2006, the Revised Tier 1 Biological Opinion, issued by USFWS on August 24, 2006, and the Amendment to the Tier 1 Revised Biological Opinion, issued by USFWS on May 25, 2011, and Tier 1 Biological Assessment for the Northern Long-Eared Bat, issued by FHWA on October 10, 2014, and the Tier 1 Conference/Biological Opinion, issued by USFWS in 2014. Tier 2 documents include the Section 6 Tier 2 DEIS, issued in February 2017.

⁴ FHWA and INDOT submitted to the USFWS the certification of compliance with the Incidental Take Statement, included in the Revised Tier 1 BO, as part of an application for an expedited BGEPA permit pursuant to the regulations at 50 CFR



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The Indiana Department of Natural Resources (IDNR) Natural Heritage Database includes no record of a bald eagle nest within 0.5 mile of any I-69 Section 6 alternatives. However, there is an active nest approximately [REDACTED] from proposed local service road improvements (new frontage road west of I-69 at [REDACTED]) and an active nest approximately [REDACTED] of [REDACTED]. Both nests are outside of the recommended 660-foot radius for activities as described in the USFWS National Bald Eagle Management Guidelines. No impacts to any nest sites are anticipated by the proposed action. Appendix E includes mapping showing all nests relative to the Section 6 Preferred Alternative C4. No additional nests were identified during surveys conducted in 2015 and 2016.

Table 1-1: Summary of NEPA and Section 7 Consultation History for I-69, Tier 1 & Tier 2

Date	Event / Action
May 18, 1999	Agency review meeting held to discuss tiered approach for this project.
January 5, 2000	Notice of Intent to undertake Tier 1 NEPA study for I-69 between Evansville and Indianapolis is published in Federal Register.
February 3, 2000	INDOT and FHWA hosted a “Scoping Meeting” with environmental review agencies.
June 5, 2001	INDOT and FHWA convened an agency review meeting to discuss the “Purpose and Need Statement.” A substantial portion of this meeting was devoted to discussing the type of agency coordination required in Tier 1 and Tier 2 of this study. The specific requirements of each agency were discussed in terms of its legal and regulatory responsibilities.
November 27, 2001	INDOT and FHWA convened an agency review meeting to discuss their “Screening of Alternatives” for I-69 (included environmental information).
December 21, 2001	Bloomington Field Office (BFO) sent comments on the Draft Level 2 Alternatives Analysis Report for the Evansville to Indianapolis I-69 study including endangered species and Critical Habitat technical information.
March 14, 2002	Federally-listed species were reviewed and appropriate tables constructed with species, their number and status and presented to the USFWS at the BFO.
June 4 and 5, 2002	A BFO biologist took a two-day bus tour of I-69 alternatives focused on environmentally-sensitive areas with INDOT, FHWA, United States Environmental Protection Agency (USEPA), and IDNR.
June 2002	Through informal consultation with the USFWS, INDOT agreed to shift the common alignment of Alternative 3A, B, and C to be beyond the range of bats that forage around and hibernate in a cave that is Designated Critical Habitat for the Indiana bat in Greene County.

22.28, which apply to projects previously exempted from the take prohibition for bald eagles under Section 7 of the ESA. The USFWS granted a bald eagle permit on June 25, 2009 (Permit No. MB218918-0).



Date	Event / Action
June 27, 2002	FHWA sent a letter to BFO requesting a list of federally-listed species and Designated Critical Habitat that may be present in the I-69 Study Area of five alternatives being carried forward for detailed analysis in the DEIS.
July 1, 2002	BFO sent FHWA a species list for all five alternatives that included six species and one cave Designated Critical Habitat for the Indiana bat that may be present within the proposed project counties.
July 31, 2002	INDOT and FHWA released their Tier 1 DEIS for public comment. The DEIS had been approved on July 22.
November 14, 2002	The BFO's comments on the Tier 1 DEIS are combined with those of the National Park Service and sent in a single letter from the Department of the Interior's Washington Office to FHWA.
January 9, 2003	Gov. Frank O'Bannon announced Alternative 3C as INDOT's recommendation as the "preferred alternative" for I-69.
February 21, 2003	FHWA requests a species list for their preferred alternative, 3C.
February 28, 2003	FHWA sends BFO a letter requesting comments regarding the four variations of Alternative 3C around the City of Washington.
March 11, 2003	An Agency Coordination Meeting was held at BFO to discuss a Conceptual Tier 1 Forest and Wetland Mitigation Plan, Sections of Independent Utility, the proposed Patoka River crossing, and how the Section 7 consultation would be undertaken.
March 13, 2003	BFO sent FHWA a letter listing three species that may be present in the Alternative 3C Study Area: Indiana bat, bald eagle, and fanshell mussel.
March 14, 2003	BFO sent FHWA a letter recommending that it choose one of the two eastern routes around Washington (variation "WE1" was specifically recommended) as they were less likely to have adverse effects to Indiana bats or bald eagles because impacts to forest and wetlands would be smaller.
March 26, 2003	BFO was sent a Draft BA addressing effects to Alternative 3C on Indiana bats, bald eagles, and fanshell mussels and requested review and comments.
May 30, 2003	BFO returned comments on Draft BA.
June 15 – July 2003	BFO assisted INDOT and FHWA in developing Conservation Measures to be included in the BA that would avoid and minimize incidental take of Indiana bats and bald eagles.
July 21, 2003	BFO received a revised BA and letter from FHWA requesting formal Section 7 consultation for the effects of Alternative 3C of I-69 on Indiana bats and bald eagles. The letter also requested concurrence that fanshell mussels were not likely to be adversely affected by Alternative 3C. The 135-day period for formal consultation began.



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Date	Event / Action
August 22, 2003	BFO sent FHWA a letter acknowledging receipt and completeness of formal consultation initiation package. Informed FHWA that the USFWS expected to provide them with a final BO no later than December 3, 2003. Based on information contained in the BA, the USFWS also provided the FHWA written concurrence with their determination that the fanshell mussel was “not likely to be adversely affected” by the proposed construction, operation, and maintenance of Alternative 3C in I-69.
August – November 2003	BFO consulted with FHWA/INDOT to gain clarification on various issues resulting in several revisions to the Tier 1 BA.
November 28, 2003	BFO sent FHWA/INDOT a draft BO for review.
December 2, 2003	FHWA/INDOT returned comments on the draft BO to BFO.
December 3, 2003	BFO sent FHWA/INDOT the Final BO for Alternative 3C of I-69.
December 2003	INDOT released the FEIS with Alternative 3C named as its preferred alternative.
March 2004	FHWA issued a ROD approving the 3C corridor.
Summer 2004	Tier 2 mist net surveys revealed the presence of 13 maternity colonies and scattered occurrences of male Indiana bats throughout the 3C corridor.
Summer 2005	Additional mist netting and radio tracking located additional Indiana bat roost trees within the 13 maternity colony areas.
July 1, 2005	FHWA and INDOT met with USFWS and agreed to reinstate formal consultation on Tier 1 of I-69 in light of all the new information on Indiana bat maternity activity and hibernacula in the project area.
Fall 2005	BFO and project consultant staff held weekly meetings to guide development of the Tier 1 BA Addendum.
February 2006	FHWA, INDOT, and USFWS signed a Pre-consultation Agreement.
March 7, 2006	FHWA submitted a Tier 1 BA Addendum to the USFWS with a letter requesting to reinstate formal consultation for the Indiana bat.
June & July 2006	BFO consulted with FHWA/INDOT/project consultants to gain clarification on various issues discussed within the BA Addendum.
July 10, 2006	BFO reviewed and submitted comments on the Tier 1 Re-evaluation Report for I-69, which outlined anticipated impacts resulting from the interstate being a toll road.
July 17, 2006	BFO met with FHWA/INDOT/project consultants to discuss findings of the Tier 1 Re-evaluation report and other issues. It was agreed to expand the Winter Action Area to include an additional cave, which would necessitate FHWA/INDOT/project consultants to provide additional data to BFO and an effects determination on the cave as Critical Habitat. It was mutually agreed to extend the formal consultation period to accommodate these changes.



Date	Event / Action
July 20, 2006	BFO received a letter from FHWA stating that it determined that I-69 “may effect, but is not likely to adversely affect” the cave as Critical Habitat for the Indiana bat. Additional information was provided regarding impacts around this cave and revised data for the revised Winter Action Area.
July 26, 2006	USFWS provided FHWA a Draft of the revised Tier 1 BO and Incidental Take Statement for review.
August 10, 2006	FHWA/INDOT return comments on the draft revised Tier 1 BO to BFO.
August 24, 2006	BFO sent FHWA/INDOT the final Revised Tier 1 BO for Alternative 3C of I-69.
May 18, 2007	BFO sent FHWA a letter noting intention to prepare an individual Tier 2 BO for each Tier 2 section that BFO concludes will be likely to adversely affect the Indiana bat and/or bald eagle. Each will be a stand-alone document rather than being appended to the 2006 revised Tier 1 BO.
April 11, 2011	FHWA sent BFO a letter requesting re-initiation of formal Tier 1 consultation for the Indiana bat. The re-initiation request was based on a new maternity colony, as well as documentation of the newly discovered disease White Nose Syndrome (WNS) within the action area.
April 12, 2011	BFO sent FHWA a letter acknowledging receipt of April 11, 2011 letter and stating it plans to amend the Tier 1 Revised Programmatic BO (dated August 24, 2006).
May 18, 2011	Draft Amendment to the Tier 1 Revised Programmatic BO (dated August 24, 2006) sent to FHWA/INDOT for review.
May 23, 2011	FHWA/INDOT returned comments on the Draft Amendment to the Tier 1 Revised Programmatic BO (dated August 24, 2006) to BFO.
May 25, 2011	BFO sent FHWA/INDOT the final Amendment to the Tier 1 Revised Programmatic BO (dated August 24, 2006).
May 20, 2013	FHWA sent BFO a letter requesting re-initiation of formal Tier 1 consultation for Indiana bat. The re-initiation request was based on the identification of two new maternity colonies in Section 5, exempted levels of take, and documentation for private property owner tree clearing in Section 4.
July 11, 2013	BFO sent Draft Amendment 2 to the Tier 1 Revised Programmatic BO (dated August 24, 2006) to FHWA/INDOT for review.
July 16, 2013	FHWA/INDOT returned comments on the Draft Amendment 2 to the Tier 1 Revised Programmatic BO (dated August 24, 2006) to BFO.
July 24, 2013	BFO sent FHWA/INDOT the final Amendment 2 to the Tier 1 Revised Programmatic BO (dated August 24, 2006).
April 9, 2014	FHWA/INDOT and USFWS concurred that a Tier 1 BA Addendum was needed for the northern long-eared bat proposed for listing as threatened under the ESA.



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Date	Event / Action
July 10, 2014	Draft Tier 1 BA Addendum (dated July 9, 2014) for the northern long-eared bat submitted to USFWS for review.
September 9, 2014	USFWS indicated that listing of northern long-eared bat would be delayed six months until April 2, 2015.
October 10, 2014	Tier 1 BA Addendum for the northern long-eared bat submitted to USFWS requesting formal “conferencing” and a Conference Opinion (CO) response within 30 days.
December 2014	USFWS prepared a draft Conference Opinion (CO) for review.
January 12, 2015	FHWA/INDOT conference call with USFWS addressed multiple items in the draft Conference Opinion including “No Jeopardy”, “Take Statement”, forest cover impacts, road kill analysis, bridge and building structure inspections for bats, process for conversion of the CO into a BO after northern long-eared bat is listed.
March 2, 2015	USFWS provided clarification that additional mist netting to the original 2004-05 survey was required and should be conducted in accordance with the new 2015 guidelines.
April 1, 2015	USFWS sent FHWA/INDOT the CO for the northern long-eared bat as Amendment 3 to the Tier 1 Revised Programmatic Biological Opinion.
May 4, 2015	CO for the northern long-eared bat as Amendment 3 of the Tier 1 Revised Programmatic Biological Opinion was automatically adopted as a Biological Opinion
Summer 2015	Mist netting completed for 19 locations in Section 6.
September 18, 2015	USFWS (80 FR 56423) indicated that a 90-day finding concluded the Xerces petition requesting that the rusty patched bumble bee be listed as an endangered species included substantial information indicating that listing the species may be warranted.
May 24, 2016	USFWS and INDOT discussion of mitigation focus areas (specifically landlocked parcels), endangered species to be considered in the Section 6 BA, confirmation that bat mist netting was not necessary for Section 6 in 2016 and a commitment to conduct pre-construction bridge/culvert and building structure inspections for bats.
September 15, 2016	USFWS publishes proposed rule (81 FR 65324) to list the rusty patched bumble bee as endangered under the Endangered Species Act.
November 9-10, 2016	INDOT, FHWA and Consultant gave a 2-day tour to the USEPA), U.S. Army Corps of Engineers (USACE), USFWS, Indiana Department of Environmental Management (IDEM) and IDNR on 12 potential mitigation site in I-69 Section 6.
January 11, 2017	USFWS publishes final rule (82 FR 3186) to list the rusty patched bumble bee as endangered under the Endangered Species Act effective February 10, 2017.
February 10, 2017	USFWS publishes final rule delay of effective date (82 FR 10285) revising the effective date of listing the rusty patched bumble bee as endangered under the Endangered Species Act effective from February 10, 2017 to March 21, 2017.



This BA for I-69 Section 6 includes three separate chapters to address the species being considered (Indiana bat, northern long-eared bat and the rusty patched bumble bee). Previous Tier 2 BAs for I-69 did not address either the northern long-eared bat or the rusty patched bumble bee because neither was listed at the time those BAs were completed. The northern long-eared bat did not become a federally threatened species until 2015 and the rusty patched bumble bee did not become a federally endangered species until March 2017. The Project Description, Mitigation and Literature Cited chapters in this BA are applicable to all species.

Even though the two bat species are similar in habitat, feeding, roost tree selection and their maternity colonies overlap, they differ in Summer Action Areas (SAAs), capture sites, roost tree locations, and impacts (e.g., direct, indirect and cumulative). For these reasons and in consultation with the USFWS BFO, the I-69 Section 6 Tier 2 BA addresses each of these bat species in separate chapters. In each species-specific chapter, the following information is provided: Action Areas, Tier 2 Surveys, and Impacts.

While the Indiana bat and northern long-eared bat chapters are very similar and in some instances redundant due to the similarity of the species, habitat and survey efforts, there are distinct differences. These differences include more limited location information on northern long-eared bats from the mist net surveys prior to 2015. While northern long-eared bats were captured and documented during these survey efforts to produce substantial data, radio telemetry and roost survey data was not collected for northern long-eared bats until the species was listed in 2015.

In order to provide background information for both species, a Life History of the Indiana bat is included in Appendix A and a Life History of the northern long-eared bat is included in Appendix B.



CHAPTER 2 – Project Description

I-69 Section 6 Preferred Alternative: Alternative C4 was identified as the preferred alternative in the DEIS and has been developed into a Refined Preferred alternative based on input on the DEIS. See **Figure 2-1** and Appendix C for mapping of the Refined Preferred Alternative. The DEIS Preferred Alternative C4 has two possible interchange designs at Southport Road. The Refined Preferred Alternative includes the diamond interchange shifted to the north at this location, based upon input on the DEIS.

Description: I-69 Section 6 begins south of SR 39 just south of Martinsville in Morgan County and ends at I-465 in Indianapolis in Marion County. Unlike the first four sections of I-69, and similar to Section 5, Section 6 entails upgrading an existing multi-lane, divided transportation facility to a full freeway design. Nearly half of the right of way used for the I-69 Section 6 project (51%) already is within existing right of way. Approximately 25% of the forest that will be impacted by the Refined Preferred Alternative (RPA) is already within existing right of way.

Length: 26.9 miles⁵

Right of Way Width: The width of the Section 6 right of way varies. In the urbanized area of Martinsville (between SR 39 and SR 252) it generally is between 220 and 250 feet. In the rural area of Morgan County (between SR 252 and SR 144) it ranges from 300 to 380 feet. In Johnson County and southern Marion County (between SR 144 and Southport Road), it ranges from 270 to 380 feet. In Marion County north of Southport Road, it ranges from 250 to 450 feet until joining with I-465. Key factors affecting right of way widths include alignment, terrain features, and local access treatments. The existing right of way of SR 37 generally varies from 180 to 250 feet throughout all of Section 6.

Right of Way Area: 2,072 acres (including 1,047 acres of existing right of way).

Typical Sections: The typical sections for the RPA are included as **Figure 2-2**. The typical sections are shown in the DEIS on Figures 3-8 through 3-10 along with the other typical sections considered.

Schedule: I-69 Section 6 is anticipated to begin construction in 2020.

⁵ Table 6-44, Section 6 DEIS

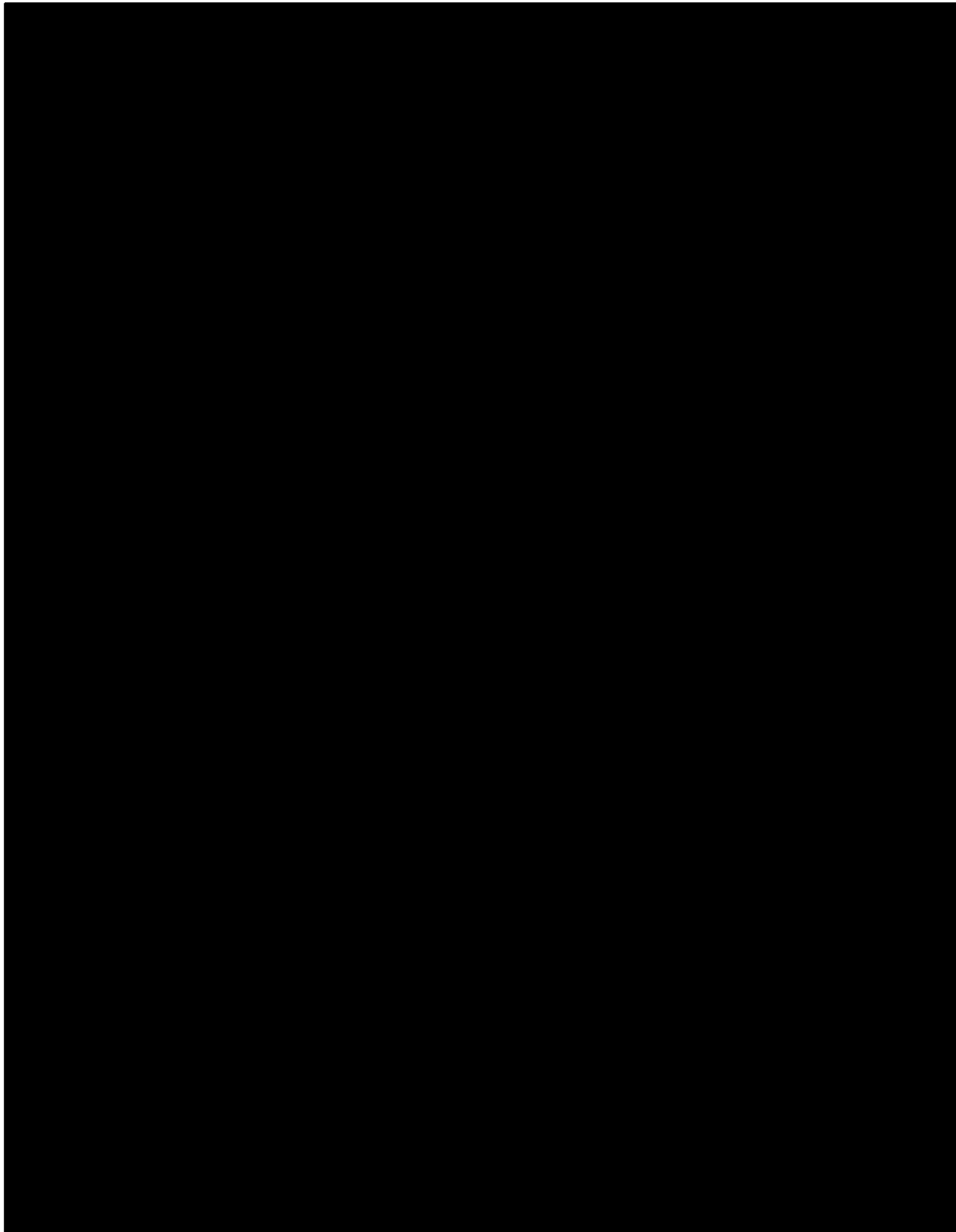
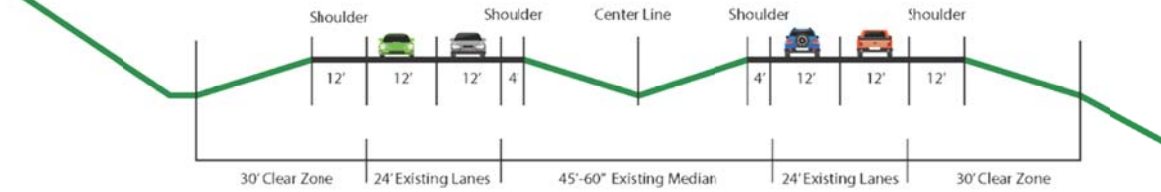


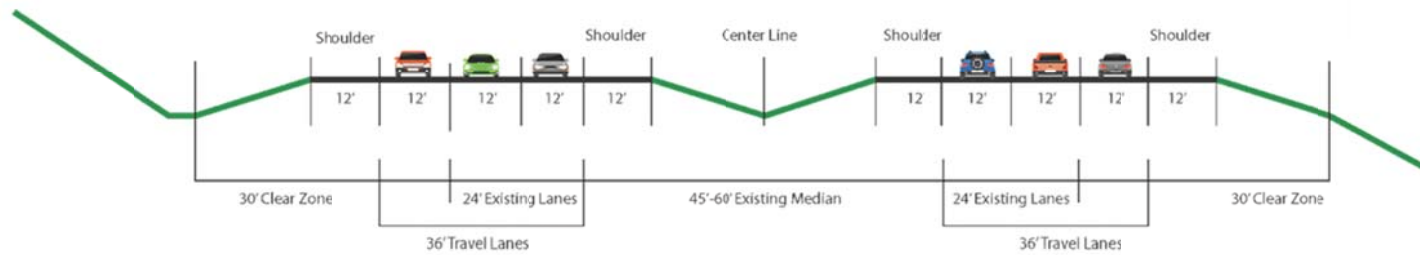
Figure 2-1: I-69 Section 6 Location Map

Figure 2-2: I-69 Mainline Typical Sections

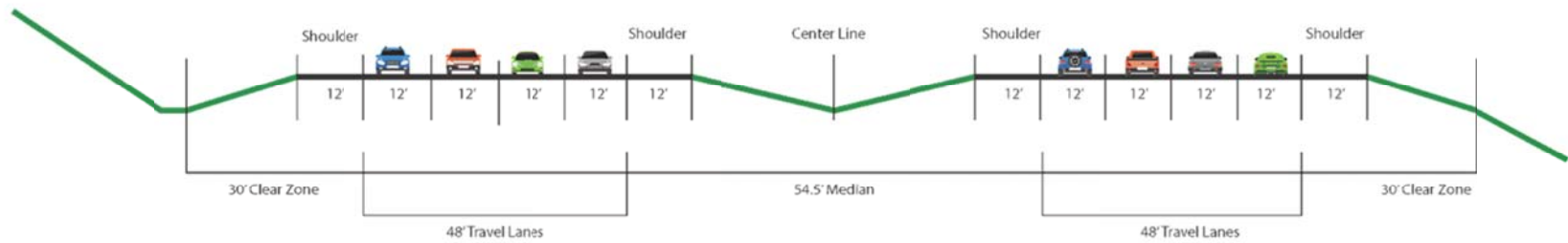
4-Lane



6-Lane



8-Lane





Relocations:

1. 142 residential homes
2. Eight duplex units
3. 9 mobile homes
4. 28 apartment units
5. 81 commercial businesses
6. 2 Non-Profit and 1 Fire Station

Rest Areas: There are no rest areas planned in I-69 Section 6.

Interchanges: The access locations presented in Tier 1 (Alternative 3C) were used for initial interchange selections in the I-69 Section 6 alternatives. The Tier 1 I-69 Section 6 potential interchange locations slated for study in Tier 2 included SR 39, Ohio Street, SR 252, Egbert Road, SR 144, Smith Valley Road, County Line Road, Southport Road and I-465. An existing SR 37 interchange is at SR 39. An additional potential interchange location at Henderson Ford Road and a combined interchange including SR 44/SR 252 were considered based upon input from local government representatives, Land Use Panels (LUP), Community Advisory Committee(s) (CAC), Stakeholder Working Groups (SWG) and public comments. The final interchanges included in the preferred alternative are included in **Table 2-1** and are very consistent with the Tier 1 interchange considerations with the inclusion of SR 44 access in combination with the previously identified SR 252 interchange and the inclusion of an interchange at Henderson Ford Road as opposed to Egbert Road.

Please see the I-69 Section 6 DEIS for the following:

- Chapter 3 Alternatives - interchange location selection and development screening
- Chapter 5.6 Traffic - local access and interchange function and descriptions
- Chapter 6 Comparison of Alternatives - resource impacts and preferred alternative selection

Refined Preferred Alternative proposed interchanges are identified in **Table 2-1**.



Table 2-1: Proposed Interchanges

State/County Roads/Railroads	Existing	Interchange Type
SR 39	Interchange	Use Existing Trumpet Interchange
Ohio Street	Intersection	Diamond Interchange
Combined SR 44 and SR 252	Intersection	Modified Split-Diamond Interchange
Henderson Ford Road	Intersection	Diamond Interchange
SR 144	Intersection	Partially Folded Diamond Interchange
Smith Valley Road	Intersection	Diamond Interchange
County Line Road	Intersection	Folded Diamond Interchange with Roundabouts
Southport Road	Intersection	Diamond Interchange, Southport Rd. Shifted North
I-465	Interchange	System Interchange West Of Existing SR 37 Interchange

Each interchange is discussed briefly below. The discussion references how interchange features of other alternatives were considered to arrive at the preferred alternative interchanges. These descriptions based upon Chapter 3 in the Section 6 DEIS.

SR 39 Interchange (Appendix C, page 1):

The preferred alternative would retain the existing trumpet style interchange. This would require less construction and have the lowest cost compared with other alternatives. With this configuration, a 25 mph loop ramp would serve northbound I-69 traffic exiting at SR 39. No new service road would be constructed on the east side of the SR 39 interchange. Rather, local connectivity between Martinsville and this area would be maintained using the existing Burton Lane connection with Jordan Road. The preferred alternative would use a five-legged roundabout on the west side of I-69 to connect SR 39 with the I-69 southbound ramp terminals and Rogers Road. It would also replace and elevate the existing bridge over Indian Creek.

Ohio Street Interchange (Appendix C, page 2):

The diamond interchange for Ohio Street is included in the preferred alternative. An alternate configuration for the Ohio Street interchange, using a loop ramp for the entrance from Ohio Street to southbound I-69, was considered at this location at the suggestion of the City of Martinsville. While this folded loop configuration would reduce impacts to commercial



properties along Bills Boulevard, it would increase impacts to residential properties east of Ohio Street and is not preferred.

Combined SR 44 and SR 252 Interchange (Appendix C, page 3):

The modified split diamond interchange is included in the preferred alternative to serve SR 252 and SR 44. I-69 would pass over SR 252 and under SR 44 instead of passing under both roads. This change was requested by the City of Martinsville. Two other adjustments have been included in the preferred alternative. First, a northbound left turn movement would be allowed from the collector-distributor road to access Reuben Drive, which should be less confusing for drivers trying to navigate to Reuben Drive. Second, right turn-in/right turn-out access would be provided at the intersection of SR 44 and Kristi Road, immediately west of I-69. This access was requested by the Martinsville Fire Department in order to minimize emergency response times to the Foxcliff neighborhood and other adjacent areas.

Henderson Ford Road Interchange (Appendix C, page 5):

Henderson Ford Road would be realigned through the interchange area to connect to Centennial Road on the east side of I-69. A standard diamond interchange configuration is included in the preferred alternative, although it would require the acquisition of slightly more farmland. There would be no operational or significant cost advantage in using a narrow diamond configuration, and the standard diamond interchange would provide greater flexibility for future improvements.

SR 144 (Appendix C, page 9):

Preferred Alternative C4 would provide a diamond interchange at SR 144 and a grade separated crossing at Stones Crossing Road. The interchange is designed to avoid impacts to the Waverly Branch of the Morgan County Public Library. The preferred alternative would provide a local service road west of I-69 that is continuous between SR 144 and County Line Road. This continuous service road was preferred by many commenters and stakeholders, including Johnson County. The service road would follow an alignment through the Greenwood Mobile Home Community.

Smith Valley Road (Appendix C, page 11):

The preferred alternative would provide a diamond interchange at Smith Valley Road. The I-69 mainline would be shifted slightly west of existing SR 37 near Smith Valley Road. This shift would avoid impacts to Wakefield Drive and the Wakefield neighborhood. Per discussion with the White River Township Fire Department, the proximity of the fire station drive to the interchange would not be desirable, particularly with the emergency egress located on Mullinix Drive after reconfiguration of the fire station site. It is therefore assumed that the fire station would be relocated, and a retaining wall would not be needed to protect the facility.



County Line Road Interchange (Appendix C, page 12):

The preferred alternative would use a folded loop interchange at County Line Road. This configuration is preferred by stakeholders. Use of the loop ramp would avoid impacts to businesses in the southeast quadrant of the County Line Road interchange and would allow Bluff Road to connect to County Line Road without impact to homes in the Mount Pleasant neighborhood. Roundabouts would be used at the ramp terminal intersections, which would allow the connection from County Line Road to Wicker Road to be aligned close to I-69 and eliminate construction of two bridges on the west side of I-69.

Southport Road Interchange (Appendix C, page 13):

Two interchange options are provided in the Preferred Alternative at Southport Road. The FEIS will choose a single interchange design at this location, based upon input to the DEIS.

Option A. Option A is a tight diamond interchange at Southport Road, located east of the existing intersection of SR 37 with Southport Road. Either interchange configuration would provide the best traffic operation of all alternatives and would best accommodate bicycle and pedestrian crossings of I-69. The location of the Southport Road interchange east of existing SR 37 would be similar to Alternative C2. Acquisition of the Aspen Lakes apartments east of I-69 and relocation of all residents would be required. Elimination of Aspen Lakes access to Southport Road would allow better traffic operation in the vicinity of the I-69 interchange. A new public road would be constructed to connect Belmont Road with Southport Road at Wellingshire Boulevard, passing north of the Southport Landing Shopping Center.

Option B. Option B is a tight diamond interchange located approximately 280 feet north of the existing intersection of SR 37 with Southport Road. The existing alignment of Southport Road in front of Aspen Lakes and the Perry Commons neighborhood would be reused as a local service road to provide access to these two neighborhoods from relocated Southport Road. The relocated Southport Road would impact all businesses in the Southport Landing shopping center. Belmont Road would be relocated further west to connect with Southport Road opposite Wellingshire Boulevard.

I-465 Interchange (Appendix C, page 15):

The preferred alternative will have a fully directional interstate-to-interstate interchange at I-465. It will be located to the west of the existing SR 37 interchange at I-465. The I-69 ramps to I-465 west would include an auxiliary lane on I-465 in each direction to the Mann Road interchange. The I-69 ramps to I-465 east would include an auxiliary lane in each direction to the southbound US 31 entrance and exit. Widening of I-465 is also included to provide four continuous through travel lanes in each direction between Mann Road and US 31. Retaining walls are assumed for the preferred alternative with a combination of retaining wall and earthen slope used on the north side of I-465 east of Bluff Road and earthen slope west of Bluff Road.



Section 6—Tier 2 Biological Assessment

Grade Separations: The following are proposed locations for grade separations. Final proposed grade separations will be determined within the FEIS and will be based on public involvement, resource and local agency comments, and cost. **Table 2-2** identifies the proposed grade separations.

Table 2-2: Proposed Grade Separations

State/County Roads/Railroads	Location	Existing	Proposed (RPA)
Grand Valley Boulevard	East/West	Intersection	Overpass
Teeters Road	East/West	Intersection	Overpass
Myra Lane	East/West	Intersection	Underpass
Egbert Road	East/West	Intersection	Overpass
Perry Road	East/West	Intersection	Overpass
Waverly Road	East/West	Intersection	Overpass
Wicker Road	East/West	Intersection	Underpass
Banta Road	East/West	Intersection	Underpass
Edgewood Avenue	East/West	Intersection	Underpass
Epler Avenue	East/West	Intersection	Underpass

Access Roads: The I-69 Section 6 Tier 2 DEIS discussed local service roads in Section 5.6:

Since I-69 Section 6 is a fully-controlled access facility, the only access would be at interchanges. Several grade separations are proposed to maintain public road connectivity. Local service roads are proposed where road closures are required, and many existing roadways would be relocated or have sections realigned. All alternatives would provide an acceptable level of access to I-69 Section 6 with a sufficient number of interchanges to handle the forecasted travel demand.

Where local service roads and existing roads dead end, cul-de-sacs will be provided. Proposed local service roads for the RPA are listed in **Table 2-3**.⁶

⁶ Source: HNTB and Lochmueller Group



Table 2-3: Description of Proposed Local Service Roads

Road	Change	From	To	Length (mi)
New local road	New Road	Old SR 37	Rogers Road	0.5
New local road	New Road	Burton Lane	Plaza Drive	0.2
East Mahalasville Road	Extension	Mahalasville Road	Grand Valley Boulevard	1.1
Commercial Boulevard	Relocation	Mahalasville Road	Industrial Drive	0.4
Grand Valley Boulevard	Extension	Grand Valley Boulevard	Cramertown Loop	0.3
South Street	Extension	Holmes Avenue	Grand Valley Boulevard	0.3
Twin Branch Road	Extension	Old SR 44	Twin Branch Road	0.7
Old SR 37	Extension	Morgan Street	Myra Lane	1.7
Egbert Road	Relocation	Egbert Road	Old SR 37	0.4
Willowbrook Drive	Extension	Willowbrook Drive	Private Drive	0.2
Centennial Road	Extension	Egbert Road	I-69	0.7
Henderson Ford Road	Relocation	Henderson Ford Rd	I-69	0.3
New local road	New Road	Centennial Road	New Harmony Road	1.7
Old SR 37	Extension	Crooked Creek	Perry Road	0.4
New local road	New Road	Perry Road	Former Mt. Zion Church	0.9
New local road	New Road	Waverly Road	Whiteland Road	0.6
Huggin Hollow Road	Extension	Huggin Hollow Road	Old SR 37	0.6
New local road	New Road	SR 144	Stones Crossing Road	1.1
New local road	New Road	Old SR 37	Old SR 37	0.8
New local road	New Road	Olive Branch Road	County Line Road	3.7
New local road	New Road	County Line Road	Wicker Road	0.4
Belmont Avenue	Relocation	Southport Road	Banta Road	0.6



Closed Roads: With the construction of I-69, the following roadways included in **Table 2-4** will be closed at the point where they meet I-69:

Table 2-4: Road Closures

State / County Roads	Location	Refined Preferred Alternative
Old SR 37	East	Closure
Burton Lane	East/West	Closure
Industrial Drive	East/West	Closure
Glenn Street	East	Closure
East Morgan Street/Twin Branch Road	East/West	Closure
Country Club Road	West	Closure
Ennis Road	East/West	Closure
New Harmony Road	East	Closure
Cragen Road	East/West	Closure
Big Bend Road	East/West	Closure
Whiteland Road	East/West	Closure
Banta Road	East/West	Closure
Travis Road	East/West	Closure
Stones Crossing Road	East/West	Closure
Olive Branch Road	East/West	Closure
Bluff Acres Drive	East/West	Closure
Bluffdale Road	East	Closure
Fairview Road	East/West	Closure
Glenns Valley Lane	West	Closure
Belmont Avenue	East	Closure
Thompson Road	East/West	Closure



Maps of proposed local access provisions are presented in Appendix C.

Utilities:⁷ A preliminary review of existing utility locations indicated some utilities may be relocated. Due to the numerous utilities in the area, extent of facilities and limited ability to predict the relocation routes and needs prior to final design and utility coordination, these impacts have been estimated based on a 30-foot easement along both sides of the entire preferred alternative. Forest impact estimates for the utility relocations have been based on the forest acreage within these estimated limits. This is thought to be a conservative estimate, including more estimated forest impact than will ultimately be realized from utility relocations. However, the limited flexibility to adjust utility relocation routes limits additional minimization of impacts from these activities. Overall it is estimated that approximately 43 acres of forest will be impacted due to utility relocations. Of the estimated 43 acres, it is anticipated that approximately 27 acres would be within the range of an existing maternity colony⁸ (inclusive of both Indiana bat and northern long-eared bat colonies). All maternity colonies with the exception of the NLEB⁹ Lambs Creek Colony would have some anticipated utility impact based on this estimation. These impacts within the maternity colonies range from 0.9 acres in the NLEB Pleasant Run Creek Colony to 12.3 acres in the Crooked Creek Colony.

Railroads: No railroads cross the existing SR 37/future I-69 Section 6 right of way.

Billboards:¹⁰ There are approximately 41 billboards that may be affected by the RPA. Approximately 23 of these are within areas where there appears to be sufficient open space outside the new right of way for the potential relocation of these billboards. It is estimated that approximately 18 of the billboards may require additional tree clearing for relocation. It is anticipated that approximately 7.2 acres of forest may be cleared to accommodate these 18 relocated billboards. This acreage was determined by reviewing multiple existing billboards along existing SR 37 using aerial photography and measuring the average acreage needed for sight distance and billboard space, and then estimating the amount of acreage needed for access. It was estimated that approximately 0.4 acre could be cleared per billboard giving a final impact number of 7.2 acres. This number was rounded to 10 acres for the final estimate. The 10 acres is considered to be a conservative estimate because it is not known for certain that current billboards will in fact be moved and/or replaced. Also, it is not known that, if they are moved, they will be relocated into a forested area. INDOT and FHWA will comply with the requirements of 223 CFR Part 750 regarding billboards.

⁷ Source: Lochmueller Group

⁸ Maternity colonies consist of reproductively active female bats and their young which may total up to 100 individuals. These colonies are established annually during the summer reproductive season following migration from winter hibernacula. Maternity colonies are significant for population growth of the Indiana bat and northern long-eared bat species and have been documented through multiple project survey efforts. Maternity colonies are further described in Sections 3.2.1, 3.4, 4.2.1 and 4.4.

⁹ NLEB refers to northern long-eared bat and is included in the maternity colony names for that species.

¹⁰ Source: Lochmueller Group



Streams:¹¹ The I-69 Section 6 Tier 2 DEIS discussed Stream Crossings in Section 5.19:

Larger stream crossings are generally accomplished using bridges or large culverts. Existing bridge crossings in I-69 Section 6 include the I-465 over the White River and SR 37 over Indian Creek, Clear Creek, Stotts Creek, Crooked Creek, Bluff Creek, Honey Creek, Pleasant Run Creek, and Little Buck Creek. Detailed bridge and large culvert design was not completed in this phase of the project. Structure size and type as well as specific design information for mitigation will not be determined until final design after the FEIS and Record of Decision (ROD).

I-69 Section 6 entails upgrading an existing transportation facility to freeway standards. Due to this, some of the existing structures may need to be modified in order to meet interstate standards. If a structure is unable to be modified in a way that would meet interstate standards, it may need to be replaced. Some local access roads may also require new bridges and/or culverts. In some cases, these activities would require an alteration to the natural shape of the stream. These could include channel widening, enclosure, straightening and realignment, bank shaping and stabilization, and placing bridge piers in the water body.

Floodplains: The existing SR 37 right of way crosses the floodplains of the White River and several major tributaries (Crooked Creek, Stotts Creek, Clear Creek and Indian Creek). The I-69 Section 6 Preferred Alternative impacts these and additional floodplains of Little Buck Creek, Pleasant Run Creek, Honey Creek, Messersmith Creek and North Bluff Creek. The total floodplain impact is 458 acres, of which 182 acres (40%) is within the existing right of way.

Section 5.19 of the DEIS states:

A final hydraulic design study that analyzes structure size and types will be completed during the final design phase of I-69 Section 6, and a summary will be included with the Field Check Plans and Design Summary. Longitudinal and transverse floodplain encroachments will be minimized, where reasonable, through re-use of existing bridges and design practices such as longer bridges and perpendicular stream crossings where new bridges are required. The study will determine the length of the bridge spans. Flood easements may be acquired if they are appropriate.

INDOT will submit a permit application to IDNR Division of Water during the design phase for all areas that require a “Construction in a Floodway” permit.

¹¹ Source: I-69 Section 6 DEIS, Section 5.19.



CHAPTER 3 – INDIANA BAT (*Myotis sodalis*)

3.1 Action Areas

The study area for I-69 Section 6 begins just south of Martinsville on SR 37 and continues to I-465. It is approximately 26.9 miles in length and the width of the study area varies; however, the majority is approximately five miles wide. It widens in the areas of the maternity colonies. It is a part of the larger I-69 Evansville to Indianapolis corridor, which was considered in the Tier 1 Revised BO as amended.

The entire I-69 project involves the construction, operation and maintenance of an Interstate highway, I-69, from Evansville to Indianapolis through southwestern Indiana. USFWS regulations define the “action area” as all areas to be affected directly and indirectly by the Federal Action and not merely the immediate area involved in the action (CFR § 402.02). The regulations further state that the action area is not limited to the “footprint” of the proposed project, nor is it limited by the sponsoring Federal agency’s authority. Rather, it is a biological determination of the reach of the proposed action on listed species.

In the Tier 1 Section 7 consultation process, FHWA, INDOT and the USFWS Bloomington Field Office (BFO) jointly developed two seasonally based action areas for the Indiana bat. As discussed below, this Tier 2 BA proposes to expand the summer action area (SAA) for the Indiana bat based on reasonably foreseeable indirect/induced growth predicted in the I-69 Section 6 Tier 2 DEIS.¹ In I-69 Section 6, there is a SAA, but no winter action area (WAA). Similarly, there is no karst in the I-69 Section 6 project area.

3.1.1 Tier 1 Summer Action Area (SAA)

Because the full “reach” of the direct and indirect effects of this project was not fully defined in Tier 1, USFWS assumed quantifiable effects to Indiana bats would be confined to the project footprint and a 2.5-mile buffer in all directions, based on the biological range of these species and anticipated impacts of the project. Therefore, the SAA for the Indiana bat has been generally defined as a 5-mile band, 2.5 miles on either side of the centerline of the Tier 1 corridor. The 2.5-mile limit has biological significance for the Indiana bat. A study in Illinois found that the maximum distance an Indiana bat traveled from its daytime roost tree to its original capture site

¹ We note that the predicted induced growth (approximately 336 acres near interchanges) are anticipated in I-69 Section 6 to be developed based on the National Environmental Policy Act (NEPA) concept of “reasonable foreseeability.” This NEPA standard for predicting indirect/induced growth is significantly broader than the ESA’s “reasonably certain” standard for consideration of indirect/induced growth as defined in 50 C.F.R § 402.02 “Effects of the Action”. If the more limited ESA “reasonably certain” standard were used, none of the predicted induced/indirect growth predicted in the Section 6 Tier 2 DEIS would be recognized in an analysis conducted solely for proceedings under Section 7 of the ESA. However, in order to continue to use the very conservative approach used in the Revised Tier 1 BO, this Tier 2 BA analyzes impacts based on the NEPA required “reasonably foreseeable” induced growth predicted in the Section 6 Tier 2 DEIS.



Section 6—Tier 2 Biological Assessment

was 2.5 miles (4.1 km)². This 2.5-mile distance is also consistent with unpublished data from Indiana bat studies conducted at the Jefferson Proving Grounds³ and the Indianapolis Airport in Indiana.⁴ The entire length of the proposed project contains suitable summer roosting and foraging habitat, thus a SAA width of 2.5 miles on either side of the proposed centerline (5 miles wide) will encompass summer habitat being used by Indiana bats that might be affected by the proposed I-69 project. The Tier 1 corridor is approximately 2,000 feet wide in most places, but is narrowed in some instances to avoid sensitive environmental resources, and is widened in some instances to allow further avoidance of direct impacts by giving greater flexibility for the location of the right of way.

A 2.5-mile radius circle has been centered on each Indiana bat maternity colony discovered during the Tier 2 mist net surveys and incorporated into the Tier 1 BA Addendum and Tier 1 Revised BO as amended. In all four Indiana bat maternity colonies in I-69 Section 6, the 2.5 mile radius circles extend beyond the limits of the standard SAA.

3.1.2 Tier 2 Summer Action Area (SAA)

The I-69 Section 6 Tier 2 DEIS (March 2017)⁵ indicated that the project may induce additional impacts as a result of the completion of the interstate. As documented in the I-69 Section 6 Tier 2 DEIS, the reasonably foreseeable predicted growth (development) is anticipated to be in specific Traffic Analysis Zones (TAZs). Most of the predicted growth falls within the Tier 1 Indiana bat SAA; however, some areas extend outside the Tier 1 SAA boundary, based on coordination with an expert land use panel. As noted in the Tier 1 Revised BO: “The [summer] Action Area may need to be expanded or otherwise refined in subsequent Tier 2 BAs as the anticipated reach of direct and indirect effects of each section of I-69 are more clearly recognized and understood.” (Tier 1 Revised BO, pg. 32).⁶ While there is no foundation to assume that the predicted “reasonably foreseeable” induced growth meets USFWS “reasonably certain” criteria by the year 2045, the SAA for the I-69 Section 6 has been expanded to include all TAZs for which the NEPA analysis indicates that growth induced by the construction and operation of the project is reasonably foreseeable. Also, the potential induced growth noted in the I-69 Section 6 Tier 2

² Gardner, J.E., J.D. Garner, and J.E. Hoffmann. 1991. *Summer Roost Selection and roosting behavior of Myotis sodalis (Indiana Bat) in Illinois. Final Report. Illinois Natural History Survey and Illinois Department of Conservation, Campaign, IL. 56 pp.*

³ Pruitt, L., S. Pruitt, and M. Litwin. 1995. *Summary of Jefferson Proving Ground bat survey: 1993-1995. Report submitted to the United States Fish and Wildlife Service, Bloomington, Indiana.*

⁴ 3D/International Inc. 1995. *Environmental technical report: 1995 field studies for interim Indiana bat habitat mitigation at the Indianapolis International Airport in Marion County, Indiana. 23 pp. plus appendices.*

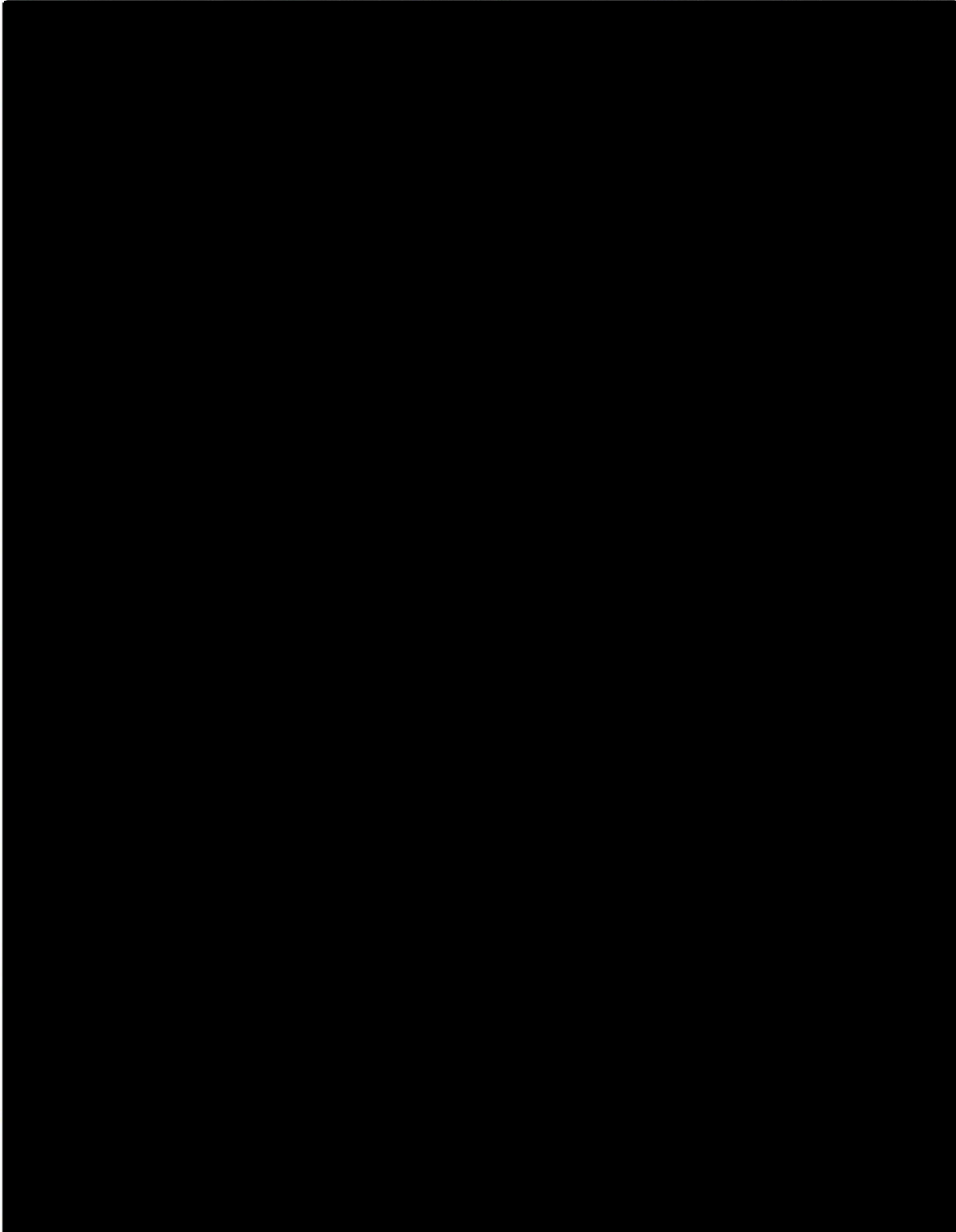
⁵ I-69 Evansville to Indianapolis, Indiana Section 6: Martinsville to Indianapolis, Tier 2 Draft Environmental Impact Statement, March 2017.

⁶ United States Fish and Wildlife Service. December 3, 2003. *Biological Opinion on the Construction, Operation, and Maintenance of Alternative 3C of Interstate 69 (I-69) from Indianapolis to Evansville for the Federally Endangered Indiana Bat (Myotis sodalis) and the Federally Threatened Bald Eagle (Haliaeetus leucocephalus) traversing portions of Gibson, Warrick, Pike, Daviess, Greene, Monroe, Morgan, Johnson, and Marion Counties, Indiana. Submitted to FHWA. Prepared by R. Andrew King.*



DEIS has been analyzed for possible indirect impacts to the Indiana bat, as required by the Tier 1 Revised BO as amended.

Figure 3.1-1: Indiana bat Tier 2 Section 6 Summer Action Area





Section 6—Tier 2 Biological Assessment

The Tier 2 I-69 Section 6 SAA begins at the north end of Tier 2 Section 5 SAA and ends in the vicinity of the I-465 interchange. The Lambs Creek Maternity Colony Area spans the section boundary between Sections 5 and 6 and encompasses portions of both sections. The refined preferred alternative for I-69 Section 6 shows different direct impacts in the Lambs Creek Colony Area than the representative alignment that was used to show direct impacts in the Section 5 Tier 2 BA due to access changes associated with Rogers Road, SR39 and Burton Lane. Due to the impact difference in the Lambs Creek Maternity Colony, the Lambs Creek Colony Area has been included in the Section 6 SAA. In addition, due to the representative alignment versus refined preferred alternative differences as well as updated resource information, resource and impact information in I-69 Section 6 is not directly comparable to those in Section 5. The area within the SAA, yet outside of the maternity colony foraging areas, is referred to in this document as the Remaining Summer Action Area (RSAA).

3.2 Tier 2 Indiana bat Surveys

3.2.1 Maternity Colonies

As required by the December 3, 2003 Tier 1 BO, INDOT and FHWA conducted an extensive research program designed to obtain information on the presence of Indiana bats within the SAA.

In 2004, mist netting surveys were conducted at 29 sites in I-69 Section 6⁷. A total of ten Indiana bats were captured within I-69 Section 6 in 2004. This includes four post-lactating adult females, one adult male and five juveniles. Five Indiana bats were radio-tagged and four roost trees were identified with emergence counts. Other bats captured included: 72 little brown bats (*Myotis lucifugus*), 67 big brown bats (*Eptesicus fuscus*), 30 eastern pipistrelles (*Pipistrellus subflavus*), 28 evening bats (*Nycticeius humeralis*), 25 eastern red bats (*Lasiurus borealis*), and 21 northern long eared bats. Eighteen bridges in the I-69 Section 6 SAA were also inspected for bats. No Indiana bats were observed roosting under any of these bridges. The only bats observed roosting under bridges in I-69 Section 6 were under two bridges over [REDACTED] [REDACTED]. These bats were big brown bats.

Additional mist netting surveys were completed during the summer of 2005⁸. These surveys focused around the location of Indiana bat captures where no primary roost trees were identified in 2004. Seven mist net sites were surveyed in I-69 Section 6. Three Indiana bats were captured in 2005; two lactating females and one post-lactating female. Bats were radio-tagged and successfully tracked to six new roost trees, one primary (6-4) and five secondary (6-1, 6-2, 6-3, 6-5, and 6-6). Based on the evidence obtained through the mist netting surveys during these

⁷ Hendricks, William D. et al. (15 December 2004). *Summer Habitat for the Indiana bat (*Myotis sodalis*) within the Martinsville Hills from Martinsville to Indianapolis, Indiana.*

⁸ Henry and Romme (5 April 2006). *Identification of Indiana bat Roost Trees along the Proposed I-69 between Bloomington and Indianapolis, Indiana.*



efforts in 2004 and 2005, there were three maternity colonies identified in I-69 Section 6. They were (from south to north) White River - Clear Creek Maternity Colony, White River - Crooked Creek Maternity Colony, and White River - Pleasant Run Creek Maternity Colony. Lambs Creek Maternity Colony has been added to I-69 Section 6 from Section 5 due to its physical location in I-69 Section 6 and due to different alternative impacts for the I-69 Section 6 refined preferred alternative compared to the representative alignment presented in the Section 5 Tier 2 BA. All four Indiana bat colonies are located/centered on tributaries of the White River. These four maternity colonies all contain the White River within their confines, and the White River has been identified by BFO as an important area to focus mitigation.

A full discussion of the methods and results of these surveys with maps of the maternity colonies and other summer habitat in I-69 Section 6 is more fully discussed in the Tier 1 BA Addendum and incorporated in the analysis in the Tier 1 Revised BO as amended.

2012 Indiana Bat Presence Surveys

An Indiana bat presence survey was completed in May/June 2012 in Section 5 that included mist net Site 24 along [REDACTED] [REDACTED]⁹. This survey effort was conducted to update Indiana bat presence status within the Section 5 SAA due to the amount of time elapsed since the previous surveys which were completed in 2004/2005. A total of 12 Indiana bats were captured, five of which were radio-tagged, but only one was captured at Site 24 in the [REDACTED] area. It was tracked to two primary roost trees (768-1 and 768-2) outside of any previously existing colony in Section 5 or Section 6. Based on the discovery of these roost trees, USFWS determined that an additional maternity colony was identified in Section 5, the Lambs Creek Maternity Colony. See **Table 3.2-1** through **Table 3.2-4** for a summary of Indiana bat's tracked during the mist netting surveys in or associated with the four Indiana bat maternity colonies in I-69 Section 6, and the roost trees and emergence counts for those roosts.

2014 Indiana Bat Presence Surveys

An Indiana bat presence survey was completed in May 2014 prior to construction of Section 5¹⁰. This survey effort was conducted to monitor (pre-construction) for Indiana bats at select sites as approved by USFWS in Section 5. It included eight sites that were previously surveyed in 2004 and selectively surveyed in 2005 as well as in 2012. For the 2014 effort, a total of 89 bats representing eight species were captured: 49 big-brown bats, 21 eastern red bats, six Indiana bats, five silver haired bats (*Lasionycteris noctigavans*), three evening bats, two northern long-eared bats, one hoary bat (*Lasiurus cinereus*) and one tri-colored bat (*Perimyotis subflavus*). One captured bat escaped before identification could be obtained. During 2014, Indiana bat 141 from

⁹ Clarkston et al. (18 June 2012). I-69 Mist Netting Survey for the Indiana bat (*Myotis sodalis*) 2012: Section 5 Bloomington to Martinsville.

¹⁰ Lochmueller Group (20 January 2015). I-69 Pre-construction Period Mist Netting Survey for the Indiana bat (*Myotis sodalis*) Section 5 (Monroe and Morgan Counties, IN) in the East Fork, Lower and Upper White River Watersheds.



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Site 24 went to three secondary roost trees in the Lambs Creek Maternity Colony. See **Table 3.2-1** through **Table 3.2-4** for a summary of these roost trees and emergence counts for those roosts.

2015 Indiana Bat Presence Surveys

An Indiana bat presence survey was completed for Section 6 between July 3 and August 6, 2015¹¹ (see Appendix H). This survey effort was conducted to update Indiana bat presence status within the I-69 Section 6 SAA due to the amount of time elapsed since the previous surveys which were completed in 2004/2005. It was also conducted for the recently listed federally threatened northern long-eared bat using mist net capture techniques and the use of radio-telemetry tracking to identify maternity roost trees. While the primary objective of the survey was an updated presence/absence survey for the Indiana bat and northern long-eared bats in the I-69 corridor, data was also collected on other species native to Indiana, including the possible presence of the state endangered evening bat.

This 2015 survey included 19 sites, 15 of which were previously surveyed in 2004 and in part again in 2005. The 2015 survey captured 126 bats representing seven species: 72 big brown bats, 18 eastern red bats, 24 evening bats, four little brown bats, three Indiana bats, three northern long-eared bats, and one tri-colored bat. One captured bat escaped before identification could be obtained. Overall capture rates for the survey were 1.5 bats per net night.

Radio transmitters were attached to all three of the Indiana bats (all juvenile females) in 2015, but only one captured at Site 21 was tracked to two different dead cottonwood trees with diameter at breast height (dbh) of approximately 18 inches and 14 inches. These trees were located west of the White River in northwest Johnson County. Emergence counts from four nights of observation for these two roosts ranged from seven to 35. The capture of these three Indiana bats have not changed the location of the three Indiana bat maternity colonies (Clear Creek, Crooked Creek, and Pleasant Run Creek) in Section 6. In 2015, Site 24 in Section 5 at [REDACTED] was also surveyed and resulted in the capture of a pregnant female Indiana bat¹². However, it was not possible to track this bat to any roosts in the area. The location of the Lambs Creek maternity colony remained unchanged.

See **Table 3.2-1** through **Table 3.2-4** for a summary of Indiana bats tracked during the mist netting surveys and the roost trees and emergence counts for those roosts that are within or associated with the above four maternity colonies in I-69 Section 6.

¹¹ Lochmueller Group (31 January 2016). *I-69 Presence/Absence Mist Netting Survey for the Indiana bat (*Myotis sodalis*) and Northern Long-eared bat (*Myotis septentrionalis*) Section 6 (Morgan, Johnson and Marion Counties, IN) Upper White River Watershed.*

¹² Lochmueller Group (31 January 2016). *I-69 Pre-construction/During Construction Period Mist Netting Survey for the Indiana bat (*Myotis sodalis*) Section 5 (Monroe and Morgan Counties, IN) in the East Fork, Lower and Upper White River Watersheds.*



2016 Indiana Bat Monitoring Surveys

An Indiana bat monitoring survey was completed during the construction of Section 5 in 2016, and again Site 24 yielded an Indiana bat¹³. On August 2, 2016, a radio-transmitter was attached to an adult male Indiana bat and tracked to three different roost trees within the Lambs Creek Maternity Colony. These trees were secondary roost trees and emergence counts ranged from 0-1 from observations on August 3-9, 2016. They were very close to each other and located about [REDACTED] mile [REDACTED] of [REDACTED], and close to mist netting Site 24. Roost tree 433-1 was a dead oak tree (*Quercus sp.*) with a dbh of approximately 15 inches with exfoliating bark. Its coordinate was [REDACTED] North and [REDACTED] West. Roost tree 433-2 was a live shagbark hickory (*Carya ovata*) with a dbh of approximately 8 inches with exfoliating bark. Its coordinate was [REDACTED] North and [REDACTED] West. Roost tree 433-3 was a live shagbark hickory with a dbh of approximately 7 inches with exfoliating bark. Its coordinate was [REDACTED] North and [REDACTED] West.

Lambs Creek Maternity Colony

In 2012, a pregnant female was captured at site 24. She was tracked to two primary roosts. These roosts were not already within an existing maternity colony. One was a dead eastern cottonwood (*Populus deltoides*) (768-1) and had an emergence count between 29 and 80. This tree was located [REDACTED] [REDACTED] from the proposed corridor. It was classified as a primary roost since the emergence count was above 30. The second roost was a dead American elm (*Ulmus americana*) (768-2). This tree had an emergence count between one and 43. This roost tree was approximately [REDACTED] [REDACTED] from the corridor. Based on informal consultation, USFWS considers the finding of these roosts with emergence counts over 30 as indicative of a maternity colony. Due to this, the Lambs Creek Maternity Colony was added. The epicenter of this new maternity colony is the midpoint of the two primary roosts. Because this maternity colony was identified subsequent to the Tier 1 BA Addendum, an assessment of the maternity colony area was completed in the earlier Section 5 BA in its Appendix I. Due to this maternity colony area encompassing portions of both Section 5 and 6, this I-69 Section 6 BA provides an additional analysis to address the refined preferred alternative for I-69 Section 6. Since 2012, surveys in 2014 and 2016 have found Indiana bats in this maternity colony as associated with Site 24. This site is not far from the [REDACTED] [REDACTED] mitigation site. The [REDACTED] [REDACTED] mitigation site was purchased by INDOT and has over 300 acres of bottomland forest and reforestation, open water, and other wetlands. This mitigation site is directly across from the confluence of [REDACTED] with the [REDACTED] and Indiana bat primary roost tree 768-1.

¹³ Lochmueller Group (February 2017). I-69 During Construction Period Mist Netting Survey for the Indiana bat (*Myotis sodalis*) Section 5 (Monroe and Morgan Counties, IN) in the East Fork, Lower and Upper White River Watersheds.



Clear Creek Maternity Colony

Within the Clear Creek Maternity Colony, four Indiana bats were captured in 2004; two Indiana bats in 2005; and two Indiana bats in 2015. Females made up 70% (7 of 10) in 2004; 100% (1 of 1) in 2005; and 100% (3 of 3) in 2015. Adults made up 50% in 2004 (5 of 10); 100% in 2005 (1 of 1); and 0% in 2015. In 2004, two roost trees were located within this maternity colony (203-1 and 022R1). The former (203-1) was a primary roost (dead ash (*Fraxinus* sp.) that showed emergence counts of 64, 61, 23, 53, 67, 7 and one. It could be seen east from SR 37. The latter roost tree (022R1) was a secondary roost and was also a dead elm. It showed emergence counts of 12, 11, 15 and 12, and was about one mile west of SR 37.

In 2005, four roost trees were located in this maternity colony (6-1, 6-2, 6-3 and 6-4). Roost 6-4 was a primary roost tree, while roosts 6-1, 6-2 and 6-3 were secondary roost trees. Emergence counts for 6-4 were 40, 42, 52, 29 and 41. For the secondary roosts, emergence counts ranged from zero to 15. Roost trees 6-1 and 6-4 were dead silver maples, while roost tree 6-2 was a dead elm. Roost tree 6-3 was a live silver maple (*Acer saccharinum*). These trees were located 0.4 to 1.3 miles west of SR 37.

In 2015, no additional roost trees were found in this maternity colony for the Indiana bat.

Crooked Creek Maternity Colony

In the Crooked Creek Maternity Colony, two Indiana bats were captured in 2004; and no Indiana bats in 2005 and 2015. Females made up 14% in 2004; 0% in 2005; and 0% in 2015. Adults made up 86% in 2004; 0% in 2005; and 0% in 2015. In 2004, two roost trees were located within this maternity colony (105-1 and 105-2). The 105-1 was a primary roost (power pole) that showed emergence counts ranging from one to 98. It is located approximately one mile west of SR 37. The 105-2 was a primary roost (live shagbark hickory). It showed emergence counts of zero to 30. It was about 0.8 mile west of SR 37.

Pleasant Run Creek Maternity Colony

Within the Pleasant Run Creek Maternity Colony and slightly north (mist net Sites 24 and 25), three Indiana bats were captured in 2004; one Indiana bat in 2005; and one Indiana bat in 2015. Females made up 67% in 2004; 100% in 2005; and 100% in 2015. Adults made up 33% in 2004; 100% in 2005; and 0% in 2015. In 2004, no roost trees were located within this maternity colony. In 2005, two roost trees were located in this maternity colony (6-5, 6-6). Roost 6-5 was a dead cottonwood, while 6-6 was a live silver maple. Both were secondary roost trees with emergence counts of zero for roost tree 6-5 and one for roost tree 6-6. These trees were located 1.0 to 1.3 miles west of SR 37.

In 2015, two additional roost trees were found in this maternity colony (283-1 and 283-2). The 283-1 was a secondary roost tree, while the 283-2 was a primary roost tree. Roost tree 283-1 was a dead cottonwood with exfoliating bark. It had emergence counts of seven and 13 and was located about 1.6 miles west of SR 37. Roost tree 283-2 was a dead cottonwood. It had emergence counts of 30 and 35 and located about 1.6 miles west of SR 37.



2004/2005/2015 Roost Tree Updates

During summer, Indiana bats roost underneath bark, and in crevices or hollows of both live and dead trees, including snags. A snag may be defined as a standing, dead or dying tree that often has its top and/or branches gone. Generally, suitable roost trees may include live shagbark hickories; lightning-struck trees; dead, dying, or damaged trees; trees with exfoliating bark; den trees, broken trees, or stumps over 9 feet in height; and large live trees of any species.¹⁴

Twenty roost trees discovered in 2004, 2005, 2012, 2014, 2015 and 2016 in I-69 Section 6 through mist netting surveys and radio telemetry were visited in 2016. The following summarizes the current condition of these roost trees.

