



## **Appendix G9. Habitat Surveys for Rare Birds**



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# Habitat Surveys for Rare Birds

West Lake Corridor Project

Federal Transit Administration  
and  
Northern Indiana Commuter  
Transportation District

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## Acronyms and Abbreviations

cm	Centimeters
CN	Canadian National Railway
et al.	and others
FEIS	Final Environmental Impact Statement
FTA	Federal Transit Administration
GPS	global positioning system
IDNR	Illinois Department of Natural Resources
INDNR	Indiana Department of Natural Resources
n.d.	no date
NEPA	National Environmental Policy Act
NICTD	Northern Indiana Commuter Transportation District
SSL	South Shore Line
TPSS	traction power substation
USFWS	United States Fish and Wildlife Service



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## Executive Summary

The Federal Transit Administration and the Northern Indiana Commuter Transportation District (NICTD) are conducting the environmental review process for the West Lake Corridor Project (Project) in Lake County, Indiana, in accordance with the National Environmental Policy Act (NEPA) and other regulatory requirements. The purpose of this study is to determine whether building a 9-mile southern extension of the existing NICTD South Shore Line (SSL) between Dyer and Hammond, Indiana, would negatively affect any of the bird species that were identified during preconstruction coordination with state and federal regulatory agencies including the Indiana Department of Natural Resources (INDNR), the Illinois Department of Natural Resources (IDNR), and the United States Fish and Wildlife Service (USFWS).

The Project team addressed these concerns by completing a multi-step analysis. First, desktop analyses were used to determine whether the landscape contains large areas of high-suitability habitat for any of the target species. Habitat for the target species was virtually nonexistent and consisted of multiple fragmented areas associated with parks, rights-of-way associated with existing railroad tracks, and riparian areas along the Calumet River.

Second, biologists skilled in bird identification selected the 10 best locations within these areas and completed intense, short-duration observations during which they identified and counted all birds seen or heard during a 10-minute interval. These surveys provide the best opportunity to detect species that use highly specialized habitat such as marshes or grasslands. These surveys (point counts) were performed on May 1, 2017, and detected 342 birds of 37 species.

Third, biologists recorded all birds heard or seen on May 1 and 2, 2017, during times between the formal point counts and completing the traveling field work for the bird surveys and habitat assessments for rare insects (covered in a companion report). Such traveling surveys provide the most efficient way to detect species that travel widely and use a variety of habitats. These surveys detected 372 birds of 41 species.

The two survey types (point counts and traveling surveys for total avian diversity) detected very similar avian communities including most of the same species. The most common species in order of abundance using either or both techniques were the ringed-billed gull (*Larus delawarensis*) followed by the European starling (*Sturna vulgaris*), American robin (*Turdus migratorius*), Canada goose (*Branta canadensis*), and red-winged blackbird (*Agelaius phoeniceus*).



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# 1 Introduction

The Federal Transit Administration (FTA) and Northern Indiana Commuter Transportation District (NICTD) are conducting the environmental review process for the West Lake Corridor Project (Project) in Lake County, Indiana, in accordance with the National Environmental Policy Act (NEPA) and other regulatory requirements. This report has been prepared in support of the Final Environmental Impact Statement (FEIS) for the West Lake Corridor Project (Project). FTA is the federal lead agency and NICTD is the local project sponsor responsible for implementing the Project under NEPA.

## 1.1 Purpose of Report

The purpose of this report is to provide information regarding natural resources in the Project Area, including location and general quality of habitat for target bird species, and to provide a preliminary indication regarding the impacts of the Project on these species.



## 1.2 Project Description

The environmental review process builds on NICTD's prior West Lake Corridor studies that examined a broad range of alignments, technologies, and transit modes. The studies concluded that a rail-based service between the Munster/Dyer area and Metra's Millennium Station in downtown Chicago would best meet the transportation needs of the northwest Indiana area. Thus, NICTD advanced a Preferred Build Alternative (referred to as the FEIS Preferred Alternative) for more detailed analysis in the FEIS. NEPA also requires consideration of a No Build Alternative to provide a basis for comparison to the Build Alternative.

### 1.2.1 No Build Alternative

The No Build Alternative is defined as the existing transportation system, plus any committed transportation improvements included in the Northwestern Indiana Regional Planning Commission's (NIRPC) *2040 Comprehensive Regional Plan* (2011) and Chicago Metropolitan Agency for Planning's *GO TO 2040 Comprehensive Regional Plan* (2014) through the planning horizon year 2040. It also includes capacity improvements to the existing Metra line and Millennium Station, documented in NICTD's *20-Year Strategic Business Plan* (NICTD and Regional Development Authority 2014).

### 1.2.2 FEIS Preferred Alternative

The Project is an approximate 9-mile southern extension of the existing NICTD SSL between the town of Dyer and city of Hammond, Indiana. Traveling north from the southern terminus near Main Street at the Munster–Dyer municipal boundary, the Project would include new track operating at grade on a separate right-of-way to be acquired adjacent to the CSX Transportation Monon Subdivision rail line in Dyer and Munster. The Project alignment would be elevated from 45th Street to the Canadian National Railway (CN) Elsdon Subdivision rail line at Maynard Junction. North of the CN line, the Project alignment would return to grade and join with the



publicly owned former Monon Railroad corridor in Munster and Hammond, Indiana, and continue north. The Project would relocate the existing Monon Trail pedestrian bridge crossing over the Little Calumet River and build a new rail bridge at the location of the former Monon Railroad bridge. The Project alignment would cross under Interstate 80/94 (I-80/94) and continue north on the former Monon Railroad corridor to Sibley Street. From Douglas Street north, the Project would be elevated over all streets and rail lines using a combination of retaining walls, elevated structures, and bridges. The Project would terminate just east of the Indiana Harbor Belt at the state line, where it would connect with the SSL. Project trains would operate on the existing MED line for the final 14 miles, terminating at Millennium Station in downtown Chicago.

Four new stations would be constructed along the alignment; Munster/Dyer Main Street, Munster Ridge Road, South Hammond, and Hammond Gateway Stations. Each station would include station platforms, parking facilities, benches, trash receptacles, bicycle racks, and other site furnishings. Shelter buildings would only be located at the Munster/Dyer Main Street and Hammond Gateway Stations. The Project would include a vehicle maintenance and storage facility with a layover yard and traction power substation (TPSS) to power the overhead contact system, located just south of the Hammond Gateway Station, west of Sheffield Avenue. Additional TPSSs would be located at the South Hammond Station parking lot and Munster/Dyer Main Street Station. The TPSS would be enclosed to secure the electrical equipment and controls, with a footprint of about 20 feet by 40 feet.

