



Northeastern Indiana Regional Coordinating Council

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Daniel S. Avery,
Executive Director

Date: January 13, 2023

To: City of New Haven
Alex Bourke
815 Lincoln Highway E
New Haven, IN 46774

From: Stacey Gorsuch
Northeastern Indiana Regional Coordinating Council
200 East Berry Street, Suite 230
Fort Wayne, IN 46802
Stacey.gorsuch@co.allen.in.us

Re: RED FLAG INVESTIGATION
DES # 2100622 Local Project
Road Widening, 2 lane roadway with center turn lane
South Maplecrest Road from SR 930 to Seiler Road
New Haven, Allen County, Indiana

PROJECT DESCRIPTION

Brief Description of Project:

This project is on South Maplecrest Road, with the beginning of the RFI at Seiler Road on the south end and to State Road 930 at the north end. The project will increase the width of the travel lanes and will include curb and gutter on both sides with an underground storm sewer system to address drainage on the roadway. The roadway will consist of two travel lanes, that will be twelve (12) feet wide, with a center left turn lane that will be fourteen (14) to sixteen (16) feet wide. Intersection improvement at Moeller Road will be considered with a possible roundabout. A ten (10) foot trail on the east side with a five-foot sidewalk on the west side of the roadway is proposed. The trail will go the length of the project limits, but the sidewalk will only be from SR 930 to Moeller Road. There will be a six-foot grass buffer between trail/sidewalk and curb line. In addition to the trails and sidewalks, curb ramps will be installed at all intersections. The roadway bridge over Trier Ditch will be widened and will include the trail on the east side.

Bridge Work Included in Project: Yes No Structure #(s) 184

If this is a bridge project, is the bridge Historical? Yes No , Select Non-Select

(Note: If the project involves a historical bridge, please include the bridge information in the Recommendations Section of the report).

Culvert Work Included in Project: Yes No Structure #(s) TBD, there are multiple culverts along corridor

Proposed right of way: Temporary # Acres TBD Permanent # Acres TBD, Not Applicable

Type of excavation: It is anticipated that excavation will include storm sewer, pavement widening, and small structure with a maximum depth of 10 feet.

Maintenance of traffic (MOT): TBD

Work in waterway: Yes No Below ordinary high water mark: Yes No

State Project: LPA:

INFRASTRUCTURE TABLE AND SUMMARY

Infrastructure			
Indicate the number of items of concern found within the 0.5 mile search radius. Items in () are the number of items that are adjacent to or within the project area. If there are no items, please indicate N/A:			
Religious Facilities	0	Pipelines	5 (1)
Airports ¹	0	Railroads Active	52 (0)
Cemeteries	1 (0)	Railroads Abandoned	N/A
Hospitals	N/A	Trails Existing	1 (0)
Schools	N/A	Trails Proposed/Planned	5 (3)
Recreational Facilities	1 (0)	Managed Lands	1 (0)

¹In order to complete the required airport review, a review of public airports within 3.8 miles (20,000 feet) is required.

Explanation:

Cemeteries: One (1) cemetery is located within the 0.5 mile radius. It is located approximately 0.3 miles northwest of the project area. No impact is expected.

Recreational Facilities: One (1) recreational facility is located within the 0.5 mile radius. Sunnymede Park is located approximately 0.49 miles west of the project area. No impact is expected.

Pipelines: Five (5) pipeline segments are located within the 0.5 mile radius. One (1) natural gas intrastate pipeline owned by Northern Indiana Public Service Co. running east/west is approximately 0.03 miles north of the project area. Coordination with Northern Indiana Public Service Co. will occur.

Railroads Active: Fifty-two (52) railroad segments are located within the 0.5 mile radius. The nearest railroad segment is located 0.05 miles south of the project area. No impact is expected.

Trails Existing: One (1) existing trail is located within the 0.5 mile search radius. The existing Maplecrest Rd Trail is located approximately 0.08 miles north of the project area. No impact is expected.

Trails Proposed/Planned: Five (5) proposed or planned trails are located within the 0.5 mile search radius. Three (3) of the proposed or planned trails are adjacent to or intersect the project area. The Maplecrest Rd Trail (also part of the 6-Mile Creek Trail) is planned to be extended along the east side of Maplecrest Rd for the entire length of the project area and will need included in the project. The Moeller Rd Trail (also part of the 6-Mile Creek Trail) is proposed along the north side of Moeller Rd east and west of Maplecrest Rd and should be included in the project. An alternate alignment for the 6-Mile Creek Trail is to follow the Trier Ditch east of Maplecrest Rd. Coordination will be needed to find out if this is still a viable option. For all three planned or proposed trails, Coordination with City of New Haven, the Northeastern Indiana Regional Coordinating Council, and City of Fort Wayne Greenways Manager will occur.

Managed Lands: One (1) managed lands are located within the 0.5 mile radius. Sunnymede Park is located approximately 0.49 miles west of the project area. No impact is expected.

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WATER RESOURCES TABLE AND SUMMARY

Water Resources			
Indicate the number of items of concern found within the 0.5 mile search radius. Items in () are the number of items that are adjacent to or within the project area. If there are no items, please indicate N/A:			
NWI - Points	N/A	Canal Routes - Historic	1 (0)
Karst Springs	N/A	NWI - Wetlands	15 (3)
Canal Structures – Historic	N/A	Lakes	2 (0)
NPS NRI Listed	N/A	Floodplain - DFIRM	15 (4)
NWI-Lines	1 (0)	Cave Entrance Density	N/A
IDEM 303d Listed Streams and Lakes (Impaired)	1 (0)	Sinkhole Areas	N/A
Rivers and Streams	17 (2)	Sinking-Stream Basins	N/A
High Capacity Wells (Wellhead Protection Areas/Source Water Areas)	N/A	Line of Protection – Flood Levee	N/A

Explanation:

NWI-Lines: One (1) NWI-Line segment is located within the 0.5 mile search radius. The wetland line segment is approximately 0.41 miles east of the project area. No impact is expected.

IDEM 303d Listed Streams and Lakes (Impaired): One (1) impaired stream is located within the 0.5 mile search radius. The impaired stream is located approximately 0.49 miles north of the project area. No impact is expected.

Rivers and Streams: Seventeen (17) segments of Rivers/Streams/Ditches are located within the 0.5 mile search radius. Five (5) of them are coded as “Allen County Regulated Drains”. Two (2) segments intersect the project area. One (1) segment is called the “Trier Ditch” which intersects the project area approximately 0.22 miles north of Seiler Rd and is coded as an “Allen County Regulated Drain”. One (1) segment is an unnamed open drain intersecting the project area approximately 0.24 miles north of Moeller Rd. A Waters of the US Report is recommended based on mapped features, and coordination with the appropriate agency, if applicable, will occur.

Canal Route – Historic: One (1) historic canal route is located within the 0.5 mile search radius. The historic canal route is located approximately 0.41 miles north of the project area. No impact is expected.

NWI – Wetlands: Fifteen (15) Wetlands are located within the 0.5 mile search radius. Four (4) potential wetlands are mapped within or adjacent to the project area. A Waters of the US Report is recommended based on mapped features, and coordination with the appropriate agency, if applicable, will occur.

Lakes: Two (2) lakes are located within the 0.5 mile search radius. The nearest lake is located 0.12 miles east of the project area. No impact is expected.

Floodplain – DFIRM: Fifteen (15) Floodplain polygons are located within the 0.5 mile search radius. The project area is located within four (4) floodplain polygons. Coordination with the appropriate agency will occur.

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MINING AND MINERAL EXPLORATION TABLE AND SUMMARY

Mining/Mineral Exploration			
Indicate the number of items of concern found within the 0.5 mile search radius. Items in () are the number of items that are adjacent to or within the project area. If there are no items, please indicate N/A:			
Petroleum Wells	N/A	Mineral Resources	N/A
Mines – Surface	N/A	Mines – Underground	N/A

Explanation:

No mining or mineral resources were identified within the 0.5 mile search radius.

HAZARDOUS MATERIAL CONCERNS TABLE AND SUMMARY

Hazardous Material Concerns			
Indicate the number of items of concern found within the 0.5 mile search radius. Items in () are the number of items that are adjacent to or within the project area. If there are no items, please indicate N/A:			
Superfund	1 (0)	Manufactured Gas Plant Sites	N/A
RCRA Generator/ TSD	3 (1)	Open Dump Waste Sites	N/A
RCRA Corrective Action Sites	N/A	Restricted Waste Sites	N/A
State Cleanup Sites	N/A	Waste Transfer Stations	N/A
Septage Waste Sites	N/A	Tire Waste Sites	N/A
Underground Storage Tank (UST) Sites	6 (1)	Confined Feeding Operations (CFO)	N/A
Voluntary Remediation Program	3 (1)	Brownfields	N/A
Construction Demolition Waste	N/A	Institutional Controls	9 (1)
Solid Waste Landfill	5 (0)	NPDES Facilities	9 (5)
Infectious/Medical Waste Sites	N/A	NPDES Pipe Locations	1 (0)
Leaking Underground Storage (LUST) Sites	10 (5)	Notice of Contamination Sites	N/A

Explanation:

Superfund: One (1) Superfund Site is located within the 0.5 mile search radius. The Superfund is mapped 0.21 miles north of the project area. After further investigation it was found that the mapped location was not accurate. The site is actually located 0.60 miles northwest of the project area and is outside the 0.5 mile search radius. No impact is expected.

RCRA Generator/ TSD: Three (3) RCRA Generator/ TSD Facilities are located within the 0.5 mile search radius. One (1) RCRA Generator/ TSD Facility is located adjacent to the project area.

- The RCRA Generator named “YRC Incorporated 246”, Site EPA ID # IND985030766 with Agency Interest ID # 14973 is located at 3513 S. Maplecrest Rd (Previous address was 3513 Adams Center Rd). The last form submitted was on March 4, 2002 with a response letter from IDEM on May 1, 2002 stating information was updated regarding the facility’s status to “Conditionally Exempt Small Quantity. Reports stated that waste is only generated sporadically as a result of damaged or refused freight. No impact is expected.

Underground Storage Tank Sites (UST): Six (6) UST sites are located within the 0.5 mile search radius. One (1) UST site is located adjacent to the project area.

- Witwer Construction, located at 3636 S. Maplecrest Rd (Previous address was 3636 Adams Center Rd), AI #2466. This UST is mapped incorrectly and is actually located approximately 0.2 miles north of the mapped location. Two USTs at the site were successfully closed in 1993-1994 with no record of any contamination. No impact is expected.

Voluntary Remediation Program: Three (3) Voluntary Remediation Program (VRP) sites are located within the 0.5 mile search radius. One (1) Voluntary Remediation Program site's property boundary may be located adjacent to the project area depending on the final project area boundaries set in the project development phase.

- Former Jones Transfer Company, located at 5929 Moeller Rd, AI # 1089, VRP # 6090301. Contamination at the site resulted from Volatile Organic Compounds (VOC) associated with historical discharges of chlorinated solvents into former floor drains and a release of petroleum from underground storage tanks. A "Certificate of Completion" was dated for September 30, 2011 and received an Environmental Restrictive Covenant (ERC) with use restrictions which state the following uses are restricted: No use for residential purposes, including, but not limited to daily care facilities; Shall be no consumptive, extractive or other use of the groundwater; Neither engage in nor allow excavation of soil below 12" deep anywhere in the affected areas depicted in the ERC without first submitting a work plan for approval by IDEM. This site's property boundary, which contain the affected areas within the property boundary, is located approximately 800-900 ft west of S. Maplecrest Rd on the north side of Moeller Rd. Impact to the project would only occur if project limits, for the Moeller Rd west approach, extend to this property. If excavation occurs in this area, proper handling, removal, and disposal of soil and/or groundwater will be necessary. Refer to Appendix G of the SAM Manual for the recommended procedure to manage and report contamination.

Solid Waste Landfill: Five (5) Solid Waste Landfills are located within the 0.5 mile search radius. The nearest Solid Waste Landfill is located 0.09 miles south of the project area. No impact is expected.

Leaking Underground Storage Tank Sites (LUST): Ten (10) LUST sites are located within the 0.5 mile search radius. Five (5) LUST sites are located adjacent to the project area.

- Former Jones Transfer Company, located at 5929 Moeller Rd, and AI # 1089. Refer to the VRP section.
- Roadway Express, Inc, located at 3513 S. Maplecrest Rd (Previous address was 3513 Adams Center Rd), and Agency Interest ID # 14973. In 1990 during a tank tightness test on an 8,000 gallon diesel tank, the fiberglass line connecting the tank to the pump was found to be leaking. The estimated volume of released diesel was approximately 15 gallons. The extent of the contamination was limited to the granular backfill material around the underground pipe. All visibly contaminated material (approximately 1 cubic yard) was removed and disposed of. No soil samples were collected for analysis. In 1996 underground storage tanks were removed and closed. Soil samples obtained during the UST closure did not contain Total Petroleum Hydrocarbons (TPH) above the IDEM guideline cleanup concentration of 100 mg/kg. In addition, a water sample obtained from the UST excavation contained only a trace level of xylenes as well as trace levels of several polynuclear aromatic hydrocarbons which were all below IDEM guideline cleanup concentrations. No additional assessments and/or remedial activities were necessary at this site. No impact is expected.
- Clark Oil & Refining #0653, located at 6134 Moeller Rd, and AI # 490. Two USTs were removed in 1989. No leaks were detected for either tank system but some soil contamination was found near the tanks due to overfilling at the sites. The contaminated soil was removed and further testing around the excavation site came back with the highest levels being total petroleum hydrocarbons of 8.2 ppm. Based on these results IDEM made a determination that No Further Action was required. No impact is expected.
- Crown Enterprises, located at 4221 S Maplecrest Road (Previous address was 4221 Adams Center Rd), and Agency Interest ID # 5493. A 20,000 gallon UST containing diesel fuel was closed in 1999 and approximately 80 cubic yards of soil had been excavated. Borings were conducted in the area surround the former UST location in 2001 and results indicated groundwater was not impacted and that TPH levels were below the IDEM's 100 ppm action level (ranged from 1mg/kg to 46 mg/kg for all samples). IDEM issued a No Further Action determination in October 2021. No impact is expected.
- Speedway #8526, located at 6422 W SR 930 (Previous address was 6244 Lincoln Hwy), and Agency Interest ID # 1295. In January 1992, a petroleum release was reported to Indiana Department of Environmental Management (IDEM) and assigned Leaking Underground Storage Tank (LUST) Incident #199201500. In February 1998, a petroleum release was reported to IDEM and assigned LUST Incident #199802506. Based on the results of the soil and groundwater investigation at the site, the residual soil and groundwater contamination has been largely

addressed by the completed source removal activities at the site. Due to the effectiveness of the source removal on both soil and groundwater at the site, a No Further Action (NFA) status for both of these releases was approved in 2016 based on the following Risk Integrated System of Closure (RISC) non-rule policy document (NPD) guidelines and conditions known at the time of issuance: RISC, non-default, industrial for subsurface soil; and RISC, default, industrial for groundwater. This property is adjacent to the north end of the project limits if the project extends as far north as indicated in this RFI. The contamination area at the property did not indicate there would be contamination near the project area, and the analytical data collected at the contamination area indicated a reduction in the contamination plume as well. No impact is expected.

Institutional Controls: Nine (9) Institutional Control sites are located within the 0.5 mile search radius. All Institutional Control sites were further investigated to determine the extent that any impacts could be identified. One (1) Institutional Control site is located adjacent to the project.

- Former Jones Transfer Company, located at 5929 Moeller Rd, and AI # 1089. Refer to the VRP section.

NPDES Facilities: Nine (9) NPDES Facilities are located within the 0.5 mile search radius. Five (5) NPDES Facilities are located adjacent to the project area.

- The NPDES Facility named “SAIA Motor Freight Lines Incorporated”, permit number INRM0147 is located at 6374 Wilson Dr. The property and project associated with the facility is adjacent to the project area. The permit was issued on 3/2/2019 and expires 3/1/2024. This is an active permit. Coordination with SAIA Motor Freight Lines Incorporated will occur.
- The NPDES Facility named “YRC Freight (246)”, permit number INRM01213 is located at 3513 S. Maplecrest Rd (Previous address was 3513 Adams Center Rd). The property and project associated with the facility is adjacent to the project area. The permit was issued on 3/28/2019 and expires 6/28/2024. This is an active permit. Coordination with YRC Freight (246) will occur.
- The NPDES Facility named “Sanko 2018 Building Addition”, permit number INRM02406 is located at 6509 Moeller Rd. The property and project associated with the facility is adjacent to the project area. The permit was issued on 10/18/2018 and expires 10/17/2023. This is an active permit. Coordination with Sanko 2018 Building Addition will occur.
- The NPDES Facility named “Multimatic”, permit number INRA02785 is located at 2808 S. Maplecrest Rd (Previous address was 2808 Adams Center Rd). The property and project associated with the facility is adjacent to the project area. The permit was issued on 1/7/2019 and expires 1/6/2024. This is an active permit. Coordination with Multimatic will occur.
- The NPDES Facility named “Precision Heat Treating Corporation”, permit number INRM01470 is located at 2711 S. Maplecrest Rd (Previous address was 2711 Adams Center Rd). The property and project associated with the facility is adjacent to the project area. The permit was issued on 4/2/2019 and expires 6/27/2024. This is an active permit. Coordination with Precision Heat Treating Corporation will occur.

NPDES Pipe Locations: One (1) NPDES Pipe Facility is located within the 0.5 mile search radius. It is located 0.45 miles north of the project area. No impact is expected.

ECOLOGICAL INFORMATION SUMMARY

The Allen County listing of the Indiana Natural Heritage Data Center information on endangered, threatened, or rare (ETR) species and high quality natural communities are provided at https://www.in.gov/dnr/nature-preserves/files/np_allen.pdf. A preliminary review of the Indiana Natural Heritage Database **did not** indicate the presence of ETR species within the 0.5 mile search radius. A letter dated 9/20/2022, from the Indiana Natural Heritage Data Center, is provided (included with this report). This does not preclude the requirement for further consultation with the U.S. Fish and Wildlife Service as required under Section 7 of the Endangered Species Act of 1973. Coordination with USFWS and IDNR will occur.

A review of the USFWS database (by INDOT Fort Wayne District dated 9/12/2022) did not indicate the presence of endangered bat species in or within 0.5 mile of the project area. The range-wide programmatic consultation for the Indiana Bat and Northern Long-eared Bat shall be completed according to the most recent “Using the USFWS’s IPaC System for Listed Bat Consultation for INDOT Projects”.

Also, information from the Planning and Consultation (IPaC) report is included along with a generated letter from the United States Department of the Interior Fish and Wildlife Service.

HISTORIC SITES AND AREAS/ENVIRONMENTAL JUSTICE TABLE AND SUMMARY

Historic Features/Environmental Justice			
Indicate the number of items of concern found within the 0.5 mile search radius. Items in () are the number of items that are adjacent to or within the project area. If there are no items, please indicate N/A:			
Historic Sites or Districts	N/A	Potential Historic Bridges	N/A
Non-Select Bridges	N/A	Potential Historic Sites or Districts	N/A
Select Bridges	N/A	Canal Routes - Historic	1 (0)
Properties identified in the SHAARD database	40 (4)	Canal Structures - Historic	N/A
Post-War Era (1940-1973) Residential Housing Sites	220 (0)	Environmental Justice Area	3 (2)

Explanation:

Properties identified in the SHAARD database (State Historic Architectural and Archaeological Research Database): Forty (40) properties or sites are located within the 0.5 mile search radius. Four (4) sites are located adjacent to the project area (see SHAARD map). All four properties are listed as “Contributing”. The following is the list of properties adjacent to the project area. Coordination with the appropriate agency, if applicable, will occur.

- House located at 6008 Moeller Rd Lot 274. SHAARD ID 003-214-27066. Rated as “Contributing”.
- Christian Wiese Farm located at 3527 S. Maplecrest Rd (Previous address was 3527 Adams Center Rd). SHAARD ID 003- 214-27133. Rated as “Contributing”.
- Truck Terminal located at 6420 Wilson Ln. SHAARD ID 003- 214-27079. Rated as “Contributing”.
- Bridge over Trier Ditch located 0.3 miles south of Moeller Rd on S. Maplecrest Rd (Adams Center Rd). This site is mapped in the wrong location on the SHAARD GIS website. SHAARD ID 003- 214-27132. Rated as “Contributing”.

Post-War Era (1940-1973) Residential Housing Sites: Two hundred twenty (220) Parcels that have residential housing built between 1940 and 1973 are located within the 0.5 mile search radius. The closest property is 0.09 miles north of the project area. No impact is expected.

Canal Route – Historic: One (1) historic canal route is located within the 0.5 mile search radius. The historic canal route is located approximately 0.41 miles north of the project area. No impact is expected.

Environmental Justice Area: Three (3) areas meeting thresholds for Environmental Justice are located within the 0.5 mile search radius. Two (2) of the areas are located within or adjacent to the project area. Additional information about these areas defined as “Environmental Justice Areas” can be found in NIRCC’s most recent Participation Plan and Long Range Transportation Plan. Additional provisions are undertaken to provide outreach to traditionally underserved and potentially disadvantaged populations residing in the metropolitan area. Potentially disadvantaged populations include minority, low-income, elderly, and disabled individuals, and those with Limited English Proficiency (LEP). These populations may have been excluded from previous outreach efforts and underrepresented in the transportation planning process. In accordance with federal regulations, NIRCC utilizes Census and American Community Survey data to identify areas within the metropolitan area where potentially disadvantaged populations reside and has developed outreach procedures to increase participation of these individuals in the transportation planning process. As identified in NIRCC’s 2022 Participation Plan, NIRCC evaluates census tracts for specific socio-economic characteristics and prioritizes them based on a cumulative presence of these socio-economic characteristics. The planning process should assure public involvement of disadvantaged populations in planning activities and decision-making, prevent disproportionately high and adverse impacts of decisions

on these populations, and assure these populations receive a proportionate share of transportation benefits. There are three fundamental principals at the core of environmental justice:

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

The two areas adjacent to the project area meet Tier 2 (exceeds 4-5 Thresholds) and Tier 3 (exceeds 2-3 Thresholds) EJ thresholds. Thresholds that exceed the EJ proportions include elderly populations, disabled populations, Hispanic populations, populations without access to vehicles, and low income populations. EJ principles and procedures will need to be followed. Coordination with the appropriate agency, if applicable, will occur.

PEDESTRIAN INFRASTRUCTURE

- The overall recommendation for S Maplecrest Rd is to construct a sidewalk along the west side of S Maplecrest Rd from the northern project limits to Moeller Rd and a trail along the east side of S Maplecrest Rd from the northern project limits to the southern project limits. For any portions of Moeller Rd that are within the project area, a trail should be constructed along the north side of Moeller Rd and a sidewalk along the south side of Moeller Rd. In addition, the following pedestrian infrastructure/connections (1-7) should be accommodated in the project:
 - 1) A trail is planned along the east side of S. Maplecrest Rd throughout the project and a sidewalk is planned along the west side of S. Maplecrest Rd from Moeller Rd to the northern project limits. A trail is planned along the north side of Moeller Rd and a sidewalk is planned for the south side of Moeller Rd throughout the limits of the project. Appropriate sidewalk crossings will be needed at the intersection of S. Maplecrest Rd and Moeller Rd for the west and south approaches. Appropriate trail crossings will be needed at the intersection for the north and east approach.
 - 2) Coordination with Dawn Ritchie the Fort Wayne Greenways Manager, the Northeastern Indiana Regional Coordinating Council (NIRCC), and New Haven Planning Department will be needed. One of the proposed alignments of the Six Mile Creek Trail follows the Trier Ditch alignment. If this trail is still a viable option, then a trail should be extended along the north side of Moeller Rd, as a minimum, to connect with the entrance drive of Sanko Gosei Technologies USA, Inc. located at 6509 Moeller Rd, Fort Wayne, IN 46806. If the Six Mile Creek Trail is not a viable option any longer, then a sidewalk should be extended along the north side of Moeller Rd in place of the trail.
 - 3) If the project area extends to the Trier Ditch, coordination with Dawn Ritchie the Fort Wayne Greenways Manager, the Northeastern Indiana Regional Coordinating Council (NIRCC), and New Haven Planning Department will be needed. One of the proposed alignments of the Six Mile Creek Trail follows the Trier Ditch alignment. If this proposed alignment is still a viable option there may need to be a trail connection on the north side of Moeller Rd that extends to the Trier Ditch for the future trail connection. A sidewalk is needed along the south side of Moeller Rd as well for the entire project area limits.
 - 4) A sidewalk should extend along the south side of Moeller Rd to connect with Kenosha Rd.
 - 5) Coordination with Dawn Ritchie the Fort Wayne Greenways Manager, the Northeastern Indiana Regional Coordinating Council (NIRCC), and New Haven Planning Department will be needed. New Haven identified the need for a north/south trail approximately 1,200 ft west of S. Maplecrest Rd. If this trail alignment is still a viable option, then a trail should be extended along the north side of Moeller Rd, as a minimum, to connect with the entrance of Estes Express Lines located at 5929 Moeller Rd. If the north/south trail is no longer a viable option, then only a sidewalk will be needed in place of the trail along the north side of Moeller Rd.
 - 6) Coordination with Dawn Ritchie the Fort Wayne Greenways Manager, the Northeastern Indiana Regional Coordinating Council (NIRCC), and New Haven Planning Department will be needed. New Haven identified the need for a north/south trail approximately 1,200 ft west of S. Maplecrest Rd. If this trail alignment is still a viable option, then a trail should be extended along the north side of Moeller Rd, to connect with the future trail. If the north/south trail is no longer a viable option, no facilities are needed along the north side of Moeller Rd extended to this location. Also, a sidewalk should be extended along the south side of Moeller Rd for the entire project area.

- 7) Coordination with Dawn Ritchie the Fort Wayne Greenways Manager, the Northeastern Indiana Regional Coordinating Council (NIRCC), and New Haven Planning Department will be needed. One of the proposed alignments of the Six Mile Creek Trail follows the Trier Ditch alignment. If this trail is still a viable option, additional infrastructure may be needed to accommodate a connection from the trail along the east side of S. Maplecrest Rd and the future Six Mile Creek Trail option along the Trier Ditch.

UTILITIES

A contact list of utility companies, provided by Indiana 811, is located within project area can be found in the Graphics section.

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RECOMMENDATIONS SECTION

Include recommendations from each section. If there are no recommendations, please indicate N/A:

INFRASTRUCTURE:

- Pipelines: One (1) pipeline is within the project area. Coordination with Northern Indiana Public Service Co. will occur.
- Trails Proposed: Three (3) potential trails are located adjacent to or intersect the project area. Coordination with the City of New Haven, the Northeastern Indiana Regional Coordinating Council, and the City of Fort Wayne Greenways Manager will occur.

WATER RESOURCES: The presence of the following water resources will require the preparation of a Waters of the US Report and coordination with the appropriate agency, if applicable.

- Rivers and Streams: Two (2) segments are located within the project area. A Waters of the US Report is recommended and coordination with the appropriate agency, if applicable, will occur.
- Floodplain – DFIRM: Four (4) floodplain polygons are within the project area. Coordination with the appropriate agency will occur.

MINING/MINERAL EXPLORATION:

N/A

HAZARDOUS MATERIAL CONCERNS:

- RCRA Generator/TSD: One (1) RCRA Generator/TSD facility is located adjacent to the project area. No impact is expected.
- Underground Storage Tank Sites (UST): One (1) UST site is adjacent to the project area. No impact is expected.
- Voluntary Remediation Program: One (1) Voluntary Remediation Program site may be adjacent to the project depending on final project area boundaries. If excavation occurs in this area, proper handling, removal, and disposal of soil and/or groundwater will be necessary. Refer to Appendix G of the SAM Manual for the recommended procedure to manage and report contamination.
- Leaking Underground Storage Tank Sites: Five (5) LUST sites are located adjacent to the project area. One (1) site is the same as the Voluntary Remediation Program, the other four (4) no impact is expected.
- Institutional Controls: One (1) Institutional Control site is located adjacent to the project. The site is the same as the Voluntary Remediation Program.
- NPDES Facility: Five (5) NPDES facilities are adjacent to the project area. Coordination with SAIA Motor Freight Lines Incorporated, YRC Freight (246), Sanko 2018 Building Addition, Multimatic, Precision Heat Treating Corporation will occur.

ECOLOGICAL INFORMATION:

- Endangered, Threatened, or Rare (ETR): ETR species have not been preliminarily identified in the project area. Coordination with USFWS and IDNR will occur.
- A review of the USFWS database (by INDOT Fort Wayne District dated 12/30/2021) did not indicate the presence of endangered bat species in or within 0.5 mile of the project area. The range-wide programmatic consultation for the Indiana Bat and Northern Long-eared Bat will be completed according to the most recent “Using the USFWS’s IPaC System for Listed Bat Consultation for INDOT Projects”.

HISTORICAL SITES AND AREAS / ENVIRONMENTAL JUSTICE

- Properties identified in the SHAARD database (State Historic Architectural and Archaeological Research Database): Two (2) sites are adjacent to the project area. Coordination with the appropriate agency, if applicable, will occur.