There were four roost trees found in 2004. They were 203R1, 105R1, 105R2 and 022R1. Roost tree 203R1 was located east of SR 37 near the [REDACTED]. Coordinates were [REDACTED] North [REDACTED] West. Roost trees 105R1 (Power Pole) and 105R2 were located north and west of the [REDACTED] immediately west of the confluence of [REDACTED] with the [REDACTED]. Coordinates were [REDACTED] North [REDACTED] West and [REDACTED] North [REDACTED] West respectively. Roost tree 022R1 is located north and west of the [REDACTED] along the east side of [REDACTED]. Coordinates were [REDACTED] North [REDACTED] West.

There were six roost trees found in 2005. They were 6-1, 6-2, 6-3, 6-4, 6-5 and 6-6. Roost trees 6-1, 6-3 and 6-4 were located close to each other east of [REDACTED] in a wet forest near the [REDACTED]. Coordinates were [REDACTED] North [REDACTED] West, [REDACTED] North [REDACTED] West, and [REDACTED] North [REDACTED] West respectively. Roost tree 6-2 is the same roost tree as the 2004 roost tree 022R1 as described in the previous paragraph. Roost trees 6-5 and 6-6 are located near each other east of the [REDACTED] and west of [REDACTED]. Coordinates for 6-5 are [REDACTED] North [REDACTED] West and for 6-6 are [REDACTED] North [REDACTED] West.

There were two roost trees found in 2012 in the [REDACTED] area. They were 768-1 and 768-2. Both were primary roost trees. Roost tree 768-1 showed 29 to 80 emerging bats from May 19 to June 12, while Roost tree 768-2 showed one to 43 bats emerging from May 23 to June 12. The former was a dead eastern cottonwood with a dbh of 27.5 inches, while the latter was a dead American elm with a dbh of 26 inches. Coordinates for the cottonwood are [REDACTED] North [REDACTED] West and for the American elm [REDACTED] North [REDACTED] West.

In 2014, there were three roost trees used by Indiana bat 141 captured at Site 24 near [REDACTED]. The first secondary roost (141-1) was a dead (stage of decay 2) white ash (*Fraxinus americana*) with a dbh of 25 inches. On May 25, an emergence count was zero. The second secondary roost tree (141-2) was a dead (stage of decay 4) silver maple with a 14 inch dbh. On May 26 - 28, emergence counts were three, one and one respectively. The third secondary roost

¹⁴ <https://www.fws.gov/northeast/njfieldoffice/pdf>. Characteristics of Indiana bat Summer Habitat.



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tree (142-3) was another dead (stage of decay 4) American elm with an 18 inch dbh. On May 27-29, emergence counts were one, zero and one respectively. Coordinates for these three roost trees are for 141-1 ([redacted] North [redacted] West), 141-2 [redacted] North [redacted] West), and 141-3 [redacted] North [redacted] West). Their locations are about one to 1.5 miles from SR 37 along the [redacted] and [redacted] within the Lambs Creek Maternity Colony. They are within and/or adjacent to INDOT's [redacted] mitigation site.

In 2015, there were two roost trees found for the Indiana bat. They were 283-1 and 283-2. These roost trees were located close to each other west of the [redacted] in association with an oxbow northwest of the confluence of [redacted] [redacted] [redacted] with the [redacted]. These roost trees were within an isolated wooded area within a large agricultural field. Both trees were in close proximity to an open water area (slough) within the interior of this woods that also contained many large cottonwood trees. This woods showed indications of past flooding. The understory contained a lot of bush honeysuckle. Coordinates for 283-1 are [redacted] North [redacted] West and for 283-2 are [redacted] North [redacted] West.

In 2016, there were three roost trees found for the Indiana bat from an adult female capture at mist net Site 24 on [redacted]. This capture site is 0.5 mile upstream of INDOT's [redacted] mitigation site. These three roost trees were reasonably small in diameter and showed zero to one emergence counts.

The 20 roost trees discussed above and relevant information may be found in **Table 3.2-1** through **Table 3.2-4**.



Table 3.2-1: I-69 Section 6 Indiana Bat Information, Roost Tree and Emergence Data for 2004

Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information		
	Bat ID	Net Site	Capture Date	Gender	Adult/ Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/ Secondary Roost
2004	Indiana Bat 203	7	7/14/2004	Female	Adult	Reproductive Post-Lactating	8.0	203R1	7/14/2004	1.6 mi	Ash - dead	7/14/2004	64	Primary
												7/15/2004	61	
												7/16/2004	23	
												7/17/2004	53	
												7/18/2004	67	
	Indiana Bat 105	14	7/17/2004	Female	Adult	Reproductive Post-Lactating	9.0	105R1	7/18/2004	1.5 mi	Power Pole	7/18/2004	90	Primary
												7/19/2004	98	
												7/20/2004	98	
												7/21/2004	109	
								105R2	7/19/2004	1.2 mi	Shagbark Hickory	7/19/2004	30	Primary
												7/20/2004	8	
												7/21/2004	1	
												7/22/2004	0	
												7/23/2004	15	

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Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information		
	Bat ID	Net Site	Capture Date	Gender	Adult/Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/Secondary Roost
	Indiana Bat 022	8	7/15/2004	Female	Adult	Reproductive Post-Lactating	7.0	022R1	7/16/2004	0.5 mi	Dead Elm	7/16/2004	12	Secondary
7/17/2004												11		
7/18/2004												15		
7/19/2004												12		



Table 3.2-2: I-69 Section 6 Indiana Bat Information, Roost Tree and Emergence Data for 2005

Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information		
	Bat ID	Net Site	Capture Date	Gender	Adult/Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/Secondary Roost
2005	Indiana Bat 046	8	7/12/2005	Female	Adult	Lactating	7.75	6-1	7/13/2005	1.0 mi	Silver Maple (dead)	7/13/2005	2	Secondary
												7/14/2005	1	
												7/15/2005	0	
												7/27/2005	2	
												7/28/2005	1	
	Indiana Bat 025	7	7/17/2005	Female	Adult	Post-Lactating	8.25	6-3	7/18/2005	1.2 mi	Silver Maple (live)	7/18/2005	6	Secondary
												7/19/2005	7	
												7/20/2005	7	
												7/27/2005	6	
												7/28/2005	0	
	Indiana Bat 046	8	7/12/2005	Female	Adult	Lactating	7.75	6-2	7/15/2005	0.5 mi	American Elm - dead	7/15/2005	4	Secondary
												7/26/2005	5	
												7/17/2005	3	
												7/27/2005	1	
												7/28/2005	0	

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Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information								
	Bat ID	Net Site	Capture Date	Gender	Adult/Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/Secondary Roost						
								6-4	7/29/2005	1.2 mi	Silver Maple (dead)	7/29/2005	40	Primary						
												7/30/2005	42							
												7/31/2005	52							
												8/1/2005	29							
												8/2/2005	41							
	Indiana Bat 068	23	7/19/2005	Female	Adult	Lactating	6.25	6-5	7/20/2005	0.2 mi	Cottonwood (Dead)	7/20/2005	0	Secondary						
																7/25/2005	0			
																7/26/2005	0			
																7/27/2005	0			
														6-6	7/23/2005	0.2 mi	Silver Maple (live)	7/25/2005	0	Secondary
																		7/26/2005	1	
																		7/27/2005	0	



Table 3.2-3: I-69 Section 6 Indiana Bat Information, Roost Tree and Emergence Data for 2012 and 2014

Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information		
	Bat ID	Net Site	Capture Date	Gender	Adult/Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/Secondary Roost
2012	Indiana Bat 768	24	5/18/2012	Female	Adult	Pregnant	8.0	768-1	5/19/2012	1.0 mi	Eastern cottonwood - Dead	5/19/2012	29	Primary
												5/20/2012	31	
												5/21/2012	35	
												5/22/2012	48	
												5/27/2012	29	
												6/12/2012	80	
	768-2	5/23/2012	0.5 mi	American Elm - Dead	5/23/2012	43	Primary							
					5/24/2012	22								
					5/25/2012	27								
					5/26/2012	36								
					5/27/2012	34								
					5/28/2012	32								
					6/12/2012	1								
2014	Indiana Bat 141	24	5/24/2014	Female	Adult	Pregnant	8.5	141-1	5/25/2014	0.3 mi	White Ash Dead	5/25/2014	1	Secondary

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Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information		
	Bat ID	Net Site	Capture Date	Gender	Adult/Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/Secondary Roost
								141-2	5/25/2014	0.8 mi	Silver Maple Dead	5/26/2014	3	Secondary
												5/27/2016	1	
												5/28/2014	1	
								141-3	5/25/2014	0.9 mi	Silver Maple Dead	5/27/2014	1	Secondary
												5/28/2014	0	
												5/29/2014	1	



Table 3.2-4: I-69 Section 6 Indiana Bat Information, Roost Tree and Emergence Data for 2015 and 2016

Survey Year	Indiana Bat Information							Roost Tree Information				Emergence Information		
	Bat ID	Net Site	Capture Date	Gender	Adult/Juvenile	Reproductive Status	Weight (g)	Roost Tree ID	Initial Roost Discovery Date	Distance from Capture Site	Roost Description	Emergence Survey Dates	Emergence Count	Primary/Secondary Roost
2015	Indiana Bat 306	3	7/20/2015	Female	Juvenile	Non-reproductive	5.5	None	No Data	No Data	No Data	No Data	No Data	No Data
	Indiana Bat 936	3	7/21/2015	Female	Juvenile	Non-reproductive	7.25	None	No Data	No Data	No Data	No Data	No Data	No Data
	Indiana Bat 283	21	7/25/2015	Female	Juvenile	Non-reproductive	7.0	283-1	7/27/2015	0.7 mi	Cottonwood Partially Dead	7/27/2015	13	Secondary
												7/30/2015	7	
								283-2	7/27/2015	0.2 mi	Cottonwood Dead	7/28/2015	30	Primary
				7/29/2015	35									
2016	Indiana Bat 433	24	8/2/2016	Male	Adult	Non-reproductive	7.25	433-1	8/3/2016	0.77 mi	Oak Dead	8/3/2016	1	Secondary
												8/4/2016	1	
												8/5/2016	0	
	433-2	8/3/2016	0.92 mi	Shagbark Hickory Live	8/5/2016	1	Secondary							
					8/6/2016	0								
					8/7/2016	0								
	433-3	8/3/2016	0.8 mi	Shagbark Hickory Live	8/6/2016	1	Secondary							
					8/7/2016	0								
					8/9/2016	0								



Roost 203-1 – This dead ash, discovered in 2004, was a primary roost tree for the Indiana bat. It was located within the Clear Creek Maternity Colony just east of SR 37. In 2016 (12 years later), this roost was not observed. No roost tree was found at this location in 2016. It was likely cut down since 2004. No photo available.

Figure 3.2-1: Roost 105-1



Roost 105-1 – This transmission pole (**Figure 3.2-1**), discovered in 2004, was a primary roost pole for the Indiana bat. It was located within the Crooked Creek Maternity Colony. It was present in 2016, but some tar paper had been lost from the pole. The majority of the tar paper though is still in place. A sign has been placed on the pole that states “Do Not Climb this Pole from April 15 – September 15. Any Questions Please Call 261-8124 or LDO.” The adjoining property is being considered for an INDOT mitigation site. That mitigation site is identified as the [REDACTED] (fka [REDACTED]) Mitigation Site.

Roost 105-2 – This live shagbark hickory (**Figure 3.2-2**), discovered in 2004, was a primary roost tree for the Indiana bat. It was located within the Crooked Creek Maternity Colony. In 2016 it was observed along the hillside in good condition. This property is being considered for an INDOT mitigation site and is identified as the [REDACTED] (fka [REDACTED]) Mitigation Site.

Figure 3.2-2: Roost 105-2

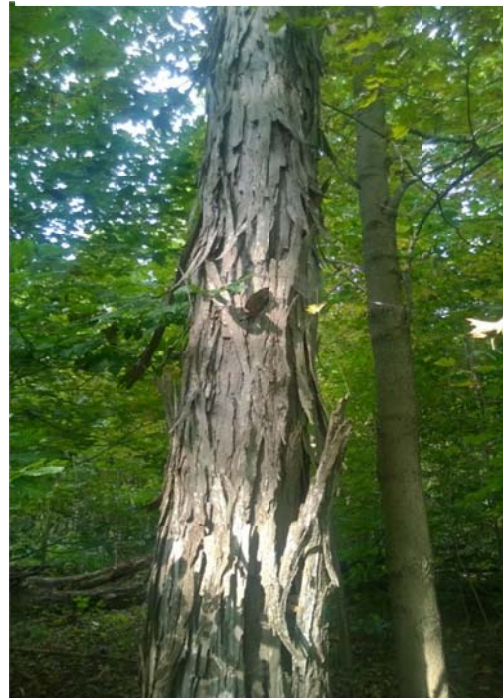


Figure 3.2-3: Roost 022R1



Roost 022R1 – This dead elm (**Figure 3.2-3**), discovered in 2004, was a secondary roost tree for the Indiana bat. It was located within the Clear Creek Maternity Colony. In 2016, it was observed intact (Stage of Decay 5-6) even though many branches were observed on the ground. It has an approximate dbh of 12 inches. It is near the edge of the woods, and the ground cover is dominated by great ragweed.

Roost 6-1 - This dead silver maple (**Figure 3.2-4**), discovered in 2005, was a secondary roost tree for the Indiana bat. It was located within the Clear Creek Maternity Colony. In 2016 (11 years later), tree was found lying on the ground. It had moss on the trunk and branches, and the other elm trees in the vicinity were also dead. Some had sloughing bark and could act as roost trees. The decaying silver maple on the ground would no longer afford preferred roosting conditions

Figure 3.2-4: Roost 6-1





Figure 3.2-5: Roost 6-2



Roost 6-2 - This dead elm (**Figure 3.2-5**), discovered in 2004, was used again in 2005 as a secondary roost tree for the Indiana bat. It was located within the Clear Creek Maternity Colony. In 2016, it was present, but in a more advanced stage of decay. The stage of decay was 6.

Roost 6-3 – This live silver maple (**Figure 3.2-6**), discovered in 2005, was a secondary roost tree for the Indiana bat. It was located within the Clear Creek Maternity Colony. In 2016, it was observed and appeared alive, but it had fallen on two other silver maples. There were many silver maples in the vicinity in 2016. It is near an open grassy wetland in the woods near a deer stand. A fallen tree on the ground had moss on it.

Figure 3.2-6: Roost 6-3



Figure 3.2-7: Roost 6-4

Roost 6-4 - This dead silver maple (**Figure 3.2-7**), discovered in 2005, was a primary roost tree for the Indiana bat and was located within the Clear Creek Maternity Colony. In 2016, it was observed with its upper top broken off and lying on the ground. Stage of decay for this tree in 2016 was 4-5.

Roost 6-5 – This dead cottonwood (**Figure 3.2-8**), discovered in 2005, was a secondary roost tree for the Indiana bat. It was located within the Pleasant Run Creek Maternity Colony. In 2016, it was not observed in the vicinity of the original coordinates. There were no standing cottonwoods in the immediate area. However, there was a large cottonwood on the ground that could be the missing tree. This photograph shows the general habitat at the roost location.

Figure 3.2-8: Roost 6-5



Figure 3.2-9: Roost 6-6



Roost 6-6 – This live silver maple (**Figure 3.2-9**), discovered in 2005, was a secondary roost tree for the Indiana bat. It was located within the Pleasant Run Creek Maternity Colony. In 2016, it was observed with many other silver maples in an oxbow slough. It has a concavity below the first large limb on the north facing side of the tree.

Roost 768-1 – This dead cottonwood, discovered in 2012, was a primary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony directly across the White River from the INDOT Nutter Ditch mitigation site. In 2016, a dead cottonwood at the original coordinates was not observed. Tree species generally included in the area were green ash, silver maple and eastern cottonwood. No photo available.

Roost 768-2 – This dead American elm, discovered in 2012, was a primary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. In 2016, it was not observed. It appeared the tree has been cut with a chainsaw and removed. The tree was previously located on a small forest fragment along a fence row between a cattle pasture and an agricultural field along [REDACTED]. No photo available.

Figure 3.2-10: Roost 141-1

Roost 141-1 – This dead white ash (**Figure 3.2-10**), discovered in 2014, was a secondary roost tree for the Indiana bat. It was located in the Lambs Creek Maternity Colony. In 2016, it was still standing within a cattle pasture along [REDACTED], but it was in an early stage of decay (Stage 2). Approximately 95% of the bark remains. It has numerous dead branches and areas of exposed wood.

Roost 141-2 – This dead silver maple (**Figure 3.2-11**), discovered in 2014, was a secondary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. In 2016, it had fallen and was dead with a stage of decay of 4. The tree is located in a lowland floodplain along the [REDACTED] [REDACTED] on the INDOT [REDACTED] mitigation site. The tree had approximately 80% of its bark remaining with the rest of the trunk being bare wood. Dominant surrounding trees were green ash, silver maple and eastern cottonwood.

Figure 3.2-11: Roost 141-2

**Figure 3.2-12: Roost 141-3**

Roost 141-3 – This dead silver maple (**Figure 3.2-12**), discovered in 2014, was a secondary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. In 2016, it was observed at its original location which was approximately [REDACTED] [REDACTED] from the [REDACTED] [REDACTED]. This roost was located on the edge of a sand/gravel bar. Surrounding habitat consists of a gravel bar to the west and a floodplain forest to the east. Dominant surrounding tree species included green ash, red maple, and eastern cottonwood. The roost had approximately 10% of the bark remaining. Stage of decay was 5-6.

Roost 283-1 – This partially dead cottonwood (**Figure 3.2-13**), discovered in 2015, was a secondary roost for the Indiana bat. It was located within the Pleasant Run Creek Maternity Colony. In 2015, it was described as partially dead. In 2016, it appeared all dead. It was with other cottonwoods with an understory of bush honeysuckle. Stage of decay was 4-5.

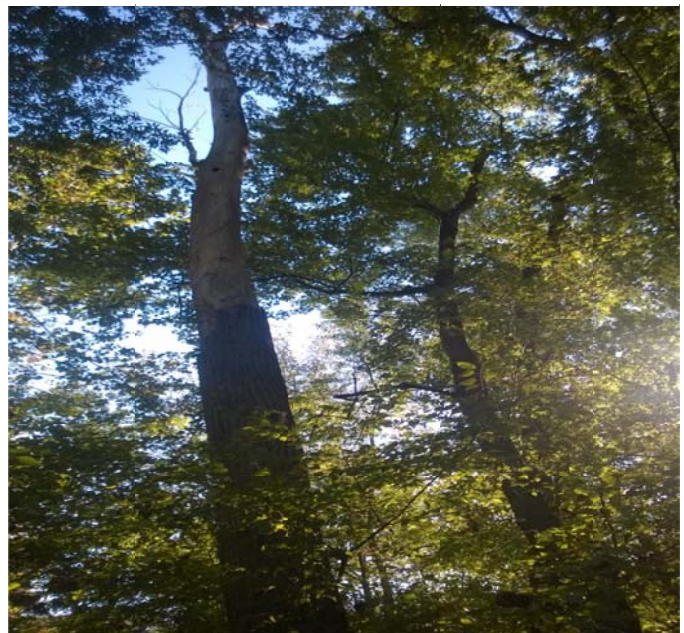
Figure 3.2-13: Roost 283-1

Figure 3.2-14: Roost 283-2

Roost 283-2 - This dead cottonwood (**Figure 3.2-14**), discovered in 2015, was a primary roost tree for the Indiana bat. It was located within the Pleasant Run Creek Maternity Colony. In 2016, the stage of decay was 4-5. It was located near a pond (slough) with other cottonwood, sycamore and silver maple trees.

Figure 3.2-15: Roost 433-1

Roost 433-1 - This dead oak (**Figure 3.2-15**), discovered in 2016, was a secondary roost for the Indiana bat. It was located within the Lambs Creek Maternity Colony. It was dead and had a stage of decay of 3. It was located on a mesic slope with other oaks and hickories.





Figure 3.2-16: Roost 433-2



Roost 433-2 - This shagbark hickory (**Figure 3.2-16**), discovered in 2016, was a secondary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. It was alive and had a stage of decay of 1. It was observed in upland habitat with other hickories and an understory composed of spicebush (*Lindera benzoin*).

Figure 3.2-17: Roost 433-3

Roost 433-3 – This shagbark hickory (**Figure 3.2-17**), discovered in 2016, was a secondary roost for the Indiana bat. It was alive and had a stage of decay of 1. It was located within the Lambs Creek Maternity Colony. It was with other oaks and hickories on the edge of a mesic slope.



The roost trees discussed above were found from original coordinates with the assistance of a Professional Surveyor. The loss of some over time illustrates the ephemeral nature of roost trees.



3.3 Impacts

As required by the Tier 1 Revised BO as amended, loss of Indiana bat habitat is used in this BA as a surrogate to monitor levels of Indiana bat impact and incidental take within the entire SAA. In accordance with this methodology, impacts included in this BA focus on Indiana bat habitat (i.e., forest and wetlands).

Forests are important to the Indiana bat. As the Indiana Bat Draft Recovery Plan, First Revision, April 2007, states on page 7: “In summer, most reproductive female Indiana bats occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fence line, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.”

The I-69 roadway may act as a barrier for bats. However, bats have been observed crossing SR 37 under a bridge, as well as crossing I-70 near the [REDACTED]. Both of these roadways have right of way widths of 250 to 500 feet and are of a similar footprint to the existing SR 37 and proposed I-69. The [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED] and [REDACTED] bridges in I-69 Section 6 will allow ample room for bats to fly under the bridge to maintain existing flyways. Keeley and Tuttle¹⁵ have documented that bats use bridges and culverts for roosting including flyways entering and exiting these roosts. This use is documented with bridge roost heights typically 10 feet or more above the ground and culvert heights between five and 10 feet tall. The bridge crossings listed above include the major riparian corridors within the project area that cross existing SR 37 and proposed I-69 and all are within the height range of documented bat use. [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED] and [REDACTED] have documented clearances in excess of 10 feet, while [REDACTED] and [REDACTED] have estimated clearances between five and 10 feet and all will have a similar clearance following I-69 construction. There is no evidence that would indicate that I-69 will act as a greater barrier than existing SR 37.

3.4 Direct Impacts

Direct impacts to the Indiana bat may occur during project construction, project operation, and project maintenance. For example, during project construction a direct impact to roosting bats could result from roost disturbance such as tree removal or bridge removal/construction. A direct impact from project operations could include vehicle/bat collisions. Project maintenance direct impacts could include bridge repair/replacement of a structure that is an active roost.

¹⁵ Keeley, B.W. & M.D. Tuttle. 1999. *Bats in American Bridges*. Bat Conservation International, Inc., Austin, Texas. 42 pp.

**Section 6—Tier 2 Biological Assessment**

Conservation measures and mitigation requirements have been developed to avoid or minimize the chance of such direct impacts. These include avoiding tree removal of trees greater than three inches dbh during seasonal potential bat use periods and inspection of bridges and culverts greater than 60 inches of height or rise for the presence of bats prior to construction activity on the bridge or culvert.

3.4.1 Forests and Tree Cover

A direct impact to forests as a result of I-69 Section 6 would arise from the removal of trees for construction of the interstate within the refined preferred alternative right of way. The term “forest” as used in analysis of impacts differs from the term “tree cover” used in the analysis of maternity colony impacts. “Tree cover” is a dataset of all tree crown coverage, no minimum size, that could be identified from field reviews. “Forests” were delineated using the USDA definition of forest. This definition states that the minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. All forests were identified for the Section 6 project in the field and through aerial photography and digitized with current aerial photographs as a backdrop. The delineated forests were used within the refined preferred alternative only.

Corridor Forest Impacts

The I-69 Section 6 Tier 2 DEIS provides a summary of forest impacts in Section 5.20. There are 159.5 acres of forested land (including both upland forest and wetland forest) estimated to be directly impacted within the refined preferred alternative right of way for I-69 Section 6. Of the 159.5 acres of forest impacted, 157.8 acres are upland forests or non-wetland forests. These forest impacts do not include the estimated impact from utility and billboard relocations of 50.2 acres presented in Chapter 2. Appendix F contains a summary of forest impacts for all sections of I-69.

Forest Characteristics**Methods**

The quality of Indiana bat habitat was assessed by completing forest transects assessments, which included a minimum 10% sample dataset. This method was developed by INDOT, FHWA, and USFWS. USFWS approved this methodology as providing an effective forest habitat sample of the I-69 Section 6 refined preferred alternative and adjacent area.

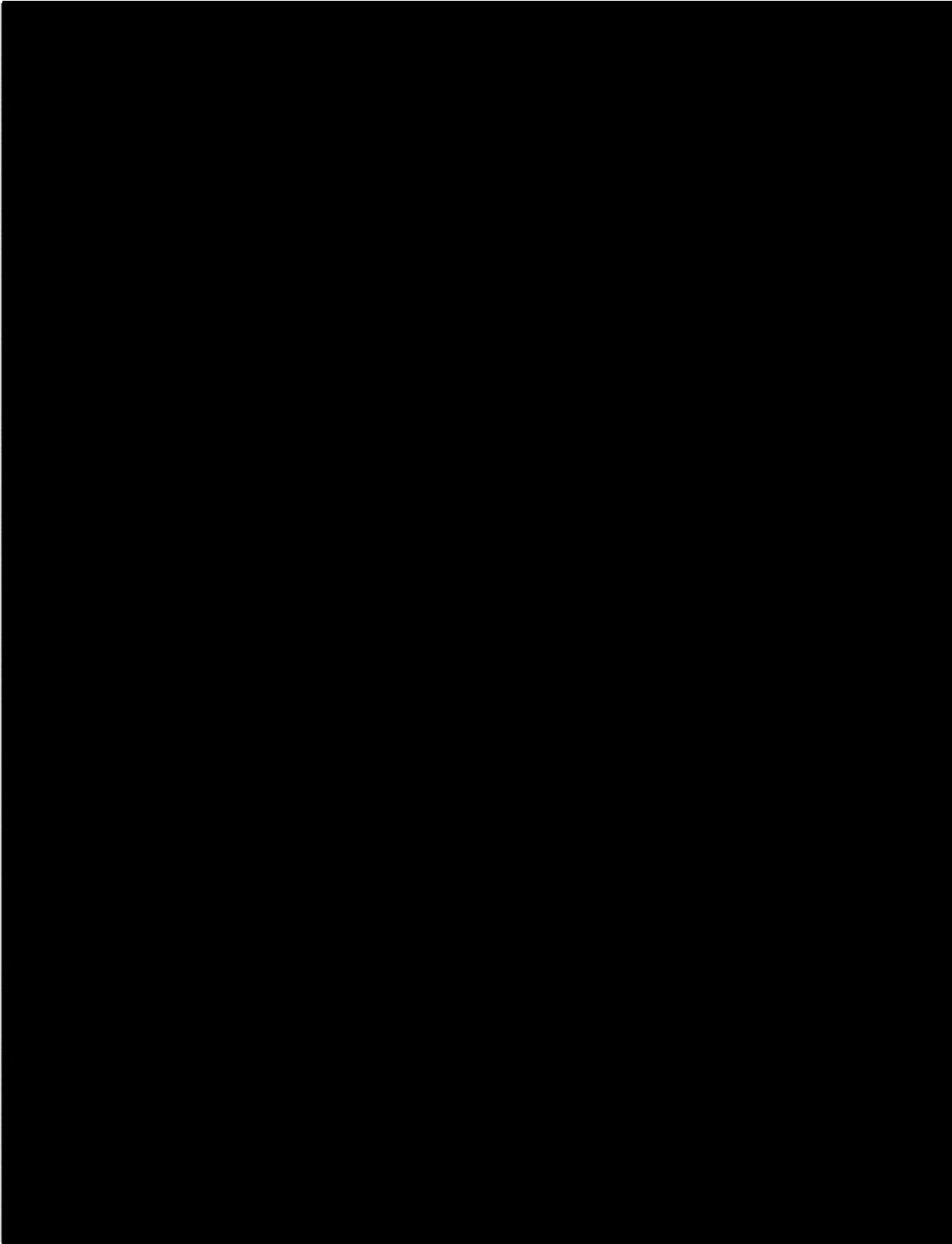
A total of 38 line transects (19 within the proposed right of way and 19 outside the proposed right of way) were completed along the I-69 Section 6 refined preferred alternative. These 38 line transects were approximately 60 feet wide and varied from 285 feet to 1,786 feet in length. The forest transects were distributed throughout I-69 Section 6 to develop a 10% sample of the impacted forests. The forest transects that were completed within right of way impact areas are used to determine how many snags will be impacted and the outside of the right of way transects



are used to identify how many snags will be remaining. The total area sampled within the I-69 Section 6 refined preferred alternative has 19.4 acres (12.2% of the estimated 159.5 acres impacted by the right of way) and the total area sampled outside the refined preferred alternative was 19.3 acres (12.1% of the estimated 159.5 acres impacted by the right of way). The number of snags, upper-canopy tree species and size class, sub-canopy density, invasive species, and live primary habitat tree species greater than nine inches dbh were sampled in these transects. Appendix D includes forest plot worksheets for each transect. **Figure 3.4-1** shows the location of these transects. Each location contained one forest transect within the refined preferred alternative right of way and one outside the right of way.



Figure 3.4-1: I-69 Section 6 Forest Sampling Transect Locations





Forest Transect Results

There were a total of 78 snags ranging in size from nine to 36” dbh identified from the 19 line transects sampled within the alignment. There were a total of 62 snags ranging in size from nine to 40” dbh from the 19 line transects sampled outside the alignment. **Table 3.4-1** shows the occurrence of snags per acre sampled and also shows an estimate of the average number of snags per acre for the forests in this area. A comparison of the means (Student’s t Test) showed no significant difference between the number of snags within or outside the right of way at $p < .05$ ($t = 0.8403$, $df = 36$, $p = 0.203144$).

Table 3.4-1: I-69 Section 6 Forest Transect Snag Data

Transects Within Alignment			Transects Outside Alignment		
Sample Results		Snag Estimates	Sample Results		Snag Estimates
Number of Snags	Acres Sampled	Snags/Acre	Number of Snags	Acres Sampled	Snags/Acre
78	19.4	4.1 ± 3.2	62	19.3	3.3 ± 2.9

Dominant trees in the upper canopy from line transect samples both within and outside the refined preferred alternative consisted of sugar maple (*Acer saccharum*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), shagbark hickory (*Carya ovata*), white oak (*Quercus alba*), American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), black walnut (*Juglans nigra*), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), and black locust (*Robinia pseudoacacia*).

Dominant trees found within the transects of the refined preferred alternative in order of abundance were sugar maple, tulip poplar, black cherry, white oak, red oak, red maple, shagbark hickory, pignut hickory, black walnut (*Juglans nigra*), and silver maple. Dominant trees found outside the transects of the refined preferred alternative in order of abundance were sugar maple, black locust, shagbark hickory, black cherry, silver maple, cottonwood, pignut hickory, red maple, American beech, and black walnut. Species diversity within and outside the right of way appeared similar.

The majority of trees constituting the upper canopy sampled in all 38 line transects were nine to 46” dbh. The overall sub-canopy density for these 38 line transects ranged from open areas to dense areas. Invasive plants (principally Amur honeysuckle (*Lonicera maackii*), Japanese honeysuckle (*Lonicera japonica*), garlic mustard (*Alliaria petiolata*), creeping Charlie (*Glechoma hederacea*), multiflora rose (*Rosa multiflora*), winter creeper (*Euonymus fortunei*), burning bush (*Euonymus alata*), and Russian olive (*Elaeagnus angustifolia*)) were growing in the sub-canopy in 100% (19 of 19 sites) transects within the right of way, and in 95% (18 of 19 sites) outside of the right of way.



Analysis

Nineteen forest transects were completed within and 19 forest transects were completed outside the proposed refined preferred alternative right of way for I-69 in Section 6. The total linear distance sampled within the alignment was approximately 2.7 miles which equals about 10% of the total length (26.9 miles) of proposed highway. The mean number of snags/acre within the right of way was 4.1 ± 3.2 (n = 78 snags), while the mean number of snags outside the right of way was 3.3 ± 2.9 (n = 62 snags). The forest transects were 60 feet wide and approximately the same length in all but one forest transect, and it was different by 113 feet. Variability in snags per line transect ranged from zero to 12.93 snags/acre. No significant difference was shown between the number of snags inside and outside the refined preferred alternative. A combined total of all forest transects showed 3.6 snags/acre (n = 38). While the construction of the I-69 Section 6 refined preferred alternative will impact some of the Indiana bat habitat in the SAA, there will still be ample habitat remaining after construction.

Forest impacts in the action area were evaluated in two parts: in the maternity colonies and in the RSAA. Snag projections were also calculated in these two parts. Tier 2 forest transects found an average of 4.1 snags/acre within and 3.3 snags/acre outside the refined preferred alternative. An average 3.6 snags/acre was used for maternity colony calculations. **Table 3.4-2** summarizes the results of the snag analysis.

Table 3.4-2: I-69 Section 6 Forest Transect Snag Availability Results for the Indiana Bat

	Snags Available ¹	Snags Impacted ² (% of available)	Snags Remaining
Lambs Creek Maternity Colony	18,083	13 (0.07%)	18,070
Clear Creek Maternity Colony	19,411	153 (0.79%)	19,258
Crooked Creek Maternity Colony	13,090	167(1.28%)	12,923
Pleasant Run Creek Maternity Colony	7,470	31 (0.41%)	7,439
Remaining Summer Action Area	57,042	210 (0.37%)	56,832

1. Available tree cover X 3.6 snags/acre

2. RPA forest impacts X 3.6 snags/acre



In the Lambs Creek Maternity Colony, 5,023 acres of tree cover¹⁶ are available. This equates to 18,083 available snags at 3.6 snags/acre density. Based on I-69 Section 6 forest data¹⁷, 3.5 acres of forests will be impacted within the maternity colony by the refined preferred alternative, resulting in 13 snags impacted within the refined preferred alternative. This is approximately 0.07% of the available snags in the maternity colony.

In the Clear Creek Maternity Colony, 5,392 acres of tree cover are available. This equates to 19,411 available snags at 3.6 snags/acre density. Based on I-69 Section 6 forest data, 42.4 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 153 snags impacted within the refined preferred alternative. This is approximately 0.79% of the available snags in the maternity colony.

In the Crooked Creek Maternity Colony, 3,636 acres of tree cover are available. This equates to 13,090 available snags at 3.6 snags/acre density. Based on I-69 Section 6 forest data, 46.3 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 167 snags impacted within the refined preferred alternative. This is approximately 1.28% of the available snags in the maternity colony circle.

In the Pleasant Run Creek Maternity Colony, 2,075 acres of tree cover are available. This equates to 7,470 available snags at 3.6 snags/acre density. Based on I-69 Section 6 forest data, 8.7 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 31 snags impacted within the refined preferred alternative. This is approximately 0.41% of the available snags in the maternity colony circle.

There is an overlap of tree cover between the Clear Creek and Crooked Creek colonies, which would impact 1.3 acres of forest resulting in five snags included in this overlap area. These five snags were considered in both summaries above.

In the RSAA, 15,845 acres of forest (2011 National Land Cover Database (NLCD) land cover data¹⁸) are available. This equates to 57,042 available snags. The forest impact in the RSAA is 58.3 acres, resulting in impacts to an estimated 210 snags. This is approximately 0.37% of the available snags in the RSAA.

Consequently, in the maternity colonies, the percent of snags being impacted range from 0.07% to 1.28% and in the RSAA impacts include approximately 0.37% of available snags. Based on

¹⁶ *Tree Cover – defined as all trees, including individual, fragmented groups of trees. Based on field verified forests and forest fragments within the right of way and adjacent survey area and 2011 NLCD forest data outside of the survey area.*

¹⁷ *Forest included groups of trees >1 acre and wider than 120 feet as verified in the field and using current aerial photographs within the right of way and adjacent study area. This includes forested wetlands as well as upland forest.*

¹⁸ *Forest included tree cover (forest and forest fragments) where available and 2011 NLCD land cover forest in the remaining areas.*



this level of impact, the construction of I-69 is anticipated to have an insignificant and discountable effect on snag availability for Indiana bats within the SAA.

Summer Action Area (SAA)

The SAA totaled 138,601 acres as shown in **Figure 3.1-1**. Removing the four Indiana bat maternity colonies from this area and accounting for overlap of 600 acres in the Clear Creek and the Crooked Creek maternity colonies, showed a maternity colony area of 49,664 acres. The area within the SAA, yet outside of the maternity colony foraging areas, is referred to in this document as the Remaining Summer Action Area (RSAA.). The RSAA is defined as the area of the original 5-mile wide SAA, expanded by the boundaries of induced growth TAZs, with any area overlapping maternity colony circles removed. **Table 3.4-3** shows direct tree cover impacts in the maternity colonies, while **Table 3.4-4** shows the direct impacts to forest in the RSAA, the Tier 1 information impacts are also provided for comparison purposes. The Tier 1 information is shown in grey text and referred to as the Representative Alternative (RA).

The RSAA includes 88,937 acres. This area was analyzed to account for impacts to more solitary Indiana bats such as males and non-reproductive females. The analysis included total forest and forest core in the RSAA, forest and forest core directly impacted, as well as wetland resources directly in the RSAA. Additionally, this analysis included indirect and cumulative impacts to forest resources anticipated for I-69 Section 6. As with the maternity colony analysis, forest resources used included forest cover within the I-69 Section 6 field survey study area, and 2011 NLCD forest and woody wetland class data for those areas beyond the field survey study area.

The RSSA of 88,937 acres presented in this BA for I-69 Section 6 is higher than the 55,683 acres from 2006 reported in the Tier 1 BA Addendum for the Indiana bat. The I-69 Section 6 BA higher number is due to the large area included as induced TAZs from coordination with expert land use panel members. In 2006, TAZs were not incorporated in the Tier 1 BA nor did RSSA proceed along existing I-465 as it does today. From the larger RSAA, total forest acres (non-wetland) increased from 8,220 acres in 2006 to 15,845 acres for the refined preferred alternative today. This would be expected and similarly, core forest increased from 990 acres to 3,412 acres in the refined preferred alternative.

Even though more acres were accounted for within the Indiana bat SAA, impacts were less for the refined preferred alternative than for the representative alignment that was used to calculate impacts in the 2006 Tier 1 BA Addendum. There will be approximately 11.5 acres of core forest impacted by the refined preferred alternative right of way. Of these 11.5 acres, zero acres are located within the RSAA, zero acres are located within the Lambs Creek Maternity Colony, 2.1 acres are located within the Clear Creek Maternity Colony, 9.4 acres are located within the Crooked Creek Maternity Colony, and zero acres are located within the Pleasant Run Creek Maternity Colony. There are no core forest impacts within the Lambs Creek Maternity Colony or within the Pleasant Run Creek Maternity Colony or in the overlap between Clear Creek and Crooked Creek maternity colonies. Core forest impacts are less at 11.5 acres for the refined preferred alternative compared to 15 acres shown in the analysis of the representative alignment



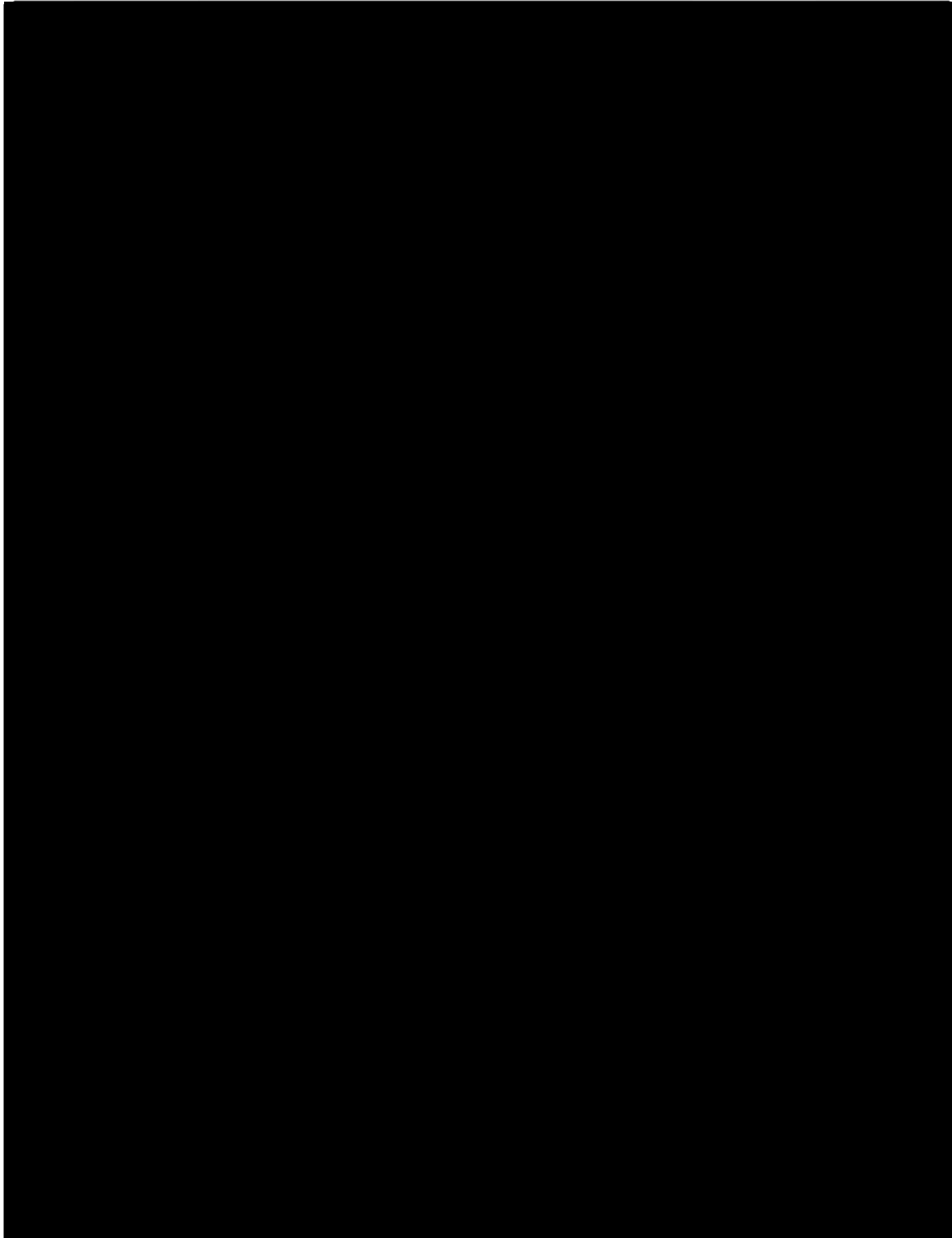
in the 2006 Tier 1 BA Addendum. **Table 3.4-3** shows the direct impacts to forest and tree cover in the Indiana bat maternity colonies.

Maternity Colony Tree Cover Impacts

The Lambs Creek Maternity Colony contains 5,023 acres of tree cover. Within the refined preferred alternative right of way, 4.7 acres of tree cover will be impacted. This impact has decreased from the 4.5 acres reported in the analysis of the 2006 representative alignment presented in the Section 5 Tier 2 BA. **Figure 3.4-2** shows the tree cover within the Lambs Creek Maternity Colony and potential impacts.



Figure 3.4-2: White River/Lambs Creek Maternity Colony Tree Cover Impacts





The Clear Creek Maternity Colony contains 5,392 acres of tree cover. Within the refined preferred alternative right of way, 52.0 acres of tree cover will be impacted. This impact has decreased from the 99 acres reported in the analysis of the 2006 representative alignment. **Figure 3.4-3** shows the tree cover within the Clear Creek Maternity Colony and potential impacts.

The Crooked Creek Maternity Colony contains 3,636 acres of tree cover. Within the refined preferred alternative right of way, 57.1 acres of tree cover will be impacted. This impact has decreased from the 170 acres reported in the analysis of the 2006 representative alignment. **Figure 3.4-4** shows the tree cover within the Crooked Creek Maternity Colony and potential impacts.

The Pleasant Run Creek Maternity Colony contains 2,075 acres of tree cover. Within the refined preferred alternative right of way, 15.8 acres of tree cover will be impacted. This impact has decreased from the 29 acres reported in the analysis of the 2006 representative alignment. **Figure 3.4-5** shows the tree cover within the Pleasant Run Creek Maternity Colony and potential impacts.

A comparison of tree cover impacts in the four Indiana bat maternity colonies shows a total tree cover impact of 290.5 acres for the 2006 representative alignment and 127.9 acres for the refined preferred alternative.

Summary

A concerted effort has been made in both the placement of the corridor during Tier 1, and the refined preferred alternative in Tier 2, to avoid and minimize impacts to forests in I-69 Section 6. The impact of the refined preferred alternative right of way on forest/tree cover habitat (0.68% of the available forest/tree cover habitat total within the I-69 Section 6 SAA) is considered insignificant and discountable in relation to the habitat needs for the Indiana bat. The commitment has been made to not remove any trees in the SAA with a diameter of three inches or greater between April 1 and September 30. In addition, FHWA and INDOT have committed to replacing upland forest at a 3:1 ratio. Based on **Table 3.4-3** and **Table 3.4-4**, there is ample amount of forest habitat available for the Indiana bat within the I-69 Section 6 SAA.



Figure 3.4-3: White River/Clear Creek Maternity Colony Tree Cover Impacts

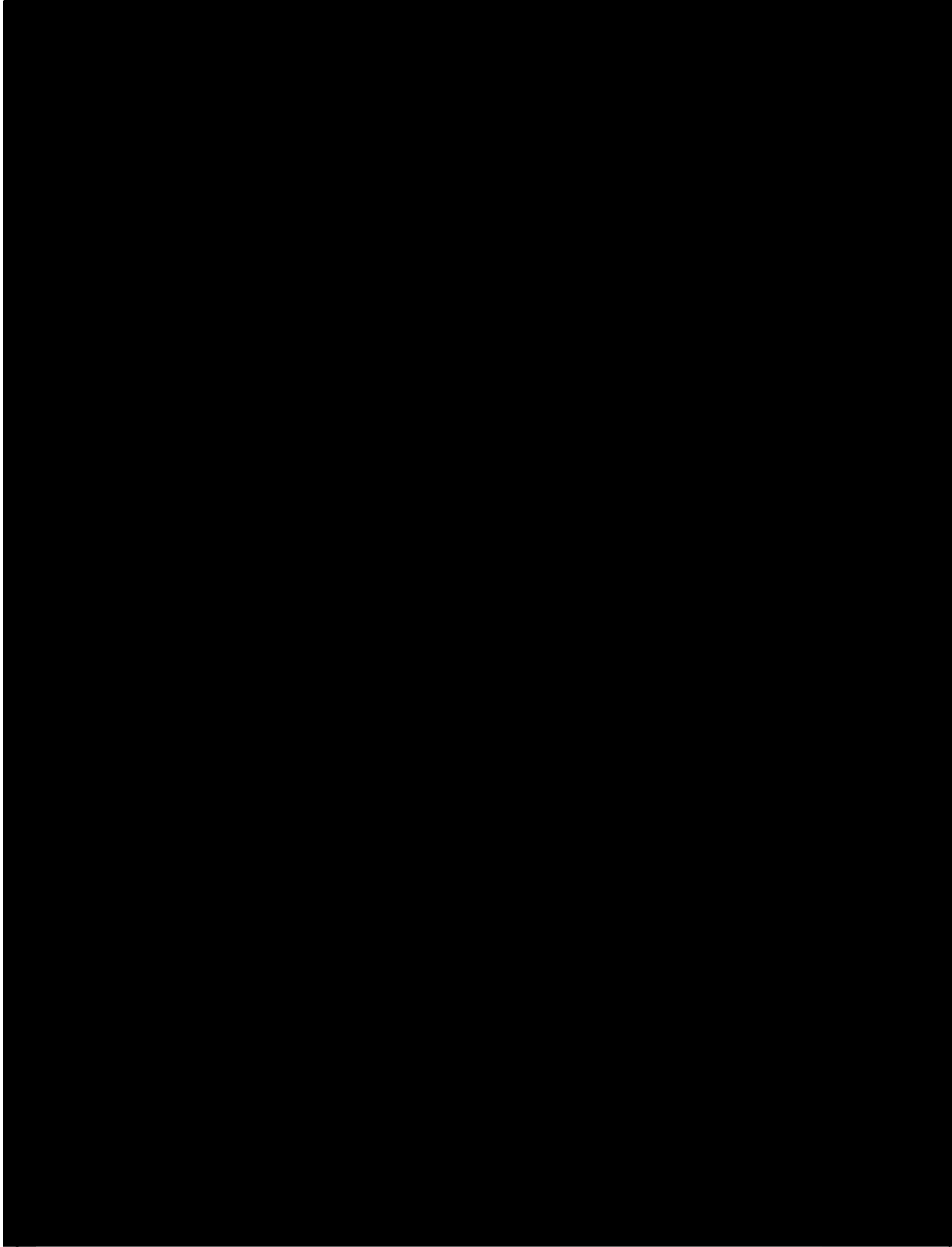




Figure 3.4-4: White River/Crooked Creek Maternity Colony Tree Cover Impacts

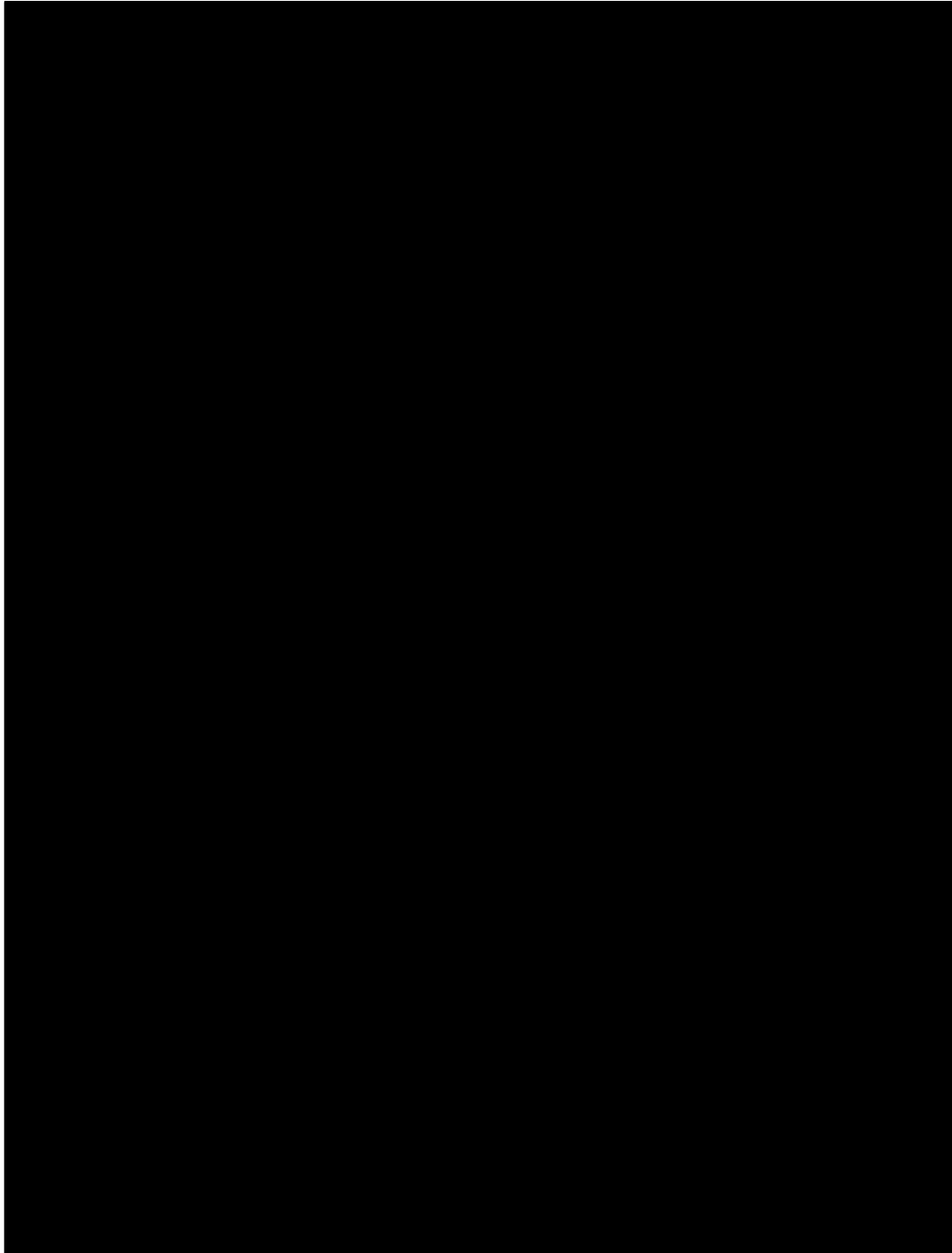
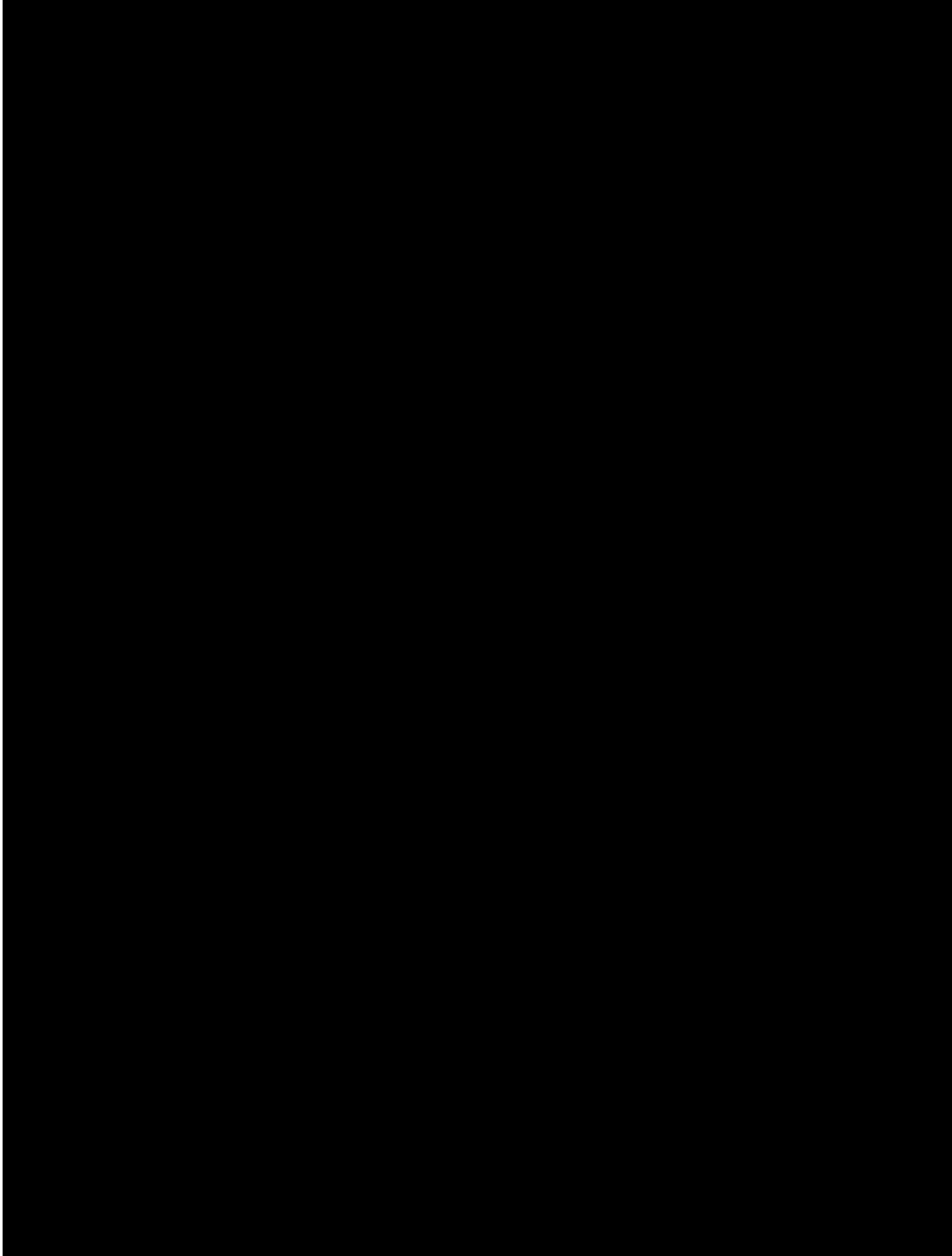




Figure 3.4-5: White River/Pleasant Run Creek Maternity Colony Tree Cover Impacts





Impacts in each maternity colony to tree cover, connectivity, floodplain proximity, and core area effects, calculated in the Tier 1 BA Addendum and Section 5 Tier 2 BA (Lambs Creek Maternity Colony), are most strongly affected by how the alignment crosses the area. These metrics were re-evaluated, but not recalculated for the maternity colonies. No recalculation was considered necessary because of the similarity of how the Tier 2 refined preferred alternative and the 2006 representative alignment traverse the landscape, which is primarily along existing SR 37. These small differences do not result in any material or significant differences in these impacts.

Table 3.4-3: Forests and Tree Cover Direct Impacts for Maternity Colonies

Lambs Creek Maternity Colony			
Lambs Creek Maternity Colony Use Area (acres)	12,566		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	5,058 ²	4.5 ²	5,052 ²
Core Forest (acres)	2,346 ²	0.1 ²	2,346 ²
	No Build	RPA Impacts ³	Remaining
Tree Cover in the maternity colony (acres)	5,023 ⁴	4.7 ⁵	5,018
Forest in the maternity colony (acres)	5,023 ⁴	3.5 ⁶	5,019
Core Forest (acres)	2,258	0	2,258
Clear Creek Maternity Colony			
Clear Creek Maternity Colony Use Area (acres)	12,566		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	5,375 ⁷	99 ⁷	5,276 ⁷
Core Forest (acres)	959 ⁷	1 ⁷	958 ⁷
	No Build	RPA Impacts ³	Remaining
Tree Cover in the maternity colony (acres)	5,392 ⁴	52.0 ⁵	5,340
Forest in the maternity colony (acres)	5,392 ⁴	42.4 ⁶	5,350
Core Forest (acres)	1,434	2.1 ⁸	1,432



Crooked Creek Maternity Colony			
Crooked Creek Maternity Use Area (acres)	12,566		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	3,722 ⁷	170 ⁷	3,552 ⁷
Core Forest (acres)	339 ⁷	13 ⁷	326 ⁷
	No Build	RPA Impacts ³	Remaining
Tree Cover in the maternity colony (acres)	3,636 ⁴	57.1 ⁵	3,579
Forest in the maternity colony (acres)	3,636 ⁴	46.3 ⁶	3,590
Core Forest (acres)	606	9.4 ⁸	597
Pleasant Run Creek Maternity Colony			
Pleasant Run Creek Maternity Colony Use Area (acres)	12,566		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	2,276 ⁷	29 ⁷	2,247 ⁷
Core Forest (acres)	35 ⁷	0 ⁷	35 ⁷
	No Build	RPA Impacts ³	Remaining
Tree Cover in the maternity colony (acres)	2,075 ⁴	15.8 ⁵	2,059
Forest in the maternity colony (acres)	2,075 ⁴	8.7 ⁶	2,066
Core Forest (acres)	136	0	136
Colony Overlap			
Clear Creek and Crooked Creek Maternity Colony Overlap (acres)	600		
	No Build	RPA Impacts ³	Remaining
Tree Cover in the maternity colony (acres)	85 ⁴	1.7 ⁵	83
Forest in the maternity colony (acres)	85 ⁴	1.3 ⁶	84
Core Forest (acres)	0	0	0



Maternity Colonies Total			
Maternity Colonies Use Area	49,664		
	No Build	RPA Impacts ³	Remaining
Tree Cover in the maternity colony (acres)	16,041 ⁴	127.9 ⁵ (0.80%)	15,913
Forest in the maternity colony (acres)	16,041 ⁴	99.6 ⁶	15,941
Core Forest (acres)	4,434	11.5 ⁸ (0.26%)	4,422

1. RA = Representative Alignment (Tier 1 BA Addendum).

2. Information presented based on Section 5 Tier 2 BA Table 8 (Section 6 RA impact estimated as 4.5 acres of the total combined Section 5 and 6 impact estimated at 5.6 acres).

3. RPA = Refined Preferred Alternative (New Information) impacts were calculated from EIS forest and forest fragment delineation.

4. Available Forest/Tree Cover included forest and tree cover (forest fragments) where available within the right of way and adjacent survey area and the NLCD 2011 forest data in the remaining areas. These sources are the best available current "forest" data for action area comparisons.

5. Tree Cover impacts included forests and groups of trees (forest fragments) that did not classify as forest verified for the EIS within the right of way and adjacent study area.

6. Forest impacts included groups of trees >1 acre and wider than 120 feet verified for the EIS within the right of way and adjacent study area.

7. Information presented based on Tier 1 BA Addendum March 7, 2006.

8. Core area loss resulted from a loss of edge, redefining the core as a smaller area, as described in the Section 6 Tier 2 DEIS, Section 5.20 "Forests".



Table 3.4-4: Forests Direct Impacts for the Remaining Summer Action Area

Section 6 Remaining Summer Action Area			
	No Build	RA Impacts ¹	Remaining
Tier 1 Section 6 Remaining Summer Action Area (acres)	55,683 ²		
Total Forest (non-wetland) (acres)	8,220 ²	69 ²	8,151 ²
Core Forest (acres)	990 ²	1 ²	989 ²
	No Build	RPA Impacts ³	Remaining
Tier 2 Section 6 Remaining Summer Action Area (acres)	88,937		
Tree Cover (acres)	15,845 ⁴	89.4 ⁵	15,756
Forest (acres)	15,845 ⁴	58.3 ⁶	15,787
Core Forest (acres)	3,412	0.0 ⁷	3,412

1. RA = Representative Alignment (Tier 1 BA Addendum).
2. Information presented based on Tier 1 BA Addendum March 7, 2006.
3. RPA = Refined Preferred Alternative (New Information) impacts were calculated from EIS forest and forest fragment delineations.
4. Available Forest/Tree Cover included forest and tree cover (forest fragments) where available within the right of way and adjacent survey area and the NLCD 2011 forest data in the remaining areas. These sources are the best available current "forest" data for action area comparisons.
5. Tree Cover impacts included forests and groups of trees (forest fragments) that did not classify as forest verified for the EIS within the right of way and adjacent study area.
6. Forest impacts included groups of trees >1 acre and wider than 120 feet verified for the EIS within the right of way and adjacent study area.
7. Core area loss resulted from a loss of edge, redefining the core as a smaller area, as described in the Section 6 Tier 2 DEIS, Section 5.20 "Forests".

3.4.2 Connectivity

In this BA, connectivity is defined as the potential flight corridors which Indiana bats may use when traveling between various habitats. The assessment of habitat connectivity is used to determine how Indiana bat capture sites and roost trees may be linked to the I-69 corridor and mitigation sites. This information is important to determine the likelihood of Indiana bats



traveling from previously identified locations to I-69, and the potential associated use of the existing habitat that will be impacted. In addition, this will identify the most likely locations where Indiana bats may cross I-69. In the Tier 1 BO as amended, it was stated that “Brack and Tyrell (1990) found that in early summer, foraging was restricted to riparian habitats. Foraging also occurs over clearings with successional vegetation, along cropland borders, fencerows, and over farm ponds. Maternity colony foraging ranges from a linear strip of creek vegetation 0.5 mi long to a 0.75 mi foraging area along a wooded river.” This information was used when analyzing possible connectivity routes to I-69.

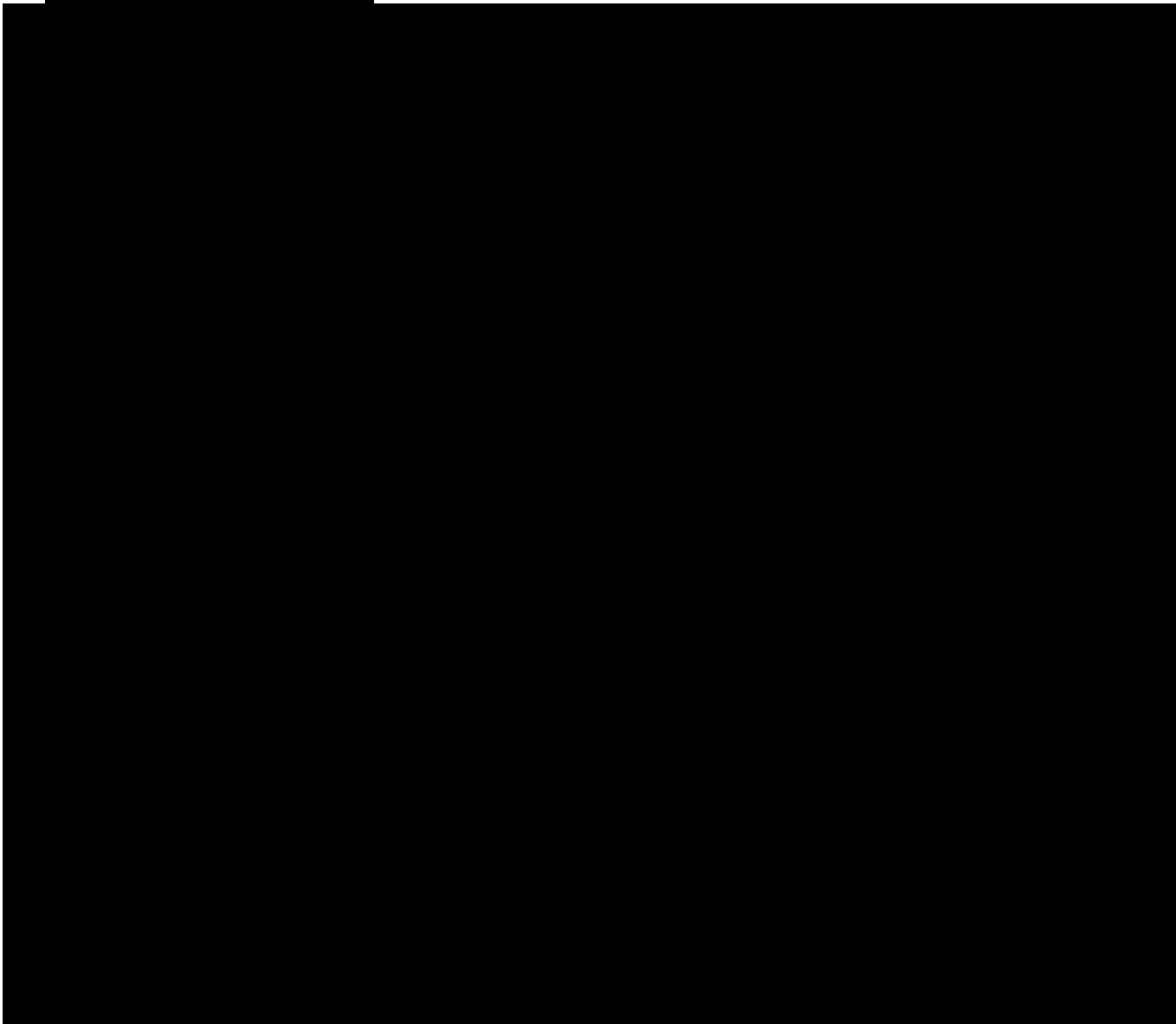
In addition, the straight line distance from each Indiana bat capture point and roost tree location to the nearest tree cover impact was determined for comparison to the connectivity distances. The shortest straight-line distance is provided because while improbable, it is possible that Indiana bats may fly in a straight path to get to their destination and such distances provide a conservative approach. In most places, connectivity to I-69 would be the same as connectivity to tree cover impacts; this is due to the bats using riparian corridors as flyways. The connectivity to the nearest mitigation site from each known Indiana bat capture point and roost tree was also analyzed to establish the relative value of the mitigation sites to the species. Detailed mitigation site information can be found in the Mitigation section of this document as well as in Appendices I-V.