## 2 Environmental Setting

The FEIS Preferred Alternative is located in Indiana, but adjacent to the Indiana–Illinois border. During the Draft EIS process, the Indiana and Illinois Departments of Natural Resources provided information regarding rare bird species. The Illinois Department of Natural Resources (IDNR) identified concern for 19 species of birds known to occur in the region, many of which are also a concern for the Indiana Department of Natural Resources (INDNR) and the United States Fish and Wildlife Service (USFWS). Examination of all such species provides regional context.

Each of these target species is described below, with the order of appearance being based on the order in *Field Guide to the Birds of North America* (Dunn and Alderfer 2008), which groups closely related species together.

### 2.1 Pied-billed Grebe

#### 2.1.1 Description

The pied-billed grebe (*Podilymbus podiceps*) is a small, heavy-bodied swimming bird (length of 30–38 centimeters [cm]). The species has a blocky head, a slender neck, a compact body, and a short, thick bill. It lacks a prominent tail. It is brown with lightly tawny-brown underparts. In the spring and summer, the crown and nape are dark and have a black throat. While a pied-billed grebe is breeding, its bill is whitish with a black band, but otherwise it is yellow-brown. Juveniles are similar to adults with the addition of a conspicuous striped face (Dunn and Alderfer 2008).

#### 2.1.2 Distribution and Status

The pied-billed grebe is widely distributed throughout North and South America at various times of year. It is a year-round resident in the southern United States south to Argentina but migrates into northern states and Canada only to breed. Worldwide it is a species of least concern (Dunn and Alderfer 2008).

#### 2.1.3 Regional Occurrence

The pied-billed grebe is widely distributed and occurs statewide in Illinois and Indiana. It is not listed by either State (Illinois Endangered Species Protection Board 2015; INDNR 2017).

#### 2.1.4 Natural History

The pied-billed grebe occupy bodies of sluggish, fresh to slightly salty water. It anchors its floating nests using emergent aquatic vegetation. Its habitat types include freshwater wetlands, wet fields, bays, sloughs, marshes, lakes, slow-moving rivers, and sewage ponds. The Pied-billed grebe forages on crustaceans and small fish, which it crushes with their bill and muscular jaws. It is an opportunistic feeders that will forage on crabs, shrimp, snails, mussels, beetles, and aquatic insects (Glover 1953).

A hen produces 1 to 2 clutches of 2 to 10 eggs each per year, which are then incubated for 23 to 27 days. The chicks are able to leave the nest soon after hatching by climbing on the adult's back, where they remain for a week (Dunn and Alderfer 2008).



## **2.2 American Bittern**

### **2.2.1 Description**

The American bittern (*Botaurus lentiginosus*) is a medium-bodied heron (length of 60–85 cm) with short, stocky legs, a thick, short neck, and a compact body. The species is smaller than most members of the heron family and is distinguished by brown plumage with heavy, dark streaks extending down the neck. Juveniles are similar to adults in appearance, albeit without the appearance of the black neck streak (Dunn and Alderfer 2008). When disturbed, bitterns hold their necks erect in order to mimic the surrounding vegetation.

### **2.2.2 Distribution and Status**

The American bittern has an extensive North American range. It maintains a nonbreeding range from Oregon east to the Atlantic Coast and north to Canada's Northwest Territories. The species breeds along the U.S. Pacific Coast from Seattle to Los Angeles and along the Atlantic Coast from Philadelphia to the Outer Banks of North Carolina, with a disjunct (geographically separated) breeding population in central New Mexico near Albuquerque (Butler et al. 2014).

### **2.2.3 Regional Occurrence**

The American bittern has been documented occupying breeding grounds statewide in Indiana and Illinois, where it is listed as endangered by both States (Illinois Endangered Species Protection Board 2015; INDNR 2017). The species is typically associated with cattails and reeds, especially when such vegetation is surrounded by grassy areas or other emergent, wetland vegetation.

### **2.2.4 Natural History**

The American bittern occupies freshwater marshes, lakes, shallow wetlands, and estuaries. It feeds primarily on fish, crustaceans, insects, and occasionally small reptiles and amphibians (Butler et al. 2014).

It forages by ambushing prey in dense vegetation surrounding freshwater bodies. The species is territorial and establishes territories soon after arriving in its breeding range in May and June. A female produces 3 to 5 eggs per breeding season with as many as 7 being documented. The young hatch within 24 to 28 days, at which time the female is the sole provider of the offspring. The chicks leave the nest 1 to 2 weeks after hatching (Duebbert and Lokemoen 1977).



## **2.3 Least Bittern**

### **2.3.1 Description**

The least bittern (*Ixobrychus exilis*) is a small (length of 28–38 cm), thin heron. It has rich buff flanks and sides, with streaking on the fore neck. It has white underparts and a mostly pale bill. The species has a short tail and dark primary and secondary feathers. Males have black crowns and backs, and females and juveniles have darker streaking on the breast and back (Dunn and Alderfer 2008).

### **2.3.2 Distribution and Status**

The least bittern is distributed from southeast Canada to northern Argentina. Its breeding range includes the eastern United States with isolated breeding populations in the western United States (Dunn and Alderfer 2008).

### **2.3.3 Regional Occurrence**

The least bittern can be found anywhere suitable habitat is present. Suitable habitat is rare across Indiana and Illinois, where it is listed as endangered by both States (Illinois Endangered Species Protection Board 2015; INDNR 2017).

### **2.3.4 Natural History**

The least bittern prefers freshwater wetlands, reservoirs, rivers, streams, ponds, swamps, and brackish marshes with dense emergent vegetation (Rodgers and Schwikert 1999).

The least bittern is an ambush hunter that hunts perched silently in vegetation 2 to 3 feet above water. The bill is used as a spear to attack a variety of small animals including fish, insects, frogs, crayfish, and mammals. Nests consist of a vegetative platform constructed from emergent vegetation with a canopy for shelter. Clutch sizes range from 1 to 7 eggs per year. Incubation is 17 to 20 days, and the chicks are independent within 6 to 14 days after hatching (Arnold 2005).