- Environmental Justice (EJ) Area: The project area is located within or adjacent to an area defined as an “Environmental Justice Area”. EJ principles and procedures will need to be followed. Coordination with the appropriate agency, if applicable, will occur.

PEDESTRIAN AND BUS STOP INFRASTRUCTURE:

- Seven (7) locations have been identified that require new infrastructure. All facilities must meet PROWAG requirements.

UTILITIES:

- A list of the utility companies within the project area has been identified. Contact utility representatives early in engineering phase to determine impact project will have on the location of all utilities.

Prepared by:

Stacey Gorsuch

Principal Transportation Planner

Northeastern Indiana Regional Coordinating Council

200 East Berry Street Suite 230

Fort Wayne, IN 46802

260-449-7309

stacey.gorsuch@co.allen.in.us

nircc.com

Graphics:

A map for each report section with a 0.5 mile search radius buffer around all project area(s) showing all items identified as possible items of concern is attached.

PROJECT LOCATION: YES

SITE LOCATION: YES

INFRASTRUCTURE: YES

WATER RESOURCES: YES

MINING/MINERAL EXPLORATION: YES

HAZARDOUS LOCATIONS: YES

HISTORIC FEATURES: YES

ENVIRONMENTAL JUSTICE: YES

SHAARD GIS MAP: YES

PEDESTRIAN INFRASTRUCTURE: YES

UTILITY CONTACT LIST: YES

LETTER (9-20-2022) FROM THE INDIANA NATURAL HERITAGE DATA CENTER AND LIST OF THE THREATENED OR ENDANGERED (T&E) SPECIES, HIGH QUALITY NATURAL COMMUNITIES, AND NATURAL AREAS: YES

LETTER FROM THE UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE: YES

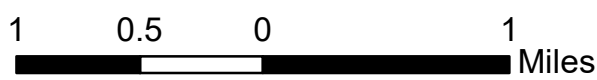
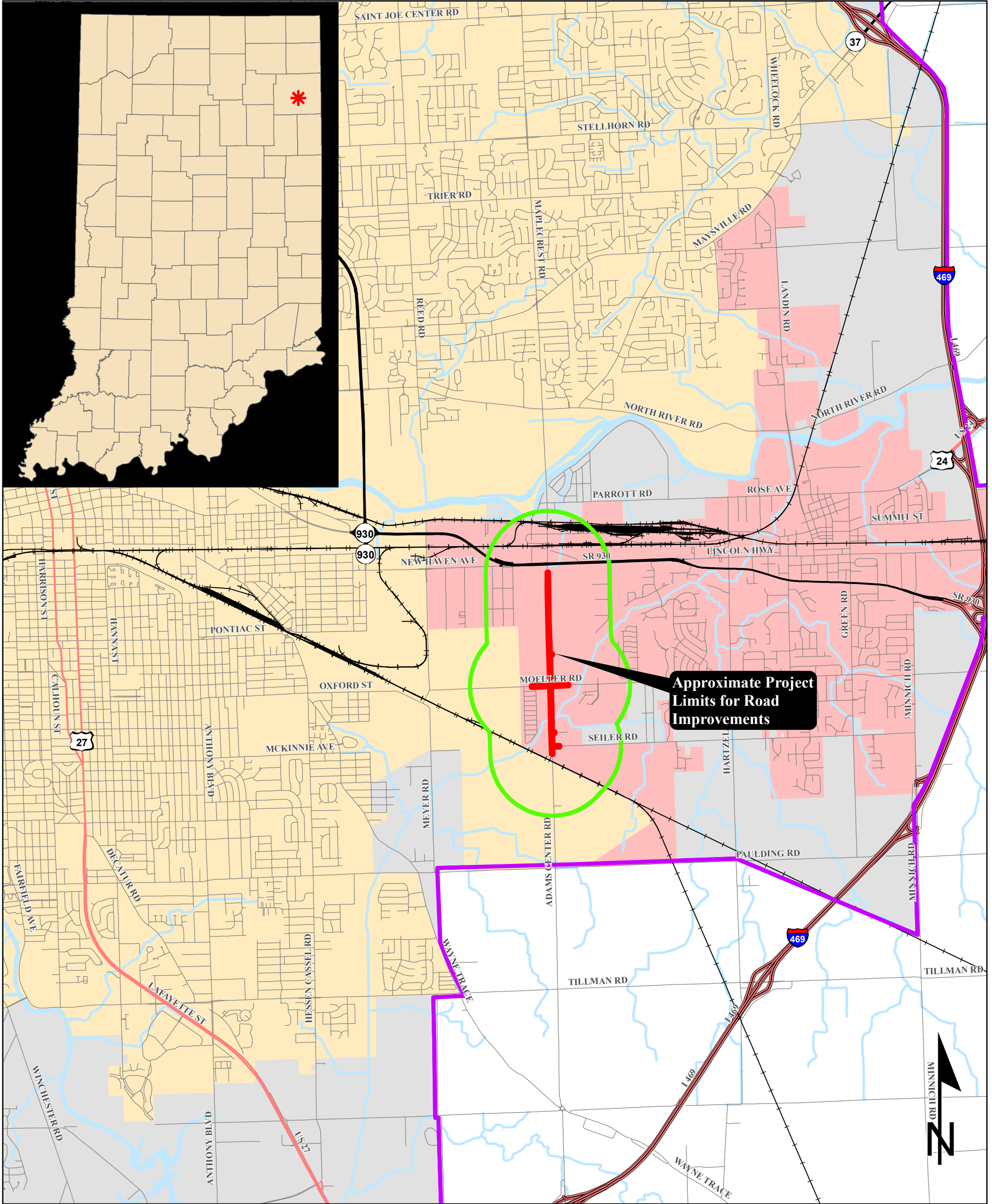
INFORMATION FROM THE PLANNING AND CONSULTATION (IPaC): YES

Red Flag Investigation - Project Location

Maplecrest Rd - State Route 930 to Seiler Road

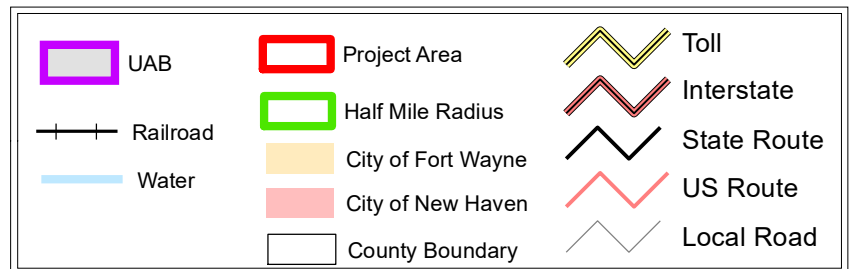
Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana

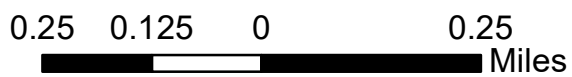
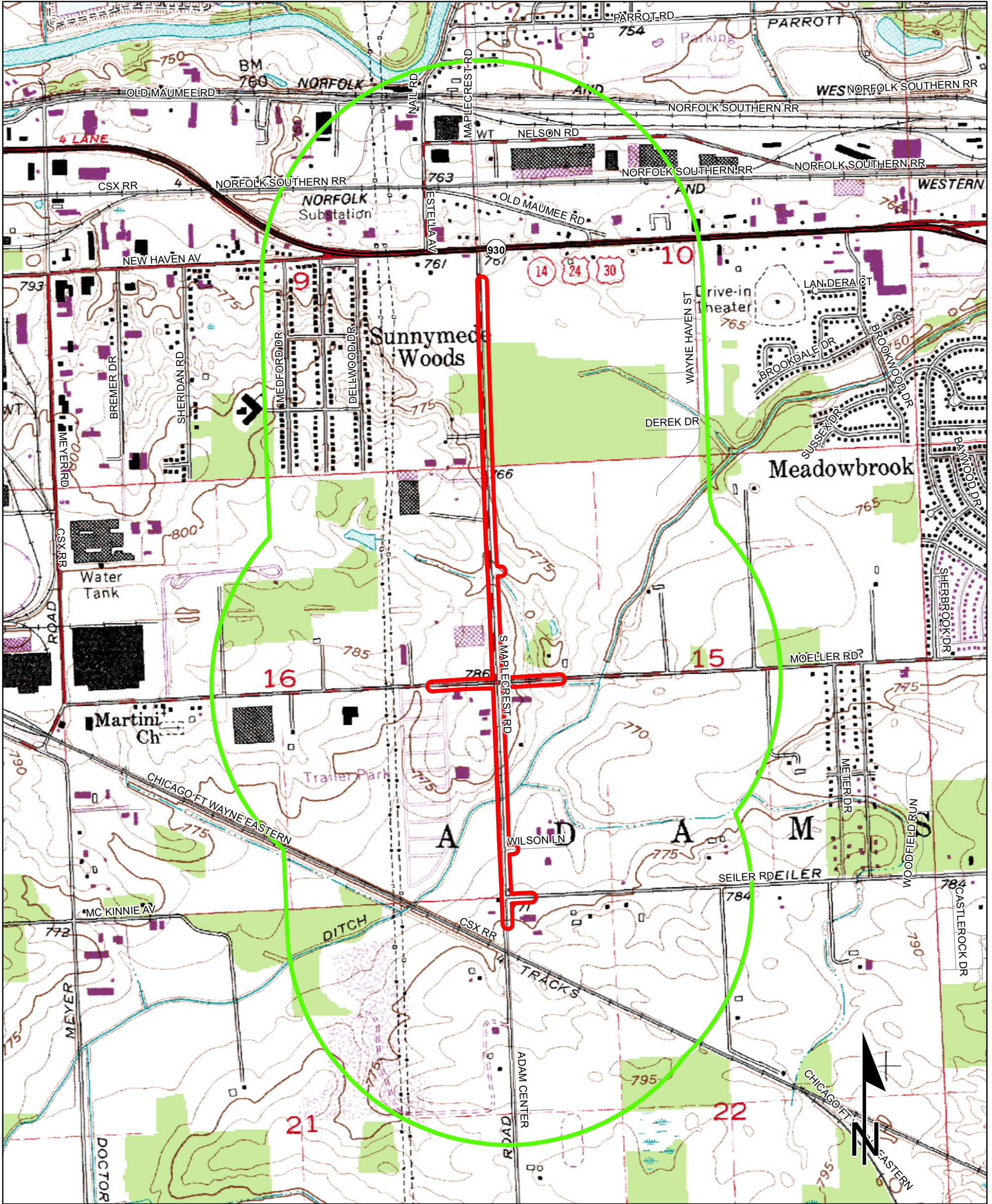


Sources:
Non Orthophotography
 Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.



Red Flag Investigation - Site Location
Maplecrest Rd - State Route 930 to Seiler Road
Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane
City of New Haven, Allen County, Indiana



Sources:
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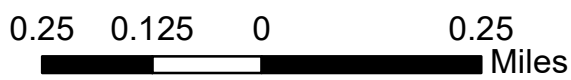
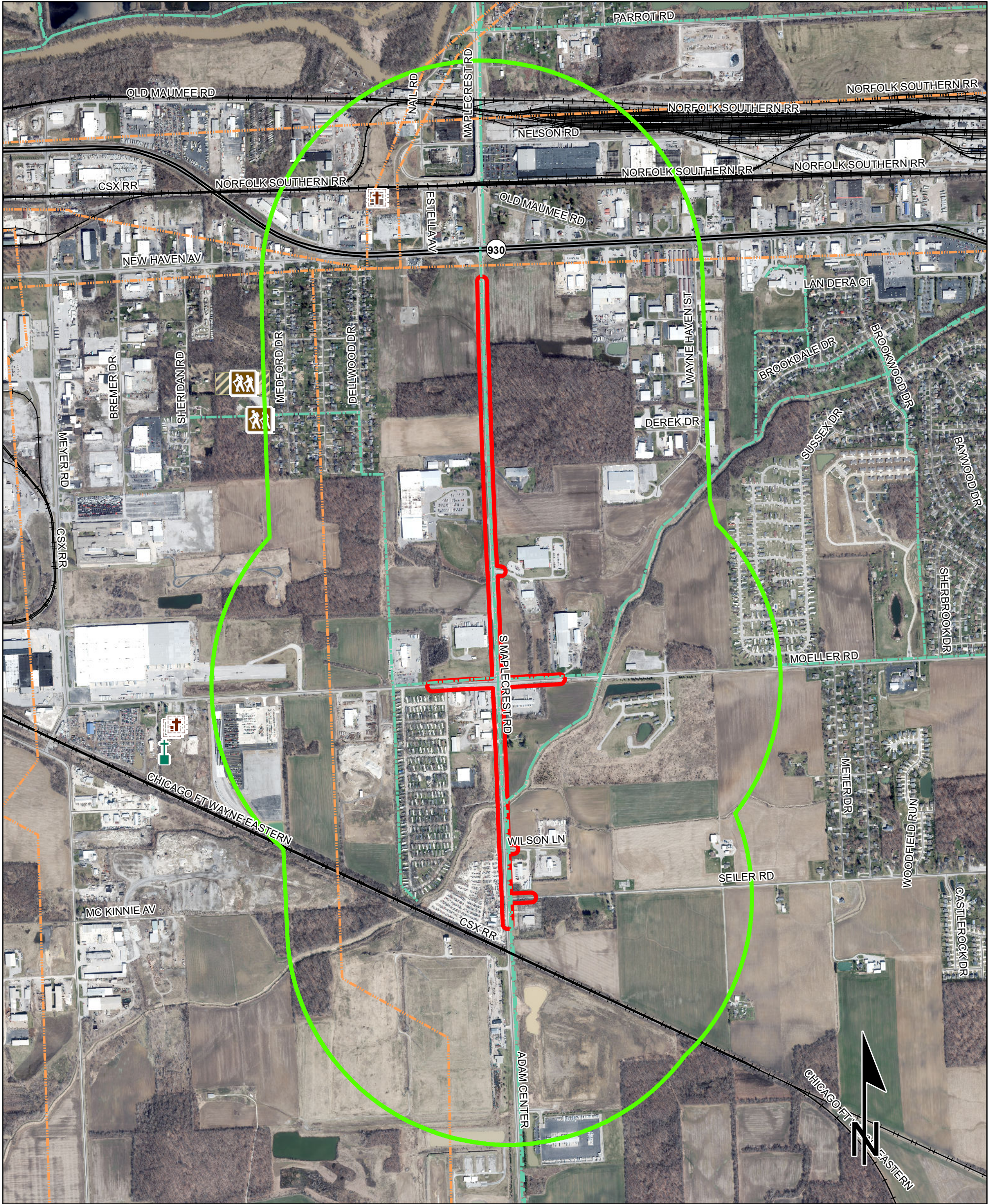
FORT WAYNE EAST
QUADRANGLE
INDIANA
7.5 MINUTE SERIES
(TOPOGRAPHIC)

Red Flag Investigation - Infrastructure

Maplecrest Rd - State Route 930 to Seiler Road

Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana



Sources:
Non Orthophotography
Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council
Orthophotography - (2021) Obtained from Allen County iMap

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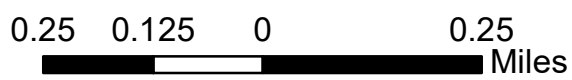
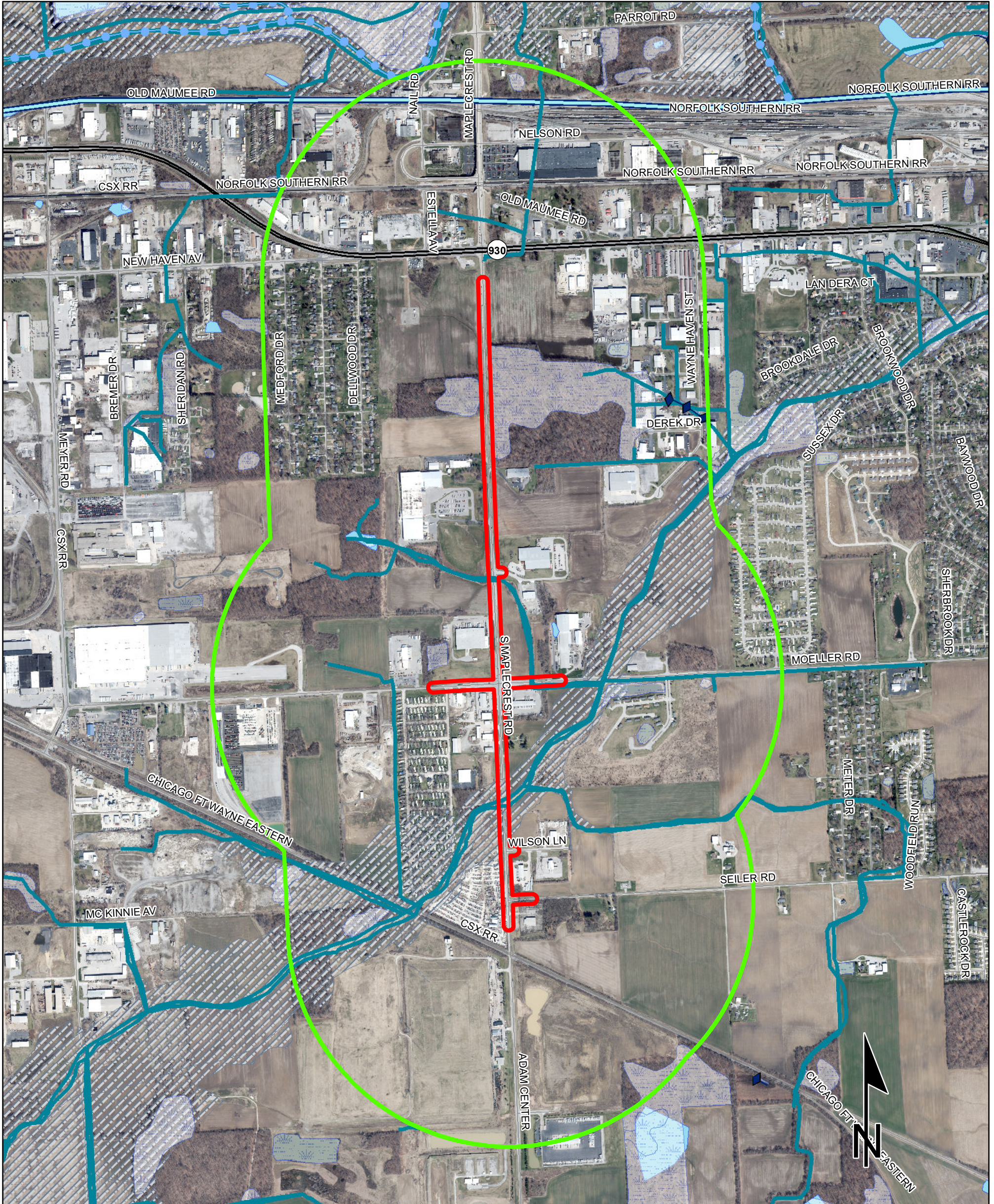
	Religious Facility		Recreation Facility		Project Area
	Airport		Pipeline		Half Mile Radius
	Cemeteries		Railroad		Toll
	Hospital		Trails		Interstate
	School		Managed Lands		State Route
			County Boundary		US Route
					Local Road

Red Flag Investigation - Water Resources

Maplecrest Rd - State Route 930 to Seiler Road

Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana



Sources:

Non Orthophotography

Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council

Orthophotography - (2021) Obtained from Allen County iMap

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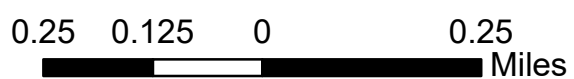
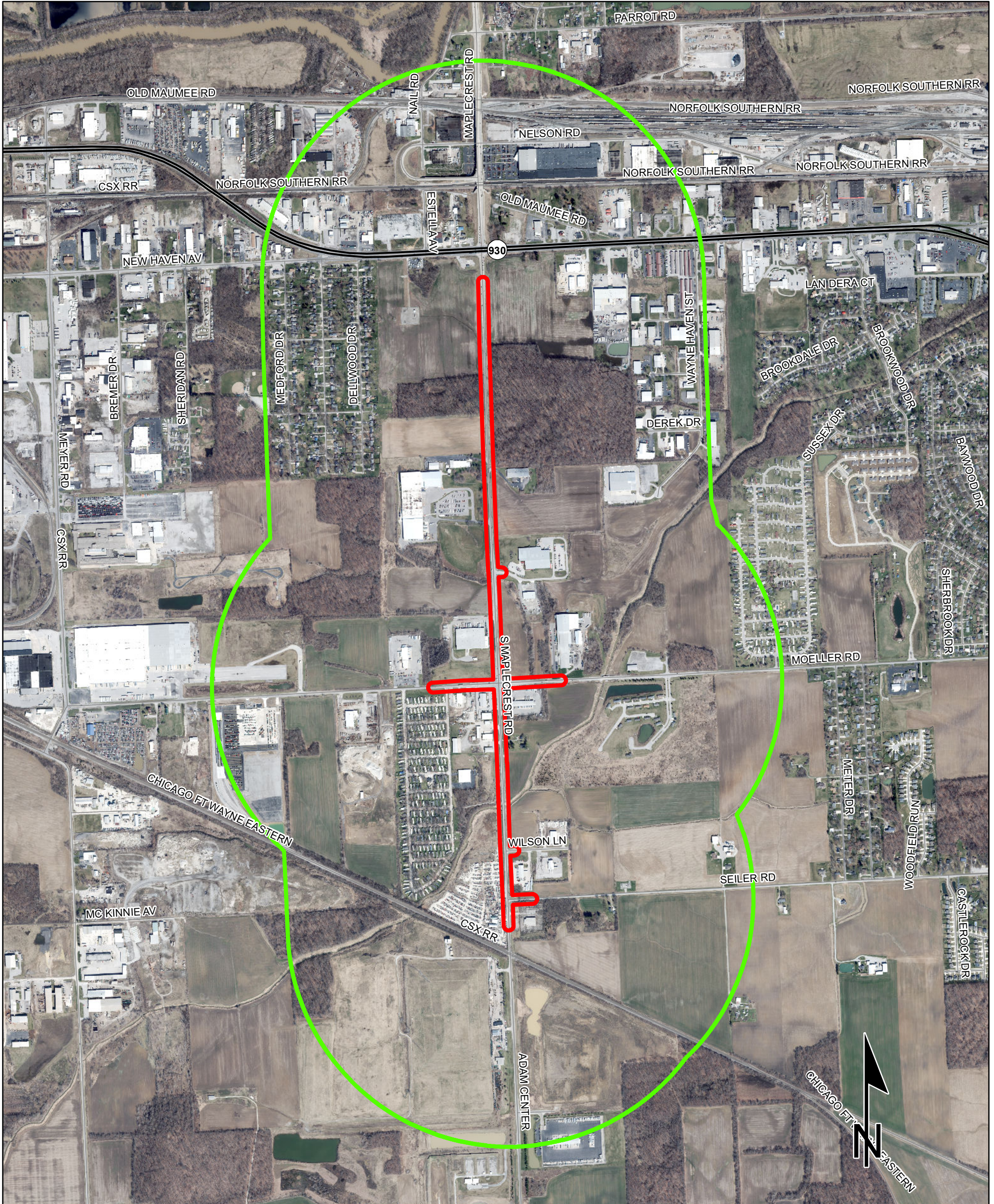
NWI - Point	Line of Protection	Project Area
Karst Spring	Wetlands	Half Mile Radius
NWI- Line	Lake	Toll
Impaired_Stream_Lake	Floodplain - DFIRM	Interstate
NPS NRI listed	Cave Entrance Density	State Route
River/Stream/Drain	Sinkhole Area	US Route
Canal Structure - Historic	Sinking-Stream Basin	Local Road
Canal Route - Historic	County Boundary	

Red Flag Investigation - Mining/Mineral Exploration

Maplecrest Rd - State Route 930 to Seiler Road

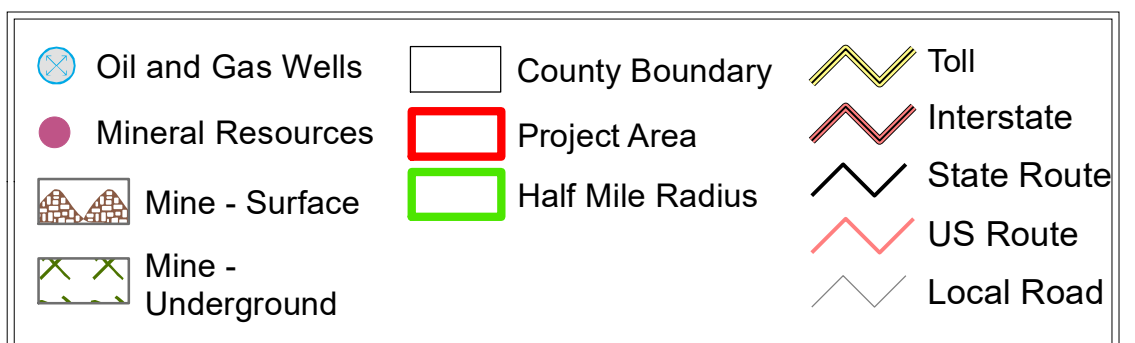
Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana



Sources:
Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council
Orthophotography - (2021) Obtained from Allen County iMap

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Red Flag Investigation - HazMat Concerns

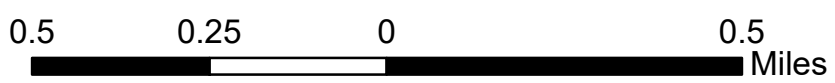
Maplecrest Rd - State Route 930 to Seiler Road

Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana



	Brownfield		RCRA Generator/TSD		Institutional Controls
	RCRA Corrective Action Sites		Restricted Waste Site		County Boundary
	Confined Feeding Operation		Septage Waste Site		Project Area
	Notice_of_Contamination		Solid Waste Landfill		Half Mile Radius
	Construction/Demolition Site		State Cleanup Site		Toll
	Infectious/Medical Waste Site		Superfund		Interstate
	Leaking Underground Storage Tank		Tire Waste Site		State Route
	Manufactured Gas Plant		Underground Storage Tank		US Route
	NPDES Facilities		Voluntary Remediation Program		Local Road
	NPDES Pipe Locations		Waste Transfer Station		
	Open Dump Waste Site				



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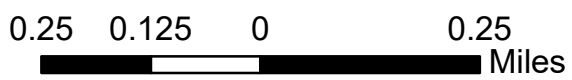
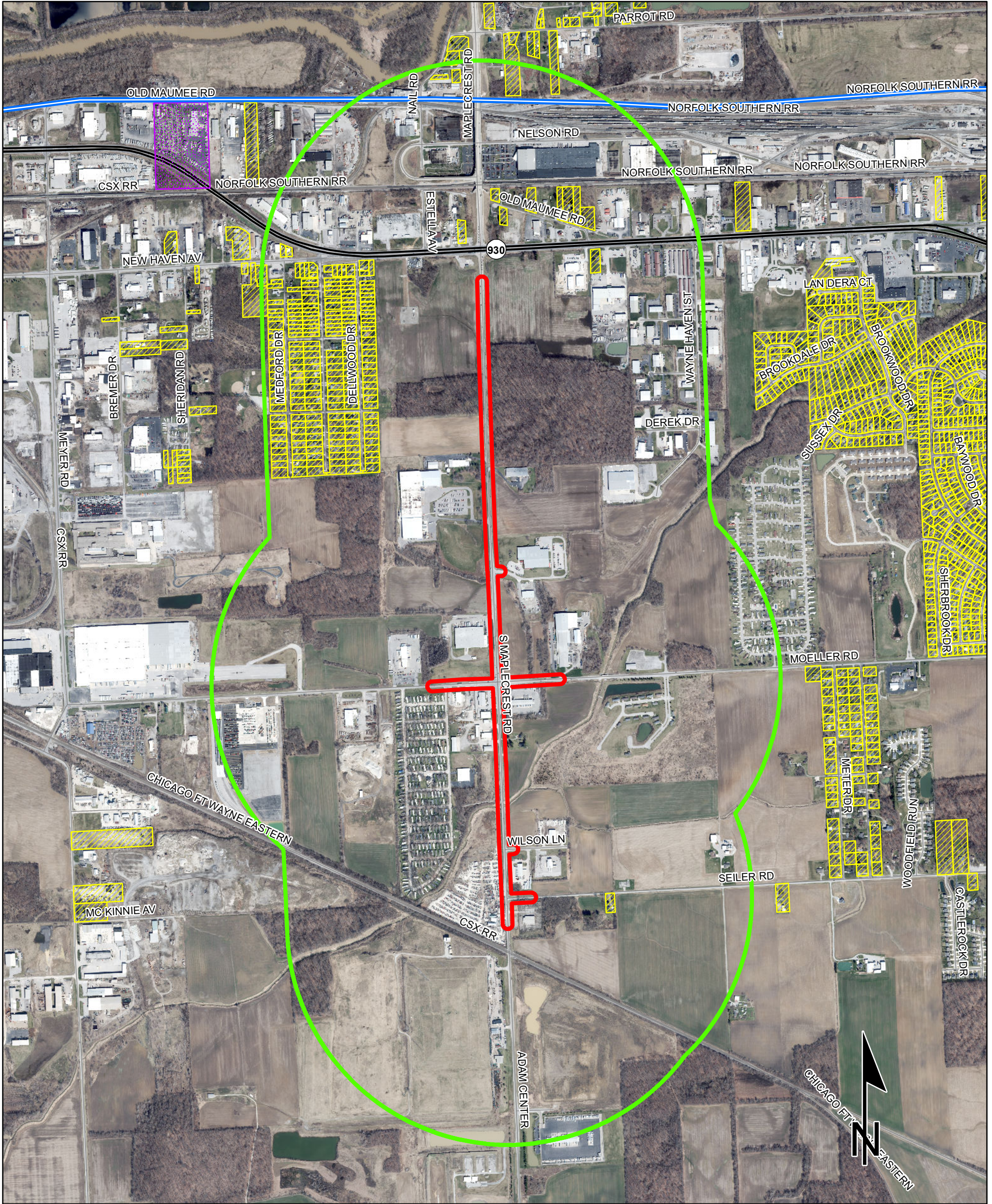
Sources:
Non Orthophotography
Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council
Orthophotography - (2021) Obtained from Allen County iMap