Section 6 of I-69 entails upgrading an existing multi-lane, divided transportation facility to a full freeway design. Most of the right of way used for the Section 6 project already is devoted to transportation use. It is reasonable to assume that I-69 will have little additional effect on the habitat connectivity in this section due to the existing highway. The majority of the mist netting surveys that were completed identified Indiana bats to the west of the highway. Based on this, and based on the presence of the habitat surrounding the White River to the west of I-69, it is reasonable to assume that there is ample foraging habitat to the west of existing SR 37 and the alignment. These parameters are analyzed below for each Indiana bat maternity colony and the RSAA. Figures 3.4-6 through 3.4-9 below show each Indiana bat roost tree and capture site in relation to I-69, and connectivity to the nearest mitigation site, and nearest forest impact. **Table 3.4-5** summarizes the results.



Table 3.4-5: Connectivity and Distance to Impacts from known Indiana Bat Roost Trees and Indiana Bat Capture Points and Connectivity to Closest Mitigation Site

[Redacted Table Content]



Lambs Creek Maternity Colony

There are eight roost trees and one bat capture point in the Lambs Creek Maternity Colony. USFWS identified Roost 141-1 as the centroid of the maternity colony. Seven other roost trees were identified by USFWS. Within the Lambs Creek Maternity Colony, connectivity to I-69 from the roost trees and capture points occurs along various tree lines and [REDACTED], unnamed tributaries to [REDACTED], and the [REDACTED]. The shortest connectivity route distance to I-69 from the one Indiana bat capture point is approximately [REDACTED] (Site 24). The shortest connectivity route distance to I-69 from the eight known roost trees are approximately [REDACTED] (768-1), [REDACTED] (768-2), [REDACTED] (141-1), [REDACTED] (141-2), [REDACTED] (141-3), [REDACTED] (433-1), [REDACTED] (433-2) and [REDACTED] (433-3). The shortest straight-line distance from an Indiana bat capture point to I-69 is [REDACTED] (Site 24). The shortest straight-line distance from



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any roost tree to I-69 is approximately [REDACTED] [REDACTED] (768-1), while the longest straight-line distance is approximately [REDACTED] (433-2).

Connectivity routes were calculated for both the roost tree sites and the bat capture sites to the mitigation sites. The eight roost trees are located zero mile (141-2 and 141-3), [REDACTED] [REDACTED] (768-1), [REDACTED] miles (141-1), [REDACTED] miles (433-2), [REDACTED] miles (768-2) and [REDACTED] miles (433-1 and 433-3) away from the [REDACTED] mitigation site (Section 5 mitigation site). Capture Site 24 is located [REDACTED] away from the [REDACTED] mitigation site.

Substantial alternative roosting and foraging habitat is located on the west side of the I-69 Section 6 refined preferred alternative in this area. **Figure 3.4-6** shows the Indiana bat connectivity associated with Lambs Creek maternity colony.

Clear Creek Maternity Colony

Six roost trees and five Indiana bat capture sites are located within the Clear Creek Maternity Colony. Connectivity to I-69 from the Indiana bat capture points occurs primarily along tree lines, the White River, Clear Creek, and the West Fork Clear Creek. The shortest connectivity route to I-69 from the Indiana bat capture points is less than [REDACTED] [REDACTED] (Site 5), while the longest is approximately [REDACTED] miles (Site 10). The shortest connectivity route to I-69 from the roost trees is [REDACTED] (203-R1), while the longest is [REDACTED] miles (6-2, 6-4, and 022R1). The shortest straight-line distance from an Indiana bat capture point to I-69 is less than [REDACTED] [REDACTED] (Site 5), while the longest was approximately [REDACTED] (Site 8). The shortest straight-line distance from a roost tree to I-69 is [REDACTED] (203-R1), while the longest is approximately [REDACTED] (6-1 and 022R1). Connectivity routes were calculated for both the roost tree sites and the bat capture sites to the mitigation sites. Sites 7 and 8 are both located within a mitigation site, the [REDACTED] [REDACTED] and [REDACTED] [REDACTED] mitigation sites respectively. Site 3 was located the farthest from a mitigation site at approximately [REDACTED] miles away from the [REDACTED] mitigation site. Roost trees 6-2 and 022R1 are located the closest to a mitigation site at approximately [REDACTED] [REDACTED] away from the [REDACTED] [REDACTED] mitigation site. Roost tree 203-R1 was located the farthest from a mitigation site at approximately [REDACTED] miles away from the [REDACTED] mitigation site.

The [REDACTED], [REDACTED] [REDACTED] and [REDACTED] [REDACTED] mitigation sites are located in close proximity to a majority of the bat captures and the roost trees that have been identified in this colony. This site will preserve roosting and foraging habitat for the Indiana bat. **Figure 3.4-7** shows the Indiana bat connectivity pertaining to the Clear Creek Maternity Colony.

Crooked Creek Maternity Colony

One Indiana bat capture point and two roost trees are located within the Crooked Creek Maternity Colony. Connectivity to I-69 from the Indiana bat capture point occurs primarily along Crooked Creek, White River, and unnamed tributaries to the White River. The connectivity route to I-69 from the Indiana bat capture point is less than [REDACTED] [REDACTED] (Site 14). The shortest connectivity route to I-69 from the roost trees is approximately [REDACTED] [REDACTED] (105-2). The shortest straight-line distance from the Indiana bat capture point to I-69 is less than [REDACTED] [REDACTED] (Site 14).



The shortest straight-line distance from the roost trees to I-69 is approximately [REDACTED] (105-2) and [REDACTED] (105-1). Connectivity routes were calculated for both the roost tree sites and the bat capture site to the nearest mitigation site. Site 14 is approximately [REDACTED] away from the [REDACTED] mitigation site. Roost tree 105-1 is approximately [REDACTED] away from the [REDACTED] mitigation site. Roost tree 105-2 is approximately [REDACTED] away from the [REDACTED] mitigation site.

Substantial alternative roosting and foraging habitat is located to the west of the I-69 Section 6 refined preferred alternative in this area. **Figure 3.4-8** shows the Indiana bat connectivity pertaining to the Crooked Creek Maternity Colony.

Pleasant Run Creek Maternity Colony

Three Indiana bat capture points and four roost trees are located within the Pleasant Run Creek Maternity Colony. Connectivity to I-69 from the Indiana bat capture points occurs primarily along tree lines, North Bluff Creek, Travis Creek, White River, and unnamed tributaries to the White River. The shortest connectivity route to I-69 from the Indiana bat capture points is less than [REDACTED] (Site 19), while the longest is approximately [REDACTED] (Site 23). The shortest connectivity route to I-69 from the roost trees is approximately [REDACTED] (6-5), while the longest is approximately [REDACTED] (283-2). The shortest straight-line distance from an Indiana bat capture point to I-69 is less than [REDACTED] (Site 19), while the longest is approximately [REDACTED] (Site 23). The shortest straight-line distance from a roost tree to I-69 is approximately 0.9 mile (6-6), while the longest is approximately 1.3 miles (283-1 and 283-2). Connectivity routes were calculated for both the roost tree sites and the bat capture sites to the mitigation sites. Sites 21 and 22 are located the closest to a mitigation site at approximately [REDACTED] away from the [REDACTED] mitigation site. Site 19 was located the farthest from a mitigation site at approximately [REDACTED] away from the [REDACTED] mitigation site. Roost tree 6-5 is located the closest to a mitigation site at approximately [REDACTED] away from the [REDACTED] mitigation site. Roost trees 283-1 and 283-2 are located the farthest from a mitigation site at approximately [REDACTED] away from the [REDACTED] mitigation site.

Substantial alternative roosting and foraging habitat is located to the west of the I-69 Section 6 refined preferred alternative in this area. **Figure 3.4-9** shows the Indiana bat connectivity pertaining to the Pleasant Run Creek Maternity Colony.

Summary

Based on the fact that this project entails upgrading an existing multi-lane, divided transportation facility to a full freeway design and that most of the right of way used for the I-69 Section 6 project already is devoted to transportation use, it is reasonable to assume that I-69 will have little additional effect on the habitat connectivity in this section. The majority of the mist netting surveys identified Indiana bats to the west of the highway. There will still be ample foraging habitat surrounding the White River to the west of I-69. Based on this, impacts to connectivity is considered insignificant.



Figure 3.4-6: Lambs Creek Maternity Colony Connectivity

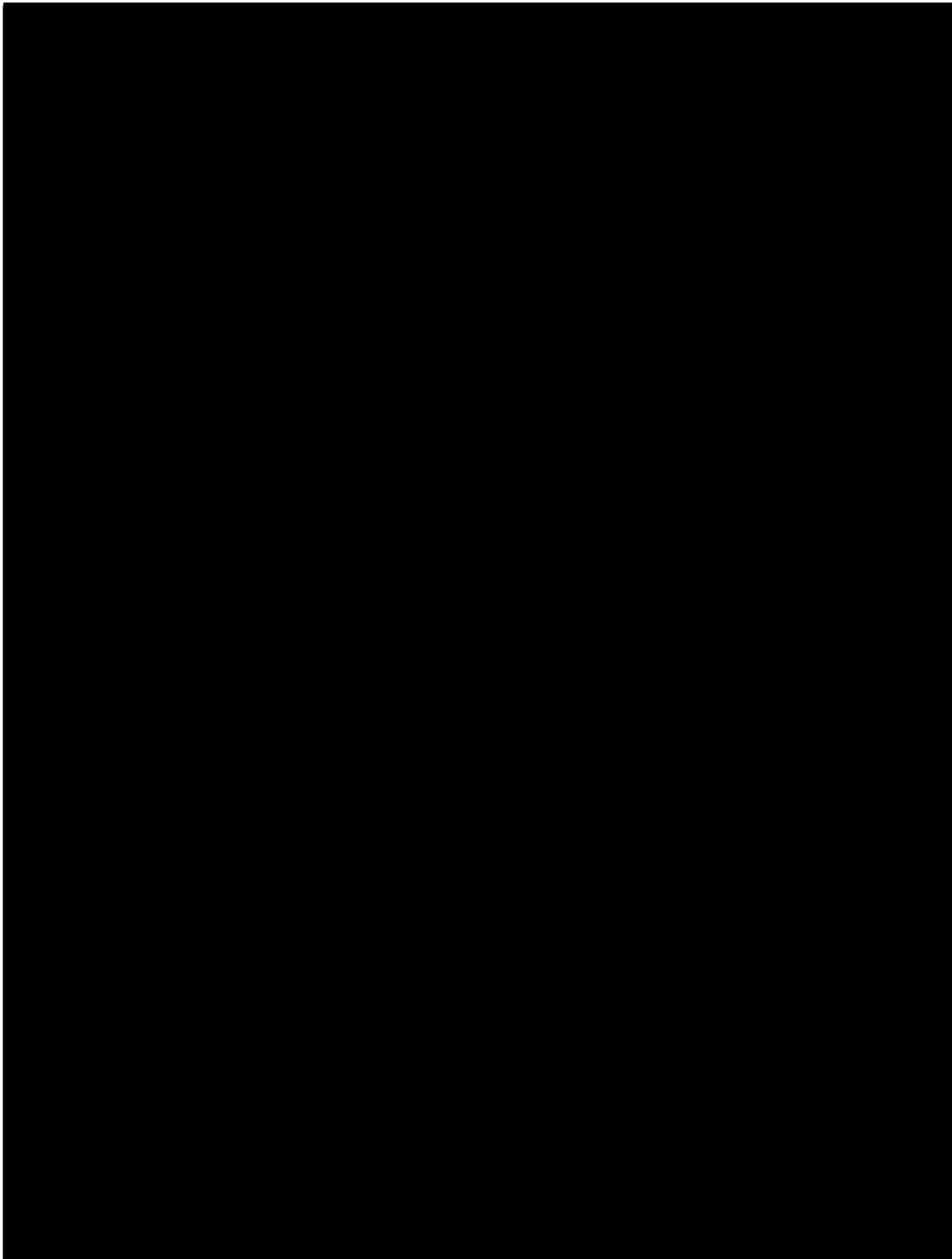




Figure 3.4-7: Clear Creek Maternity Colony Connectivity

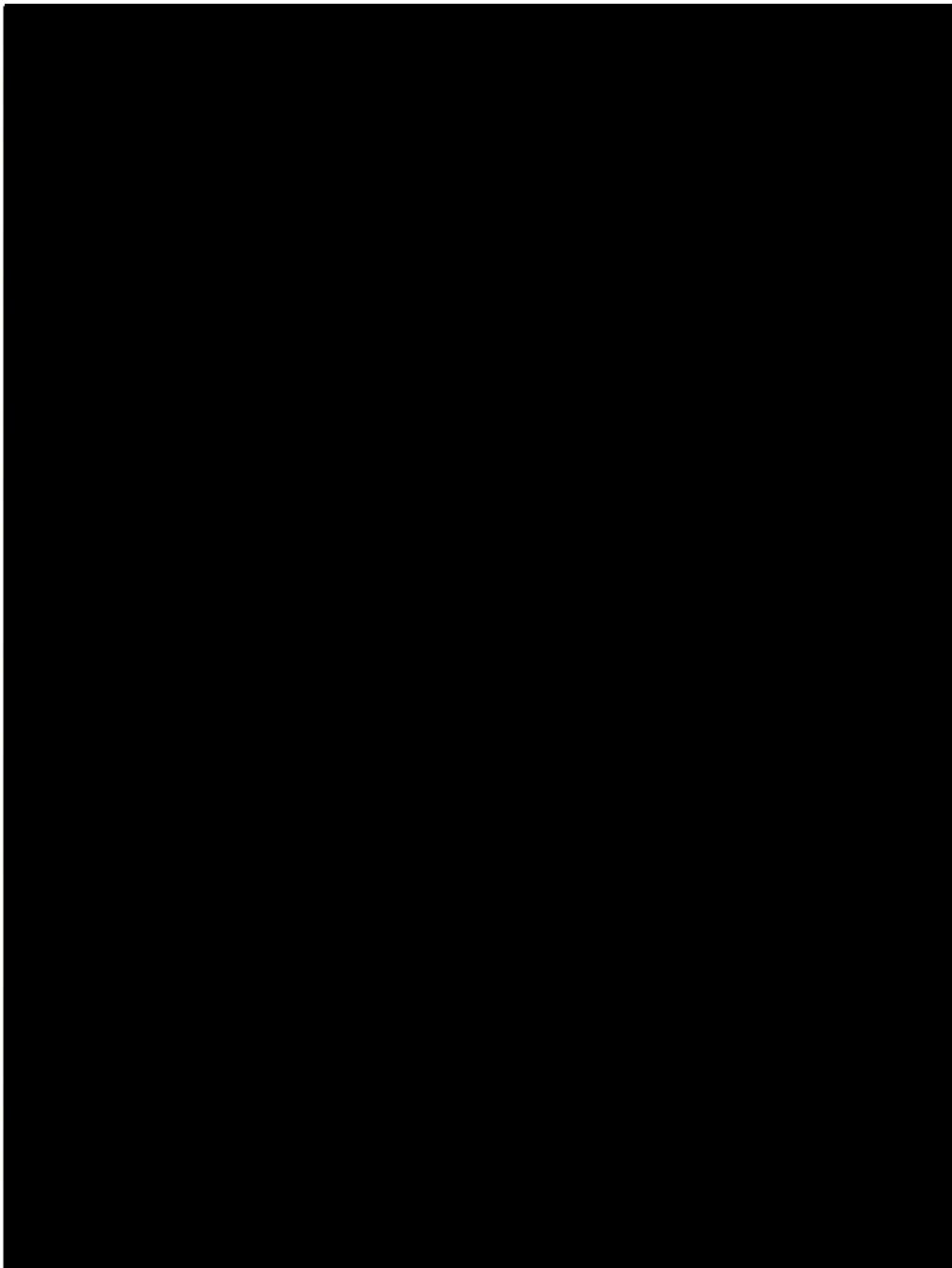




Figure 3.4-8: Crooked Creek Maternity Colony Connectivity

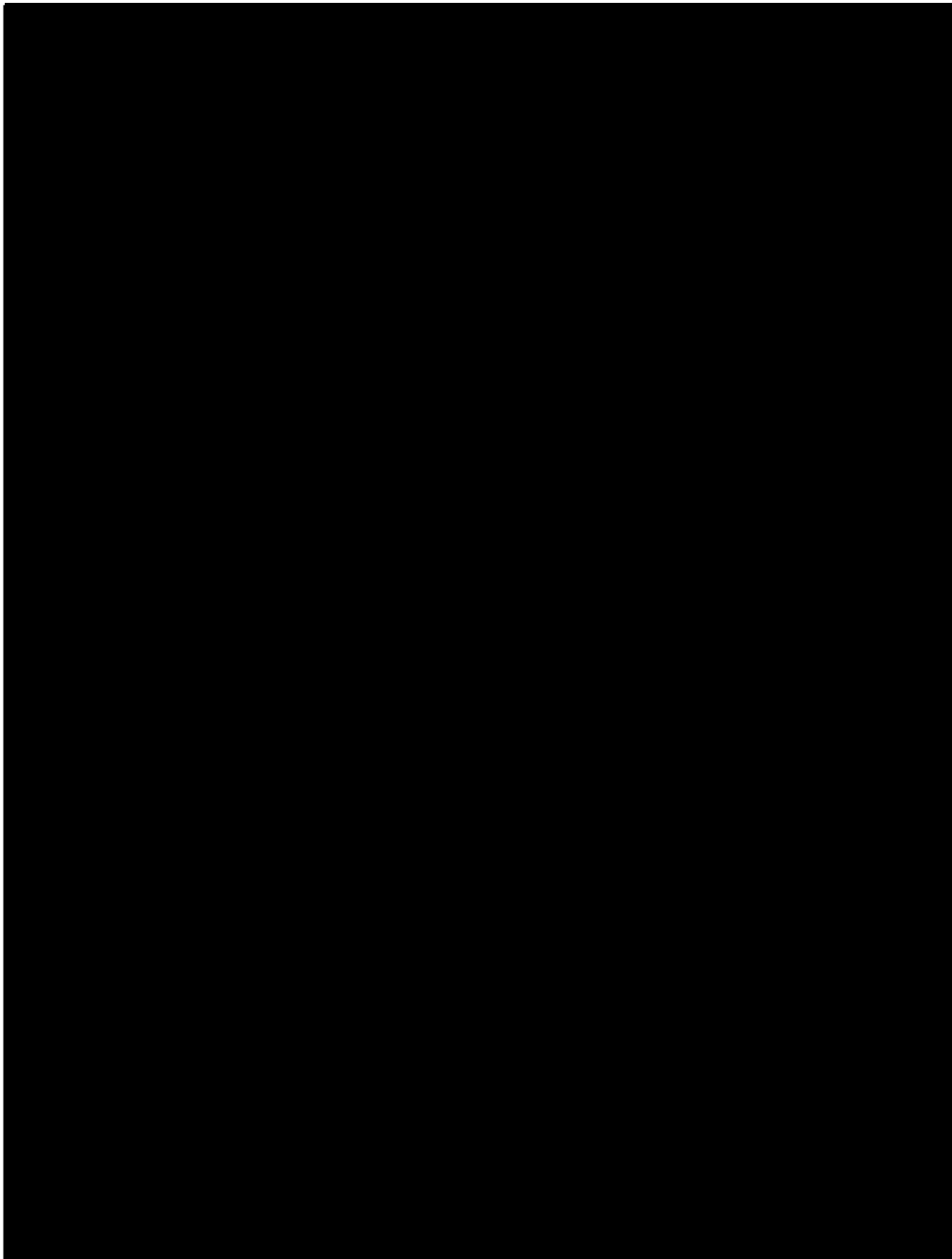
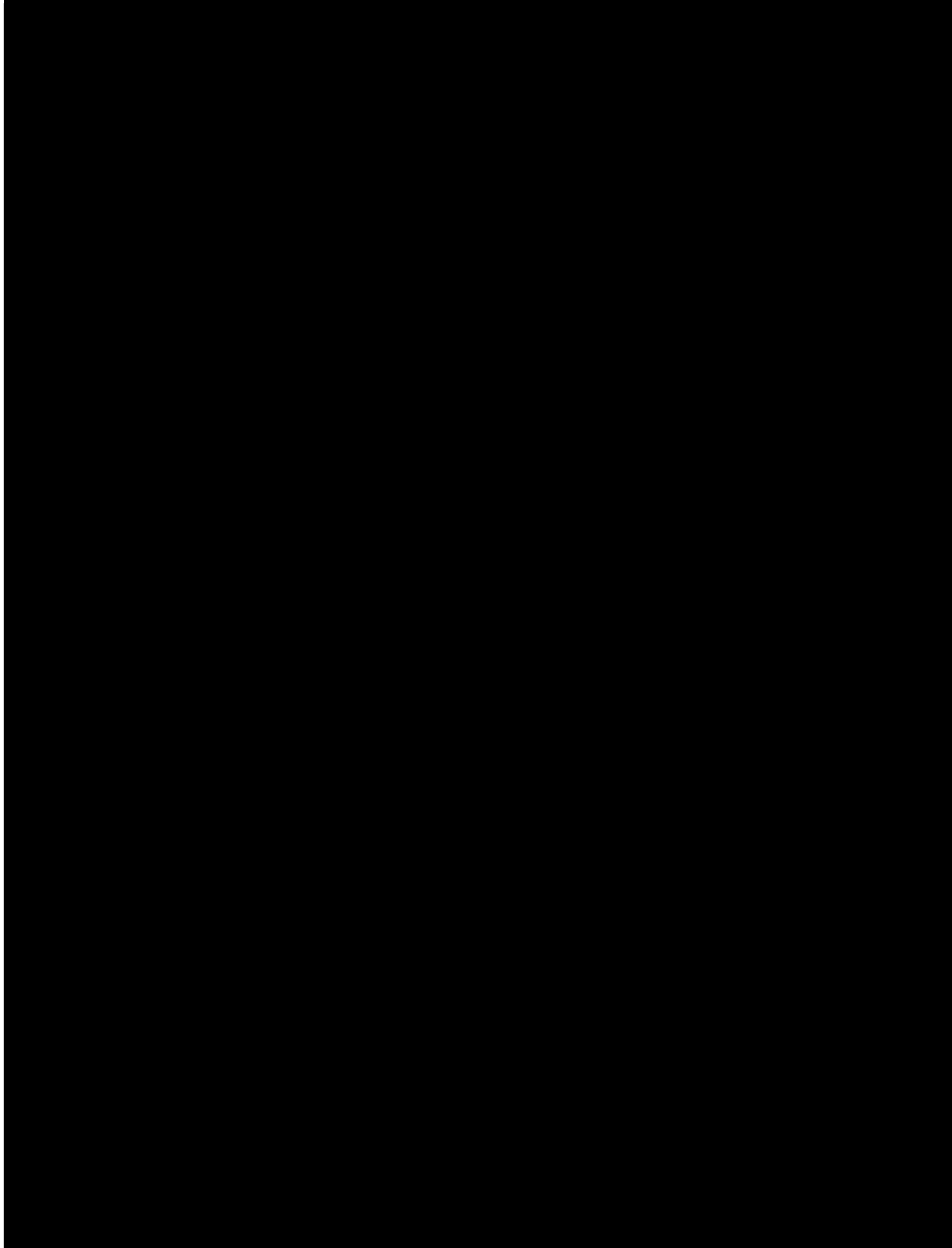




Figure 3.4-9: Pleasant Run Creek Maternity Colony Connectivity





3.4.3 Water Resources

Wetlands and Ponds

The I-69 Section 6 Tier 2 DEIS discusses wetlands and ponds in Section 5.19. Wetlands and wetland complexes will be avoided when possible. If unable to be avoided completely, wetland impacts will be minimized by shifts in the alignment wherever practicable and feasible in final design. A firm commitment was made that wetlands and other water resources will be actively avoided wherever practicable and feasible throughout the final design of the I-69 Section 6 roadway. All water resource areas within the right of way will be identified on the design plans and these areas will have erosion control measures as approved by IDEM as part of the overall erosion control plan for the roadway project to prevent any filling or contamination of these areas during construction of the I-69 Section 6 project.

Wetlands

The refined preferred alternative impacts 1.90 acres of emergent wetlands, 0.39 acres of scrub-shrub wetlands, 1.70 acres of forested wetlands, and 2.78 acres of open water, both palustrine and lacustrine. The refined preferred alternative would impact 6.77 acres of wetlands, including open water. Appendix F contains a summary of wetland impacts for all sections of I-69.

Maternity Colony Wetland Impacts

Wetlands in four Indiana bat maternity colony circles will be impacted by the I-69 Section 6 project. **Table 3.4-6** shows impacts to wetlands in the maternity colonies. Tier 2 DEIS wetlands were used for these calculations. Tier 2 DEIS wetlands include field verified wetland impacts within the right of way and field survey study area, and National Wetland Inventory (NWI) data current to May 2014 for areas outside the right of way and field survey study area. The Tier 1 information impacts are also provided for comparison purposes. The Tier 1 information is shown in grey text and referred to as the Representative Alternative (RA).

The Lambs Creek Maternity Colony has a total of 218 acres of emergent wetlands, 306 acres of forested wetlands, seven acres of scrub-shrub wetlands, and 291 acres of unconsolidated bottom wetlands. The refined preferred alternative will have no impacts to scrub-shrub or unconsolidated bottom wetlands in this colony. The refined preferred alternative will impact 0.2 acre of emergent wetlands and 0.3 acre of forested wetlands within the Lambs Creek Maternity Colony. Approximately 0.09% of the available emergent wetland and 0.1% of the available forested wetlands within the Lambs Creek Maternity Colony will be impacted by the refined preferred alternative.

The Clear Creek Maternity Colony has a total of seven acres of aquatic bed wetlands, 133 acres of emergent wetlands, 429 acres of forested wetlands, five acres of scrub-shrub wetlands, and 366 acres of unconsolidated bottom wetlands. The refined preferred alternative will have no impacts to aquatic bed or scrub-shrub wetlands in this colony. The refined preferred alternative



will impact 0.8 acre of emergent wetlands, 1.2 acres of forested wetlands, and 0.7 acre of unconsolidated bottom wetlands within the Clear Creek Maternity Colony. Approximately 0.6% of the available emergent wetlands, 0.3% of the available forested wetlands, and 0.2% of the unconsolidated bottom wetlands within the Clear Creek Maternity Colony will be impacted by the refined preferred alternative.

The Crooked Creek Maternity Colony has a total of 29 acres of emergent wetlands, 460 acres of forested wetlands, 0.2 acre of scrub-shrub wetlands, and 158 acres of unconsolidated bottom wetlands. The refined preferred alternative will have no impacts to scrub-shrub or unconsolidated bottom wetlands in this colony. The refined preferred alternative will impact 0.7 acre of emergent wetlands and 0.3 acre of forested wetlands within the Crooked Creek Maternity Colony. Approximately 2.4% of the available emergent wetlands and 0.07% of the available forested wetlands within the Crooked Creek Maternity Colony will be impacted by the refined preferred alternative.

The Pleasant Run Creek Maternity Colony has a total of 31 acres of emergent wetlands, 622 acres of forested wetlands, 15 acres of scrub-shrub wetlands, and 369 acres of unconsolidated bottom wetlands. The refined preferred alternative will have no impacts to emergent wetlands, forested wetlands or scrub-shrub wetlands in this colony. The refined preferred alternative will impact 0.6 acre of unconsolidated bottom wetlands within the Pleasant Run Creek Maternity Colony. Approximately 0.2% of the available unconsolidated bottom wetlands within the Pleasant Run Creek Maternity Colony will be impacted by the refined preferred alternative.

Table 3.4-6: Wetlands and Ponds Direct Impacts in the Maternity Colonies

Lambs Creek Maternity Colony				
Lambs Creek Maternity Colony Use Area (acres)	12,566			
	No Build ¹	Impacts		RPA ³ Remaining
		RA ²	RPA ³	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	218	0.5	0.2	218
Forested Wetlands (PFO)	306	1.3	0.3	306
Scrub-Shrub Wetlands (PSS)	7	0	0	7
Open Water Ponds (PUB/L1UB))	291	0	0	291
Clear Creek Maternity Colony				
Clear Creek Maternity Colony Use Area (acres)	12,566			
	No Build ¹	Impacts		RPA ³ Remaining
		RA ²	RPA ³	



Aquatic Bed (PAB)	7	0	0	7
Emergent Wetlands (PEM)	133	5	0.8	132
Forested Wetlands (PFO)	429	2.6	1.2	428
Scrub-Shrub Wetlands (PSS)	5	0	0	5
Open Water Ponds (PUB/L1UB)	366	3.3	0.7	365
Crooked Creek Maternity Colony				
Crooked Creek Maternity Colony Use Area (acres)	12,566			
	No Build¹	Impacts		RPA³ Remaining
		RA²	RPA³	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	29	1.6	0.7	28
Forested Wetlands (PFO)	460	1.8	0.3	460
Scrub-Shrub Wetlands (PSS)	0.2	0.1	0	0
Open Water Ponds (PUB/L1UB)	158	3.5	0	158
Pleasant Run Creek Maternity Colony				
Pleasant Run Creek Maternity Colony Use Area (acres)	12,566			
	No Build¹	Impacts		RPA³ Remaining
		RA²	RPA³	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	31	0	0	31
Forested Wetlands (PFO)	622	0.4	0	622
Scrub/Shrub Wetlands (PSS)	15	0	0	15
Open Water Ponds (PUB/L1UB)	369	0.3	0.6	368
Colony Overlap				
Clear Creek and Crooked Creek Maternity Colony Overlap (acres)	600			
	No Build¹	Impacts		RPA³ Remaining
		RPA³		
Aquatic Bed (PAB)	0	0		0



Emergent Wetlands (PEM)	3	0.1	3
Forested Wetlands (PFO)	40	0	40
Scrub-Shrub Wetlands (PSS)	0	0	0
Open Water Ponds (PUB/L1UB)	0	0	0
Maternity Colonies Total			
Maternity Colonies Area (acres)	49,664		
	No Build¹	Impacts	RPA³ Remaining
		RPA³	
Aquatic Bed (PAB)	7	0	7
Emergent Wetlands (PEM)	408	1.6	406
Forested Wetlands (PFO)	1,777	1.8	1,775
Scrub-Shrub Wetlands (PSS)	27.2	0	27
Open Water Ponds (PUB/PAB)	1,184	1.3	1,183

1. Acres calculated using Tier 2 wetlands. These are made from NWI wetlands (2014) outside the right of way and field survey study area. Inside the right of way and field survey study area, acres were calculated using field verified wetlands

2. RA = Representative Alignment (Tier 1 BA Addendum). Impacts based on revised NWI (2014) and Section 6 EIS delineations.

3. RPA = Refined Preferred Alternative (New Information) Impacts were calculated from Section 6 EIS delineations.

In the 600-acre colony overlap between Clear Creek and Crooked Creek Maternity Colonies, there are three acres for emergent wetlands and 40 acres of forested wetlands. The refined preferred alternative will impact 0.1 acre of the emergent wetlands within the Clear Creek and Crooked Creek Maternity Colonies overlap area. Approximately 3.3% of the available emergent wetlands within the Clear Creek and Crooked Creek Maternity Colonies overlap area will be impacted by the refined preferred alternative.

Remaining Summer Action Area Wetland Impacts

There are 2.2 acres of wetland impacts in the RSAA. The RSAA has a total of six acres of aquatic bed wetlands, 242 acres of emergent wetlands, 758 acres of forested wetlands, 13 acres of scrub-shrub wetlands, and 2,177 acres of unconsolidated bottom wetlands available. The refined preferred alternative will have no impacts to aquatic bed wetlands or forested wetlands in the RSAA. The refined preferred alternative will impact 0.3 acre of emergent wetlands, 0.4 acre of scrub-shrub wetlands, and 1.5 acres of unconsolidated bottom wetlands located within the RSAA. Approximately 0.1% of the available emergent wetlands, 3.1% of the available scrub-shrub wetlands, and 0.07% of the available unconsolidated bottom wetlands within the RSAA



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will be impacted by the refined preferred alternative. Table 3.4-7 summarizes wetland impacts in the RSAA.

Table 3.4-7: Wetlands and Ponds Direct Impacts in the Remaining Summer Action Area

Section 6 Remaining Summer Action Area				
Tier 1 Remaining Summer Action Area (acres)	55,693			
Tier 2 Remaining Summer Action Area (acres)	88,938			
	No Build	Impacts		RPA Remaining ²
		RA ¹	RPA ²	
Aquatic Bed (PAB) (acres)	6 ³	0 ⁴	0 ⁵	6
Emergent Wetlands (PEM) (acres)	242 ³	0.7 ⁴	0.3 ⁵	242
Forested Wetlands (PFO) (acres)	758 ³	2.5 ⁴	0 ⁵	758
Scrub-Shrub Wetlands (PSS) (acres)	13 ³	0.2 ⁴	0.4 ⁵	13
Open Water Ponds (PUB/PAB) (acres)	2,177 ³	32.8 ⁴	1.5 ⁵	2,175

1. RA = Representative Alignment (Tier 1 BA Addendum)
2. RPA = Refined Preferred Alternative (New Information) Losses were calculated from EIS delineations.
3. Acres calculated using Tier 2 wetlands. These were developed using NWI wetlands outside the right of way. Inside the right of way, acres were calculated using field verified wetlands. These acreages are not comparable to previous documents due to updated NWI data and field delineation data.
4. Impacts for the Representative Alignment were calculated from field verified wetlands within the wetland study area and current NWI wetland data where outside of the field delineated wetland study area.
5. Impacts calculated from field verified wetlands.

Open Water, Streams, and Riparian Zone

As discussed above, there are approximately 166.8 acres of open water wetlands (PUB/L1UB) within the field survey study area. Seventeen open water wetlands will be affected by the project totaling 2.78 acres of impact.

Regarding stream impacts the I-69 Section 6 DEIS in Section 5.19 states:

A total of 275 stream segments, including existing culverts, were identified in the I-69 Section 6 field survey study area. QHEI or HHEI assessments were completed for potentially impacted segments, as appropriate. Concrete gutters and roadside ditches were assessed, but no assessments were completed for the bridged or culverted segments. Continuing coordination with the regulatory



agencies will occur to identify any mitigation requirements for these previously impacted resources (i.e., culverts, concrete gutters, or roadside ditches). At this time, it is anticipated that mitigation will not be required for these previously disturbed channels.

A single stream impact may have more than one stream assessment segment if the habitat along the length of the stream changes. A separate assessment was made for each reach of distinct habitat. Only one assessment segment was completed where the habitat did not differ along the entire impact length of the stream. If two or more alternatives cross a stream in the same location and the habitat was consistent throughout the stream reach, then only one assessment was made.

As the QHEI/HHEI scores indicate, approximately eight percent of streams crossed by the alternatives have at least moderate water quality. The White River was the only one of the 49 stream segments that had an excellent QHEI score. Twelve of the 133 (9 percent) stream segments evaluated using HHEI had scores in the highest quality category (Class III).

The refined preferred alternative crosses 47,253 linear feet of stream. The impacts are as follows:

- Perennial Streams – 16,944 linear feet in the right of way
- Intermittent Streams – 11,797 linear feet in the right of way
- Ephemeral Streams – 18,512 linear feet in the right of way
- Riparian Habitat – 40.47 acres

In some cases, maintaining water flow would require an alteration to the natural shape of the stream. Such alterations—which could include channel widening, enclosure, straightening and realignment, and bank shaping and stabilization—can produce the following impacts:

- Channel widening—Reduction in stream velocity allowing accumulation of sediments, or altering riffle-pool complexes.
- Channel enclosure (pipes/culverts)—Restriction of flow during peak flood events; accumulation of backwater; and/or disruption of the natural ecology of a water body by blocking sunlight, removing natural aquatic and wildlife habitat, and destroying bottom substrate important to macro-invertebrate communities.
- Channel realignment—By removing meanders, an increase in stream velocity and energy resulting in stream bank erosion, loss of stream bank vegetation, and destruction of riffle/pool complexes.
- Bank shaping and stabilization—Loss of habitat or bank-side vegetation.
- Placing bridge piers in a water body—Loss of habitat in the area of the piers.



Floodplains

The I-69 Section 6 DEIS discusses floodplains in Section 5.19. The I-69 Section 6 field survey study area crosses several 100-year floodplains. These mapped floodplains are located on Federal Emergency Management Agency's (FEMA) recently updated Flood Insurance Rate Map Numbers FIRM 18097C0228F, 18097C229F, 18097C0233F, 18097C0240G, 18081C0014D, 18081C105D, 18109C0170E, 18109C0165E, 18109C0280E, and 18109C0264E (White River); FIRM 18097C0240G (Buck Creek and Pleasant Run Creek); FIRM 18081C0105D (Honey Creek and Messersmith Ditch); FIRM 18081C0105D (North Bluff Creek); FIRM 18109C0170E (Crooked Creek); FIRM 18109C0165E and 18109C0280E (Stotts Creek); FIRM 18109C0280E (Clear Creek); FIRM 18109C0266E, 18109C0262E, 18109C0268E, and 18109C0264E (Indian Creek). It is difficult to precisely determine if these crossings shall be considered longitudinal or transverse because the floodplain is so broad across the I-69 Section 6 field survey study area.

The I-69 Section 6 refined preferred alternative impacts 458 acres of floodplains.

Roadway Runoff

The I-69 Section 6 Tier 2 DEIS discusses roadway runoff in Section 5.19.

Roadway runoff can have significant impacts to the water quality of receiving streams. Numerous contaminants can be found in roadway runoff. These contaminants include: particulates, nitrogen, phosphorus, metals, salts, petroleum, pesticides, PCBs, rubber, pathogenic bacteria, and asbestos. These contaminants originate through many sources. Some of the primary sources include: deicing chemicals, tire wear, wear of engine and other moving parts, exhaust, lubricant leaks and blow-by, roadside spraying, and precipitation. The build-up of deicing chemicals in the atmosphere is a primary concern. This is due to the seasonally large volumes of this contaminant. Salting of a highway in winter and drainage from the road could cause changes in stream water quality, especially those with little volume or flow. Salting of any road may lead to adverse effects for aquatic and terrestrial organisms.

A variety of environmental consequences have been associated with the use of deicing chemicals. Road salt 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. Excess salinity causes moisture stress in plants, suppresses proper nutrient uptake, and leads to deficiencies in plant nutrition. Deicing additives can contribute to eutrophication in wetlands and toxicity to its inhabitants.

Where appropriate, roadside ditches will be grass-lined and connected to filter strips and containment basins. Efforts will be made to minimize the amount of salt used on the bridges and roads to that which is necessary to maintain a safe



roadway. Alternative substances (e.g., sand) or low salt will be used as much as possible.

BMPs will be used to prevent non-point source pollution, to control storm water runoff, and to minimize sediment damage to water and aquatic habitats.

Hazardous Material Spill Response

The I-69 Section 6 Tier 2 DEIS discusses hazardous material spill responses in Section 5.19:

The release of hazardous materials into surface and subsurface waters from spills along highways is a concern both during and after construction. It is anticipated that the highway will be used by a large number of trucks transporting a wide variety of hazardous materials. The potential for hazardous material contamination of surface and subsurface waters exists for each I-69 Section 6 alternative.

During construction of I-69 Section 6, contractors will be required to provide a spill response plan. This response plan will include telephone numbers for emergency response personnel and copies of agreements with agencies that are part of the spill-response effort. Special measures including diversion of highway runoff from direct discharge from bridge decks into streams and containment basins to detain accidental spills, will be incorporated into final design plans for any structure located over a regulated waterway.

Following construction of I-69 Section 6, emergency spill response for hazardous materials transported on the highway will be handled by local fire departments and regional hazardous materials units coordinated through the deputy state fire marshals. If called upon, INDOT state highway equipment and resources can also be deployed to assist in containment anywhere along the proposed interstate facility.

The Indiana Emergency Response Commission has established 11 Regional Response Teams throughout the state which have full Level A hazardous materials response capabilities. Currently, the hazardous materials units of Bloomington Township and Marion County/Indianapolis are the regional units with Level A capabilities closest to I-69 Section 6. Evansville, Vincennes, Terre Haute, and Crane Naval Surface Warfare Center (NSWC) are the other regional units with Level A capabilities in the area. The I-69 Section 6 project will help accelerate emergency response to incidents on routes served by these units.

3.4.4 Noise

Highways are linear noise sources in which the tire/pavement contact, engine and exhaust generate sound at various pressures and frequencies. As a general rule, the reduction rate of 3



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decibels (dB) per distance doubling applies at a range of 50 to 350 feet from a highway. Under conditions where ground cover consists of tall grass or crops, the drop-off rate may be as much as 4.5 dB per distance doubling. Due to the logarithmic nature of sound propagation, a 3 dB reduction in sound pressure resulting from a doubling of distance (i.e., 350 feet doubled to 700 feet) from the source represents a 50% loss of acoustic energy, whereas a 10 dB reduction represents a 90% reduction of acoustic energy. In situations where point noise sources occur, such as construction equipment, the drop-off rate is generally 6 dB per distance doubling.

For interstates such as I-69, steady state A-weighted sound pressure levels of 66 dB or greater are anticipated at distances of 250 feet from the roadway and possibly as much as 350 to 400 feet from the roadway depending on the volume of traffic predicted for the design year. Levels will decrease with increased distance from the roadway. The construction of I-69 Section 6 will result in increased noise levels from the noise levels of the existing SR 37.

The noise levels of many common appliances and events are listed below for reference:

- Refrigerator 40-43 dBA
- Typical Living Room 40 dBA
- Forced Hot Air Heating System 40-52 dBA
- Normal Conversation 55-65 dBA
- Dishwasher 63-66 dBA
- Clothes Washer 65-70 dBA
- Telephone Ringing 66-75 dBA
- Inside Car-windows closed 30 mph 68-73 dBA
- Lawn Mower 88-94 dBA

As required by NEPA, noise studies were conducted for I-69 Section 6. The I-69 Section 6 Tier 2 DEIS discusses noise studies in Section 5.10. The existing measured L_{eq} noise levels within the project corridor ranged from 45.8 dBA at Site HS-2 to 70.1 dBA at Site FS-19.

It is unknown exactly how bats (including Indiana bats) perceive and react to noise levels, including the types of noises associated with highway construction and operation. However, we do know from studies in southwestern Indiana, that:

- Hundreds of bats (including Indiana bats) roost throughout the day and night under a bridge with an L_{eq} of 84.1 dBA;
- Twenty-three to 67 Indiana bats roosted in a tree approximately [redacted] to edge of pavement of the 4-lane [redacted] (with median) in 2004. The L_{eq} at that site has been measured at 59.8 dBA.
- A male Indiana bat left a roost tree and crossed over or under [redacted] near [redacted] in 2004. The L_{eq} under the bridge has been measured at 65.7 dBA.



- A juvenile male Indiana bat flew under the 4-lane [REDACTED] along [REDACTED] in 2004. The L_{eq} at that site has been measured at 67.4 dBA.
- Bats (including Indiana bats) fly over and under the 4-lane [REDACTED] (with median) near the [REDACTED]

While the perception of noise by bats is not clearly understood, the assessment of noise levels and impacts to human receptors has been evaluated in detail for Section 6 and the sound pressure represented by the noise level measurements and model predictions are directly comparable to the measured levels identified in the references listed above.

The receptor sites are classified into different categories based on the surrounding areas. Category A (exterior location) includes 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 for its intended purpose. Category B (exterior location) includes residential areas. Category C (exterior location) includes active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings. Category D (interior location) includes auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios. Category E (exterior location) includes hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F. Category F includes agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing. Category G includes undeveloped lands that are not permitted. **Figure 3.4-10** shows the location of all noise receptors used for the noise study of the refined preferred alternative.

Lambs Creek Maternity Colony

Within the Lambs Creek Maternity Colony, the Traffic Noise Model (TNM) 2.5 yielded existing L_{eq} levels between 44 dBA and 68 dBA for the 80 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the receptors between 50 dBA and 76 dBA. These receptors include a bowling alley, a hotel, an industrial property, a medical facility, a movie theater, office properties, restaurants, retail facilities, place of worship, school, and residential properties. These receptors are generally located north/west of SR 37 in Morgan County and are within about 520 feet from the I-69 Section 6 refined preferred alternative right of way. There are 19 impacted residential receptors, one school, one church, and two restaurant impacted receptors within the Lambs Creek colony. For the impacted receptors, the modeled existing L_{eq} ranges from 58 dBA to 68 dBA and the future 2045 modeled the refined preferred alternative noise level ranges from 66 dBA to 76 dBA. **Figure 3.4-11** shows noise location receptors in proximity of the Lambs Creek maternity colony.



Clear Creek Maternity Colony

Within the Clear Creek Maternity Colony, the TNM 2.5 yielded existing year L_{eq} levels between 41 dBA and 68 dBA for the 36 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the same receptors between 48 dBA and 75 dBA. These receptors include a golf course, an industrial property, places of worship, playgrounds and residential properties generally located along SR 37 in Morgan County and within about 450 feet from the I-69 Section 6 refined preferred alternative right of way. There are 15 impacted residential receptors within the Clear Creek Maternity Colony. For the impacted receptors, the modeled existing L_{eq} ranges from 58 dBA to 66 dBA and the future 2045 modeled the refined preferred alternative noise level ranges from 66 dBA to 74 dBA. **Figure 3.4-12** shows noise location receptors in proximity of the Clear Creek maternity colony.



Figure 3.4-10: Noise Receptor Location

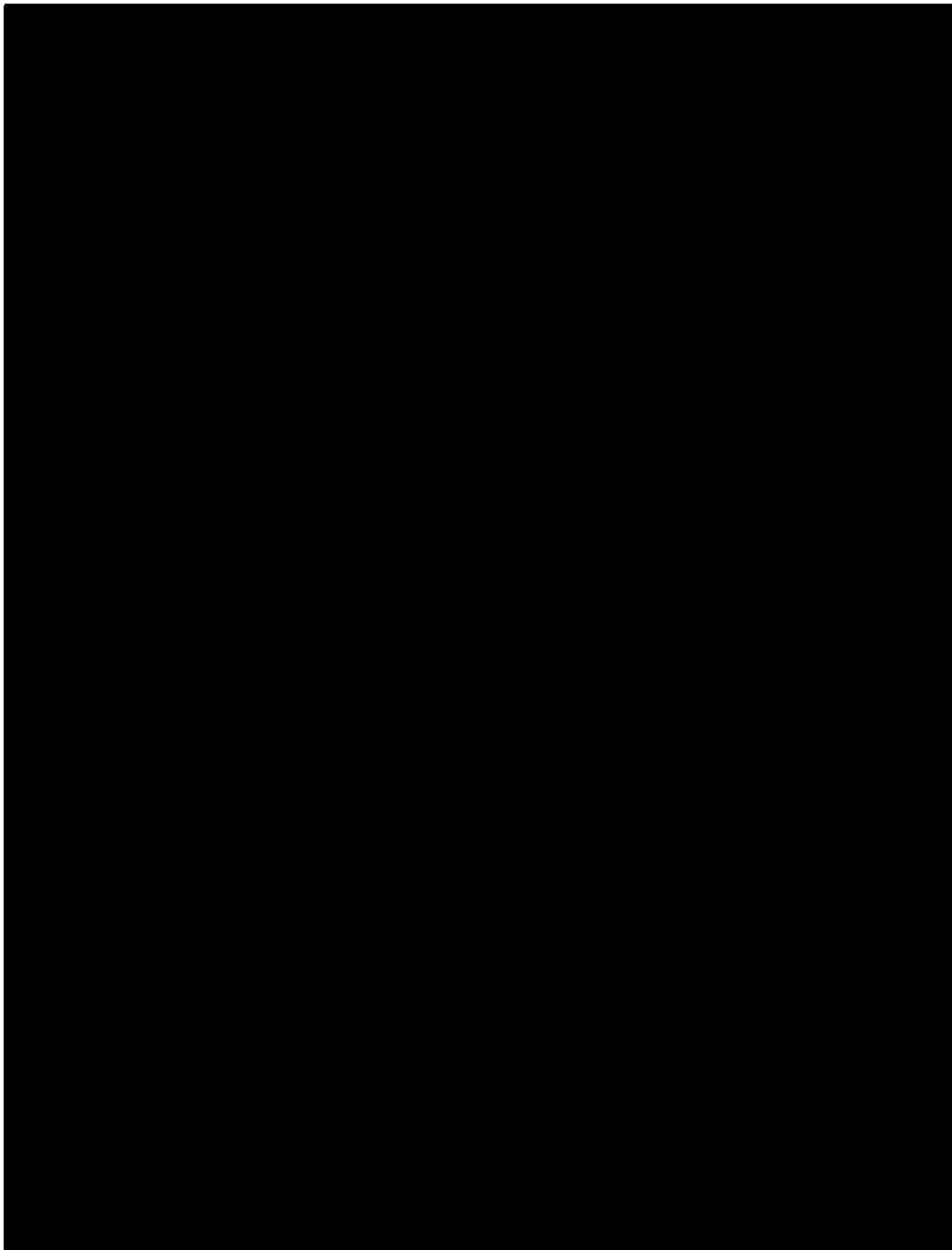




Figure 3.4-11: Noise Receptor Locations within the Lambs Creek Maternity Colony

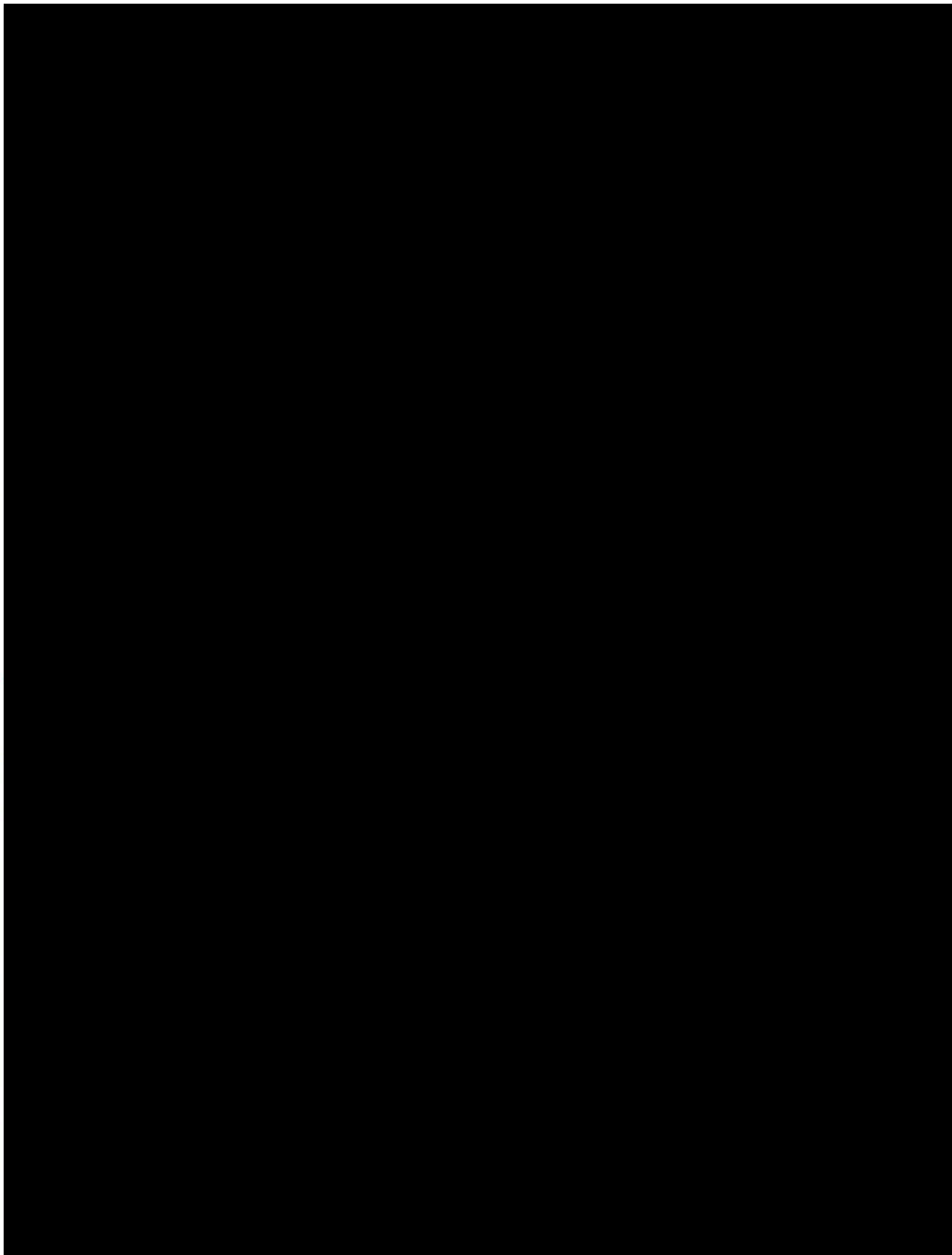




Figure 3.4-12: Noise Receptor Locations within the White River/Clear Creek Maternity Colony

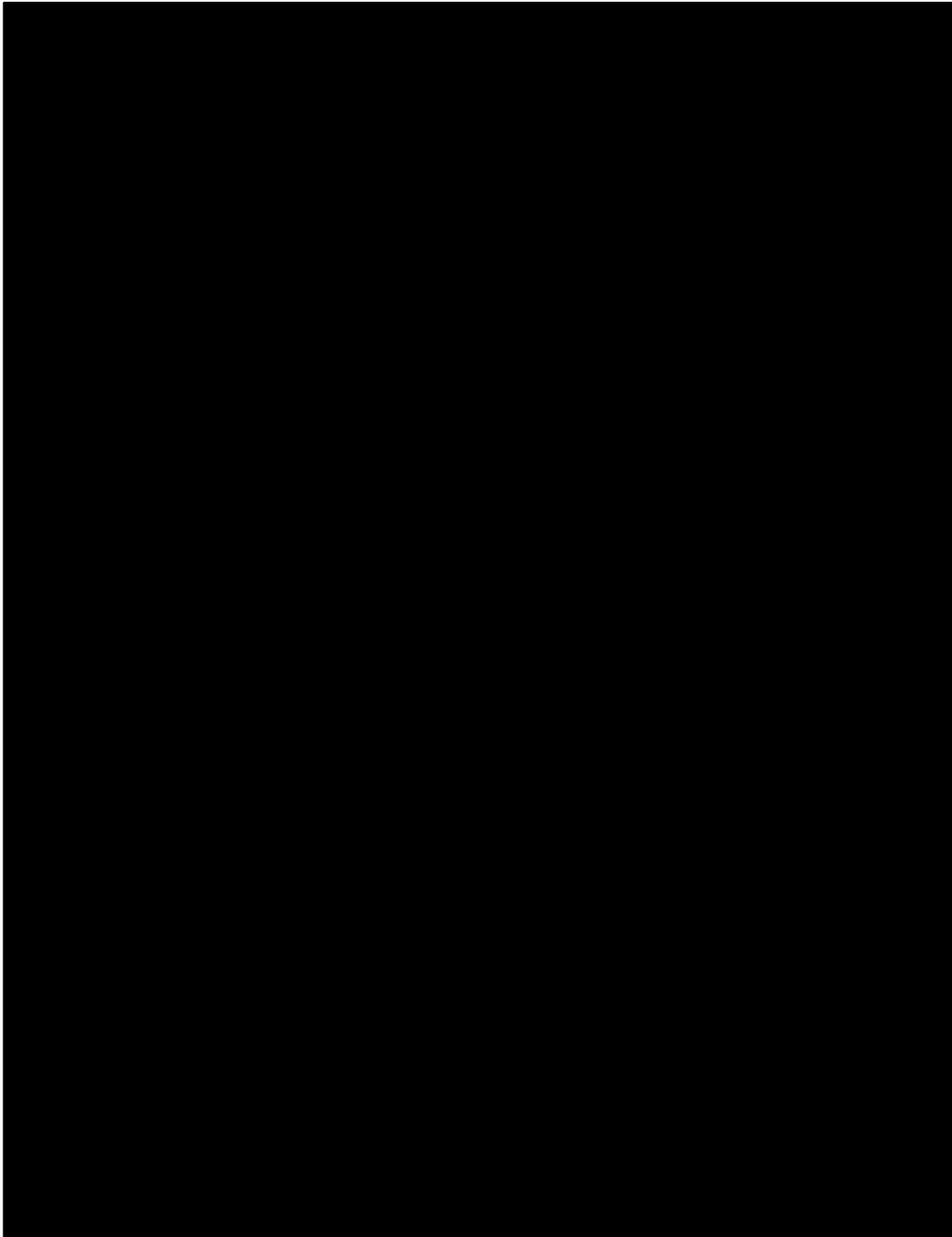




Figure 3.4-13: Noise Receptor Locations within the White River/Crooked Creek Maternity Colony

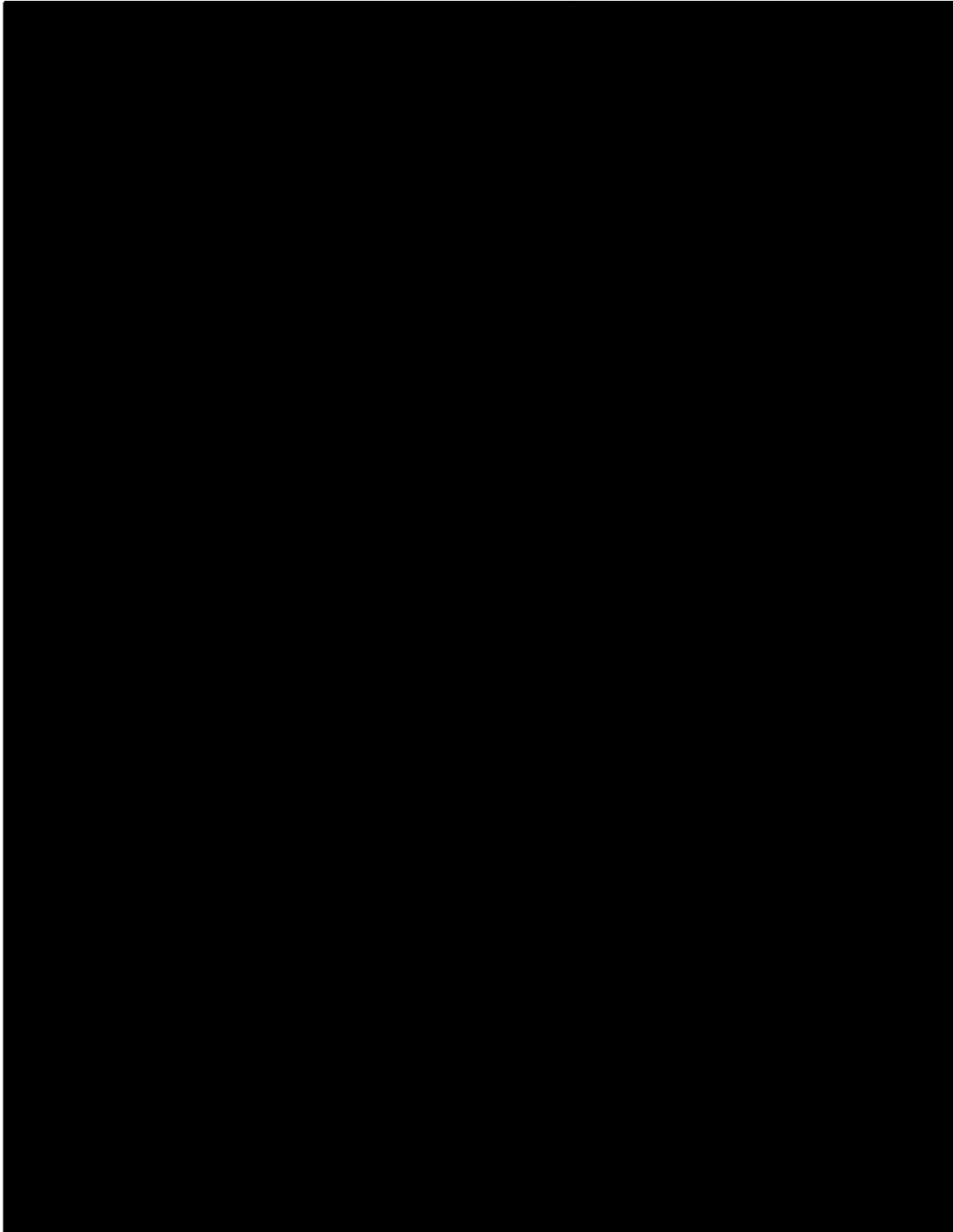
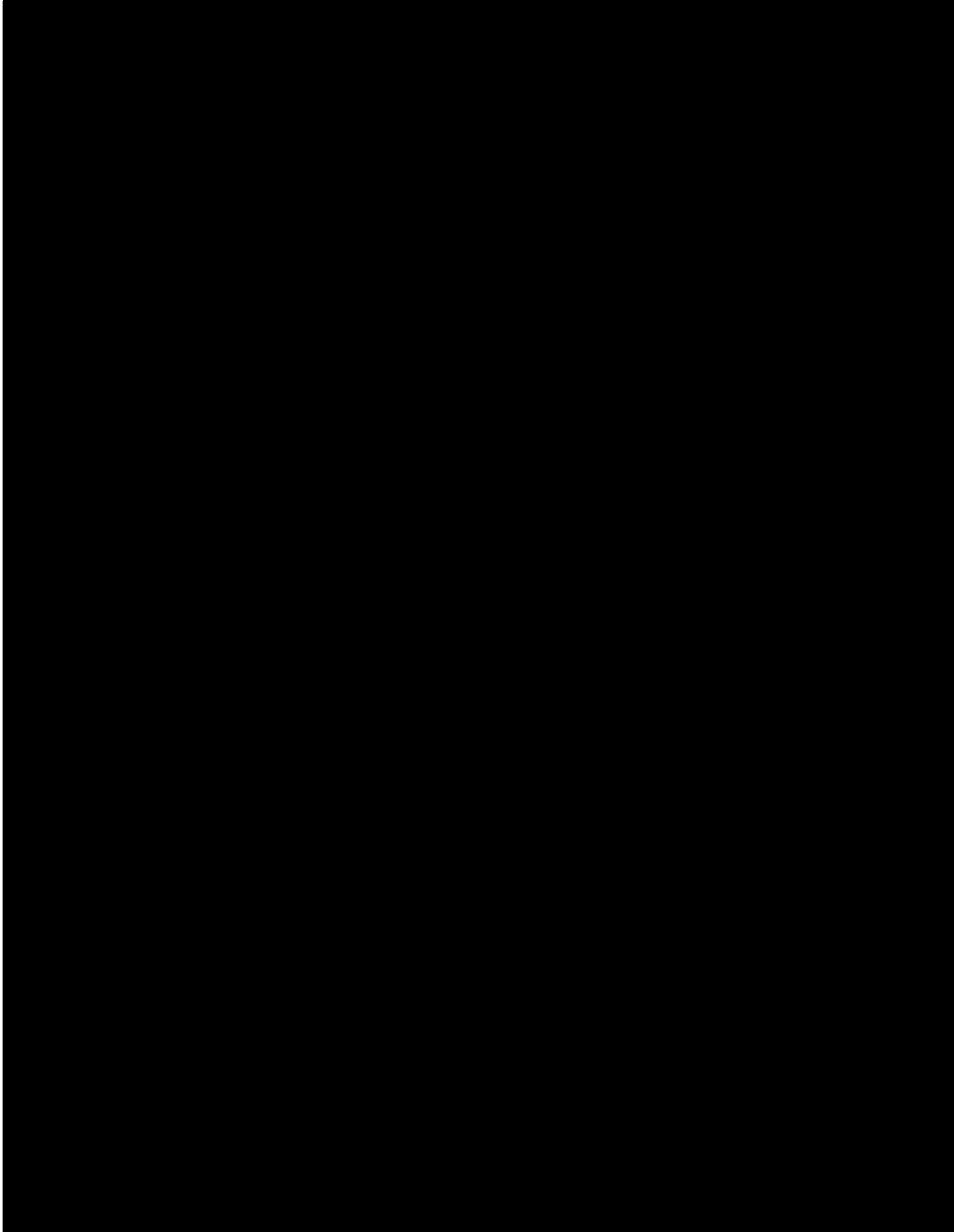




Figure 3.4-14: Noise Receptor Locations within the White River/Pleasant Run Creek Maternity Colony





Crooked Creek Maternity Colony

Within the Crooked Creek Maternity Colony, the TNM 2.5 yielded existing L_{eq} levels between 52 dBA and 66 dBA for the 24 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the receptors between 60 dBA and 74 dBA. These receptors include a historic residential property, an industrial property, a retail facility, and residential properties. These receptors are generally located along SR 37 in Morgan County and are within about 605 feet from the I-69 Section 6 refined preferred alternative right of way. There are 15 impacted residential receptors within the Crooked Creek Maternity Colony. For the impacted receptors, the modeled existing L_{eq} ranges from 58 dBA to 65 dBA and the future 2045 modeled refined preferred alternative noise level ranges from 66 dBA to 73 dBA. **Figure 3.4-13** shows noise location receptors in proximity of the Crooked Creek maternity colony.