## **2.4 Yellow-crowned Night-Heron**

### **2.4.1 Description**

The yellow-crowned night-heron (*Nyctanassa violacea*) is a small (length of 55–70 cm) member of the heron family. It is distinguished by a stocky, purple-gray body and a large, crested head with white markings under the eyes. Juveniles are typically brown with white spots adorning the wings and dorsal portions of the body (Dunn and Alderfer 2008).

### **2.4.2 Distribution and Status**

The yellow-crowned night-heron's range includes the central United States from Nebraska south to Texas and east to the Atlantic Ocean. Along the Atlantic Coast, it is found from Maine to Florida, with populations in the Caribbean, Central America, and South America (Dunn and Alderfer 2008).

### **2.4.3 Regional Occurrence**

The yellow-crowned night-heron can be found across Illinois and Indiana where appropriate habitat is present. Despite this large geographic range, both States list the species as

endangered because nesting pairs are rare (Illinois Endangered Species Protection Board 2015; INDNR 2017). Small numbers of yellow-crowned night-herons nest in wetlands associated with Lake Michigan.

#### **2.4.4 Natural History**

The yellow-crowned night-heron is a secretive species that occupies swamps, bayous, streams, and mangroves. It is common in heavily vegetated areas near shallow waters and occurs less commonly in trees near urban areas. The species forages at night by slowly stalking prey in shallow waters or by standing still to ambush prey as it swims nearby (Watts 1995).

The nesting behavior of the yellow-crowned night-heron is not well-documented, but it is known to nest in isolated pairs, sometimes in mixed nesting areas with other avian species, where the yellow-crowned night-heron constructs nests in tree branches 30 to 40 feet above the ground. Clutch size is usually 4 to 5 eggs, but females can produce as many as 8 eggs during a single season. Incubation typically lasts between 21 and 25 days, during which time both sexes care for their offspring (Dunn and Alderfer 2008).

### **2.5 Black-crowned Night-Heron**

#### **2.5.1 Description**

The black-crowned night-heron (*Nycticorax nycticorax*) is generally smaller than other herons and has stockier proportions. It is distinguished by its short legs and broad, flat head with a black crown. Adults are gray with a black back, and juveniles are brown with white spots on their wings (Dunn and Alderfer 2008).

#### **2.5.2 Distribution and Status**

The black-crowned night-heron is found in the United States. It maintains resident populations along the Gulf and Atlantic Coasts, with breeding populations occurring in the Northwest, Southwest, Midwest, Great Lakes, and eastern Piedmont regions (Dunn and Alderfer 2008).

#### **2.5.3 Regional Occurrence**

In Indiana, the black-crowned night-heron can be found statewide, where it is listed as endangered and is considered a Species of Greatest Conservation Need. The species occurs year-round near Vincennes, but summer breeding populations occur throughout the rest of the state (INDNR 2017). In Illinois, the black-crowned night-heron occurs statewide in suitable habitat and is listed as endangered (Illinois Endangered Species Protection Board 2015). The species maintains breeding populations in the southern-most portions of the state, from Mount Vernon south to the Ohio and Mississippi Rivers.

#### **2.5.4 Natural History**

The black-crowned night-heron occupies rivers, streams, lakes, swamps, saltwater and freshwater marshes, canals, mudflats, and reservoirs where it feeds on a variety of arthropods, reptiles, and small mammals. The species is predominantly nocturnal, foraging in thick vegetative cover surrounding freshwater and estuarine environments. The black-crowned night-heron sometimes shifts its activity period to diurnal foraging during the breeding season. Nests are 12 to 18 inches in diameter, are composed of woody vegetation, and are often located in trees or cattails (Dunn and Alderfer 2008).

The black-crowned night-heron is territorial and forms colonies that can last for decades. The species is monogamous and exhibits a high level of parental care from both the male and female. Clutch sizes are 3 to 4 eggs on average and can be as large 7 eggs in a breeding season. Incubation is 21 to 26 days, and the young leave the nest after 6 weeks (Nickell 1966).

## **2.6 Little Blue Heron**

### **2.6.1 Description**

The little blue heron (*Egretta caerulea*) is a small heron (length of 51–76 cm) that is unique to the heron family in that the species has two distinct color morphs. Adult little blue herons are almost uniformly dark, smoky blue, while juveniles are completely white. The uniform pale gray legs of juveniles can be used to distinguish this species from the similarly sized and white snowy egret. Little blue herons have a slender neck, long legs, and a spear-like bill (Dunn and Alderfer 2008).

### **2.6.2 Distribution and Status**

The little blue heron is common along the Gulf and Atlantic Coasts of the United States, where it resides year-round. The species occurs in the lower Midwest, where its range extends from western Oklahoma, north to central Nebraska, and east to the Atlantic Ocean. The species also maintains a resident population along the northern coast of South America and south from Columbia into the interior portions of eastern Peru and western Brazil (Dunn and Alderfer 2008).

### **2.6.3 Regional Occurrence**

The little blue heron occurs across the southern two-thirds of Illinois, where it is listed as endangered (Illinois Endangered Species Protection Board 2015). The species also occurs in the southern half of Indiana, where it is not listed at the state or federal level (INDNR 2017).

### **2.6.4 Natural History**

The little blue heron occurs in the rivers, lakes, swamps, freshwater marshes, ponds, reservoirs, tidal flats, and estuaries of the coastal southeastern United States, where they stalk heavily vegetated, shallow waters for fish, arthropods, and amphibians. The species is largely solitary but becomes highly gregarious during the breeding season, forming territorial breeding colonies on islands and flooded lakes and marshes. The little blue heron builds stick nests in shrubs and small trees (3 to 15 feet above the ground) in which females lays 3 to 5 eggs during the breeding season. The eggs are incubated for about 20 to 23 days. Once the young are hatched, they are fed by both parents for 6 to 7 weeks before fledging (Dunn and Alderfer 2008).

## **2.7 Snowy Egret**

### **2.7.1 Description**

The snowy egret (*Egretta thula*) is a medium-sized heron (length of 47.5–68 cm) with snowy-white plumage, black legs with yellow feet, and a distinct yellow mask. Juvenile snowy egrets are similar to adults except for their duller, greenish legs (Dunn and Alderfer 2008). The species is also similar to juvenile little blue herons, which have uniformly gray legs.