Red Flag Investigation - Historical Features

Maplecrest Rd - State Route 930 to Seiler Road

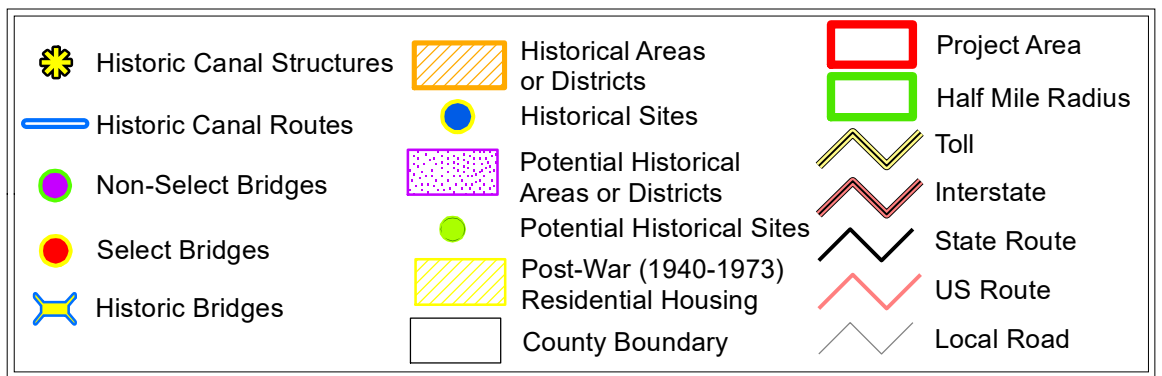
Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana

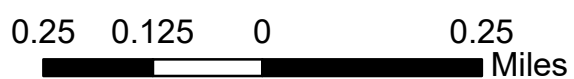
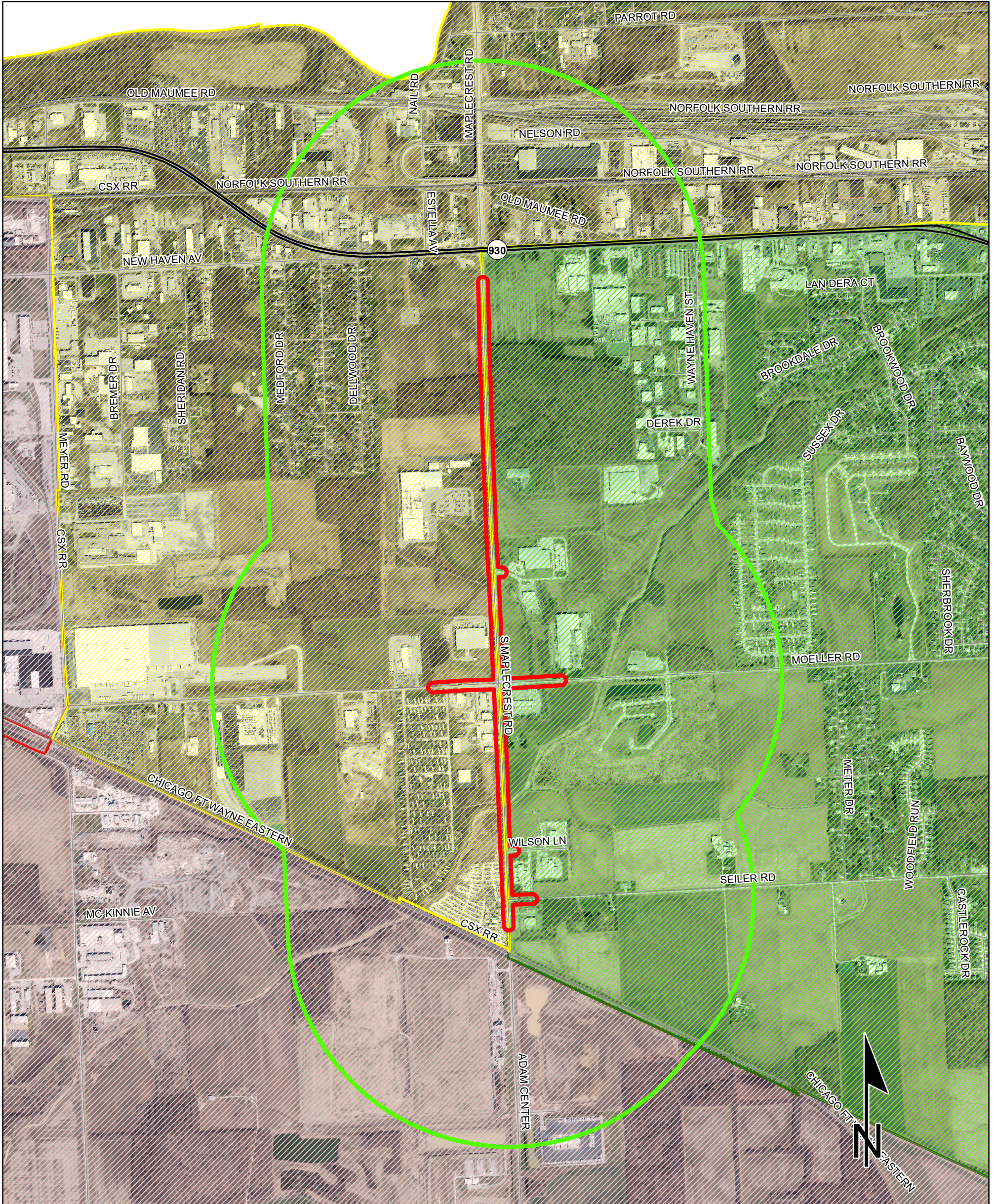


Sources:
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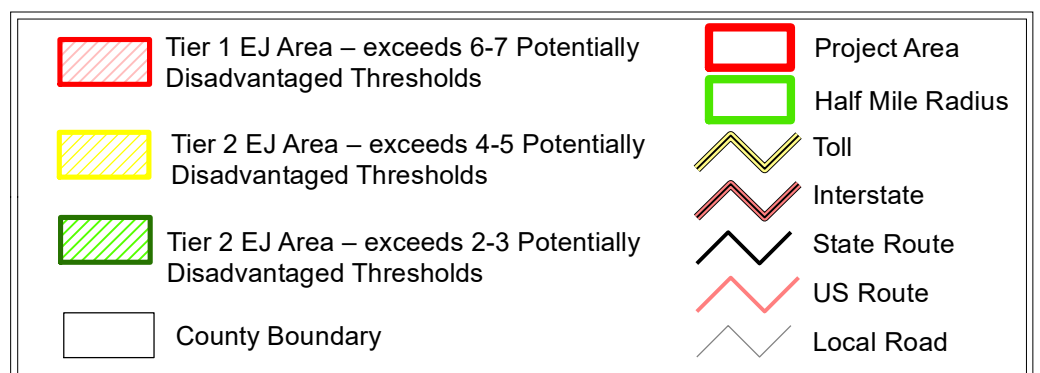


Red Flag Investigation - Environmental Justice Maplecrest Rd - State Route 930 to Seiler Road Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane City of New Haven, Allen County, Indiana

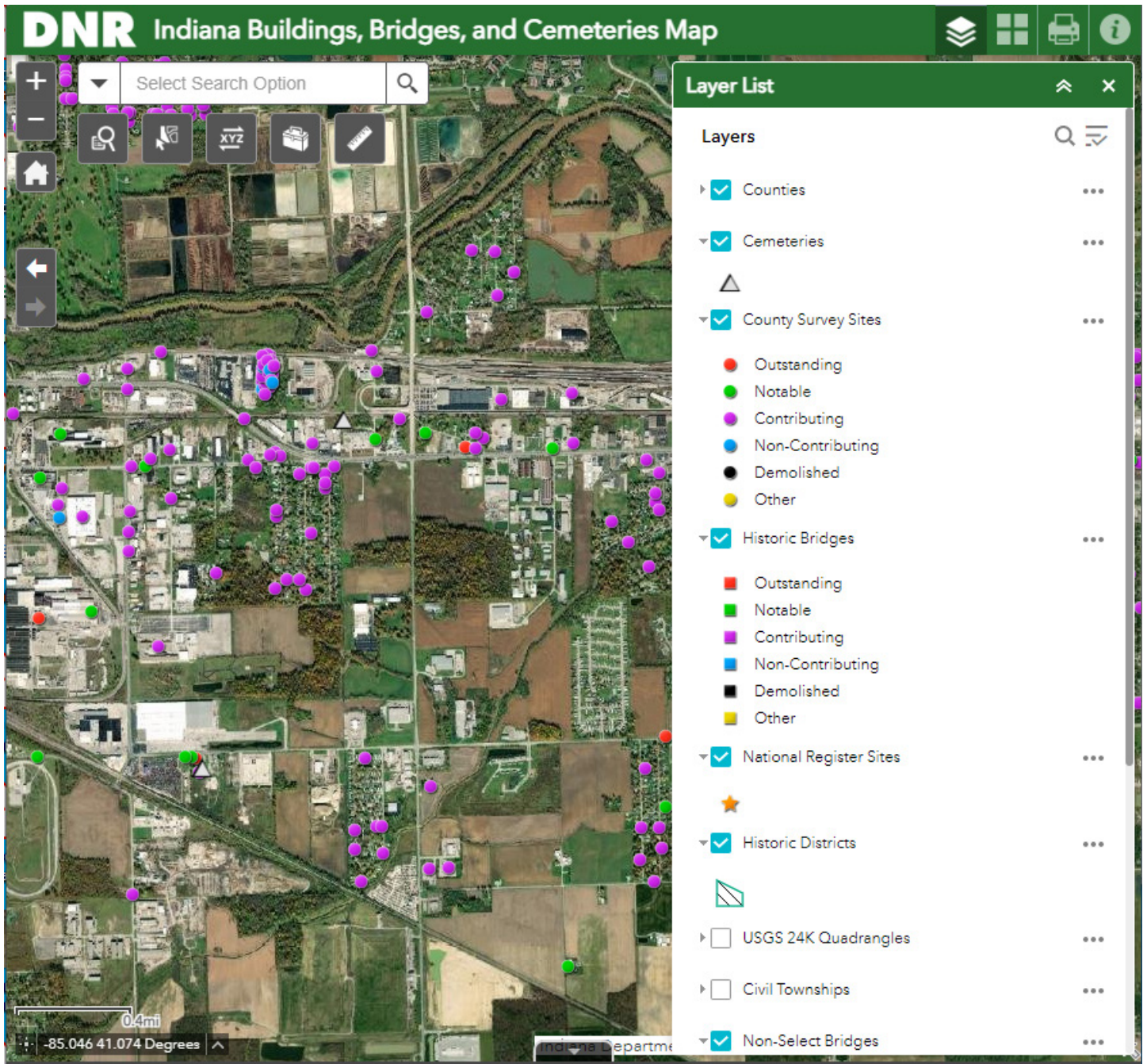


Sources:
Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council
Orthophotography - (2021) Obtained from Allen County iMap

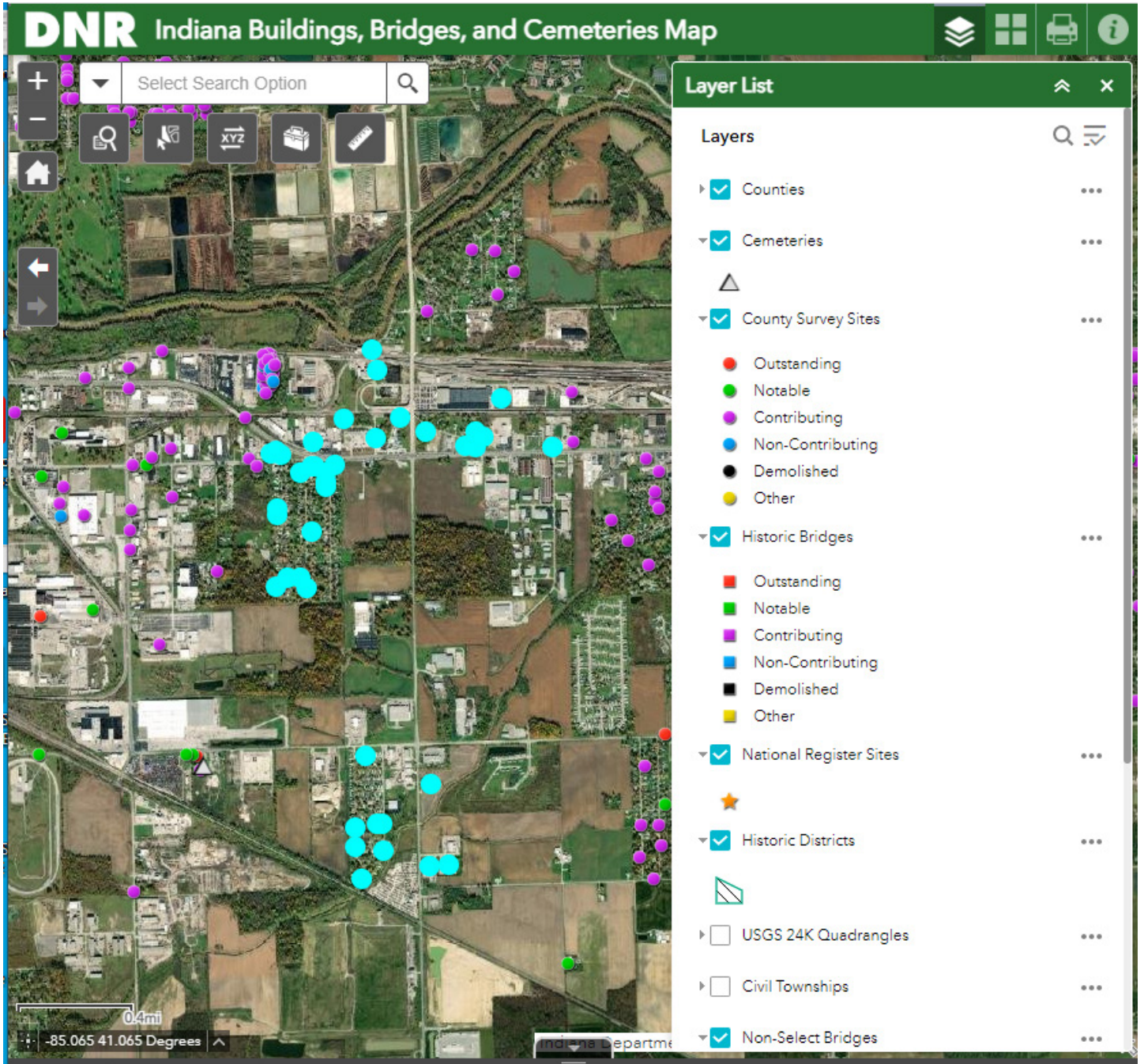
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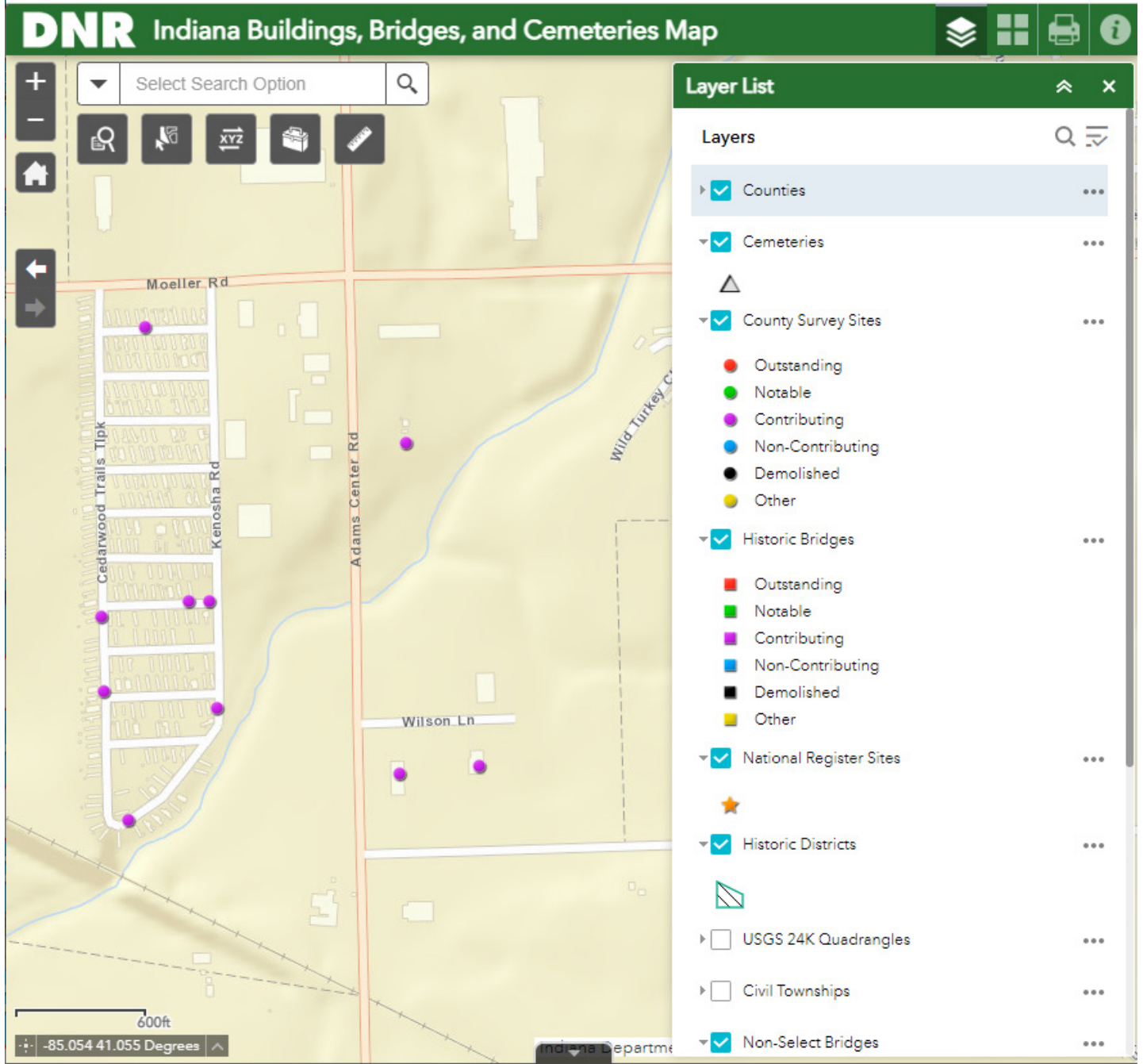
Sites identified in SHAARD GIS near the project area - August 2022



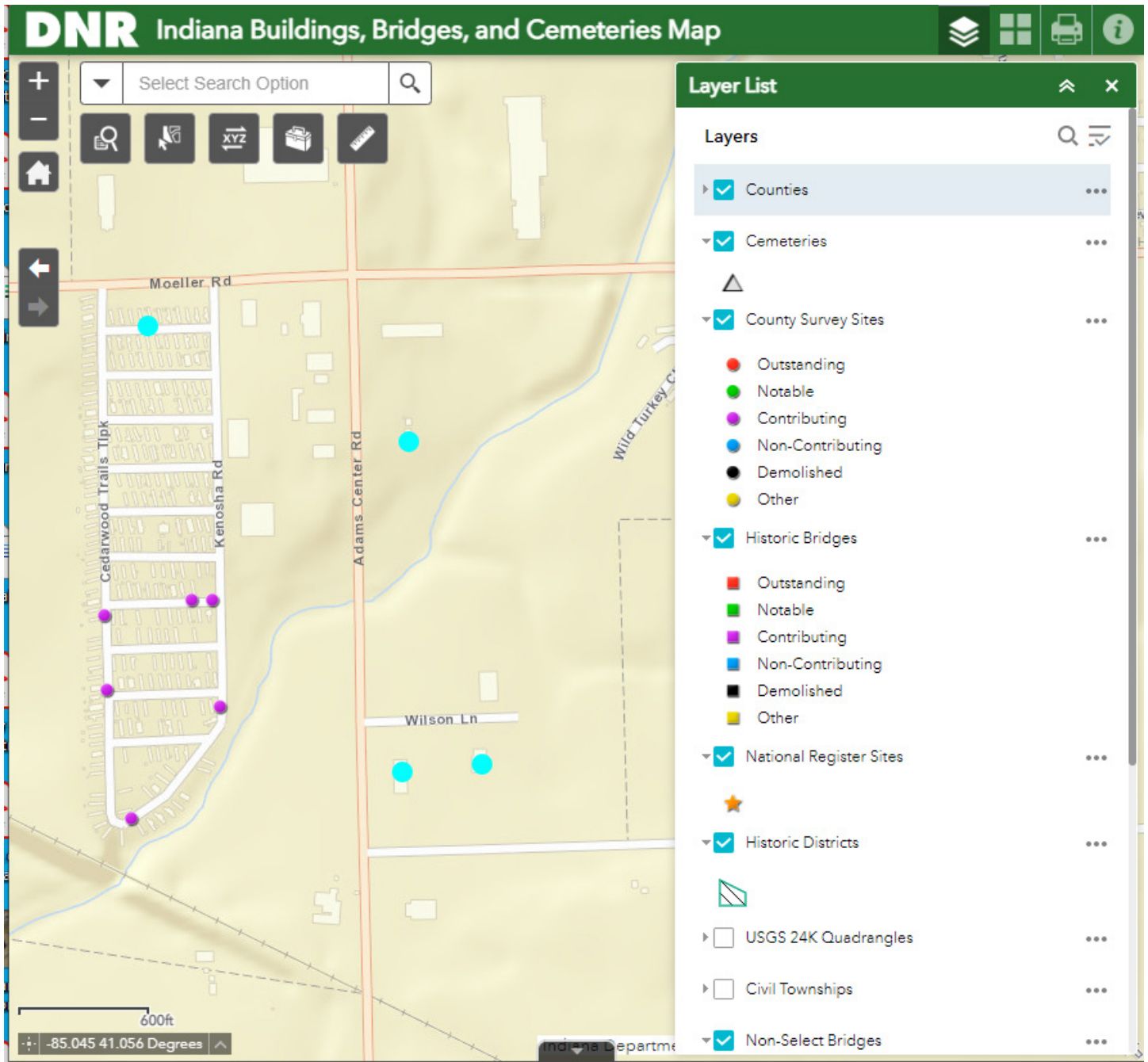
Sites selected in SHAARD GIS within a half mile radius of the project area



Sites identified in SHAARD GIS near the project area



Sites selected in SHAARD GIS adjacent to the project area



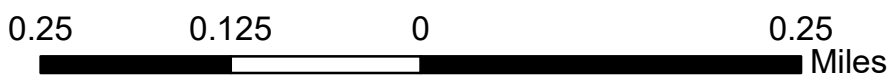
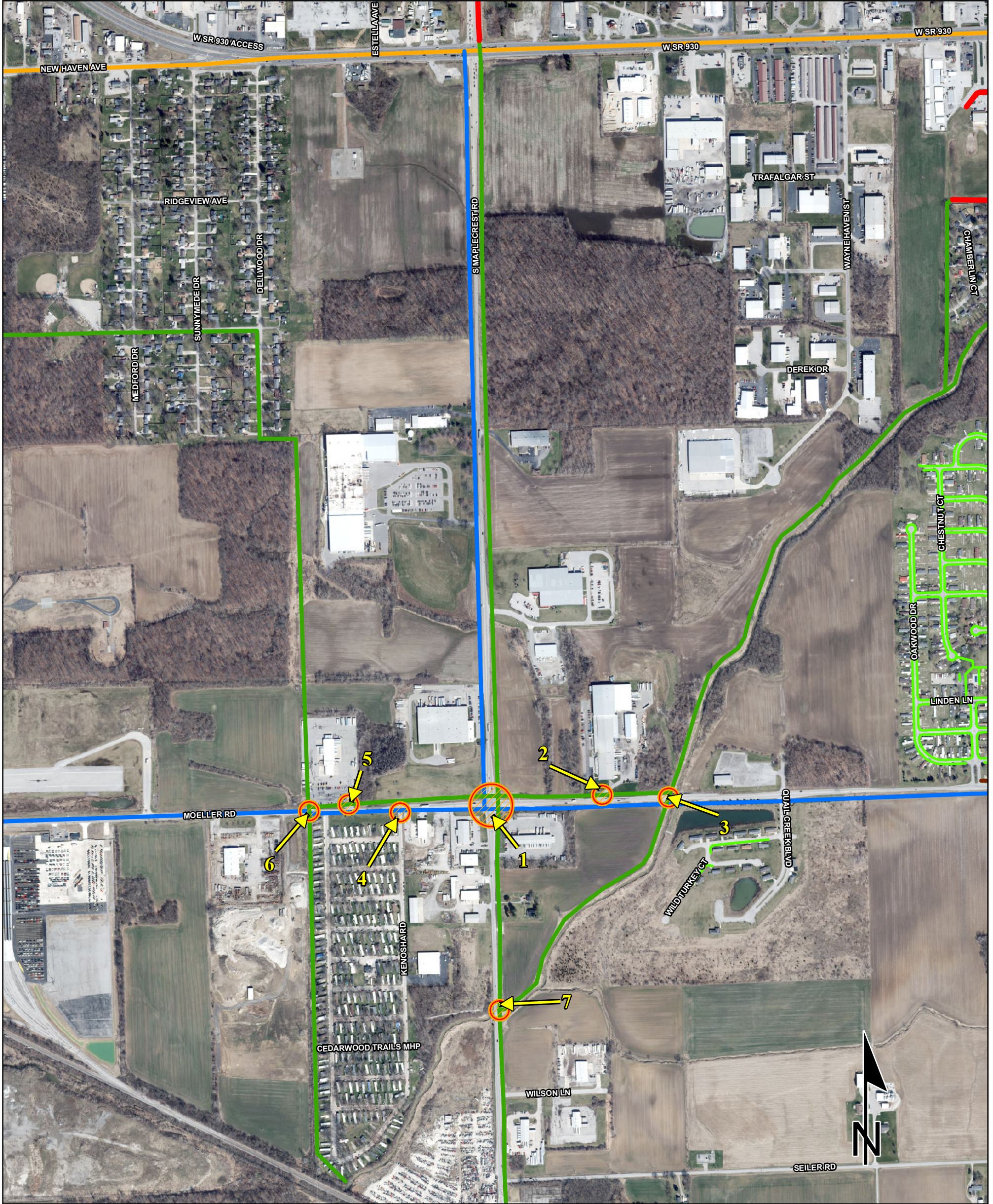
SHAARD_ID	HISTORICNAME	LOCATION	RATING
003-214-27066	House	6008 Moeller Rd Lot 274	Contributing
003-214-27133	Christian Wiese Farm	3527 Adams Center Rd	Contributing
003-214-27079	Truck Terminal	6420 Wilson Ln	Contributing
003-214-27132	Bridge over Trier Ditch	.3 miles south of Moeller Rd on S. Maplecrest Rd (Adams Center Rd)	Contributing

Red Flag Investigation - Environmental Justice

Maplecrest Rd - State Route 930 to Seiler Road

Des. No. 2100622, Road Widening - 2 Lane with Center Turn Lane

City of New Haven, Allen County, Indiana



Sources:
Non Orthophotography
Data - Obtained from the State of Indiana Geographical Information Office Library, Allen County iMap, and the Northeastern Indiana Regional Coordinating Council
Orthophotography - (2021) Obtained from Allen County iMap

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

Red Flag Considerations		Bicycle and Pedestrian Network	
	Pedestrian Connection		Trail Existing
			Sidewalk Existing
			trail - planned
			trail - proposed
			Sidewalk Planned
			Sidewalk Needed - Both sides
			Sidewalk Needed - One side

Utility Contact Information from Indiana 811

9/12/22, 8:50 AM

Design Inquiry

Dig Site Information

Street / Address: MAPLECREST RD
Cross Street:
State: IN County: ALLEN Township: ADAMS

Affected Service Areas

<u>Name</u>	<u>Utility Types</u>	<u>Design Engineer</u>	<u>Alternate</u>
AMERICAN ELECTRIC POWER	ELECTRIC	J. JAY MARLOW (260) 408-3447	
COMCAST CABLE (FORT WAYNE)	CABLE TV	JOHN GAYDAY (260) 458-5107 john_gayday@cable.comcast.com 720 TAYLOR ST. FT. WAYNE, IN 46802	
COMMUNITY FIBER SOLUTIONS, INC.	FIBER OPTIC		
FORT WAYNE, CITY OF	FIBER OPTIC, SEWER, STREETLIGHTS, TRAFFIC LIGHTS, WATER	MARIO TREVINO (260) 427-1136 1 E MAIN STREET FORT WAYNE, IN 46802-1804	
FRONTIER	TELEPHONE		
NEW HAVEN UTILITIES, CITY OF	SEWER, STORM, WATER	DAVE JONES (260) 748-7056 djones@newhavenin.org 815 LINCOLN HWY E / PO BOX 570 NEW HAVEN, IN 46774	
NIPSCO GAS (FORT WAYNE)	GAS	DEAN GARRETT (219) 647-6260 utilitycoordination@nisource.com 801 E. 86TH AVE. MERRILLVILLE, IN 46410	
PAULDING PUTNAM ELECTRIC COOP, INC.	ELECTRIC		
TRI-STATE PIPELINE	PIPELINE	SOLOMON WEHR gladieuxops@gmail.com 4133 NEW HAVEN AVE FORT WAYNE, IN 46803	
ZAYO BANDWIDTH	FIBER OPTIC	WAYLON HIGGINS (765) 341-1199 waylon.higgins@zayo.com 722 N HIGH SCHOOL RD INDIANAPOLIS, IN 46214	



Division of Nature Preserves
402 W. Washington St., Rm W267
Indianapolis, IN 46204-2739

September 20, 2022

Matt Peters
Northeastern Indiana Regional Coordinating Council
200 East Berry Street, Suite 230
Fort Wayne, IN 46802

Dear Matt Peters:

I am responding to your request for information on the threatened or endangered (T&E) species, high quality natural communities, and natural areas for the South Maplecrest Road Widening Project located in Allen County, Indiana. The Indiana Natural Heritage Data Center has been checked and there are no T&E species or significant areas documented within 0.5 mile of the project area.