Pleasant Run Creek Maternity Colony

Within the Pleasant Run Creek Maternity Colony, the TNM 2.5 yielded existing L_{eq} levels between 52 dBA and 68 dBA for the 105 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the receptors between 58 dBA and 76 dBA. These receptors include an active sport area, a day care center, historic residential properties, a medical facility, a restaurant, retail facilities, a utility property, and residential properties. These receptors are generally located along SR 37 in Johnson County and are within about 500 feet from the I-69 Section 6 refined preferred alternative right of way. There are 40 impacted residential receptors, an impacted day care center, and an impacted medical facility within the Pleasant Run Creek Maternity Colony. For the impacted receptors, the modeled existing L_{eq} ranges from 57 dBA to 68 dBA and the future 2045 modeled refined preferred alternative noise level ranges from 66 dBA to 76 dBA. **Figure 3.4-14** shows noise location receptors in proximity of the Pleasant Run Creek maternity colony.

Analysis

Noise impact assessment for bats is currently in its elementary stage of development. No protocol is available, and little is presently known regarding this issue. For this reason, noise data associated with human noise impact assessments are presented to document noise level changes associated with the project. A total of 244 noise receptors were located within the I-69 Section 6 Indiana bat maternity colonies. The INDOT Highway Traffic Noise Policy developed to analyze human noise impacts, defines “approach or exceed” to mean that future levels are higher than 1 dBA L_{eq} (h) below the appropriate NAC (for Category B, 1 dBA below the NAC is 66 dBA). “Substantially exceed” means the predicted traffic noise levels exceed existing noise levels by 15 dBA or more. Of the 244 receptors in the I-69 Section 6 Indiana bat maternity colonies, 94 exceed the applicable noise abatement criteria or substantially exceed the existing noise level for the design year refined preferred alternative (includes one impacted residential receptor within the overlap area of Clear Creek and Crooked Creek maternity colonies). The construction of I-69



will occur during daylight hours, and cause temporary noise impacts from chainsaws, bulldozers, skidders, trucks, etc.

It is possible that bats may roost adjacent to cleared right of way and be affected during the day by unusual and/or loud sounds. Indiana bats that were roosting under a bridge with noise levels at 84.1 dBA were not disturbed by the noise. The construction noise should not affect their foraging, because they forage in the evening when construction activities usually stop for the day. Possible loud noise effects could include an increase in their heart rate/respiratory rate and potential roost abandonment.

3.4.5 Lighting Impacts

At present, roadway lighting is anticipated at interchanges as well as along the mainline in highly developed areas. Lighting at all interchanges will be evaluated, and will be included if warranted for safety reasons. Any lights installed will be approximately 40 feet above the highway and would be non-diffuse. The tallest vehicles expected to be traveling on I-69 would be between 15 - 18 feet tall. This would leave 22 - 25 feet of open space for bats that are drawn to the lights to forage on insects. Based on this, the incidental take will be within the anticipated amounts in the Tier 1 Revised BO as amended.

3.4.6 Vibration Impacts

Vibration impacts from I-69 Section 6 are not anticipated since they would be applicable only on bridges with roosting bats and in trees with high noise levels. A survey of 259 bridges for the Indiana bat in 2004, showed only one bridge with roosting Indiana bats. That bridge, located within Section 3, was the only bridge that showed the large size, height, concrete beams with cracks near the ceiling, and reduced light illumination characteristic of suitable roosting bridge habitat. Hundreds of bats use this bridge during the early spring to late fall each year, and when trucks and cars travel overhead, vibration from the traffic occurs on these beams. Placing one's hand next to these bats when these short vibrations occur showed these bats seemingly unaffected by these short vibrations and number of occurrences. Every day loud noise events under the bridge did not seem to affect these bats; however, on rare incidents when abnormally different vibration events happened, bats did fly but immediately settled back to roost. Based on behavior observed at bridges with roosting bats, it is likely that bats roosting in I-69 bridges will not be adversely affected by vibrations caused by vehicles using the bridges.

3.4.7 Borrow Sites/ Waste Disposal

The locations of borrow and waste disposal sites will not be known until the project is let for construction. Contractors are required to follow safeguards established in INDOT Standard Specifications Section 203.08, entitled "Borrow or Disposal". Best Management Practices (BMPs) will be used in the construction of this project to minimize impacts related to borrow and



waste disposal activities. Solid waste generated by clearing and grubbing, demolition or other construction practices will be removed from the location and properly disposed.

Prior to their use, borrow sites will be assessed for impacts to resources such as archaeological resources, wetlands, and/or waters of the U.S., and appropriate measures will be taken to avoid or mitigate impacts to these resources. Tree clearing for borrow areas will be restricted to the approved USFWS clearing dates (no trees with a diameter of three or more inches will be removed April 1 through September 30 in the SAA to avoid any impacts to Indiana bats.

3.4.8 Maintenance Practices

It is not anticipated that maintenance practices will negatively affect the Indiana bat. In regards to herbicide use, a commitment has been made to minimize the use of herbicides in environmentally sensitive areas. An herbicide use plan will be developed for environmentally sensitive areas.

3.5 Indirect Impacts

With induced housing and employment combined, approximately 336 acres are reasonably foreseeable to be developed because of induced growth from the proposed interstate within the TAZs associated with I-69 Section 6.

- The combined anticipated induced number of households for Hendricks County is 100 for the design year of 2045. When divided by 4.38 housing units per acre; the result is 22.8 acres impacted. The combined anticipated induced number of jobs for Hendricks County is 117 for the design year of 2045. When divided by 14.6 employees per acre, the result is 8.0 acres impacted.
- The combined anticipated induced number of households for Johnson County is 156 for the design year of 2045. When divided by 4.38 housing units per acre, the result is 35.5 acres impacted. The combined anticipated induced number of jobs for Johnson County is 243 for the design year of 2045. When divided by 14.6 employees per acre, the result is 16.5 acres impacted.
- The combined anticipated induced number of households for Marion County is 312 for the design year of 2045. When divided by 4.38 housing units per acre, the result is 71.3 acres impacted. The combined anticipated induced number of jobs for Marion County is 605 for the design year of 2045. When divided by 14.6 employees per acre, the result is 41.5 acres impacted.
- The combined anticipated induced number of households for Morgan County is 379 for the design year of 2045. When divided by 4.38 housing units per acre, the result is 86.6 acres impacted. The combined anticipated induced number of jobs for Morgan County is



783 for the design year of 2045. When divided by 14.6 employees per acre, the result is 53.5 acres impacted.¹⁹

This results in impacts to 31 acres in Hendricks County, 52 acres in Johnson County, 113 acres in Marion County and 140 acres in Morgan County.

According to the Tier 2 I-69 Section 6 DEIS in Section 5.24:

Review of existing data, mapping, and local coordination indicates that streams and wetlands account for a smaller acreage than the agricultural land or forests in any given induced growth TAZ. An induced growth TAZ is a TAZ with growth caused by I-69 Section 6 that exceeds the year 2045 no-build growth. Ratios of available agricultural and forest land within TAZs with induced growth were used to estimate induced growth trends in each county in the study area.

Table 3.5-1: Percentages to Apply Growth to Non-Developed Land

County	Agricultural Land	Forest Land
Hendricks	80%	20%
Johnson	85%	15%
Marion	90%	10%
Morgan	60%	40%

Table 3.5-1 shows the percentages that were used for estimating impacts of induced growth to agricultural and forest land. These percentages are applied where growth is expected to occur on non-developed land, as described below. Due to the developed land uses along the corridor, it is assumed that a portion of the induced development would result in higher densities on already developed land. The remaining acres of induced growth would result in the conversion of farmlands and forests to housing units and employment areas. The percentages above would only be applied to those acreages where there are available farmlands and forest to convert.

¹⁹ I-69 Section 6 Tier 2 DEIS, Section 5.24.3 “Analysis”. Table 5.24-4: Induced Land Use Changes by Alternative.



Analysis Methods and Results

The I-69 Section 6 DEIS discusses the analysis methods and results in Section 5.24:

To estimate indirect impacts to land use, the following nine-step process was used. This process was developed in Tier 2, Section 1, and used in previous Tier 2 EISs:

Step 1A: Obtain the economic forecasts for 2045 from the TREDIS²⁰ analysis. This provides the induced or indirect growth resulting from I-69 for the forecast year for I-69 Section 6.

Prior to determining the magnitude and significance of the cumulative effects in I-69 Section 6, an analysis was completed which provided anticipated land use changes in the I-69 Section 6 study area. See Appendix Y for information regarding the TREDIS analysis performed for I-69 Section 6.

Several land use scenarios were identified by reviewing the TAZ data estimates for the no-build scenario and for the four build alternatives. Forecasts from the TREDIS economic model were used to forecast increases in jobs and households resulting from economic growth. These increases were then assumed to result in impacts.

Maps of TAZs within Hendricks, Johnson, Marion and Morgan counties were used to identify where project-induced land use changes would be expected to occur. The number of new houses and new jobs for the year 2045 were forecasted for the no-build scenario and for the four build alternatives. Induced growth is anticipated where the number of houses or jobs for the build alternatives is higher than for the no-build scenario.

As expected, the build alternatives were found to result in more employment and housing than the no-build scenario for the four-county area. The TREDIS forecasts indicated that building I-69 Section 6 would induce 785 new housing units and 1,347 new jobs within the four-county geographic scope of the I-69 Section 6 project. Figures 5.24-1 and 5.24-2 show the location of the TAZs with predicted growth in the no-build scenario. Figure 5.24-3 through Figure 5.24-6

²⁰ TREDIS (www.tredis.com) is an economic model which is computerized representation of the economy of a region. It models the interaction of components such as labor, capital, markets, and government policy. It provides benefit-cost analysis, economic impact analysis, and financial impact analysis for transportation planning. It is used in this study to evaluate alternatives' relative performance on purpose and need indicators. It also provides forecasts of added households and employment that occur due to the I-69 Section 6 project.



show the location of predicted growth in the build scenario for the four-county study area.

Step 1B: Allocate the induced growth to individual counties.

TREDIS forecasted an increased number of jobs and housing units for the four-county area for the year 2045 (build and no-build), as described in the previous step. These forecasts were allocated to each of the four counties, as follows:

- 382 jobs and 217 housing units within Morgan County²¹
- 243 jobs and 156 housing units within Johnson County
- 117 jobs and 100 housing units in Hendricks County
- 605 jobs and 312 housing units within Marion County

²¹ In Morgan County only, the land use panel reallocated no-build growth to other TAZs in the build scenario. The induced households and jobs for Morgan County shown here represent the net increase in the build scenario over the no-build scenario. Table 5.24-4 shows all TAZs where there is more growth in the build scenario than in the no-build. For this reason, the total induced households and jobs in Morgan County shown in Table 5.24-4 are greater than these shown here. All calculations of cumulative effects (as shown in Table 5.24-8, Table 5.24-9 and Table 5.24-10) use the net induced households and jobs shown here.



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Consultant staff used a manual allocation process²² to provide induced employment and population growth forecasts for each county using forecasts for the four-county region. Allocation percentages for each county were based on both land use and transportation factors. The land use factors consider the baseline growth forecasts (2010-2045) as well as the total 2045 no-build employment and households within each county. Both serve as proxies for the economic activity occurring within each county. The transportation factors are represented by the number of I-69 Section 6 vehicle miles traveled (VMT) forecasted within Marion, Johnson, and Morgan counties (Hendricks County has no VMT on I-69). This VMT measure represents the use and geographic proximity to I-69 Section 6.

These forecasts of induced jobs and housing units at the county level reflect only the induced growth effects I-69 Section 6. The effects of induced jobs and housing units due to the completion of Sections 1 through 5 of I-69 are included in the estimates of no build growth.²³ These forecasts are shown in Figure 5.24-1 and 5.24-2

Step 1C: Meet with the Land Use Panel to determine the location and comparative order of magnitude of growth by TAZ.

Estimating indirect impacts relied upon input from a Land Use Panel assembled for I-69 Section 6. According to a United States Department of Transportation (USDOT) report,²⁴ “Expert panels can be a very effective way to organize input and gain general consensus on the range of impacts that might be expected. The use of expert panels seems to be an effective way to determine what is ‘reasonably foreseeable’ since it utilized the judgments of reasonable people.”

²² This allocation process was determined in consultation with TREDIS technical staff.

²³ The sources of the No Build forecasts (Indiana Business Research Center and Woods/Poole) considered broad regional economic trends in influences in making these forecasts of county-level growth. The technical tools and land use panels which allocated these county-level forecasts to individual TAZs took into account significant local undertakings (such as the completion of Sections 1 through 5 of I-69).

²⁴ “Environmental Stewardship and Transportation Infrastructure Project Review: Executive Order 13274 Indirect and Cumulative Impacts Work Group Draft Baseline Report.” ICF Consulting for USDOT. March 15, 2005.



The I-69 Section 6 Land Use Panel included representatives from Indianapolis Department of Metropolitan Development, Develop Indy, Mooresville Redevelopment Commission, Morgan County Planning and Zoning, Johnson County Planning and Zoning, Indianapolis Metropolitan Planning Organization (MPO), Morgan County Economic Development Corporation, Johnson County Economic Development Corporation, Hendricks County Planning and Zoning, Mid-Indiana Board of Realtors (MIBOR), and Bargersville Planning and Development. See Chapter 11 - Comments, Coordination and Public Involvement.

The Land Use Panel was first convened in September 2015²⁵ to review the 2045 employment and household forecasts no-build scenario. A second Land Use Panel meeting was held in February 2016 to review the no-build re-allocation and to distribute the 2045 employment and household allocations totals for the build alternatives.

In both of the meetings described above, the Land Use Panel, they provided guidance about the potential for I-69 Section 6 to influence the location and intensity of future growth in the study area. The panel identified those TAZs that they felt would be most likely to experience induced growth with the new interchanges to be provided by I-69 Section 6. They determined that indirect impacts would differ among alternatives based on different interchange locations. Minutes of the meetings with the Land Use Panel are included in Appendix Y.

Step 1D: Using these growth guidelines from the Land Use panel, allocate the induced growth for the counties to individual TAZs in proportion to the relative order of magnitude established by the panel.

The Land Use Panel focused on TAZs within the four counties to determine the level of growth that can be expected within each TAZ. The panels then allocated the anticipated induced growth in housing units and employment into each TAZ, as shown in Table 5.24-4 and Figure 5.24-3.

Steps 1E and 1F: Determine any shifts in development resulting from accessibility changes as a result of interchanges. Allocate any shifts in development to the TAZs; and, determine a value for I-69-induced growth and growth from employment shifts resulting from changes in accessibility for each TAZ.

Shifts in employment resulting from accessibility changes are anticipated in the induced growth TAZs surrounding the new interchanges. For example, shifting

²⁵ Land Use Panels met for I-69 Section 6 in 2005. Given the passage of time between then and the resumption of I-69 Section 6 studies in late 2014, the Land Use Panel process was restarted and the previous Land Use Panel's findings were not considered in this effort.

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may occur as a result of new businesses such as medical, science and technology, engineering, manufacturing, assembly, distribution, gas stations, hotels, and restaurants which may choose to locate at these interchanges creating new jobs in the area. The Land Use Panel in Morgan County also determined that some of the no-build growth in Morgan County would shift due to the added accessibility of I-69 Section 6. The panel determined that this would result in the shift of 400 employees for the preferred alternative. The panel also determined that 160 housing units would shift. The effects of these shifts in growth are reflected in the TAZ induced growth in Table 5.24-4 and Figure 5.24-3 through Figure 5.24-6.

Step 1G: Convert the growth into acres of developed land uses based on values from “Trip Generation – 6th Edition” from the Institute of Transportation Engineers (ITE), 1997.

The number of induced housing and new jobs was converted to acres of induced new development based on the following assumptions:

Since Tier 1, the economic analysis determined that within Hendricks, Johnson, Marion and Morgan counties the average number of dwelling units per acre was 4.38. This estimate was based on a combination of three single-family dwelling units per acre and seven multi-family units per acre, weighted by the percent of single-family verses multi-family units. This estimate was recently reconfirmed and is used in this analysis.

The Tier 1 economic analysis determined that within the counties of Hendricks, Johnson, Marion and Morgan, the average number of jobs per acre was 14.6. The Tier 1 economic analysis for jobs was based on a weighted average of the standard employees per acre by employment type. The data for employees per acre, per employment type were developed from the ITE Trip Generation Manual 6th Edition,²⁶ and are as follows: 18.5 employees per acre for Durable Manufacturing and Non-Durable Manufacturing jobs; 8.2 employees per acre for Mining, Construction, Transportation Public & Utilities, and Agricultural Service jobs; 55.8 employees per acre for Finance, Insurance, Real Estate, and Services jobs; 8.7 employees per acre Retail Trade jobs; and 14.7 employees per acre for Wholesale Trade jobs.

The forecasted 947 new housing units in I-69 Section 6 for the preferred alternative would require conversion of 216.2 acres, and the forecasted 1,748 jobs would require conversion of 119.5 acres. Combined, a total of 335.7 acres of indirect land use changes are anticipated to occur as a result of the preferred

²⁶ These ratios were confirmed using the most recent (9th Edition, 2012) of the ITE Trip Generation Manual.



alternative. The geographic scope of the cumulative impact analysis for I-69 Section 6 overlaps with that of adjacent Section 5 of I-69. As a result, some cumulative impacts would be counted in both Tier 2 EISs.

Step 1H: Determine which resources will be impacted by these changes in land use in each TAZ.

Farmland, forest, streams and wetlands are the principal resources that the project's indirect land use changes would potentially affect. I-69 Section 6 is more developed than Sections 1 through 4, where it was determined that all induced growth would occur on farmland or forests. Long-term development patterns (in particular, where and how development occurs) would be similar to the more developed Section 5. Due to the existing development patterns, the amount of "available" farmland or forest is limited in some TAZs, and induced growth would result in some higher densities on already developed lands. A conservative estimate of the amount of available farmland and forested land was developed based on 2011 NLCD in each TAZ with induced development.

As previously described, percentages of land use types for undeveloped land were analyzed for TAZs forecasted to receive induced growth. Based on this analysis, percentages of induced development on undeveloped land are forecasted as follows: Hendricks County 80 percent farmland and 20 percent forested land; Johnson County 85 percent farmland and 15 percent forested land; Marion County 90 percent farmland and 10 percent forested land; and Morgan County 60 percent farmland and 40 percent forested land.

The equivalent of 336 acres of induced growth would be anticipated for the preferred alternative. Of this, the equivalent of 65 acres of induced development would result in higher densities on already developed land. The remaining 272 acres of induced growth would result in the conversion of agricultural lands and forests to housing units and employment areas (see Table 5.24-2).

In Hendricks County, the predicted impact is 25 acres of agricultural land and 6 acres of forest impacts for all build alternatives. In Johnson County, the predicted impact is 35 acres of agricultural land and 6 acres of forest impacts for all build alternatives. In Marion County, the predicted impact is 66 acres of agricultural land and 7 acres of forest impacts for all build alternatives. In Morgan County, the predicted impact is 83 acres of agricultural land and 44 acres of forest impacts in the preferred alternative. Collectively in the TAZs that are anticipated to experience induced growth, agricultural lands and forest are the predominant land uses, with ranges between 24 and 57 percent (see Table 5.24-2).

Step II: Use these indirect impacts to the resources in the cumulative impact analysis.



The cumulative impact analysis includes the consideration of direct and other impacts to farmland, forests, streams, and wetlands, as well as the indirect impacts quantified above.

The threshold for consideration of indirect impacts (reasonably certain) for Section 7 consultation is higher than the NEPA threshold for consideration of cumulative impacts (reasonably foreseeable), thus the use of the NEPA standard to estimate indirect impacts in this BA is a conservative approach. **Figure 3.5-1** and **Figure 3.5-2** show the induced growth TAZs and **Table 3.5-2** shows the acres of growth expected. See Appendix G for the results of the indirect development land use analysis for the induced growth TAZs.



Figure 3.5-1: Induced Growth TAZs South (See Table 3.5-2 below for coordinating TAZ ID and TAZ information.)

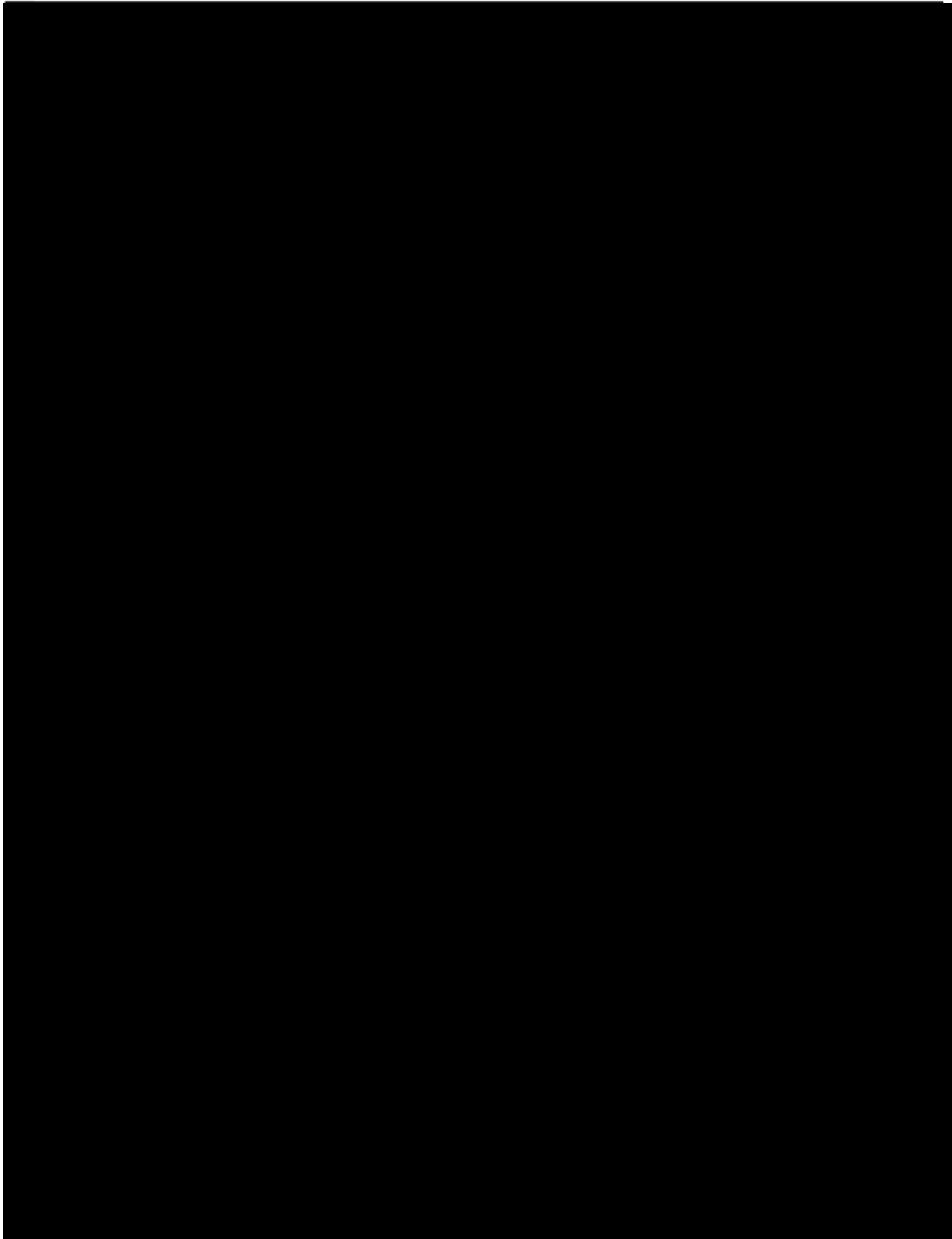




Figure 3.5-2: Induced Growth TAZs North (See Table 3.5-2 below for coordinating TAZ ID and TAZ information.)

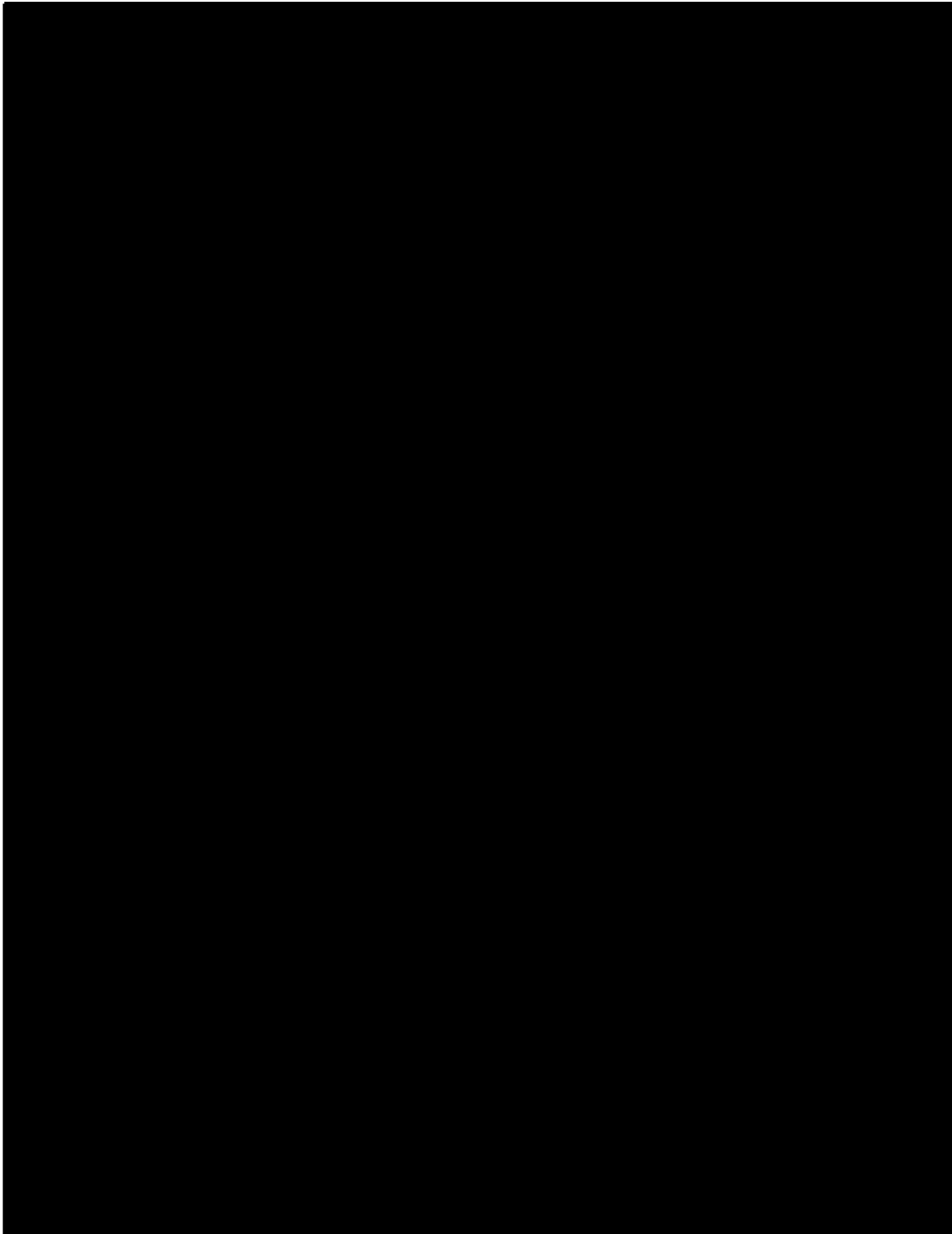




Table 3.5-2: TAZ Cross Reference Table

Reference Number	TAZ ID	County	Housing Induced Acreage	Employee Induced Acreage	Total Induced Acres
1	268	Hendricks	--	6.8	6.8
2	275	Hendricks	22.8	--	22.8
3	282	Hendricks	--	1.2	1.2
4	297	Johnson	13.0	--	13.0
5	306	Johnson	7.5	--	7.5
6	343	Johnson	--	1.4	1.4
7	363	Johnson	--	3.4	3.4
8	373	Johnson	7.5	--	7.5
9	374	Johnson	--	1.4	1.4
10	380	Johnson	--	1.2	1.2
11	381	Johnson	--	3.5	3.5
12	384	Johnson	--	2.7	2.7
13	444	Johnson	--	1.7	1.7
14	445	Johnson	7.5	1.2	8.7
15	972	Marion	25.6	--	25.6
16	974	Marion	8.0	--	8.0
17	980	Marion	37.7	--	37.7
18	1065	Marion	--	1.9	1.9
19	1141	Marion	--	13.7	13.1
20	1144	Marion	--	4.2	4.2
21	1239	Marion	--	16.4	16.4
22	1245	Marion	--	5.3	5.3
23	1679	Morgan	--	2.3	2.3



Reference Number	TAZ ID	County	Housing Induced Acreage	Employee Induced Acreage	Total Induced Acres
24	1684	Morgan	--	2.0	2.0
25	1696	Morgan	--	0.5	0.5
26	1725	Morgan	11.4	--	11.4
27	1727	Morgan	2.3	--	2.3
28	1730	Morgan	--	0.5	0.5
29	1754	Morgan	-	-	-
30	1761	Morgan	6.4	--	6.4
31	1763	Morgan	18.7	--	18.7
32	1764	Morgan	11.0	--	11.0
33	1767	Morgan	2.7	--	2.7
34	1768	Morgan	--	3.8	3.8
35	1774	Morgan	--	3.4	3.4
36	1775	Morgan	--	3.4	3.4
37	1776	Morgan	2.3	--	2.3
38	1777	Morgan	--	3.8	3.8
39	1780	Morgan	--	5.5	5.5
40	1783	Morgan	--	3.4	3.4
41	1794	Morgan	--	1.7	1.7
42	1795	Morgan	0.9	2.1	3.0
43	1796	Morgan	--	0.8	0.8
44	1797	Morgan	--	1.8	1.8
45	1798	Morgan	--	0.2	0.2
46	1799	Morgan	8.7	5.2	13.9
47	1800	Morgan	--	9.0	9.0
48	1817	Morgan	--	0.5	0.5



Reference Number	TAZ ID	County	Housing Induced Acreage	Employee Induced Acreage	Total Induced Acres
49	1822	Morgan	--	1.7	1.7
50	1825	Morgan	5.7	--	5.7
51	1826	Morgan	2.3	--	2.3
52	1829	Morgan	4.6	--	4.6
53	1832	Morgan	--	0.1	0.1
54	1894	Morgan	--	1.8	1.8
55	1914	Morgan	5.0	--	5.0
56	1916	Morgan	4.6	--	4.6

3.5.1 Water Resources

The I-69 Section 6 Tier 2 DEIS discusses indirect impacts to water resources in Section 5.24:

Anticipated indirect impacts could be wetlands bought by a developer to build a service facility such as a gas station and/or convenience food mart. Development near wetlands could result in impacts to wetlands due to pollutants (including de-icing chemicals) in runoff from impervious surfaces such as access roads and parking lots, or due to erosion and siltation from construction activities. However, with few exceptions (some of which are direct impacts of the I-69 Section 6 project), wetlands within the geographic scope of I-69 Section 6 are not in the immediate vicinity of interchanges, where most of the project-induced development is predicted to occur. No indirect acreage impacts to wetlands are anticipated due to the implementation of I-69 Section 6.

Streams could have the same indirect impacts as wetlands, whereby land surrounding the streams could be bought by a developer to build a commercial or residential establishment, and impacts could occur from surface water runoff and construction activities. However, development near streams tends to be adjacent to a stream rather than interrupting the stream to create a proposed development. Depending on the location, type of development, and potential stream/water quality impact, various permit requirements would have to be met, such as a CWA Section 404 Permit, CWA Section 401 Water Quality Certification, IDEM Isolated Wetlands Permit, and NPDES permits authorized under the CWA; IDNR permit approvals for floodway and below the high-water line of lake impacts under the state of Indiana’s Flood Control Act IC 14-28-1 and Navigable

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Waterways Act IC 14-29-1; construction plan to fulfill Rule 5 requirements (327 IAC 15-5) under NPDES guidelines. See **Section 5.23** for a description of these permits.

As noted in “Wetlands,” above, the results of FHWA analysis of surface water runoff shows that pollutant concentrations due to runoff are within the applicable USEPA criteria. BMPs would be used to prevent non-point source pollution, to control surface water runoff, and to minimize sediment damage to water quality and aquatic habitats. INDOT Standard Specifications would govern construction activities to control erosion and subsequent water pollution.

3.5.2 Forests

The Section 6 Tier 2 DEIS discusses indirect impacts to forests in Section 5.24:

Indirect impacts to forests would result from land converted to commercial or residential development, as a result of additional access provided by I-69. Development expected to occur as a result of I-69 Section 6 is 337 acres [for the preferred alternative]. Within the approximately 36,659 total acres of TAZs identified as potential locations for project-induced development in the four county study area, 120 acres are projected for job induced development and 216 acres are projected for induced residential development with Alternatives C1, C3, and C4. Within the approximately 36,883 total acres of TAZs identified as potential locations for project-induced development in the four county study area with Alternative C2, 140 acres are projected for job induced development and 216 acres are projected for induced residential development (see Table 5.24-4).

Timber harvest by landowners potentially affected by the I-69 Section 6 project may occur due to the potential of land being acquired for this project and uncertainty regarding the right of way acquisition limits and process. The amount of this private harvesting cannot be quantified because whether a particular parcel is harvested depends on the marketability of the timber and the landowner’s interest in harvesting, neither of which can be reliably predicted. Timber salvage, which may also occur, is timber recovery by the construction contractor that occurs as land is cleared for construction.

I-69 Section 6, similar to Section 5, is more urbanized than Sections 1 through 4 and a portion of induced growth (equivalent to 65 and 83 acres) is anticipated to occur on parcels that are currently developed, resulting in increased densities. Within each TAZ, the remaining induced growth on undeveloped land (272 and 273 acres in the four counties) would convert agricultural land and forest to residential and commercial developments. Within I-69 Section 6, growth on forest land is estimated to be 20 percent in Hendricks County, 15 percent in Johnson County, 10 percent in Marion County, and 40 percent in Morgan County.



In Hendricks County, 20 percent of the induced growth would convert 6 acres of forest for the build alternatives. In Johnson County, 11 of the anticipated 52 acres of induced growth would occur as increased density of already developed land. Of the remaining 41 acres, 15 percent of the induced growth would convert 6 acres of forest for the build alternatives. In Marion County, 40 of the anticipated 113 acres of induced growth would occur as increased density on already developed land. Of the remaining 73 acres, 10 percent of the induced growth would convert 7 acres of forest for the build alternatives. In Morgan County, 14 of the 141 acres (Alternatives C1, C3, and C4) and 32 of the 160 acres (Alternative C2) of induced growth would occur as increased density on already developed land. Of the remaining 127 acres (Alternatives C1, C3 and Alternative C4) and 128 acres (Alternative C4), 40 percent of the induced growth would convert 44 acres of forest for Alternatives C1, C3, and C4, and 47 acres of forest for Alternative C2. See Table 5.24-3 and Table 5.24-10.

The total estimated indirect impact to forest for the four counties is 63 acres for [the preferred alternative].

3.6 Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BA. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the Endangered Species Act. Cumulative effects include future direct impacts, indirect (induced) impacts and “other” impacts on a natural resource. The former two are related to the proposed action, while the last one is not.

Many sources were contacted for information on cumulative effects. This included extensive coordination with local county offices and staff (e.g., surveyor’s office, recorder’s office, auditor’s office, highway superintendents, county zoning and planning officials) within Morgan, Johnson and Marion counties, as well as private industry development experts within these areas. In addition, the cumulative effects analysis used the results from the TREDIS economic model to forecast increases in jobs and households resulting from economic growth. The number of new houses and new jobs for the year 2045 were forecasted for the no-build scenario and for the refined preferred alternative. Growth within the I-69 Section 6 SAA was allocated into TAZs based on input from the expert land use panels.

Changes were projected for both the no-build and the build conditions. Household changes were converted to acreages by dividing by 4.38 household per acre. Employment changes were converted to acreages by dividing by 14.6 employees per acre. These factors were developed for each region based on current housing and commercial/industrial development factors within the region.



The no-build condition represents what is expected to occur without the proposed I-69 construction, and represents "other" impacts in this analysis. These population and employment forecasts form the baseline condition for land use changes by 2045. The no-build population forecasts²⁷ have been determined based on birth rate, death rate, immigration, and emigration, and are independent of the I-69 project. The build scenario growth less the no-build scenario growth is equal to the induced (indirect) impacts attributed to I-69. The land use panel reviewed the TREDIS economic model results and either concurred with model results, or suggested adjustments based on their expectations of development. These panels consisted of realtors, local city and county planning staff, and economic development personnel.

Once indirect impacts were identified, the panel again reviewed the TAZ maps to provide insight on where land use changes would likely occur regardless of whether I-69 were constructed. In addition, information on development projected to occur whether or not the project is constructed was obtained through a review of local land use plans where such exist and discussions with representatives of local governments, local and regional economic development groups/agencies, and major employers. The results of this review indicated "other" reasonably foreseeable major future actions (by year 2045) that could add to this project's potential direct and indirect impacts. The three reasonably foreseeable actions are gravel quarrying, legal drain maintenance and water quality, and commercial/retail development.

GIS analysis was conducted to determine the approximate amount of no-build growth that is projected to occur in the action areas. This analysis made a conservative estimate of impacts. The percentage of the TAZ within the action areas was calculated and the no-build growth by land use type within that particular action area was determined on a percentage basis. The total acreage of no-build that will occur on lands that have not been previously developed was then multiplied by 20% in Hendricks County, 15% in Johnson County, 10% in Marion County and 40% in Morgan County to get the amount of forest that would be impacted by the no-build growth. Please see Chapter 5.24 in the Section 6 DEIS for an explanation of how these percentages were chosen. These calculations showed that approximately 453 acres of no-build growth would occur in forested areas in the RSAA. This is approximately 2.8% of the available forest in the RSAA. The calculations showed that approximately 63 acres of no-build growth would occur in forested areas within the maternity colonies. Approximately 11 acres of no-build growth would occur in forested areas in Lambs Creek Maternity Colony (0.2% of available forest), four acres in Clear Creek Maternity Colony (0.1% of available forest), three acres in Crooked Creek Maternity Colony (0.1% of available forest), and 45 acres in Pleasant Run Creek Maternity Colony (2.4% of available forest). This would equate to approximately 0.4% of the available forest within the maternity colony areas.

²⁷ The "No-Build" term refers only to the construction of the new I-69 highway. The normal growth and minor incremental changes expected during the time period, referred to here as "Other Projected Growth", are understood to be included in the "No-Build" scenario, but not any growth induced by the construction of I-69 or the major "Other" projects discussed in this chapter.



Refer to the Indirect Impacts section of this document under forest for more information on land use and development factors in the I-69 Section 6 SAA.

3.6.1 Gravel Quarrying

The I-69 Section 6 Tier 2 DEIS discussed the gravel quarrying in Section 5.24:

There are active limestone and sand/gravel quarries in the project area, as described in Section 5.15. Active quarry sites are Hanson Aggregates, Irving Materials and Jones Gravel Pit. The impacts of these active quarries to forest and agricultural land is included as other projected growth in the cumulative impact analysis.

3.6.2 Tax Increments Finance (TIF) Districts

The I-69 Section 6 Tier 2 DEIS discussed Tax Incremental Finance (TIF) districts in Section 5.24:

TIF is a type of financing that permits local governments to finance the redevelopment of target areas and enhance the economic development of rapidly developing areas. Land Use Panel members took TIF districts into consideration when allocating growth. Additional TIF district context is provided in Section 2.3.4. For I-69 Section 6, eleven TIF districts have been identified as relevant to the I-69 project. Among these, four are located in the City of Martinsville and four are located just outside the city limits in Morgan County (described below). Figure 4.2-7 depicts the location of the eleven TIF Districts. Information on the TIF Districts was obtained from the Indiana Gateway for Local Government TIFViewer website.²⁸

Ohio Street (City of Martinsville) TIF. This TIF District is located on the south side of Martinsville. The TIF District runs along the west side of Ohio Street to Poston Road. From that intersection, the TIF areas are located on the east side of Ohio Street to York Street. The District includes Artesian Square Shopping Center, the site of the former Harman-Becker plant and Twigg Corp. The Ohio Street TIF District includes 36 properties and a based value \$16,568,400.

Morgan Street (City of Martinsville) TIF. The Morgan Street TIF District is located the along Morgan Street from SR 39 east to SR 37. The depth of the TIF

²⁸ <http://gateway.ifionline.org/TIFviewer>

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from the Morgan Street varies from one half block to 6 blocks deep along Main Street. It includes downtown Martinsville, Morgan Hospital, Medical Center, and the Morgan County Fairgrounds. The Morgan Street TIF District includes 393 properties and a base value of \$32,177,601.

SR 39 (City of Martinsville) TIF. The SR 39 TIF District is located near the southern limits of Martinsville. The district runs along SR 39/Morton Avenue from the SR 39/SR 37 split, north and east along Morton Avenue, then north of SR 39 to Morgan Street. The SR 39 TIF District includes 267 parcels and a base value of \$30,448,682.

Southeast 37 (City of Martinsville) TIF. The Southeast 37 TIF District is located along the south side of SR 37 between Mahalasville Road and the northern terminus of Birk Road. This district includes the Grand Valley Boulevard shopping area and a variety of other restaurants and retail establishments. The district includes 60 parcels and a base value of \$37,905,700.

Eagle Valley (Morgan County) TIF. The Eagle Valley TIF District is located north of Martinsville, to the west of the intersection of SR 67 and Centerton Road/Robb Hill Road. The property contained in the TIF district is associated with the Indianapolis Power and Light (IPL) electric generation plant. This district includes 18 properties and a base value of \$27,971,125.

Henderson Ford Interchange (Morgan County) TIF. The Henderson Ford Interchange TIF district is located at the intersection of SR 37 and Henderson Ford Road. North of SR 37, the TIF runs along either side of Henderson Ford Road. On the south side of SR 37, the district is only present on the east side of Henderson Ford Road. There are 11 properties in the district and base value of \$244,000.

Old Morgan Town Road (Morgan County) TIF. The Old Morgan Town Road TIF District is located along north side of Indiana Highway 252, 1 mile east of SR 37. The property is undeveloped. There are two properties in the district and base value of \$105,800.

Waverly (Morgan County) TIF. The Waverly TIF District is located near the intersection of SR 37 and Waverly Road. The TIF boundaries extend into the north, east and south quadrants of this intersection. The TIF District also extends north to an area between the White River and Old SR 37. This is the area identified for development of the Old Town Waverly Park. There are 60 properties in the district and a base value of \$112,199.



3.6.3 Legal Drain Maintenance and Water Quality

In addition to "other" impacts projected under the no-build scenario, impacts to tree cover from legal drains and their maintenance were estimated and included in addition to the model based other impacts. These impacts could potentially occur regardless of the I-69 construction. Legal drains were identified through consultation with county officials and/or use of GIS layers. They are defined as those streams legally maintained by the county or maintained through conservancy districts. For the Tier 1 BA Addendum analysis, impacts were assumed to be 75 feet from either side of a legal drain. The legal drain impacts represent a highest impact scenario for tree cover impacts as not all legal drains are likely to be maintained, and maintenance may not result in impacts on both sides of the stream, or the entire 75 feet. GIS layers showed five legal drains in Marion County. They are State/Harmon Ditch, Fowler-Haueisen or Thompson Run/Haueisen Ditch, Hare-Marea Ditch, Alcorn Ditch or Little Buck Creek, and Orme Ditch. No legal drains are in Johnson County, and there is one legal drain in Morgan County (Sartor Ditch). None of these legal drains are within any Indiana bat maternity colony, and as such, there would be no removal of any tree cover related to any known legal drain in any Indiana bat colony in I-69 Section 6.

3.6.4 Land Conversion Trends

Typically, one cannot precisely quantify how much forest land on private lands will be converted to other habitat types, the extent of future timber harvests on private lands, nor the amount of privately owned habitat that will be developed for other purposes. However, one can look at regional and state-wide trends and make reasonable extrapolations as to how the private lands within the SAA will likely be managed in the foreseeable future.

In the Revised Tier 1 BO as amended, the following Indiana forest trends were highlighted within the USDA National Forest Service North Central Research Station's 2005 report, "Indiana Forests: 1999-2003, Part A."

Trends that appear beneficial to the Indiana bat are:

- The ratio of harvested tree volume to tree volume growth indicates sustainable management.
- Diverse and abundant forest habitat (snags, coarse woody debris, forest cover and edges) support healthy wildlife populations across the state.
- Indiana possesses a diversity of standing dead tree wildlife habitat with an abundance of recently acquired snags to replenish fully decayed snags as Indiana's forests mature.
- Indiana's forests continue to mature in terms of the number and size of trees within forest stands.

Other trends reported by the USFWS are:

- The amount of forest edge doubled from 1992 to 2001, indicating smaller forest plots.

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- Due to land use history and natural factors, the forest soils of southern Indiana are generally below-average in quality.
- Ownerships of Indiana forests have changed in the past decade, resulting in more parcelization and fragmentation.
- The average private forest landholding dropped from 22-acres in 1993 to 16-acres in 2003, indicating a continued “parcelization” of Indiana forests.
- While the data shows there has been loss of continuous forest, resulting in smaller, fragmented stands, there is also an overall increase in forested land across the state.
- Introduced or invasive plant species inhabit a majority of inventory plots.
- Although Indiana’s overall forested land cover is increasing, the rate of increase has slowed over the past decade.
- Increases in total volumes of oak species are less than those for most other hardwood species.
- The advanced ages and inadequate regeneration of Indiana’s oak forests may signal a successional shift from an oak/hickory-dominated landscape to one where other hardwood species, such as maples, occupy more forested areas.
- Indiana’s hardwood saw-timber resource continues to be at risk due to maturing of hardwood stands, loss of timberland to development and new pests (e.g., gypsy moth, emerald ash-borer, sudden oak death, beech-bark disease).

Based on discussions with the IDNR Division of Forestry, there is no reliable, accurate and consistent method for tracking timber harvest activities on a site specific, detailed level.

Observations within the SAA throughout many years indicate that cutting is for the most part selective harvest, and that clear cutting is limited and sporadic. Some who own property within and outside the right of way may harvest timber on a portion of their property. However, such harvesting cannot be characterized as “reasonably certain.” A property owner’s decision to harvest trees on privately owned land simply cannot be predicted. In Section 4 as an example, only a limited number of property owners chose to timber (less than 20% of right of way landowners), and the majority of these (greater than 90%) included selective harvesting. An individual landowner’s decision to harvest trees depends upon a multitude of individual factors, none of which can be predicted with any reasonable certainty. Thus, the likelihood of tree harvesting in I-69 Section 6, as well as the number of acres outside of the right of way that would be harvested, is both unpredictable and unknown at this time. Forest within the right of way is presumed to be harvested and is included in the forest impacts.

Should USFWS so desire, INDOT and FHWA will assist USFWS in distributing letters to the property owners in the I-69 Section 6 proposed right of way designed to increase awareness of the impact of tree harvesting on Indiana bats. INDOT will also send a letter to each property owner in the right of way, stating that INDOT is not working with any logging companies in the development of I-69. It is anticipated that these letters would be distributed in early 2017 or 2018



to assure owners are informed early in the process. This information should prevent any confusion on the part of the landowners that INDOT advocates, condones or permits logging on the property prior to the time when INDOT purchases the property for I-69 Section 6. INDOT and FHWA will also work with USFWS to identify logging activities within the project area, and INDOT will notify USFWS of any logging activity discovered. This notice will allow USFWS to take appropriate action under the ESA as warranted.

Because a substantial part of I-69 Section 6 will use the existing SR 37 and due to its proximity to Indianapolis, it is not anticipated that large logging operations will occur in this section. Unlike the “new terrain” projects in Sections 1, 2, 3 and 4, the majority of the proposed right of way for I-69 Section 6 will consist of existing right of way of SR 37 similar to Section 5. Because of the use of existing right of way, the majority of right of way acquisitions from private properties will be small in comparison to previous new terrain right of way acquisitions.

IDNR Classified Forests are found in the vicinity of the I-69 Section 6 refined preferred alternative. However, there are no known acres of Classified Forests impacted by the refined preferred alternative. Nonetheless, there is approximately 3.6 acres of publicly owned managed lands (Cikana State Fish Hatchery) that will be impacted by I-69 Section 6.

The USFWS anticipates a decline in bat habitat in some areas of the SAA in the future, although they are not aware of specific development plans in Indiana bat habitat at this time. If INDOT, FHWA or USFWS become aware of specific projects, impacts to Indiana bats will be addressed through the incidental take permit process, if appropriate.

Areas set aside for mitigation plantings and preservation in I-69 Section 6 will protect those areas from development in perpetuity, and in the long term will provide quality roosting (i.e., snags) and foraging habitat. Thirty-eight forest plots inside and outside of the proposed right of way were evaluated for snags. Results showed 140 snags (stage of decay 3 or greater) in 38.66 acres of forest survey resulting in an average of 3.62 snags/acre. Results per plot varied and ranged from zero to 12.93 snags/acre. Multiplying the average snags by an expected 320 acres of preservation in proposed mitigation sites for I-69 Section 6, mitigation could preserve approximately 1,152 snags. These areas will also help to decrease habitat fragmentation, and to improve the potential for colonies of Indiana bats currently using the SAA to expand into other areas of suitable habitat.

With successful implementation of the revised Tier 1 Forest and Wetland Mitigation and Enhancement Plan, particularly as detailed herein for I-69 Section 6, and all of the other proposed mitigation efforts and conservation measures, we anticipate that long-term habitat conditions for Indiana bat maternity colonies and individuals within the SAA will be sustainable and in some situations, may be better than existing conditions.



CHAPTER 4 NORTHERN LONG-EARED BAT (*Myotis septentrionalis*)

4.1 Action Areas

The study area for I-69 Section 6 begins just south of Martinsville on SR 37 and continues to I-465. It is approximately 26 miles in length and the width of the study area varies; however, the majority is approximately three miles wide. It widens in the areas of the maternity colonies. It is a part of the larger I-69 Evansville to Indianapolis which was considered in the Tier 1 Revised BO as amended.

The proposed project involves the construction, operation and maintenance of an Interstate highway, I-69, from Evansville to Indianapolis through southwestern Indiana. USFWS regulations define the “action area” as all areas to be affected directly and indirectly by the Federal Action and not merely the immediate area involved in the action (CFR § 402.02). The regulations further state that the action area is not limited to the “footprint” of the proposed project, nor is it limited by the sponsoring Federal agency’s authority. Rather, it is a biological determination of the reach of the proposed action on listed species.

In the Tier 1 Section 7 Consultation process completed as part of the Tier 1 Biological Assessment (BA) Addendum – For the Northern Long-Eared Bat¹ dated October 10, 2014, the FHWA, INDOT and the USFWS Bloomington Field Office (BFO) jointly developed two seasonally based action areas for the northern long-eared bat. As discussed below, this Tier 2 BA proposes to modify the summer action area (SAA) for the northern long-eared bat based on reasonably foreseeable indirect/induced growth predicted in the I-69 Section 6 Tier 2 DEIS.² The induced growth TAZs in the I-69 Section 6 Tier 2 DEIS differ from the induced growth TAZs included in the Tier 1 Biological Assessment (BA) Addendum for the Northern Long-Eared Bat dated October 10, 2014 based on updated land use panel coordination. There is a summer action area (SAA), but no winter action area (WAA) in I-69 Section 6. Also, there is no critical habitat in I-69 Section 6 for the northern long-eared bat.

¹ United States Federal Highway Administration and Indiana Department of Transportation. October 10, 2014. Tier 1 Biological Assessment (BA) Addendum – For the Northern Long-Eared Bat. Volumes I and II.

² We note that the predicted induced growth (approximately 336 acres near interchanges) are anticipated in I-69 Section 6 to be developed based on the NEPA concept of “reasonable foreseeability.” This NEPA standard for predicting indirect/induced growth is significantly broader than the ESA’s “reasonably certain” standard for consideration of indirect/induced growth as defined in 50 C.F.R § 402.02 “Effects of the Action”. If the more limited ESA “reasonably certain” standard were used, none of the predicted induced/indirect growth predicted in the I-69 Section 6 Tier 2 DEIS would be recognized in an analysis conducted solely for proceedings under Section 7 of the ESA. However, in order to continue to use the very conservative approach used in the Revised Tier 1 BO, this Tier 2 BA analyzes impacts based on the NEPA required “reasonably foreseeable” induced growth predicted in the I-69 Section 6 Tier 2 DEIS.



4.1.1 Tier 1 Summer Action Area (SAA)

Based on the information available at the time of the Tier 1 BA Addendum – For the Northern Long-Eared Bat, the “reach” of the direct and indirect effects of this project were based on the project footprint and a 1.5-mile buffer in all directions plus all induced development TAZs identified, based on the biological range of this species and reasonably foreseeable impacts of the Project. Therefore, the Tier 1 SAA for the northern long-eared bat is generally defined as a three-mile band, 1.5 miles either side of the centerline of the I-69 Section 6 Representative Alignment. The 1.5-mile distance has biological significance for the northern long-eared bat. The entire length of the proposed project contains suitable summer roosting and foraging habitat, thus a SAA width of 1.5 miles on either side of the proposed centerline (three miles wide) will encompass summer habitat being used by northern long-eared bats that might be affected by the proposed I-69 project. The Tier 1 corridor is approximately 2,000 feet wide in most places, but is narrowed in some instances to avoid sensitive environmental resources, and is widened in some instances to allow further avoidance of direct impacts by giving greater flexibility for the location of the right of way. The 1.5-mile distance for the northern long-eared bat was determined in consultation with the Service.

A 1.5-mile radius circle has also been centered on each northern long-eared bat maternity colony developed by USFWS and incorporated into the Tier 1 BA Addendum – For the Northern Long-Eared Bat and Amendment 3 to the Tier 1 Revised BO³ as amended. In all northern long-eared bat maternity colonies in I-69 Section 6, the 1.5 mile radius circles extended beyond the limits of the standard SAA. In addition, induced growth TAZs were also incorporated into the standard SAA limits in the Tier 1 BA Addendum – For the Northern Long-Eared Bat. The determination of five northern long-eared bat maternity colonies in I-69 Section 6, as determined by USFWS, are also within the SAA for the Indiana bat. In addition, the Indiana bat and the northern long-eared bat have some maternity colonies that overlap.

4.1.2 Tier 2 Summer Action Area (SAA)

The I-69 Section 6 Tier 2 DEIS indicated that the Project may induce additional impacts as a result of the completion of the Project. As documented in the I-69 Section 6 Tier 2 DEIS, the reasonably foreseeable predicted growth (development) is anticipated to be in specific Traffic Analysis Zones (TAZs). Most of the predicted growth falls within the Tier 1 northern long-eared bat SAA; however, some areas extend outside the Tier 1 SAA boundary, based on updated coordination with an expert land use panel, as compared to the previous TAZ information used for the Tier 1 BA Addendum – For the Northern Long-Eared Bat. In addition and during the time of developing the Tier 2 DEIS for Section 6, several TAZs previously identified within Johnson

³ *United States Federal Highway Administration and Indiana Department of Transportation. April 1, 2015/May 4, 2015. Conference Opinion/Biological Opinion for the Northern Long-Eared Bat (*Myotis septentrionalis*). Amendment 3 to the Tier 1 Revised Programmatic Biological Opinion (dated August 24, 2006, previously amended July 24, 2013 and May 25, 2011) for the I-69, Evansville to Indianapolis, Indiana highway.*



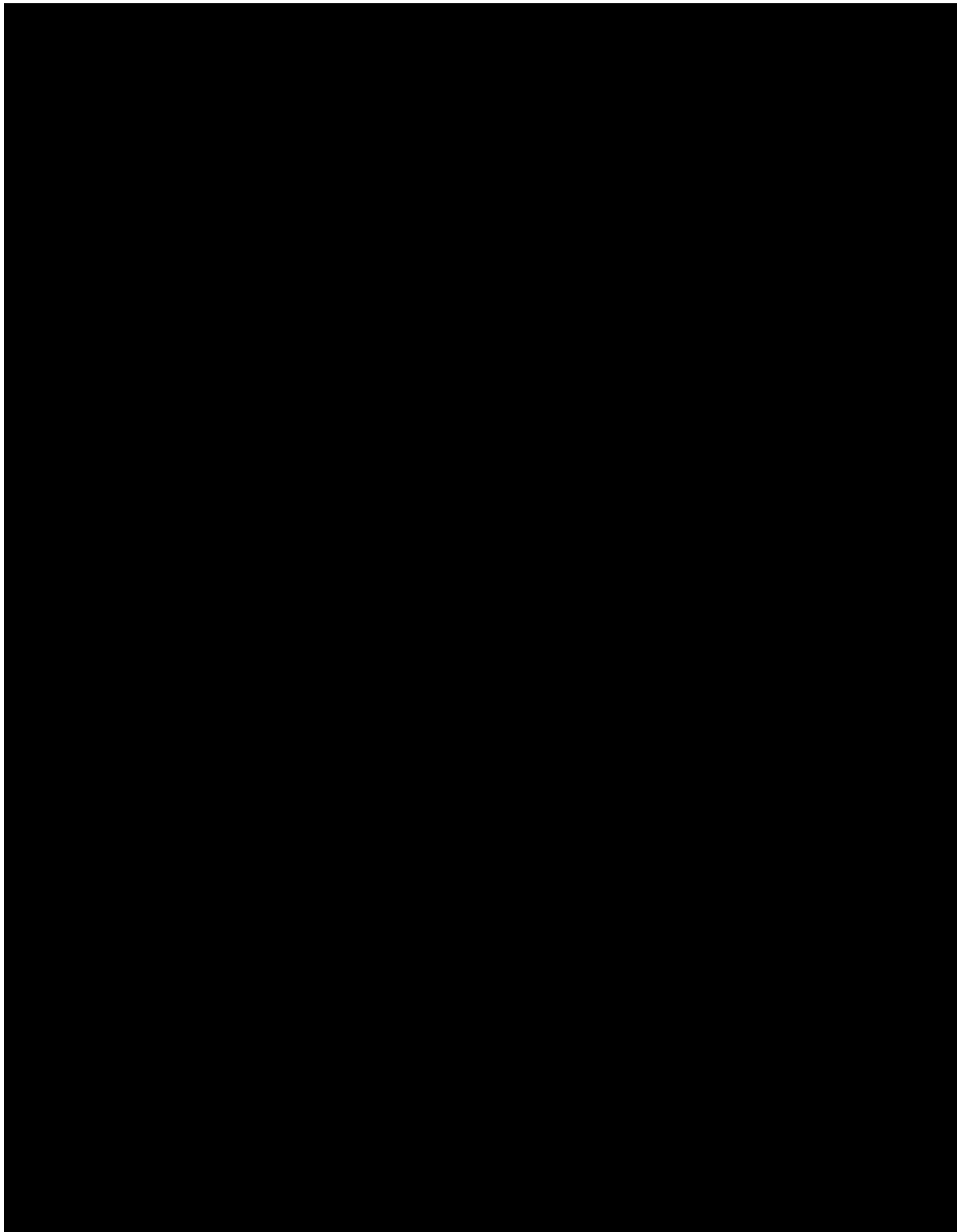
County for induced development have not been included in the current predicted "reasonably foreseeable" induced growth and have thus been removed from the Tier 2 SAA based on the more recent analysis as part of the Tier 2 process. As noted in the Tier 1 Revised BO: "The [summer] Action Area may need to be expanded or otherwise refined in subsequent Tier 2 BAs as the anticipated reach of direct and indirect effects of each section of I-69 are more clearly recognized and understood" (Tier 1 Revised BO, pg. 32).⁴ While there is no foundation to assume that the predicted "reasonably foreseeable" induced growth meets USFWS "reasonably certain" criteria by the year 2045, the SAA for the I-69 Section 6 portion of the I-69 Project has been expanded to include all TAZs for which the NEPA analysis indicates that growth induced by the construction and operation of the Project is reasonably foreseeable. Also, the potential induced growth noted in the I-69 Section 6 Tier 2 DEIS has been analyzed for possible indirect impacts to the northern long-eared bat, as required by the Tier 1 Revised BO as amended.

The Tier 2 I-69 Section 6 SAA begins at the north end of Tier 2 I-69 Section 5 SAA and ends in the vicinity of the I-465 interchange. The area within the SAA, yet outside of the maternity colony foraging areas, is referred to in this document as the Remaining Summer Action Area (RSAA). Due to the induced development TAZ differences in the SAA, the total area and available habitat within the I-69 Section 6 RSAA cannot be directly compared to those presented in the Tier 1 BA Addendum – For the Northern Long-Eared Bat.

⁴ United States Fish and Wildlife Service. December 3, 2003. *Biological Opinion on the Construction, Operation, and Maintenance of Alternative 3C of Interstate 69 (I-69) from Indianapolis to Evansville for the Federally Endangered Indiana Bat (*Myotis sodalis*) and the Federally Threatened Bald Eagle (*Haliaeetus leucocephalus*) traversing portions of Gibson, Warrick, Pike, Daviess, Greene, Monroe, Morgan, Johnson, and Marion Counties, Indiana.* Submitted to FHWA. Prepared by R. Andrew King.



Figure 4.1-1: Northern Long-Eared Bat Section 6 Tier 2 Summer Action Area





4.2 Tier 2 Northern Long-eared Bat Surveys

4.2.1 Maternity Colonies

As required by the December 3, 2003 Tier 1 BO, INDOT and FHWA conducted an extensive research program designed to obtain information on the presence of the Indiana bat; however mist netting efforts also provided the additional benefit of recording northern long-eared bats and other species within the action area for all years from 2004 to present. Radio-telemetry on the northern long-eared bats started in 2015 because it was not a federally listed species before that time. It became a federally listed threatened species under the Endangered Species Act on April 2, 2015. A final 4(d) rule for the northern long-eared bat was published in the Federal Register on January 14, 2016.

In 2004, mist netting surveys were conducted at 29 sites in I-69 Section 6⁵. A total of 26 northern long-eared bats (*Myotis septentrionalis*) were captured within I-69 Section 6 in 2004, including five from Site #24 in I-69 Section 5. This included three post-lactating adult females, two adult females (non-reproductive), four juvenile females, 14 adult males and three juvenile males. No northern long-eared bats were radio-tagged and no roost trees were identified with any emergence counts because the northern long-eared bat was not a federally listed species then and there was no expectation from USFWS for any radio-telemetry on this species. Other bats captured in 2004 included: 72 little brown bats (*Myotis lucifugus*), 67 big brown bats (*Eptesicus fuscus*), 30 eastern pipistrelles (*Pipistrellus subflavus*), 28 evening bats (*Nycticeius humeralis*), 25 eastern red bats (*Lasiurus borealis*), and ten Indiana bats (*Myotis sodalis*). Eighteen bridges in the I-69 Section 6 action area were also inspected for bats. No northern long-eared bats were found roosting under any bridges in I-69 Section 6. The only bridges that showed bats were under two bridges over [REDACTED] [REDACTED]. Bats observed were big brown bats.

Additional mist netting surveys were completed during the summer of 2005⁶. The 2005 surveys focused around the location of Indiana bat captures where no primary roost trees were identified in 2004. Seven mist net sites were surveyed in I-69 Section 6. Six northern long-eared bats were captured in 2005. They were one lactating female, four non-reproductive females, and one adult male. No northern long-eared bats were radio-tagged in 2005 because this species was not at that time a federally listed species so there is no roost tree data for 2005. Without roost tree data, surveys for the northern long-eared bat in 2004 and 2005 were unable to determine any maternity colonies for this species. For these two years (2004 and 2005), 32 northern long-eared bats were captured and data obtained on them.

⁵ J. F. New. 15 December 2004. Summer Habitat for the Indiana bat (*Myotis sodalis*) within the Martinsville Hills from Martinsville to Indianapolis, Indiana. Prepared for HNTB for INDOT and FHWA.

⁶ Henry and Romme (5 April 2006). Identification of Indiana bat Roost Trees along the Proposed I-69 between Bloomington and Indianapolis, Indiana.

**Section 6—Tier 2 Biological Assessment**

A full discussion of the methods and results of these surveys including maps and other summer habitat in I-69 Section 6 is more fully discussed in the Tier 1 BA Addendum and incorporated in the analysis in the Tier 1 Revised BO as amended.

2015 Northern Long-Eared Bat Presence Surveys

A northern long-eared bat presence survey was completed for Section 6 between 3 July and 6 August 2015⁷ (see Appendix H). This survey effort was conducted to update northern long-eared bat presence status within the I-69 Section 6 action area due to the amount of time that elapsed since the 2004 and 2005 surveys. The presence surveys were conducted using mist net capture techniques and radio-telemetry tracking to identify maternity roost trees. While the primary objective was to provide a presence/absence survey for the Indiana bat and northern long-eared bats in the I-69 corridor, data was also collected on other species native to Indiana, including the possible presence of the state endangered evening bat (*Nycticeius humeralis*).