### **2.7.2 Distribution and Status**

The snowy egret has an extensive range from the northern United States south to Chile and Argentina. It is a year-round resident along the Pacific, Gulf, and Atlantic Coasts in the United States and across its range in South America. The species also maintains a more northern breeding range in the central United States from southeastern Oregon east to the Atlantic Ocean (Dunn and Alderfer 2008).

### **2.7.3 Regional Occurrence**

The snowy egret can be found across the southern two-thirds of Indiana, where it has no special status, and across the southern two-thirds of Illinois, where it is listed as endangered (Illinois Endangered Species Protection Board 2015; INDNR 2017). Isolated populations also occur along Lake Michigan.

### **2.7.4 Natural History**

The snowy egret is common in mudflats, beaches, rivers, lakes, and wetlands along the North American coast and farther inland, where it wades in shallow waters to forage on aquatic organisms. During the breeding season, from March through May, this highly gregarious species nests in dense colonies. Males offer an elaborate courtship display before constructing nests in trees and shrubs on average 5 to 10 feet above the water's surface. Females lay an average of 3 to 5 eggs per season, and both parents incubate the eggs for about 20 to 24 days. After hatching, the young quickly develop and are fledging within 20 to 30 days (Dunn and Alderfer 2008).

## **2.8 Osprey**

### **2.8.1 Description**

The osprey (*Pandion haliaetus*) is a large raptor (length of 54–58 cm) with a slender body and narrow wings. The osprey displays a distinctive M-shaped flight pattern when seen from below, which is characteristic of the species. The species has a white underside and head, and a brown upper body with black, lines across the eyes that extend to the wings. The species is sexually dimorphic, with males having a bright white chest and females having a brown V on the chest. It is also distinguished from other birds of prey by its reversible fourth toe and talons, which can grasp fish while flying over open water (Dunn and Alderfer 2008).

### **2.8.2 Distribution and Status**

The osprey has a worldwide distribution including all of North and South America. Although the osprey can be found throughout North America, there are seasonal and geographic patterns within this larger distribution. Year-round populations occur in the warm climate of Florida and

the Baja Peninsula. Most North American birds breed in Canada and Alaska or along the coast and migrate to South America for winter. Inland, the osprey is relatively rare but is becoming more abundant as it occupies a variety of river ways and other water sources (Dunn and Alderfer 2008).

### **2.8.3 Regional Occurrence**

The osprey is listed as endangered in both Illinois and Indiana (Illinois Endangered Species Protection Board 2015; INDNR 2017) and is found throughout both states as a fall and spring migrant. Nesting pairs are rare and are often associated with large impoundments.

### **2.8.4 Natural History**

The osprey prefers coasts, lakes, rivers, streams, and swamps (Dunn and Alderfer 2008).

The osprey is one of the few birds of prey that feeds almost exclusively on live fish. However, regional variations in diet have indicated that some individuals will occasionally feed on small mammals. In North America, more than 80 species of fresh- and saltwater fish account for 99 percent of the osprey's diet (Francour and Thibault 1996).

Nests are built with sticks and lined with bark on top of snags, treetops, human-made structures, or crotches between large branches. Females typically lay 1 to 4 eggs per clutch with incubation periods of 36 to 42 days and nesting periods of 50 to 55 days (Bai et al. 2009).

## **2.9 Northern Harrier**

### **2.9.1 Description**

The northern harrier (*Circus hudsonius*) is a medium-sized raptor (length of 43–52 cm) that can be easily identified by its characteristically broad wings and rounded tail. Males are dorsally gray and ventrally white with a black-banded tail. Females and juveniles are generally brown with black bands on the posterior portion of the tail. All individuals have a white rump patch that is obvious during flight and serves as a primary identifying characteristic (Dunn and Alderfer 2008). The northern harrier can also be identified by its behavior and is usually observed either in flight, flying low over open fields (foraging), or perched on a fence post, rock, or stump (Serrentino 1992).

### **2.9.2 Distribution and Status**

The northern harrier has an extensive range spanning the entirety of North America. Its breeding range extends from the Arctic Circle in Alaska east to the Atlantic Ocean and south to the upper midwestern United States. The species winters in the southern United States and Mexico and maintains itself as a year-round resident in the middle United States from Washington east to coastal New York (Dunn and Alderfer 2008).

### **2.9.3 Regional Occurrence**

The northern harrier can be found statewide in appropriate habitat throughout Indiana and Illinois. It is listed as an endangered species by both States (Illinois Endangered Species Protection Board 2015; INDNR 2017).

## 2.9.4 Natural History

The northern harrier builds nests on the ground in open wetlands, pastures, cropland, grasslands, bogs, thickets, and riparian woodlands. It is also known to build nests in reclaimed strip mines when these mimic grasslands (Gross 2014).

The breeding season occurs from April to July, during which time the species uses a polygynous mating system. The females lay 3 to 6 eggs per season and then incubate the eggs for 29 to 31 days. For the first 2 weeks after hatching, the young are fed exclusively by the male, who transfers prey to the female via a series of highly acrobatic aerial passes. The young fledge in about 29 to 42 days after hatching and reach sexual maturity in 2 to 3 years (Gross 2014).

## 2.10 Peregrine Falcon

### 2.10.1 Description

The peregrine falcon (*Falco peregrinus*) is one of the largest falcons (length of 38–43 cm) in North America. It has a blue gray back, dark “helmet,” and light under parts with fine, dark spotting. Immatures have a brown back with heavier breast streaks, gray feet, and skin covering the base of the beak (cere). In flight, its wings are pointed, long, and narrow, and its tail is dark-banded (Dunn and Alderfer 2008).

#### Federal Register (FR) Documents

[35 FR 16047](#); October 13, 1970:  
Final Rule: Listed As Endangered

[63 FR 45446–45463](#); August 26,  
1998: Proposed Rule: Remove  
from the List of Endangered and  
Threatened Wildlife

[64 FR 46543–46558](#); August 25,  
1999: Final Rule: Remove from the  
List of Endangered and Threatened  
Wildlife

### 2.10.2 Distribution and Status

The peregrine falcon is widely distributed throughout all of the continents except Antarctica. In North America, it is a migrant in the Great Plains and Midwest, while its breeding grounds are in northern Canada extending through the Rocky Mountains, Great Lakes, and New England region (Dunn and Alderfer 2008). The species was initially listed as endangered in 1970 under a precursor of the modern Endangered Species Act. A combination of banning the pesticide DDT (dichlorodiphenyltrichloroethane) and introducing juvenile birds to urban areas allowed the species to be delisted at the federal level in 1999.