If you need a general environmental review of the project from DNR, you can submit the project information to Christie Stanifer, DNR Environmental Coordinator, at environmentalreview@dnr.in.gov (preferred) or send to the street address below. For more help or guidance contact Christie Stanifer at cstanifer@dnr.in.gov.

Department of Natural Resources
Environmental Review
Division of Fish and Wildlife
402 W. Washington Street, Room W273
Indianapolis, IN 46204

The information I am providing does not preclude the requirement for further consultation with the U.S. Fish and Wildlife Service as required under Section 7 of the Endangered Species Act of 1973. If you have concerns about potential Endangered Species Act issues you should contact the Service at their Bloomington, Indiana office.

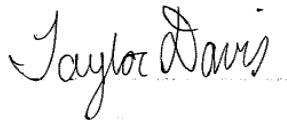
U.S. Fish and Wildlife Service
620 South Walker St.
Bloomington, Indiana 47403-2121
(812)334-4261

Please note that the Indiana Natural Heritage Data Center relies on the observations of many individuals for our data. In most cases, the information is not the result of comprehensive field surveys conducted at particular sites. Therefore, our statement that there are no documented significant natural features at a site should not be interpreted to mean that the site does not support special plants or animals.

Due to the dynamic nature and sensitivity of the data, this information should not be used for any project other than that for which it was originally intended. It may be necessary for you to request updated material from us in order to base your planning decisions on the most current information.

Thank you for contacting the Indiana Natural Heritage Data Center. You may reach me at (317)233-2558 you have any questions or need additional information.

Sincerely,

A handwritten signature in cursive script that reads "Taylor Davis". The signature is written in black ink on a white background.

Taylor Davis
Indiana Natural Heritage Data Center



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Indiana Ecological Services Field Office
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

In Reply Refer To:
Project Code: 2022-0084745
Project Name: Maplecrest Road South Widening Project

September 13, 2022

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

Please use the species list provided and visit the U.S. Fish and Wildlife Service's Region 3 Section 7 Technical Assistance website at - <http://www.fws.gov/midwest/endangered/section7/s7process/index.html>. This website contains step-by-step instructions which will help you

determine if your project will have an adverse effect on listed species and will help lead you through the Section 7 process. For all **wind energy projects and projects that include installing towers that use guy wires or are over 200 feet in height**, please contact this field office directly for assistance, even if no federally listed plants, animals or critical habitat are present within your proposed project or may be affected by your proposed project.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see <https://www.fws.gov/birds/policies-and-regulations.php>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see <https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of

Executive Order 13186, please visit <https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. **Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.**

Attachment(s):

- Official Species List
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Indiana Ecological Services Field Office

620 South Walker Street
Bloomington, IN 47403-2121
(812) 334-4261

Project Summary

Project Code: 2022-0084745

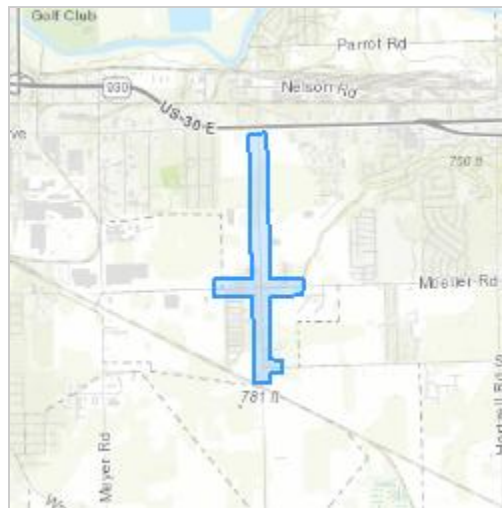
Project Name: Maplecrest Road South Widening Project

Project Type: Road/Hwy - Maintenance/Modification

Project Description: Maplecrest Rd from SR 930 to Seiler Rd (Des# 2100622) - 2 lanes with a center turn lane along with trail and sidewalk facilities.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@41.05756455,-85.05842035850172,14z>



Counties: Allen County, Indiana

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> ▪ Incidental take of the NLEB is not prohibited here. Federal agencies may consult using the 4(d) rule streamlined process. Transportation projects may consult using the programmatic process. See www.fws.gov/midwest/endangered/mammals/nleb/index.html Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

MIGRATORY BIRD INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list

of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical](#)

[Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- [Palustrine](#)

RIVERINE

- [Riverine](#)
-

IPaC User Contact Information

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Lead Agency Contact Information

Lead Agency: Department of Transportation

Maplecrest Road South Widening Project

Species Survey Guidelines (2 Species)

Generated September 13, 2022 02:58 PM UTC, IPaC v6.80.1-rc3



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Species Document Availability

Species with survey guidelines

Indiana Bat *Myotis sodalis*

Northern Long-eared Bat *Myotis septentrionalis*

Species without survey guidelines available

Monarch Butterfly *Danaus plexippus*

Species Survey Guidelines - Indiana Bat and 2 more species

Published by Indiana Ecological Services Field Office - Publication Date: March 29, 2022 for the following species included in your project

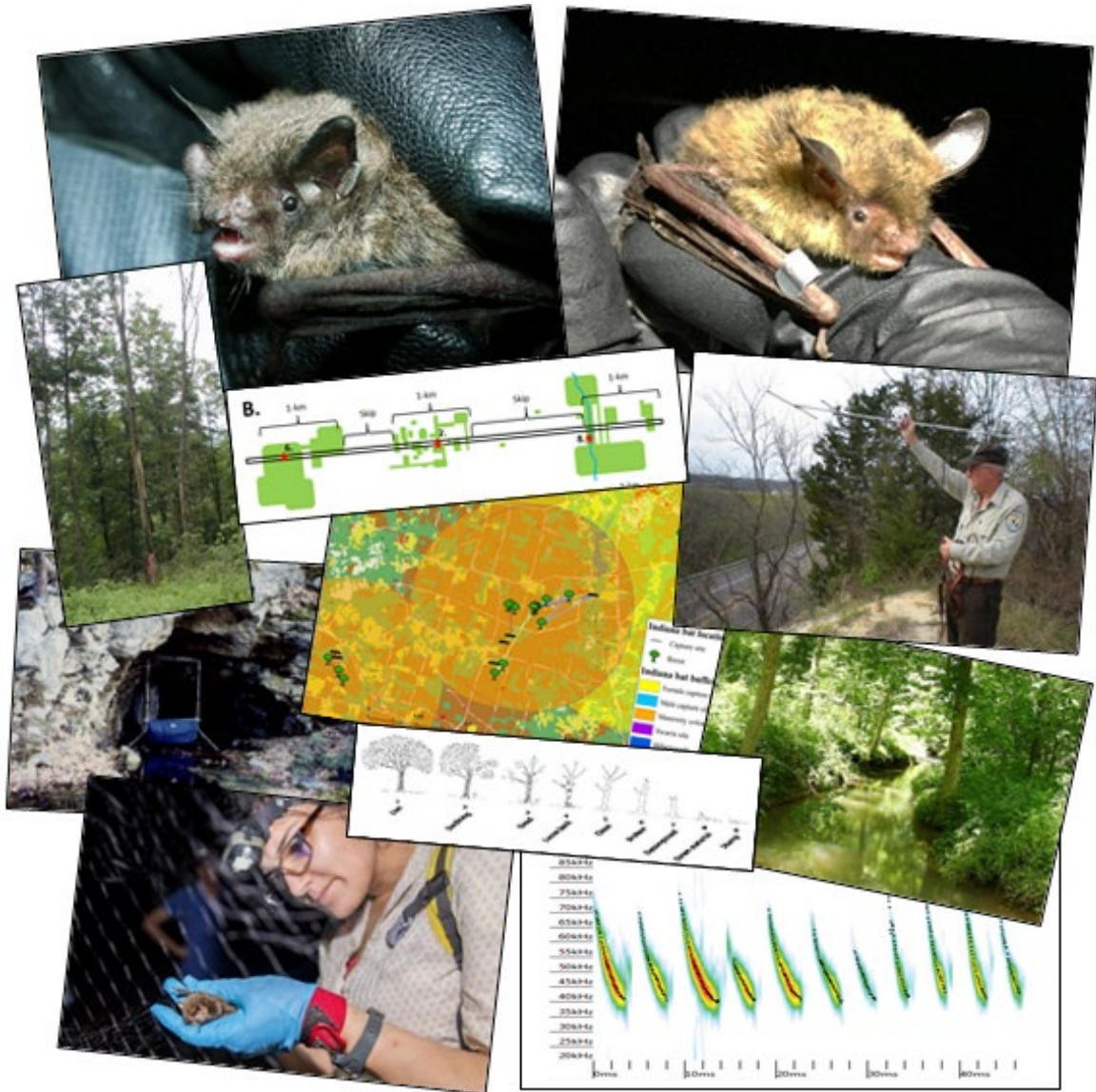
Indiana Bat *Myotis sodalis*

Monarch Butterfly *Danaus plexippus*

Northern Long-eared Bat *Myotis septentrionalis*

U.S. Fish and Wildlife Service

RANGE-WIDE INDIANA BAT & NORTHERN LONG-EARED BAT SURVEY GUIDELINES



March 2022



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Cover Photos/Graphics: Mike Coffey/USFWS, Kyle Edmonds/USFS, Mark Ford/USFS (USGS), Andrew King/USFWS, Keith Lott/USFWS, Alex Morrison/VA Tech, and Alex Silvis/VA Tech (WV DNR).

RANGE-WIDE INDIANA BAT & NORTHERN LONG-EARED BAT SURVEY GUIDELINES

(modifications from the previous guidelines are in **blue**)

INTRODUCTION

The Indiana bat (**IBAT**) (*Myotis sodalis*) was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967), and is currently listed as endangered under the Endangered Species Act (ESA) of 1973, as amended. **The northern long-eared bat (NLEB) (*Myotis septentrionalis*) was listed as threatened under the ESA on April 2, 2015.** This survey protocol provides the U.S. Fish and Wildlife Service's (USFWS) recommended guidance on survey methods and outlines additional reporting requirements for surveyors.

The following guidance is designed to determine whether **IBAT and/or NLEB** are present¹ or absent (P/A)² at a given site during the summer (May 15 to August 15; Table 1) **and/or during the winter (see Appendix H: potential bat hibernacula surveys).** The phased-approach, which includes coordination with the USFWS³, habitat assessments, and acoustic, mist-net, radio-tracking, emergence, "outer-tier project", and potential bat hibernacula surveys, supersedes all prior survey guidance **for these two species.** Future changes to this guidance may occur and will be posted on the USFWS **IBAT and NLEB** survey guidance website(s) **by March 31st of each year.** **Before conducting surveys, please check this website to ensure use of the most current version of this document.** **The USFWS is currently transitioning to a new website platform.** All USFWS survey guidance documents can now be found at <https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines>.

These protocols may be different from those designed for general bat monitoring as part of the North American Bat Monitoring Program (NABat)⁴. NABat surveys may be thought of as similar to breeding bird surveys and are not project-specific surveys in most cases. Information from NABat surveys can be considered as part of "best available" information when assessing whether there is already some existing information on presence of **IBAT or NLEB** in the vicinity of a given project.

OBJECTIVES

The objectives of **IBAT and NLEB** survey guidelines are to: (1) standardize range-wide survey procedures; (2) maximize the potential for detection/capture of **IBAT and NLEB** at a minimum acceptable level of effort (LOE); (3) make accurate presence/probable absence determinations; and (4) aid in conservation efforts for the species' by identifying areas where they are present.

¹ The guidance is not intended to be rigorous enough to provide sufficient data to fully determine population size or structure.

² Recognizing protocols are not 100% likely to detect IBAT and NLEB when present and identification errors may occur.

³ Coordinate with the appropriate state natural resource agencies and any involved federal agency(ies) whenever "USFWS" coordination is listed. USFWS FO(s) may direct project sponsors to state agencies for existing occurrence information. Coordinate with your local USFWS FO(s) to understand the process for their area of jurisdiction.

⁴ Loeb et al. 2015 available at <https://www.nabatmonitoring.org>

BACKGROUND

In 2011, the USFWS developed a multi-agency team to determine whether improvements could be made to the 2007 IBAT Mist-Net Protocols (USFWS 2007). The team included members from each of the four USFWS regions (Midwest, Northeast, Southeast, and Southwest) where IBATs are known to occur, representatives of state natural resource agencies from three of those four regions (Midwest, Northeast, and Southeast), and representatives from three federal agencies (U.S. Geological Survey (USGS), Department of Defense, and U.S. Forest Service). This initial team obtained informal peer review of the draft guidelines in February 2012, gathered additional information in 2012, and made a revised version available for public comment in 2013 [78 FR 1879, January 9, 2013, and 78 FR 9409, February 8, 2013]. The USFWS implemented the revised guidance in 2014. Since then, a smaller USFWS team has made any necessary revisions to the guidelines each year. The USGS conducted initial independent testing of automated acoustic software programs during the winter of 2014-15 and continues to test new versions of available software using software-testing procedures updated in January 2019⁵.

We considered the best available information for all aspects of the guidance. For example, see our white paper⁶ and 2018 addendum outlining the methods used to determine the minimum IBAT LOE. [Our 2022 addendum provides the rationale for the NLEB minimum LOE for acoustic and mist-net surveys \(previously we deferred to LOE used for IBAT\). As we receive additional information, we may incorporate additional survey recommendations for the IBAT, NLEB, or other bat species in the future.](#) The USFWS continues to partner with local, State, and Federal biologists; scientific and academic institutions; commercial organizations; and other interested parties to collect additional data on the distribution, ecology, and biology of the IBAT [and NLEB](#) and looks forward to receiving any additional pertinent information from partners.

GENERAL PROCESS

Indiana [and/or NLEB](#) surveys for some proposed projects will require modification (or clarification) of this guidance through coordination with the USFWS FO(s) responsible for the state(s) in which the project occurs⁷. If not already required by federal permit, federal action agencies and surveyors should develop a proposed survey study plan in coordination with the USFWS FO(s) so that all parties fully understand which methods will be deployed, what assumptions will be made, and what the various outcomes would be based on the results of each step. Project proponents [are encouraged to coordinate with the USFWS FO\(s\) regarding when they](#) may stop survey work at any point once an assumption or documentation of [their targeted species](#) presence occurs. Pre-survey coordination typically will preclude the need for subsequent reviews of intermediate steps by USFWS FO(s) during the busy field season. An online directory of USFWS FO(s) is available [on the USFWS website](#). Unless otherwise agreed to by the USFWS, negative P/A survey results obtained using this guidance are valid for a minimum of five years⁸ from their completion unless new information (e.g., other nearby surveys) suggest otherwise. If survey results are older than 5 years, coordinate with the

⁵ Revised USFWS Software Testing Procedures are available [on the USFWS website provided in the intro](#).

⁶ The white paper, 2018 and [2022 addenda](#) are available [on the USFWS website provided in the intro](#).

⁷ For example, project sponsors for large acreage and/or landscape-scale projects that do not result in permanent habitat loss and would not pose an ongoing threat of lethal take, especially those proposed by land management agencies, may work with local USFWS FOs to apply different scales of surveys (broad vs. project-level) or different types of surveys, such as long-term monitoring results (e.g., forest-wide acoustic transect data) and/or targeted survey efforts (e.g., sub-sampling of large project areas), to address P/A concerns.

⁸ The timeframe may be reduced if significant habitat changes have occurred in the area or increased based on local information.

USFWS FO(s) to discuss if additional surveys are needed. If not already required by federal permit, submit all results (negative or positive) from any phase to the USFWS FO(s) **you have been in coordination with**. We strongly encourage this coordination as it improves the USFWS' understanding of (1) the level of survey effort underway and (2) the distribution of the species. A single report can be submitted at the end of all phases conducted for a given project.

USFWS FO-level coordination is also important during the survey planning process. The guidelines that are described in this document are designed to be implemented in typical habitats that are conducive to the standard survey techniques described herein. However, the USFWS recognizes that occasionally there may be some site-specific conditions in summer habitats or at potential hibernacula sites that do not lend themselves to being surveyed using the standard survey options (e.g., mist nets, acoustic detectors, or harp traps) even though a site may otherwise meet the definition of suitable IBAT **and/or NLEB** habitat. Therefore, we strongly encourage coordination with the FO(s) prior to using methods that may not be appropriate for site-specific habitat conditions.

Because surveys that result in the capture of IBAT **and/or NLEB** result in take, such surveys should only be conducted by a qualified biologist⁹. Generally, a recovery permit for the IBAT **and NLEB** authorizes the capture of bats for identification, and handling of bats for measurements, photography, **banding**, and radio transmitter attachment; some (but not all) may also authorize entry into potential hibernacula to conduct internal surveys **and other study-specific collection**. Following this survey guidance will meet standard USFWS requirements; however, surveyors also need to ensure they meet all applicable state permitting and reporting requirements. Failure to follow the survey guidance, as written, and/or failure to follow a study plan which has received concurrence from the local USFWS FO(s), may result in a USFWS FO requesting additional survey effort.

The following provides a step-by-step outline of how IBAT **and/or NLEB** summer surveys and/or potential hibernacula surveys should be conducted. Some of these steps can occur concurrently.

NOTE: Advantages (or disadvantages) of targeting the NLEB in surveys should be discussed with the USFWS FO(s). However, if specifically targeting both the IBAT and NLEB, **make sure to use the higher minimum LOE for chosen survey methods (e.g., NLEB range-wide acoustic or mist-netting LOE, also see 2022 Addendum)** to ensure it meets the needs for both species.

PHASE 1 – INITIAL PROJECT SCREENING

Step 1. Coordinate with the U.S. Fish and Wildlife Service Field Office(s)¹⁰ regarding existing IBAT **and/or NLEB summer and/or winter occurrence information. [*Projects located within known IBAT **and/or NLEB** summer habitat and/or known hibernacula/spring-staging/fall swarming zones will not proceed to Phase 2 of this process unless the project meets the definition of an “outer-tier project” outlined in Appendix G.*]**

- a) If a project (located within or outside of a known maternity colony home range or spring-staging/fall-swarming zone of a known hibernaculum) is already covered under an

⁹ A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for IBAT **and/or NLEB** in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to net and handle IBAT **and/or NLEB**. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

¹⁰ Coordinate with the appropriate state natural resource agencies and any involved Federal Action agencies whenever “USFWS” coordination is listed. USFWS FO(s) may direct project sponsors to state agencies for existing occurrence information. Coordinate with your local USFWS FO(s) to understand the process for their area of jurisdiction.

existing Endangered Species Act (ESA) incidental take authorization (e.g., HCP, BO), then no further summer and/or potential hibernacula surveys are needed, follow the procedures previously authorized by the USFWS FO(s).

- b) If there are known IBAT or NLEB occurrences (e.g., known roost trees, capture locations, foraging locations or hibernacula) within the project action area¹¹; **OR**

if there are no known IBAT or NLEB summer or spring/fall/winter occurrences within the proposed project area itself, but the project area is located within a known maternity colony home range and/or the spring-staging and fall-swarming zone of a known hibernaculum¹²; **OR**

if the project is located outside a known maternity colony home range and/or spring-staging and fall-swarming zone of a hibernaculum but is within the range of the IBAT and/or NLEB (note this can change over time), then proceed to [Step 2](#).

Step 2. Conduct Habitat Assessment (Desktop or Field-based; see Appendix A and Appendix H).

- a) If suitable summer habitat and/or a potential hibernaculum (a) is present within the action area, then proceed to [Step 3](#).
- b) If both suitable summer and winter habitat (i.e., potential hibernaculum) are absent within the action area, then no further P/A surveys are recommended; however, additional coordination with the USFWS FO(s) may be recommended if IBAT and/or NLEB may be present in an action area during other seasons (e.g., spring and fall migration) and may be affected by the proposed project.

Step 3. Assess potential for adverse effects to IBAT and/or NLEBs

- a) If the project is not anticipated to result in adverse effects to IBAT and/or NLEB (as proposed), then no further summer and/or potential hibernacula surveys are recommended, coordinate with the USFWS FO(s).
- b) If the project may result in adverse effect to IBAT and/or NLEB, but impacts can be adequately assessed and conservation measures can be designed to minimize those effects without additional P/A information (this includes **all** proposed projects within known summer maternity colony home ranges and /or at known hibernacula and their surrounding spring-staging and fall-swarming zones, but may include other areas as well), then no further surveys are recommended. Coordinate with the USFWS FO(s) regarding an assessment of the project's potential effects, development of conservation measures, determination of the need for any ESA incidental take authorization, and discussion of value of additional surveys.
- c) If the project does not meet the conditions of 3a or 3b, then proceed to **Phase 2** and/or

¹¹ The "action area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. [50 CFR Section 402.02]

¹² See USFWS IBAT Section 7 and Section 10 Guidance for Wind Energy Projects (Questions 4 & 5) [on the USFWS website provided in the intro](#)

Phase 5.

PHASE 2 – SUMMER PRESENCE/ABSENCE SURVEYS (NETTING OR ACOUSTIC SURVEYS)¹³

Presence/probable absence (P/A) of IBAT and/or NLEB may be determined by conducting either Step 4 (mist netting; see Appendix B) or Step 5 (acoustics; see Appendix C) as outlined below. As long as the project area contains habitat that is appropriate to conduct either survey method, it is the project proponent's choice as to which option to use, for each survey area unit (i.e., ≤123-acre area or 1-km section of linear project). A combined mist-netting and acoustic approach is acceptable; however, the minimum LOE must be met for at least one of the methods. Under no scenario can a project proponent use either mist-netting or acoustic Phase 2 surveys to challenge the other methods results. The USFWS accepts the results of either option and has no preference for methods. The USFWS FO(s) can discuss pros and cons of different approaches depending on project sponsor needs and project-specific habitat conditions. For example, a project area may not have suitable conditions for a mist net survey and an acoustic survey may be the only appropriate method for establishing presence/probable absence. It is up to the surveyor to determine whether the habitat on-site has the appropriate habitat for the survey method chosen prior to the survey and to coordinate with the FO(s) if issues arise with the method chosen and need to be reconsidered.

However, acoustics at the Phase 2 level of effort (LOE) (or otherwise agreed to with the USFWS FO) may be used as a coarse screening tool for conducting subsequent mist-netting at the Phase 2 LOE. For example, if NO high frequency (HF) calls (≥35 kHz) are detected, then no netting is required within that 123-acre (non-linear) or 1-km (linear) survey area due to the probable IBAT and/or NLEB absence. If ANY HF calls are detected, then mist-net at the Phase 2 LOE. Any project study plan that includes use of both acoustics and netting needs to be written clearly to avoid potential misunderstandings between the project proponent and the USFWS FO.

Also, Phase 2 acoustic results should be used to inform whether, when, and where to conduct any optional Phase 3 mist-netting. In this case, acoustics is the P/A method and if probable presence is detected (HF screen, automated/MLE, or manual vetting), then IBAT and/or NLEB probable presence is established. Negative results from follow-up mist-netting (at any LOE) does not refute a previously established positive acoustic result. The goal of Phase 3 netting is simply to verify where IBAT and/or NLEB(s) are active and to capture and track individuals to document roost trees and population size to further inform consultation or coordination under the ESA.

The summer survey season is from 15 May through 15 August¹⁴ for either survey option. All presence/absence surveys should be completed by August 15 unless otherwise indicated by USFWS FO¹⁴. The minimum prescribed survey level of effort for any given survey area unit (i.e., ≤123-acre area or 1-km section of linear project) **cannot** be completed in a single calendar night regardless of which survey method (netting or acoustic) is used (i.e., minimum survey effort must be spread over at least 2 calendar nights with suitable weather conditions). If netting is chosen as the preferred P/A

¹³ NOTE: acoustic and/or mist-net surveys should be conducted in the best suitable habitat possible for each survey type to increase the likelihood of detecting/capturing IBAT and/or NLEB. In some cases, the most suitable habitat for effectively conducting surveys may occur outside a project site boundary and may be sampled if landowner permission is available. For projects with multiple survey areas (e.g., >123 acres or >1 km), survey methods may be interchanged. For example, acoustics could be used for one 123-acre survey area and netting could be used for another 123-acre area.

¹⁴ With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15. If tracking is proposed, surveys should be scheduled so that tracking is concluded prior to August 15.

method and an IBAT **and/or NLEB** is captured, then surveyors may immediately begin Phase 4/radio-tracking. Project proponents must decide whether they will proceed to Phase 4 in coordination with the USFWS FO before any mist netting occurs. Submit Phase 2 study plans to USFWS FO prior to conducting surveys **for their review and site-specific authorization**.

Step 4. Conduct Mist-Netting Surveys following IBAT Recovery Unit-based and/or NLEB Protocols¹⁵

(See Figures 1 - 4 and Appendix B)

Northeast and Appalachia IBAT Recovery Units (CT, DE, MA, MD, NC, NJ, PA, eastern TH, WV, VA, VT):

Linear projects: a minimum of 10 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 42 net nights per 123 acres (0.5 km²) of suitable summer habitat.

For example:

- 7 sites, 2 nets/site for 3 calendar nights = 42 net nights
- 7 sites, 3 nets/site for 2 calendar nights = 42 net nights
- 3 sites, 2 nets/site for 7 calendar nights* = 42 net nights

The sampling period for each net shall begin at sunset¹⁶ and continue for at least 5 hours (longer survey periods may also improve success).

*Maximum of 3 nights of consecutive netting at any given net location. After 2 consecutive nights of netting at the same location **without capturing target species**, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of IBAT(s), then no further summer surveys are recommended¹⁷.
- a) If capture of IBAT(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO.

Midwest and Ozark-Central IBAT Recovery Units (AL, AR, IA, IL, IN, GA, KY, MI, MO, MS, OH, OK, central & western TN, and Lee County, VA):

¹⁵ The IBAT populations in the Northeast and Appalachia Recovery Units have been most heavily impacted by white-nose syndrome to date; therefore, we recommend higher survey effort when compared to the Midwest and Ozark-Central Recovery Units. We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Level of effort is based on detection probabilities and occupancy estimates that were derived from past survey efforts that used the same acreage threshold. Level of effort is designed to reach 90% confidence in negative survey results (see Niver et al. 2014).

¹⁶ Surveys may need to start a little earlier or later than official sunset times (i.e., at “dusk”) in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>

¹⁷ NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase “no further summer surveys are recommended” occurs within this document, the USFWS FO(s) is in affect assuming probable absence of IBAT **and/or NLEB**.

Linear projects: a minimum of 2 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km²) of suitable summer habitat.

For Example:

- 3 sites, 1 net/site for 3 calendar nights = 9 net nights
- 1 site, 3 nets/site for 3 calendar nights = 9 net nights

The sampling period for each net shall begin at sunset¹⁸ and continue for at least 5 hours (longer survey periods may also improve success).

*Maximum of 3 nights of consecutive netting at any given net location. After 2 consecutive nights of netting at the same location without capturing target species, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of IBAT(s), then no further summer surveys are recommended.
- b) If capture of IBAT(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO.