The 2015 survey included 19 sites following USFWS's new protocol, 15 of which were previously surveyed in 2004 and in part again in 2005. The 2015 survey captured 126 bats representing seven species: 72 big brown bats (*Eptesicus fuscus*), 18 eastern red bats (*Lasiurus borealis*), 24 evening bats (*Nycticeius humeralis*), four little brown bats (*Myotis lucifugus*), three Indiana bats (*Myotis sodalis*), three northern long-eared bats (*Myotis septentrionalis*), and one tri-colored bat (*Perimyotis subflavus*). One captured bat escaped before identification could be obtained. Of the three northern long-eared bats captured, one was a post-lactating female, one was a juvenile female, and one was a juvenile male. See **Table 4.2-1** for a summary of capture and roost data for the northern long-eared bat in 2004, 2005, and 2015. Since the Lambs Creek Maternity Colony overlaps with I-69 Section 5 because of the location of mist netting Site #24, information on one northern long-eared bat from I-69 Section 5 surveys is also provided in **Table 4.2-1**. It was an adult male captured on 24 May 2014. It was not radio-tagged. Site #24 is located within the NLEB Lambs Creek Maternity Colony established by BFO.

Radio transmitters were attached to two of the three northern long-eared bats. One northern long-eared bat (#189), a post-lactating female, captured at Site 20 was tracked to a dead black cherry located east of the White River in a forest swamp in Morgan County. The black cherry had a diameter at breast height (dbh) of about 15 inches. Emergence counts from two nights of observation for this roost were three and six. The capture of this northern long-eared bat was within the NLEB Goose Creek maternity colony determined by the BFO so it did not alter any earlier positioning of this colony. This northern long-eared bat maternity colony is fully contained within the Pleasant Run Indiana bat maternity colony. Maternity colonies of these two species overlap in I-69 Section 6.

⁷ Lochmueller Group (31 January 2016). *I-69 Presence/Absence Mist Netting Survey for the Indiana bat (*Myotis sodalis*) and Northern Long-eared bat (*Myotis septentrionalis*) Section 6 (Morgan, Johnson and Marion Counties, IN) Upper White River Watershed.*



There are five northern long-eared bat maternity colonies in I-69 Section 6. They are, from south to north: the NLEB Lambs Creek, NLEB Clear Creek East Fork, NLEB White River, NLEB White River - Goose Creek and NLEB Pleasant Run. Based upon mist netting efforts during the summers of 2004, 2005 and 2015 in Sections 5 and 6, and mist netting/monitoring efforts in Section 5 for Site 24 in 2012, 2014, 2015 and 2016, 34 northern long-eared bats were captured (**Table 4.2-1**). Within the Tier 1 BA Addendum for the NLEB (10 October 2014), the USFWS (BFO) identified 38 northern long-eared bat maternity colonies and their associated foraging areas within the I-69 SAA for the complete project from Section 1 to Section 6. Five of these 38 are in Section 6.

Table 4.2-1: I-69 Section 6 capture and roost data in 2004, 2005 and 2015 for the northern long-eared bat

Site # (I-69 Section 6)	Northern Long-eared Bat		
	2004 ¹	2005 ¹	2015 ²
Site 1			
Site 2			
Site 3			
Site 4			
Site 5	1 A-M		
Site 6	1 A-F-PL; 3 J-F; 2 J-M		
Site 7		1 J-F	1 J-F ³ (no roosts found)
Site 8			
Site 9			
Site 10	1 J-F	2 J-F	
Site 11			
Site 12	3 A-M		
Site 13			1 J-M ³ (no roosts found)
Site 14	1 A-M		
Site 15	1 A-M		
Site 16			



Site # (I-69 Section 6)	Northern Long-eared Bat							
	2004 ¹		2005 ¹		2015 ²			
Site 17								
Site 18								
Site 19	1 A-M		1 A-F-L					
Site 20	1 A-F-PL; 2 A-M				1 A-F-PL ³ (1 roost tree found)			
Site 21	2 A-M							
Site 22								
Site 23			1 A-M; 1 J-F					
Site 24	1 A-M							
Site 25	1 J-M							
Site 26								
Site 27								
Site 28								
Site 29								
Site 30								
Site 31								
Site 32								
Site 33								
(I-69 Section 5)	2004 ¹		2005 ¹		2012 ¹	2014 ¹	2015 ²	2016 ²
Site 24	2 A-M; 1-A-F; 1-A-F-PL; 1 J-F					1 A-M		

Note: A refers to Adult; J – Juvenile; M-Male; F – Female; L – Lactating; PL – Post Lactating

Gray shading indicates site was not surveyed

¹ Capture data only available for northern long-eared bats.

² Capture data and telemetry conducted for northern long-eared bat.

³ Indicates northern long-eared bat for which telemetry was conducted.

A maternity colony consists of reproductively active female northern long-eared bats and their young. A maternity colony was determined to exist if there was evidence of reproduction (the capture of a reproductive female or juvenile) in an area during the summer reproductive season.

Each maternity colony foraging area is defined by a circle with a 1.5-mile radius from either a roost tree(s) or capture site or a combination of both. The 1.5-mile distance was determined in consultation with the Service. A 1.5-mile distance was also used to determine the width of the SAA by buffering the right of way and the refined preferred alternative for I-69 Section 6. Maternity colony foraging area circles were centered on mist net sites of northern long-eared bat capture or centroids from multiple mist net capture locations where such locations were in generally close proximity to each other. These maternity colonies were determined by the Service (BFO) using the best data available, which included capture data (especially reproductive females and juveniles); habitat descriptions in scientific publications; and use of existing maps (e.g., USGS, NWI, Soil Survey, aerials, etc.).

Figure 4.2-1: Roost Tree 189-1



2015 Roost Tree for the Northern Long-Eared Bat

During summer, northern long-eared bats roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥ 3 inches dbh), and roost in similar sized and species-specific trees to those used by Indiana bats.⁸ A snag maybe be defined as a standing, dead or dying tree that often has its top and/or branches gone. Generally, suitable roost trees may include live shagbark hickories; lightning-struck trees; dead, dying, or damaged trees; trees with exfoliating bark; den trees, broken trees, or stumps over 9 feet in height; and large live trees of any species.⁹ Some evidence shows the northern long-eared bat to use shorter stumps, specifically a 1.9 meter and a couple 2 meter records (USFWS-BFO, Per. Com.)

There was one roost tree found in 2015 for the northern long-eared bat. It was 189-1, and identified as a dead black cherry. It was located east of the White River in the NLEB Goose Creek Maternity Colony (coordinates [REDACTED] North and [REDACTED] West). It was labelled as a secondary roost tree for the northern long-eared bat. In 2016, it was visited and identified as a

⁸ USFWS. 2014. *USFWS Regions 2,3,4,5, and 6. Northern Long-Eared Bat Interim Conference and Planning Guidance. p. 10, Appendices A to I.*

⁹ <https://www.fws.gov/northeast/njfieldoffice/pdf>. *Characteristics of Indiana bat Summer Habitat.*



silver maple. Please see **Figure 4.2-1**. It appears it was misidentified in 2015. It is standing, has an approximate dbh of 15 inches and a stage of decay of four.

4.3 Impacts

As required by the Tier 1 Revised BO as amended, loss of northern long-eared bat habitat is being used as a surrogate to monitor levels of impact and incidental take within the entire Summer Action Area (SAA). In accordance with this methodology, impacts included in this BA focus on northern long-eared bat habitat (i.e., forest and wetlands).

Forests are important to the northern long-eared bat. In 2016, the USFWS provided information on the northern long-eared bat,¹⁰ and defined suitable summer habitat for the northern long-eared bat which consisted of a wide variety of forested and wooded habitats where they roost, forage, and travel,¹¹ and may also include adjacent and interspersed non-forested habitats.¹² In I-69 Section 6, NLEB and Indiana bats were captured together and both species maternity colonies overlap.

The I-69 roadway may act as a barrier for bats. However, bats have been observed crossing SR 37 under a bridge, as well as crossing I-70 near the [REDACTED] [REDACTED] [REDACTED]. Both of these roadways have right of way widths of 250 to 500 feet and are of a similar footprint to the existing SR 37 and proposed I-69. The [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED] [REDACTED] bridges will allow ample room for bats to fly under the bridge to maintain existing flyways. Keeley and Tuttle¹³ have documented that bats use bridges and culverts for roosting including flyways entering and exiting these roosts. This use is documented with bridge roost heights typically 10 feet or more above the ground and culvert heights between five and 10 feet tall. The bridge crossings listed above include the major riparian corridors within the project area that cross existing SR 37 and proposed I-69 and all are within the height range of documented bat use. Indian Creek, Clear Creek, Stotts Creek, Crooked Creek and Honey Creek all have documented clearances in excess of 10 feet, while Pleasant Run Creek and Little Buck Creek have estimated clearances between five and 10 feet and all will have a similar clearance following I-69 construction. There is no evidence that would indicate that I-69 will act as a greater barrier than existing SR 37.

¹⁰ U.S.F.W.S. Department of the Interior. 27 April 2016. 50 CFR Part 17. Rules and Regulations. Endangered and Threatened Wildlife and Plants; Determination that designation of critical habitat is not prudent for the northern long-eared bat. 81:24707-24717.

¹¹ Foster, R. W. and A. Kurta. 1999. Roosting ecology of the Northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). *Journal of Mammalogy*. 80(2):659-672.

¹² Yates and Muzika, 2006. Effect of forest structure and fragmentation on site occupancy of bat species in Missouri Ozark forests. *The Journal of Wildlife Management*, 70(5):1238-1248.

¹³ Keeley, B.W. & M.D. Tuttle. 1999. *Bats in American Bridges*. Bat Conservation International, Inc., Austin, Texas. 42 pp.



4.4 Direct Impacts

Direct impacts to the northern long-eared bat may occur during project construction, project operation, and project maintenance. For example, during project construction a direct impact to roosting bats could result from roost disturbance or bridge removal. A direct impact from project operations could include vehicle/bat collisions. Project maintenance direct impacts could include bridge repair or replacement of a structure that is an active roost. Conservation measures and mitigation commitments have been developed to avoid or minimize the chance of direct impacts. These include avoiding tree removal of trees greater than three inches dbh during seasonal potential bat use periods and inspection of bridges and culverts greater than 60 inches of height or rise for the presence of bats prior to construction activity on the bridge or culvert.

4.4.1 Forests and Tree Cover

A direct impact to forests as a result of the Project would arise from the removal of trees for construction of the interstate within the selected refined preferred alternative right of way. The term “forest” as used in analysis of impacts differs from the term “tree cover” used in the analysis of impacts. “Tree cover” is a dataset of all tree crown coverage, no minimum size, including forest and forest fragments which were field verified for the DEIS. Tree cover consisted of 2011 NLCD forest outside of the right of way and adjacent survey area and DEIS forest and forest fragments within the right of way and adjacent survey area. “Forests” were delineated using the USDA definition of forest. This definition states that the minimum area for classification of forest land is one acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. All forests were identified for the Section 6 project in the field and through aerial photography and digitized with current aerial photographs as a backdrop.

Corridor Forest Impacts

The I-69 Section 6 Tier 2 DEIS provides a summary of forest impacts in Section 5.20. There are 159.5 acres of forested land (including both upland forest and wetland forest) estimated to be directly impacted within the refined preferred alternative right of way for I-69 Section 6. Of the 159.5 acres of forest impacted, 157.8 acres are upland forests or non-wetland forests. These forest impacts do not include the estimated impact from utility and billboard relocations of 50.2 acres presented in Chapter 2. Appendix F contains a summary of forest for all sections of I-69.

Forest Characteristics

Methods

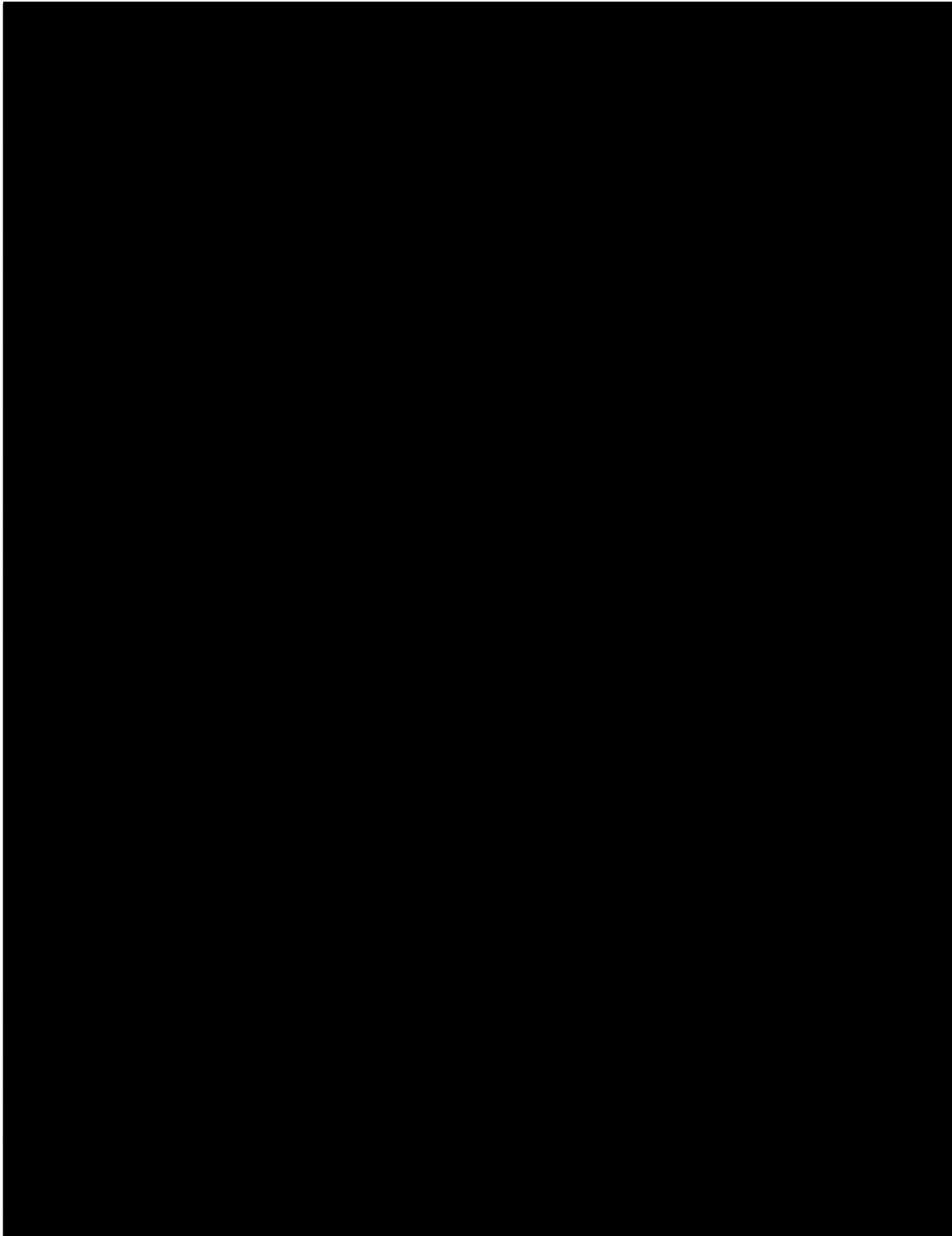
The quality of northern long-eared bat habitat was assessed by completing forest transects assessments, which included a minimum 10% sample dataset. This method was developed by INDOT, FHWA, and USFWS. USFWS approved this methodology as providing an effective forest habitat sample of the I-69 Section 6 refined preferred alternative and adjacent area.



A total of 38 line transects (19 within the proposed right of way and 19 outside the proposed right of way) were completed along the I-69 Section 6 refined preferred alternative. These 38 line transects were approximately 60 feet wide and varied from 285 feet to 1,786 feet in length. The forest transects were distributed throughout I-69 Section 6 to develop a 10% sample of the impacted forests. The forest transects that were completed within right of way impact areas are used to determine how many snags will be impacted and the “outside” of the right of way transects are used to identify how many snags will be remaining. The total area sampled within the I-69 Section 6 refined preferred alternative has 19.4 acres (12.2% of the estimated 159.5 acres impacted by the right of way) and the total area sampled outside the right of way of the refined preferred alternative was 19.3 acres (12.1% of the estimated 159.5 acres impacted by the right of way). The number of snags, upper-canopy tree species and size class, sub-canopy density, invasive species, and live primary habitat tree species >9 inches were sampled in these transects. Appendix D includes forest plot worksheets for each transect. **Figure 4.1-1** shows the location of these forest transects. Each location contained one forest transect within the refined preferred alternative right of way and one outside the right of way.



■ |
Figure 4.4-1: Forest Sampling Transect Locations





Forest Transect Results

There were a total of 78 snags ranging in size from nine to 36 inch dbh identified from the 19 line transects sampled within the alignment. There were a total of 62 snags ranging in size from nine to 40 inch dbh from the 19 line transects sampled outside the alignment. **Table 4.4-1** shows the occurrence of snags per acre sampled and also shows an estimate of the average number of snags per acre for the forests in this area. A comparison of the means (Student’s t Test) showed no significant difference between the number of snags within or outside the right of way at $p < .05$ ($t = 0.8403$, $df = 36$, $p = 0.203144$).

Table 4.4-1: I-69 Section 6 Forest Transect Snag Data for Northern Long-Eared Bat

Transects Within Alignment			Transects Outside Alignment		
Sample Results		Snag Estimates	Sample Results		Snag Estimates
Number of Snags	Acres Sampled	Snags/Acre	Number of Snags	Acres Sampled	Snags/Acre
78	19.4	4.1 ± 3.2	62	19.3	3.3 ± 2.9

Dominant trees in the upper canopy from line transect samples both within and outside the refined preferred alternative consisted of sugar maple (*Acer saccharum*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), shagbark hickory (*Carya ovata*), white oak (*Quercus alba*), beech (*Fagus grandifolia*), red oak (*Quercus rubra*), black walnut (*Juglans nigra*), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), and black locust (*Robinia pseudoacacia*).

Dominant trees found “within” the transects of the refined preferred alternative in order of abundance were sugar maple, tulip poplar, black cherry, white oak, red oak, red maple, shagbark hickory, pignut hickory, black walnut, and silver maple. Dominant trees found outside the transects of the refined preferred alternative in order of abundance were sugar maple, black locust, shagbark hickory, black cherry, silver maple, cottonwood, pignut hickory, red maple, beech, and black walnut. Species diversity within and outside the right of way appeared similar.

The majority of trees constituting the upper canopy sampled in all 38 line transects were nine to 46 inch dbh. The overall sub-canopy density for these 38 line transects ranged from open areas to dense areas. Invasive plants included principally Amur honeysuckle (*Lonicera sp.*), Japanese honeysuckle (*Lonicera japonica*), garlic mustard (*Alliaria petiolata*), creeping Charlie (*Glechoma hederacea*), multiflora rose (*Rosa multiflora*), winter creeper (*Euonymus fortunei*), burning bush (*Euonymus alatus*), and Russian olive (*Elaeagnus angustifolia*) were growing in the sub-canopy in 100% (19 of 19 sites) transects within the right of way, and in 95% (18 of 19 sites) outside of the right of way.



Analysis

Nineteen forest transects were completed within and 19 forest transects were completed outside the proposed refined preferred alternative right of way for I-69 Section 6. The total linear distance sampled within the alignment was approximately 2.7 miles which equals about 10% of the total length (26.9 miles) of proposed highway. The mean number of snags/acre within the right of way was 4.1 ± 3.2 (n = 78 snags), while the mean number of snags outside the right of way was 3.3 ± 2.9 (n = 62 snags). The forest transects were 60 feet wide and approximately the same length in all but one forest transect, and it was different by 113 feet. Variability in snags per line transect ranged from zero to 12.93 snags/acre. No significant difference was shown between the number of snags inside and outside the refined preferred alternative. A combined total of all forest transects showed 3.6 snags/acre (n = 38). While the construction of the I-69 Section 6 refined preferred alternative will impact some of the northern long-eared bat habitat in the SAA, there will still be ample habitat remaining after construction.

Forest impacts in the action area were evaluated in two parts: in the maternity colonies and in the RSAA. Snag projections were also calculated in these two parts. Tier 2 forest transects found an average of 4.1 snags/acre within and 3.3 snags/acre outside the refined preferred alternative. An average 3.6 snags/acre was used for maternity colony calculations. **Table 4.4-2** summarizes the results of the snag analysis.

Table 4.4-2: I-69 Section 6 Forest Transect Snag Availability Results for the Northern Long-Eared Bat

	Snags Available ¹	Snags Impacted ² (% of available)	Snags Remaining
Lambs Creek Maternity Colony	7,006	0 (0.00%)	7,006
Clear Creek East Fork Maternity Colony	6,221	90 (1.45%)	6,131
White River Maternity Colony	3,218	44 (1.37%)	3,174
White River – Goose Creek Maternity Colony	2,945	26 (0.88%)	2,919
Pleasant Run Maternity Colony	3,708	9 (0.24%)	3699
Remaining Summer Action Area	56,005	399 (0.71%)	55,606

1. Available tree cover X 3.6 snags/acre

2. RPA forest impacts X 3.6 snags/acre

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In the Lambs Creek Maternity Colony, 1,946 acres of tree cover¹⁴ are available. This equates to 7,006 available snags at 3.6 snags/acre density. Based on DEIS forest data¹⁵, no forests will be impacted within the maternity colony by the refined preferred alternative, resulting in no snags impacted within in the refined preferred alternative.

In the Clear Creek East Fork Maternity Colony, 1,728 acres of tree cover are available. This equates to 6,221 available snags at 3.6 snags/acre density. Based on DEIS forest data, 24.9 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 90 snags impacted within the refined preferred alternative. This is approximately 1.45% of the available snags in the maternity colony.

In the White River Maternity Colony, 894 acres of tree cover are available. This equates to 3,218 available snags at 3.6 snags/acre density. Based on DEIS forest data, 12.3 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 44 snags impacted within the refined preferred alternative. This is approximately 1.37% of the available snags in the maternity colony circle.

In the White River – Goose Creek Maternity Colony, 818 acres of tree cover are available. This equates to 2,945 available snags at 3.6 snags/acre density. Based on DEIS forest data, 7.1 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 26 snags impacted within the refined preferred alternative. This is approximately 0.88% of the available snags in the maternity colony circle.

In the Pleasant Run Maternity Colony, 1,030 acres of tree cover are available. This equates to 3,708 available snags at 3.6 snags/acre density. Based on DEIS forest data, 2.4 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to nine snags impacted within the refined preferred alternative. This is approximately 0.24% of the available snags in the maternity colony circle.

The Clear Creek East Fork and the White River Maternity Colonies overlap, but there were no forest impacts within the overlapping area.

In the RSAA, 15,557 acres of forest (tree cover where available and 2011 NLCD land cover data¹⁶) are available. This equates to 56,005 available snags. The forest impact in the RSAA is 110.9 acres, resulting in impacts to an estimated 399 snags. This is approximately 0.71% of the available snags in the RSAA.

¹⁴ *Tree Cover – defined as all trees, including individual, fragmented groups of trees. Delineated from 2011 NLCD Land Cover outside of the right of way and field delineated forest and forest fragments within the right of way.*

¹⁵ *Forest included groups of trees >1 acre and wider than 120 feet as verified for the DEIS within the right of way. This includes forested wetlands as well as upland forest.*

¹⁶ *Forest included tree cover (forest and forest fragments) where available and 2011 NLCD land cover forest in the remaining areas.*



Consequently, in the maternity colonies, the percent of snags being impacted range from 0.0% to 1.45% and in the RSAA impacts include approximately 0.71% of available snags. Based on this level of impact, the construction of I-69 is anticipated to have an insignificant and discountable effect on snag availability for northern long-eared bats within the SAA.

Summer Action Area (SAA)

The SAA totaled 95,233 acres as shown in **Figure 4.1-1**. Of this SAA, the maternity colony area equals 21,554 acres. The area within the SAA, yet outside of the maternity colony foraging areas, is referred to in this document as the Remaining Summer Action Area (RSAA). The RSAA is defined as the area of the original three-mile wide SAA, expanded by the boundaries of induced growth TAZs, with any area overlapping maternity colony circles removed. **Table 4.4-3** shows direct tree cover impacts in the maternity colonies, while **Table 4.4-4** shows the direct impacts to forest in the RSAA. The Tier 1 information impacts are also provided for comparison purposes. The Tier 1 information is shown in grey text and referred to as the Representative Alignment (RA).

The RSAA includes 73,719 acres. This area was analyzed to account for impacts to more solitary northern long-eared bats such as males and non-reproductive females. The analysis included total forest and forest core in the RSAA, forest and forest core directly impacted, as well as wetland resources directly in the RSAA. Additionally, this analysis included indirect and cumulative impacts to forest resources anticipated for I-69 Section 6. As with the maternity colony analysis, forest resources used included forest cover delineated for the DEIS within the I-69 right of way, and 2011 NLCD forest and woody wetland class data for those areas beyond the I-69 right of way.

The RSSA of 73,719 acres presented in this BA for I-69 Section 6 is a significant decrease from the 203,134 acres in the October 10, 2014 Tier 1 BA Addendum for the northern long-eared bat. This difference is due to the larger area included as induced TAZs reported in 2014. In addition, total forest acres (non-wetland) has been reduced from 35,018 acres in 2014 (i.e., representative alignment) to 15,557 acres for the refined preferred alternative today. Similarly, core forest has decreased from 6,921 acres for the representative alignment to 3,109 acres in the refined preferred alternative. Forest impacts for the refined preferred alternative showed approximately 46.7 acres of impact within the maternity colonies and approximately 110.9 acres outside the maternity colonies in the RSSA.

In addition, there will be approximately 11.5 acres of core forest impacted by the refined preferred alternative right of way. Of these 11.5 acres, 4.1 acres are located within the RSAA, zero acres are located within the Lambs Creek Maternity Colony, 2.1 acres are located within the Clear Creek East Fork Maternity Colony, 5.3 acres are located within the White River Maternity Colony, zero acre are located within the White River – Goose Creek Maternity Colony, and zero acre are located within the Pleasant Run Maternity Colony. There is no core forest impact within the overlap between Clear Creek East Fork and White River Maternity Colonies. There is an increase of 5.5 acres from the finding in the analysis of the representative alignment in the Tier 1



BA Addendum when compared to the refined preferred alternative. **Table 4.4-3** shows the direct impacts to forest and tree cover in the northern long-eared bat maternity colonies.

Maternity Colony Tree Cover Impacts

The NLEB Lambs Creek Maternity Colony contains 1,946 acres of tree cover. Within the refined preferred alternative, no acres of tree cover will be impacted within the right of way. This is similar to the less than 1 acre as reported in the analysis of the representative alignment in 2014. **Figure 4.4-2** shows the tree cover within the NLEB Lambs Creek Maternity Colony and potential impacts.

The NLEB Clear Creek East Fork Maternity Colony contains 1,728 acres of tree cover. Within the refined preferred alternative, 29.8 acres of tree cover will be impacted within the right of way. This impact has decreased from the 48 acres reported in the analysis of the representative alignment in 2014 due to a reduction in right of way take. **Figure 4.4-3** shows the tree cover within the NLEB Clear Creek East Fork Maternity Colony and potential impacts.

The NLEB White River Maternity Colony contains 894 acres of tree cover. Within the refined preferred alternative, 16.7 acres of tree cover will be impacted within the right of way. This impact has decreased from the 40 acres reported in the analysis of the representative alignment in 2014 due to a reduction in right of way take. **Figure 4.4-4** shows the tree cover within the NLEB White River Maternity Colony and potential impacts.

The NLEB White River – Goose Creek Maternity Colony contains 818 acres of tree cover. Within the refined preferred alternative, 13.8 acres of tree cover will be impacted within the right of way. This impact has increased from the 9 acres reported in the analysis of the representative alignment in 2014. **Figure 4.4-5** shows the tree cover within the NLEB White River – Goose Creek Maternity Colony and potential impacts.

The NLEB Pleasant Run Maternity Colony contains 1,030 acres of tree cover. Within the refined preferred alternative, 2.6 acres of tree cover are impacted within the right of way. This impact is a slight increase in impact when compared to the less than 1 acre reported in the analysis of the representative alignment in 2014. **Figure 4.4-6** shows the tree cover within the NLEB Pleasant Run Maternity Colony and potential impacts.

Summary

A concerted effort has been made in both the placement of the corridor during Tier 1, and the refined preferred alternative in Tier 2, to avoid and minimize impacts to forests in I-69 Section 6. The impact of the refined preferred alternative right of way on forests/tree cover habitat (1.00% of the available forest/tree cover habitat total within the I-69 Section 6 SAA) is considered insignificant and discountable in relation to the habitat needs for the northern long-eared bat. The commitment has been made to not remove any trees in the SAA with a diameter of 3 inches or greater between April 1 and September 30. In addition, FHWA and INDOT have committed to replacing upland forest at a 3:1 ratio. Based on **Table 4.4-3** and **Table 4.4-4**, there is ample amount of forest habitat available for the northern long-eared bat within the I-69 Section 6 SAA.



Figure 4.4-2: NLEB Lambs Creek Maternity Colony Tree Cover Impacts

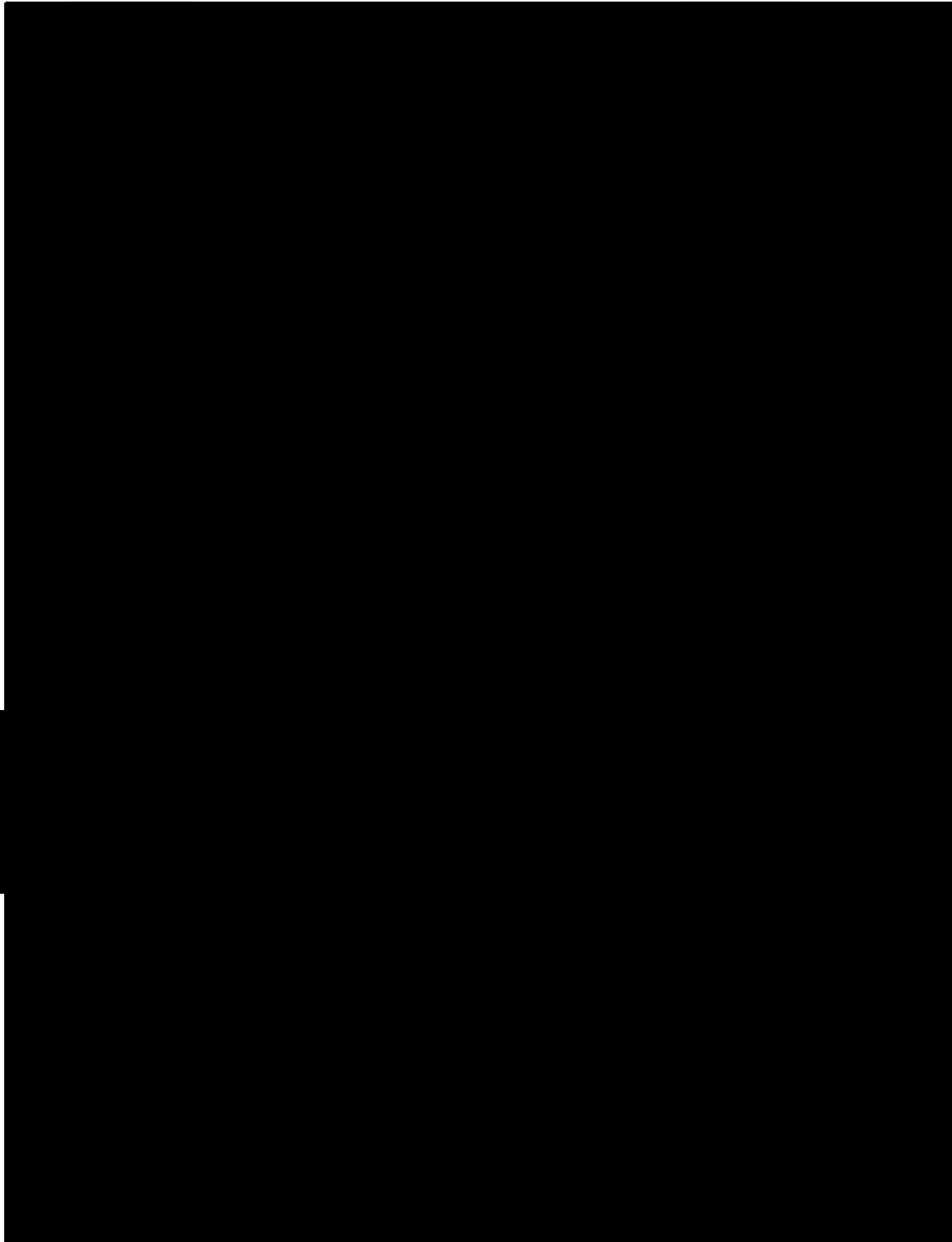




Figure 4.4-3: NLEB Clear Creek East Fork Maternity Colony Tree Cover Impacts

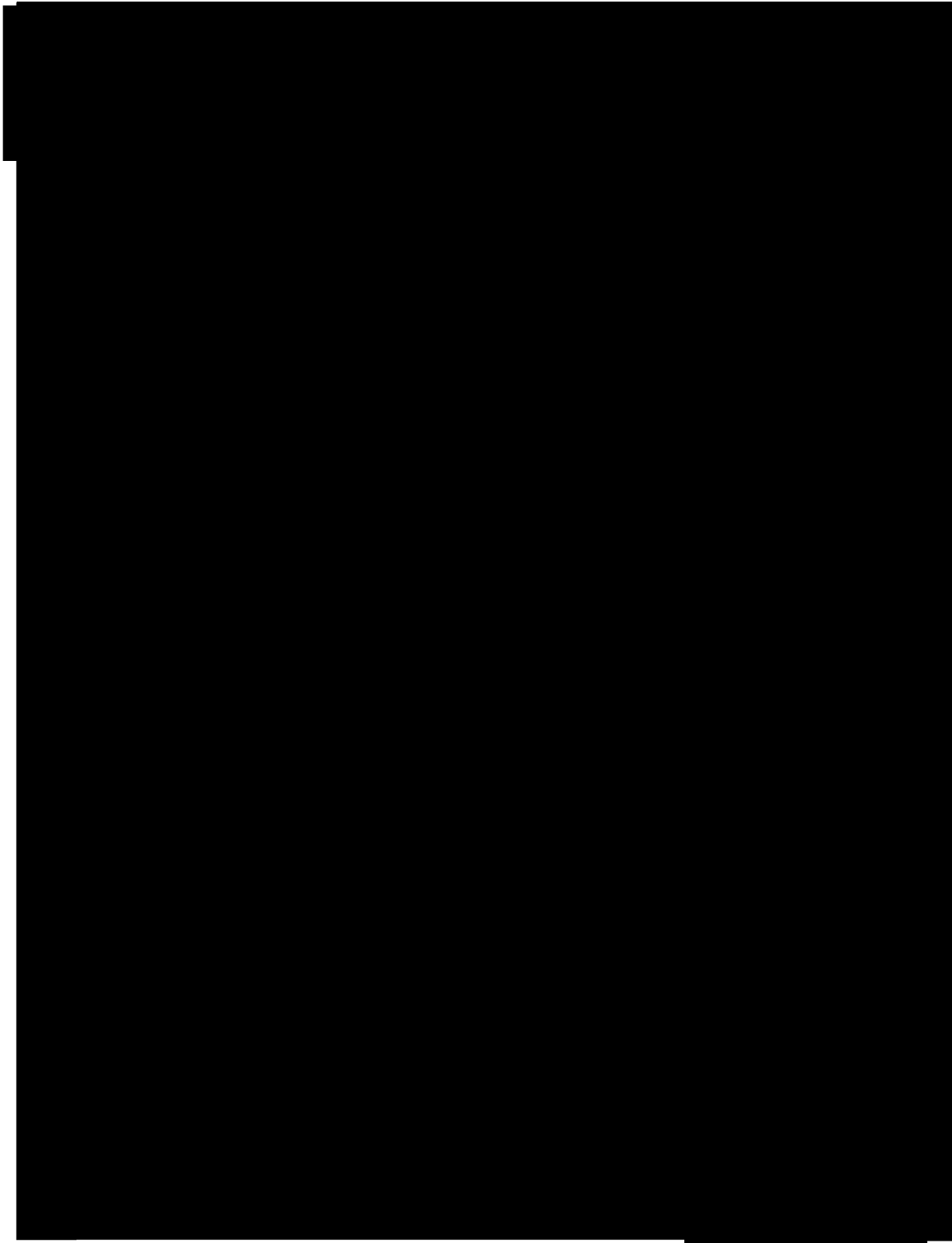




Figure 4.4-4: NLEB White River Maternity Colony Tree Cover Impacts

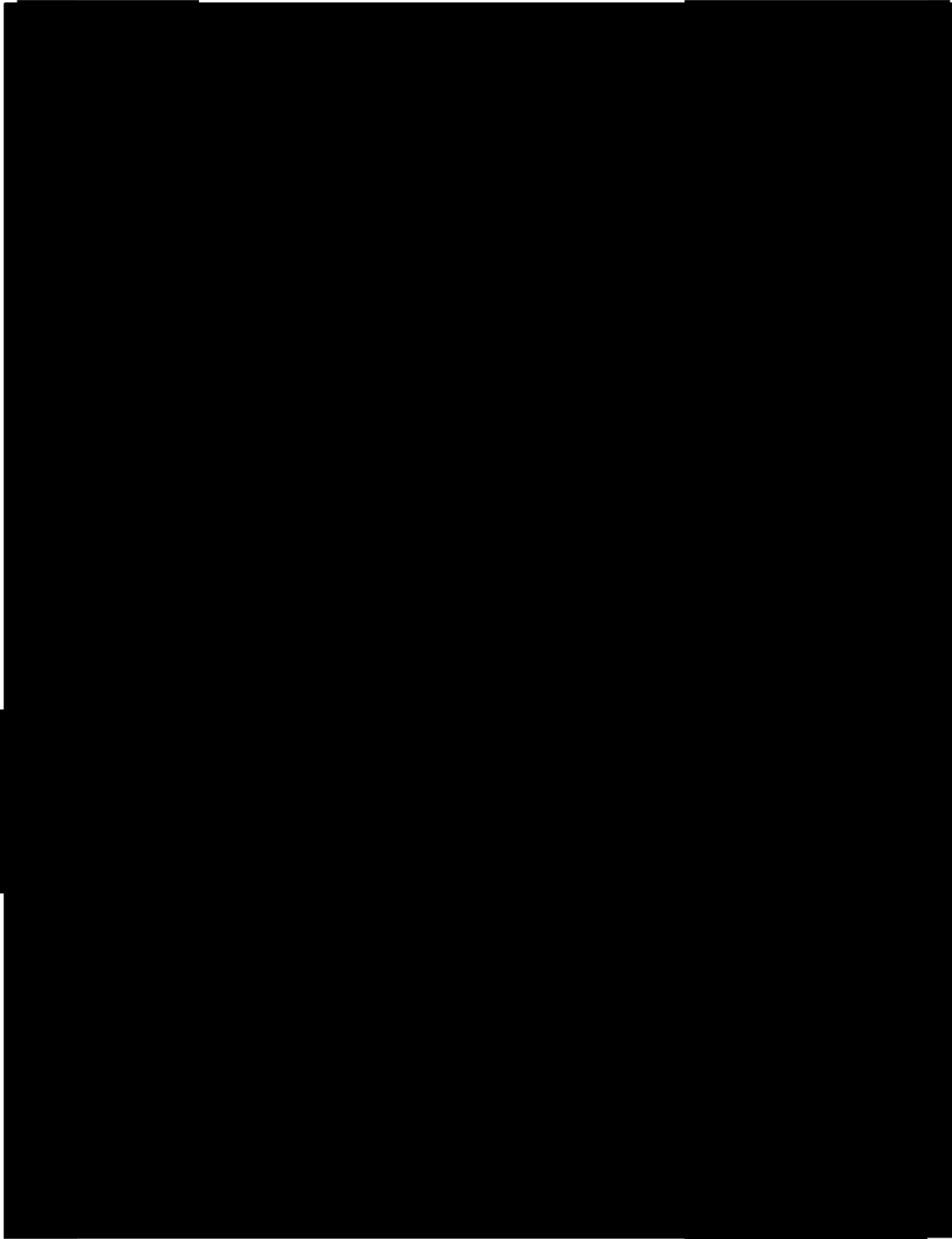




Figure 4.4-5: NLEB White River-Goose Creek Maternity Colony Tree Cover Impacts

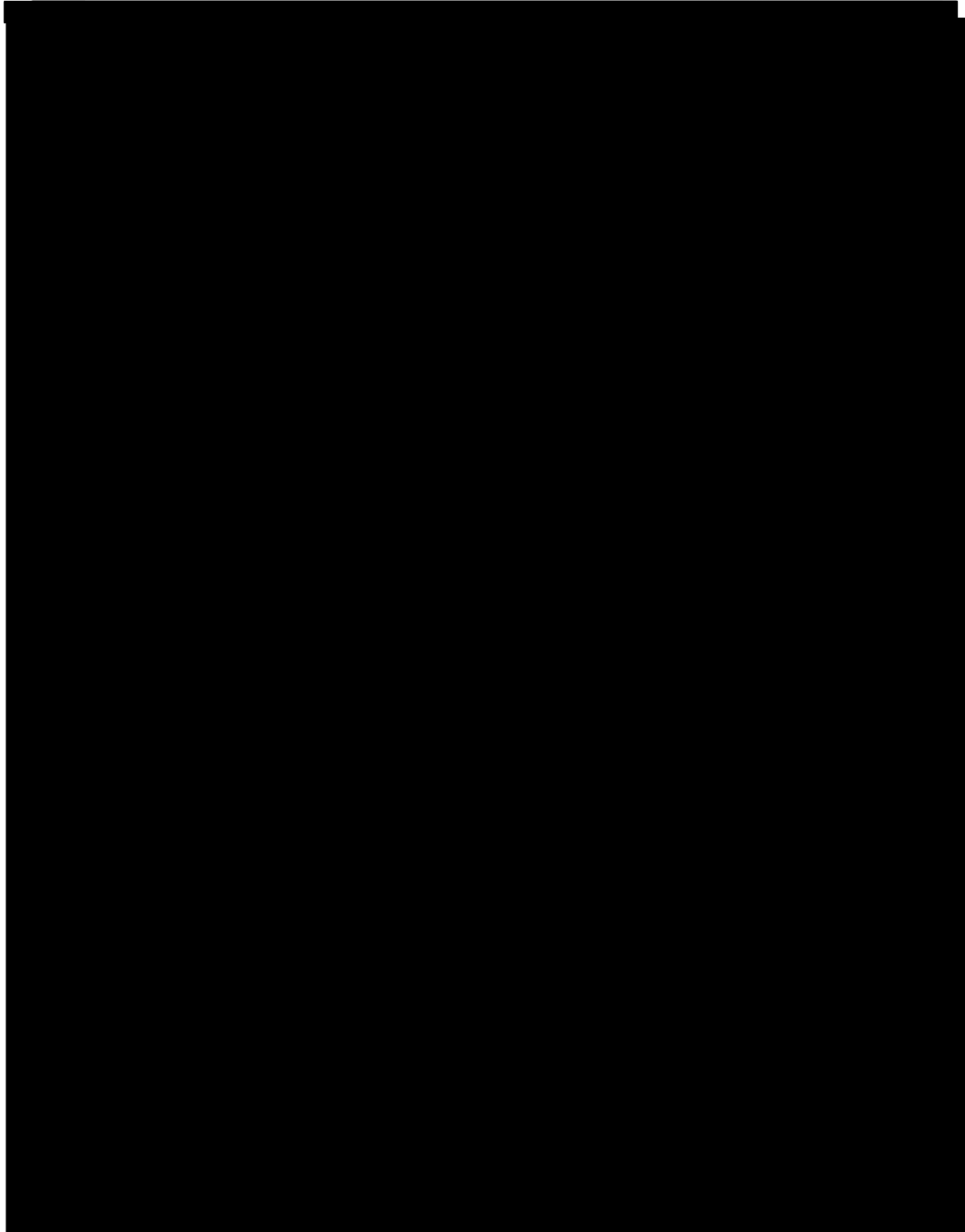




Figure 4.4-6: NLEB Pleasant Run Maternity Colony Tree Cover Impacts

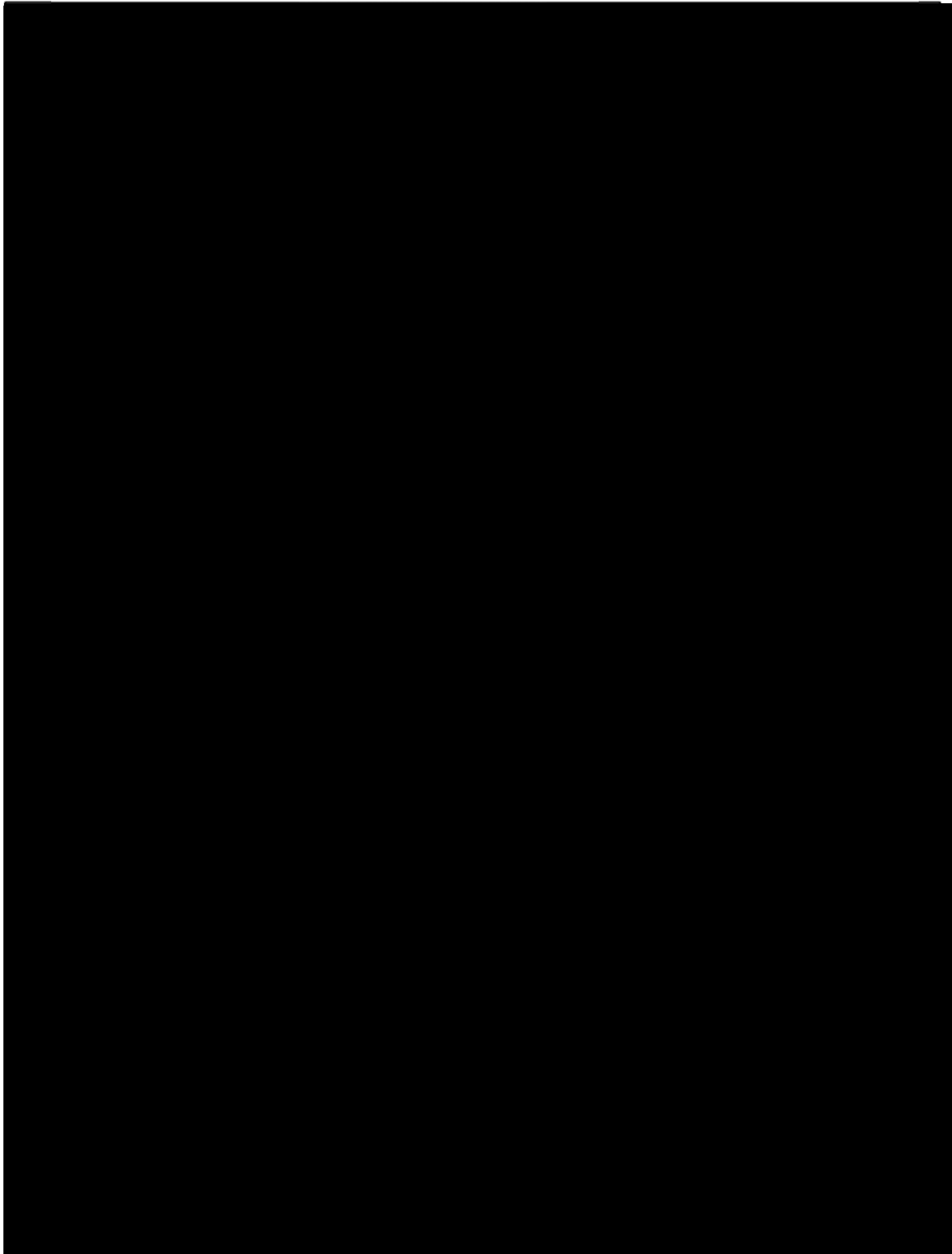




Table 4.4-3: Forests and Tree Cover Direct Impacts for Maternity Colonies

NLEB Lambs Creek Maternity Colony			
NLEB Lambs Creek Maternity Colony Use Area (acres)	4,524		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	1,947 ²	<1 ²	1,947 ²
Core Forest (acres)	757 ²	0 ²	757 ²
		RPA Impacts³	Remaining
Tree Cover in the maternity colony (acres)	1,946 ⁴	0 ⁵	1,946
Forest in the maternity colony (acres)	1,946 ⁴	0 ⁶	1,946
Core Forest (acres)	756	0	756
NLEB Clear Creek East Fork Maternity Colony			
NLEB Clear Creek Maternity Colony Use Area (acres)	4,524		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	1,716 ²	48 ²	1,668 ²
Core Forest (acres)	341 ²	0 ²	341 ²
		RPA Impacts³	Remaining
Tree Cover in the maternity colony (acres)	1,728 ⁴	29.8 ⁵	1,698
Forest in the maternity colony (acres)	1,728 ⁴	24.9 ⁶	1,703
Core Forest (acres)	356	2.1 ⁷	354
NLEB White River Maternity Colony			
NLEB White River Maternity Use Area (acres)	4,524		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	884 ²	40 ²	844 ²
Core Forest (acres)	80 ²	0 ²	80 ²
		RPA Impacts³	Remaining
Tree Cover in the maternity colony (acres)	894 ⁴	16.7 ⁵	877
Forest in the maternity colony (acres)	894 ⁴	12.3 ⁶	882
Core Forest (acres)	83	5.3 ⁷	78



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NLEB White River - Goose Creek Maternity Colony			
NLEB White River - Goose Creek Maternity Use Area (acres)	4,524		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	787 ²	9 ²	778 ²
Core Forest (acres)	30 ²	0 ²	30 ²
		RPA Impacts³	Remaining
Tree Cover in the maternity colony (acres)	818 ⁴	13.8 ⁵	804
Forest in the maternity colony (acres)	818 ⁴	7.1 ⁶	811
Core Forest (acres)	35	0 ⁷	35
NLEB Pleasant Run Maternity Colony			
NLEB Pleasant Run Maternity Use Area (acres)	4,524		
	No Build	RA Impacts ¹	Remaining
Tree Cover in the maternity colony (acres)	1,028 ²	<1 ²	1,027 ²
Core Forest (acres)	123 ²	0 ²	123 ²
		RPA Impacts³	Remaining
Tree Cover in the maternity colony (acres)	1,030 ⁴	2.6 ⁵	1,027
Forest in the maternity colony (acres)	1,030 ⁴	2.4 ⁶	1,028
Core Forest (acres)	126	0 ⁷	126
Colony Overlap			
NLEB Clear Creek East Fork and NLEB White River Maternity Colony Overlap (acres)	1,066		
	No Build	RPA Impacts³	Remaining
Tree Cover in the maternity colony (acres)	147 ⁴	2.3 ⁵	145
Forest in the maternity colony (acres)	147 ⁴	0 ⁶	147
Core Forest (acres)	18	0	18
Maternity Colonies Total			
Maternity Colonies Use Area	21,554		
	No Build	RPA Impacts³	Remaining



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Tree Cover in the maternity colony (acres)	6,269 ⁴	60.6 ⁵	6,208
Forest in the maternity colony (acres)	6,269 ⁴	46.7 ⁶	6,222
Core Forest (acres)	1,356	7.4 ⁷	1,349

1. RA = Representative Alignment (Tier 1 BA Addendum).
2. Information presented based on Tier 1 BA Addendum – For the Northern Long-Eared Bat.
3. RPA = Refined Preferred Alternative (New Information) impacts were calculated from Section 6 forest and forest fragment delineation.
4. Available Forest/Tree Cover included forest and tree cover (forest fragments) where available within the right of way and adjacent survey area and the NLCD 2011 forest data in the remaining areas. These sources are the best available current “forest” data for action area comparisons.
5. Tree Cover impacts included forests and groups of trees (forest fragments) that did not classify as forest field verified within the right of way and field survey study area.
6. Forest impacts included groups of trees >1 acre and wider than 120 feet field verified within the right of way and field survey study area.
7. Core area loss resulted from a loss of edge, redefining the core as a smaller area, as described in the I-69 Section 6 Tier 2 DEIS, Section 5.20 “Forests”.

Table 4.4-4: Forest Direct Impacts for the Remaining Summer Action Area

I-69 Section 6 Remaining Summer Action Area (RSAA)			
	No Build	RA Impacts ¹	Remaining
Tier 1 Remaining I-69 Section 6 Action Area (acres)	203,134 ²		
Total Forest (non-wetland) (acres)	35,018 ²	219 ²	34,799 ²
Forest Core Area (acres)	6,921	6	6,915
	No Build	RPA Impacts ³	Remaining
Tier 2 Remaining I-69 Section 6 Action Area (acres)	73,719		
Tree Cover (acres)	15,557	156.6	15,400
Forest (acres)	15,557	110.9	15,446
Core Forest (acres)	3,109	4.1	3,105

1. RA = Representative Alignment (Tier 1 BA Addendum)
2. Information presented based on Tier 1 BA Addendum – For the Northern Long-Eared Bat.
3. RPA = Refined Preferred Alternative (New Information) impacts were calculated from Section 6 forest and forest fragment delineation.



4.4.2 Connectivity

In this BA, connectivity is defined as the potential flight corridors which northern long-eared bats may use when traveling between various habitats. The assessment of habitat connectivity is used to determine how northern long-eared bat capture sites and roost trees may be linked to the I-69 corridor and mitigation sites. This information is important to determine the likelihood of northern long-eared bats traveling from previously identified locations to I-69, and the potential associated use of the existing habitat that will be impacted. In addition, this will identify the most likely locations where northern long-eared bats may cross I-69. In the Tier 1 BO as amended, it was stated that “Brack and Tyrell (1990) found that in early summer, foraging was restricted to riparian habitats. Foraging also occurs over clearings with successional vegetation, along cropland borders, fencerows, and over farm ponds. Maternity colony foraging ranges from a linear strip of creek vegetation 0.5 mi long to a 0.75 mi foraging area along a wooded river.” This information was used when analyzing possible connectivity routes to I-69.

In addition, the straight line distance from each northern long-eared bat capture point and roost tree location to the nearest tree cover impact were determined for comparison to the connectivity distances. The shortest straight-line distance is provided because while improbable, it is possible that northern long-eared bats may fly in a straight path to get to their destination and such distances provide a conservative approach. In most places, connectivity to I-69 would be the same as connectivity to tree cover impacts; this is due to the bats using riparian corridors as flyways. The connectivity to the nearest mitigation site from each known northern long-eared bat capture point and roost tree was also analyzed to establish the relative value of the mitigation sites to the species. Detailed mitigation site information can be found in the Mitigation section of this document.

Section 6 of I-69 entails upgrading an existing multi-lane, divided transportation facility to a full freeway design. Most of the right of way used for the I-69 Section 6 project already is devoted to transportation use. It is reasonable to assume that I-69 will have little additional effect on the habitat connectivity in this section due to the existing highway.

The mist netting surveys completed identified the majority of northern long-eared bats west of the highway as associated with the White River and its major tributaries. In addition, four of the five maternity colonies are impacted more by I-69 on the far eastern outskirts of the colony circles. The NLEB Clear Creek East Fork Maternity Colony has I-69 more near the west edge of it.

Based on this information, and based on the presence of the habitat surrounding the White River to the west of I-69, it is reasonable to assume that there is ample foraging habitat to the west of existing SR 37 and the alignment. These parameters are analyzed below for each northern long-eared bat maternity colony and the RSAA. **Figure 4.4-7 to Figure 4.4-11** show each northern long-eared bat roost tree and capture site in relation to I-69, and connectivity to the nearest mitigation site. **Table 4.4-5** summarizes the results.

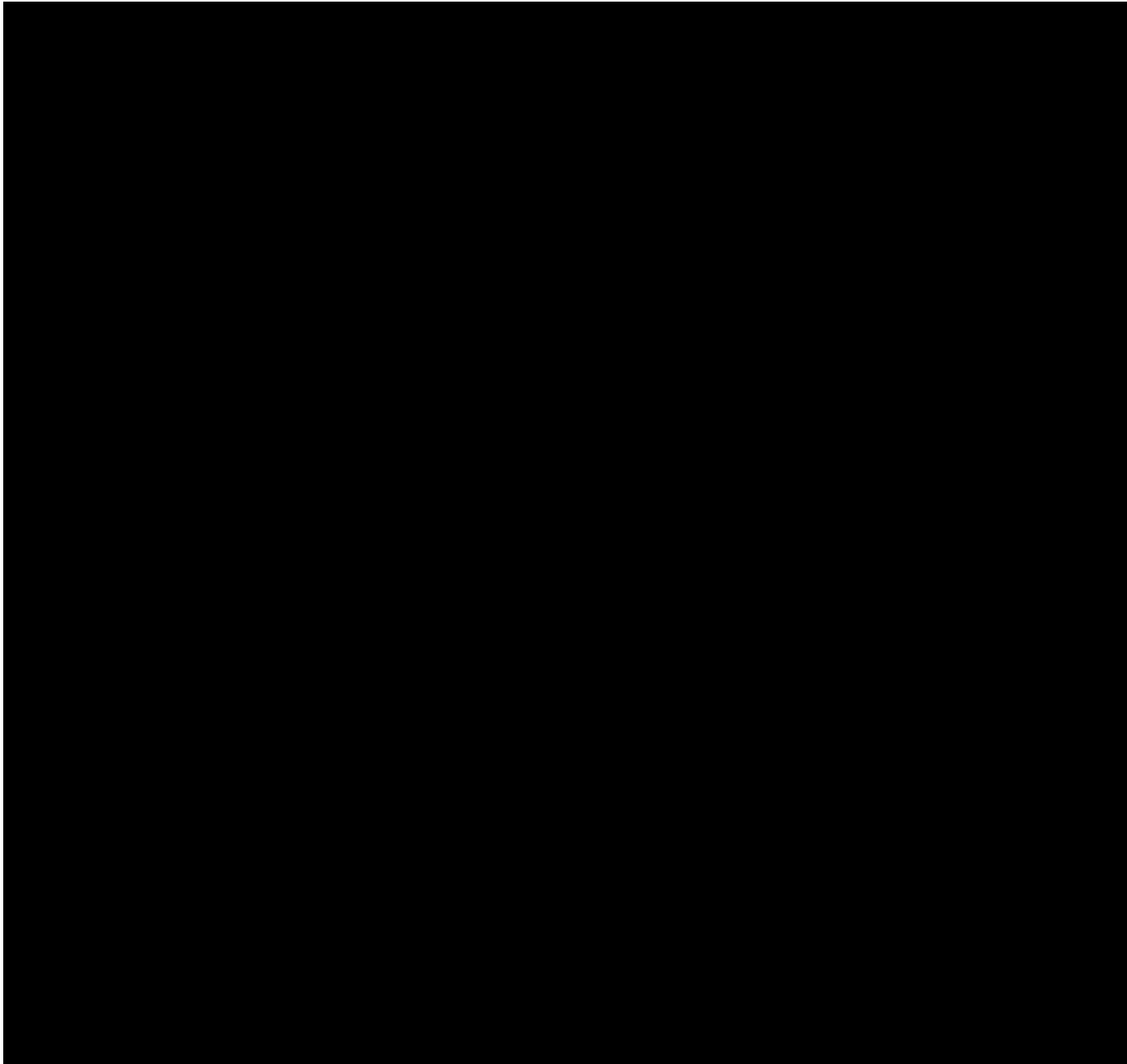


Prior to describing each northern long-eared bat maternity colony and connectivity to I-69 or a mitigation site, it is important to note that this Biological Assessment does not have the volume of data for the northern long-eared bat that is available for the Indiana bat. The NLEB was listed as a federally threatened species in 2015. In 2015, INDOT and FHWA conducted mist netting surveys and radio-telemetry in I-69 Section 6. Multiple northern long-eared bats were captured in earlier mist netting efforts, but there was never any requirement to complete radio-telemetry studies before 2015. In addition, white nose syndrome, reported in Indiana in January 2011, may also have lowered the number of NLEB.

Connectivity data for the northern long-eared bat includes only one northern long-eared bat roost tree, but there were a number of capture sites. Please refer to Chapter 2 of this document for additional information on the surveys.

Table 4.4-5: Connectivity and Distance to Impacts from known northern long-eared bat Roost Trees and northern long-eared bat Capture Points and Connectivity to Closest Mitigation Site

A large black rectangular redaction covers the entire content area of the page, obscuring the data from Table 4.4-5.



NLEB Lambs Creek Maternity Colony

One northern long-eared bat capture site (Site 24 from I-69 Section 5) is located within the NLEB Lambs Creek maternity colony. No roost trees have been identified for the northern long-eared bat in this colony. Route connectivity to I-69 from this northern long-eared bat capture site occurs primarily along [REDACTED] the [REDACTED] and [REDACTED] a distance of [REDACTED]. The shortest straight-line distance to I-69 is [REDACTED]. Site 24 is [REDACTED] away from the [REDACTED] mitigation site.



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Substantial alternative roosting and foraging habitat is located to the [REDACTED] of the I-69 Section 6 refined preferred alternative in this area. **Figure 4.4-7** shows the northern long-eared bat connectivity pertaining to the NLEB Lambs Creek maternity colony.

NLEB Clear Creek East Fork Maternity Colony

Two northern long-eared bat capture sites (Sites 6 and 7) are located within the NLEB Clear Creek East Fork maternity colony. No roost trees have been identified for the northern long-eared bat in this colony. Route connectivity to I-69 from the northern long-eared bat capture sites are along [REDACTED] [REDACTED], distances from Site 6 ([REDACTED] [REDACTED]) and Site 7 [REDACTED]. The shortest straight-line distance to I-69 are [REDACTED] [REDACTED] and [REDACTED] [REDACTED] respectively. Site 6 is about [REDACTED] from the [REDACTED] mitigation site, while Site 7 is on the [REDACTED] mitigation property.

Substantial alternative roosting and foraging habitat is located upstream and downstream of these two sites. Upstream of Site 7, INDOT and FHWA also have another mitigation site called [REDACTED] [REDACTED]. **Figure 4.4-8** shows the northern long-eared bat connectivity pertaining to the NLEB Clear Creek East Fork maternity colony.

NLEB White River Maternity Colony

Two northern long-eared bat capture sites (Sites 10 and 13) are located within the NLEB White River maternity colony. No roost trees have been identified for the northern long-eared bat in this colony. Route connectivity to I-69 from the northern long-eared bat capture sites are along the White River and Stotts Creek. Distance from Site 10 is [REDACTED] [REDACTED] and from Site 13 is [REDACTED] [REDACTED]. In the same order, the shortest straight-line distances to I-69 are [REDACTED] mile and [REDACTED] mile. Site 10 is [REDACTED] mile and Site 13 is [REDACTED] mile from a large landlocked mitigation property.

Substantial alternative roosting and foraging habitat is located [REDACTED] and [REDACTED] of these two sites along the [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. **Figure 4.4-9** shows the northern long-eared bat connectivity pertaining to the NLEB White River maternity colony.

NLEB White River – Goose Creek Maternity Colony

Three northern long-eared bat capture sites (Sites 19, 20 and 21) are located within the NLEB White River – Goose Creek maternity colony. There is one roost tree used by the northern long-eared bat in this colony. It is [REDACTED] [REDACTED] from I-69 following riparian corridors, and [REDACTED] [REDACTED] using a straight line distance to I-69. It is across the White River (0.27 mile) from the WF Farms mitigation site.

Route connectivity to I-69 from the northern long-eared bat capture sites (19 and 20) are along [REDACTED] [REDACTED] the [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. Route connectivity to I-69 from capture site 21 is the [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. Distances are [REDACTED] [REDACTED] and [REDACTED] [REDACTED] for Sites 19, 20 and 21, respectively. The shortest straight-line distances to I-69 are [REDACTED] [REDACTED] and [REDACTED] [REDACTED], respectively. Sites 19 and 20 are [REDACTED] [REDACTED] and [REDACTED] [REDACTED] from the [REDACTED] [REDACTED] mitigation



site. Site 21 is [redacted] mile from the [redacted] mitigation site. Connected and north of the [redacted] mitigation site is the Slough mitigation site. In this area, there is a nature preserve, wellhead protection area, utility and water company property.

Substantial alternative roosting and foraging habitat is located upstream and downstream of these three sites. Properties are associated with the White River and land is reasonably remote from any development. Figure 4.4-10 shows the northern long-eared bat connectivity pertaining to the NLEB White River – Goose Creek maternity colony.

NLEB Pleasant Run Maternity Colony

Two northern long-eared bat capture sites (Sites 23 and 25) are located within the NLEB Pleasant Run maternity colony. There are no roost trees identified for the northern long-eared bat in this colony. Route connectivity to I-69 are along the White River and Pleasant Run, with distances of [redacted] miles and [redacted] respectively. Shortest straight-line distance to I-69 are [redacted] and [redacted], respectively. Site 23 is about [redacted] [redacted] from the [redacted] mitigation site, while Site 25 is [redacted] [redacted] for the [redacted] mitigation site.

Substantial alternative roosting and foraging habitat is located [redacted] and [redacted] of these two sites. Figure 4.4-11 shows the northern long-eared bat connectivity pertaining to the NLEB Pleasant Run maternity colony.

Remaining Summer Action Area

Five northern long-eared bat capture sites (Sites 5, 12, 14, 15 and 24) are located within the RSAA. There are no identified roost trees for this species in the RSAA. All of the 7 northern long-eared bats captured at these sites in the RSAA were males.

Site 5 is connected to I-69 via [redacted] [redacted] at [redacted] and [redacted] [redacted] using riparian and straight line distances respectively. It is [redacted] [redacted] from the [redacted] mitigation property.

Site 12 is connected to I-69 via an [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] at [redacted] and [redacted] [redacted] using riparian and straight line distances respectively. It is [redacted] [redacted] from [redacted] [redacted] mitigation property.

Site 14 is connected to I-69 via [redacted] [redacted] and the [redacted] [redacted] at a distance of [redacted] and [redacted] [redacted] using riparian and straight line distances respectively. It is [redacted] [redacted] from the [redacted] [redacted] mitigation site.

Site 15 is connected to I-69 via an [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] at a distance of [redacted] and [redacted] [redacted] using riparian and straight line distances respectively. It is [redacted] [redacted] from the [redacted] [redacted] mitigation property.