### 2.10.3 Regional Occurrence

As a result of conservation efforts, the peregrine falcon was down-listed from a status of threatened to a species of special concern in Indiana (INDNR 2017). It continues to be a state threatened species in Illinois (Illinois Endangered Species Protection Board 2015). As part of the reintroduction effort, peregrines were reintroduced to Chicago between 1986 and 1990 and subsequently have nested on several structures (The Field Museum n.d.) including an inactive nest near the Calumet Water Reclamation Plant.

### 2.10.4 Natural History

The peregrine falcon prefers to nest in open landscapes with rock cliffs or human-made structures (primarily skyscrapers) during the breeding season. Wintering habitat includes open habitat landscapes, barrier islands, mudflats, coastlines, lake edges, and mountain chains. The species eats a wide variety of bird species. Typically, it will prey on shorebirds, ptarmigans, ducks, grebes, gulls, storm-petrels, pigeons, and songbirds including jays, thrushes, longspurs, buntings, larks, waxwings, and starlings. Males select a few possible cliff nest locations at the

beginning of the nesting season, and females choose one of the locations. Females lay clutches of about 2 to 5 eggs that will incubate for 29 to 32 days. The species' nestling period takes 35 to 42 days (Dunn and Alderfer 2008).

## **2.11 King Rail**

### **2.11.1 Description**

The king rail (*Rallus elegans*) is a medium-sized species (length of 33–48 cm) and the largest of the rail family in North America. The species can be distinguished by its reddish, compact body, long, down-curved bill, and black and white stripes on its posterior (Dunn and Alderfer 2008).

### **2.11.2 Distribution and Status**

The king rail is distributed primarily in the eastern United States, where its range extends from central Texas, north to North Dakota, and east to New York City. The species winters on the Gulf and Atlantic Coasts before moving north to its breeding grounds in the Midwest and Great Lakes regions (Dunn and Alderfer 2008).

### **2.11.3 Regional Occurrence**

The king rail can be found statewide in Indiana and Illinois during the breeding season. It is listed as endangered by both States (Illinois Endangered Species Protection Board 2015; INDNR 2017).

### **2.11.4 Natural History**

The king rail prefers the dense vegetation surrounding freshwater marshes and estuaries where they are diurnal foragers, feeding primarily on crustaceans, insects, and small fish. They begin to migrate to their breeding range as early as February, though they typically breed from March to August. The king rail is highly territorial and quickly establish a territory to begin courtship soon after arriving in their breeding habitat (Dunn and Alderfer 2008).

The king rail then constructs elevated nests using dead plant material under a canopy of riparian vegetation, where they generally produce 10 to 12 eggs during the breeding season. The eggs are incubated for about 21 to 24 days, and the young generally leave the nest 6 to 10 weeks after hatching (Meanley 1969).

## **2.12 Common Moorhen**

### **2.12.1 Description**

The common moorhen (*Gallinula chloropus*) is a medium-sized species (length of 30–38 cm) with primarily dark, brown-gray plumage and a characteristic red beak with a bright yellow tip. Juveniles are paler with brown plumage and a duskier bill and legs (Dunn and Alderfer 2008).

### **2.12.2 Distribution and Status**

The common moorhen has an extensive range and can be found on four continents, excluding South America, Australia, and Antarctica. Within the United States, it can be found along the Gulf, Atlantic, and Pacific Coasts and, to a lesser degree, throughout the Midwest and Great Lakes regions (Dunn and Alderfer 2008).

### **2.12.3 Regional Occurrence**

In Indiana, the common moorhen is not state listed (INDNR 2017), and can be found along the northern border with Michigan and in the southwestern corner of the state, along the border with Illinois. In Illinois, the species can be found across much of the state when suitable habitat is present. Such habitat is rare, so the species is listed as threatened at the state level (Illinois Endangered Species Protection Board 2015).

### **2.12.4 Natural History**

The common moorhen is found in freshwater wetlands, marshes, swamps, reservoirs, lakes, rivers, streams, and ponds where they hunt insect larva, crustaceans, mollusks, and earthworms. The common moorhen prefers dense vegetation near water bodies where they can forage. The common moorhen nests on the ground or slightly elevated in small, riparian shrubs, have a cupped shape, and are constructed of aquatic and woody vegetation (Dunn and Alderfer 2008).

## **2.13 Common Gallinule**

### **2.13.1 Description**

The common gallinule (*Gallinula galeata*) is a medium-sized (length of 32–35 cm), ground-dwelling bird that can be easily identified by its characteristic dark body with a white lateral stripe and its conspicuous triangular, orange bill (Dunn and Alderfer 2008).

### **2.13.2 Distribution and Status**

The species has an extensive range and can be found from southern Canada to Argentina. It maintains a year-round presence along the southern Pacific, Gulf, and Atlantic Coasts in the United States, as well as in Central and South America. Its breeding habitat occurs primarily in the Midwest and Great Lakes regions of the United States as well as the Yucatan and Baja Peninsulas in Mexico (Dunn and Alderfer 2008).

### **2.13.3 Regional Occurrence**

The common gallinule can be found statewide in Indiana and Illinois during the breeding season. It is listed as endangered by both States (Illinois Endangered Species Protection Board 2015; INDNR 2017).

### **2.13.4 Natural History**

The common gallinule prefers the tall, aquatic vegetation of freshwater and estuarine marshes, where they feed on the seeds of grasses and sedges as well as some invertebrates. During the spring breeding season, it breeds in solitary, territorial pairs. The nests are constructed by both sexes; generally consist of a wide cup made of aquatic vegetation such as cattails, rushes, and reeds; and often contain a ramp leading to water. The female lays a clutch of 8 to 11 eggs (sometimes as many as 13), and both sexes provide parental care, incubating the eggs for 19 to 22 days until hatching. The young are generally precocial and can swim shortly after hatching. Juveniles are able to forage independently after about 3 weeks and begin to leave the nest about 40 to 50 days after hatching (Dunn and Alderfer 2008).



## 2.14 Piping Plover

### 2.14.1 Description

The piping plover (*Charadrius melodus*) is a small, sand-colored shore bird (length of about 18 cm) with black bands across its forehead and breast, orange legs, and a black-tipped orange bill (Dunn and Alderfer 2008).