Range-wide NLEB Mist-netting LOE:

Linear projects: a minimum of 4 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 16 net nights per 123 acres (0.5 km²) of suitable summer habitat.

For Example:

- 4 sites, 2 net/site for 2 calendar nights = 16 net nights
- 8 sites, 2 nets/site for 1 calendar nights = 16 net nights

The sampling period for each net shall begin at sunset¹⁹ and continue for at least 5 hours (longer survey periods may also improve success).

*Maximum of 3 nights of consecutive netting at any given net location. After 2 consecutive nights of netting at the same location without capturing target species, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of NLEB(s), then no further summer surveys are recommended.

¹⁸ Surveys may need to start a little earlier or later than official sunset times (i.e., at “dusk”) in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>

¹⁹ Surveys may need to start a little earlier or later than official sunset times (i.e., at “dusk”) in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>

- b) If capture of NLEB(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO.

OR

Step 5. Conduct Acoustic Surveys²⁰ (see Figures 1 - 4 and Appendix C)

IBAT Acoustic LOE (Range-wide)

Linear projects: a minimum of 4 detector nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 10 detector nights per 123 acres (0.5 km²) of suitable summer habitat.

At least 2 detector locations per 123 acre "site" shall be sampled until at least 8 detector nights has been completed over the course of at least 2 calendar nights (may be consecutive).

For example:

- 5 detectors for 2 nights each (can sample the same location or move within the site)
- 2 detectors for 5 nights each (can sample the same location or move within the site)
- 1 detector for 10 nights (must sample at least 2 locations and move within the site – we recommend evenly distributing LOE among locations)

NLEB Acoustic LOE (Range-wide)

Linear projects: a minimum of 4 detector nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 14 detector nights per 123 acres (0.5 km²) of suitable summer habitat.

At least 2 detector locations per 123 acre "site" shall be sampled until at least 14 detector nights has been completed over the course of at least 2 calendar nights (may be consecutive).

For example:

- 4 detectors for 3 nights and 1 detector for 2 nights each (can sample the same location or move within the site)
- 2 detectors for 7 nights each (can sample the same location or move within the site)

²⁰ Acoustic surveys are available as a Presence/Absence option throughout the range of both species (i.e., Northeast, Appalachian, Midwest, and Ozark-Central IBAT Recovery Units; range-wide NLEB).

- 1 detector for 14 nights (must sample at least 2 locations and move within the site – we recommend evenly distributing LOE among locations)

The acoustic sampling period for each site must begin at sunset²¹ and end at sunrise each night of sampling. It is the responsibility of the surveyor to ensure detector functioned for the set recording duration.

NOTE: Optional coarse screening - for high frequency (HF) or myotid calls (depending on available H/L frequency filters) or Proceed to Step 6

- i) If no positive detection of HF calls²² (≥ 35 kHz) or myotid calls, no further summer surveys recommended.
- ii) If positive detection of HF or myotid calls, then
 - (a) proceed to Step 6 for further acoustic analysis; **OR**
 - (b) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
 - (c) assume presence and proceed to **Phase 3**.

Step 6. Conduct Automated Acoustic Analyses for each site that had HF or Myotid calls from Step 5 or ALL sites if step 5 was not conducted.

(NOTE: cannot skip this step and proceed directly to Step 7)

Use **one or more** of the currently available ‘approved’ acoustic bat ID programs²³ (use most current approved software versions available and manufacturer’s recommended settings for IBAT and/or NLEB P/A surveys). ‘Candidate’ programs are not yet approved by USFWS for stand-alone use for P/A surveys but may be used in conjunction with one or more of the approved programs. Include your plans for which specific software program(s) you will use in your survey study plan and submit for USFWS FO(s) review prior to conducting surveys. Beginning with acoustic data from night one at each acoustic site, run each night’s data for each site through your chosen ID program(s). Review results by site by night from each acoustic ID program used²⁴.

- a) If IBAT and NLEB presence is considered unlikely by all the approved and candidate program(s) used in analysis, then no further summer surveys recommended.
- b) If IBAT and/or NLEB presence is considered likely at one or more sites on one or more nights by any approved or candidate program(s) used in analysis, then
 - i) proceed to Step 7 for qualitative ID; **OR**
 - ii) assume presence of IBAT and/or NLEB and coordinate with the USFWS FO(s); **OR**
 - iii) assume presence and proceed to **Phase 3**.

²¹ Surveys may need to start a little earlier or later than official sunset times (i.e., at “dusk”) in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>

²² HF calls are defined as individual call pulses whose minimum frequency is ≥ 35 kHz.

²³ Approved and candidate programs are listed on the USFWS website provided in the intro.

²⁴ The approved acoustic identification programs all have implemented a maximum likelihood estimator (MLE) at this time. If the analysis of collected calls at a given site on a given night results in the probable presence of IBAT or NLEB with high levels of certainty ($P < 0.05$), then select one of the options available in Step 6b.

Step 7. Conduct Qualitative Analysis of Calls.

At a minimum, for each detector site/night a program considered IBAT and/or NLEB presence likely (from MLE results) review all files (including no IDs) from that site/night. Qualitative analysis²⁵ (i.e., manual vetting) must also include a comparison of the results of each acoustic ID program by site and night (see Reporting Requirements in Appendix C).

- a) If no visual confirmation of probable IBAT and NLEB, then no further summer surveys recommended²⁶.
- b) If visual confirmation of probable IBAT and/or NLEB, then
 - i) assume presence of IBAT and/or NLEB and coordinate with the USFWS FO(s); **OR**
 - ii) assume presence and proceed to **Phase 3**.

PHASE 3. CONDUCT MIST-NETTING SURVEYS TO CAPTURE INDIANA and/or NORTHERN LONG-EARED BATS.

If netting was not conducted as the P/A method, then netting may be conducted in Phase 3 to capture and characterize (e.g., sex, age, reproductive condition) the IBAT and/or NLEB that are present in an area and to facilitate Phase 4 efforts. We encourage working with the FOs to develop Phase 3 netting plans based on best available information (e.g., positive acoustic locations). There are no minimum requirements for this phase as this is not a P/A phase.

- a) If no IBAT and/or NLEB are captured, then coordinate with the USFWS FO.
- b) If IBAT and/or NLEB are captured, then proceed to **Phase 4**.

PHASE 4. CONDUCT RADIO-TRACKING AND EMERGENCE SURVEYS (See Appendices D and E).

PHASE 5. CONDUCT POTENTIAL HIBERNACULA SURVEYS (See Appendix H)

²⁵ Qualitative analysis of each acoustic site and night with probable detections of IBAT or NLEB during Step 6 must include the entire night's high-frequency call data and not just those files making it through the acoustic analysis tools as probable IBAT or NLEB.

²⁶ If you identify any suspected mis-identifications from programs, the Service will share those results with the software manufacturer(s) and the USGS to assist with future improvements and testing of software.

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TABLE 1. Standard survey seasons for conducting P/A surveys for IBAT and/or NLEB.

IBAT & NLEB Survey Seasons	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Internal (IBAT) Winter Hibernacula Surveys ^{1,2} Acceptable survey window (1 Jan. - 28 Feb.) Traditional survey window of known sites (15 Jan. - 15 Feb.)												
Spring & Fall Surveys at Entrances of Potential Hibernacula ^{3,4} Acceptable survey window (1 - 21 Apr. & 15 Sep. - 31 Oct.)												
Summer Surveys of Suitable Summer Habitat ⁵ Acceptable survey window (15 May - 15 Aug.) Optimal survey window (1 Jun. - 31 Jul.) ^{6,7}												

¹ visual and photographic surveys conducted within known and/or potential hibernacula (if deemed safe to enter).

² internal winter hibernacula surveys are seldom appropriate for NLEB as they typically fail to reliably detect and accurately enumerate the species when present.

³ conducted using harp traps or mist nets at cave/mine entrances.

⁴ if State/USFWS FO approve, spring and fall survey windows can "drift" a bit earlier or later to better accommodate prevailing weather patterns and/or climate conditions in the location of the proposed survey. For example, the fall survey window in northern portions of the IBAT or NLEB range may begin on or after 1 Sep. and end prior to 31 Oct. pending local State and FO approval. Likewise, if agencies approve, spring surveys of potential hibernacula may be pushed back/extended a few days or longer due to an extended period of unseasonably cold spring weather.

⁵ conducted using mist nets or acoustic detectors deployed within suitable flight corridors and foraging areas.

⁶ the middle of the maternity season (June and July) is considered by many to be the best or "optimal" time to capture resident bats.

⁷ due to concerns with transmission of white-nose syndrome, some USFWS FO(s) and state natural resource agencies have delayed the start of the bat summer field survey season/mist-netting until June 1. Surveyors/applicants should always coordinate with local USFWS FO(s) and state natural resource agencies to confirm acceptable dates before beginning surveys.

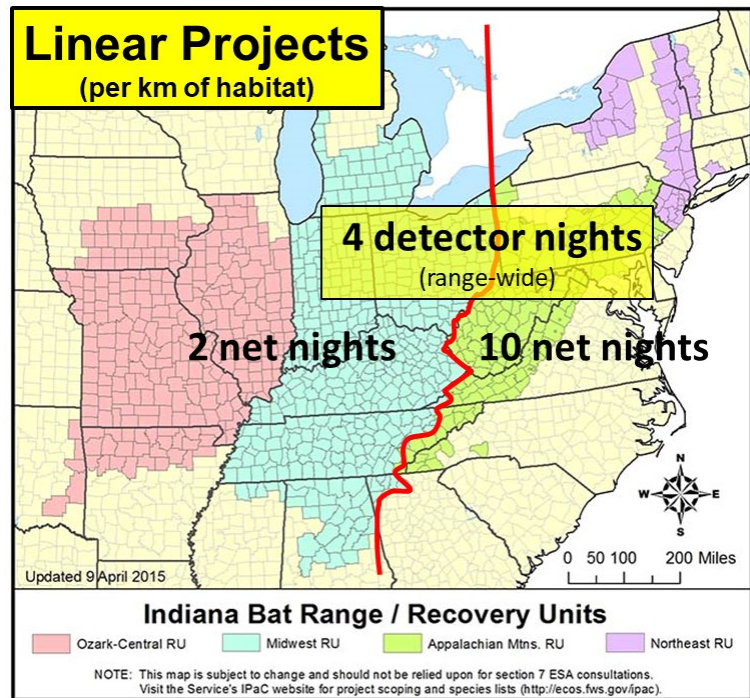


FIGURE 1. Minimum survey level of effort for mist netting and/or acoustic options for linear projects by IBAT recovery unit.

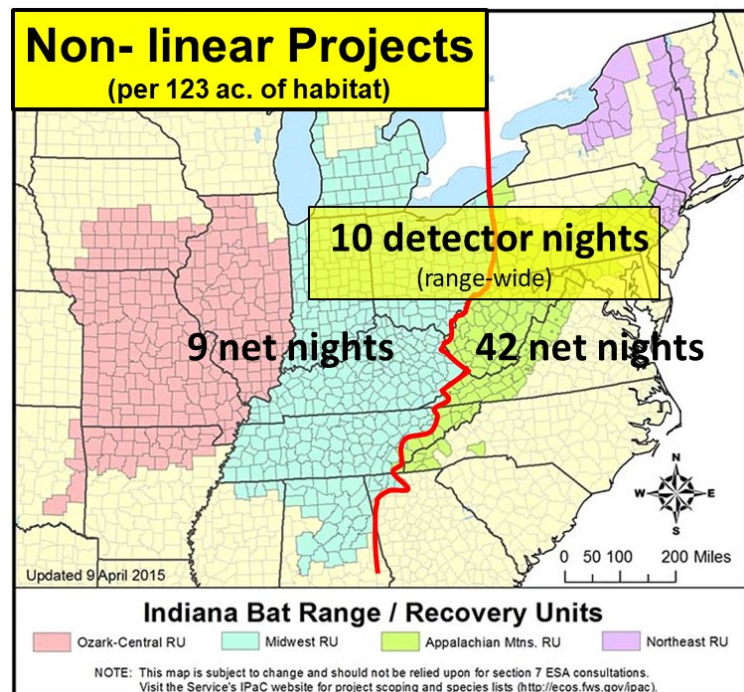


FIGURE 2. Minimum survey level of effort for mist netting and/or acoustic options for non-linear projects by IBAT recovery unit.

FIGURE 3. Minimum survey level of effort for mist netting and/or acoustic options for linear projects targeting NLEB.

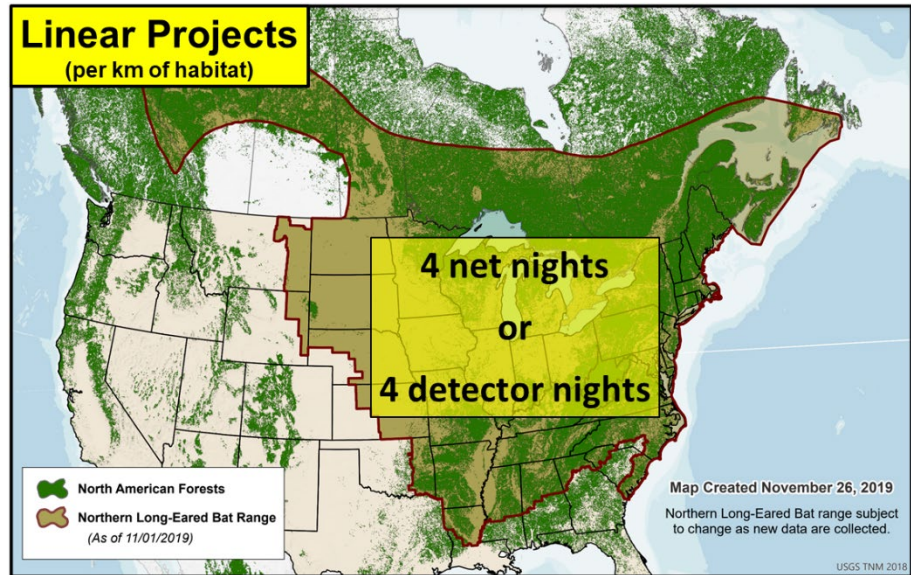


FIGURE 4. Minimum survey level of effort for mist netting and/or acoustic options for non-linear projects targeting NLEB.

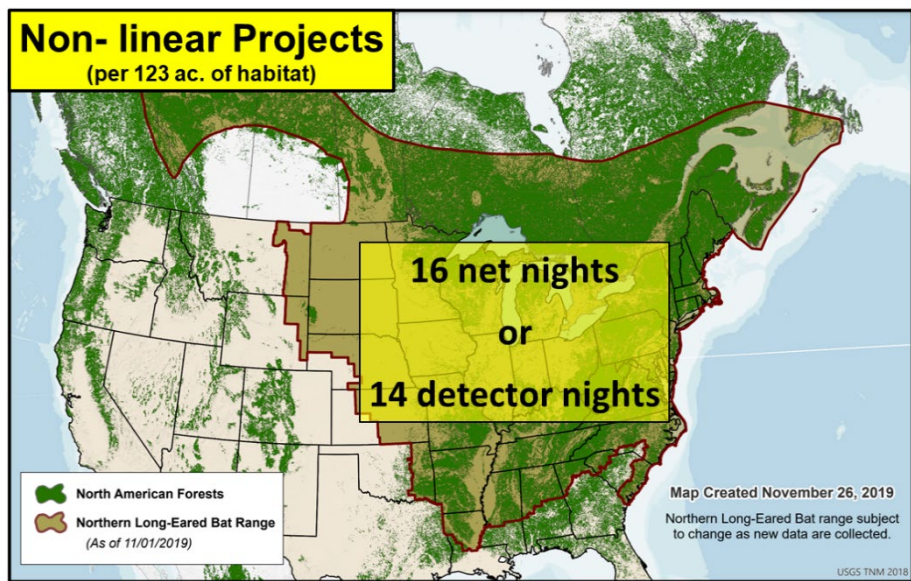


TABLE 2. Summary of current survey LOEs for IBAT and NLEB.

Species	Region	MIST NETTING (net nights)		ACOUSTICS (detector nights)	
		Linear (per km)	Non-Linear (per 123 ac.)	Linear (per km)	Non-Linear (per 123 ac.)
IBAT	Northeast & Appalachia RUs	10	42	4	10
	Midwest & Ozark- Central RUs	2	9		
NLEB	Range-wide	4	16	4	14

APPENDIX A: PHASE 1 HABITAT ASSESSMENTS

Summer habitat and potential hibernacula assessments are Step 2 of Phase 1- Initial Project Screening. The information below is provided to assist applicants, consultants, and/or project proponents (hereinafter termed the “applicant”) in establishing whether surveys for IBAT and/or NLEB should be conducted. As a reminder, the first step for determining presence of IBAT and/or NLEB at a given site is to determine whether there is any existing occurrence data available for the vicinity of the project from the local USFWS FO. This step can be conducted remotely via a desktop analysis (e.g., use of aerial photography to assess the potential presence of suitable summer habitat). The applicant is responsible for developing and providing sufficient information as to whether suitable summer habitat and/or potential hibernacula exist within a proposed project area. If suitable habitat is present, the applicant should calculate the amount and submit this to the USFWS FO(s) and determine the need for any presence/absence surveys (Phase 2). **NOTE:** if IBAT and/or NLEB are present or assumed to be present during any phase, more detailed habitat information may be necessary to adequately assess the potential for impacts (see attached example Bat Habitat Assessment Datasheet). If no suitable habitat is present or it is determined through discussions with USFWS FO(s) that no adverse effects are anticipated from the proposed project, no surveys are recommended to assess risk during the summer. Habitat assessments for IBAT and/or NLEB can be completed any time of year and applicants are encouraged to submit results and proposed Phase 2 study plans well in advance of the summer survey season.

PERSONNEL

Habitat assessments should be completed by individuals with a natural resource degree or equivalent work experience.

DEFINITION FOR POTENTIALLY SUITABLE INDIANA BAT SUMMER HABITAT

Suitable summer habitat for IBAT consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats²⁷ such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥ 5 inches dbh²⁸ (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat.

²⁷ Non-forested habitats typically should be excluded from acreages used to establish a minimum level of survey effort for Phase 2 surveys.

²⁸ While trees < 5 inches (< 12.7 cm) dbh that have exfoliating bark, cracks, crevices, and/or hollows may have some potential to be male IBAT summer roosting habitat, the USFWS does not consider early successional, even-aged stands of trees < 5 inches dbh to be suitable roosting habitat for the purposes of this guidance. Suitable *roosting* habitat is defined as forest patches with trees of 5-inch (12.7 cm) dbh or larger. However, early successional habitat with small diameter trees may be used as foraging habitat by IBATs. Therefore, a project that would remove or otherwise adversely affect ≥ 20 acres of early successional habitat containing trees between 3 and 5 inches (7.6-12.7 cm) dbh would require coordination/consultation with the USFWS FO to ensure that associated impacts would not rise to the level of take. The USFWS may request P/A surveys if > 20 acres of early successional habitat were proposed for removal.

Indiana bats have also been observed roosting in human-made structures, such as bridges and bat houses (artificial roost structures); therefore, these structures should also be considered potential summer habitat²⁹. We recommend that project proponents or their representatives coordinate with the appropriate USFWS Field Office to more clearly define suitable habitat for their region as some differences in state/regional suitability criteria may be warranted (e.g., high-elevation areas may be excluded as suitable habitat in some states).

Examples of unsuitable habitat:

- Individual trees that are greater than 1,000 feet from forested/wooded areas;
- Trees found in highly developed urban areas (e.g., street trees, downtown areas); and
- A pure stand of less than 3-inch dbh³⁰ trees that are not mixed with larger trees.

DEFINITION FOR POTENTIALLY SUITABLE NORTHERN LONG-EARED BAT SUMMER HABITAT

Suitable summer habitat for the NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥ 3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. [NLEBs are nocturnal foragers and use hawking \(catching insects in flight\) and gleaning \(picking insects from surfaces\) behaviors in conjunction with passive acoustic cues \(Nagorsen and Brigham 1993, p. 88; Ratcliffe and Dawson 2003, p. 851\). NLEB seem to prefer intact mixed-type forests with small gaps \(i.e., forest trails, small roads, or forest-covered creeks\) in forest with sparse or medium vegetation for foraging and commuting rather than fragmented habitat or areas that have been clear cut \(USFWS 2015, p. 17992\).](#) Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat³¹. The NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat³². NLEBs typically

²⁹ If human-made structures are present within your project area and are proposed to be removed or modified, see Appendix E (Emergence Surveys) and then coordinate with the local USFWS FO(s) regarding how to determine presence/absence.

³⁰ Suitable *roosting* habitat is defined as forest patches with trees of 5-inch (12.7 cm) dbh or larger. However, early successional habitat with small diameter trees may be used as foraging habitat by IBAT. Therefore, a project that would remove or otherwise adversely affect ≥ 20 acres of early successional habitat containing trees between 3 and 5 inches (7.6-12.7 cm) dbh would require coordination/consultation with the USFWS FO to ensure that associated impacts would not rise to the level of take. The USFWS may request P/A surveys if >20 acres of early successional habitat were proposed for removal.

³¹ This number is based on observations of bat behavior indicating that such an isolated tree (i.e., ≥ 1000 feet) would be extremely unlikely to be used as a roost. This distance has also been evaluated and vetted for use for the NLEB. See the "Indiana bat Section 7 and Section 10 Guidance for wind Energy Projects," question 33, found [on the USFWS website provided in the intro](#).

³² Trees found in highly-developed urban areas (e.g., street trees, downtown areas) are extremely unlikely to be suitable habitat.

occupy their summer habitat from mid-May through mid-August each year³³ and the species may arrive or leave some time before or after this period.

Examples of unsuitable habitat:

- Individual trees that are greater than 1,000 feet from forested/wooded areas;
- Trees found in highly-developed urban areas (e.g., street trees, downtown areas); and
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees.

SUBMISSION OF PHASE 1 HABITAT ASSESSMENT & PHASE 2 AND/OR PHASE 5 STUDY PLAN (IF NEEDED)

If a proposed project may affect (positively or negatively) IBAT and/or NLEB and the conditions outlined in Step 3 a or b are not met, a habitat assessment report should be submitted to the appropriate USFWS FO(s) (and/or to the lead Federal Action Agency, such as the USACE, as appropriate) along with a draft study plan for the Phase 2 (acoustic or netting) and/or Phase 5 (potential hibernaculum) survey(s) (if suitable habitat(s) is present). Complete Phase 1 reports will include the following:

1. Full names and relevant titles/qualifications of individuals (e.g., John E. Smith, Biologist II, State University, B.S. Wildlife Science 2007) completing the habitat assessment and when the assessment was conducted
2. A map and latitude/longitude or UTM clearly identifying the project location (or approximate center point) and boundaries
3. A detailed project description (if available)
4. Documentation of any known/occupied spring staging, summer, fall swarming, and/or winter habitat for IBAT and/or NLEB within or near the project area
5. A description of methods used during the habitat assessment
6. A summary of the assessment findings and a completed Bat Summer Habitat Assessment Datasheet (see example below; use of this datasheet is optional)
7. Other information that may have a bearing on use of the project area (e.g., presence of fall or winter habitat [caves, crevices, fissures, or sinkholes, or abandoned mines of any kind], bridges and other non-tree potential summer roosts.)
8. A Phase 1 Habitat Assessment on all potential hibernacula that could be affected by the proposed project (see Appendix H for additional instructions for completing this assessment and sample datasheet), if necessary
9. Any other information requested by the local USFWS FO(s) related to the project

In addition, Phase 2 Study Plans should contain the following:

1. A statement as to which type of P/A surveys will be conducted (i.e., mist netting or acoustic surveys) and how the proposed survey level of effort (i.e., total # of net nights or detector nights) was calculated/determined;

³³ Exact dates vary by location., with NLEBs typically being found earlier in spring at lower latitudes

APPENDIX A: PHASE 1 HABITAT ASSESSMENTS

2. A map depicting the proposed number of survey sites (mist netting or acoustic) and their tentative distribution throughout the project area; **NOTE: If a site has never been visited or confirmed to have suitable mist netting habitat, it is the surveyor's responsibility to contact the USFWS FO(s), and come up with an alternative plan, such as conducting an acoustic survey. The USFWS FO may reject mist net surveys that lead to false negative results.**
3. A tentative list of surveyor names and copies of relevant federal permits (if applicable);
4. A tentative survey schedule (e.g., start date, duration, end date);
5. For mist netting surveys with planned Phase 4 radio-tracking: the approximate number and distribution of transmitters (e.g., prioritization of sex/age, maximum number per site) and a request that bats targeted for tracking may be held for up to 30 minutes³⁴ to allow for application of transmitters; and
6. For acoustic surveys: information on which specific program(s) will be used and what level of acoustic analyses will be conducted.

If **potential hibernacula** are identified, then Phase 5 Study Plans should contain the following:

1. A completed USFWS Project Proposal Form (see Appendix H);
2. A map depicting all potential hibernacula identified and their tentative distribution throughout the project area;
3. A written justification if an entrance(s) survey is proposed instead of an internal survey;
4. A written justification if mist-nets are proposed instead of harp traps; and
5. For surveys of entrances that are inter-connected and unfeasible to survey on the same night, a proposed modified method to complete the survey (see Phase 2, #5 in Appendix H).

³⁴ Current standard federal Section 10 bat permit conditions require prior written approval from the Field Supervisor in the USFWS FO(s) if capture times may exceed 30 minutes.

APPENDIX A: PHASE 1 HABITAT ASSESSMENTS

BAT HABITAT ASSESSMENT DATASHEET

Project Name: _____ Date: _____

Township/Range/Section: _____

Lat Long/UTM/ Zone: _____ Surveyor: _____

Brief Project Description

Project Area				
	Total Acres	Forest Acres		Open Acres
Project				
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types	
Pre-Project	Post-Project

Landscape within 5 mile radius
Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

Proximity to Public Land
What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Use additional sheets to assess discrete habitat types at multiple sites in a project area
 Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
 A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____

Water Resources at Sample Site				Describe existing condition of water sources:
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	
Pools/Ponds (# and size)	Open and accessible to bats?			
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50%)	Midstory (20-50%)	Understory (<20%)	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Dominant Species of Mature Trees				
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
No. of Suitable Snags				

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____

IS THE HABITAT SUITABLE FOR NORTHERN LONG-EARED BATS? _____

Additional Comments:

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

APPENDIX B: PHASE 2 OR PHASE 3 MIST-NETTING

Mist-netting can be used as a presence/probable absence method (Phase 2 surveys) or it can be conducted for the purpose of attempting to capture IBAT [and/or NLEB](#) after detection during acoustic presence/probable absence surveys (Phase 3 surveys). The same recommendations (e.g., season, personnel, equipment, net placement, checking nets) apply for either use of mist-netting surveys.

SUMMER MIST-NETTING SEASON: May 15³⁵ – August 15³⁶

Capture of reproductive adult females (i.e., pregnant, lactating, or post-lactating) and/or young of the year during May 15 – August 15 confirms the presence of a maternity colony in the area. Since adult males and non-reproductive females have commonly been found summering with maternity colonies, radio-tracking results will be relied upon to help determine the presence or absence of a maternity colony or large concentrations of bats in the area when only males and/or non-reproductive females are captured.

PERSONNEL

A qualified biologist(s)³⁷ must (1) select/approve mist-net set-ups in areas that are most suitable for capturing IBAT [and/or NLEB](#), (2) be physically present at each mist-net site throughout the survey period, and (3) confirm all bat species identifications. This biologist may oversee other biological technicians and manage mist-net set-ups in close proximity to one another if the net-check timing (i.e., every 10 minutes) can be maintained while **walking** between nets.

COORDINATION WITH USFWS FO(s)

If not already required by federal permit, we recommend that applicants submit a draft study plan for all survey phases to the USFWS FO(s) for review and approval (See Appendix A for guidance on submitting a draft study plan).

EQUIPMENT

Use the finest, lowest visibility mesh mist-nets commercially available, as practicable. Currently, the finest net on the market is 75 denier, 2 ply, denoted 75/2 (Arndt and Schaez 2009); however, the 50

³⁵ Due to concerns with transmission of white-nose syndrome, some USFWS FO(s) and state natural resource agencies have delayed the start of the bat summer field survey season/mist-netting until June 1. Surveyors/applicants should always coordinate with local USFWS FO(s) and state natural resource agencies before beginning surveys.

³⁶ With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15. [If tracking is proposed, surveys should be scheduled so that tracking is concluded prior to August 15.](#)

³⁷ A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for IBAT [and NLEB](#) in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to net and handle IBAT [and/or NLEB](#). Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

denier nets are still acceptable for use currently. The finest mesh size available is approximately 1½ inches (38 millimeters). No specific hardware is required. There are many suitable systems of ropes and/or poles to hold nets. The system of Gardner et al. (1989) has been widely used. See NET PLACEMENT for minimum net heights, habitats, and other netting requirements that affect the choice of hardware.