Site 24 is connected to I-69 via [REDACTED] [REDACTED] [REDACTED] at a distance of [REDACTED] and [REDACTED] using riparian and straight line distances respectively. It is [REDACTED] [REDACTED] from the [REDACTED] mitigation property.

Summary

Since this project entails upgrading an existing multi-lane, divided transportation facility to a full freeway design and that most of the right of way used for the I-69 Section 6 project already is devoted to transportation use, it is reasonable to assume that I-69 will have little effect on the habitat connectivity in this section.

There will still be ample foraging habitat surrounding the White River to the west of I-69 especially due to its remoteness and disposition to flooding. Based on this, impacts to connectivity are considered insignificant.



Figure 4.4-7: NLEB Lambs Creek Maternity Colony Connectivity

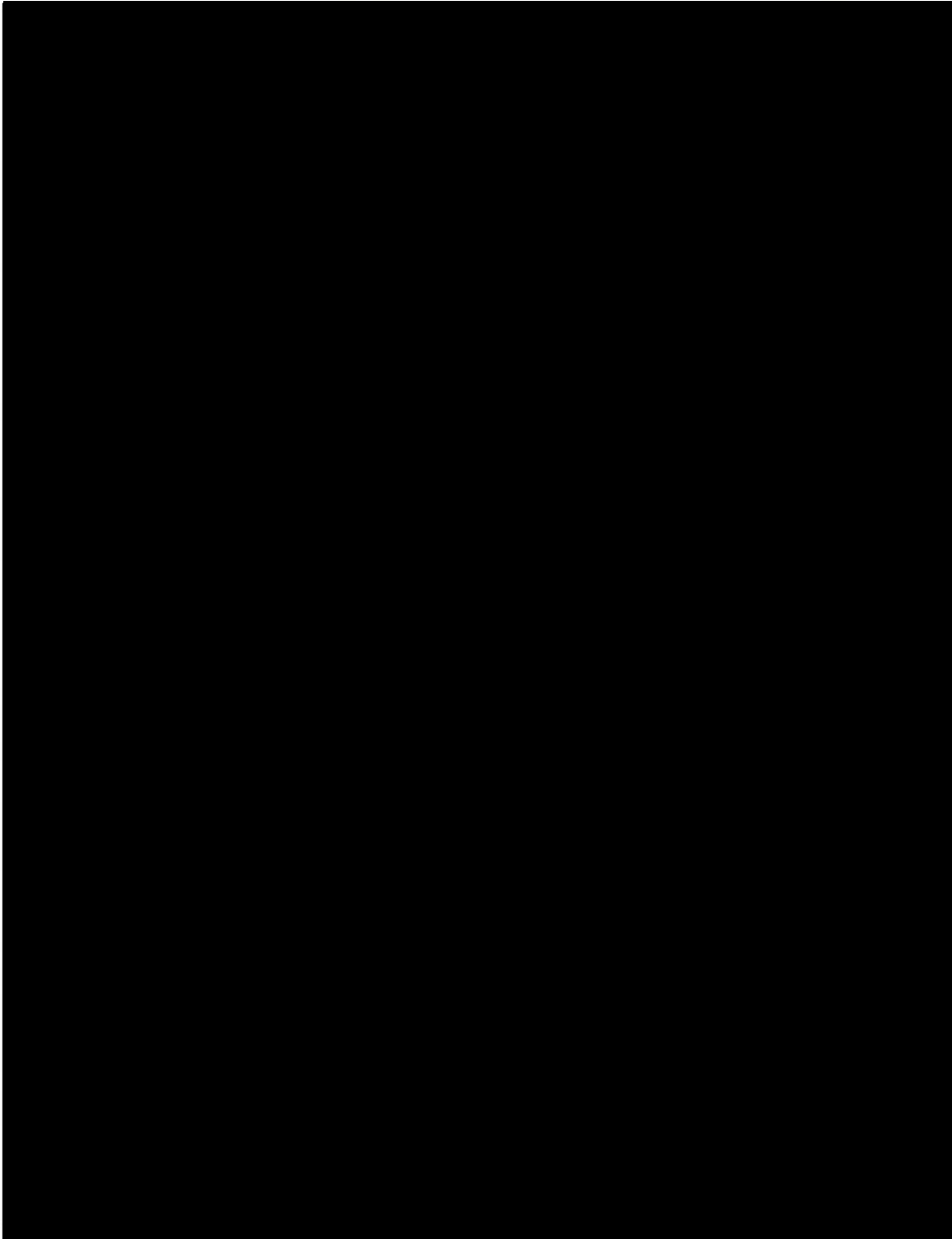




Figure 4.4-8: NLEB Clear Creek East Fork Maternity Colony Connectivity

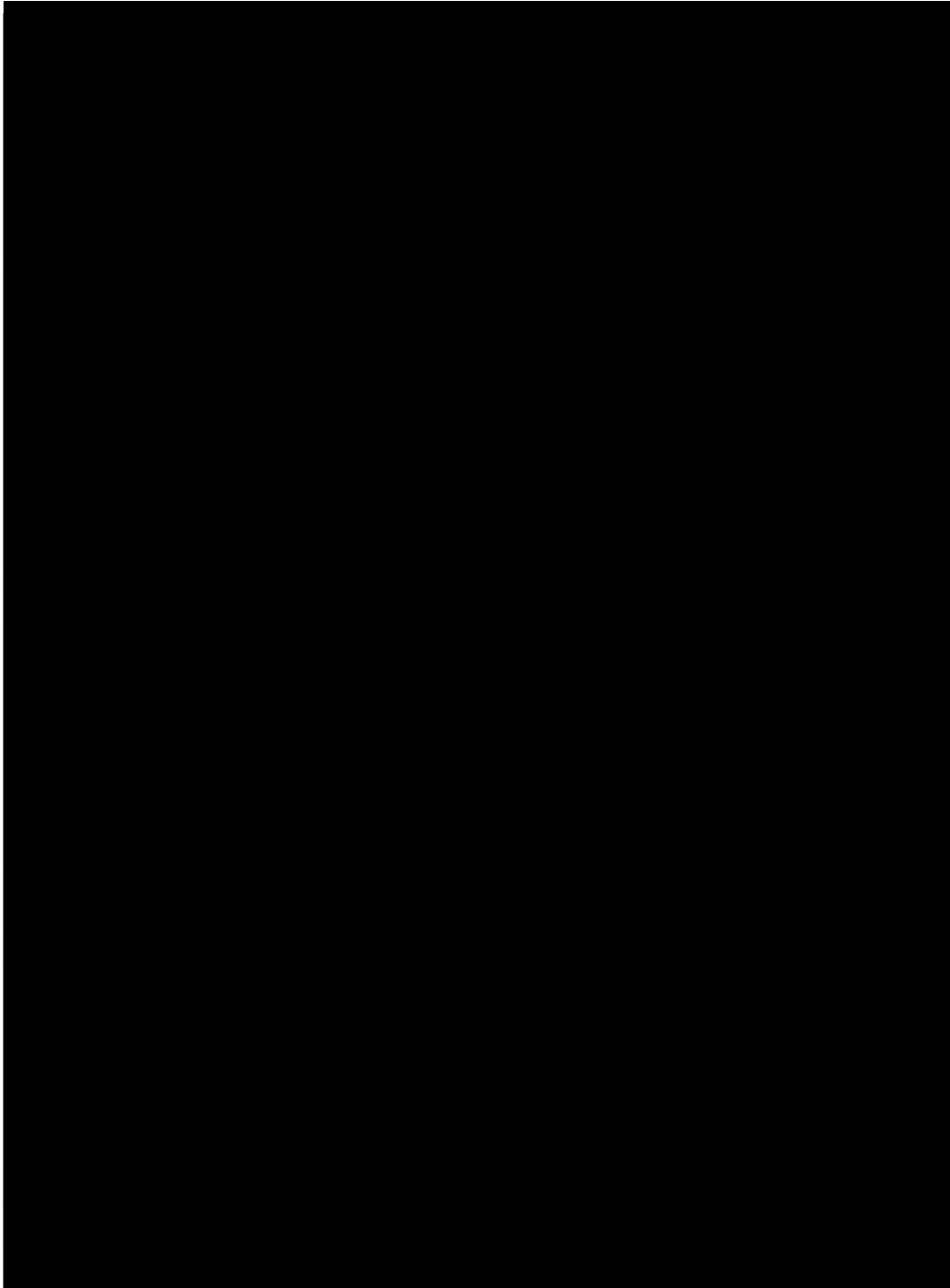




Figure 4.4-9: NLEB White River Maternity Colony Connectivity

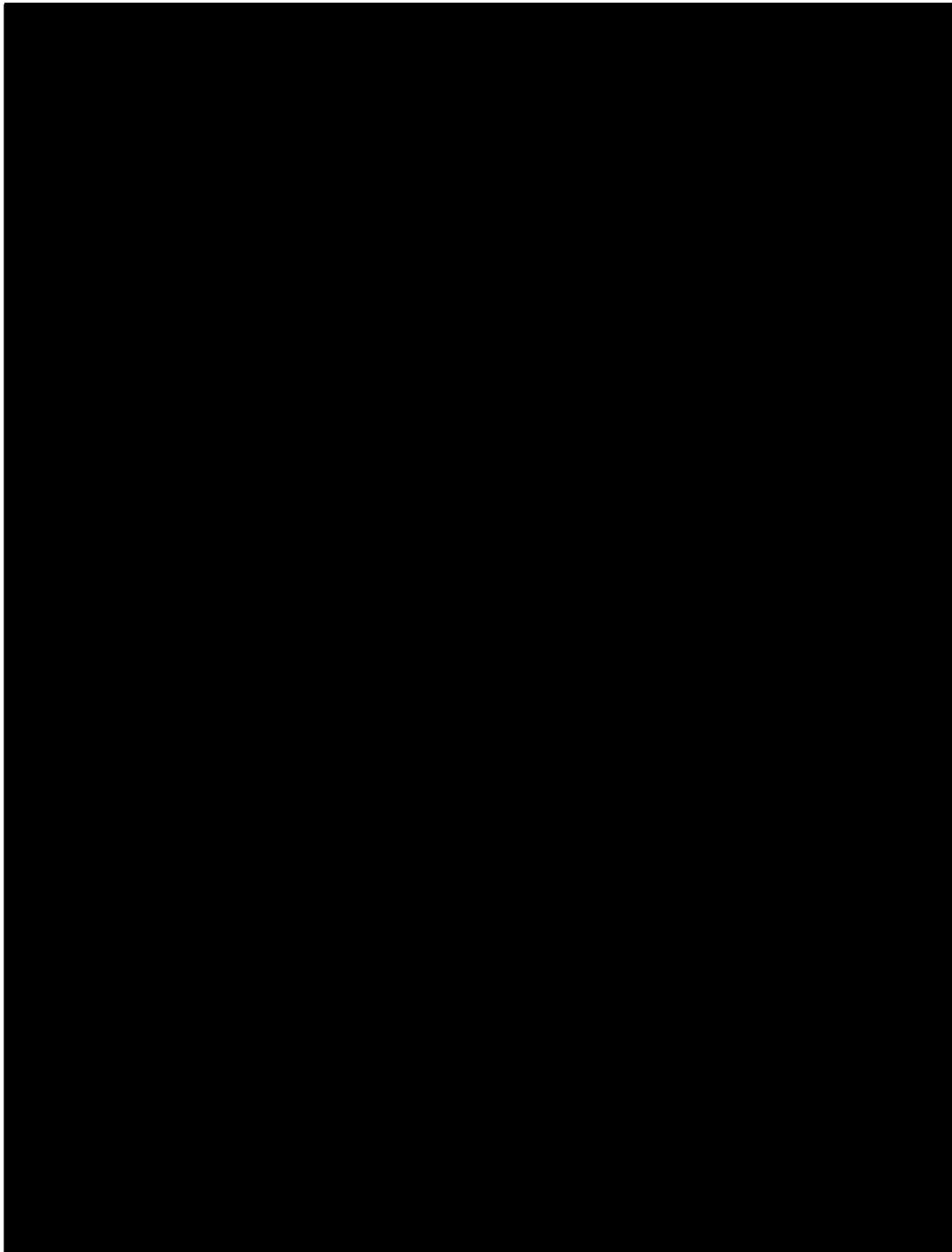




Figure 4.4-10: NLEB White River – Goose Creek Maternity Colony Connectivity

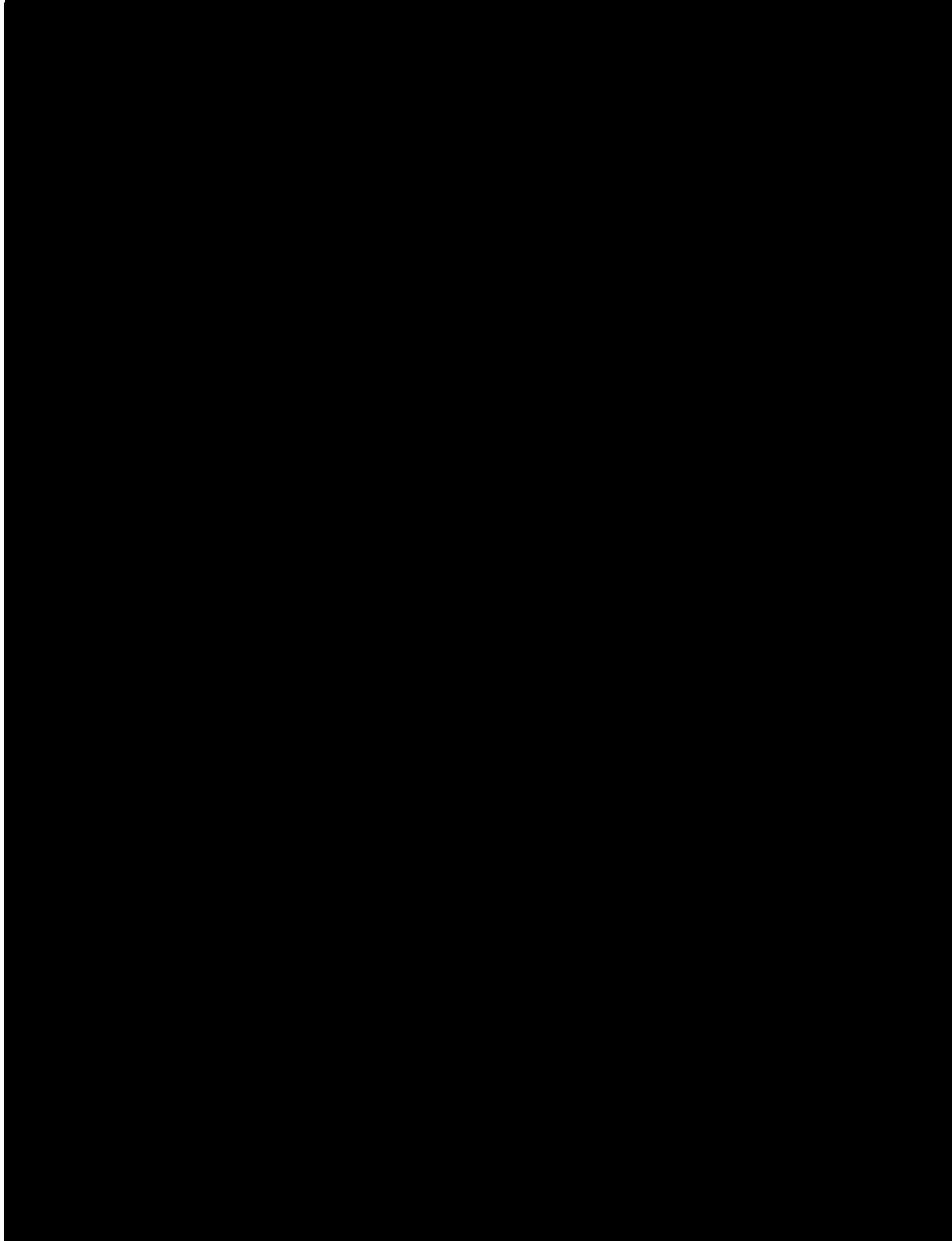
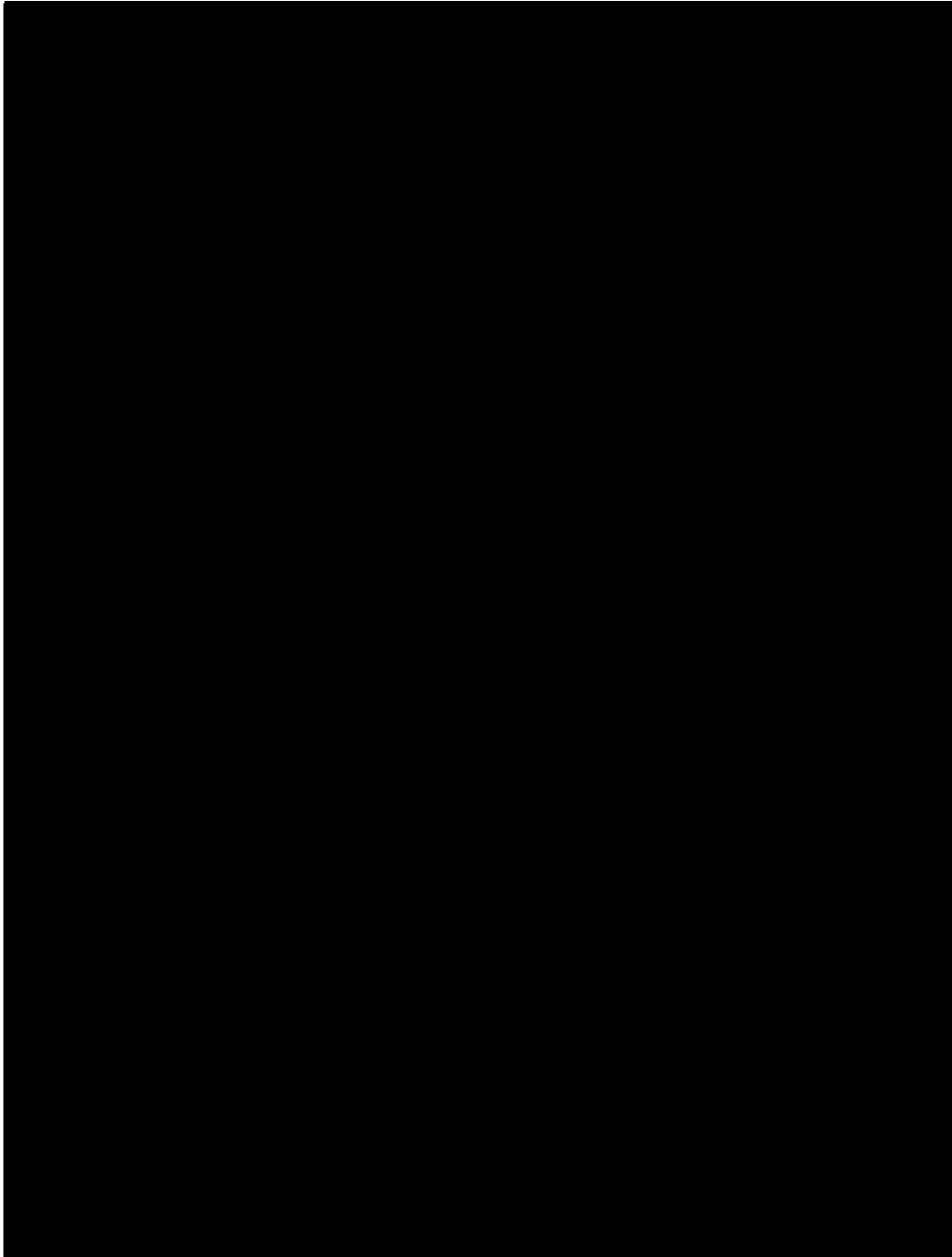




Figure 4.4-11: NLEB Pleasant Run Maternity Colony Connectivity





4.4.3 Water Resources

Wetlands and Ponds

The I-69 Section 6 Tier 2 DEIS discusses wetlands and ponds in Chapter 5.19. Wetlands and wetland complexes will be avoided when possible. If unable to be avoided completely, wetland impacts will be minimized by shifts in the alignment wherever practicable and feasible in final design. A firm commitment was made that wetlands and other water resources will be actively avoided wherever practicable and feasible throughout the final design of the I-69 Section 6 roadway. All water resource areas within the right of way will be identified on the design plans and these areas will have erosion control measures as approved by IDEM as part of the overall erosion control plan for the roadway project to prevent any filling or contamination of these areas during construction of the I-69 Section 6 project.

Wetlands

The RPA includes impacts to 1.90 acres of emergent wetlands, 0.39 acre of scrub-shrub wetlands, 1.70 acres of forested wetlands, and 2.78 acres of open water, both palustrine and lacustrine. The refined preferred alternative would impact 6.77 acres of wetlands, including open water. Appendix F contains a summary of wetland impacts for all sections of I-69.

Maternity Colony Wetland Impacts

Wetlands in two maternity colony circles will be impacted by the Project. **Table 4.4-6** shows impacts to wetlands in the maternity colonies. Tier 2 wetlands were used for these calculations. Tier 2 Wetlands include field verified wetland impacts within the right of way and NWI data current to May 2014 for areas outside the right of way.

The Lambs Creek maternity colony has a total of 82 acres of emergent wetlands, 139 acres of forested wetlands, two acres of scrub-shrub wetlands, and 151 acres of unconsolidated bottom wetlands available. The refined preferred alternative will have no impact to emergent, forested, scrub-shrub or unconsolidated bottom wetlands in the Lambs Creek maternity colony.

The Clear Creek East Fork maternity colony has a total of one acre of aquatic bed wetlands, 39 acres of emergent wetlands, 104 acres of forested wetlands, three acres of scrub-shrub wetlands, and 161 acres of unconsolidated bottom wetlands available. The refined preferred alternative will have no impacts to aquatic bed, emergent, or scrub-shrub wetlands in this colony. The refined preferred alternative will impact 0.4 acre of emergent wetlands, 1.2 acres of forested wetlands, and 0.7 acre of unconsolidated bottom wetlands in the Clear Creek East Fork maternity colony. Approximately 1.0% of the available emergent wetlands, 1.2% of the available forested wetlands and 0.4% of the available unconsolidated bottom emergent wetlands within the Clear Creek East Fork maternity colony will be impacted by the refined preferred alternative.



Table 4.4-6: Wetlands and Ponds Direct Impacts in the NLEB Maternity Colonies

NLEB Lambs Creek Maternity Colony				
Lambs Creek Maternity Colony Use Area (acres)	4,524			
	No Build ³	Impacts		RPA Remaining
		RA ¹	RPA ^{2,4}	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	82	0	0	82
Forested Wetlands (PFO)	139	0	0	139
Scrub-Shrub Wetlands (PSS)	2	0	0	2
Open Water Ponds (PUB/L1UB)	151	0	0	151
NLEB Clear Creek East Fork Maternity Colony				
Clear Creek East Fork Maternity Colony Use Area (acres)	4,524			
	No Build ³	Impacts		RPA Remaining
		RA ¹	RPA ^{2,4}	
Aquatic Bed (PAB)	1	0	0	1
Emergent Wetlands (PEM)	39	2.5	0.4	39
Forested Wetlands (PFO)	104	2.5	1.2	103
Scrub-Shrub Wetlands (PSS)	3	0	0	3
Open Water Ponds (PUB/L1UB)	161	3.1	0.7	160
NLEB White River Maternity Colony				
White River Maternity Colony Use Area (acres)	4,524			
	No Build ³	Impacts		RPA Remaining
		RA ¹	RPA ^{2,4}	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	103	1.9	0.6	102
Forested Wetlands (PFO)	321	0.4	0.3	321



Scrub-Shrub Wetlands (PSS)	1	0	0	1
Open Water Ponds (PUB/PAB)	11	0.1	0	11
NLEB White River – Goose Creek Maternity Colony				
White River – Goose Creek Maternity Colony Use Area (acres)	4,524			
	No Build³	Impacts		RPA Remaining
		RA¹	RPA^{2, 4}	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	9	0	0	9
Forested Wetlands (PFO)	399	0	0	399
Scrub-Shrub Wetlands (PSS)	0.2	0	0	0
Open Water Ponds (PUB/L1UB)	244	0.2	0	244
NLEB Pleasant Run Maternity Colony				
Pleasant Run Maternity Colony Use Area (acres)	4,524			
	No Build³	Impacts		RPA Remaining
		RA¹	RPA^{2, 4}	
Aquatic Bed (PAB)	0	0	0	0
Emergent Wetlands (PEM)	49	0	0	49
Forested Wetlands (PFO)	190	0.3	0	190
Scrub-Shrub Wetlands (PSS)	8	0	0	8
Open Water Ponds (PUB/L1UB)	185	0	0	185
Colony Overlap				
Clear Creek East Fork and White River Maternity Colony Overlap (acres)	600			
	No Build³	Impacts		RPA Remaining
		RPA^{2, 4}		
Aquatic Bed (PAB)	0	0		0
Emergent Wetlands (PEM)	33	0.2		33



Forested Wetlands (PFO)	41	0	41
Scrub-Shrub Wetlands (PSS)	0	0	0
Open Water Ponds (PUB/PAB)	1	0	1
Maternity Colonies Total			
Maternity Colonies Area (acres)	22,020		
	No Build³	Impacts	RPA Remaining
		RPA^{2, 4}	
Aquatic Bed (PAB)	1	0	1
Emergent Wetlands (PEM)	249	0.8	248
Forested Wetlands (PFO)	1,112	1.5	1,110
Scrub-Shrub Wetlands (PSS)	14.2	0	14
Open Water Ponds (PUB/PAB)	751	0.7	750

1. RA = Representative Alignment (Tier 1 BA Addendum).

2. RPA = Refined Preferred Alternative (New Information) Losses were calculated from EIS delineations.

3. Acres calculated using Tier 2 wetlands. These are made from NWI wetlands outside the right of way. Inside the right of way, acres were calculated using field verified wetlands.

4. Impacts calculated from field verified wetlands.

The White River maternity colony has a total of 103 acres of emergent wetlands, 321 acres of forested wetlands, 1.0 acre of scrub-shrub wetlands, and 11 acres of unconsolidated bottom wetlands available. The refined preferred alternative will have no impacts to scrub-shrub wetlands or unconsolidated bottom wetlands in this colony. The refined preferred alternative will impact 0.6 acre of emergent wetlands and 0.3 acre of forested wetlands in the White River maternity colony. Approximately 0.6% of the available emergent wetlands and 0.1% of the available forested wetlands within the White River maternity colony will be impacted by the refined preferred alternative.

The White River – Goose Creek maternity colony has a total of nine acres of emergent wetlands, 399 acres of forested wetlands, 0.2 acre of scrub-shrub wetlands, and 244 acres of unconsolidated bottom wetlands available. The refined preferred alternative will have no impact to emergent, forested, scrub-shrub or unconsolidated bottom wetlands in the White River – Goose Creek maternity colony.

The Pleasant Run maternity colony has a total of 49 acres of emergent wetlands, 190 acres of forested wetlands, eight acres of scrub-shrub wetlands, and 185 acres of unconsolidated bottom



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wetlands available. The refined preferred alternative will have no impacts to scrub-shrub wetlands or unconsolidated bottom wetlands in this colony. The refined preferred alternative will have no impact to emergent, scrub-shrub or unconsolidated bottom wetlands in the Pleasant Run maternity colony. The refined preferred alternative will impact 0.3 acres of forested wetlands in the Pleasant Run maternity colony. Approximately 0.2% of the forested wetlands within the Pleasant Run maternity colony will be impacted by the refined preferred alternative.

In the 600-acre colony overlap between Clear Creek East Fork and White River maternity colonies, there are only 33 acres of emergent wetlands, 41 acres of forested wetlands, and one acre of unconsolidated bottom wetlands. The refined preferred alternative will impact 0.2 acre of emergent wetlands in the colony overlap between Clear Creek East Fork and White River maternity colonies. Approximately 0.6% of the available emergent wetlands within the colony overlap between Clear Creek East Fork and White River maternity colonies will be impacted by the refined preferred alternative.

Remaining Summer Action Area Wetland Impacts

The refined preferred alternative will impact 3.8 acres of wetlands in the RSAA. The RSAA has a total of 12 acres of aquatic bed wetlands, 207 acres of emergent wetlands, 1,033 acres forested wetlands, 18 acres of scrub-shrub wetlands, and 1,852 acres of unconsolidated bottom wetlands available. The refined preferred alternative will have no impacts to aquatic bed wetlands within the RSAA. The refined preferred alternative will impact 1.0 acre of emergent wetlands, 0.3 acre of forested wetlands, 0.4 acre of scrub-shrub wetlands, and 2.1 acres of unconsolidated bottom wetlands located within the RSAA. Approximately 0.5% of the available emergent wetlands, <0.1% of the available forested wetlands, 2.2% of the available scrub-shrub wetlands, and 0.1% of the available unconsolidated bottom wetlands will be impacted in the RSAA. **Table 4.4-7** summarizes wetland impacts in the RSAA.

Table 4.4-7: Wetlands and Ponds Direct Impacts in the NLEB Remaining Summer Action Area

I-69 Section 6 Remaining Summer Action Area				
Tier 1 Remaining Summer Action Area (acres)	203,134			
Tier 2 Remaining Summer Action Area (acres)	73,719			
	No Build ³	Impacts		RPA Remaining
		RA ¹	RPA ^{2,4}	
Aquatic Bed (PAB)	12	0	0	12
Emergent Wetlands (PEM)	207	4.6	1.0	206
Forested Wetlands (PFO)	1,033	5.1	0.3	1,033



Scrub-Shrub Wetlands (PSS)	18	0.3	0.4	18
Open Water Ponds (PUB/PAB)	1,852	36.8	2.1	1,850

1. RA = Representative Alignment (Tier 1 BA Addendum dated October 10, 2014)
2. RPA = Refined Preferred Alternative (New Information) Losses were calculated from EIS delineations.
3. Acres calculated using Tier 2 wetlands. These are made from NWI wetlands outside the right of way. Inside the right of way, acres were calculated using field verified wetlands.
4. Impacts calculated from field verified wetlands.

Open Water, Streams, and Riparian Zone

As discussed above, there are approximately 166.8 acres of open water wetlands (PUB/L1UB) within the field survey study area. Seventeen open water wetlands will be affected by the project totaling 2.78 acres of impact.

Regarding stream impacts the I-69 Section 6 DEIS on page 5.19-19 to 5.19-30 states:

A total of 275 stream segments, including existing culverts, were identified in the I-69 Section 6 field survey study area. QHEI or HHEI assessments were completed for potentially impacted segments, as appropriate. Concrete gutters and roadside ditches were assessed, but no assessments were completed for the bridged or culverted segments. Continuing coordination with the regulatory agencies will occur to identify any mitigation requirements for these previously impacted resources (i.e., culverts, concrete gutters, or roadside ditches). At this time, it is anticipated that mitigation will not be required for these previously disturbed channels.

A single stream impact may have more than one stream assessment segment if the habitat along the length of the stream changes. A separate assessment was made for each reach of distinct habitat. Only one assessment segment was completed where the habitat did not differ along the entire impact length of the stream. If two or more alternatives cross a stream in the same location and the habitat was consistent throughout the stream reach, then only one assessment was made.

As the QHEI/HHEI scores indicate, approximately eight percent of streams crossed by the alternatives have at least moderate water quality. The White River was the only one of the 49 stream segments that had an excellent QHEI score. Twelve of the 133 (9 percent) stream segments evaluated using HHEI had scores in the highest quality category (Class III).

The refined preferred alternative crosses 47,253 linear feet of stream. They are as follows:

- Perennial Streams – 16,944 linear feet in the right of way



- Intermittent Streams – 11,797 linear feet in the right of way
- Ephemeral Streams – 18,512 linear feet in the right of way
- Riparian Habitat – 40.47 acres

In some cases, maintaining water flow would require an alteration to the natural shape of the stream. Such alterations—which could include channel widening, enclosure, straightening and realignment, and bank shaping and stabilization—can produce the following impacts:

- Channel widening—Reduction in stream velocity allowing accumulation of sediments, or altering riffle-pool complexes.
- Channel enclosure (pipes/culverts)—Restriction of flow during peak flood events; accumulation of backwater; and/or disruption of the natural ecology of a water body by blocking sunlight, removing natural aquatic and wildlife habitat, and destroying bottom substrate important to macro-invertebrate communities.
- Channel realignment—By removing meanders, an increase in stream velocity and energy resulting in stream bank erosion, loss of stream bank vegetation, and destruction of riffle/pool complexes.
- Bank shaping and stabilization—Loss of habitat or bank-side vegetation.
- Placing bridge piers in a water body—Loss of habitat in the area of the piers.

Floodplains

The I-69 Section 6 DEIS discusses floodplains on page 5.19-30 to 5.19-33. The I-69 Section 6 field survey study area crosses several 100-year floodplains. These mapped floodplains are located on Federal Emergency Management Agency's (FEMA) recently updated Flood Insurance Rate Map Numbers FIRM 18097C0228F, 18097C229F, 18097C0233F, 18097C0240G, 18081C0014D, 18081C105D, 18109C0170E, 18109C0165E, 18109C0280E, and 18109C0264E (White River); FIRM 18097C0240G (Buck Creek and Pleasant Run Creek); FIRM 18081C0105D (Honey Creek and Messersmith Ditch); FIRM 18081C0105D (North Bluff Creek); FIRM 18109C0170E (Crooked Creek); FIRM 18109C0165E and 18109C0280E (Stotts Creek); FIRM 18109C0280E (Clear Creek); FIRM 18109C0266E, 18109C0262E, 18109C0268E, and 18109C0264E (Indian Creek). It is difficult to precisely determine if these crossings shall be considered longitudinal or transverse because the floodplain is so broad across the I-69 Section 6 Environmental field study area.

The I-69 Section 6 refined preferred alternative impacts 458 acres of floodplains.

Roadway Runoff

The I-69 Section 6 Tier 2 DEIS discusses roadway runoff on pages 5.19-46.



Roadway runoff can have significant impacts to the water quality of receiving streams. Numerous contaminants can be found in roadway runoff. These contaminants include: particulates, nitrogen, phosphorus, metals, salts, petroleum, pesticides, PCBs, rubber, pathogenic bacteria, and asbestos. These contaminants originate through many sources. Some of the primary sources include: deicing chemicals, tire wear, wear of engine and other moving parts, exhaust, lubricant leaks and blow-by, roadside spraying, and precipitation. The build-up of deicing chemicals in the atmosphere is a primary concern. This is due to the seasonally large volumes of this contaminant. Salting of a highway in winter and drainage from the road could cause changes in stream water quality, especially those with little volume or flow. Salting of any road may lead to adverse effects for aquatic and terrestrial organisms.

A variety of environmental consequences have been associated with the use of deicing chemicals. Road salt 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. Excess salinity causes moisture stress in plants, suppresses proper nutrient uptake, and leads to deficiencies in plant nutrition. Deicing additives can contribute to eutrophication in wetlands and toxicity to its inhabitants.

Where appropriate, roadside ditches will be grass-lined and connected to filter strips and containment basins. Efforts will be made to minimize the amount of salt used on the bridges and roads to that which is necessary to maintain a safe roadway. Alternative substances (e.g., sand) or low salt will be used as much as possible.

BMPs will be used to prevent non-point source pollution, to control storm water runoff, and to minimize sediment damage to water and aquatic habitats.

Hazardous Material Spill Response

The I-69 Section 6 Tier 2 DEIS discusses hazardous material spill responses on page 5.19-47.

The release of hazardous materials into surface and subsurface waters from spills along highways is a concern both during and after construction. It is anticipated that the highway will be used by a large number of trucks transporting a wide variety of hazardous materials. The potential for hazardous material contamination of surface and subsurface waters exists for each I-69 Section 6 alternative.

During construction of I-69 Section 6, contractors will be required to provide a spill response plan. This response plan will include telephone numbers for emergency response personnel and copies of agreements with agencies that are part of the spill-response effort. Special measures including diversion of

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highway runoff from direct discharge from bridge decks into streams and containment basins to detain accidental spills, will be incorporated into final design plans for any structure located over a regulated waterway.

Following construction of I-69 Section 6, emergency spill response for hazardous materials transported on the highway will be handled by local fire departments and regional hazardous materials units coordinated through the deputy state fire marshals. If called upon, INDOT state highway equipment and resources can also be deployed to assist in containment anywhere along the proposed interstate facility.

The Indiana Emergency Response Commission has established 11 Regional Response Teams throughout the state which have full Level A hazardous materials response capabilities. Currently, the hazardous materials units of Bloomington Township and Marion County/Indianapolis are the regional units with Level A capabilities closest to I-69 Section 6. Evansville, Vincennes, Terre Haute, and Crane Naval Surface Warfare Center (NSWC) are the other regional units with Level A capabilities in the area. The I-69 Section 6 project will help accelerate emergency response to incidents on routes served by these units.

4.4.4 Noise

Highways are linear noise sources in which the tire/pavement contact, engine and exhaust generate sound at various pressures and frequencies. As a general rule, the reduction rate of 3 decibels (dB) per distance doubling applies at a range of 50 to 350 feet from a highway. Under conditions where ground cover consists of tall grass or crops, the drop-off rate may be as much as 4.5 dB per distance doubling. Due to the logarithmic nature of sound propagation, a 3 dB reduction in sound pressure resulting from a doubling of distance (i.e., 350 feet doubled to 700 feet) from the source represents a 50% loss of acoustic energy, whereas a 10 dB reduction represents a 90% reduction of acoustic energy. In situations where point noise sources occur, such as construction equipment, the drop-off rate is generally 6 dB per distance doubling.

For interstates such as I-69, steady state A-weighted sound pressure levels of 66 dB or greater are anticipated at distances of 250 feet from the roadway and possibly as much as 350 to 400 feet from the roadway depending on the volume of traffic predicted for the design year. Levels will decrease with increased distance from the roadway. The construction of I-69 Section 6 will result in increased noise levels from the noise levels of the existing SR 37.

The noise levels of many common appliances and events are listed below for reference:

- Refrigerator 40-43 dBA
- Typical Living Room 40 dBA
- Forced Hot Air Heating System 40-52 dBA



- Normal Conversation 55-65 dBA
- Dishwasher 63-66 dBA
- Clothes Washer 65-70 dBA
- Telephone Ringing 66-75 dBA
- Inside Car-windows closed 30 mph 68-73 dBA
- Lawn Mower 88-94 dBA

As required by NEPA, noise studies were conducted for I-69 Section 6. The I-69 Section 6 Tier 2 DEIS discusses noise studies in Chapter 5.10 Highway Noise. The existing measured L_{eq} noise levels within the project corridor ranged from 31 dBA at Site N-419 to 77 dBA at Site N-1192 and N-2151. Noise Meter Locations are shown in the following figures.

It is unknown exactly how bats (including northern long-eared bats) perceive and react to noise levels, including the types of noises associated with highway construction and operation. However, we do know from studies in southwestern Indiana, that:

- Hundreds of bats (including Indiana bats) roost throughout the day and night under a bridge with an L_{eq} of 84.1 dBA;
- Twenty-three (23) to 67 Indiana bats roosted in a tree approximately 340 feet to edge of pavement of the four-lane SR 37 (with median) in 2004. The L_{eq} at that site has been measured at 59.8 dBA.
- A male Indiana bat left a roost tree and crossed over or under SR 37 near Clear Creek. The L_{eq} under the bridge has been measured at 65.7 dBA.
- A juvenile male Indiana bat flew under the four-lane SR 37 along Crooked Creek in 2004. The L_{eq} at that site has been measured at 67.4 dBA.
- Bats (including northern long-eared bats and Indiana bats) fly over and under the four-lane I-70 (with median) near the Indianapolis Airport.

While the perception of noise by bats is not clearly understood, the assessment of noise levels and impacts to human receptors has been evaluated in detail for Section 6 and the sound pressure represented by the noise level measurements and model predictions are directly comparable to the measured levels identified in the references listed above.

The receptor sites are classified into different categories based on the surrounding areas. Category A (exterior location) includes 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 for its intended purpose. Category B (exterior location) includes residential areas. Category C (exterior location) includes active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas,



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Section 4(f) sites, schools, television studios, trails, and trail crossings. Category D (interior location) includes auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios. Category E (exterior location) includes hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F. Category F includes agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing. Category G includes undeveloped lands that are not permitted. **Figure 4.4-12** shows the location of all noise receptors used for the noise study of the refined preferred alternative.

Lambs Creek Maternity Colony

Within the Lambs Creek Colony, it was determined there were no noise receivers identified and no noise monitoring was conducted in this area for I-69 Section 6. The closest receiver is located 2,841 feet from the nearest colony area and has an existing L_{eq} level 57 dBA and a future L_{eq} level of 64 dBA with the refined preferred alternative. The closest impacted receiver is located 3,471 feet from the nearest colony area and has an existing L_{eq} level 61 dBA and a future L_{eq} level of 67 dBA. Based on the nearest I-69 mainline right of way being more than one half mile from the colony area L_{eq} levels resulting from I-69 are expected to be considerably less than these levels within the colony area. **Figure 4.4-13** shows noise location receptors in proximity of the NLEB Lambs Creek maternity colony.

Clear Creek East Fork Maternity Colony

Within Clear Creek Colony, the TNM 2.5 yielded existing year L_{eq} levels between 41 dBA and 68 dBA for the 22 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the same receptors between 48 dBA and 75 dBA. These receptors include a playground, place of worship, residential properties, and industrial areas generally located along SR 37 in Morgan County within 450 feet of the I-69 Section 6 refined preferred alternative right of way. The 75 dBA design year L_{eq} is predicted for an industrial area located approximately 30 feet from the refined preferred alternative right of way along SR 37.

Figure 4.4-14 shows noise location receptors within the NLEB Clear Creek East Fork maternity colony.



Figure 4.4-12: Noise Receptor Locations

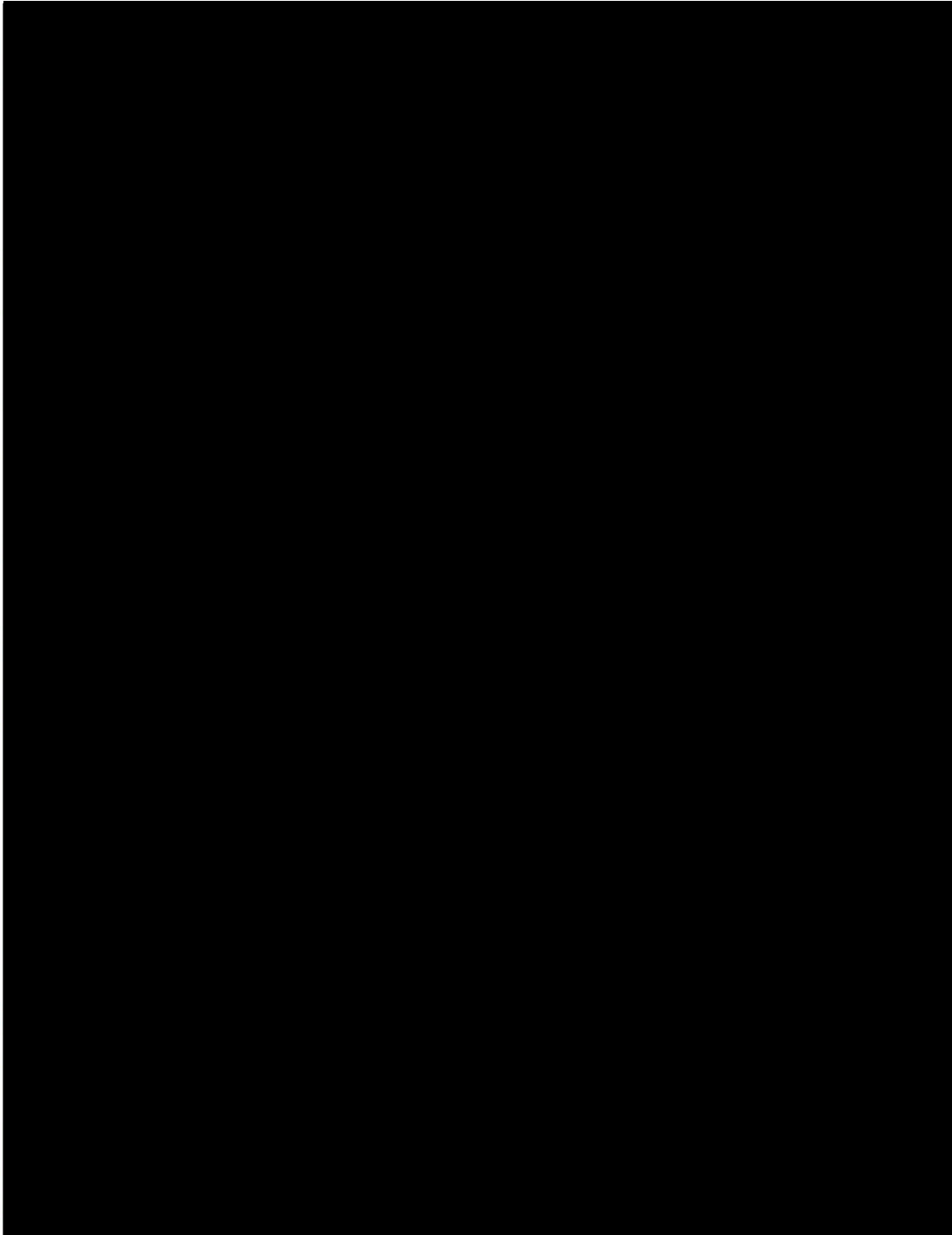




Figure 4.4-13: Noise Receptor Locations within the NLEB Lambs Creek Maternity Colony

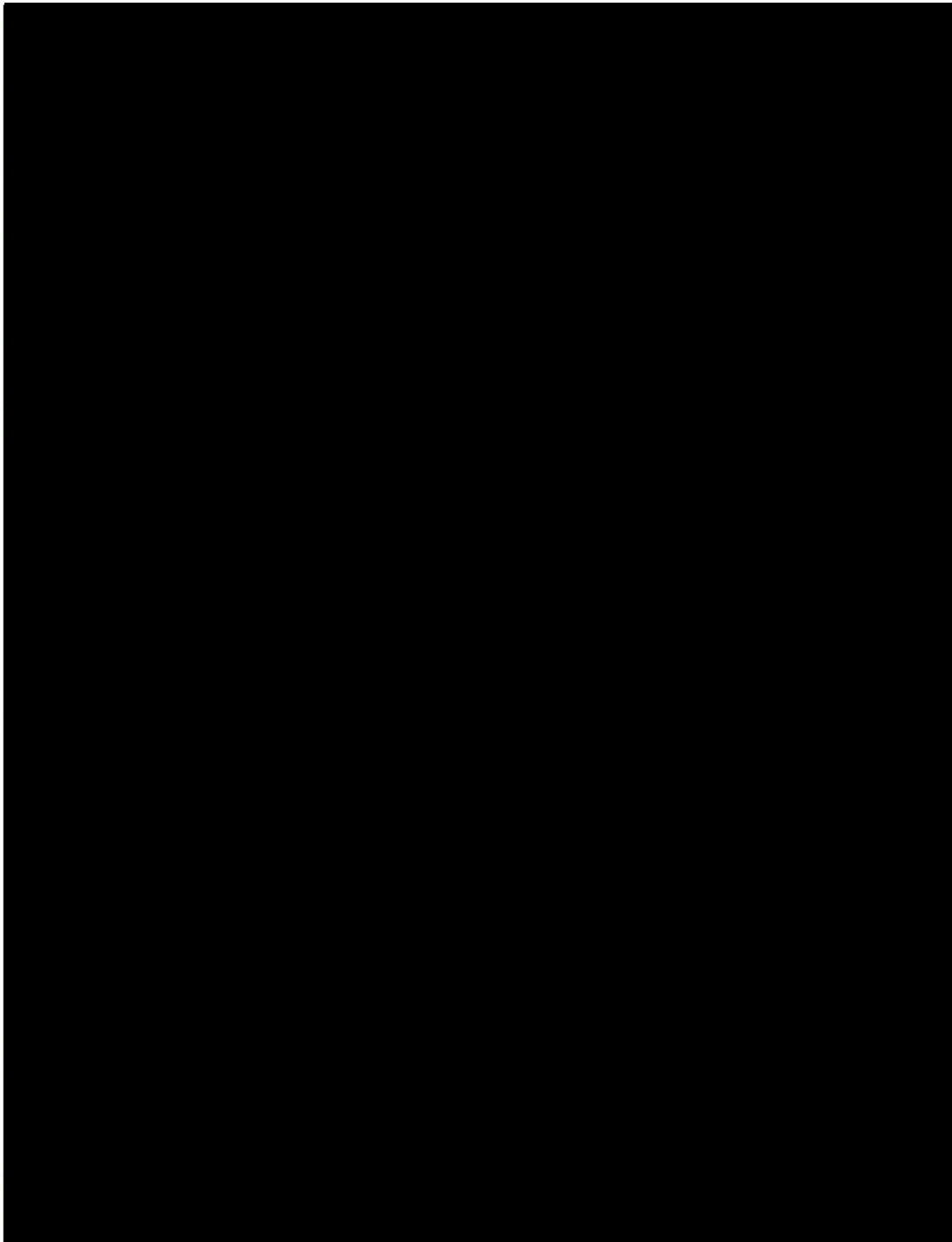




Figure 4.4-14: Noise Receptor Locations within the NLEB Clear Creek East Fork Maternity Colony

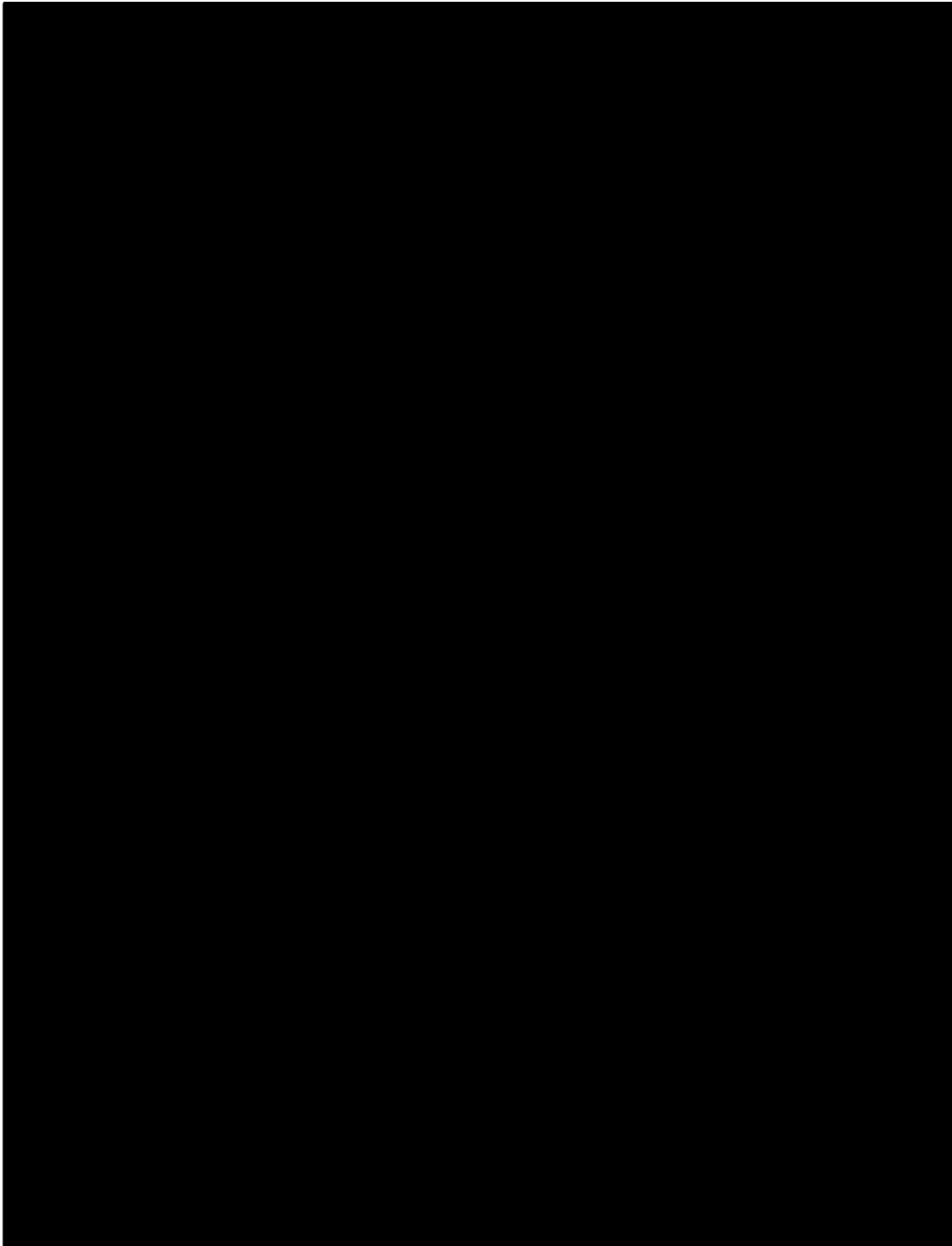




Figure 4.4-15: Noise Receptor Locations within the NLEB White River Maternity Colony

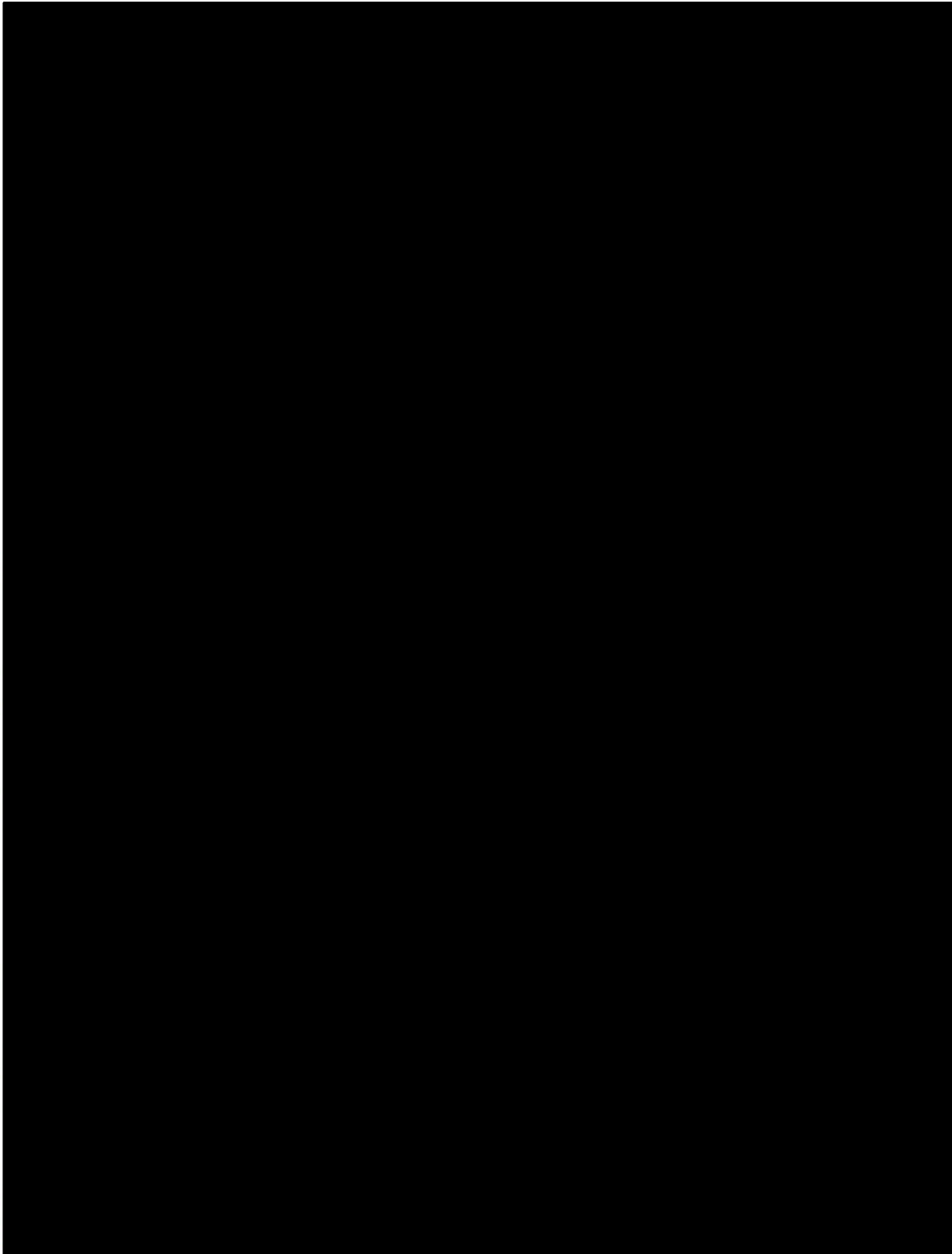




Figure 4.4-16: Noise Receptor Locations within the NLEB Goose Creek Maternity Colony

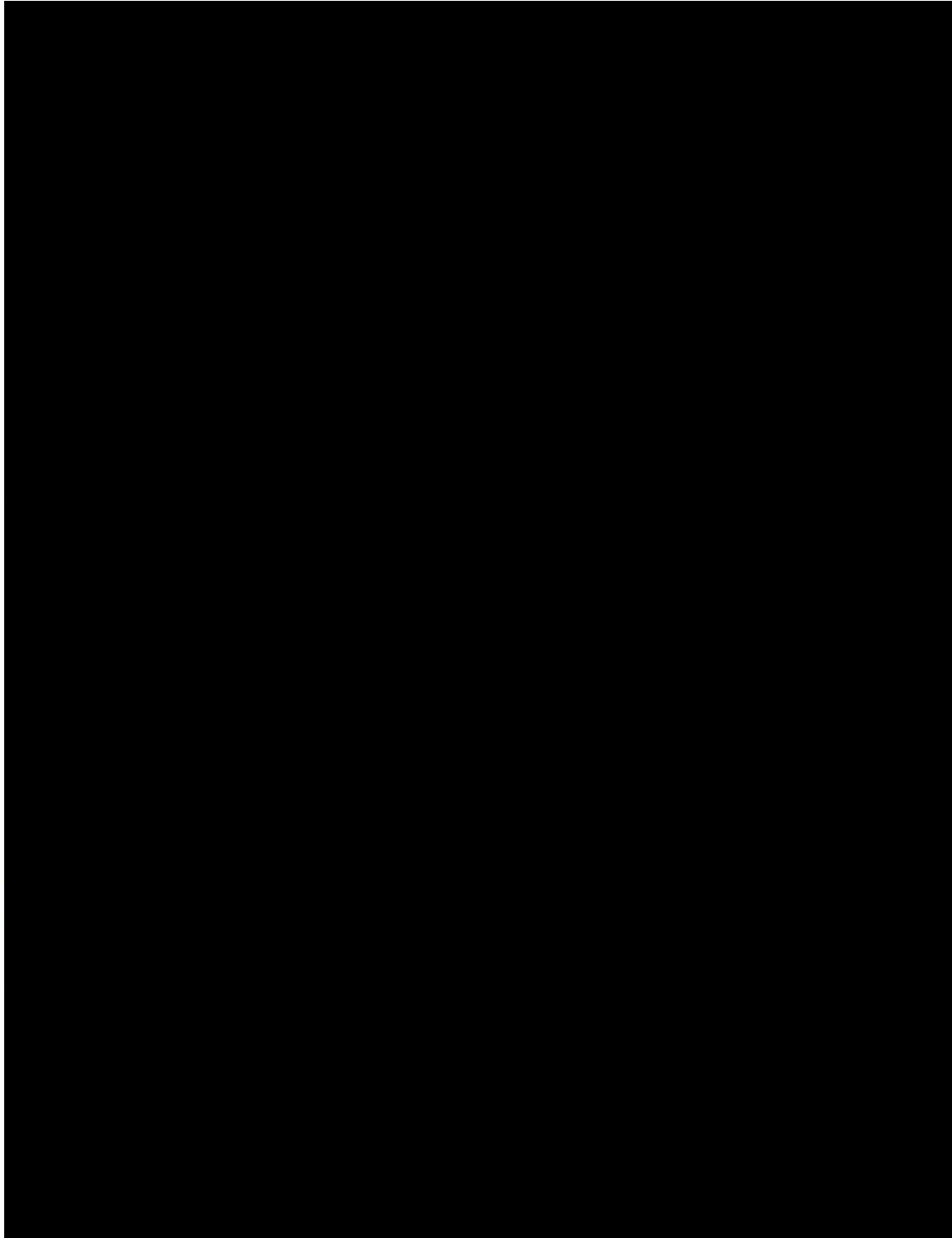
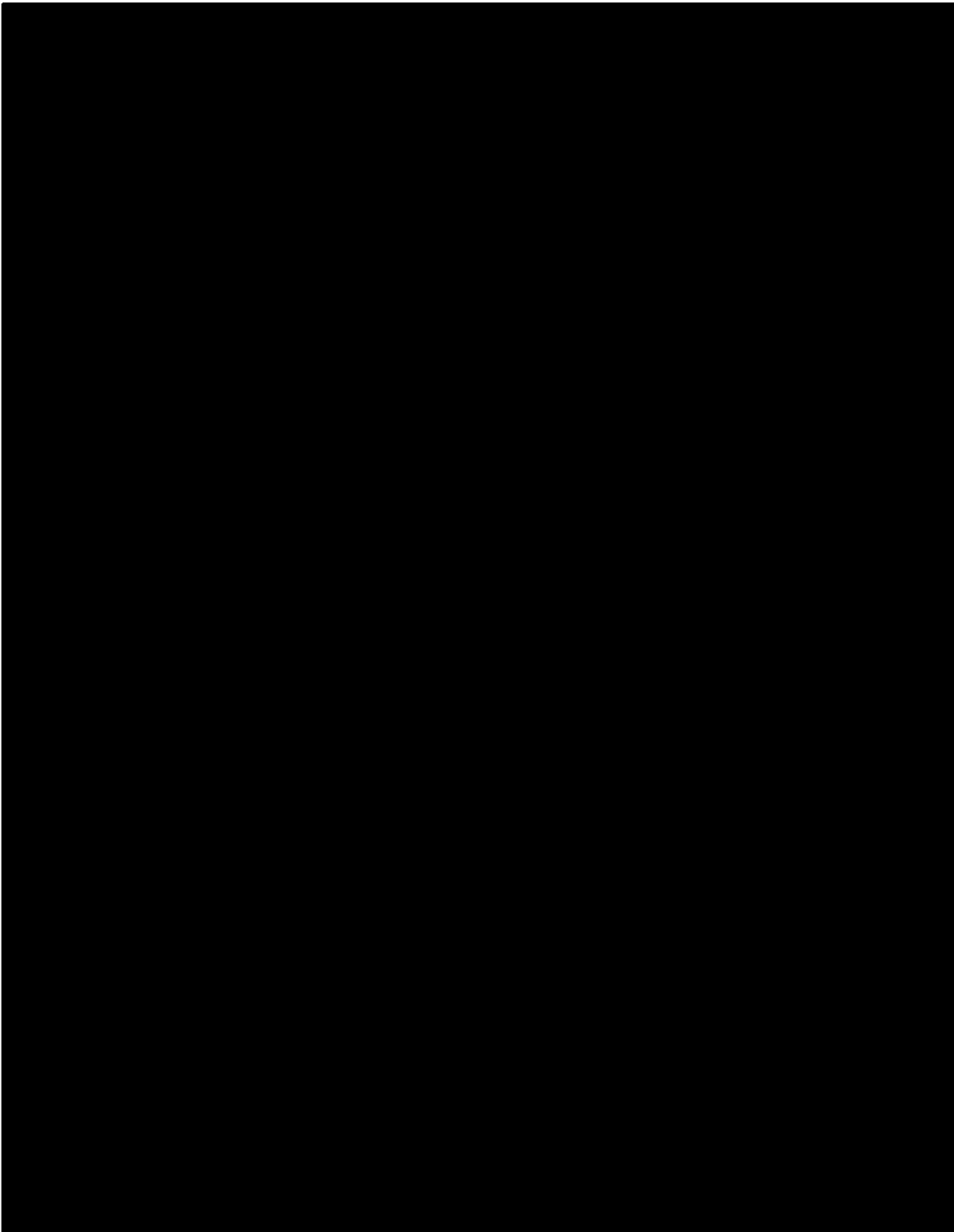




Figure 4.4-17: Noise Receptor Locations within the NLEB Pleasant Run Maternity Colony





White River Maternity Colony

Within the White River Colony, the TNM 2.5 yielded existing year L_{eq} levels between 54 dBA and 65 dBA for the 14 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the same receptors between 62 dBA and 72 dBA. These receptors include rural residential properties located along SR 37 within 450 feet of the I-69 Section 6 refined preferred alternative right of way. The 72 dBA design year L_{eq} is predicted for a residential area located approximately 30 feet from the refined preferred alternative right of way along SR 37. **Figure 4.4-15** shows noise location receptors within the NLEB White River maternity colony.

Goose Creek Maternity Colony

Within the White River – Goose Creek Colony, the TNM 2.5 yielded existing year L_{eq} levels between 55 dBA and 68 dBA for the 33 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the same receptors between 63 dBA and 76 dBA. These receptors include residential, historical, and retail properties located along SR 37 in Johnson County within 340 feet of the I-69 Section 6 refined preferred alternative right of way. The 76 dBA design year L_{eq} is predicted for a residential area located approximately 36 feet from the refined preferred alternative right of way along SR 37. **Figure 4.4-16** shows noise location receptors within the NLEB Goose Creek maternity colony.

Pleasant Run Maternity Colony

Within the Pleasant Creek Colony, the TNM 2.5 yielded existing year L_{eq} levels between 52 dBA and 68 dBA for the 33 receptors not relocated by the refined preferred alternative. The TNM 2.5 yielded future 2045 refined preferred alternative noise levels for the same receptors between 61 dBA and 76 dBA. These receptors include day care facility, office, residential, historic residential, restaurants, retail properties, utility properties, and a place of worship. The areas are mostly located on the east side of SR 37 in Johnson County, within 470 feet of the I-69 Section 6 refined preferred alternative right of way. The 76 dBA design year L_{eq} is predicted for a restaurant located approximately 30 feet from the refined preferred alternative right of way along SR 37. **Figure 4.4-17** shows noise location receptors within the NLEB Pleasant Run maternity colony.