### 2.14.2 Distribution and Status

The piping plover ranges from the southern portions of the Canadian provinces of Alberta, Saskatchewan, Manitoba, and Ontario south across portions of Montana, North Dakota, South Dakota, Nebraska, Kansas, Colorado, Iowa, and Missouri. The species also has disjunct populations around the Great Lakes in Wisconsin, Illinois, Indiana, Michigan, and Ohio as well as the Atlantic and Gulf Coasts from Maine to southeastern Texas (Dunn and Alderfer 2008). The Great Lakes population of piping plover is listed as endangered, whereas the Great Plains and Atlantic Coast populations are considered threatened.

### 2.14.3 Regional Occurrence

The piping plover is listed as endangered in Indiana and Illinois where it historically nested along the southern shore of Lake Michigan (Illinois Endangered Species Protection Board 2015; INDNR 2017). It has been decades since the species has been observed breeding in the region, with the last siting at the Indiana Dunes in the 1950s and the last nesting record from Illinois at Waukegan in 1973.

### 2.14.4 Natural History

The piping plover nests on sandy beaches, sandflats, barrier islands, alkaline lakes, riverine sand and gravel bars, reservoirs, and sand and gravel pits. It exhibits high fidelity for winter habitats and exhibit a strong preference for sandy nesting sites near water and vegetation, where they feed primarily on small arthropods (Dunn and Alderfer 2008).

During the breeding season, the piping plover typically has broods of 2 to 4 eggs, which are incubated by both sexes over the course of 26 to 28 days. The nest site is typically open and is usually some distance from water, often near vegetation for cover. The nest often consists of a shallow scrape in the sand, sometimes lined with shells and pebbles. Shortly after hatching, the young leave the nest in search of food. This precocious species relies on care from the male, as the female abandons the nest shortly after the eggs hatch. After 31 to 35 days, the young are able to fly and leave the nest (Dunn and Alderfer 2008).

#### Federal Register Documents

[72 FR 30326–30331](#); May 31, 2007: Revised Designation of Wintering Population

[73 FR 56860–56862](#); September 30, 2008: 5-Year Review

[73 FR 62816–62841](#); October 21, 2008: Revised Designation of Critical Habitat of Wintering Population (North Carolina)

[74 FR 23476–23600](#); May 19, 2009: Revised Designation of Critical Habitat of Wintering Population (Texas)

[76 FR 55638–55641](#); September 8, 2011: 90-Day Finding: Winter Population

[79 FR 38560–38562](#); July 8, 2014: Initiation of 5-Year Status Review

[81 FR 14121–14122](#); March 16, 2016: ETWP [Endangered and Threatened Wildlife and Plants] Draft Revised Recovery Plan

## **2.15 Wilson's Phalarope**

### **2.15.1 Description**

The Wilson's phalarope (*Phalaropus tricolor*) is a small, grayish shorebird (average length = 23 cm) with long legs, a slender neck, and a thin, straight, long bill. Cinnamon or rusty highlights are evident, especially on the neck. During the breeding season, the throat is white, and the neck is rust-colored. Breeding females are more colorful than males, displaying a dark line through the eye and extending down the neck. During the nonbreeding season, birds are pale gray above, white below, with no strong facial markings (Dunn and Alderfer 2008).

### **2.15.2 Distribution and Status**

The Wilson's phalarope winters predominantly on salty lakes in South American highlands, but during the breeding season the species nests mostly in shallow freshwater marshes in open country in the northern Great Plains (Butler et al. 2014; Dunn and Alderfer 2008).

### **2.15.3 Regional Occurrence**

Populations of breeding Wilson's phalarope are known to occur around the Great Lakes region, specifically in northern Illinois, northern Indiana, and northern Ohio. The Wilson's phalarope is listed as endangered in Illinois and as a species of special concern in Indiana (Illinois Endangered Species Protection Board 2015; INDNR 2017).

### **2.15.4 Natural History**

The Wilson's phalarope forages, mostly for small aquatic invertebrates, while by spinning in circles to create a whirlpool to trap and suck prey to the surface of the water. The Wilson's phalarope also attempts to grab flying insects while swimming or on land and probe through the mud on shore banks.

Females compete for males and might mate with more than one male for the season. A female lays a clutch of 3 to 4 eggs in a shallow depression made near the edge of a wetland before abandoning her mate to find additional mates (Butler et al. 2014). The male finishes the nest by placing a lining of grass around the depression and incubates the eggs for about 2.5 to 4 weeks until downy young hatch. Hatchlings leave the nest after a day and are largely independent apart from some tending and brooding from the male (Dunn and Alderfer 2008). The age of the young at first flight and the age of true independence are unknown.

## **2.16 Black Tern**

### **2.16.1 Description**

The black tern (*Chilidonias niger*) is a small, dark tern (length of 23–28 cm) identified by its characteristic dark head and chest with gray wings. In nonbreeding colors, the tern displays a white head and underside with gray wings and a dusky coloration around the head and eyes (Dunn and Alderfer 2008).

### **2.16.2 Distribution and Status**

The Black tern has an extensive worldwide range consisting of five continents, excluding Australia and Antarctica. In North America, it maintains a breeding range from coastal Oregon east to Quebec and south to Central America. The black tern also maintains an extant

nonbreeding range from eastern Oregon north to British Columbia and east to Quebec, extending as far north as the Northwest Territories (Dunn and Alderfer 2008).

### **2.16.3 Regional Occurrence**

In Indiana and Illinois, the black tern can be found statewide. Breeding birds can be found across most of both states, with nonbreeding birds found across the northern portions. Both States list the species as endangered (Illinois Endangered Species Protection Board 2015; INDNR 2017).

### **2.16.4 Natural History**

The black tern can be found around freshwater marshes, lakes, and rivers; meadows; and along coastal areas, where it forages in flight along the water's surface for insects, small fish, amphibians, arthropods, and earthworms during the breeding season (Naugle et al. 2000).

Outside of the breeding season, the black tern feeds predominantly on small marine fish during their extensive migration. The black tern breeds in scattered colonies where both sexes construct platform nests from floating vegetation or on the ground near large water bodies. The female lays 2 to 4 eggs per season, and incubation is performed by both sexes for about 21 to 22 days. After hatching, the young develop rapidly and leave the nest within 2 to 3 days. Juveniles fledge within only 19 to 25 days after hatching (Dunn and Alderfer 2008).