To minimize potential for disease transmission, any equipment that comes in contact with bats should be kept clean and disinfected, following approved protocols; this is particularly a concern relative to white-nose syndrome (WNS). Disinfection of equipment to avoid disease transmission (e.g., WNS) is required; protocols are posted at <http://www.whitenosesyndrome.org/>. Federal and state permits may also have specific equipment restrictions and disinfection requirements.

MINIMUM PRESENCE/ABSENCE MIST-NETTING LEVEL OF EFFORT (PHASE 2)

The level of netting survey effort required for a non-linear project will be dependent upon the overall acreage of suitable habitat that may be impacted by the action (directly or indirectly). To determine the survey effort, quantify the amount of suitable summer habitat within the project area. **NOTE:** for projects where other impacts than tree removal are likely (e.g., collision), ensure that presence/probable absence surveys are designed to cover all suitable habitat within the entire project area (where exposure to any kind of impacts may be anticipated) and NOT just the locations where tree removal is planned. Additional guidance for linear project is in Appendix F.

Conduct Mist-Netting Surveys following **IBAT Recovery Unit-based and/or NLEB Range-wide Level-of-Effort Recommendations**³⁸ (See Figures 1 - 4)

Northeast and Appalachia IBAT Recovery Units (CT, DE, MA, MD, NC, NJ, NY, PA, eastern TN, WV, VA, VT):

Linear projects: a minimum of 10 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 42 net nights per 123 acres³⁹ (0.5 km²) of suitable summer habitat.

For example:

- 7 sites⁴⁰, 2 nets⁴¹/site for 3 calendar nights = 42 net nights
- 7 sites, 3 nets/site for 2 calendar nights = 42 net nights
- 3 sites, 2 nets/site for 7 calendar nights* = 42 net nights

³⁸ The IBAT populations in the Northeast and Appalachia Recovery Units (RUs) have been more heavily impacted by white-nose syndrome; therefore, we recommend higher survey effort in these RUs than the Midwest and Ozark-Central RUs.

³⁹ We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Detection probabilities and occupancy estimates were derived from past survey efforts that used the same acreage threshold (see Niver et al. 2014).

⁴⁰ A site is defined as a geographic area to be sampled. It can include one or more nets that can be managed by one Qualified Biologist.

⁴¹ A net is defined as any combination of individual panels and poles (e.g., single, double, triple high) to fill the area (e.g., corridor) being sampled.

Maximum of 3 nights of consecutive netting at any given net location. After 2 consecutive nights of netting at the same location without capturing target species, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of IBAT(s), then no further summer surveys are recommended⁴².
- b) If capture of IBAT(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

Midwest and Ozark-Central IBAT Recovery Units (AL, AR, GA, IA, IL, IN, KY, MI, MO, MS, OH, OK, and central & western TN):

Linear projects: a minimum of 2 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km²) of suitable summer habitat.

For Example:

- 3 sites, 1 net/site for 3 calendar nights = 9 net nights
- 1 site, 3 nets/site for 3 calendar nights = 9 net nights

Maximum of 3 nights of consecutive netting at any given net location. After 2 consecutive nights of netting at the same location without capturing target species, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of IBAT(s), then no further summer surveys are recommended.
- b) If capture of IBAT(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

Range-wide NLEB Mist-netting LOE:

Linear projects: a minimum of 4 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 16 net nights per 123 acres (0.5 km²) of suitable summer habitat.

For Example:

- 4 sites, 2 net/site for 2 calendar nights = 16 net nights
- 8 sites, 2 nets/site for 1 calendar nights = 16 net nights

⁴² NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase “no further summer surveys are recommended” occurs within this document, the USFWS FO(s) is in affect assuming probable absence of IBAT and/or NLEB during the summer.

*Maximum of 3 nights of consecutive netting at any given net location. After 2 consecutive nights of netting at the same location without capturing target species, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of NLEB(s), then no further summer surveys are recommended.
- b) If capture of NLEB(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO.

MIST-NETTING SURVEYS TO CAPTURE INDIANA AND/OR NORTHERN LONG-EARED BATS AFTER ACOUSTICS WERE USED AS P/A METHOD (PHASE 3)

If netting was not conducted as the P/A method, then netting may be conducted to capture and characterize (e.g., sex, age, reproductive condition) the IBAT and/or NLEB (documented through the Phase 2 acoustic P/A survey) present in an area and to facilitate radio-tracking (Phase 4) efforts. We encourage working with the FO(s) to develop Phase 3 netting plans based on best available information (e.g., positive acoustic locations). There are no minimum requirements for this phase as this is not a P/A phase.

- a) If no IBAT and/or NLEB are captured, then coordinate with the USFWS FO.
- b) If IBAT or NLEB are captured, then proceed to **Phase 4** as previously decided in coordination with the FO(s).

NET PLACEMENT

Indiana and Northern long-eared bats typically forage in habitats that do not completely overlap (see species-specific habitat definitions in Appendix A) therefore, net placement should reflect these differences when targeting both species. Net placement along potential travel corridors (e.g., streams, logging trails, roads) as well as other edge habitats (e.g., other water sources, field edges) have traditionally been the most common habitats sampled due to their ease of access. However, non-traditional net placement in interior forest habitats may also be productive, especially for NLEB and IBAT (Carroll et al. 2002). Because the best survey sites for capturing bats may fall outside of a project footprint, the surveyor and project proponent should coordinate with the appropriate USFWS FO(s) to establish a project-specific maximum net placement distance from the centerline or project boundary prior to initiating surveys.

When sampling traditional travel corridors with defined edges, place nets approximately perpendicular to the edge and, ideally within bends or curves in the corridor that reduces bat reaction time to avoid capture. Nets should fill the corridor from side to side, extending beyond the corridor boundaries to prevent bats from flying along the edges of the corridor and avoiding the nets, and from water (or ground) level up to the overhanging canopy. Surveyed corridors must have overhanging branches, most often within 9 m of the ground, that force bats to fly downward and into the nets. Nets of varying widths and heights may be used as the situation dictates. A typical set is at least 5 m to 9 m high consisting of two or more nets stacked on top one another (without gaps) and from 6 m to 18 m wide. If netting over water, ensure there is enough space between the net and the

water so that captured bats will not get wet. Justification for placing nets perpendicular to a forest edge, or any site, without overhanging vegetation (i.e., no funneling effect) should be specifically provided in the survey report or ideally discussed with the FO(s) prior to sampling.

Because a) NLEB is a clutter-adapted gleaning species (see definition of suitable summer habitat in Appendix A) or b) a project area may not have well-defined travel corridors, surveyors may sample more non-traditional habitat types (e.g., small forest openings, ponds, interior forest). The typical equipment and placement described in the section above may be inadequate when netting for IBAT and NLEB in these non-traditional locations, where a travel corridor is less obvious. This would require innovation on the part of the surveyor (see Humphrey et al. 1968). For example, net placement in interior forests should be a minimum of 50 m from edge habitats and should represent a variety of understory cover and canopy closure (Carroll et al. 2002). Ponds and large water-filled road ruts can be productive places to net when other water sources are limited. See Kiser and MacGregor (2005) for additional discussion about net placement.

Although no minimum spacing between mist-nets is being specified, surveyors should attempt to evenly distribute net set-ups throughout suitable habitat and must provide written justification in their report if net set-ups were not distributed throughout suitable habitat (i.e., why were they clumped?). Surveys conducted for northern long-eared bat should include both traditional and non-traditional (as described above) net placements within suitable habitat when present. Net set-ups can be repeatedly sampled throughout the project, but generally no more than 2-3 nights at a single location is recommended. In addition, changing locations within a project area may improve capture success (see Robbins et al. 2008; Winhold and Kurta 2008). Photo-document placement of nets.

SURVEY PERIOD

The survey period for each net shall begin at sunset⁴³ and continue for at least 5 hours (longer survey periods may also improve success).

CHECKING NETS

Each net set-up should be checked approximately every 10 minutes (Gannon et al. 2007). If surveyors monitor nets continuously, take care to minimize noise, lights and movement near the nets. Monitoring the net set-up continuously with a bat detector (ideally using ear phones to avoid alerting bats) can be beneficial: (a) bats can be detected immediately when they are captured, (b) prompt removal from the net decreases stress on the bat and potential for the bat to escape (MacCarthy et al. 2006), and (c) monitoring with a bat detector also allows the biologist to assess the effectiveness of each net placement (i.e., if bats are active near the net set-up but avoiding capture), which may allow for adjustments that will increase netting success on subsequent nights. There should be no other disturbance near the nets, other than to check nets and remove bats. Biologists should be prepared to cut the net if a bat is severely entangled and cannot be safely extracted within 3 or 4 minutes (CCAC 2003; Kunz et al. 2009). Capture and handling are stressful for bats. Emphasis should be on minimizing handling and holding bats to as short a time as possible to achieve field study objectives. Indiana and/or northern long-eared bats should not be held for more than 30 minutes after capture,

⁴³ Surveys may need to start a little earlier or later than official sunset times (i.e., at “dusk”) in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>.

unless the individual is targeted for radio-tracking. Bats targeted for radio-tracking should be released as quickly as possible, but no longer than 30 minutes⁴⁴ after capture, or as allowed in federal and state permits. See Kunz and Kurta (1988) for general recommendations for holding bats.

WEATHER, LIGHTING, AND OTHER ENVIRONMENTAL CONDITIONS

Severe weather adversely affects capture of bats. Some IBAT and NLEBs may remain active despite inclement weather and may still be captured while others in the same area become inactive.

Therefore, negative surveys combined with any of the following weather conditions throughout all or most of a sampling period are likely to require an additional night of mist-netting⁴⁵: (a) temperatures that fall below 50°F (10°C)⁴⁶; (b) precipitation, including rain and/or heavy fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/seconds; 3 on Beaufort scale) for 30 or more minutes.

NOTE: Provided that nets are not dripping wet, surveyors can resume netting to meet the minimum 5-hour requirement after short periods of adverse weather. If nets are under good cover, light rain may not alter bat behavior. However, if no bats are being captured during marginal weather, coordinate with the USFWS FO(s).

It is typically best to place net set-ups under the canopy where they are out of moonlight, particularly when the moon is half-full or greater. Net set-ups illuminated by artificial light sources should also be avoided.

The shining of lights, and noise should be kept to a minimum with no smoking around the survey sites. In addition, the use of radios, campfires, running vehicles, punk sticks, citronella candles and other disturbances will not be permitted within 300 feet of mist nets (or acoustic detectors) during surveys.

DOCUMENTATION OF INDIANA AND/OR NORTHERN LONG-EARED BAT CAPTURES

If an IBAT and/or NLEB is captured during mist-netting, protocols for radio-tracking and emergence survey requirements, as provided in Appendix D and E, respectively, should be followed. In addition, the appropriate USFWS FO(s) must be notified of the capture within 48 hours (or in accordance with permit conditions), and the sex and reproductive condition of the bat and GPS coordinates of the capture site should be provided. Ensure GPS coordinates are recorded for each individual net set on datasheets.

⁴⁴ Current standard federal Section 10 bat permit conditions require prior written approval from the Field Supervisor in the USFWS FO(s) if capture times may exceed 30 minutes.

⁴⁵ With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays because of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15. [If tracking is proposed, surveys should be scheduled so that tracking is concluded prior to August 15.](#)

⁴⁶ Overnight survey temperatures may be lower in northern portions of the NLEB range, coordinate with the local USFWS FO in the northern portion of the range for any variation in temperature requirements.

Several species of bats from the genus *Myotis* share common features which can make identification difficult; IBATs and little brown bats (*Myotis lucifugus*) can be particularly difficult to distinguish. Photo documentation of all bats captured and identified as IBAT and/or NLEB and the first 10 little brown bats per project are requested to verify the identifications made in the field.

Photo documentation should include diagnostic characteristics:

- a ¾-view of face showing ear, tragus, and muzzle
- view of calcar showing presence/absence of keel
- a transverse view of toes showing extent of toe hairs

Consider taking short video clips of the bat and its diagnostic features, as videos may also be helpful to later confirm bat identification. If a bat from the genus *Myotis* is captured during mist netting that cannot be readily identified to the species level, then species verification may be attempted through fecal DNA analysis. Collect one or more fecal pellets (i.e., guano) from the bat in question by placing it temporarily in a holding bag (15 minutes is usually sufficient, no more than 30 minutes is recommended). The pellet (or pellets) collected should be placed in a small vial (e.g., 1.5 ml) with silica gel desiccant; pellets from each individual bat should be stored in separate vials and out of direct light. Fees charged by independent laboratories for sequencing fecal DNA samples is generally inexpensive (approx. \$50 per guano sample), however, it has been challenging to identify labs willing to consistently conduct these analyses. Any additional information and a list of available laboratories will be made available on the IBAT webpage on the USFWS's Region 3 website (<http://www.fws.gov/midwest/Endangered/mammals/inba/>).

SUBMISSION OF MIST-NETTING RESULTS

Provide results of netting surveys to the appropriate USFWS FO(s) in accordance with previously agreed upon⁴⁷ timeframes and formats⁴⁸. If IBAT and/or NLEB are captured, this report should also include the results of subsequent radio-tracking and emergence counts. Reports should include the following:

1. Copy of prior phase reports (if not previously provided).
2. Explanation of any modifications from original survey plan (e.g., altered net locations).⁴⁹
3. Description of net locations (including site diagrams), net set-ups (include net heights), survey dates, duration of surveys, weather conditions, and a summary of findings.
4. Map identifying netting locations and information regarding net set-ups, including lat/long or UTM, individual net placement, net spacing (i.e., include mist-netting equipment in photographs of net locations), and adequate justification if net set-ups are not evenly distributed across suitable habitat within the project area.

⁴⁷ As discussed in the Introduction, we encourage coordination with USFWS FO(s) prior to implementation of any surveys to ensure that all parties agree upon the need for surveys, the methods proposed, and the decisions from various survey results.

⁴⁸ In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using the standardized permit reporting spreadsheets available on the USFWS website provided in the intro.

⁴⁹ If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods

5. Full names of mist-netting personnel attending each mist-net site during an operation, including the federally permitted/qualified biologist present at each mist-net site. Indicate on the field data sheet the full name of person who identified bats each night at each site.
6. Legible copies of all original mist-netting datasheets (see example datasheet below) and a summary table with information on all bats captured during the survey including, but not limited to: capture site, date of capture, time of capture, sex, reproductive condition, age, weight, right forearm measurement, band number and type (if applicable), and Reichard's wing damage index score (Reichard and Kunz. 2009).
7. Photographs of all net set-ups, as well as **all IBAT and NLEB** and the first 10 little brown bats captured from each project, so that the placement of netting equipment and identification of species can be verified. Photographs of bats should include all diagnostic characteristics that resulted in the identification of the bat to the species level.
8. Any other information requested by the local USFWS FO(s) related to the project.

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Sample Data Sheets for Bat Surveys

Site No.				Project/Firm:				Date:						
Location:														
County:				State:		Quad:		Quadrant:						
Lat/Long (DMS):		N		W		Zone:		Surveyors:						
#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type	Moon Phase:		%
1													Rise	Set
2														
3														
4														
5														
6														
7														
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10														
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30														
												Avg		
Sky Code														
0		Clear												
1		Few Clouds												
2		Partly Cloudy												
3		Cloudy or overcast												
4		Smoke or fog												
5		Drizzle or light rain												
6		Thunderstorm												
Beauford Wind Code														
0		Calm (0 mph)												
1		Light wind (1-3 mph)												
2		Light breeze (4-7 mph)												
3		Gentle breeze (8-12 mph)												
4		Moderate breeze (13-18 mph)												

*Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended

APPENDIX C: PHASE 2 ACOUSTIC SURVEYS

SUMMER ACOUSTIC SURVEY SEASON: May 15 – August 15⁵⁰

PERSONNEL⁵¹

Overall: Acoustic surveyors should have either completed one or more of the available bat acoustic courses/workshops (e.g., BCM, Titley/AnaBat, Wildlife Acoustics, USFWS) or be able to show similar on-the-job or academic experience.

Detector Deployment: Acoustic surveyors should have a working knowledge of the acoustic equipment and IBAT and/or NLEB ecology. Surveyors should be able to identify appropriate detector placement sites and establish those sites in the areas that are most suitable for recording high-quality IBAT and/or NLEB calls. Thus, it is highly recommended that all potential acoustic surveyors attend appropriate training and have experience in the proper placement of their field equipment.

Acoustic Analysis: Acoustic surveyors should have a working knowledge of the approved acoustic analysis programs. Thus, it is highly recommended that all potential acoustic surveyors attend appropriate training and have experience in the analysis of acoustic recordings.

Qualitative Analysis: Individuals qualified to conduct qualitative analysis of acoustic bat calls typically have experience: (1) gathering known calls as this provides a valuable resource in understanding how bat calls change and the variation present in them; (2) identifying bat calls recorded in numerous habitat types; (3) familiarity with the species likely to be encountered within the project area; and (4) individuals must have multiple years of experience and must have stayed current with qualitative ID skills. A resume (or similar documentation) must be submitted along with final acoustic survey reports for anyone making final qualitative identifications.

COORDINATION WITH USFWS FO(s)

If not already required by federal permit, we recommend that applicants submit a draft study plan for all survey phases to the USFWS FO(s) for review and approval. Study plans should include a map/aerial photo identifying the proposed project area boundaries, suitable bat habitats and acreages within the project area, the proposed number and tentative locations of acoustic monitoring sites, and the identification of the approved acoustic software program(s) (and version #) used for analysis of calls for the specific project. If a single software program is used for analysis, surveyors will not be allowed to switch programs from what was originally identified in their final study plan.

⁵⁰ With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15.

⁵¹ Coordinate with your local FO regarding any state-specific requirements.

DETECTOR AND MICROPHONE REQUIRED CHARACTERISTICS

Full-spectrum (FS) and/or zero-crossing (ZC) detectors are suitable for use in this survey protocol. Directional, hemispherical, and omnidirectional microphones are acceptable for acoustic surveys. The use of external microphones on an extension cable is the preferred deployment as it further limits degradation of call quality. Recording without directional horns on hemispherical and omnidirectional microphones is preferred as the addition of these systems may result in some signal degradation and directional microphones are commercially available.

Use recommended manufacturer detector settings for conducting IBAT [and/or NLEB](#) P/A surveys unless otherwise noted on the Service's IBAT Summer Survey Guidance webpage. For ZC detectors (as well as when converting WAV files to ZC files), the data-division ratio must be set to 8.

ACOUSTIC SAMPLING PROTOCOL

Detector/Microphone Placement

Detector/Microphone placement is critical to the successful isolation of high-quality bat call sequences for later analysis. The following locations are likely to be suitable sites for detectors/microphones, including, but not limited to: (a) forest-canopy openings; (b) near water sources; (c) wooded fence lines that are adjacent to large openings or connect two larger blocks of suitable habitat; (d) blocks of recently logged forest where some potential roost trees remain; (e) road and/or stream corridors with open tree canopies or canopy height of more than 33 feet (10 meters); and (f) woodland edges (Britzke et al. 2010). Of equal importance to acoustic site selection is the surveyor's working knowledge of the sampling volume and area of highest sensitivity within the zone of detection around a given microphone, which helps to ensure that detector placement as well as microphone selection and orientation are best suited for a particular site to ensure the detection zone is free of clutter. Detection distance, placement (e.g., location, orientation, height of microphone), and specific features (e.g., vegetation, water, and other obstructions) at the sample site should dictate whether a directional, hemispherical, or omnidirectional microphone is used. If detectors/microphones are placed in unsuitable locations, effective data analysis may be impossible, and the results of the sampling effort will likely be invalid.

Many features (e.g., vegetation, water, wind turbines, high-tensile powerlines, micro-wave towers) can obstruct and reflect call sequences recorded in the field and thereby reduce the surveyor's ability to record high-quality bat call sequences. The following recommendations are provided to aid surveyors in their selection of acoustic sites (also see Chengler and Tyburec 2014). If surveyors choose acoustic sites outside of these recommendations, then adequate justification for doing so should be provided with the acoustic survey report provided to the USFWS FO(s); otherwise, results from these sites will not be accepted. Surveyors should deploy microphones: (a) at least 10 feet (3 meters) in any direction from vegetation or other obstructions (Hayes 2000; Weller and Zabel 2002;

Chenger and Tyburec 2014, [Fraser et al. 2020](#)); (b) in areas without, or with minimal⁵², vegetation within 100 feet (30 meters) of highly directional microphones or 33 feet (10 meters) from other microphones; (c) parallel to woodland edges; and (d) at least 49 feet (15 meters) from known or suitable roosts⁵³ (e.g., trees/snags, buildings, bridges, bat houses, cave or mine portal entrances).

Elevating a detector greater than 3 meters above ground level (AGL) vegetation may dramatically improve recording quality. Microphones can be attached horizontally to a pole to listen out into flight space, rather than just listening up from the ground. This will serve to increase the volume of airspace sampled and avoid the distortion effect of recording near the ground. However, the relationship between the zone of detection and the vegetation/clutter, not the placement of the detector is the most important consideration during site selection. [Because NLEBs are a clutter-adapted gleaning species \(see definition of suitable summer habitat in Appendix A\), placement of detectors should be as close to clutter as possible but not in clutter.](#)

Surveyors should distribute acoustic sites throughout the project area or adjacent habitats. In most cases, acoustic sites should be at least 656 feet (200 meters) apart. If closer spacing is determined to be necessary or beneficial (e.g., multiple suitable habitats and acoustic sites immediately adjacent to each other), sufficient justification must be provided in the acoustic study plan and survey report submitted to USFWS FO(s).

Verification of Deployment Location

It is recommended to temporarily attach GPS units to each detector (according to manufacturer's instructions) to directly record accurate location coordinates for each acoustic site that is paired with the acoustic data files. Regardless of technique used, accurate GPS coordinates must be generated and reported for each acoustic detector location.

Verification of Proper Functioning

It is highly recommended that surveyors ensure acoustic detectors are functioning properly through a periodic verification of performance to factory specifications (a service currently offered or in development by several manufacturers). It may be possible that independent service bureaus would be willing to perform this service, providing that a standard test/adjustment procedure can be developed.

It is also recommended to ensure equipment is working during set-up in the field. This can be done simply by producing ultrasound (e.g., finger rubs, calibrator, or follow the equipment manufacturer's testing recommendations) in front of the microphone at survey start and survey finish. These tests document that the equipment was working when deployed and when picked up (and by assumption throughout the entire period). Detector field settings (e.g., sensitivity, frequency, etc.) should follow the recommendations provided by the manufacturer. Surveyors should also save files produced by detectors (e.g., log files, status files, sensor files) as an excellent way to provide documentation when equipment was functioning within the survey period. Many types of detectors allow for setting timers

⁵² If necessary, surveyors can remove small amounts of vegetation (e.g., small limbs, saplings) from the estimated detection zone at a site, much like what is done while setting up mist-nets. Deployment of detectors/microphones in closed-canopy locations that typically are good for mist-netting are acceptable as long as the area sampled below the canopy does not restrict the ability of the equipment's detection zone to record high-quality calls (i.e., vegetation is outside of the detection zone).

⁵³ If the surveyor discovers a potential roost and wishes to document bat use, refer to Appendix E for guidance on conducting emergence surveys and contact the USFWS FO(s).

that initiate and end recording sessions. This saves battery life as well as reducing the number of extraneous noise files recorded. However, if the units are visited when the timer is on (i.e., unit is in standby mode), the surveyor cannot verify that the unit is functioning properly. This is particularly important in areas where no bat activity is recorded for the entire night or during the last portion of the night. In these cases, if the surveyor cannot demonstrate that the detector was indeed functioning properly throughout the survey period, then the site will need to be re-sampled, unless adequate justification can be provided to the USFWS FO(s).

Selection of acoustic sites is similarly important. Suitable set-up of the equipment should result in high-quality call sequences that are adequate for species identification. Nights of sampling at individual sites that produce no bat calls may need to be re-sampled unless adequate justification (e.g., areas with significant bat population declines due to WNS) can be provided to the USFWS FO(s). Modifications of the equipment (e.g., changing the orientation and/or microphone type) at the same location on subsequent nights may improve quantity and quality of call sequences recorded, which can be determined through daily data downloads. If modifications of the equipment do not improve call identification, then the detectors will need to be moved to a new location.

Orientation

Detectors deployed with directional microphones should be aimed to sample the majority of the identified flight path/zone to maximize the number of call pulses recorded from individual bats. Omnidirectional microphones deployed on a pole in the center of the flight path/zone should be oriented horizontally. In some circumstances, it might be desirable to aim a directional microphone straight up in smaller forest openings. As always, the goal is to sample as large a volume of likely bat flight space as possible while minimizing clutter. Hemispherical microphones should be aimed vertically, creating a dome-like detection field. Hemispherical microphones are best suited for open areas where deploying at heights greater than 3 meters AGL is problematic because of the lack of structure to hide the microphone and prevent it from becoming a novel item of interest to bats. Vertical orientation, however, precludes the use of weatherproofing for protection of the microphone, since no currently approved weatherproofing system will adequately protect the microphone of a detector aimed vertically. Once acoustic sites are identified, photographs documenting the orientation, detection zone (i.e., “what the detector is sampling”), and relative position of the microphone should be taken for later submittal to the USFWS FO(s) as part of the acoustic survey report (See Submission of Acoustic Survey Results for additional description).

Weather Conditions

If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night⁵⁴: (a) temperatures fall below 50°F (10°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours of the survey period. At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports.

⁵⁴ With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15.

Weatherproofing

Most bat detectors are not weatherproof when delivered from the factory. Recording without after-market weatherproofing is preferred as the addition of these systems may result in some signal degradation. The decision to weatherproof detectors or not should be determined nightly based on the likelihood of precipitation in the survey area. If necessary, detectors should be placed in after-market weatherproof containers and an external microphone, attached by an extension cable should be deployed greater than 3 meters AGL.

For directional microphones, the use of a polyvinyl chloride (PVC) tube⁵⁵, generally, in the form of a 45-degree elbow the same diameter as the microphone (Britzke et al. 2010) is acceptable, if the situation requires the use of after-market weatherproofing. The microphone should be placed facing the open end of the elbow and as close to the opening as is consistent with the aim of weatherproofing. The microphone should be pointing at an angle below horizontal so water will not collect in it. Corben & Livengood (2014) showed that the direction of greatest sensitivity of tubes like this varies greatly depending on details of the specific tube shape and the exact position of the microphone. Often the greatest sensitivity will be pointed up at a substantial angle (up to 45 degrees) above horizontal when the microphone itself is pointing 45 degrees below horizontal. Users should be aware of the characteristics of the setup they use so they can know what region is being sampled. Again, the preferred option for weatherproofing detectors is to detach the microphone from the detector so that the detector can be placed in a weatherproof container, but the microphone (tethered by a cable) remains unobstructed.

Other after-market weatherproofing systems may become available and approved by the USFWS provided they show that call quality and the number of calls recorded are comparable to those without weatherproofing.

MINIMUM LEVEL OF EFFORT

The level of acoustic survey effort required for a project will be dependent upon the overall acreage of suitable habitat that may be impacted by the action (directly or indirectly). To determine the acoustic survey effort, quantify the amount of suitable summer habitat within the project area. **NOTE:** for projects where impacts other than tree removal are likely (e.g., collision), ensure that presence/probable absence surveys are designed to cover all suitable habitat within the entire project area and NOT just the locations where tree removal is planned.

IBAT Range-wide Acoustic LOE (See Figures 1 and 2)

Linear projects: a minimum of 4 detector nights per km (0.6 miles) of suitable summer habitat (See Appendix F).

At least 1 detector location for at least 2 calendar nights (can sample the same location or move within the km site).

Non-linear projects: a minimum of 10 detector nights per 123 acres (0.5 km²) of suitable summer habitat.

⁵⁵ The PVC option has only been tested with AnaBat SD1/SD2 detectors and directional microphones. It may not perform as well with other detector microphone combinations.

At least 2 detector locations per 123 acre "site" shall be sampled until at least 4 detector nights has been completed over the course of at least 2 calendar nights (may be consecutive).

For example:

- 5 detectors for 2 nights each (can sample the same location or move within the site)
- 2 detectors for 5 nights each (can sample the same location or move within the site)
- 1 detector for 10 nights (must sample at least 2 locations and move within the site – we recommend evenly distributing LOE among locations)

NLEB Range-wide Acoustic LOE (See Figures 3 and 4)

Linear projects: a minimum of 4 detector nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 14 detector nights per 123 acres (0.5 km²) of suitable summer habitat.

At least 2 detector locations per 123 acre "site" shall be sampled until at least 14 detector nights has been completed over the course of at least 2 calendar nights (may be consecutive).

For example:

- 4 detectors for 3 nights and 1 detector for 2 nights each (can sample the same location or move within the site)
- 2 detectors for 7 nights each (can sample the same location or move within the site)
- 1 detector for 14 nights (must sample at least 2 locations and move within the site – we recommend evenly distributing LOE among locations)

The acoustic sampling period for each site must begin at sunset⁵⁶ and ends at sunrise each night of sampling.

ANALYSIS OF RECORDED ECHOLOCATION CALLS

Step 5. Optional coarse screening - for high frequency (HF) or myotid calls (depending on available H/L frequency filters) or Proceed to Step 6.