Analysis

Noise impact assessment for bats is currently in its elementary stage of development. No protocol is available, and little is presently known regarding this issue. For this reason, noise data associated with human noise impact assessments are presented to document noise level changes associated with the project. A total of 22 noise receptors were located within the NLEB Clear Creek Colony, 14 receptors in the NLEB White River Colony, 33 receptors within the NLEB Goose Creek Colony and 33 receptors within the NLEB Pleasant Creek Colony. The INDOT Highway Traffic Noise Policy developed to analyze human noise impacts, defines “approach or

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exceed” to mean that future levels are higher than 1 dBA L_{eq} (h) below the appropriate NAC (for Category B, 1 dBA below the NAC is 66 dBA). “Substantially exceed” means the predicted traffic noise levels exceed existing noise levels by 15 dBA or more. Of the 22 receptors in the NLEB Clear Creek Colony, seven exceed the applicable noise abatement criteria for the design year refined preferred alternative. Of the 14 receptors in the NLEB White River Colony, six exceed the applicable NAC. Of the 33 receptors in the NLEB Goose Creek Colony, 21 exceed the applicable NAC. Of the 33 receptors in the NLEB Pleasant Creek Colony, 13 exceed the applicable NAC. The construction of I-69 will occur during daylight hours, and cause temporary noise impacts from chainsaws, bulldozers, skidders, trucks, etc.

It is possible that bats may roost adjacent to cleared right of way and be affected during the day by unusual and/or loud sounds. Indiana bats that were roosting under a bridge with noise levels at 84.1 dBA were not disturbed by the noise. The construction noise should not affect their foraging, because they forage in the evening when construction activities usually stop for the day. Possible loud noise effects could include an increase in their heart rate/respiratory rate and potential roost abandonment.

4.4.5 Lighting Impacts

At present, roadway lighting is anticipated at interchanges as well as along the mainline in highly developed areas. Lighting at all interchanges will be evaluated, and will be included if warranted for safety reasons. Any lights installed will be approximately 40 feet above the highway and would be non-diffuse. The tallest vehicles expected to be traveling on I-69 would be between 15 - 18 feet tall. This would leave 22 - 25 feet of open space for bats that are drawn to the lights to forage on insects. Based on this, the incidental take will be within the anticipated amounts in the Tier 1 Revised BO as amended.

4.4.6 Vibration Impacts

Vibration impacts from I-69 are not anticipated since they would be applicable only on bridges with roosting bats and in trees with high noise levels. A survey of 259 bridges for the Indiana bat in 2004, showed only one bridge with roosting Indiana bats and no northern long-eared bats under this bridge even though northern long-eared bats have been found under a bridge on [REDACTED] over a tributary of [REDACTED] ([REDACTED] County) and under the [REDACTED] bridge over [REDACTED]. That bridge, located within [REDACTED] Section [REDACTED], was the only bridge that showed the large size, height, concrete beams with cracks near the ceiling, and reduced light illumination characteristic of suitable roosting bridge habitat. Hundreds of bats use this bridge during the early spring to late fall each year, and when trucks and cars travel overhead, vibration from the traffic occurs on these beams. Placing one’s hand next to these bats when these short vibrations occur showed these bats seemingly unaffected by these short vibrations and number of occurrences. Every day loud noise events under the bridge did not seem to affect these bats; however, on rare incidents when abnormally different vibration events happened, bats did fly but immediately settled back to roost. Based on behavior observed at bridges with roosting bats, it is



likely that bats roosting in I-69 bridges will not be adversely affected by vibrations caused by vehicles using the bridges.

4.4.7 Borrow Sites/ Waste Disposal

The locations of borrow and waste disposal sites will not be known until the project is let for construction. Contractors are required to follow safeguards established in INDOT Standard Specifications Section 203.08, entitled “Borrow or Disposal”. Best Management Practices (BMPs) will be used in the construction of this project to minimize impacts related to borrow and waste disposal activities. Solid waste generated by clearing and grubbing, demolition or other construction practices will be removed from the location and properly disposed.

Prior to their use, borrow sites will be assessed for impacts to resources such as archaeological resources, wetlands, and/or waters of the U.S., and appropriate measures will be taken to avoid or mitigate impacts to these resources. Tree clearing for borrow areas will be restricted to the approved USFWS clearing dates (no trees with a diameter of three or more inches will be removed April 1 through September 30 in the SAA to avoid any impacts to northern long-eared bats.

4.4.8 Maintenance Practices

It is not anticipated that maintenance practices will negatively affect the northern long-eared bat. In regards to herbicide use, a commitment has been made to minimize the use of herbicides in environmentally sensitive areas. An herbicide use plan will be developed for environmentally sensitive areas.

4.5 Indirect Impacts

With induced housing and employment combined, approximately 336 acres are anticipated to be developed because of induced growth from the proposed interstate within the Traffic Analysis Zones (TAZs) associated with I-69 Section 6.

The combined anticipated induced number of households for Hendricks County is 100 for the design year of 2045. When divided by 4.38 housing units per acre; the result is 22.8 acres impacted. The combined anticipated induced number of jobs for Hendricks County is 117 for the design year of 2045. When divided by 14.6 employees per acre, the result is 8.0 acres impacted.

The combined anticipated induced number of households for Johnson County is 156 for the design year of 2045. When divided by 4.38 housing units per acre, the result is 35.5 acres impacted. The combined anticipated induced number of jobs for Johnson County is 243 for the design year of 2045. When divided by 14.6 employees per acre, the result is 16.5 acres impacted.



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The combined anticipated induced number of households for Marion County is 312 for the design year of 2045. When divided by 4.38 housing units per acre, the result is 71.3 acres impacted. The combined anticipated induced number of jobs for Marion County is 605 for the design year of 2045. When divided by 14.6 employees per acre, the result is 41.5 acres impacted.

The combined anticipated induced number of households for Morgan County is 379 for the design year of 2045. When divided by 4.38 housing units per acre, the result is 86.6 acres impacted. The combined anticipated induced number of jobs for Morgan County is 783 for the design year of 2045. When divided by 14.6 employees per acre, the result is 53.5 acres impacted.¹⁷

This results in impacts to 31 acres in Hendricks County, 52 acres in Johnson County, 113 acres in Marion County and 140 acres in Morgan County.

According to the Tier 2 I-69 Section 6 DEIS on page 5.24-5:

Review of existing data, mapping, and local coordination indicates that streams and wetlands account for a smaller acreage than the agricultural land or forests in any given induced growth TAZ. An induced growth TAZ is a TAZ with growth caused by I-69 Section 6 that exceeds the year 2045 no-build growth. Ratios of available agricultural and forest land within TAZs with induced growth were used to estimate induced growth trends in each county in the study area.

Table 4.5-1: Percentages to Apply Growth to Non-Developed Land (NLEB)

County	Agricultural Land	Forest Land
Hendricks	80%	20%
Johnson	85%	15%
Marion	90%	10%
Morgan	60%	40%

Table 4.5-1 shows the percentages that were used for estimating impacts of induced growth to agricultural and forest land. These percentages are applied where growth is expected to occur on non-developed land, as described below. Due to the developed land uses along the corridor, it is assumed that a portion of the induced development would result in higher densities on already developed land. The remaining acres of induced growth would result in the conversion of farmlands and forests to housing units and employment areas. The percentages above would only be applied to those acreages where there are available farmlands and forest to convert.

¹⁷ I-69 Section 6 Tier 2 DEIS, Section 5.24.3 “Analysis”. Table 5.24-4: Induced Land Use Changes by Alternative p (5.24-17)-(5.24-19)



4.5.1 Analysis Methods and Results

The I-69 Section 6 DEIS discusses the analysis methods and results on pages 5.24-8 to 5.24-22:

To estimate indirect impacts to land use, the following nine-step process was used. This process was developed in Tier 2, I-69 Section 1, and used in previous Tier 2 EISs:

Step 1A: Obtain the economic forecasts for 2045 from the TREDIS¹⁸ analysis. This provides the induced or indirect growth resulting from I-69 for the forecast year for I-69 Section 6.

Prior to determining the magnitude and significance of the cumulative effects in I-69 Section 6, an analysis was completed which provided anticipated land use changes in the I-69 Section 6 study area. See **Appendix Y [DEIS]** for information regarding the TREDIS analysis performed for I-69 Section 6.

Several land use scenarios were identified by reviewing the TAZ data estimates for the no-build scenario and for the four build alternatives. Forecasts from the TREDIS economic model were used to forecast increases in jobs and households resulting from economic growth. These increases were then assumed to result in impacts.

Maps of TAZs within Hendricks, Johnson, Marion, and Morgan counties were used to identify where project-induced land use changes would be expected to occur. The number of new houses and new jobs for the year 2045 were forecasted for the no-build scenario and for the four build alternatives. Induced growth is anticipated where the number of houses or jobs for the build alternatives is higher than for the no-build scenario.

As expected, the build alternatives were found to result in more employment and housing than the no-build scenario for the four-county area. The TREDIS forecasts indicated that building I-69 Section 6 would induce 785 new housing units and 1,347 new jobs within the four-county geographic scope of the I-69 Section 6 project. Figures 5.24-1 and 5.24-2 show the location of the TAZs with predicted growth in the no-build scenario. Figure 5.24-3 through Figure 5.24-6 show the location of predicted growth in the build scenario for the four-county study area.

TREDIS (www.tredis.com) is an economic model which is computerized representation of the economy of a region. It models the interaction of components such as labor, capital, markets, and government policy. It provides benefit-cost analysis, economic impact analysis, and financial impact analysis for transportation planning. It is used in this study to evaluate alternatives' relative performance on purpose and need indicators. It also provides forecasts of added households and employment that occur due to the I-69 Section 6 project.



Step 1B: Allocate the induced growth to individual counties.

TREDIS forecasted an increased number of jobs and housing units for the four-county area for the year 2045 (build and no-build), as described in the previous step. These forecasts were allocated to each of the four counties, as follows:

- 382 jobs and 217 housing units within Morgan County¹⁹
- 243 jobs and 156 housing units within Johnson County
- 117 jobs and 100 housing units in Hendricks County
- 605 jobs and 312 housing units within Marion County

Consultant staff used a manual allocation process²⁰ to provide induced employment and population growth forecasts for each county using forecasts for the four-county region. Allocation percentages for each county were based on both land use and transportation factors. The land use factors consider the baseline growth forecasts (2010-2045) as well as the total 2045 no-build employment and households within each county. Both serve as proxies for the economic activity occurring within each county. The transportation factors are represented by the number of I-69 Section 6 vehicle miles traveled (VMT) forecasted within Marion, Johnson, and Morgan counties (Hendricks County has no VMT on I-69). This VMT measure represents the use and geographic proximity to I-69 Section 6.

These forecasts of induced jobs and housing units at the county level reflect only the induced growth effects I-69 Section 6. The effects of induced jobs and housing units due to the completion of Sections 1 through 5 of I-69 are included in the estimates of no build growth.²¹ These forecasts are shown in Figure 5.24-1 and Figure 5.24-2.

Step 1C: Meet with the Land Use Panel to determine the location and comparative order of magnitude of growth by TAZ.

¹⁹ In Morgan County only, the land use panel reallocated no-build growth to other TAZs in the build scenario. The induced households and jobs for Morgan County shown here represent the net increase in the build scenario over the no-build scenario. Table 5.24-4 shows all TAZs where there is more growth in the build scenario than in the no-build. For this reason, the total induced households and jobs in Morgan County shown in Table 5.24-4 are greater than these shown here. All calculations of cumulative effects (as shown in Table 5.24-8, Table 5.24-9 and Table 5.24-10) use the net induced households and jobs shown here.

²⁰ This allocation process was determined in consultation with TREDIS technical staff.

²¹ The sources of the No Build forecasts (Indiana Business Research Center and Woods/Poole) considered broad regional economic trends and influences in making these forecasts of county-level growth. The technical tools and land use panels which allocated these county-level forecasts to individual TAZs took into account significant local undertakings (such as the completion of I-69 Sections 1 through 5).



Estimating indirect impacts relied upon input from a Land Use Panel assembled for I-69 Section 6. According to a United States Department of Transportation (USDOT) report,²² “Expert panels can be a very effective way to organize input and gain general consensus on the range of impacts that might be expected. The use of expert panels seems to be an effective way to determine what is ‘reasonably foreseeable’ since it utilized the judgments of reasonable people.”

The I-69 Section 6 Land Use Panel included representatives from Indianapolis Department of Metropolitan Development, Develop Indy, Mooresville Redevelopment Commission, Morgan County Planning and Zoning, Johnson County Planning and Zoning, Indianapolis Metropolitan Planning Organization (MPO), Morgan County Economic Development Corporation, Johnson County Economic Development Corporation, Hendricks County Planning and Zoning, Mid-Indiana Board of Realtors (MIBOR), and Bargersville Planning and Development. See Chapter 11 - Comments, Coordination and Public Involvement.

The Land Use Panel was first convened in September 2015²³ to review the 2045 employment and household forecasts no-build scenario. A second Land Use Panel meeting was held in February 2016 to review the no-build re-allocation and to distribute the 2045 employment and household allocations totals for the build alternatives.

In both of the meetings described above, the Land Use Panel, they provided guidance about the potential for I-69 Section 6 to influence the location and intensity of future growth in the study area. The panel identified those TAZs that they felt would be most likely to experience induced growth with the new interchanges to be provided by I-69 Section 6. They determined that indirect impacts would differ among alternatives based on different interchange locations. Minutes of the meetings with the Land Use Panel are included in **Appendix Y [DEIS]**.

Step 1D: Using these growth guidelines from the Land Use panel, allocate the induced growth for the counties to individual TAZs in proportion to the relative order of magnitude established by the panel.

The Land Use Panel focused on TAZs within the four counties to determine the level of growth that can be expected within each TAZ. The panels then allocated the anticipated induced growth in housing units and employment into each TAZ, as shown in Table 5.24 and Figure 5.24-3.

²² “Environmental Stewardship and Transportation Infrastructure Project Review: Executive Order 13274 Indirect and Cumulative Impacts Work Group Draft Baseline Report.” ICF Consulting for USDOT. March 15, 2005.

²³ Land Use Panels met for I-69 Section 6 in 2005. Given the passage of time between then and the resumption of I-69 Section 6 studies in late 2014, the Land Use Panel process was restarted and the previous Land Use Panel’s findings were not considered in this effort.



Steps 1E and 1F: Determine any shifts in development resulting from accessibility changes as a result of interchanges. Allocate any shifts in development to the TAZs; and, determine a value for I-69-induced growth and growth from employment shifts resulting from changes in accessibility for each TAZ.

Shifts in employment resulting from accessibility changes are anticipated in the induced growth TAZs surrounding the new interchanges. For example, shifting may occur as a result of new businesses such as medical, science and technology, engineering, manufacturing, assembly, distribution, gas stations, hotels, and restaurants which may choose to locate at these interchanges creating new jobs in the area. The Land Use Panel in Morgan County also determined that some of the no-build growth in Morgan County would shift due to the added accessibility of I-69 Section 6. The panel determined that this would result in the shift of 400 employees for the preferred alternative. The panel also determined that 160 housing units would shift. The effects of these shifts in growth are reflected in the TAZ induced growth in Table 5.24-4 and Figure 5.24-3 through Figure 5.24-6.

Step 1G: Convert the growth into acres of developed land uses based on values from “Trip Generation – 6th Edition” from the Institute of Transportation Engineers (ITE), 1997.

The number of induced housing and new jobs was converted to acres of induced new development based on the following assumptions:

Since Tier 1, the economic analysis determined that within Hendricks, Johnson, Marion and Morgan counties the average number of dwelling units per acre was 4.38. This estimate was based on a combination of three single-family dwelling units per acre and seven multi-family units per acre, weighted by the percent of single-family versus multi-family units. This estimate was recently reconfirmed and is used in this analysis.

The Tier 1 economic analysis determined that within the counties of Hendricks, Johnson, Marion, and Morgan the average number of jobs per acre was 14.6. The Tier 1 economic analysis for jobs was based on a weighted average of the standard employees per acre by employment type. The data for employees per acre, per employment type were developed from the ITE Trip Generation Manual 6th Edition,²⁴ and are as follows: 18.5 employees per acre for Durable Manufacturing and Non-Durable Manufacturing jobs; 8.2 employees per acre for Mining, Construction, Transportation Public & Utilities, and Agricultural Service jobs; 55.8 employees per acre for Finance, Insurance, Real Estate, and Services jobs; 8.7 employees per acre Retail Trade jobs; and 14.7 employees per acre for Wholesale Trade jobs.

²⁴ These ratios were confirmed using the most recent (9th Edition, 2012) of the ITE Trip Generation Manual.



The forecasted 947 new housing units in I-69 Section 6 for the preferred alternative would require conversion of 216.2 acres, and the forecasted 1,748 jobs would require conversion of 119.5 acres. Combined, a total of 335.7 acres of indirect land use changes are anticipated to occur as a result of the preferred alternative. The geographic scope of the cumulative impact analysis for I-69 Section 6 overlaps with that of adjacent Section 5 of I-69. As a result, some cumulative impacts would be counted in both Tier 2 EISs.

Step 1H: Determine which resources will be impacted by these changes in land use in each TAZ.

Farmland, forest, streams and wetlands are the principal resources that the project's indirect land use changes would potentially affect. I-69 Section 6 is more developed than I-69 Sections 1 through 4, where it was determined that all induced growth would occur on farmland or forests. Long-term development patterns (in particular, where and how development occurs) would be similar to the more developed I-69 Section 5. Due to the existing development patterns, the amount of "available" farmland or forest is limited in some TAZs, and induced growth would result in some higher densities on already developed lands. A conservative estimate of the amount of available farmland and forested land was developed based on 2011 NLCD in each TAZ with induced development.

As previously described, percentages of land use types for undeveloped land were analyzed for TAZs forecasted to receive induced growth. Based on this analysis, percentages of induced development on undeveloped land are forecasted as follows: Hendricks County 80 percent farmland and 20 percent forested land; Johnson County 85 percent farmland and 15 percent forested land; Marion County 90 percent farmland and 10 percent forested land; and Morgan County 60 percent farmland and 40 percent forested land.

The equivalent of 336 acres of induced growth would be anticipated for the preferred alternative. Of this, the equivalent of 65 acres of induced development would result in higher densities on already developed land. The remaining 272 acres of induced growth would result in the conversion of agricultural lands and forests to housing units and employment areas (see Table 5.24-2).

In Hendricks County, the predicted impact is 25 acres of agricultural land and 6 acres of forest impacts for all build alternatives. In Johnson County, the predicted impact is 35 acres of agricultural land and 6 acres of forest impacts for all build alternatives. In Marion County, the predicted impact is 66 acres of agricultural land and 7 acres of forest impacts for all build alternatives. In Morgan County, the predicted impact is 83 acres of agricultural land and 44 acres of forest impacts in the preferred alternative. Collectively in the TAZs that are anticipated to experience induced growth, agricultural lands and forest are the predominant land uses, with ranges between 24 and 57 percent (see Table 5.24-2).



Step II: Use these indirect impacts to the resources in the cumulative impact analysis.

The cumulative impact analysis includes the consideration of direct and other impacts to farmland, forests, streams, and wetlands, as well as the indirect impacts quantified above.

The threshold for consideration of indirect impacts (reasonably certain) for Section 7 consultation is higher than the NEPA threshold for consideration of cumulative impacts (reasonably foreseeable), thus the use of the NEPA standard to estimate indirect impacts in this BA is a conservative approach. **Figure 4.5-1** and **Figure 4.5-2** show the induced growth TAZs and **Table 4.5-2** shows the acres of growth expected. See Appendix G for the results of the indirect development land use analysis for the induced growth TAZs.



Figure 4.5-1: Induced Growth TAZs South for NLEB (See Table 4.5-2 below for coordinating TAZ ID and TAZ information.)

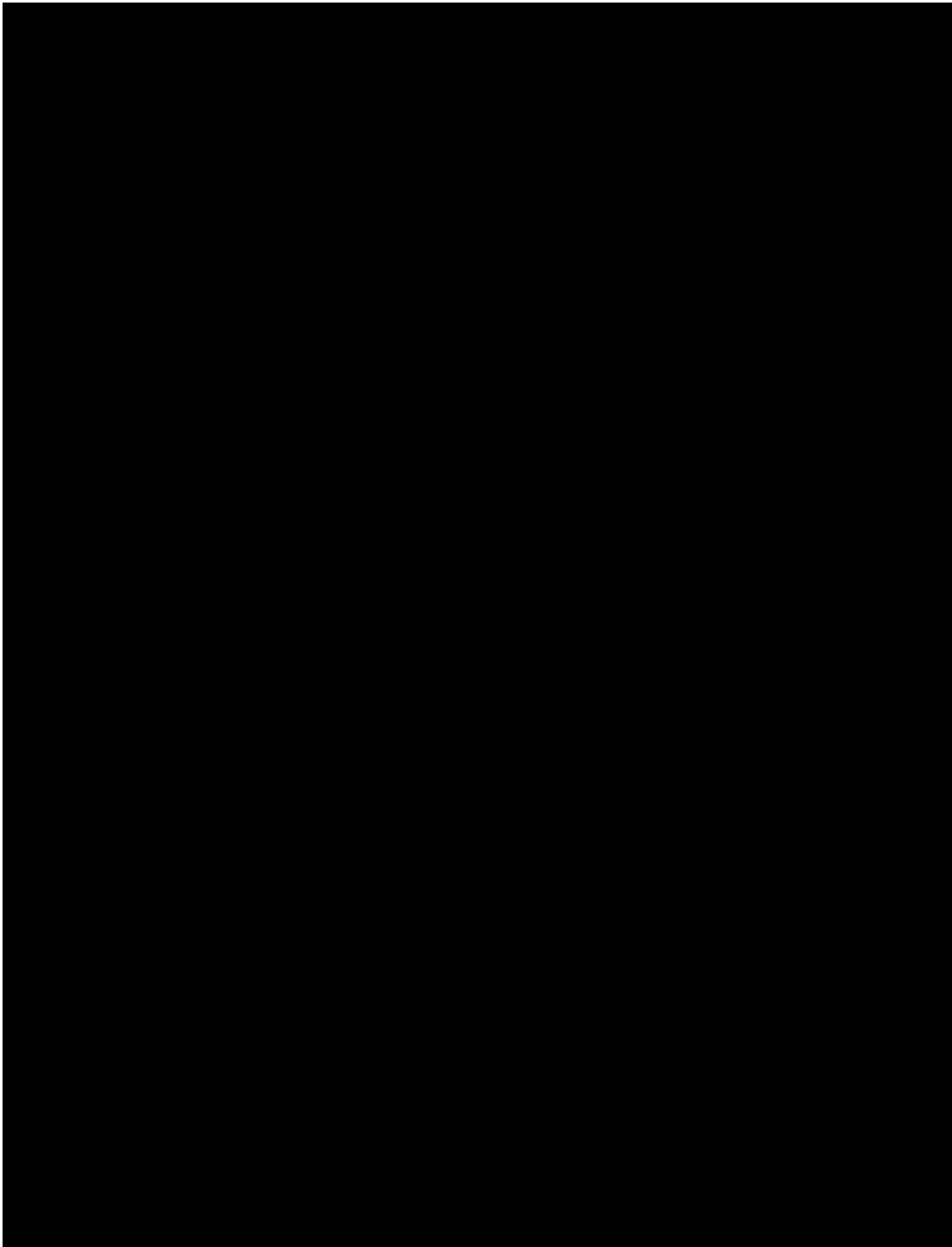




Figure 4.5-2: Induced Growth TAZs North for NLEB (See Table 4.5-2 below for coordinating TAZ ID and TAZ information.)

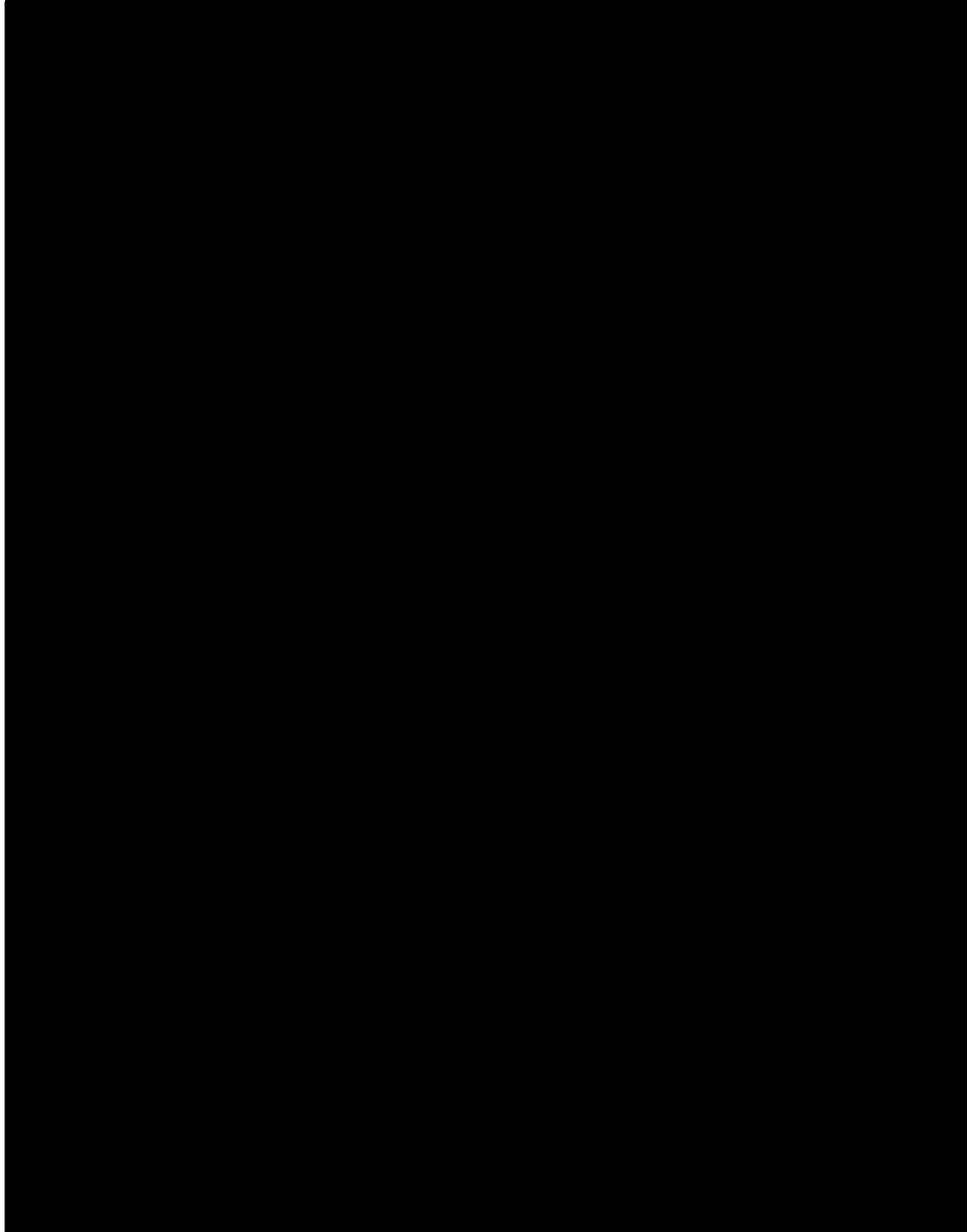




Table 4.5-2: TAZ Cross Reference Table

Reference Number	TAZ ID	County	Housing Induced Acreage	Employee Induced Acreage	Total Induced Acres
1	268	Hendricks	--	6.8	6.8
2	275	Hendricks	22.8	--	22.8
3	282	Hendricks	--	1.2	1.2
4	297	Johnson	13.0	--	13.0
5	306	Johnson	7.5	--	7.5
6	343	Johnson	--	1.4	1.4
7	363	Johnson	--	3.4	3.4
8	373	Johnson	7.5	--	7.5
9	374	Johnson	--	1.4	1.4
10	380	Johnson	--	1.2	1.2
11	381	Johnson	--	3.5	3.5
12	384	Johnson	--	2.7	2.7
13	444	Johnson	--	1.7	1.7
14	445	Johnson	7.5	1.2	8.7
15	972	Marion	25.6	--	25.6
16	974	Marion	8.0	--	8.0
17	980	Marion	37.7	--	37.7
18	1065	Marion	--	1.9	1.9
19	1141	Marion	--	13.7	13.1
20	1144	Marion	--	4.2	4.2
21	1239	Marion	--	16.4	16.4
22	1245	Marion	--	5.3	5.3
23	1679	Morgan	--	2.3	2.3



Reference Number	TAZ ID	County	Housing Induced Acreage	Employee Induced Acreage	Total Induced Acres
24	1684	Morgan	--	2.0	2.0
25	1696	Morgan	--	0.5	0.5
26	1725	Morgan	11.4	--	11.4
27	1727	Morgan	2.3	--	2.3
28	1730	Morgan	--	0.5	0.5
29	1754	Morgan	-	-	-
30	1761	Morgan	6.4	--	6.4
31	1763	Morgan	18.7	--	18.7
32	1764	Morgan	11.0	--	11.0
33	1767	Morgan	2.7	--	2.7
34	1768	Morgan	--	3.8	3.8
35	1774	Morgan	--	3.4	3.4
36	1775	Morgan	--	3.4	3.4
37	1776	Morgan	2.3	--	2.3
38	1777	Morgan	--	3.8	3.8
39	1780	Morgan	--	5.5	5.5
40	1783	Morgan	--	3.4	3.4
41	1794	Morgan	--	1.7	1.7
42	1795	Morgan	0.9	2.1	3.0
43	1796	Morgan	--	0.8	0.8
44	1797	Morgan	--	1.8	1.8
45	1798	Morgan	--	0.2	0.2
46	1799	Morgan	8.7	5.2	13.9
47	1800	Morgan	--	9.0	9.0
48	1817	Morgan	--	0.5	0.5



Reference Number	TAZ ID	County	Housing Induced Acreage	Employee Induced Acreage	Total Induced Acres
49	1822	Morgan	--	1.7	1.7
50	1825	Morgan	5.7	--	5.7
51	1826	Morgan	2.3	--	2.3
52	1829	Morgan	4.6	--	4.6
53	1832	Morgan	--	0.1	0.1
54	1894	Morgan	--	1.8	1.8
55	1914	Morgan	5.0	--	5.0
56	1916	Morgan	4.6	--	4.6

4.5.2 Water Resources

The I-69 Section 6 Tier 2 DEIS discusses indirect impacts to water resources on pages 5.24-53 to 5.24-54:

Anticipated indirect impacts could be wetlands bought by a developer to build a service facility such as a gas station and/or convenience food mart. Development near wetlands could result in impacts to wetlands due to pollutants (including de-icing chemicals) in runoff from impervious surfaces such as access roads and parking lots, or due to erosion and siltation from construction activities. However, with few exceptions (some of which are direct impacts of the I-69 Section 6 project), wetlands within the geographic scope of I-69 Section 6 are not in the immediate vicinity of interchanges, where most of the project-induced development is predicted to occur. No indirect acreage impacts to wetlands are anticipated due to the implementation of I-69 Section 6.

Streams could have the same indirect impacts as wetlands, whereby land surrounding the streams could be bought by a developer to build a commercial or residential establishment, and impacts could occur from surface water runoff and construction activities. However, development near streams tends to be adjacent to a stream rather than interrupting the stream to create a proposed development. Depending on the location, type of development, and potential stream/water quality impact, various permit requirements would have to be met, such as a CWA Section 404 Permit, CWA Section 401 Water Quality Certification, IDEM Isolated Wetlands Permit, and NPDES permits authorized under the CWA; IDNR permit approvals for floodway and below the high-water line of lake impacts



under the state of Indiana’s Flood Control Act IC 14-28-1 and Navigable Waterways Act IC 14-29-1; construction plan to fulfill Rule 5 requirements (327 IAC 15-5) under NPDES guidelines. See Section 5.23 for a description of these permits.

As noted in “Wetlands,” above, the results of FHWA analysis of surface water runoff shows that pollutant concentrations due to runoff are within the applicable USEPA criteria. BMPs would be used to prevent non-point source pollution, to control surface water runoff, and to minimize sediment damage to water quality and aquatic habitats. INDOT Standard Specifications would govern construction activities to control erosion and subsequent water pollution.

4.5.3 Forests

The I-69 Section 6 Tier 2 DEIS discusses indirect impacts to forests on pages 5.24-48 and 5.24-49:

Indirect impacts to forests would result from land converted to commercial or residential development, as a result of additional access provided by I-69. Development expected to occur as a result of I-69 Section 6 is 337 acres [for the preferred alternative]. Within the approximately 36,659 total acres of TAZs identified as potential locations for project-induced development in the four county study area, 120 acres are projected for job induced development and 216 acres are projected for induced residential development with Alternatives C1, C3, and C4. Within the approximately 36,883 total acres of TAZs identified as potential locations for project-induced development in the four county study area with Alternative C2, 140 acres are projected for job induced development and 216 acres are projected for induced residential development (see Table 5.24-4).

Timber harvest by landowners potentially affected by the I-69 Section 6 project may occur due to the potential of land being acquired for this project and uncertainty regarding the right of way acquisition limits and process. The amount of this private harvesting cannot be quantified because whether a particular parcel is harvested depends on the marketability of the timber and the landowner’s interest in harvesting, neither of which can be reliably predicted. Timber salvage, which may also occur, is timber recovery by the construction contractor that occurs as land is cleared for construction.

I-69 Section 6, similar to Section 5, is more urbanized than Sections 1 through 4 and a portion of induced growth (equivalent to 65 and 83 acres) is anticipated to occur on parcels that are currently developed, resulting in increased densities. Within each TAZ, the remaining induced growth on undeveloped land (272 and 273 acres in the four counties) would convert agricultural land and forest to residential and commercial developments. Within I-69 Section 6, growth on forest



land is estimated to be 20 percent in Hendricks County, 15 percent in Johnson County, 10 percent in Marion County, and 40 percent in Morgan County.

In Hendricks County, 20 percent of the induced growth would convert 6 acres of forest for the build alternatives. In Johnson County, 11 of the anticipated 52 acres of induced growth would occur as increased density of already developed land. Of the remaining 41 acres, 15 percent of the induced growth would convert 6 acres of forest for the build alternatives. In Marion County, 40 of the anticipated 113 acres of induced growth would occur as increased density on already developed land. Of the remaining 73 acres, 10 percent of the induced growth would convert 7 acres of forest for the build alternatives. In Morgan County, 14 of the 141 acres (Alternatives C1, C3, and C4) and 32 of the 160 acres (Alternative C2) of induced growth would occur as increased density on already developed land. Of the remaining 127 acres (Alternatives C1, C3 and Alternative C4) and 128 acres (Alternative C4), 40 percent of the induced growth would convert 44 acres of forest for Alternatives C1, C3, and C4, and 47 acres of forest for Alternative C2. See Table 5.24-3 and Table 5.24-10.

The total estimated indirect impact to forest for the four counties is 63 acres for [the preferred alternative].

4.6 Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BA. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the Endangered Species Act. Cumulative effects include future direct impacts, indirect (induced) impacts and “other” impacts on a natural resource. The former two are related to the proposed action, while the last one is not.

Many sources were contacted for information on cumulative effects. This included extensive coordination with local county offices and staff (e.g., surveyor’s office, recorder’s office, auditor’s office, highway superintendents, county zoning and planning officials) within Morgan, Johnson and Marion counties, as well as private industry development experts within these areas. In addition, the cumulative effects analysis used the results from the TREDIS economic model to forecast increases in jobs and households resulting from economic growth. The number of new houses and new jobs for the year 2045 were forecasted for the no-build scenario and for the refined preferred alternative. Growth within the I-69 Section 6 SAA was allocated into TAZs based on input from the expert land use panels.

Changes were projected for both the No Build and the Build conditions. Household changes were converted to acreages by dividing by 4.38 household per acre. Employment changes were converted to acreages by dividing by 14.6 employees per acre. These factors were developed for



each region based on current housing and commercial/industrial development factors within the region.

The No-Build condition represents what is expected to occur without the proposed I-69 construction, and represents "other" impacts in this analysis. These population and employment forecasts form the baseline condition for land use changes by 2045. The "No-Build" population forecasts²⁵ have been determined based on birth rate, death rate, immigration, and emigration, and are independent of the I-69 project. The Build scenario growth less the No Build scenario growth is equal to the induced (indirect) impacts attributed to I-69. The land use panel reviewed the TREDIS economic model results and either concurred with model results, or suggested adjustments based on their expectations of development. These panels consisted of realtors, local city and county planning staff, and economic development personnel.

Once indirect impacts were identified, the panel again reviewed the TAZ maps to provide insight on where land use changes would likely occur regardless of whether I-69 were constructed. In addition, information on development projected to occur whether or not the project is constructed was obtained through a review of local land use plans where such exist and discussions with representatives of local governments, local and regional economic development groups/agencies, and major employers. The results of this review indicated "other" reasonably foreseeable major future actions (by year 2045) that could add to this project's potential direct and indirect impacts. The three reasonably foreseeable actions are gravel quarrying, legal drain maintenance and water quality, and commercial/retail development.

GIS analysis was conducted to determine the approximate amount of no-build growth that is projected to occur in the action areas. This analysis made a conservative estimate of impacts. The percentage of the TAZ within the action areas was calculated and the no-build growth by land-use type within that particular action area was determined on a percentage basis. The total acreage of no-build that will occur on lands that have not been previously developed was then multiplied by 20% in Hendricks County, 15% in Johnson County, 10% in Marion County and 40% in Morgan County to get the amount of forest that would be impacted by the no-build growth. Please see Chapter 5.24 in the I-69 Section 6 DEIS for an explanation of how these percentages were chosen. These calculations showed that approximately 391 acres of no-build growth would occur in forested areas in the RSAA. This is approximately 2.5% of the available forest in the RSAA. The calculations showed that approximately 18 acres of no-build growth would occur in forested areas within the maternity colonies. Approximately 0 acres of no-build growth would occur in forested areas in Lambs Creek Maternity Colony (0.0% of available forest), 1 acre in Clear Creek East Fork Maternity Colony (0.1% of available forest), 0 acres in White River Maternity Colony (0.0% of available forest), 13 acres in White River - Goose Creek Maternity Colony (1.8% of available forest), and four acres in Pleasant Run Maternity Colony

²⁵ The "No-Build" term refers only to the construction of the new I-69 highway. The normal growth and minor incremental changes expected during the time period, referred to here as "Other Projected Growth", are understood to be included in the "No-Build" scenario, but not any growth induced by the construction of I-69 or the major "Other" projects discussed in this chapter.



(0.4% of available forest). This would equate to approximately 0.3% of the available forest within the maternity colony areas.

Refer to the Indirect Impacts section of this document under forest for more information on land-use and development factors in the I-69 Section 6 SAA.

4.6.1 Gravel Quarrying

The I-69 Section 6 Tier 2 DEIS discussed the gravel quarrying on page 5.24-27:

There are active limestone and sand/gravel quarries in the project area, as described in **Section 5.15**. Active quarry sites are Hanson Aggregates, Irving Materials and Jones Gravel Pit. The impacts of these active quarries to forest and agricultural land is included as other projected growth in the cumulative impact analysis.

4.6.2 Tax Increments Finance (TIF) Districts

The I-69 Section 6 Tier 2 DEIS discussed TIF districts on pages 5.24-27 and 5.24-28:

TIF is a type of financing that permits local governments to finance the redevelopment of target areas and enhance the economic development of rapidly developing areas. Land Use Panel members took TIF districts into consideration when allocating growth. Additional TIF district context is provided in Section 2.3.4. For I-69 Section 6, eleven TIF districts have been identified as relevant to the I-69 project. Among these, four are located in the City of Martinsville and four are located just outside the city limits in Morgan County (described below). Figure 4.2-7 depicts the location of the eleven TIF Districts. Information on the TIF Districts was obtained from the Indiana Gateway for Local Government TIFViewer website.²⁶

Ohio Street (City of Martinsville) TIF. This TIF District is located on the south side of Martinsville. The TIF District runs along the west side of Ohio Street to Poston Road. From that intersection, the TIF areas are located on the east side of Ohio Street to York Street. The District includes Artesian Square Shopping Center, the site of the former Harman-Becker plant and Twigg Corp. The Ohio Street TIF District includes 36 properties and a based value \$16,568,400.

Morgan Street (City of Martinsville) TIF. The Morgan Street TIF District is located the along Morgan Street from SR 39 east to SR 37. The depth of the TIF

²⁶ <http://gateway.ifionline.org/TIFviewer>



from the Morgan Street varies from one half block to 6 blocks deep along Main Street. It includes downtown Martinsville, Morgan Hospital, Medical Center, and the Morgan County Fairgrounds. The Morgan Street TIF District includes 393 properties and a base value of \$32,177,601.

SR 39 (City of Martinsville) TIF. The SR 39 TIF District is located near the southern limits of Martinsville. The district runs along SR 39/Morton Avenue from the SR 39/SR 37 split, north and east along Morton Avenue, then north of SR 39 to Morgan Street. The SR 39 TIF District includes 267 parcels and a base value of \$30,448,682.

Southeast 37 (City of Martinsville) TIF. The Southeast 37 TIF District is located along the south side of SR 37 between Mahalasville Road and the northern terminus of Birk Road. This district includes the Grand Valley Boulevard shopping area and a variety of other restaurants and retail establishments. The district includes 60 parcels and a base value of \$37,905,700.

Eagle Valley (Morgan County) TIF. The Eagle Valley TIF District is located north of Martinsville, to the west of the intersection of SR 67 and Centerton Road/Robb Hill Road. The property contained in the TIF district is associated with the Indianapolis Power and Light (IPL) electric generation plant. This district includes 18 properties and a base value of \$27,971,125.

Henderson Ford Interchange (Morgan County) TIF. The Henderson Ford Interchange TIF district is located at the intersection of SR 37 and Henderson Ford Road. North of SR 37, the TIF runs along either side of Henderson Ford Road. On the south side of SR 37, the district is only present on the east side of Henderson Ford Road. There are 11 properties in the district and base value of \$244,000.

Old Morgan Town Road (Morgan County) TIF. The Old Morgan Town Road TIF District is located along north side of Indiana Highway 252, 1 mile east of SR 37. The property is undeveloped. There are two properties in the district and base value of \$105,800.

Waverly (Morgan County) TIF. The Waverly TIF District is located near the intersection of SR 37 and Waverly Road. The TIF boundaries extend into the north, east and south quadrants of this intersection. The TIF District also extends north to an area between the White River and Old SR 37. This is the area identified for development of the Old Town Waverly Park. There are 60 properties in the district and a base value of \$112,199.



4.6.3 Legal Drain Maintenance and Water Quality

In addition to "other" impacts projected under the No Build scenario, impacts to tree cover from legal drains and their maintenance were estimated and included in addition to the model based other impacts. These impacts could potentially occur regardless of the I-69 construction. Legal drains were identified through consultation with county officials and/or use of GIS layers. They are defined as those streams legally maintained by the county or maintained through conservancy districts. For the Tier 1 BA Addendum analysis, impacts were assumed to be 75 feet from either side of a legal drain. The legal drain impacts represent a highest impact scenario for tree cover impacts as not all legal drains are likely to be maintained, and maintenance may not result in impacts on both sides of the stream, or the entire 75 feet. GIS layers showed five legal drains in Marion County. They are State/Harmon Ditch, Fowler-Haueisen or Thompson Run/Haueisen Ditch, Hare-Marea Ditch, Alcorn Ditch or Little Buck Creek, and Orme Ditch. No legal drains are in Johnson County, and there is one legal drain in Morgan County (Sartor Ditch). The only legal drain that enters into a northern long-eared bat maternity colony is Orme Ditch. It touches the edge of the NLEB Pleasant Run maternity colony.

Reviewing a 2016 aerial of this area, Orme ditch is located within a golf course. From the pond eastward to the second road (a distance of approximately 500 feet), Orme Ditch is cleared on both sides except for 3 small patches of trees. Two patches appear to have from 1-2 trees, while in the third patch, maybe 10 trees. If these three patches were cleared completely, a length of about 210 feet by 150 feet would equal 0.7 acres of forest removed at the most. Nevertheless, it appears these trees shield to some extent the roadways from errant golf balls at either end and would most likely not be cleared for this reason. Similarly, they may be there for aesthetics and needed as part of the fairway.

For these reasons, it is unlikely that these trees will be removed along Orme Ditch. Thus, no tree removal impacts along any legal drain are expected in any northern long-eared maternity colony in I-69 Section 6.

4.6.4 Land Conversion Trends

Typically, one cannot precisely quantify how much forest land on private lands will be converted to other habitat types, the extent of future timber harvests on private lands, nor the amount of privately owned habitat that will be developed for other purposes. However, one can look at regional and state-wide trends and make reasonable extrapolations as to how the private lands within the Summer Action Area (SAA) will likely be managed in the foreseeable future.

In the Revised Tier 1 BO as amended, the following Indiana forest trends were highlighted within the USDA National Forest Service North Central Research Station's 2005 report, "Indiana Forests: 1999-2003, Part A."

Trends that appear beneficial to the northern long-eared bat are:

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- The ratio of harvested tree volume to tree volume growth indicates sustainable management.
- Diverse and abundant forest habitat (snags, coarse woody debris, forest cover and edges) support healthy wildlife populations across the state.
- Indiana possesses a diversity of standing dead tree wildlife habitat with an abundance of recently acquired snags to replenish fully decayed snags as Indiana’s forests mature.
- Indiana’s forests continue to mature in terms of the number and size of trees within forest stands.

Other trends reported by the USFWS are:

- The amount of forest edge doubled from 1992 to 2001, indicating smaller forest plots.
- Due to land use history and natural factors, the forest soils of southern Indiana are generally below-average in quality.
- Ownerships of Indiana forests have changed in the past decade, resulting in more “parcelization” and fragmentation.
- The average private forest landholding dropped from 22-acres in 1993 to 16-acres in 2003, indicating a continued “parcelization” of Indiana forests.
- While the data shows there has been loss of continuous forest, resulting in smaller, fragmented stands, there is also an overall increase in forested land across the state.
- Introduced or invasive plant species inhabit a majority of inventory plots.
- Although Indiana’s overall forested land cover is increasing, the rate of increase has slowed over the past decade.
- Increases in total volumes of oak species are less than those for most other hardwood species.
- The advanced ages and inadequate regeneration of Indiana’s oak forests may signal a successional shift from an oak/hickory-dominated landscape to one where other hardwood species, such as maples, occupy more forested areas.
- Indiana’s hardwood saw-timber resource continues to be at risk due to maturing of hardwood stands, loss of timberland to development and new pests (e.g., gypsy moth, emerald ash-borer, sudden oak death, beech-bark disease).

Based on discussions with the IDNR Division of Forestry there is no reliable, accurate and consistent method for tracking timber harvest activities on a site specific, detailed level.

Observations within the SAA throughout many years indicate that cutting is for the most part selective harvest, and that clear cutting is limited and sporadic. Some who own property within and outside the right of way may harvest timber on a portion of their property. However, such harvesting cannot be characterized as “reasonably certain.” A property owner’s decision to



harvest trees on privately owned land simply cannot be predicted. In I-69 Section 4 as an example, only a limited number of property owners chose to timber (less than 20% of right of way landowners), and the majority of these (greater than 90%) included selective harvesting. An individual landowner's decision to harvest trees depends upon a multitude of individual factors, none of which can be predicted with any reasonable certainty. Thus, the likelihood of tree harvesting in I-69 Section 6, as well as the number of acres outside of the right of way that would be harvested, is both unpredictable and unknown at this time. Forest within the right of way is presumed to be harvested and is included in the forest impacts.

Should USFWS so desire, INDOT and FHWA will assist USFWS in distributing letters to the property owners in the I-69 Section 6 corridor designed to increase awareness of the impact of tree harvesting on Indiana bats and northern long-eared bats. INDOT will also send a letter to each property owner in the right of way, stating that INDOT is not working with any logging companies in the development of I-69. It is anticipated that these letters would be distributed in early 2017 or 2018 to assure owners are informed early in the process. This information should prevent any confusion on the part of the landowners that INDOT advocates, condones or permits logging on the property prior to the time when INDOT purchases the property for the Project. INDOT and FHWA will also work with USFWS to identify logging activities within the project area, and INDOT will notify USFWS of any logging activity discovered. This notice will allow USFWS to take appropriate action under the Endangered Species Act (ESA) as warranted.

Because a substantial part of I-69 Section 6 will use the existing SR 37 and due to its proximity to Indianapolis, it is not anticipated that large logging operations will occur in this section. Unlike the "new terrain" projects in I-69 Sections 1, 2, 3 and 4, the majority of the proposed right of way for I-69 Section 6 will consist of existing right of way of SR 37 similar to I-69 Section 5. Because of the use of existing right of way, the majority of right of way acquisitions from private properties will be small in comparison to previous new terrain right of way acquisitions. An additional difference from the prior I-69 Sections 1-4 is that the total area of landlocked parcels will also be smaller in comparison.

IDNR Classified Forests are found in the vicinity of the I-69 Section 6 refined preferred alternative. However, there are no known acres of Classified Forests impacted by the refined preferred alternative. Nonetheless, approximately 3.6 acres of publicly owned managed lands (Cikana State Fish Hatchery) will be impacted by I-69 Section 6.

The USFWS anticipates a decline in bat habitat in some areas of the SAA in the future, although they are not aware of specific development plans in northern long-eared bat habitat at this time. If INDOT, FHWA or USFWS become aware of specific projects, impacts to northern long-eared bats will be addressed through the incidental take permit process, if appropriate.

Areas set aside for mitigation plantings and preservation in I-69 Section 6 will protect those areas from development in perpetuity, and in the long term will provide quality roosting (i.e., snags) and foraging habitat. Thirty-eight forest plots inside and outside of the proposed R/W were evaluated for snags. Results showed 140 snags (stage of decay 3 or greater) in 38.66 acres of forest survey resulting in an average of 3.6 snags/acre. Results per plot varied and ranged from



0 to 12.93 snags/acre. Multiplying the average snags by an expected 320 acres of preservation in proposed mitigation sites for I-69 Section 6, mitigation could preserve approximately 1,152 snags. These areas will also help to decrease habitat fragmentation, and to improve the potential for colonies of northern long-eared bats currently using the SAA to expand into other areas of suitable habitat.

With successful implementation of the revised Tier 1 Forest and Wetland Mitigation and Enhancement Plan, particularly as detailed herein for I-69 Section 6, and all of the other proposed mitigation efforts and conservation measures, we anticipate that long-term habitat conditions for the northern long-eared bat maternity colonies and individuals within the action areas will be sustainable and in some situations, may be better than existing conditions.



CHAPTER 5 – RUSTY PATCHED BUMBLE BEE (*Bombus affinis*)

5.1 USFWS Endangered Status

The Xerces Society for Invertebrate Conservation (Xerces Society) first petitioned the USFWS (Service) to list the rusty patched bumble bee (*Bombus affinis*) as endangered on February 5, 2013.¹ In response to a May 13, 2014 lawsuit filed by the Xerces Society, the Service agreed to publish a 90-day finding by September 30, 2015. In 80 FR 56423 (September 18, 2015), the Service indicated that the listing of the species may be warranted and subsequently initiated a status review. As a result of the 12-month review, the Service issued a proposed rule to list the species as endangered on September 22, 2016 (81 FR 65324) and received comments on the proposed listing through November 7, 2016. On January 11, 2017, the Service published a final rule (82 FR 3186) to list the rusty patched bumble bee as endangered under the Endangered Species Act. On February 10, 2017, the Service published a final rule, delay of effective date (82 FR 10285). The effective date of the rule that published on January 11, 2017 was delayed from February 10, 2017, to March 21, 2017. Although the Service acknowledges that designation of critical habitat for the rusty patched bumble bee may be prudent, sufficient information to conduct the require analysis is lacking, and as such, critical habitat has not been determined at this time.

5.2 Description

The rusty patched bumble bee is one of 23 species of *Bombus* known from the eastern United States². It is a eusocial species with a round-body and black and yellow piles (hairs). Castes (i.e., bees with different roles based on gender and reproductive ability) within each colony include a queen, female workers, males and gynes or foundress queens. The queen (including gynes), female workers and males are each different in appearance from one another.³ All castes have a short tongue which restricts its ability to access nectar from flowers with deep corollas.⁴

¹ Jespen S., E. Evans, R. Thorp, R. Hatfield, and S.H. Black. 2013. *Petition to List the rusty patched bumble bee Bombus affinis* (Cresson), 1863 as an endangered species under the U.S. Endangered Species Act. The Xerces Society for Invertebrate Conservation.

² Szymanski, J.A., T. Smith, A. Horton, M. Parkin, L. Ragan, G. Masson, E. Olson, K. Gifford, and L. Hill. 2016. *Rusty patched bumble bee (Bombus affinis) Species Status Assessment, Final Report, Version 1*. Unpublished. 93 pp.

³ Mitchell, T. B. 1962. *Bombus affinis* Cresson. In *Bees of the eastern United States*. The North Carolina Agriculture Experiment Foundation with support from The National Science Foundation, North Carolina State College, Raleigh, North Carolina. 557 pp.

Williams, P. H., R. W. Thorp, L. L. Richardson, and S. R. Colla. 2014. *Bumble bees of North America*. Princeton University Press, Princeton, New Jersey. 208 pp.

⁴ Lavery, T. and L. D. Harder. 1988. *The bumble bees of eastern Canada*. *Entomological Society of Canada* 120:965-987.



- The **Queen** is the single reproductive female of the colony and the largest of the caste members measuring 0.75-0.92 inch (19-23 mm) long and 0.37-0.42 inch (9.5-11 mm) in width. Black hairs occur on the face and head of the queen, as well as on lower portions of the thorax (the middle body segment of an insect), middle of the upper portion (scutum) of the thorax, legs, and the rear-most portions of the abdomen. Contrasting, yellow hairs cover the rest of the thorax as well as the first two segments of the abdomen. Unlike most of her offspring, queens do not have the rusty-colored patch or hairs for which the species is named. The new queen gynes are similar in appearance to the queen.
- The **Female Workers** vary in size with lengths of 0.37-0.64 inch (9-16 mm) and widths of 0.28-0.35 inch (5-9 mm). The first workers hatched each year are large, whereas later broods tend to become progressively smaller, depending on floral resource availability. As the name suggests the female workers have a distinctive rusty-colored patch of hairs on the back of the second abdominal segment (T2). In addition, the uppermost portion of the thorax often has a small band of black hairs medially, in contrast to queens who exhibit only a spot of black hairs.
- The **Males** are intermediate in size with a typical length of 0.51-0.69 inch (13-17.5 mm) and width of 0.20-0.28 inch (5-7 mm). As with the female workers, the males have a similar rusty-colored patch of hairs of the abdomen. Males are produced in late summer/early fall and only serve for purposes of mating. They do not perform other activities in the colony.

While the absence of a rusty patch is not diagnostic, the combination of color patterns on the head and abdomen in combination with the short malar space distinguish this species from most co-occurring species throughout its range. The more common brown-belted bumble bee (*B. griseocollis*) has a similar reddish patch on the T2 segment, although the color of the pile on the posterior corners is black, not yellow as with the rusty patched bumble bee. The rusty patched bumble bee is also sometimes confused with the lemon cuckoo bumble bee (*B. citrinus*), confusing bumble bee (*B. perplexus*) and half-black bumble bee (*B. vagans*).

5.3 Range-wide and Indiana Distribution

Following Szymanski⁵ and the Federal Register⁶, the historic (pre-2000) range of the rusty patched bumble bee includes all or portions of 19 States and two Canadian provinces (Quebec and Ontario). This range extended from Maine westward to the eastern Dakotas, south to eastern Missouri and northern Georgia, and along the Atlantic coast north of Virginia, covering 15 ecoregions (

⁵ Szymanski, J.A., T. Smith, A. Horton, M. Parkin, L. Ragan, G. Masson, E. Olson, K. Gifford, and L. Hill. 2016. Rusty patched bumble bee (*Bombus affinis*) Species Status Assessment, Final Report, Version 1. Unpublished. 93 pp.

⁶ USFWS. 2017. Final Rule: Endangered species status for rusty patched bumble bee. U.S. Department of the Interior, Fish and Wildlife Service, in Federal Register, Volume 82, No. 7, Wednesday, January 11, 2017.



Figure 5.3-1). The historic distribution is based on 926 populations documented from before 1950 through the late 1990s. Each population typically consists of tens to hundreds of colonies, with each colony being comprised of several hundred individual bees. Since 2000, only 103 populations have been documented, an 88 percent reduction. More recently, since 2015 the species has only been found within 28 of the 103 extant populations, or 27 percent. Post-1999 populations are considered extant have only been observed in 14 States/Provinces and six ecoregions, an 87 percent reduction in the spatial extent of the range. States/Provinces within which current post-1999 populations exist include: Minnesota (n=10 counties), Wisconsin (n=10), Illinois (n=10), Indiana (n=9), Ohio (n=3), Iowa (n=3), Maine (n=2), Quebec (n=2), Massachusetts (n=1), Pennsylvania (n=1), Maryland (n=1), Virginia (n=1), North Carolina (n=1), and Tennessee (n=1).

The historic range of the species includes roughly the northern 75 percent of Indiana, with the southern limits extending from Sullivan County on the west to Jefferson County on the east (**Figure 5.3-2**). Indiana occurrence records exist for 24 counties,⁷ primarily in central and northwest Indiana. Of these, extant populations based on post-1999 records are known for just nine counties from northwestern, west-central and central Indiana: Lake, Newton, Jasper, Starke, Vermillion, Vigo, Parke, Montgomery, and Marion.

On January 11, 2017, the U.S. Fish and Wildlife Service (FWS) published a final rule to list the rusty patched bumble bee (*Bombus affinis*) as an endangered species under the Endangered Species Act (as amended). The listing became effective on March 21, 2017.

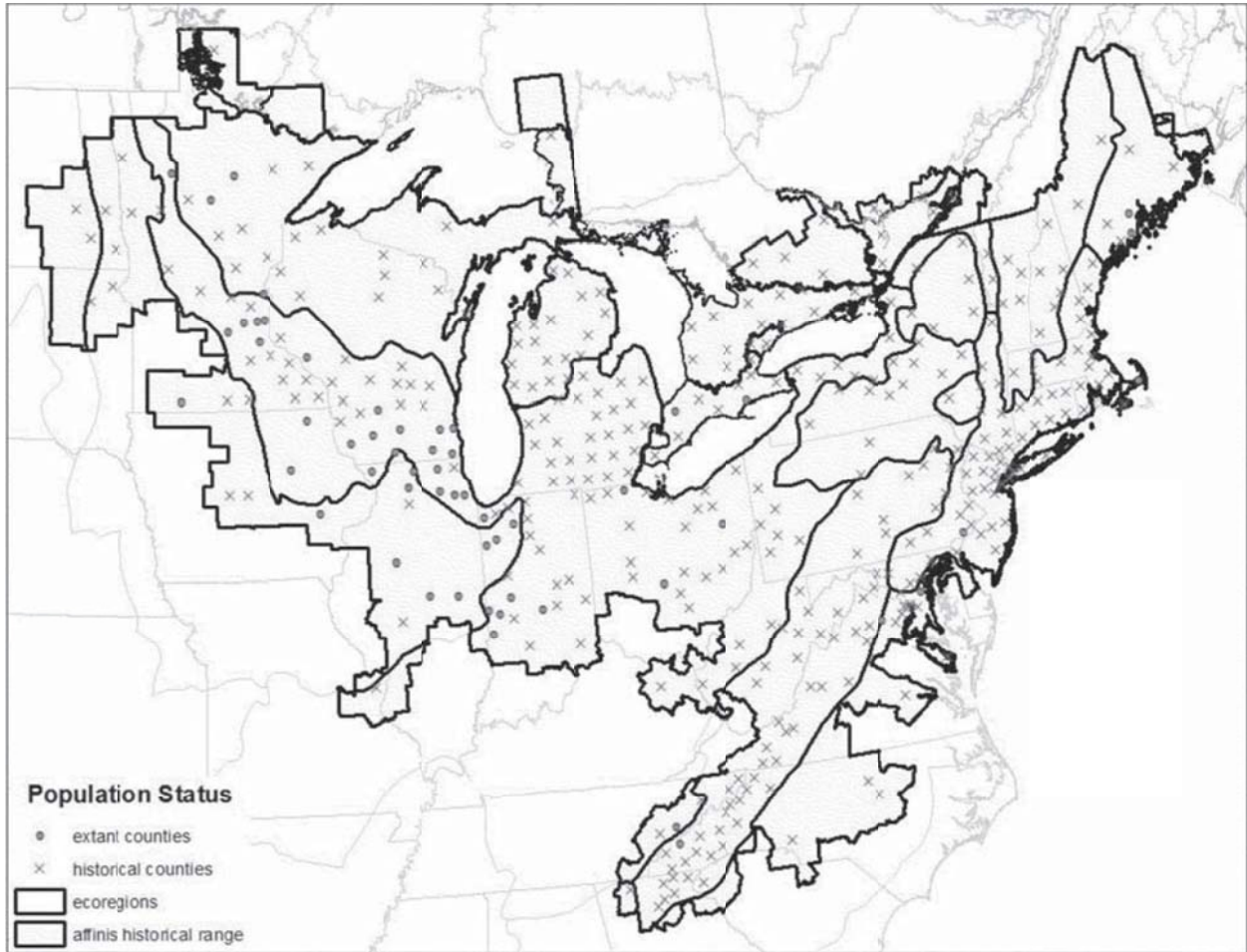
Rusty patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast. They emerge early in spring and are one of the last species to go into hibernation. Rusty patched bumble bees live in colonies that include a single queen and female workers. The colony produces males and new queens in late summer. Bumble bees require areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent 5 cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil). They need a constant supply and diversity of flowers blooming for pollen and nectar collection throughout the colony’s long life, April through September.

Recently, the FWS has developed “high potential” zones around each current (2007-2016) rusty patched bumble bee record, and have concluded that the bee is only likely to be present within these specific areas. There are three such zones in Indiana. Although not of uniform size, they have discrete boundaries that are being used by FWS field offices to help action agencies determine when consultation under the ESA section 7(a)(2) may be necessary. One zone is in northern Marion County although it is not near the I69 project area (IPaC, <https://ecos.fws.gov/ipac/>). Based on the project location and action area, consultation for the rusty patched bumble bee under section 7(a)(2) for the I69 Section 6 project is not required.

⁷ Jean, R. 2010. *Studies of bee diversity in Indiana: the influence of collection methods on species capture, and a state checklist based on museum collections*. Ph.D. dissertation, Indiana State University, Terre Haute, Indiana.

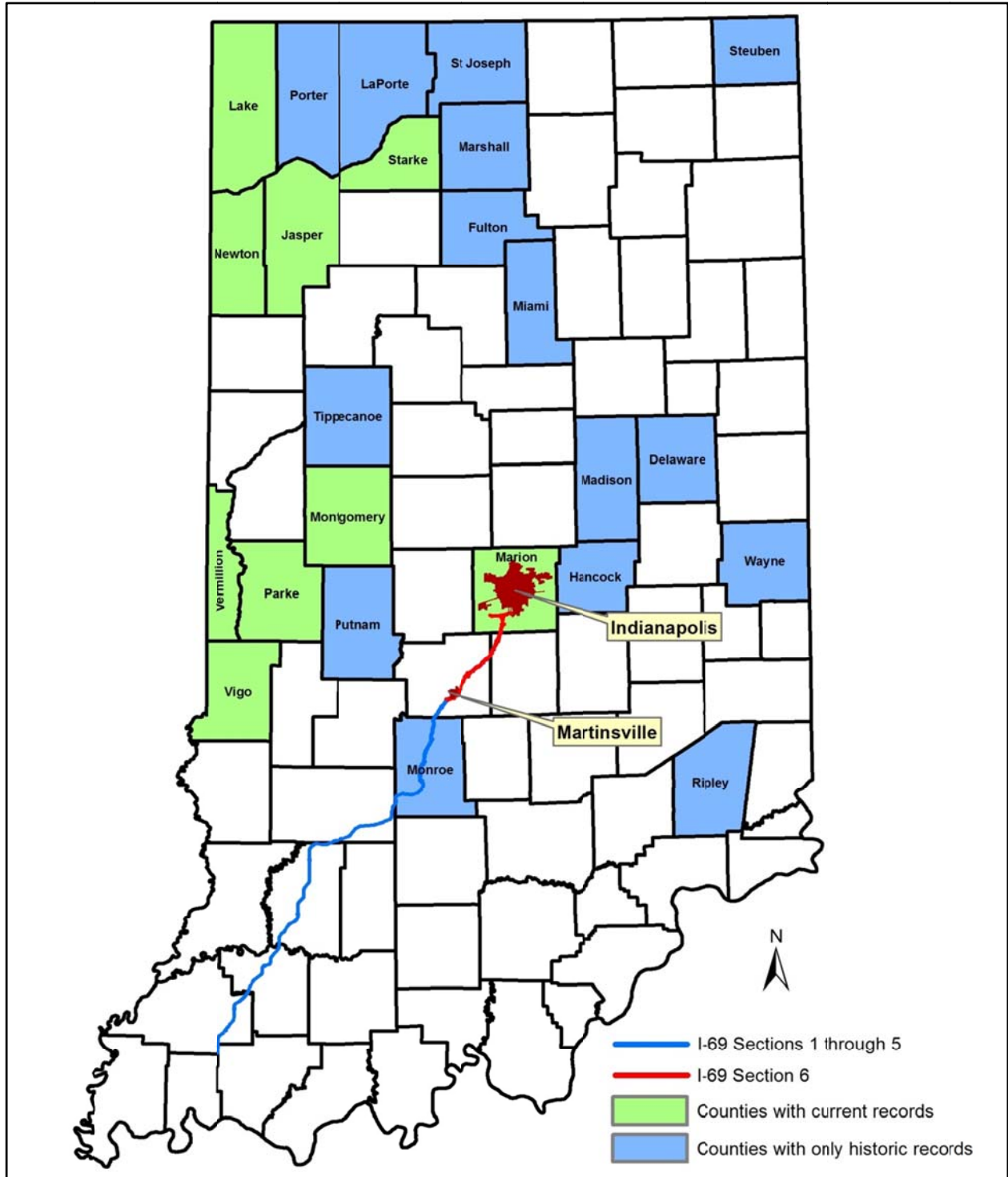


Figure 5.3-1: Range maps for rusty patched bumble bee. Dots represent counties with a rusty patched bumble bee occurrence since 2000. The Xs represent counties with historical occurrences (i.e., no occurrences since 2000)



(Source: 82 FR 3186)

Figure 5.3-2: Indiana record distribution map for rusty patched bumble bee. Green highlighted counties indicate locations where population(s) have been documented since 2000. Blue highlighted counties indicate locations where only pre-2000 records exist (i.e., no occurrences since 2000)





5.4 Life History

Rusty patched bumble bees have a complex life cycle comprising four components⁸ illustrated in **Figure 5.4-1**:

- **Spring Emergence and Colony Formation** - Queens emerge from overwintering burrows in March to May (depending on weather conditions), and begin to search for a suitable nest. They forage at wildflowers for food for themselves and their offspring, the future workers within the colony.
- **Colony Growth and Foraging by Workers** - Once a few workers hatch, they begin to forage for food and become responsible for colony defense, and care of the young in April and May. The queen remains within the nest and continues to lay eggs, the workers are female, but hormones produced by the queen and aggression prevent them from laying eggs. During this phase, access to sufficient floral resources is requisite to support continued growth of the colony.