## **2.17 Black-billed Cuckoo**

### **2.17.1 Description**

The black-billed cuckoo (*Coccyzus erythrophthalmus*) is a blue jay-sized species (length of 28–33 cm) that has brown upper parts, white underparts, a long body, a white-spotted under-tail, a reddish eye ring, and a distinctive down curved black bill. Juveniles have a buff eye ring and might have a buff tinge on the throat and under their tail covert feathers (Dunn and Alderfer 2008).

### **2.17.2 Distribution and Status**

The black-billed cuckoo is distributed primarily from north-central Canada to south-central Bolivia. The species' breeding range extends from Alberta, Canada, south to northern Texas, east to the Carolinas, and north to New Brunswick. Worldwide, it is a species of least concern (Dunn and Alderfer 2008).

### **2.17.3 Regional Occurrence**

The black-billed cuckoo occurs statewide in Illinois and Indiana. The species is listed as threatened in Illinois (Illinois Endangered Species Protection Board 2015) but has no special status in Indiana (INDNR 2017).

### **2.17.4 Natural History**

The black-billed cuckoo prefers to inhabit woodlands and thickets, including aspen, poplar, birch, maple, hickory, hawthorn, and willow. It consumes large insects such as grasshoppers, caterpillars, cicadas, and katydids, and occasionally the eggs of other birds. Both adults build the nest, with females laying eggs before it is completed. Females lay clutches of about 2 to 5 eggs (Dunn and Alderfer 2008).

## **2.18 Willow Flycatcher**

### **2.18.1 Description**

The willow flycatcher (*Empidonax traillii*) is a typical-sized (length of 13–17 cm) member of the genus *Empidonax*, whose members are notoriously difficult to identify. It has a relatively flat forehead and a distinct peak on the rear crown. It has a broad, long body, a broad bill, and a straight-sided tail. Juveniles are browner above, more yellow below, and wing bars are buff or yellowish-brown (Dunn and Alderfer 2008). The species can be distinguished from similar species by its call and its preference for shrubby wetlands.

### **2.18.2 Distribution and Status**

The willow flycatcher is widely distributed and is found from northwest Canada to northern Peru. The species' breeding region extends from northwestern Canada to eastern Nova Scotia and south from South Carolina to southern California. Its migration passage is mainly from Central America to the northern region of South America. Because of its expansive range, the willow flycatcher is considered a species of least concern (Dunn and Alderfer 2008).

### **2.18.3 Regional Occurrence**

The willow flycatcher is widely distributed and occurs statewide in Illinois and Indiana. It is not listed by either State (Illinois Endangered Species Protection Board 2015; INDNR 2017).

### **2.18.4 Natural History**

The willow flycatcher breeds in moist, shrubby areas, often with standing or running water. In winter, it uses shrubby clearings and early successional habitat (Brown 1988).

The diet of the willow flycatcher consists mainly of insects and berries in the fall. Nests are built in the crotch branches of shrubs or small trees near water. The willow flycatcher constructs open-cup nests made of weed stems, plant fibers, pine needles, and shredded bark. Nests are lined with feathers, hair, rootlets, and fine material. Females lay clutches of 3 to 5 eggs (Sanders and Flett 1989).

## **2.19 Yellow-headed Blackbird**

### **2.19.1 Description**

The yellow-headed blackbird (*Xanthocephalus xanthcephalus*) is a large species of blackbird (length of 22–27 cm). Males have a distinctive black body, small white patches on the wings, and characteristic bright yellow breast and head. Females and juveniles are significantly smaller and brown, instead of black, with dull-yellow heads (Dunn and Alderfer 2008).

### **2.19.2 Distribution and Status**

The yellow-headed blackbird has an extensive range across the western half of North America, where it maintains breeding habitat in the southwest from central Arizona and New Mexico south into Mexico. The species also maintains a nonbreeding range farther north from the southern portion of the Rocky Mountains north to the southern border of the Northwest Territories in Canada (Dunn and Alderfer 2008).



### **2.19.3 Regional Occurrence**

A small resident population is found along the Indiana–Illinois border along Lake Michigan, with a small, disjunct population at Demotte, Indiana. The yellow-headed blackbird is listed as state endangered in both Indiana (INDNR 2017) and Illinois (Illinois Endangered Species Protection Board 2015).

### **2.19.4 Natural History**

The yellow-headed blackbird can be found in dense vegetation along western prairies, alpine meadows, marshes, ponds, rivers, and wetlands (Twedt and Crawford 1995).

There it builds small nests in the reeds directly above the water where they can forage for insects and aquatic invertebrates. In the winter, it nests in the open, often in large agricultural fields where they can maintain a steady food source of seeds and grains. During the breeding season (March –June), they form large, conspecific flocks where they can better use their polygynous mating system, with males sometimes maintaining harems of up to 16 females (Dunn and Alderfer 2008).

The female yellow-headed blackbird constructs the nest independently, within the male's territory, where she lays an average of four eggs per season (Twedt and Crawford 1995). The eggs incubate for about 11 to 13 days. The young leave the nest within 3 weeks of hatching (Twedt and Crawford 1995).



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## 3 Methods

The Project team conducted avian surveys for 19 species of birds (discussed in **Chapter 2**) for which USFWS or INDNR has expressed concern. Most of these species are known or suspected to occur along the Indiana/Illinois border where the Project would join the existing SSL, which in turn passes through several remaining natural areas. Sixteen of these species are strongly associated with wetlands and waterways, whereas the other three (black-billed cuckoo, peregrine falcon, and northern harrier) are found in a variety of habitats.

Field surveys were thus designed to (1) detect the more-specialized species in wetland habitat (using point counts) and (2) maximize the potential for detecting the target species in a variety of habitat types (to determine total avian diversity).

### 3.1 Desktop Review

The Project team used the 2011 National Landcover Database (Homer et al. 2015) publicly available aerial photographs, United States Geological Survey topographic maps, USFWS National Wetland Inventory maps, and field notes of ESI staff familiar with the region to complete a desktop review. The review identified target areas for the point counts as well as areas near the survey corridor where target species might be observed. The desktop review was performed by senior biologists with extensive experience with birds in this region (Dr. Dale W. Sparks and Dr. Robert P. Jean). This step generated a map of habitat patches and types that was used to guide the field surveys.