- a) If no positive detection of HF calls⁵⁷ (≥ 35 kHz) or myotid calls, no further summer surveys recommended.
- b) If positive detection of HF or myotid calls, then
 - i) proceed to Step 6 for further acoustic analysis; **OR**
 - ii) assume presence of Indiana bats and coordinate with the USFWS

⁵⁶ Surveys may need to start a little earlier or later than official sunset times (i.e., at “dusk”) in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>

⁵⁷ HF calls are defined as individual call pulses whose minimum frequency is ≥ 35 kHz.

- FO(s); **OR**
iii) assume presence and proceed to **Phase 3**.

Step 6. Conduct Automated Acoustic Analyses for each site that had HF or Myotis calls from Step 5 or ALL sites if Step 5 was not conducted.

Use **one or more** of the currently available ‘approved’ acoustic bat ID programs⁵⁸ (use most current approved software versions available and manufacturer’s recommended settings for IBAT and/or NLEB P/A surveys) as previously identified in your Phase 2 study plan. ‘Candidate’ programs are not yet approved by USFWS for stand-alone use for P/A surveys but may be used in conjunction with one or more of the approved programs. Include your plans for which specific software program(s) you will use in your survey study plan and submit for USFWS FO(s) review prior to conducting surveys. Beginning with acoustic data from night one at each acoustic site, run each night’s data for each site through your chosen ID program(s). Review results by site by night from each acoustic ID program used⁵⁹.

- a) If IBAT and NLEB presence is considered unlikely by the approved and candidate program(s) used in analysis, then no further summer surveys recommended.
- b) If IBAT and/or NLEB presence is considered likely at one or more sites on one or more nights by any approved or candidate program(s) used in analysis, then
 - i) proceed to **Step 7** for qualitative ID; **OR**
 - ii) assume presence of IBAT and/or NLEB and coordinate with the USFWS FO(s); **OR**
 - iii) assume presence and proceed to **Phase 3**.

Step 7. Conduct Qualitative Analysis of Calls.

At a minimum, for each detector site/night a program considered IBAT and/or NLEB presence likely, review all files (including no IDs) from that site/night. Qualitative analysis⁶⁰ (i.e., manual vetting) must also include and present within a written report a comparison of the results of each acoustic ID program by site and night (see Reporting Requirements below).

- a) If no visual confirmation of probable IBAT and NLEB, then no further summer surveys recommended⁶¹.
- b) If visual confirmation of probable IBAT and/or NLEB, then
 - i) assume presence of IBAT and/or NLEB and coordinate with the USFWS FO(s); **OR**
 - ii) assume presence and proceed to **Phase 3**.

⁵⁸ Approved and candidate programs are listed [on the USFWS website provided in the intro](#).

⁵⁹ The approved acoustic identification programs all have implemented a maximum likelihood estimator (MLE) at this time. If the analysis of collected calls at a given site on a given night results in the probable presence of IBAT and/or NLEB with high levels of certainty ($P < 0.05$), then select one of the options available in Step 6b.

⁶⁰ Qualitative analysis of each acoustic site and night with probable detections of IBAT and/or NLEB during Step 6 should include the entire night’s high frequency call data, including “no ID” files, and not just those files making it through the acoustic analysis tools as probable IBAT and/or NLEB in Step 6.

⁶¹ If you identify any suspected mis-identifications from programs, the Service will share those results with the software manufacturer(s) and the USGS to assist with future improvements and testing of software.

SUBMISSION OF ACOUSTIC SURVEY RESULTS

NOTE: All originally recorded (ZC or FS) data **MUST** be maintained for a period of 7 years and be made available to the USFWS FO(s), if requested. Failure to do so may result in invalidation of survey results.

Provide results of acoustic surveys to the appropriate USFWS FO(s) within 10 days of completing the survey unless otherwise agreed upon with the local USFWS FO(s)⁶². Each acoustic survey report should include the following⁶³ (also, see checklist at end of this appendix):

1. Copy of habitat assessment (if not previously provided)
2. Explanation of any modifications from original survey plan (e.g., altered site locations)⁶⁴
3. Full names of all personnel conducting acoustic surveys, including those that selected acoustic sites and deployed detectors
4. Full name and resume of individual(s) conducting qualitative acoustic analyses (if applicable)
5. Description of acoustic monitoring sites, survey dates, duration of survey, weather conditions, and a summary of findings
6. Table with information on acoustic monitoring and resulting data, including but not limited to: detector GPS coordinates for each detector, survey dates, survey hours
7. Map identifying acoustic detector locations and a corresponding table including the GPS coordinates. Include arrow(s) showing direction(s) of microphone(s)
8. Photographs documenting the location of each detector, the orientation of the detector, and the intended sampling area. Include detector and something for scale (e.g., vehicle, person) in photographs of acoustic sites
9. Description of acoustic detector and microphone brand(s) and model(s) used, microphone type, use of weatherproofing, acoustic monitoring equipment settings (e.g., sensitivity, audio division ratios), deployment data (i.e., deployment site, habitat, date, time started, time stopped, orientation), and call analysis methods used
10. A description of how proper functioning of bat detectors was verified

⁶² As discussed in the Introduction, we encourage coordination with USFWS FO(s) prior to implementation of any surveys to ensure that all parties agree upon the need for surveys, the methods proposed, and the decisions from various survey results.

⁶³ In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using the standardized permit reporting spreadsheets available on the IBAT Summer Survey Guidance webpage (<http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html>).

⁶⁴ If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods.

11. Discussion of what software program(s) was/were used (including settings)
12. Acoustic detector log files renamed by site identifier
13. Acoustic analysis software program output/summary results by site by night (i.e., number of calls detected, species composition, MLE results, settings files)
14. Discussion for any site/nights with zero bat calls (were additional nights added? was detector functioning? was placement appropriate?)
15. If manual vetting was used, discussion of how this was done (e.g., what keys were used?)
16. If manual vetting was used, detailed analysis and results of any qualitative acoustic analysis conducted on those projects where a program(s) considered IBAT and/or NLEB presence likely, including justification for rejecting any program MLE results (if applicable). We recommend providing a table with each species ID from the program(s), suggested species ID from manual vetting, and rationale for any changes.
17. Any other information requested by the local USFWS FO(s) related to the project

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General Checklist for Acoustic Surveys of Indiana and/or Northern Long-eared Bats

The following items should be documented and clearly presented within acoustic bat survey reports submitted to the Service

ACOUSTIC SURVEY INFO

- Project Name
- Site ID No./Name
- State and County
- Site Lat./Long. Coordinates (e.g., decimal degrees, NAD83)
- Approx. accuracy of Lat./Long. Coordinates
- Survey Date(s)
- Person who Selected Acoustic Site(s)
- Person who Deployed Detector(s)
- Detector Brand & Model
- Microphone Brand & Model
- Microphone Type: Directional/Hemispherical/Omnidirectional
- Type of Weatherproofing (if any)
- Microphone Height above Ground-level Vegetation(m)
- Distance from Nearest Vegetation or other Obstruction (m)(apart from veg. on ground)
- Horizontal Orientation of Microphone (1-360°)
- Vertical Orientation of Microphone (assuming 0° is parallel with horizon)
- Photographs of Detector Set-up at each Site
- Detector Settings and/or Log Files (all settings used for each brand/model of detector. For example, sensitivity, gain, data division, 16k high filter, sample rate, min/max duration, min trigger freq., trigger level, etc.)
- Survey Start Time (military)
- Survey End Time (military)
- Methods used to Field-test proper Functioning of Detector
- Were calls collected in Full Spectrum or Zero Crossing?
- Habitat Type and/or Feature Surveyed
- Weather Conditions during Survey Period

ACOUSTIC ANALYSIS INFO

- Program used to convert Full Spectrum to Zero Cross (if applicable)?
- Filter(s) used (if any) and parameters used (e.g., CFRead, noise, bug, etc.)
- Name of Service-approved Bat ID Software Program(s) and Version(s) used and Candidate program(s)(if used)
- Program Settings (if applicable):
 - Min. # of pulses for species ID
 - Min. # of pulses per group ID
 - Min. discrim. prob. for species ID
 - Other relevant settings affecting ID
 - Suite of species/groups included in program analysis
- Table summarizing Number of Calls ID'd for each Species/Site/Night/Program (including MLE p-values)
- If Qualitative Analysis was conducted, include Number of Calls Confirmed through Qualitative ID for each Species/Site/Night
- Full Name of Person(s) who conducted Qualitative Analysis
- Additional Survey Reporting Requirements
- Acoustic Report Appendices:
 - data sheets and maps,
 - photographs of detector set-ups,
 - computer screen captures of representative bat species identified during acoustic analyses, and
 - resume(s) highlighting relevant qualifications of person(s) who conducted qualitative analysis (e.g., experience visually identifying *Myotis*, certificates of training, publications etc.)

APPENDIX D: PHASE 4 RADIO-TRACKING

PERSONNEL

Transmitter Attachment: A qualified biologist⁶⁵ who is experienced in handling IBAT and/or NLEB and attaching radio transmitters must perform transmitter attachments, as further explained in the protocol below.

Tracking: Biological technicians and/or a qualified biologist who is experienced in tracking transmitted bats must be present and actively involved in all tracking activities for IBAT and/or NLEB as further explained in the protocol below.

METHODS

If one or more IBAT and/or NLEB are captured, the following radio-tracking protocols will be applicable:

1. Biologists should coordinate in advance with USFWS FO(s) regarding recommendations for the number and distribution of transmitters (e.g., prioritization of sex/age, maximum number per site) and whether foraging data would be beneficial to collect. Also, professional judgment should be used to determine whether attachment of transmitters could compromise the health of a bat. Since the maximum holding times for IBAT and/or NLEB targeted for radio-tracking is 30 minutes⁶⁶, or as allowed in federal and state permits, surveyors should be prepared to place transmitters on bats immediately following their capture to minimize holding times.
2. The radio transmitter, adhesive, and any other markings (e.g., wing bands) should weigh less than 5% of pre-attachment body weight (Aldridge and Brigham 1988, American Society of Mammalogists 1998), the total weight of the package (transmitter and adhesive) may not exceed 6% of the bat's body weight and must comply with any USFWS and state permits. In all cases, the lightest transmitters capable of the required task should be used, particularly with pregnant females and volant juveniles. With pregnant bats, biologists should always use the lightest transmitter possible but no more than 5% of their expected non-pregnant weight.
3. Proposed radio telemetry equipment (e.g., receivers, antennas, and transmitters) and frequencies should be coordinated with the appropriate state natural resource agency and USFWS FO(s).
4. The qualified biologist or biological technician(s) should track all radio-tagged bats captured to diurnal roosts in accordance with permit requirements. We generally recommend tracking

⁶⁵ A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for federally-listed bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to mist-net for IBAT and/or NLEB. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

⁶⁶ Current standard federal Section 10 bat permit conditions require prior written approval from the Field Supervisor in the USFWS FO(s) if capture times may exceed 30 minutes

until the transmitter fails, fall off, or cannot be located for at least 7 days and should conduct a minimum of 2 evening emergence counts at each identified roost (See Appendix E for Emergence Survey Protocols). However, biologists are encouraged to continue radio-tracking efforts for the life of the transmitter. Biologists should contact the USFWS FO(s) immediately if they plan to cease tracking efforts before the 7-day tracking period ends. If landowner access is denied, approximate roost locations (i.e., coordinates) should be determined using triangulation.

5. Daily radio telemetry searches for roosts must be conducted during daylight hours and should be conducted until the bat(s) is located or for a minimum of 4 hours of ground or 1 hour of aerial-searching effort per tagged bat per day for 7 days. However, multiple bats captured at the same net location or nearby may be tracked simultaneously. Once a signal is detected, tracking should continue until the roost is located. At a minimum, biologists should document all ground and aerial-searching effort for all bats not recovered during radio-tracking for submittal with the survey report. For each roost identified during tracking, the biologist should complete a “USFWS IBAT and/or NLEB Roost Datasheet”.
6. To minimize potential for disease transmission, any equipment that comes in contact with bats should be kept clean and disinfected, following approved protocols; this is particularly a concern relative to WNS. Protocols are posted at <http://www.whitenosesyndrome.org/>. Federal and state permits may also have specific equipment restrictions and disinfection requirements.

SUBMISSION OF RADIO-TRACKING RESULTS

Phase 4 radio-tracking results should be included with the Phase 2 or 3 mist-netting report and submitted to the appropriate USFWS FO(s). Each report should include the following information related to radio-tracking efforts⁶⁷:

1. Copy of prior phase reports (if not previously provided)
2. Explanation of any modifications from original survey plan (e.g., number of transmitters used, frequency of transmitters changed)⁶⁸
3. Map and narrative detailing all ground and aerial searching effort for all bats not recovered during radio-tracking and relative to the negotiated or agreed effort as determined by the appropriate USFWS FO(s)
4. Map summarizing IBAT and/or NLEB data collected from summer surveys for the proposed project (e.g., project area boundary and results from the site habitat assessment, acoustic survey, mist-net survey, radio-tracking, and emergence surveys)
5. Full names and permit numbers of personnel who attached transmitters to IBAT and/or NLEB and full names of all personnel conducting radio-tracking efforts
6. Photographs of all roosts identified during radio-tracking
7. Legible copies of all original USFWS IBAT and/or NLEB Roost Datasheets

⁶⁷ In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using standardized permit reporting spreadsheets available on the USFWS website provided in the intro.

⁶⁸ If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods.

8. Any other information requested by the local USFWS FO(s) where work was conducted

REFERENCES

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USFWS INDIANA **AND/OR NORTHERN LONG-EARED BAT** ROOST DATASHEET

Biologists (Full Name): _____ Date: _____

UTM: Zone _____ Easting _____ Northing _____ OR

LAT _____ LONG _____

Property Owner: _____ Phone# _____

State _____ County _____ Site # _____

Roost # _____ Roost Name: _____

Roost Tree Data

Species: _____ Live __ Snag __ Other __

(if other, explain) _____

DBH (in or cm) _____ Total Height (ft or m) _____

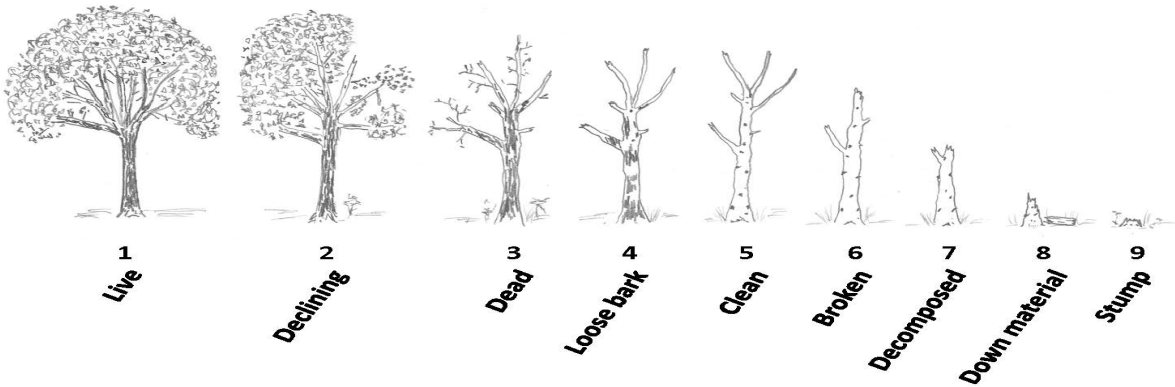
Height of roost area (if known) _____ Dist. from capture site _____

Roost position aspect (deg) _____

Exfoliating bark on bole (%) _____ Describe: sloughing __ platy__ tight__

Cavities present? __ If so, describe: _____

Roost Decay State: 1 2 3 4 5 6 7 8 9 Other



APPENDIX E: PHASE 4 EMERGENCE SURVEYS

PERSONNEL

Qualified biologists⁶⁹, biological technicians, and any other individuals deemed qualified by a local USFWS FO may conduct emergence surveys for IBAT and/or NLEB by following the protocols below.

EMERGENCE SURVEYS FOR KNOWN IBAT AND/OR NLEB ROOSTS

The following protocols should begin as soon as feasible after identification of a diurnal roost (ideally that night):

1. Bat emergence surveys should begin one half hour before sunset⁷⁰ and continue until at least one hour after sunset or until it is otherwise too dark to see emerging bats. The surveyor(s) should be positioned so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. There should be at least one surveyor per roost. Surveyors must be close enough to the roost to observe all exiting bats but not close enough to influence emergence. That is, do not stand directly beneath the roost, do not make noise or carry on a conversation, and minimize use of lights (use a small flashlight or similar to record data, if necessary). Do not shine a light on the roost as this may prevent or delay bats from emerging. Use of an infra-red, night vision, or thermal-imaging video camera or spotting scope is encouraged but not required. Likewise, use of an ultrasonic bat detector may aid in identifying the exact timing of bats emerging and may be used to help differentiate between low- and high-frequency bats species, and therefore, is strongly recommended. If multiple roosts are known within a colony, then simultaneous emergence surveys are encouraged to estimate population size. [NOTE: If a roost cannot be adequately silhouetted, then the local USFWS FO(s) should be contacted to discuss alternative survey methods].
2. Bat activity is affected by weather; therefore, emergence surveys should not be conducted when the following conditions exist: (a) temperatures that fall below 50°F (10°C); (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale).
3. Surveyors should use the attached (or similar) “Bat Emergence Survey Datasheet”.
4. Surveyors should also complete an “IBAT and/or NLEB Roost Datasheet” for each roost known to be used by one or more IBAT and/or NLEB (see Appendix D for an example).

⁶⁹ A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for federally-listed bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to mist-net for IBAT and/or NLEB. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

⁷⁰ Surveys may need to start a little earlier or later than one half hour before official sunset times (i.e., before “dusk”) in some settings such as deep/dark forested valleys or ridge tops, respectively. Sunset tables for the location of survey can be found at: <https://sunrise-sunset.org>

5. Completed datasheets should be included in reports prepared for the USFWS.

EMERGENCY SURVEYS FOR POTENTIAL IBAT AND/OR NLEB ROOSTS

In some limited cases (e.g., individual hazard tree removal during the active season), surveyors may have the option of conducting emergence surveys for individual potential IBAT and/or NLEB roosts to determine use prior to removal. **Evaluations whether potential roosts meet the criteria to conduct emergence surveys should be for each individual tree rather than groups of trees.** The following protocol applies to these surveys:

1. Consult with the local USFWS FO(s) to determine whether a tree(s) that needs to be felled/cleared may be potential roosting habitat for IBAT and/or NLEB and whether conducting an emergence survey is an appropriate means of avoiding take of IBAT and/or NLEB⁷¹. In general, the USFWS only approves of conducting emergence surveys as a means of avoiding direct take of bats for projects that only affect a very small number of potential roosts (e.g., less than or equal to 10)⁷² in relatively small project areas. **In addition, emergence surveys are only valid if all parts of the tree (limbs and trunk) can be observed by the surveyor. Therefore, trees within woodlands that are directly adjacent to other trees and whose canopy is blocked are not suitable for emergence surveys.** An online directory of USFWS offices is available at: <http://www.fws.gov/offices/>.
2. If the USFWS FO(s) approves/concurs with Step 1, then follow the emergence guidelines for Emergence Surveys for Known IBAT and/or NLEB Roosts (above) to determine if any bats are roosting in the tree(s).
3. At the conclusion of the emergence survey:
 - a. If **no** bats were observed emerging from the potential roost(s), then it maybe felled immediately. If safety concerns dictate that a tree cannot be felled immediately (i.e., in the dark), then the tree(s) should be felled as soon as possible after sunrise on the following day. If a tree is not felled during the daytime immediately following an emergence survey, then the survey must be repeated, because bats may switch roosts on a nightly basis. Immediately after the tree is felled, a visual inspection of the downed tree must be completed to ensure that no bats were present, injured, or killed. The USFWS FO(s) should be contacted immediately, if bats are discovered during this inspection.
 - b. If **1 or more** bats (regardless of species, because species identification cannot reliably be made during visual emergence counts alone) are observed emerging from the roost, then it should **not** be felled, and the USFWS FO(s) should be contacted the next working day for further guidance.

⁷¹ If a potential bat roost tree poses an imminent threat to human safety or property, then emergency consultation procedures should be followed as appropriate. (50 CFR §402.05). If a hazard tree does not pose an imminent threat, then the USFWS requests that it be felled during the bat's inactive season (i.e., generally from October – March, but contact the FO for specific dates for your area.) When possible, felling of potential roost/hazard trees should be avoided during the primary maternity period (June – July) to avoid potential adverse effects to non-volant pups.

⁷² Areas containing >10 hazard trees will be assessed by the USFWS on a case-by-case basis with the project proponent.

SUBMISSION OF EMERGENCE SURVEY RESULTS

Emergence survey results should be included with the mist-netting survey report, unless the survey was completed as an evaluation of potential roosts and should be submitted to the appropriate USFWS FO(s) for review. Each survey report should include the following information related to emergence survey efforts⁷³:

1. Copy of prior phase reports (if not previously provided)
2. Explanation of any modifications from the Phase 4 emergence count study plan (e.g., number of potential roosts surveyed), if applicable
3. Summary of roost emergence data
4. Map identifying location of roost(s) identified during radio-tracking and/or emergence surveys for IBAT and/or NLEB(s) including GPS coordinates
5. Full names of personnel present during emergence survey efforts and who conducted emergence surveys of roosts
6. Photographs of each identified roost
7. Copies of all “Emergence Survey” and “IBAT and/or NLEB Roost” datasheets
8. Any other information requested by the local USFWS FO(s) where work was conducted
9. Copy of the pre-approved site-specific written authorization from USFWS and/or state natural resource agency (if required)

⁷³ In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using standardized permit reporting spreadsheets available [on the USFWS website provided in the intro](#).

Site Name/#: _____ Roost Name/#: _____

Time	Number of Bats Leaving Roost*	Comments / Notes
Total Number of Bats Observed Emerging from the Roost/Feature During the Survey:		

* If any bats return to the roost during the survey, then they should be subtracted from the tally.

Describe Emergence: Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. If a radio-tagged bat was roosting in the tree, at what time did it emerge?

APPENDIX F: LINEAR PROJECT GUIDANCE

For linear projects (e.g., pipelines and roadways) >1 km in length (shorter lengths should be considered as a non-linear project), surveyors have the option to use either mist nets or acoustic detectors in any given 1-km segment of suitable habitat. A survey site may also cover other associated linear project facilities (e.g., access roads) that are located within a pre-determined distance of each segment. When possible, surveyors should seek out the best available survey sites located within the footprint of the project alignment, and directly adjacent to, or near, the alignment if no suitable sites are available within the footprint. Because the best survey sites for capturing/detecting bats may fall outside of a project footprint, the surveyor and project proponent should coordinate with the appropriate USFWS FO(s) to establish a project-specific maximum distance from the centerline or project boundary prior to initiating surveys.

Tentative survey site locations along linear projects should be included in a proposed study plan to be reviewed and approved by the USFWS FO(s). Adequate survey effort should be conducted within each approximate 1-km segment that contains suitable forested habitat along the proposed workspace. It is not appropriate to cumulatively add up each habitat block crossed until 1km of habitat has been traversed. Segments along a linear project that do not contain suitable habitat should be skipped until the next patch of suitable habitat is encountered (Figure 5). Establishing exactly how many survey sites are needed for presence/absence surveys along a linear project often involves some give and take particularly in fragmented habitat areas (Figure 5, rows B and C). The final number of survey sites could be greater than the minimum number of sites prescribed in the protocol in order to adequately cover the areas of suitable habitat to be impacted. When available, habitat quality and quantity (e.g., size and location of suitable maternity roost trees) from on-the-ground habitat assessments can be used to fine tune and guide the placement of survey sites. In some marginal habitat areas, the quality and quantity of the existing habitat may be low enough to justify skipping some survey segments (e.g., Figure 5, Site 11). Likewise, some isolated woodlots, fence lines or individual trees may be considered too isolated and/or small to independently support bats and may be skipped if the USFWS FO(s) concurs. Habitat suitability in fragmented areas should be assessed on a site-specific basis and consider habitat configuration and connectivity to other suitable habitat patches. In general, we recommend surveying a few more sites for a project than the absolute minimum required.

In instances where a mist netting survey has been proposed, but no suitable mist net sites can be found or accessed within a particular segment, biologists should contact the USFWS FO(s) for further guidance or ideally agree in advance as to how such situations will be handled when encountered in the field (e.g., an acoustic survey may be substituted). Similarly, if an area of forest habitat that seemed suitable from aerial photography appears to be unsuitable or of particularly low quality upon field inspection, then you should coordinate with the USFWS FO(s) to determine if an area may be exempted from surveys. To avoid problems, any significant departures from previously agreed to survey plans should be justified and coordinated with the USFWS FO(s) prior to leaving the field.

APPENDIX F: LINEAR PROJECT GUIDANCE

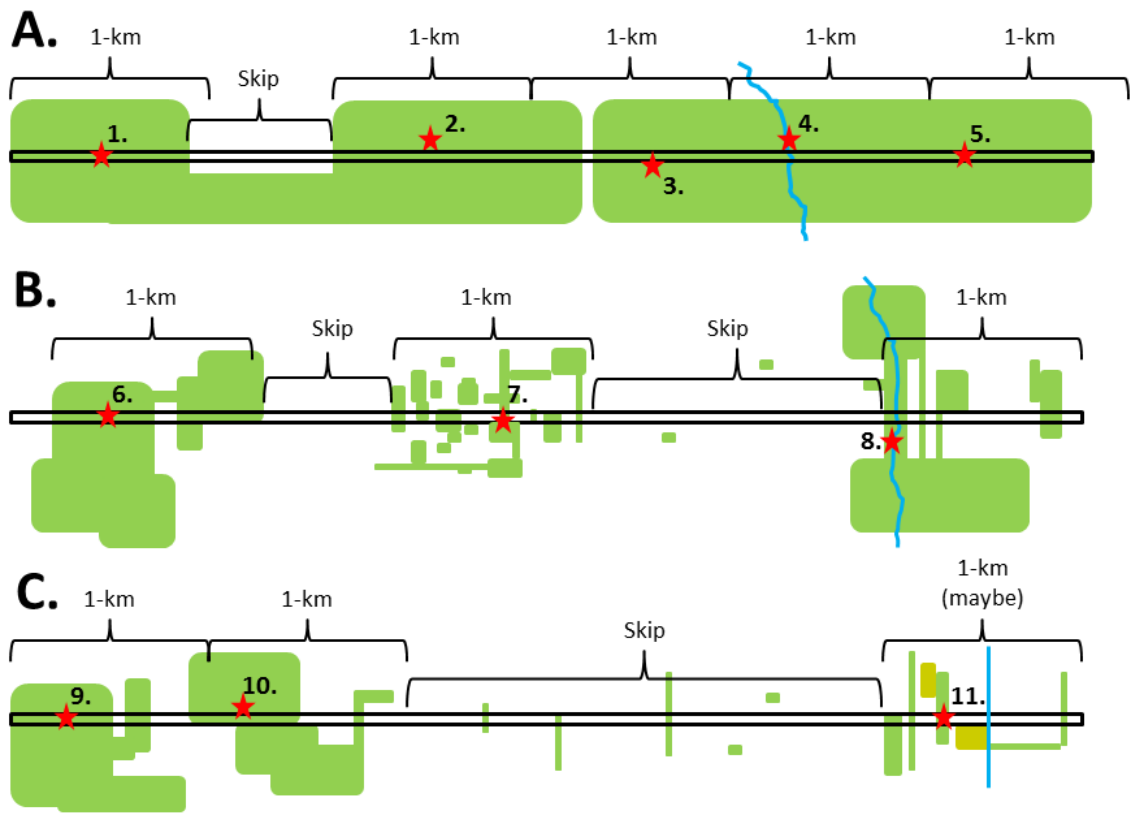


FIGURE 5. Conceptual linear project (black double lines) through relatively contiguous (A.) and fragmented (B. and C.) forested habitats (green patches) delineated into approximate 1-km survey sections. Numbered red stars represent suitable survey sites (1-11) on or near the project boundaries. Blue lines represent natural streams (A. and B.) and a ditch (C.). Yellow-green patches near Site 11 represent low-quality habitat.

APPENDIX G: THE OUTER-TIER GUIDANCE

Since early radio-tracking studies in Illinois, it has become standard practice for USFWS FOs to assume that an IBAT summer maternity colony will utilize suitable habitat within approximately 2.5 miles of its primary roost tree(s)/focal roosting area. However, if a reproductive adult female or juvenile IBAT is captured (or acoustically detected), but not radio-tracked to a roost site, then FOs typically assign its capture site a 5-mile conservation buffer and assume that its roost tree is located somewhere within 2.5 miles of the capture site. This approach is further detailed in the Service's IBAT Section 7 and Section 10 Guidance for Wind Energy Projects⁷⁴.

NOTE: The same principles used for the IBAT can be used for the NLEB using a 3-mile conservation buffer around capture/detections and 1.5-mile buffer around roost trees.