The colony continues to grow throughout the summer until it has sufficient resources to produce males and unmated queens. Fall colonies of wild rusty patched bumble bees range in size from 100 – 1000 individuals. A single captive colony, containing 2100 individuals⁹ is the largest recorded colony for any North American species of bumble bee.

- **Production of Gynes, Reproduction, and Dispersal** - In late summer/early fall (August-October), the colony begins to produce reproductive individuals (unmated queens called gynes and males). Gynes disperse to mate and find a suitable overwintering site, while the original founding queen, males, and workers die at the end of the season in September or October.
- **Winter Diapause** - Once new queens find appropriate winter habitat (loose soil), they go into a diapause (hibernation). New queens emerge the following spring to start the cycle again.

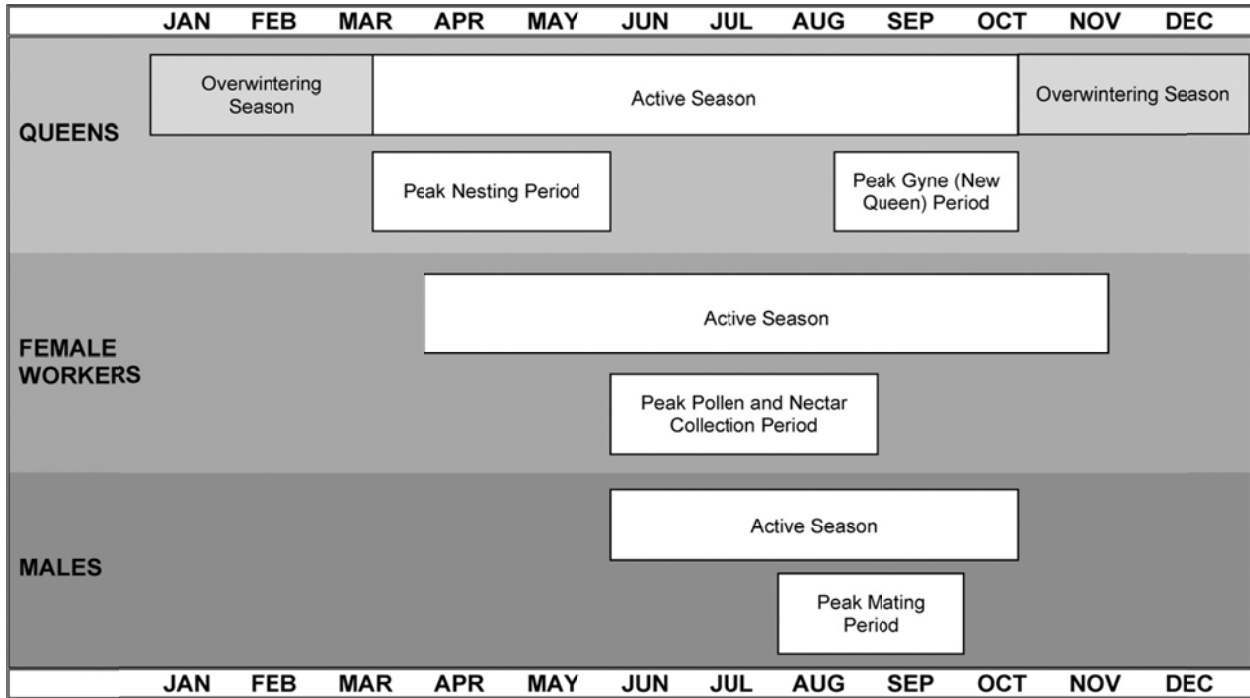
⁸ Plath, O. E. 1922. Notes on the nesting habits of several North American bumblebees. *Psyche: A Journal of Entomology* 29:1-15.

Macfarlane, R. P., K. D. Patten, L. A. Royce, B. K. W. Wyatt, and D. F. Mayer. 1994. Management potential of sixteen North American bumble bee species. *Melandria* 50:1-12.

Colla, S. R. and S. Dumesh. 2010. The bumble bees of southern Ontario: notes on natural history and distribution. *Journal of the Entomological Society of Ontario* 141:38-67.

⁹ Macfarlane, R. P. 1974. Ecology of Bombinae (Hymenoptera: Apidae) of southern Ontario, with emphasis on their natural enemies and relationships with flowers. Ph.D. dissertation, University of Guelph, Guelph, Ontario, Canada.

Figure 5.4-1: Seasonal chronology of rusty patched bumble bee



(Source: Environmental Solutions and Innovations, Inc. 2017)

5.5 Habitat Requirements

The rusty patched bumble bee nests underground, often in abandoned rodent burrows, and occasionally in clumps of grass above ground. Like other bumble bees, it is dependent on nectar and pollen from flowers as food, therefore, its preferred habitat are areas with an abundance and variety of flowering trees and forbs. As many as 160 species or genera of native and non-native plants used as food sources by the rusty patched bumble bee have been documented by Evans et al, Colla and Dumesh, Richardson (unpublished), and Jean (unpublished).¹⁰ The majority of these are included within the flora of Indiana. Plant usage by rusty patched bee documented in Indiana includes milkweed (*Asclepias sp.*), fernleaf yellow false foxglove (*Aureolaria pedicularia*), garden yellowrocket (*Barbarea vulgaris*), pagoda plant (*Blephilia hirsuta*), bellflower (*Campanula sp.*), Virginia springbeauty (*Claytonia virginica*), crownvetch (*Securigera varia*), lateflowering thoroughwort (*Eupatorium serotinum*), tall blazing star

¹⁰ Evans, E. W., R. W. Thorp, S. Jepsen, and S. H. Black. 2008. Status review of three formerly common species of bumble bee in the subgenus *Bombus*. The Xerces Society for Invertebrate Conservation, Portland, Oregon and the University of California, Davis, California. 63pp.

Colla, S. R. and S. Dumesh. 2010. The bumble bees of southern Ontario: notes on natural history and distribution. *Journal of the Entomological Society of Ontario* 141:38-67.

Dr. Leif Richardson and Dr. Rob Jean



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(*Liastris aspera*), sundial lupine (*Lupinus perennis*), alfalfa (*Medicago sativa*), sweetclover (*Melilotus sp.*), bee balm (*Monarda sp.*), parsnip (*Pastinaca sp.*), Carolina rose (*Rosa carolina*), blackberry (*Rubus sp.*), lanceleaf figwort (*Scrophularia lanceolata*), goldenrod (*Solidago sp.*), bluejacket (*Tradescantia ohioensis*), red clover (*Trifolium pratense*), ironweed (*Vernonia sp.*), and Culver's root (*Veronicastrum virginicum*).

Because it is a generalist in terms of flowering species that suit its needs, it is found in a variety of habitats ranging from prairies, woodlands, marshes, parks, residential gardens, and agricultural settings. However, since the rusty patched bumble bee is one of the first bumble bees to emerge in the spring and one of the last to enter into hibernation (diapause) in the fall, it is reliant on an abundance of early (typically ephemeral woodland spring flowers) and late flowering plants to provide a consistent source of food throughout the active stages of its life cycle. For these reasons, INDOT and FHWA may want to amend (if necessary) the seed mixes used on mitigation sites to be more beneficial to pollinators, specifically bumble bees. Foraging habitat for spring queens and early workers may be different than foraging areas used by the same colony later in the season.¹¹ Rusty patched bumble bee foraging range has not been studied directly, but studies on other species in the genus suggest foraging ranges of 500 m to 2.3 km¹² (but could be more than 2.5 km for some bumble bee species.¹³ In early spring the vast majority of the floral resources available to bees are spring ephemerals in woodlands. As the season progresses and the canopy of the forest closes, wildflower species diversity tends to decline in forests, and thus foraging often switches to more open habitats where late spring, summer, and fall wildflowers dominate.

5.6 Causes of Decline

¹¹ Colla, S. R. 2016. Status, threats and conservation recommendations for wild bumble bees (*Bombus spp.*) in Ontario, Canada: a review for policymakers and practitioners. *Natural Areas Journal* 36:412-426.

¹² Osborne, J., S.J. Clark, R.J. Morris, I.H. Williams, J.R. Riley, A.D. Smith, D.R. Reynolds, and A.S. Edwards. 1999. A landscape-scale study of bumble bee foraging range and constancy, using harmonic radar. *Journal of Applied Ecology* 36(4):519-533.

Walther-Hellwig, K. and R. Frankl. 2000. Foraging habitats and foraging distances of bumblebees, *Bombus spp.* (Hym., Apidae) in an agriculture landscape. *Journal of Applied Entomology* 124:299-306.

Darvill, B., M. E. Knight, and D. Goulson. 2004. Use of genetic markers to quantify bumblebee foraging range and nest density. *OIKOS* 107:471-478.

Knight, M. E., A. P. Martin, S. Bishop, J. L. Osborne, R. J. Hale, A. Sanderson, and D. Goulson. 2005. An interspecific comparison of foraging range and nest density of four bumblebee (*Bombus*) species. *Molecular Ecology* 14:1811-1820.

Osborne, J.L., A.P. Martin, N.L. Carreck, J.L. Swain, M.E. Knight, D. Goulson, R.J. Hale, and R.A. Sanderson. 2008. Bumblebee flight distances in relation to the forage landscape. *Journal of Animal Ecology* 77(2):406-415.

Wolf, S. and R. F. A. Mortiz. 2008. Foraging distance in *Bombus terrestris* L. (Hymenoptera: Apidae). *Apidologie* 39:419-427.

Kraus, F. B., S. Wolf, and R. F. A. Mortiz. 2009. Male flight distance and population substructure in the bumblebee *Bombus terrestris*. *Journal of Animal Ecology* 78:247-252.

¹³ Hagen, M., M. Wikelski, and W. D. Kissling. 2011. Space use of bumblebees (*Bombus spp.*) revealed by radio-tracking. *PLoS ONE* 6:1-10.

Rao, S. and J. P. Strange. 2012. Bumble bee (Hymenoptera: Apidae) foraging distance and colony density associated with a late-season mass flowering crop. *Environmental Entomology* 41:905-915.



From the Species Status Assessment² it has been estimated that within four of the six ecoregions where the species is extant, there is greater than a 90 percent probability that the rusty patched bumble bee will be extirpated within 10 years. For the remaining two ecoregions the 90 percent probability is that it will be extirpated in 30 years.

The decline of the rusty patched bumble bee over the past few decades has been attributed to a reduction in resiliency, representation, and redundancy of the species.² The principal stressors identified thus far resulting in the decline of the species include pathogens, pesticide exposure, habitat loss/degradation, small population dynamics, and climatic factors. The fungus *Nosema bombi* and the protozoan *Crithidia bombi* are two suspected pathogenic agents believed to have resulted in considerable declines in rusty patched bumble bee populations, as well as populations of other native North American bumble bee species since the mid-1990s.¹⁴ These may have been introduced in captive colonies of bumble bees used in agriculture and greenhouses.¹⁵ Imported bees also compete with native bees for limited food resources and may also harbor other diseases,¹⁶ such as viruses, bacterial infections, and parasitic protozoans like *Apicystis bombi*.

Bees are also sensitive to insecticides,¹⁷ particularly neonicotinoid class insecticides, which have been shown to have lethal effects on bumble bees. The temporal decline in rusty patched bumble bees is generally coincident with the use of imidacloprid in the United States in the early 1990s and subsequent introduction of clothianidin, thiamethoxam and other pesticides in the early 2000s. These neurotoxins act on the insect central nervous system, but are not specific to the targeted pest species. They can be absorbed by plants and ingested by insects as they forage. Additionally, sublethal effects from exposure include reduced or no male production, reduced or no egg hatching, and reduced queen production.¹⁸ Bortolotti et al., Decourtye et al., Morandin

¹⁴ Goulson, D., G. C. Lye, and B. Darvill. 2008. Decline and conservation of bumble bees. *Annual Review of Entomology* 53:191-208.

¹⁵ Colla, S. R., M. C. Otterstatter, R. J. Gegear, and J. D. Thomson. 2006. Plight of the bumble bee: Pathogen spillover from commercial to wild populations. *Biological Conservation* 129:461-467.

¹⁶ Williams, P. H. and J. L. Osborne. 2009. Bumblebee vulnerability and conservation world-wide. *Apidologie* 40:367-387.
COSEWIC. 2010. COSEWIC assessment and status report on the rusty-patched bumble bee *Bombus affinis* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Canada. 40pp.

¹⁷ Tasei, J.-N., J. Lerin, and G. Ripault. 2000. Sub-lethal effects of imidacloprid on bumblebees, *Bombus terrestris* (Hymenoptera: Apidae) during a laboratory feeding test. *Pest Management Science* 56:784-788.

Tasei, J.-N., G. Ripault, and E. Rivault. 2001. Hazards of imidacloprid seed coating to *Bombus terrestris* (Hymenoptera: Apidae) when applied to sunflower. *Journal of Economic Entomology* 94:623-627.

Scott-Dupree, C. D., L. Conroy, and C. R. Harris. 2009. Impact of currently used or potentially useful insecticides for canola agroecosystems on *Bombus impatiens* (Hymenoptera: Apidae), *Megachile rotundata* (Hymenoptera: Megachilidae), and *Osmia lignaria* (Hymenoptera: Megachilidae). *Journal of Economic Entomology* 102:177-182.

Bernal, J., E. Garrido-Bailon, M. J. Del Nozal, A. V. Gonzalez-Porta, R. Martin-Hernandez, J. C. Diego, J. J. Jimenez, J. L. Bernal, and M. Higes. 2010. Overview of pesticide residues in stored pollen and their potential effect on bee colony (*Apis mellifera*) losses in Spain. *Journal of Economic Entomology* 103:1964-1971.

¹⁸ Elston, C., H. Thompson, and K. Walters. 2013. Sub-lethal effects of thiamethoxam, a neonicotinoid pesticide, and propiconazole, a DMI fungicide, on colony initiation in bumble bee (*Bombus terrestris*) micro-colonies. *Apidologie* DOI: 10.1007/s13592-013-0206-9.

Fausser-Misslin, A., B.M. Sadd, P. Neumann, and C. Sandrock. 2014. Influence of combined pesticide and parasite exposure on bumble bee colony traits in the laboratory. *Journal of Applied Ecology* 51:450-459.



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and Winston, Franklin et al., Yang et al., and Mommaerts et al.,¹⁹ suggest that exposures may also cause other behavioral and physiological issues including reducing immune function.²⁰

Although the rusty patched bumble bee is regarded as a habitat generalist, not dependent on a specific plant community type, habitat loss or fragmentation in combination with a reduction in floristic diversity in available habitats can play a contributing role in reduced population numbers. Reductions in the quantity and diversity of suitable flowering species throughout not only the summer, but critical spring and fall life cycle periods, can result in an energy deficit and poor overall health that leaves the species more susceptible to other stressors. Large-scale agriculture may produce crops that are outstanding producers of pollen and nectar, but agricultural practice intensification, including land clearing, irrigation, tilling, and pesticide and fertilizer use, has removed and/or fragmented much of the habitat requisite for nesting.²¹ Additionally, because each queen represents a potential colony, March to May and August to

Feltham, H., K. Park, and D. Goulson. 2014. Field realistic doses of pesticide imidacloprid reduce bumble bee pollen foraging efficiency. *Ecotoxicology* 23:317-323.

Gill, R. J., O. Ramos-Rodriguez, N. E. Raine. 2012. Combined pesticide exposure severely affects individual- and colony-level traits in bees. *Nature* 491, 105–108. doi:10.1038/nature11585; PMID: 23086150

Mommaerts V, G Sterk, and G Smagghe. 2006. Hazards and uptake of chitin synthesis inhibitors in bumble bees *Bombus terrestris*. *Pest Management Science* 62:752-758.

Mommaerts, V., S. Reynders, J. Boulet, L. Besard, G. Sterk, and G. Smagghe. 2010. Risk assessment for side-effects of neonicotinoids against bumblebees with and without impairing foraging behavior. *Ecotoxicology* 19:207-215.

Scholer, J. and V. Krischik. 2014. Chronic Exposure of Imidacloprid and Clothianidin Reduce Queen Survival, Foraging, and Nectar Storing in Colonies of *Bombus impatiens*. *PLoS ONE* 9(3): e91573.

¹⁹ Bortolotti, L., R. Montanari, J. Marcelino, P. Medrzucki, S. Maini, and C. Porrini. 2003. Effects of sub-lethal imidacloprid doses on the homing rate and foraging activity of honey bees. *Bulletin of Insectology* 56:63-67.

Decourtye, A., E. Lacassie, and M.-H. Pham-Delegue. 2003. Learning performances of honeybees (*Apis mellifera* L.) are differentially affected by imidacloprid according to the season. *Pest Management Science* 69:269-278.

Morandin, L. A. and M. L. Winston. 2003. Effects of novel pesticides on bumble bee (*Hymenoptera: Apidae*) colony health and foraging ability. *Environmental Entomology* 32:555-563

Franklin, M. T., M. L. Winston, and L. A. Morandin. 2004. Effects of clothianidin on *Bombus impatiens* (*Hymenoptera: Apidae*) colony health and foraging ability. *Journal of Economic Entomology* 97:369-373.

Yang, E. C., Y. C. Chuang, Y. L. Chen, and L. H. Chang. 2008. Abnormal foraging behavior induced by sublethal dosage of imidacloprid in the honey bee (*Hymenoptera: Apidae*). *Journal of Economic Entomology* 101:1743-1748.

Mommaerts, V., S. Reynders, J. Boulet, L. Besard, G. Sterk, and G. Smagghe. 2010. Risk assessment for side-effects of neonicotinoids against bumblebees with and without impairing foraging behavior. *Ecotoxicology* 19:207-215.

²⁰ Alaux, C., J.L. Brunet, C. Dussaubat, F. Mondet, S. Tchamitchan, M. Cousin, J. Brillard, A. Baldy, L. P. Belzunces, and Y. Le Conte. 2010. Interactions between *Nosema* microspores and a neonicotinoid weaken honeybees (*Apis mellifera*). *Environmental Microbiology* 12:774-782.

Pettis, J. S., D. vanEngelsdorp, J. Johnson, and G. Dively. 2012. Pesticide exposure in honey bees results in increased levels of the gut pathogen *Nosema*. *Naturwissenschaften* 99:153-158.

²¹ Williams, P. H. 1989. Distribution and decline of British bumblebees (Available at: <http://www.nhm.ac.uk/research-curation/research/projects/bombus/decline.html>). In Ilford: Central Association of Bee-Keepers, 15 pp.

Evans, E. W., R. W. Thorp, S. Jepsen, and S. H. Black. 2008. Status review of three formerly common species of bumble bee in the subgenus *Bombus*. *The Xerces Society for Invertebrate Conservation, Portland, Oregon and the University of California, Davis, California*. 63pp.

COSEWIC. 2010. COSEWIC assessment and status report on the rusty-patched bumble bee *Bombus affinis* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Canada. 40 pp.



October are very sensitive time periods in the cycle when queens are active. Destruction of vegetation and digging during these periods can disturb bumble bees, reduce available resources, disrupt nests or mating behaviors, and potentially kill individuals and colonies.

Bees are susceptible to extinction when population sizes become small.²² Because the rusty patched bumble bee populations are comprised of colonies that include reproductive and non-reproductive castes, the effective population size is smaller than the total population size, therefore, reproductive potential is diminished. In small population situations, the haplodiploidy reproductive strategy of this species (diploid females and haploid males) can lead to increases in the proportion of nonviable haploid males which ultimately perpetuates further reductions in population size resulting in an extinction vortex.²³ While this reproductive strategy is capable of sustaining stable populations that display diversity, it can become a detriment to the species continued existence when other stressors begin to reduce the population size.

The general effect of climate change on pollinators, including bumble bees, is unknown. However, climate trends such as increased droughts, flooding, storm events, increased variability of temperatures and precipitation, early snow melt, and late frost can result in detrimental spatial and temporal effects to essential bumble bee habitat components. Such changes alone would not necessarily result in continuous reduction in populations, but could be a contributing factor in combination with other stressors.

5.7 Probable Presence/Absence in Project Area

Since the rusty patched bumble bee has just recently been listed as endangered by the USFWS, there have not been a large number of investigations on the species within the state, therefore, distribution records are limited and geographically sporadic. At present, there are two records of the species from northern Marion County (2009 and 2010) and several older records (1942 and 1973 through 1978) from Monroe County. The northern Marion County record is far removed from the northern terminus of the I-69 project in the southcentral portion of the county, with the entire urban landscape of Indianapolis in between. Although woodland, old field and wetland habitat with flowering plants occurs within the Section 6 project area, rusty patched bumble bee presence is considered to be unlikely. Additionally, the flowering plant habitat within the project area is not unique for the area and is regionally common and abundant elsewhere between Martinsville and Indianapolis.

²² Zayed, A. and L. Packer. 2005. Complementary sex determination substantially increases extinction proneness of haplodiploid populations. *Proceedings of the National Academy of Science* 102:10742-10746.

²³ Hedrick, P., W. J. Gadau, and R. E. J. Page. 2006. Genetic sex determination and extinction. *Trends in Ecology and Evolution* 21:55-57.



CHAPTER 6 – MITIGATION & CONSERVATION MEASURES

6.1 *Mitigating Direct Loss of Indiana bat Habitat*

6.1.1 Forest Mitigation

Upland forests impacted by the I-69 Evansville to Indianapolis corridor will be mitigated at a 3:1 ratio. This commitment, made in the Tier 1 FEIS and reaffirmed in the Tier 1 ROD, considers upland forests as all areas that meet the definition of a forest that are not classified as forested wetlands. Mitigation may be in the form of planting unforested areas (with a minimum goal of 1:1 replacement or reforestation) and/or protecting existing forests by fee simple purchase, permanent protective easement, or a combination of actions with a maximum goal of 2:1. The 3:1 ratio will be achieved by a combination of reforestation and preservation in the overall I-69 Evansville to Indianapolis project.

Total direct impacts in I-69 Section 6 are a loss of 158 acres of upland forest and 6.9 acres of wetlands (1.8 acres of forested wetlands, 0.4 acre of scrub-shrub wetlands, 1.9 acres of emergent wetlands, and 2.8 acres of open water wetlands). These losses are being increased by 10% to allow for any potential alignment shifts during final design that may cause additional impacts. When impacts are increased by these allowances, the impacts become 173.8 acres of upland forest and 7.6 acres of wetlands.

After the 10% increase is added as a buffer for possible future changes in design, mitigation will require 521.4 acres of upland forest mitigation, 6.0 acres of forested wetland mitigation, 1.2 acres of scrub-shrub wetland mitigation, 4.2 acres of emergent wetland mitigation, and 3.1 acres of open water mitigation. See **Table 6.1-1** for direct impacts and mitigation summary.



Table 6.1-1: I-69 Section 6 Direct Impacts and Mitigation

Impact Area	Tier 2 Upland Forest ¹	Delineated Wetlands	Forested	Scrub/Shrub	Emergent	PUB/PAB/L1UB
Indiana Bat Maternity Colonies						
Lambs Creek	3.5	0.5	0.3	0	0.2	0
Clear Creek	42.4	2.7	1.2	0	0.8	0.7
Crooked Creek	46.3	1.0	0.3	0	0.7	0
Pleasant Run Creek	8.7	0.6	0	0	0	0.6
Total of Maternity Colonies (minus overlap)	99.6	4.7	1.8	0	1.6	1.3
Remaining Action Area	58.3	2.2	0	0.4	0.3	1.5
Northern Long-Eared Bat Maternity Colonies						
Lambs Creek	0	0	0	0	0	0
Clear Creek East Fork	24.9	2.3	1.2	0	0.4	0.7
White River	12.3	0.9	0.3	0	0.6	0
White River Goose Creek	7.1	0	0	0	0	0
Pleasant Run Creek	2.4	0	0	0	0	0
Total of Maternity Colonies (minus overlap)	46.7	3.0	1.5	0	0.8	0.7
Remaining Action Area	110.9	3.8	0.3	0.4	1.0	2.1
I-69 Section 6 Overall Impacts and Mitigation Requirements						
I-69 Section 6 Direct Impacts	158	6.9	1.8	0.4	1.9	2.8
10% Impact Increase²	15.8	0.7	0.2	0	0.2	0.3
Total	173.8	7.6	2.0	0.4	2.1	3.1



Mitigation Ratio	3:1	Varies	3:1	3:1	2:1	1:1
Mitigation Acreage Required	521.4	14.5	6.0	1.2	4.2	3.1

1. Forest was determined by photo interpretation of 2015 aerial photographs and verified by field review. It includes groups of trees > 1 acre and wider than 120 feet meeting the USDA definition.

2. Direct Impacts were increased by 10% to allow for any additional impacts which might occur due to last minute alignment shifts during final design. Increasing mitigation requirement during planning will insure that “no net loss” is achieved in 1:1 forest replacement (reforestation). Final impacts will be tracked through construction to assure that final mitigation acreage provided meets the 1:1 replacement and 3:1 total mitigation requirement. Additional acres may be required for access easements (ingress and egress) to mitigation sites for construction and monitoring.

Currently, INDOT has identified 12 properties with owners interested in being considered as potential mitigation property and one potential landlocked area identified for potential mitigation totaling 1,317.3 acres. Of this amount approximately 535.9 acres is anticipated to be required. INDOT and FHWA will fulfill all required mitigation efforts. At this time, INDOT is currently in early stages of the acquisition process.

The following properties are currently being pursued by INDOT. Acreage for each parcel is provided in parentheses.

- Lambs Creek IB¹ and NLEB² Maternity Colonies (I-69 Section 6)
 - [REDACTED] (Connected to Lambs Creek Colony, 245.5 acres)
- Clear Creek and Crooked Creek IB and Clear Creek East Fork and White River NLEB Maternity Colonies
 - [REDACTED] (5.9 acres)
 - [REDACTED] [REDACTED] (106.8 acres)
 - [REDACTED] [REDACTED] [REDACTED] (302.8 acres)
- Crooked Creek IB and White River NLEB Maternity Colonies
 - [REDACTED] [REDACTED] (119.3 acres)
 - [REDACTED] [REDACTED] [formerly known as (fka) [REDACTED] [REDACTED]] (205.9 acres)
 - [REDACTED] [REDACTED] (50.9 acres)
- Pleasant Run IB and White River Goose Creek NLEB Maternity Colonies
 - [REDACTED] [REDACTED] (111.4 acres)

¹ Indiana bat

² Northern long-eared bat

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- Pleasant Run IB and Pleasant Run NLEB Maternity Colonies
 - [REDACTED] (46.2 acres)
 - [REDACTED] (26.3 acres)
- Bryant Creek IB and Bryant Creek North NLEB Maternity Colonies
 - [REDACTED] (38.4 acres) – I-69 Section 5
 - [REDACTED] (15.7 acres) – I-69 Section 5
- Indian Creek Focus Area
 - [REDACTED] (42.1 acres)

INDOT will provide written documentation to USFWS for each property for which purchases are made. As each property is acquired, the Transfer Title signed by the property owner will be provided to USFWS, along with a running total of mitigation acres purchased in I-69 Section 6. Updates will be provided on a regular basis during the review of the BA and continue until all mitigation commitments have been satisfied. INDOT will make an effort to acquire properties prior to the approval of a BO by USFWS. INDOT requests that USFWS document the total acreage of all secured properties within the approved BO.

Landlocked properties will also be available for review by INDOT for sale or for possible mitigation. The exact acres are unknown at this time and will not be fully identified until final design. It is the request of INDOT and FHWA to USFWS that these properties be considered for use as mitigation, as needed and as appropriate.

With this submittal, INDOT is committed to provide properties with documentation (e.g., transfer deed and running totals) as they become secured. It also includes the recommendation to use landlocked properties, as needed, to satisfy the total commitment which is unknown at this time, but estimated to be approximately 535.9 acres. This estimated total includes 10% “over-mitigation” acres.

In identifying mitigation properties, INDOT and FHWA used the following criteria:

- Recorded Indiana bat and northern long-eared bat capture sites
- Roost tree(s) and flyways connected to a roost (including bridges)
- Areas within a maternity colony or focus area
- Part of a larger contiguous block of forest/property
- Preservation of especially older growth forests with snags/shaggy barked trees
- Reforestation and restoration practices (e.g., wetlands and streams)
- Biologically attractive areas with streams, seeps, wetlands, forests, and endangered species
- Potential for human development



Before any construction of I-69 Section 6 commences within the maternity colony areas, the FHWA, in consultation with USFWS, will develop detailed, site-specific, mitigation plans. The mitigation plans will include design plans with detailed descriptions for each phase of mitigation including: 1) initial construction and establishment, 2) 10-year post-construction monitoring phase, and 3) long-term management. The I-69 Section 6 final mitigation plans will address and/or establish the following: 1) quantifiable criteria and methods for assessing success of all mitigation plantings and functionality of constructed wetlands and streams, 2) approved lists of tree/plant species to be planted (and their relative abundance/%), 3) approved lists of herbicides for weed control, 4) proposed construction schedules, 5) annual post-construction monitoring schedules, and 6) a long-term, ongoing management/stewardship strategy.

FHWA will begin construction and/or reforestation within the I-69 Section 6 mitigation sites either before (the most preferable option) or during the first summer reproductive season (1 April – 30 September) immediately after any I-69 related tree clearing or construction begins in I-69 Section 6. This will be applicable to all mitigation properties. Once initiated, all USFWS-approved construction and tree plantings within the I-69 Section 6 mitigation sites must be completed within three calendar years.

FHWA will provide USFWS with a written annual report that summarizes the previous year's monitoring, conservation and mitigation accomplishments, remaining efforts, and any problems encountered within I-69 Section 6. This annual report will be provided throughout the 10-year post-construction monitoring period which will be completed in the 1st, 2nd, 3rd, 5th, 7th and 10th years following completion of the construction of the mitigation sites. The annual report for I-69 Section 6 will be included with other sections of I-69 as allowed under the 2006 Tier 1 Revised Programmatic BO, Terms and Conditions Number 2 (pp. 103).

6.1.2 Wetlands Mitigation

Mitigation plans to offset unavoidable wetland impacts will comply with INDOT's MOU (1991) as noted during Tier 1. The overall I-69 project proposes wetland replacement at a ratio of 3:1 or 4:1 depending on quality for forested wetland impacts. A ratio of 2:1 or 3:1 for scrub/shrub wetland impacts and emergent wetland impacts will be replaced, depending upon their quality. Impacts to open water are proposed to be mitigated at a ratio of 1:1 and may be mitigated using borrow pits.

Native Vegetation Planting

Potential areas for native vegetation planting are anticipated to include crossings of Indian Creek, Clear Creek, Stotts Creek and Crooked Creek. Other areas that may be considered will be at the other stream crossings and interchange locations.

Wildlife Corridors

The I-69 Section 6 Tier 2 DEIS discusses wildlife corridors in Chapter 5.18 and Appendix AA. It is expected that wildlife will continue to use Indian Creek, Clear Creek, Stotts Creek, Crooked



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Creek, Honey Creek, Pleasant Run, Little Buck Creek, State Ditch, and the White River as crossing corridors.

6.2 Mitigation Areas

A two-day agency tour for the potential I-69 Section 6 mitigation sites was conducted on November 9-10, 2016. The purpose of the tour was to familiarize the resource agencies with existing resources, list on-going activities for mitigation sites, describe potential mitigation sites, identify any unique considerations, discuss general water resource/Section 7 Mitigation concepts, and offer thoughts for future coordination.

The agencies that attended this tour included the U.S. Army Corps of Engineers (USACE), USFWS, USEPA, FHWA, INDOT, IDEM, and IDNR. Twelve mitigation sites were reviewed on November 9-10, 2016. An additional property was recommended by the agencies during the review. This additional property (██████████ ██████████) has been reviewed by INDOT and included as a potential mitigation site.

A description of 13 proposed mitigation sites in I-69 Section 6 follows. These sites are associated with four Indiana bat maternity colonies (Lambs Creek, Clear Creek, Crooked Creek, and Pleasant Run Creek) and five northern long-eared bat maternity colonies (Lambs Creek, Clear Creek East Fork, White River, White River Goose Creek, and Pleasant Run Creek). In addition, two sites are associated with the IB Bryant Creek Maternity Colony and the NLEB Bryant Creek North Maternity Colony in I-69 Section 5 and one site is associated with the Indian Creek focus area and in proximity of the NLEB Jordan Creek Maternity Colony. Of these 13 proposed mitigation sites (as shown in **Figure 6.2-1**), three include forest preservation only. They are ██████████, ██████████, and ██████████. However, streambank stabilization may be considered on the ██████████. The remaining 10 sites will include construction activities such as tree planting (reforestation), and wetland and stream restoration/enhancement. The tree species that will be planted within the proposed mitigation sites will be species taken from the IDNR (Region 3) approved tree list (See Appendix W). These species will be planted in the appropriate areas according to their USFWS Indicator Status as identified in the “*National List of Vascular Plant Species that Occur in Wetlands: 1996 National Summary.*”

Tree species that may be planted in the upland mitigation areas include but are not limited to: red oak, white oak, tulip poplar, black cherry, American basswood (*Tilia americana*), black walnut, and shagbark hickory. Tree species that may be planted in the bottomland and wetland mitigation areas include but are not limited to: American elm, silver maple, eastern cottonwood, sycamore, shellbark hickory (*Carya laciniosa*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), Shumard oak (*Quercus shumardii*), and hackberry (*Celtis occidentalis*). Tree species will be planted with spacing ranging from 10 to 15 feet. A mixture of bare root and container grown tree seedlings may be planted within each of the mitigation areas. The bare root tree seedlings may be mechanically or hand planted and the container grown tree species will be hand planted. All tree species will be planted following the INDOT Standard Specification for planting trees. More detailed information may be found in Appendices J-V. **Table 6.2-1** provides a summary of anticipated credits for mitigation in I-69 Section 6. An overall mitigation site map showing bat data may be found in Appendix I.



Figure 6.2-1: I-69 Section 6 Mitigation Sites

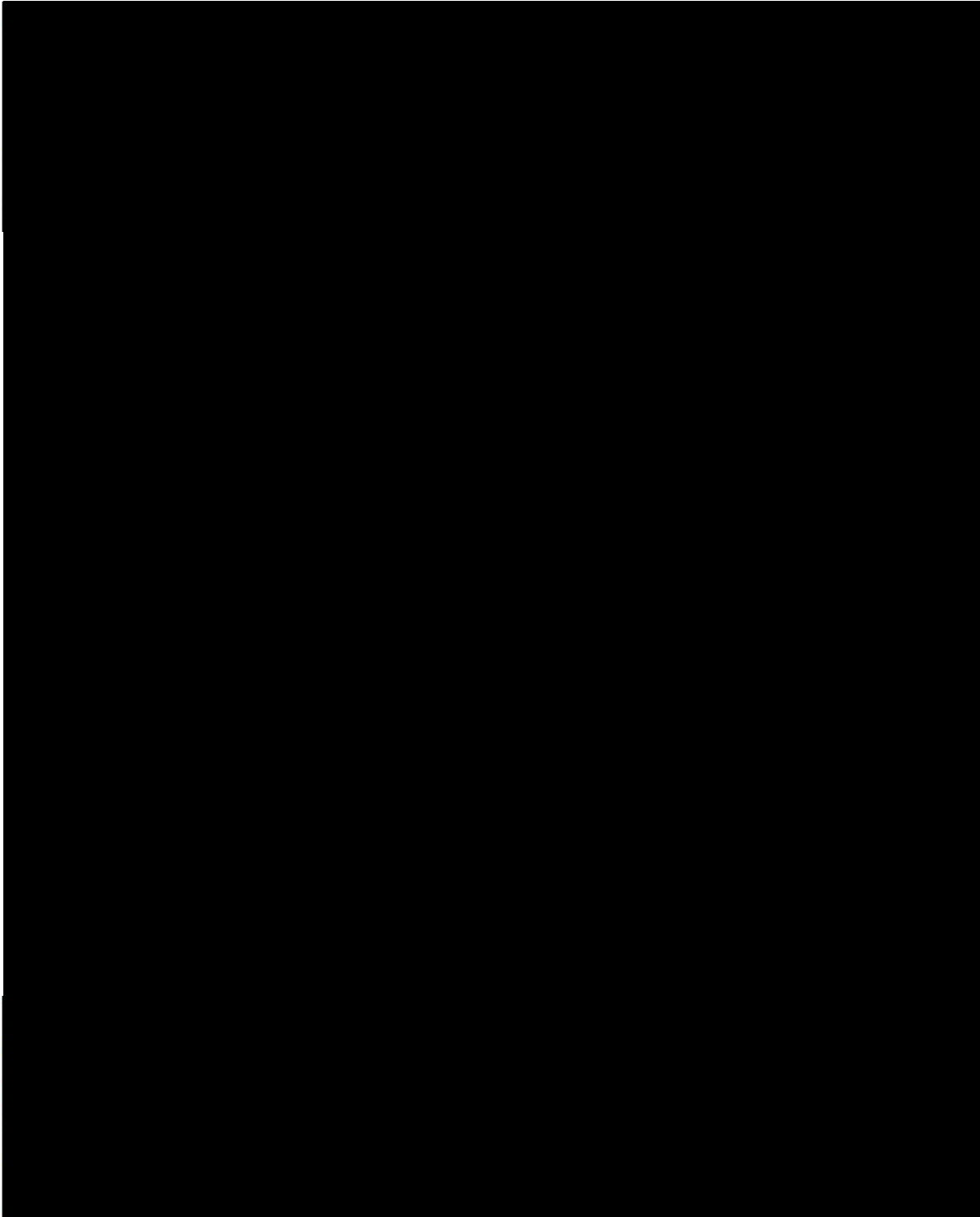
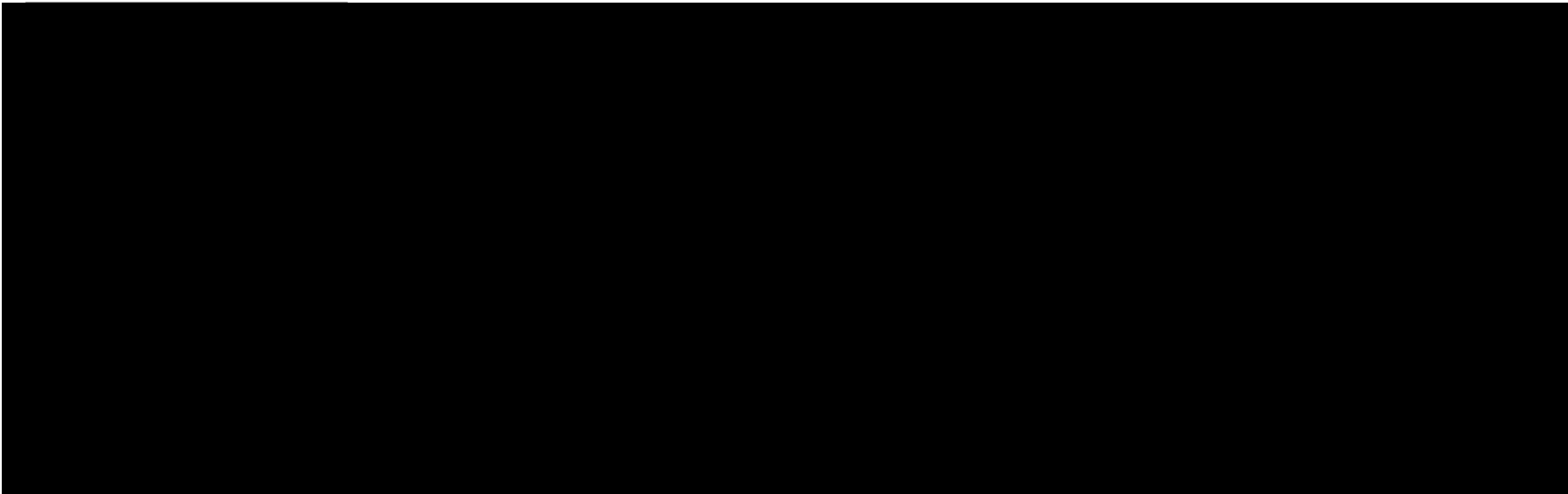




Table 6.2-1: I-69 Section 6 Mitigation Site Anticipated Acres Summary

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1. Does not include Open Water wetland impacts.

2. Site is not within the Lambs Creek maternity colonies, but is connected to the colonies via [REDACTED] [REDACTED].



Lambs Creek Indiana Bat and Lambs Creek Northern Long-eared Bat Maternity Colony

██████████

The ██████████ property is a forested parcel of land approximately 245.5 acres in size, located about ██████████ and ██████████ of ██████████ in ██████████ County. ██████████ flows through it, and is approximately ██████████ of the Lambs Creek IB and NLEB Maternity Colony and some ██████████ of ██████████. The entire property is being proposed for I-69 Section 6 mitigation. The property is located south of ██████████. This potential mitigation site is ██████████ away from the nearest recorded Indiana bat roost.

Proposed mitigation includes approximately 245.5 acres of forest preservation. Wetland or stream restoration/creation is not planned at this site. The property showed excellent upland and bottomland forests. Existing core forest acres located on this property is 170.6 acres. No reforestation is planned and as such, there is no additional core forest.

The property is within the Upper White River (#05120201) watershed. It is hilly showing oak and hickory woods, and beech maple forests depending upon aspect. The timber is mature with the understory and ground cover limited.

The soils within this potential mitigation site include Ava silt loam, Berks channery silt loam, Cincinnati silt loam, Genesee silt loam, Haymond silt loam, Hickory loam and Parke silt loam. None of the soils within this proposed mitigation site are identified as hydric soils.

This property is not located within any defined 100-year floodplains; however, it does contain approximately 18,623 linear feet of streams according to the Local-Resolution National Hydrography Dataset, 2015.

The agencies ranked this potential mitigation site as a low priority due to the distance of the site from I-69 Section 6. ██████████ which flows through this potential mitigation site, is listed on the IDEM 303(d) list of impaired waters and IDEM indicated this is a good site to preserve, maintain and improve the water quality of ██████████.

Detailed information on the property may be found in Appendix J.

Clear Creek and Crooked Creek Indiana Bat and Clear Creek East Fork Northern Long-eared Bat Maternity Colonies

██████████

The ██████████ property is a combined commercial and forested parcel of land approximately 5.9 acres in size, located in ██████████ County ██████████ of where ██████████ meets ██████████. It is located in I-69 Section 6 and is within the Clear Creek IB Maternity Colony and the Clear Creek East Fork NLEB Maternity Colony. This potential mitigation site is ██████████ away from the nearest recorded Indiana bat roost.



Proposed mitigation includes about 3.2 acres of reforestation and 2.7 acres of forest preservation. Wetland or stream restoration/creation is not proposed at this site. There are existing commercial buildings and a parking lot located on this parcel that will require removal.

The property is within the Upper White River (#05120201) watershed. A portion of [REDACTED] flows through this property. In 2015, a northern long-eared bat was captured over [REDACTED] at this site.

The soils within this potential mitigation site include Chetwynd loam, Genesee silt loam, and Shoals silt loam. None of the soils within this proposed mitigation site are identified as hydric soils; however, Shoals silt loam is identified as containing hydric inclusions. A portion of this property is located within the defined 100-year floodplain for [REDACTED] [REDACTED]

The review agencies have identified this site as a low priority and not desirable due to the small size of the property and the potential unknowns associated with the former business on the property. USEPA recommended this site be removed from consideration for I-69 Section 6 mitigation entirely.

Detailed information on the property may be found in Appendix K.

[REDACTED] Property

The [REDACTED] [REDACTED] property is currently a combination of agricultural field, existing forests, and a small area of existing mitigation for other projects. The parcel is approximately 106.8 acres in size, located in [REDACTED] County north of [REDACTED] [REDACTED] [REDACTED] and approximately [REDACTED] [REDACTED] [REDACTED] of [REDACTED] [REDACTED]. It is located in I-69 Section 6 and is within the Clear Creek IB Maternity Colony and the Clear Creek East Fork and White River NLEB Maternity Colony. This potential mitigation site is [REDACTED] [REDACTED] away from the nearest recorded Indiana bat roost.

Proposed mitigation includes about 44.4 acres of reforestation, 52.7 acres of forest preservation and 3.1 acres of wetland development. Stream restoration/creation is not proposed at this site. There is approximately 10,488 linear feet of stream located within this property according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Armiesburg silty clay loam, Genesee silt loam, Hickory loam, Markland silt loam, Parke silt loam, Shoals silt loam, Stonelick sandy loam, and Pits. None of the soils within this proposed mitigation site are identified as hydric soils; however, Shoals silt loam is identified as containing hydric inclusions. The parcel is almost entirely located within the 100-year floodplain of the White River.

This potential mitigation site was added to the list of properties after the November 9-10, 2016 agency tour as recommended by the review agencies during the tour. Therefore, this property has not been reviewed in the field by the agencies. Nonetheless, the USFWS has identified this property as not desirable and would not recommend it at this time since it has had restoration work and is protected already.



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Detailed information on the property may be found in Appendix L.

██████████ Property

The ██████████ property is currently a combination of agricultural fields and existing forests that is located adjacent to the ██████████. The property is approximately 302.8 acres in size, located in ██████████ County at the confluence of ██████████ and the ██████████ west of ██████████ and is approximately ██████████ of ██████████. It is located in I-69 Section 6 and is within the Clear Creek IB Maternity Colony; Crooked Creek IB Maternity Colony; and the White River NLEB maternity colony. This potential mitigation site is ██████████ away from the nearest recorded Indiana bat roost.

Proposed mitigation includes about 225.2 acres of reforestation, 69.4 acres of forest preservation, stream enhancement, and 8.2 acres for potential wetland restoration and/or enhancement. There is approximately 32,984 linear feet of stream located within this property according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Berks channery silt loam, Fox complex, Genesee silt loam, Gilpin silt loam, Ockley loam, Princeton fine sandy loam, Shoals silt loam, and Stonelick sandy loam. None of the soils within this proposed mitigation site are identified as hydric soils; however, Shoals silt loam and Ockley loam are identified as containing hydric inclusions. The parcel is almost entirely located within the 100-year floodplain of the White River.

The review agencies have identified this site as a high priority due to its location and ability to provide multiple different mitigation needs. IDNR did raise a concern with potential wildlife issues on the roadway with this mitigation site due to the location of the I-69 Section 6 right of way.

Detailed information on the property may be found in Appendix M.

Crooked Creek Indiana Bat and White River Northern Long-eared Bat Maternity Colonies and Upper White River Focus Area

██████████ Property

The ██████████ property is a combined agriculture and forested parcel of land approximately 124 acres in size, located ██████████ of ██████████. It is located in I-69 Section 6 and is at the edge of the Crooked Creek IB Maternity Colony. Of this 124 acre property, the property owner requested five acres to be excluded resulting in 119.3 acres available for mitigation. It is located along ██████████ County ██████████ adjacent and ██████████ of ██████████. This potential mitigation site is 2.4 miles away from the nearest recorded Indiana bat roost.

Proposed mitigation includes approximately 39.5 acres of reforestation, 79.5 acres of forest preservation, and 0.3 acre of potential wetland restoration and/or enhancement. There is approximately 8,987 linear feet of stream located within this property according to the Local-



Resolution National Hydrography Dataset, 2015. The property showed excellent existing wetlands of skunk cabbage (*Symplocarpus foetidus*), sedges (*Carex* sp.), appendaged waterleaf (*Hydrophyllum appendiculatum*), and many different species of trees. Uniquely located to these wetlands is a large seven story (about 70 foot high) ceremonial mound that overlooks the White River. The western property boundary is approximately 1/3 mile from the White River as connected via a ditch. Existing core forest acres located on this property is 13.67 acres. As a result of reforestation, there will be approximately 38.21 acres of core forest added in the future, resulting in a total of 51.88 acres of core forest at this site.

The property is within the Upper White River (#05120201) watershed, and has an old bog called [REDACTED] that showed buttonbush (*Cephalanthus occidentalis*), cottonwood, silver maple, red maple and many other species. In addition, this property contains a circumneutral seep. Archaeological material on this property is highly likely. Currently, the property owner is considering subdividing the property and selling it as residential and/or commercial parcels. Many trails exist through most of this property. The house on the property and approximately five acres around the house would be cut out and not included in mitigation acres.

The soils within this potential mitigation site include Princeton fine sandy loam, Crosby-Miami silt loams, and Miami silt loam. None of the soils within this proposed mitigation site are identified as hydric soils; however, Crosby-Miami silt loams are identified as poorly drained and may have the ability to support wetland hydrology.

This property is not located within any defined 100-year floodplains; however, it does contain approximately 3,006 linear feet of intermittent streams. The property owner is requesting a fee simple purchase.

The review agencies have identified this site as a medium to high priority due to the unique bog habitat on this site and preservation value based on development pressure. The extent of invasive species (bush honeysuckle) currently on the site was identified as a concern.

Detailed information on the property may be found in Appendix N.

[REDACTED] (fka [REDACTED]) Property

Based on the property owner’s request, the site name has been changed to incorporate the former owner’s name. The [REDACTED] property is currently a combination of agricultural fields and existing forests that is located adjacent to the [REDACTED]. The parcel is approximately 205.9 acres in size, located in [REDACTED] County along [REDACTED] approximately [REDACTED] of [REDACTED] or [REDACTED] of [REDACTED] adjacent to the [REDACTED]. It is located in I-69 Section 6 and is within the Crooked Creek IB Maternity Colony and the White River NLEB Maternity Colony. This potential mitigation site is [REDACTED] away from the nearest recorded Indiana bat roost.

Proposed mitigation includes approximately 88.3 acres of reforestation, 76.8 acres of forest preservation, stream enhancement, and 30.4 acres for potential wetland restoration and/or



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enhancement. There is approximately 20,902 linear feet of stream located within this property according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Armiesburg silty clay loam, Berks channery silt loam, Fox complex, Genesee silt loam, Martinsville loam, Miami silt loam, Shoals silt loam, Stonelick sandy loam, and Pits. None of the soils within this proposed mitigation site are identified as hydric soils; however, Shoals silt loam is identified as containing hydric inclusions. The majority of the parcel is located within the 100-year floodplain of the White River.

The review agencies have identified this site as a high priority due to its location and ability to provide multiple different mitigation needs. USEPA indicated that the existing utility line running through the site may need to be studied to determine if the easement will have any effects on the site’s ability to develop wetlands.

Detailed information on the property may be found in Appendix O.

██████████ Property

The ██████████ ██████████ property is currently a combination of existing bottomland and riparian forests, forested wetland sloughs, and agricultural fields. The parcel is approximately 50.9 acres in size, located in ██████████ County along the ██████████ ██████████ south of the intersection of ██████████ and ██████████ ██████████. The property is located in I-69 Section 6 and is within the ██████████ ██████████ ██████████ focus area. This potential mitigation site is ██████████ ██████████ away from the nearest recorded Indiana bat roost.

Proposed mitigation includes approximately 36.1 acres of reforestation and 14.8 acres of forest preservation. There are opportunities to complete stream enhancement at this site on the ██████████ ██████████ and ██████████ ██████████. There is no wetland restoration and/or enhancement planned at this site. There is approximately 8,946 linear feet of streams located within this property, including the ██████████ ██████████ and ██████████ ██████████ according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Armiesburg silty clay loam, Fox loam, Genesee silt loam, and Whitaker loam. None of the soils within this proposed mitigation site are identified as hydric; however, Whitaker loam is identified as having hydric inclusions. The entire property is within the 100-year floodplain of the White River.

USFWS ranked this site as medium priority during the November 9-10, 2016 agency field review. The other resource agencies identified this site as a high priority for stream bank stabilization, but did have a concern with the potential to restore and/or create wetlands within the site.

Detailed information on the property may be found in Appendix P.



Pleasant Run Indiana Bat and White River Northern Long-eared Bat Maternity Colonies

Property

The property is currently a combination of agricultural fields and existing forests. The parcel is approximately 111.4 acres in size, located in County on the side of approximately of the and intersection. The property is located in I-69 Section 6 and is within the Pleasant Run Creek IB Maternity Colony and the White River NLEB Maternity Colony. This potential mitigation site is away from the nearest recorded northern long-eared bat roost.

Proposed mitigation includes approximately 64.5 acres of reforestation, 34.4 acres of forest preservation, and 12.6 acres for potential wetland restoration and/or enhancement. There is approximately 8,189 linear feet of stream located within this property according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Armiesburg silty clay loam, Fox loam, Genesee silt loam, Ockley loam, Shoals silt loam, and Stonelick sandy loam. None of the soils within this proposed mitigation site are identified as hydric soils; however, Shoals silt loam is identified as containing hydric inclusions. Approximately two thirds of the parcel is located within the 100-year floodplain.

The review agencies have identified this site as a high priority due to its location and ability to provide multiple different mitigation needs. USEPA indicated coordination with the adjacent quarry operation should be conducted to verify the quarry will not have any negative effects to the proposed mitigation.

Detailed information on the property may be found in Appendix Q.

Pleasant Run Indiana Bat and Pleasant Run Northern Long-eared Bat Maternity Colonies

Property

The property is currently existing riparian forests with some early successional habitat areas. The parcel is approximately 46.2 acres in size, located in County of and of adjacent to the. The property is located in I-69 Section 6 and is within the Pleasant Run Creek IB Maternity Colony and the Pleasant Run NLEB Maternity Colony. The property is protected to the south by a proposed 26-acre mitigation site the 76-acre a 32-acre and a 46-acre property. To the north, there is a 35-acre property. The focus for this property is block preservation with this mitigation property in combination with the surrounding properties of approximately 257 acres. This potential mitigation site is away from the nearest recorded Indiana bat roost.



Detailed information on the property may be found in Appendix S.

Bryant Creek Indiana Bat and Bryant Creek North Northern Long-eared Bat Maternity Colonies in I-69 Section 5

██████████ Property

The ██████████ property is currently a combination of agricultural fields, existing riparian and upland forests. The parcel is approximately 38.4 acres in size, located in ██████████ County along ██████████ ██████████ ██████████ of ██████████ approximately ██████████ ██████████ of ██████████. The property is located in I-69 Section 5 and is within the Bryant Creek IB Maternity Colony and the Bryant Creek North NLEB Maternity Colony. There is an Indiana bat capture site located downstream of this property and ██████████ ██████████ is a flyway for the Indiana bat and most likely the northern long-eared bat. This potential mitigation site is ██████████ ██████████ away from the nearest recorded Indiana bat roost.

Proposed mitigation includes approximately 16.7 acres of reforestation, 19.8 acres of forest preservation, stream enhancement potential and 1.9 acres for potential wetland restoration and/or enhancement. There is approximately 3,410 linear feet of stream, including ██████████ ██████████ located within this property according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Ava silt loam, Banlic silt loam, Cincinnati silt loam, Haymond silt loam, Hickory loam, and Wakeland silt loam. None of the soils within this proposed mitigation site are identified as hydric soils; however, Banlic silt loam is identified as containing hydric inclusions. A portion of this property is located within the 100-year floodplain of ██████████ ██████████.

USFWS identified this site as a good site for bat mitigation during the November 9-10, 2016 agency field review. In addition, the other resource agencies indicated this site is a good site for potential stream enhancement and potential wetland restoration and/or enhancement. USFWS identified this site as a lower priority than others based on location.

Detailed information on the property may be found in Appendix T.

██████████ Property

The ██████████ property is currently a combination of existing riparian forests, a wetland slough, and a fallow agricultural field. The parcel is approximately 15.7 acres in size, located in ██████████ County along the ██████████ ██████████ approximately ██████████ ██████████ north of the intersection of ██████████ ██████████ ██████████ and ██████████ ██████████. The property is located in I-69 Section 5 and is within the Bryant Creek IB Maternity Colony and the Bryant Creek North NLEB Maternity Colony. The property is downstream from an area where there are a number of Indiana bat roosts. This potential mitigation site is ██████████ away from the nearest recorded Indiana bat roost.



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Proposed mitigation includes approximately 7.8 acres of reforestation and 7.9 acres of forest preservation. There is no stream enhancement or wetland restoration and/or enhancement planned at this site. There is approximately 887 linear feet of the [REDACTED] [REDACTED] located adjacent to this property.

The soils within this potential mitigation site include Genesee silt loam and Shoals silt loam. Neither of the soils within this proposed mitigation site are identified as hydric soils; however, Shoals silt loam is identified as containing hydric inclusions. The entire potential mitigation property is located within the 100-year floodplain of the [REDACTED] [REDACTED].

USFWS identified this site as a good site for bat mitigation during the November 9-10, 2016 agency field review, but is a lower priority property than others based on location.

Detailed information on the property may be found in Appendix U.

[REDACTED] [REDACTED] Focus Area

[REDACTED] Property

The [REDACTED] property is currently a combination of existing upland and riparian forests, forested wetlands, and agricultural fields. The parcel is approximately 42.1 acres in size, located in [REDACTED] County along [REDACTED] approximately [REDACTED] [REDACTED] [REDACTED] of [REDACTED] [REDACTED] in [REDACTED]. The property is located in I-69 Section 6 and is within [REDACTED] [REDACTED] focus area. [REDACTED] [REDACTED] is expected to be a flyway for both the Indiana bat and the northern long-eared bat. The adjoining properties to this site include a classified forest and the [REDACTED] [REDACTED]. This potential mitigation site is [REDACTED] [REDACTED] away from the nearest recorded Indiana bat roost.

Proposed mitigation includes approximately 7.3 acres of reforestation, 33.7 acres of forest preservation, and 1.1 acres of potential wetland restoration and/or enhancement. There is approximately 2,518 linear feet of streams located within this property, including Indian Creek according to the Local-Resolution National Hydrography Dataset, 2015.

The soils within this potential mitigation site include Berks channery silt loam, Genesee silt loam, and Gilpin silt loam. None of the soils within this proposed mitigation site are identified as hydric soils or soils with hydric inclusions. The eastern half of the property is within the 100-year floodplain of [REDACTED] [REDACTED].

USFWS identified this site as a good site for bat mitigation and ranked it as medium priority during the November 9-10, 2016 agency field review. IDEM indicated that [REDACTED] [REDACTED] is listed on the 303(d) list and the potential mitigation site could help to maintain and improve the water quality of [REDACTED] [REDACTED].

Detailed information on the property may be found in Appendix V.



6.3 Conservation Measures

All conservation measures reported in the Revised Tier 1 BO dated August 24, 2006 (pgs. 16-23) and its amendments will be carried out as written. The discussion below highlights specific references to the completion of these measures in I-69 Section 6. These are generally specific locations where conservation measures apply in Section 6.

Further conservation measure status changes are as follows:

A8c – Floodplains – Although it is not anticipated that any floodplains in I-69 Section 6 will be bridged in their entirety, floodplain encroachments will be minimized, where reasonable, by using existing bridge crossings and through design practices such as longer bridges and perpendicular stream crossings where new crossings are warranted. I-69 Section 6 crosses several 100-year floodplains. These mapped floodplains include: White River, Little Buck Creek, Pleasant Run Creek, Honey Creek/Messersmith Creek, North Bluff Creek, Crooked Creek, Stotts Creek, Clear Creek, and Indian Creek. A final hydraulic design study will be completed during the design phase to determine the length of the spans, and a summary of this will be included with the Field Check Plans and Design Summary.

A10 – Medians and Alignments - A typical median width of 60 feet is proposed for I-69 Section 6. No trees will be left in the median.

A13d – Spill Prevention / Containment - Special measures including diversions of highway runoff from direct discharge off of bridge decks into streams, and containment basins to detain accidental spills, will be incorporated into final design plans for perennial streams within the Indiana bat and northern long-eared bat maternity colony areas to address water quality concerns associated with Indiana bats and northern long-eared bats. These include Indian Creek; West Fork Clear Creek; UNT 12, UNT 13, and UNT 17 to West Fork of Clear Creek (Teeters Road); UNT 14 to West Fork of Clear Creek (McFadden Lane); Clear Creek; UNT 1 to the White River (Henderson Ford Road); Stotts Creek; UNT 4 to the White River (Cragen Road); Crooked Creek; Travis Creek; North Bluff Creek; Honey Creek; and Pleasant Run.

A13f – Revegetation - Revegetation of disturbed areas will occur in accordance with INDOT standard specifications. Woody vegetation will only be used a reasonable distance beyond the clear zone to ensure a safe facility. Revegetation of disturbed soils in the right of way and medians will use native grasses and wildflowers as appropriate, such as those cultivated through INDOT's Roadside Heritage program. Locations anticipated include stream crossings at Indian Creek, Clear Creek, Stotts Creek, Crooked Creek and others, as appropriate.

B1, B3, C4 – Summer Habitat Creation / Enhancement and Preservation - Actions related to this measure are further described in the "Mitigation Focus Areas" and "Specific Mitigation Areas" sections of this document.

D6 – Mist netting - A work plan for surveying, monitoring, and reporting will be developed and conducted in consultation with and approved by the USFWS. This mist netting research will be in addition to Tier 2 sampling requirements. Fifty-three mist netting sampling sites are presently

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being sampled or under consideration in all sections. In earlier discussions, FHWA/INDOT agreed with USFWS to complete surveys at 50 mist netting sites; however, two additional sites have been added to the list as recommended by USFWS previously and one additional site in I-69 Section 6 has been added due to northern long-eared bat capture data subsequent to the listing of the northern long-eared bat. To limit the number of surveyed sites to the originally identified total of 50, the I-69 Section 6 sites have been revised as shown in the list below. Monitoring surveys focused at known maternity colonies will be completed the summer before construction begins and will continue each subsequent summer during the construction phase and for at least five summers after construction has been completed and I-69 Section 6 is fully open to traffic. Sites for this additional sampling in I-69 Section 6 include the following: 3, 7, 8, 10, 13, 14, 19, 20, and 23. Alternate sites previously considered for I-69 Section 6 included 5, 17 and 22 which have been excluded based on having no captures (Sites 17 and 22) or only a male capture (Site 5).

6.4 Training and Communication

Environmentally-sensitive habitats or “locations” (e.g., wetlands, historic structures and archaeology sites) in the general area will be clearly shown on construction plans. Sites within the right of way outside the construction limits will be delineated. These sites will not be permitted for use as staging areas, borrow, or waste sites.³

All I-69 engineering supervisors, equipment operators, and other construction personnel and INDOT (and/or concessionaire) maintenance staff will attend a mandatory environmental awareness training that discloses where known sensitive Indiana bat, northern long-eared bat and bald eagle sites are located in the project area, addresses any other concerns regarding these species, and presents a protocol for reporting the presence of any live, injured, or dead bats and eagles observed or found within or near the construction limits or right of way during I-69 construction, operation, and maintenance. The awareness training video used to provide this training will be provided to USFWS for review prior to dissemination to construction and maintenance personnel.

6.4.1 I-69 Community Planning Program

The I-69 Section 6 Tier 2 DEIS discusses the I-69 Community Planning Program in Chapter 7:

The I-69 Community Planning Program set in place a regional planning strategy for the I-69 corridor and provided grants for local communities (cities, towns, and counties) to develop plans for managing growth and economic development associated with I-69. INDOT provided technical and financial assistance for development of the plans. Participation by local communities was voluntary. Eligible communities in the vicinity of I-69 Section 6 were Marion, Morgan and

³ Section 5 Tier 2 DEIS, Section 7.3.4 “Mitigation Measures and Commitments, Construction” p 7-19



Johnson counties, the Town of Mooresville, and the cities of Martinsville and Indianapolis. With a total budget of \$2 million, the I-69 Community Planning Program was implemented as a two-phase effort:

- **Phase 1** was a regional planning assessment and development of regional planning strategies and resources for the I-69 corridor impact area. It included establishing partnerships, inventories, review of regulations and legislation, identification of needs, preparation of processes and models, identification of environmentally sensitive areas, farmland protection strategies, workshops, and providing technical planning support for Phase 2 of the program.
- **Phase 2** provided grants to local communities for the preparation of local plans and growth management ordinances. It included public involvement activities, planning framework and corridor land use planning, economic development strategies, model planning ordinances, and implementation programs.

On October 29, 2007, INDOT awarded \$1,500,000 in grants to communities located along the I-69 corridor. Morgan County, the Town of Mooresville, and the City of Martinsville applied together and were awarded a single grant for \$150,000. Johnson County and the City of Greenwood were awarded a \$100,000 grant, and the City of Indianapolis elected not to pursue a planning initiative. The City of Martinsville, Town of Mooresville, and Morgan County used the grant to develop the SR 37/SR 144 Corridor Plan (2010), comprehensive plan updates for Morgan County and Martinsville, and a comprehensive plan and zoning ordinance update for Mooresville. Johnson County and Greenwood developed a new comprehensive plan that framed challenges and opportunities associated with I-69.



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