Because a 5-mile buffer encompasses four times more area than a 2.5-mile buffer (50,265 acres vs. 12,566 acres), it is reasonable to assume that only approximately 25% of a 5-mile buffered area is actually occupied by the documented IBAT summer maternity colony at any given time and that approximately 75% remains unoccupied or could be used by members of another yet undocumented colony(s). Therefore, if a subsequently proposed project is either ≤ 123 acres in size or affects $\leq 1\%$ of existing suitable summer habitat within a 5-mile buffer (whichever is greater) but is situated ≥ 2.5 miles from the original capture/detection site, then it will have a relatively low probability of being within the true maternity colony home range (assuming suitable habitat is more or less evenly distributed in all directions from the capture site) (See Figures 6 & 7). Allowing project proponents of such "outer tier" projects to conduct a summer P/A survey for IBAT and/or NLEB using the standard survey level of effort (LOE) (as outlined in Appendix B and C) in such cases is reasonable and the additional survey data would 1) help refine the home range boundaries of the original colony, 2) confirm presence of additional colonies if present, 3) provide additional radio-tracking opportunities /roost tree locations, and 4) provide an option for project proponents to survey instead of always assuming presence. **NOTE:** USFWS FO(s) may decide not to approve an outer-tier survey under the following circumstances: (1) If available forest habitat with a 5-mile (or 3-mile for NLEB) buffer is not more-or-less evenly distributed, but rather is highly clumped or restricted to a relatively narrow strip(s) (e.g., a riparian corridor); (2) $< 10\%$ of a 5-mile (or 3-mile for NLEB) buffer contains suitable summer habitat; or (3) other site-specific reasons.

If a project proponent of an "outer-tier" project coordinates with the USFWS FO(s) upfront and conducts a valid summer mist-netting (Appendix B) or acoustic (Appendix C) survey using the appropriate LOE and does not capture/detect an IBAT and/or NLEB(s), then no IBAT or NLEB related restrictions will be required for that specific project area. However, all restrictions/assumptions of IBAT and/or NLEB presence outside of a completed outer-tier project survey area shall remain intact indefinitely within the 5-mile (or 3-mile for NLEB) buffer zone or until additional negative survey data or discovery of roost trees indicate adjustments to a buffer are warranted by USFWS. Negative survey results from "outer-tier" projects are valid for 5 years for that particular project area. If an IBAT and/or NLEB(s) is captured/detected/radio-tracked during the survey, then the project area will be presumed to be occupied, restrictions will remain in place, and the USFWS FO(s) will reassess/adjust the original buffer(s) if warranted using the newly acquired bat location data.

⁷⁴Document is available [on the USFWS website provided in the intro](#)

APPENDIX G: THE OUTER-TIER GUIDANCE

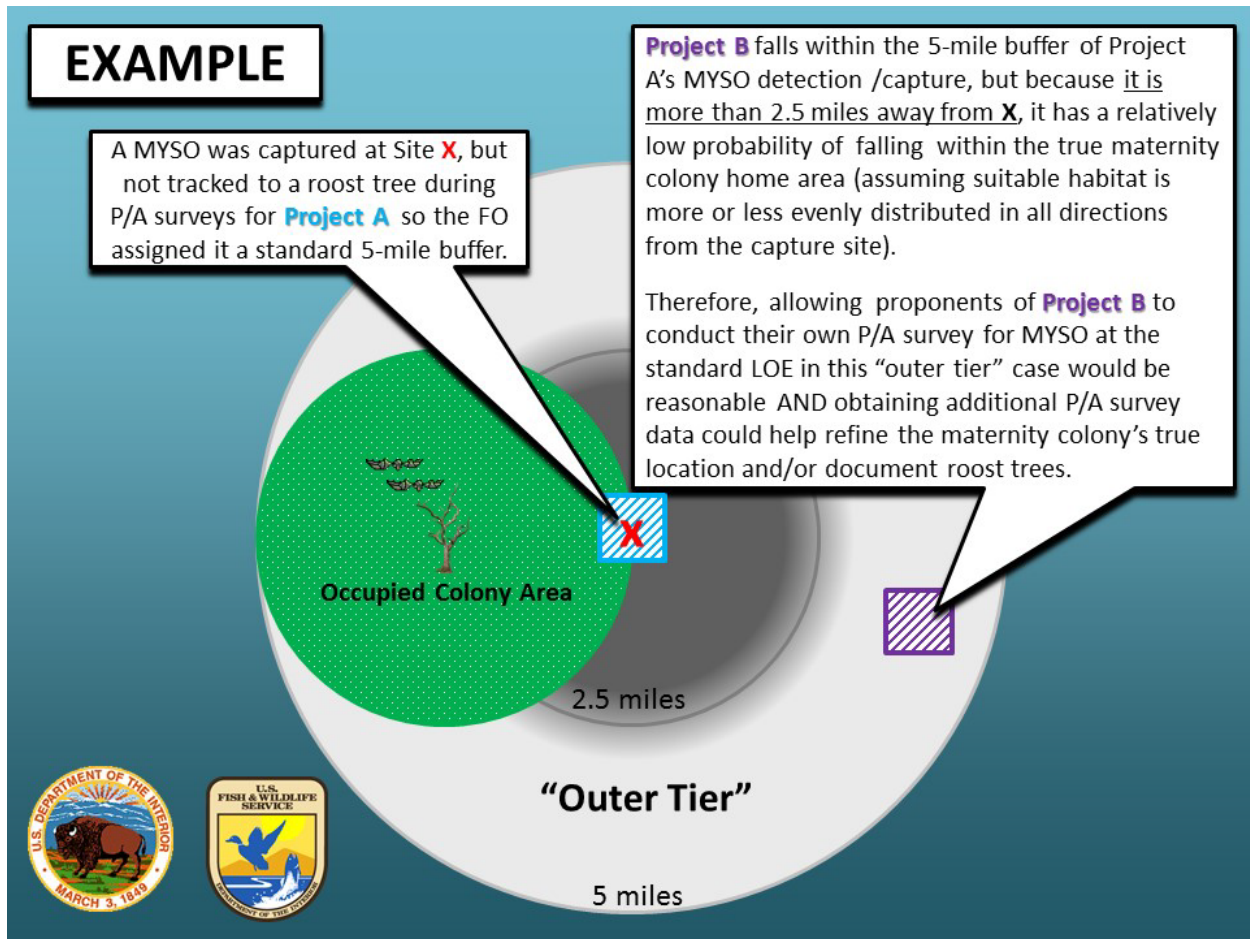


FIGURE 6. Graphical example depicting the proper application of the outer-tier guidance.

APPENDIX G: THE OUTER-TIER GUIDANCE

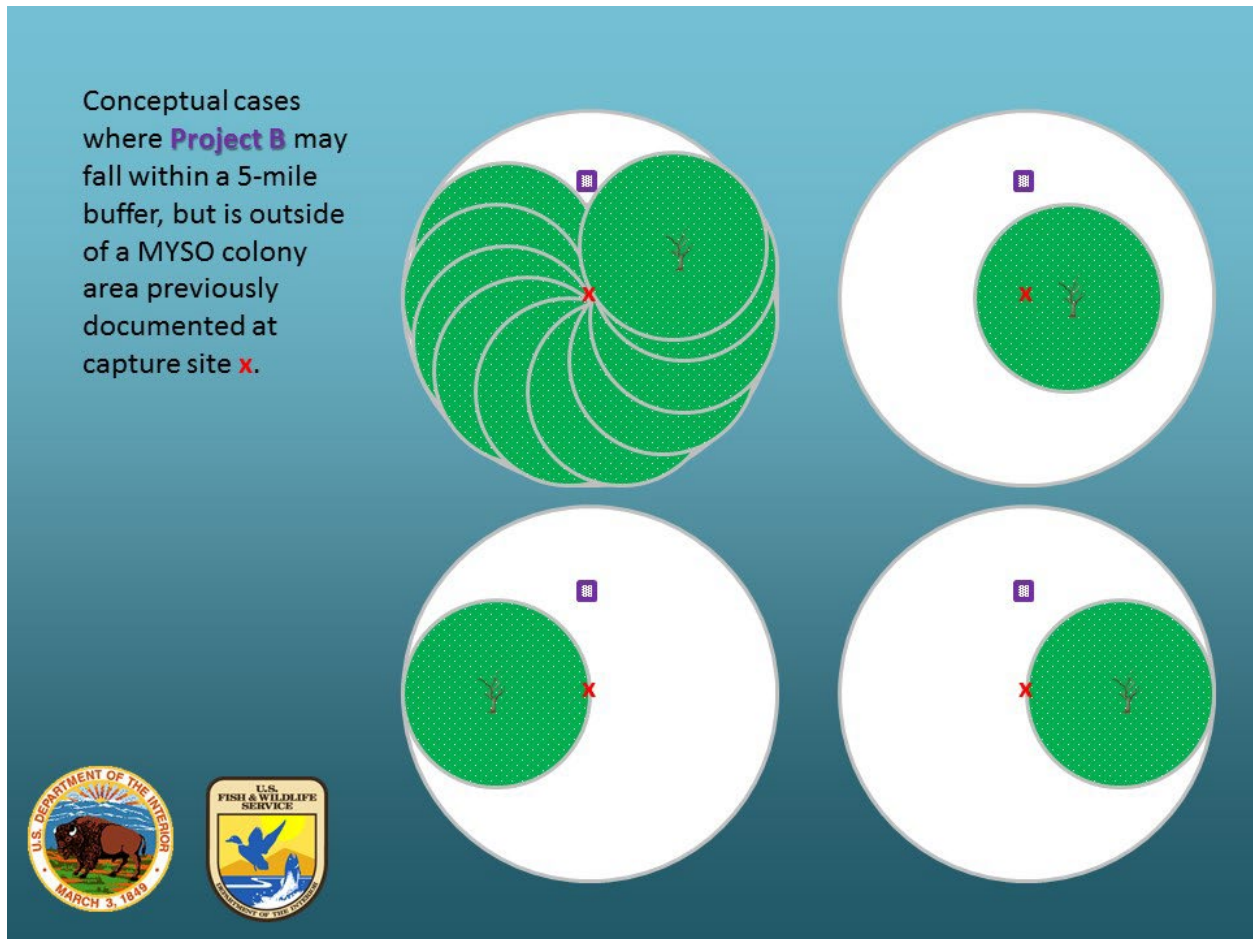


FIGURE 7. Hypothetical outer-tier scenarios where a proposed project area (depicted by a purple square) falls outside of the “true” IBAT maternity colony area(s) (depicted in green).

APPENDIX H: POTENTIAL HIBERNACULUM SURVEY GUIDANCE

Indiana [and NLEBs](#) have been documented using caves (and their associated sinkholes, fissures, and other karst features), as well as anthropogenic features such as mines and tunnels as winter hibernation habitat (i.e., hibernacula). Project proponents need to evaluate whether any potentially suitable IBAT [and/or NLEB](#) hibernacula exist within a proposed project area. This knowledge will be derived from a variety of sources. The following phased process should be followed to determine presence or probable absence of IBAT [and/or NLEB](#) in potential hibernaculum:

PHASE 1 – INITIAL PROJECT SCREENING

Step 1. Coordinate with the USFWS FO(s) and appropriate state natural resource agencies regarding existing federally listed bat hibernaculum or other occurrence information.

Prior to initiating P/A surveys (Phase 2) of potential IBAT and/or NLEB hibernacula (as determined by the Phase 1 Habitat Assessment), the USFWS FO(s) and appropriate state natural resource agencies must be contacted to determine if any caves or other underground features have been previously documented as hibernacula or other habitat for federally listed bat species. Any proposed surveys of previously documented hibernacula must be coordinated directly with these agencies to ensure that adverse effects to listed species do not occur because of the survey.

Step 2. Desktop Analysis and Initial Field Reconnaissance.

After coordinating with the FO and appropriate state natural resource agency (when applicable), a desktop analysis and initial field reconnaissance should be completed by individuals with a natural resource degree or equivalent work experience and a solid understanding of karst topography and/or surface features associated with underground mines. These initial assessments can be completed at any time of year.

For all projects, a FO-approved field survey of all land within 0.5 miles of the edge of the project footprint (where access can be obtained) and documentation (e.g., a literature search, maps and information provided by local cave survey groups or grottos, review of aerial photography and topographical maps, previous mining records (if applicable), forest inventories, previous species survey reports, and the work of consultants or other designees) of all known caves and abandoned mines within 3 miles of the outside edge of the project footprint should be conducted. If caves or abandoned mines are found, further detail about the known or estimated underground extent of the cave/mine should be provided to the USFWS FO(s), including minimum and maximum depth of features and where those features are located on a map(s).

In general, underground openings can be deemed unsuitable as a hibernaculum and dismissed from further assessment and surveys if:

- a) There is only one horizontal opening, and it is less than 6 inches (15.2 cm) in diameter;
- b) Vertical shafts are < 1 foot (0.3 m) in diameter;

- c) Passage continues < 50 feet (15.2 m) and terminates with no visible fissures that bats can access;
- d) Openings are prone to flooding, collapsed shut and completely sealed, or otherwise are inaccessible to bats; and
- e) Openings that have occurred recently (i.e., within the past 12 months) due to human activity or subsidence. (Include written documentation verifying this determination).

The results of initial field assessments should be submitted to the USFWS FO(s) and State regulatory partners (when applicable) for review and approval prior to proceeding to Step 3. FO-approved results from Step 2 will remain valid for a minimum of five years. **NOTE:** longer time frames may not be appropriate due to cave/mine dynamics.

Step 3. Conduct a Phase 1 Habitat Assessment of Potentially Suitable Hibernacula.

If underground openings are documented during field surveys in Step 2 and cannot be dismissed during initial project screening above, then a qualified biologist⁷⁵ will need to conduct a Phase 1 Habitat Assessment to determine whether bats using a potentially suitable hibernaculum within a project area could be adversely affected by the proposed project as described below (see Phase 1 Habitat Assessment Sample Data Sheet).

Habitat assessments should include all entrances or openings that will be directly or indirectly impacted by the proposed project. This would include those caves (and their associated sinkholes, fissures, and other karst features), as well as anthropogenic features such as mines and tunnels that are within the project site or that are otherwise connected (i.e., by physical passageway, airflow or hydrologically) to any underground feature that will be directly or indirectly impacted by the proposed project.

The results of a Phase 1 Habitat Assessment should be submitted to the USFWS FO(s) and State regulatory partners (when applicable) for review and approval prior to proceeding to Phase 2. FO-approved results from Step 3 will remain valid for a minimum of five years. **NOTE:** longer time frames may not be appropriate due to cave/mine dynamics.

PHASE 2 – PRESENCE/ABSENCE SURVEYS

Surveys to Confirm Use of Suitable Winter Habitat

If suitable winter habitat is discovered as a result of the Phase 1 Habitat Assessment above, do not alter, modify, or otherwise disturb entrances or internal passages of caves, mines, or other entrances to underground voids (potential hibernacula) within the action area before completing a Phase 2 survey. The survey protocols for determining occupancy are detailed below. Some

⁷⁵ A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for IBAT and/or NLEB in the state/region in which they are surveying. Alternatively, in States within Region 5 of the USFWS, state agencies assess qualifications and provide authorization to net, handle, and conduct hibernaculum surveys of/for IBAT and/or NLEB in that State (authorization is only valid in the State that provides the authorization). Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

surveys may require modification (or clarification) of these guidelines; therefore, submittal of a study plan and coordination with the USFWS FO(s) and state natural resource agency is necessary prior to initiating suitable winter habitat/hibernacula surveys. Submit results of completed summer and/or winter surveys to the appropriate FO(s) prior to clearing or altering of identified bat habitat. The USFWS FO(s) will review the results of P/A surveys conducted according to these guidelines for the purposes of determining whether IBAT and/or NLEB are occupying hibernacula in the project area and whether they may be adversely affected by any proposed actions.

WINTER (INTERNAL), FALL, AND SPRING SURVEY PROTOCOLS FOR IDENTIFYING POTENTIAL BAT HIBERNACULA

White-nose syndrome (WNS) is a devastating fungal disease that has killed unprecedented numbers of hibernating bats in eastern North America. WNS and/or *Pseudogymnoascus destructans* (Pd), the fungus causing the disease has been detected throughout the range of the IBAT, as well as most of the range of the NLEB. Users of this guidance must follow the recommendations provided in the most recent USFWS Cave Advisory⁷⁶ as they relate to reducing the potential for humans to disturb hibernating bats or inadvertently transporting Pd to uncontaminated bat habitats. All surveys conducted at caves/mines should be coordinated with the USFWS FO(s) and appropriate state natural resources agencies prior to initiation (see example USFWS Project Proposal Form).

Winter (Internal) Surveys

Working near and within abandoned mines and caves can be inherently dangerous due to a variety of potential hazards (e.g., ceiling collapse and presence of toxic gases)⁷⁷. Therefore, surveyors must thoroughly assess their work sites for any known and potential health and safety hazards and must use appropriate personal protective equipment and take proper precautions to avoid and minimize identified risks. Only sites that are deemed safe should be entered at the surveyor's discretion.

Potential hibernacula that are deemed safe to enter should be entered and all its accessible passages visually surveyed for the presence of IBAT during mid-winter (i.e., beginning January 1st and ending prior to March 1st of the same calendar year (also see Appendix 4 of the USFWS 2007 Indiana Bat Draft Recovery Plan: first revision). **NOTE: The use of direct internal surveys is not adequate for NLEB due to the difficulty in visually detecting the species inside hibernacula (i.e., it typically roosts in deep cracks and crevices)**. Only properly trained and qualified individuals with the appropriate federal and/or state permits and equipment should attempt internal presence/absence surveys for the IBAT. If the qualified biologist, who completed the Phase 1 Habitat Assessment, does not have the necessary experience/permits to complete internal survey work, then this portion of the project should be subcontracted to another individual or group that does. If a site is unsafe or too difficult to enter or it is believed that significant portions of the underground system are inaccessible, it should be surveyed using the Fall or Spring emergence survey guidance to determine presence or probable

⁷⁶ <https://www.whitenosesyndrome.org/press-release/updated-cave-advisory-recommendations-for-managing-access-to-subterranean-bat-roosts-to-reduce-the-impacts-of-white-nose-syndrome-in-bats>

⁷⁷ The Service highly recommends that surveyors seek counsel from an occupational health and safety professional(s) prior to working underground or under other potentially hazardous field conditions.

absence of federally listed bat species, including the IBAT and/or NLEB (also see Sample Data Sheet for Fall or Spring Surveys of Potential Hibernacula).

Fall or Spring Emergence Survey

1A. Fall surveys of mine/cave entrances must be conducted between September 15 and October 31⁷⁸ and prior to any tree clearing by the project applicant. A minimum of one night of harp trap sampling per week for 6 weeks (i.e., 6 nights of sampling) is required at each suitable entrance as determined by the Phase 1 Habitat Assessment. Each night of sampling should be separated by at least one week of the survey window if weather conditions allow it. However, multiple nights of sampling per week can be accepted in the last two weeks of October if forecasted weather conditions require it, at least 3 nights of sampling were completed during the first 3 weeks of the survey period, and the modification is approved by the appropriate USFWS FO(s). Survey effort may be suspended if no bats (of any species) are captured after the first 2 nights of acceptable survey effort in the fall. Surveys of a potential hibernaculum are in addition to any summer P/A surveys that may be required for a proposed project.

OR

1B. Spring surveys of mine/cave entrances must be conducted between April 1 and April 21⁷⁹ and prior to any tree clearing by the project applicant. Conducting surveys during the spring emergence is typically more complex than conducting fall surveys due to a greater number of uncontrollable factors (e.g., weather related factors). Thus, a minimum of three nights of harp trap sampling per week for three weeks (i.e., 9 nights of sampling) is required at each suitable entrance as determined by the Phase 1 Habitat Assessment. Due to the need to monitor weather conditions closely, each proposed spring mine/cave survey must be coordinated with the USFWS FO(s) and appropriate state natural resource agencies prior to surveying to ensure that adequate survey results are achieved. Surveys of a potential hibernaculum are in addition to any summer P/A surveys that may be required for a proposed project.

2. Unless otherwise approved by the USFWS FO⁸⁰, the capture of an IBAT and/or NLEB during a fall or spring mine/cave survey requires that the applicant complete three additional nights of sampling per week for three consecutive weeks (9 additional nights LOE) in order to determine the relative significance of the mine(s) and/or cave(s) and their associated underground workings to the IBAT and/or NLEB. If the mine/cave survey season (i.e., September 15 to October 31 for fall sampling and April 1 to April 21 for spring sampling) ends prior to the completion of the required additional sampling, then sampling must be completed the following fall or spring.

3. Harp traps are the preferred method for sampling entrances as they are less stressful on captured bats. Mist nets can also be deployed along corridors immediately adjacent to the entrance to increase survey effectiveness. Mist nets may also be used at the entrance but only when the mine or cave configurations are not suitable to harp trapping. The use of mist nets must be approved by the USFWS FO(s) and appropriate state natural resource agency prior to

⁷⁸ Timing of fall surveys may need adjustment based on location and weather conditions leading up to the survey. Coordination with local USFWS FO(s) and State regulatory partners (when applicable) during development of the study plan/project proposal form is required.

⁷⁹ Timing of spring surveys may need adjustment based on location and weather conditions leading up to the survey. Coordination with local USFWS FO(s) and State regulatory partners (when applicable) during development of the study plan/project proposal form is required.

⁸⁰ Additional survey effort may not be recommended in cases where a project proponent agrees to modify their project to completely avoid adverse impacts to newly documented hibernacula or the survey was conducted solely to determine if abandoned mine openings can be closed or if bat-friendly gates need to be installed.

initiation of survey. Mist nets should be made of the finest, lowest visibility mesh commercially available. Currently, this is 2-ply, 50-denier nylon (denoted 50/2). The mesh should be approximately 1.5-inch in size. No other specific mist netting hardware is required.

4. Entrances must be entirely enclosed by the survey gear when harp trapping. If mist nets are used, entrances should not be entirely enclosed by the survey gear.

5. All entrances that are potentially inter-connected should be surveyed on the same night. In cases where one team of surveyors cannot feasibly sample all entrances in one night, a modified method could also be used. This method should only be used in situations where the entrances are known to be interconnected. In this modified method, half of the interconnected entrances are surveyed on the first night, and the other half of the entrances are completely blocked using bird-exclusion netting, plastic sheets or other impervious material. On the second night, survey efforts are reversed. Any materials used to block the entrances must be removed each night immediately after conducting the survey. No entrances should be left blocked over-night. Plastics or other materials used to block the entrances should be removed each night immediately after conducting the survey. Entrances that are not connected (e.g., as determined by existing mine maps) do not have to be surveyed simultaneously.

6. The sampling period should begin at sunset and continue for at least 5 hours each night. During this time, harp traps (most preferable method) and/ or mist nets (acceptable method, but less preferable from a bat-handling perspective) should be monitored for captured bats [continuously](#) to minimize the number of bats that escape. [Surveyors monitoring set-ups continuously must minimize noise, lights and movement near the traps or nets. Monitoring with a bat detector \(ideally using ear phones to avoid alerting bats\) can be beneficial: \(a\) bats can be detected immediately when they are captured, \(b\) prompt removal from the trap/net decreases stress on the bat and potential for the bat to escape, and \(c\) monitoring with a bat detector also allows the biologist to assess the effectiveness of each trap/net placement \(i.e., if bats are active near the set-up but avoiding capture\), which may allow for adjustments that will increase capture success on subsequent nights. There should be no other disturbance near the set-up, other than to check traps/nets and remove bats. Biologists should be prepared to cut the net if a bat is severely entangled and cannot be safely extracted within 3 or 4 minutes. Capture and handling are stressful for bats. Emphasis should be on minimizing handling and holding bats to as short a time as possible to achieve field study objectives. Bats should not be held for more than 30 minutes after capture or as allowed in federal and state permits.](#)

7. If captures increase during the survey or if 6 or more bats of any species were captured during the last hour of monitoring, the survey effort must continue until activity declines or fewer than 6 bats are captured per hour. A total of 30 (fall) or 45 (spring) hours of sampling should take place for a mine/cave survey to be approved.

8. Severe weather adversely affects the activity levels of bats. If any of the following weather conditions exist during the fall or spring mine/cave survey, the time and duration of such conditions must be noted on the data sheets and in the survey report, and the survey effort for that night must be repeated: (a) winds sufficiently strong and variable enough to move equipment (i.e., traps or nets) more than 50 percent of the time; and (b) precipitation, including rain and/or fog, that does not stop within 30 minutes or continues intermittently during the survey period; and (c) temperatures that are less than 50° F (10° C) for the first 2 hours, and that drop below 40° F (1.6° C) at any point during the survey.

9. All bats captured during fall or spring surveys must be temporarily marked with a USFWS FO-approved non-toxic material that will last for the remainder of the survey period in order to identify any recaptures during subsequent survey nights.
10. If IBAT and/or NLEB (or other federally listed species) are captured during fall or spring mine/cave surveys, notification to the local USFWS FO(s) is required within 48 hours (or in accordance with permit conditions), and the sex and reproductive condition of the bat and GPS coordinates of the capture site should be provided.
11. A bat detector/roost logger should be on site to monitor general bat activity when trapping or netting. Bat passes should be monitored and tallied hourly. Bat tallies should be reported along with the time sampled. Report the beginning time and number of bat passes in hour blocks. Analysis of recorded bat calls to attempt species identification should not be completed as these calls are not expected to be foraging calls.
12. Noise, the use of lights, or other potential disturbances should be kept to, at a minimum, no closer than 300 feet (91.4 m) of the sampling site.
13. At least one member of each survey crew must hold, and have in his or her possession, a valid endangered species collection permit issued by USFWS and/or⁸¹ the appropriate state natural resource agency that allows the qualified biologist to collect bats, including federally listed species. All activities must be carried out with strict adherence to permit conditions and authorizations specified in your federal permit, as well as any State authorizations. A qualified biologist(s) must (1) select/approve harp trap/mist-net set-ups, (2) be physically present at each site throughout the survey period, and (3) confirm all bat species identifications. This biologist may oversee other biological technicians and manage set-ups in close proximity to one another as long as the traps/nets are being monitored continuously.
14. All survey efforts must follow the most recent USFWS decontamination protocols regarding WNS.

⁸¹ Surveyors working in States within Region 5 of the USFWS only require a permit from the State where the survey is taking place.

Phase I Habitat Assessment Sample Data Sheet

Location _____

Observers
(include
permit
numbers) _____

Latitude _____ **Longitude**⁸² _____

Date _____ **Time** _____ **Temp**
(outside) _____

	Opening #1	Opening #2	Opening #3	Opening #4
Opening Type (e.g., cave, portal, shaft)				
Opening vertical or horizontal				
Opening Size: Height x Width (or Diameter)				
Internal Dimensions: Height x Width				
Slope (up or down from entrance)				
Entrance Stable?				
Direction of Airflow (In or out?)				
Amount of Airflow (e.g., none, slight, heavy)				
Internal air warmer or cooler than outside temp.?				
Evidence of collapse?				
Ceiling Condition				
Amount of water in opening				
Evidence of past flooding?				
Observed length of internal passage				
Distance to nearest water source				
% Canopy Cover at entrance				
Foraging Signs? (e.g., moth wings)				

Are any portals suspected or known to be connected? Which ones?

Any observable side passages?

Additional comments:

Entry of abandoned mine portals, quarries, or caves can be extremely dangerous because of the potential for ceiling collapse and presence of toxic gases. Safety or health problems may occur as a result of entering abandoned mines. The FWS does not authorize or require anyone to enter any potential hibernaculum that is or could be unsafe while implementing surveys. These guidelines do not require any applicant or applicant employee, consultant, lessee, or other such designee to enter any cave, quarry, or mine portal.

⁸² Provide coordinates for each opening.

APPENDIX H: POTENTIAL HIBERNACULUM SURVEY GUIDANCE

USFWS Potential Hibernaculum Project Proposal Form

CONTACT INFORMATION

Permittee Name(s): _____
State Permit # _____ Section 10 USFWS Permit # _____
Institution/Company Name (as on Permit): _____
Address: _____
City: _____ State: _____ Zip: _____
Email address: _____
Phone #: _____

PROPOSED PROJECT OR ACTIVITY INFORMATION

County: _____ Quad: _____
Project location: latitude: _____ longitude: _____

(You must include an 8.5" x 11" topo or aerial map with project/activity location and proposed sites identified)

USFWS Project Number (if known): _____
Mining Project SMCRA Permit Number: _____
Transportation Project DOT Item Number: _____
Utility Project: _____
AML Project: _____
Other: _____

Acres of suitable Indiana bat habitat within project/activity area: _____
Is the project/activity linear? Yes: No:
If yes, indicate length of suitable Indiana bat habitat in km (mi): _____
Are caves or portals present? Yes: No:

METHODOLOGY & SURVEY EFFORT

Coordinates of cave/portal (if multiple, provide locations on project map): latitude: _____ longitude: _____
Name of cave (if known): _____
Estimated Start Date of Fieldwork: _____
of Acoustic Activity Nights: _____ Number of Mist Net/Harp Trap Nights: _____
Other _____

Signature **Date**