### 3.2 Field Surveys

On arrival at the field site, Dr. Jean reviewed the results of the desktop review with field ornithologist, Mr. Joseph Johnson, and Mr. Lincoln Oliver and Ms. Kate Lucier, who were concurrently working on floristic analyses and so could provide additional details about habitat quality. After analyzing the desktop review, the Project team finalized the locations where the field surveys would occur (**Appendix A**). Résumés of qualified surveyors are provided in **Appendix B**. Field surveys for birds were performed on May 1 and 2, 2017.

#### 3.2.1 Point Counts

The Project team biologists performed 10 avian point count surveys along the survey corridor in areas with the best available habitat for the 19 target species. Point counts were based on the methods described by Ralph et al. (1995). Each point count survey lasted 10 minutes. During each count, biologists stood at a predetermined location (station) while looking and listening for birds. When birds were detected, the species, sex, time of detection, and type of observation (auditory or visual) were recorded for each individual. Point count surveys were conducted in a variety of habitats including urban parks, riparian corridors, and early successional forest, and were sufficient to detect most species within 164 feet (50 meters) of the survey station.

#### 3.2.2 Total Avian Diversity

The Project team biologists maintained a running tally of the birds they encountered during the field surveys. This provided both the number of species encountered as well as an estimate of abundance for each species. This approach was specifically used to maximize the potential to detect species such as the peregrine falcon, northern harrier, and black-billed cuckoo that use a wide variety of habitat types or have large home ranges (**Appendix C**).



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## 4 Results

### 4.1 Desktop Review

The desktop review shows that the FEIS Preferred Alternative is located in a highly developed area. Habitat for the target species was virtually nonexistent. A few small areas with potential habitat were parks, the ROW of existing tracks, and riparian areas along the Calumet River. However, the areas with the best available habitat were selected for the point count surveys, and these consisted of early-successional-stage forest, riparian habitat, urban grassland, and wetland habitat (see **Table 4.2-1**).

### 4.2 Field Surveys

#### 4.2.1 Point Counts

The Project team performed 10 point counts on May 1, 2017, which detected 342 representatives of 37 species of birds (**Table 4.2-1**). American robins (*Turdus migratorious*) and ring-billed gulls (*Larus delawarensis*) were present at all survey stations. Other species encountered at most stations included American goldfinch (*Spinus tristis*), song sparrow (*Melospiza melodia*), European starling (*Sturna vulgaris*), mallard (*Anas platyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), and double-crested cormorant (*Phalacrocorax auritus*). The greatest diversity occurred at Station 6, at which 14 species were detected. Representative photographs are provided in **Appendix D**.

The most-numerous species was ring-billed gull (106 observations) followed by European starling (36 observations), American robin (35 observations), Canada goose (*Branta canadensis*) (28 observations), and red-winged blackbird (24 observations).

None of the 19 target species were detected during the point counts.

**Table 4.2-1: Point Count Results**

Station	Time of Survey	Habitat Description	Species Recorded (Number)
1	0920–0930	Early-successional-stage forest/grassland	Eastern towhee (1), American robin (3), American goldfinch (6), turkey vulture (1), song sparrow (1), ring-billed gull (2), brown-headed cowbird (1), house finch (1), Carolina wren (1), killdeer (1), red-winged blackbird (1), European starling (1), double-crested cormorant (2)
2	1614–1624	Riparian area	Song sparrow (1), red-winged blackbird (3), mallard (1), double-crested cormorant (3), mourning dove (1), American robin (1), ring-billed gull (6), great egret (2)
3	1647–1657	Urban park near pond	American robin (8), ring-billed gull (70), Canada goose (13), European starling (9), red-bellied wood pecker (1), brown-headed cowbird (3), red-winged blackbird (1), white-throated sparrow (2), double-crested cormorant (2), mallard (2), common grackle (1), American goldfinch (1)
4	1714–1724	Grassland/wetland area	Ring-billed gull (7), red-winged blackbird (2), European starling (2), northern waterthrush (1), American goldfinch (1), American robin (2), swamp sparrow (1), mallard (2)
5	0756–0806	Grassland/early-successional-stage forest	Wood duck (2), red-winged blackbird (3), American robin (7), European starling (9), pigeon (3), ring-billed gull (3), house sparrow (1), song sparrow (3), yellow warbler (1), mallard (3), double-crested cormorant (1), brown-headed cowbird (1)
6	0827–0837	Wetland area	Solitary sandpiper (3), Canada goose (8), northern cardinal (2), mallard (4), house wren (1), ring-billed gull (6), red-winged blackbird (4), brown-headed cowbird (1), song sparrow (1), common grackle (3), American goldfinch (1), American robin (1), double-crested cormorant (1), northern flicker (1)
7	0908–0918	Urban park near pond	Hermit thrush, white-crowned sparrow, brown-headed cowbird (2), Canada goose (7), mallard, American robin (4), ring-billed gull (3), barn swallow, white-throated sparrow (7), blue-winged teal (2), American crow (1), European starling (3), American goldfinch (1)
8	0940–0950	Early-successional-stage forest and open-field ecotone	Downy woodpecker (1), blue jay (1), common grackle (2), American robin (6), European starling (6), ring-billed gull (4), American goldfinch (1), mallard (2)
9	1005–1015	Wetland area	Song sparrow (2), red-winged blackbird (6), common grackle (3), ring-billed gull (2), American goldfinch (1), American robin (1), double-crested cormorant (3)



Station	Time of Survey	Habitat Description	Species Recorded (Number)
10	1052–1102	Grassland area	American robin (2), mourning dove (1), European starling (6), red-winged blackbird (4), song sparrow (1), mallard (2), barn swallow (1), ring-billed gull (3), double-crested cormorant (1), common grackle (1)
Summary	100 minutes		342 individual birds representing 37 species

Source: ESI 2017.

#### 4.2.2 Total Avian Diversity

The Project team documented a total of 372 birds representing 41 species on May 1 and 2, 2017. This total included most species detected using the point counts as well as the palm warbler (*Setophaga palmarum*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), and chipping sparrow (*Spizella passerine*). As with the point counts, the most numerous species was ringed-billed gull (133 observations) followed by European starling (36 observations), American robin (33 observations), Canada goose (28 observations), and red-winged blackbird (24 observations) (**Appendix C**).

None of the 19 target species were detected during the field surveys.



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## **5 Mitigation**

### **5.1 Long-term Operating Effects**

The No Build Alternative would not result in any direct impacts on threatened or endangered bird species and, therefore, would not require mitigation.

Threatened and endangered bird species were not found in the environmental survey area of the FEIS Preferred Alternative and would not be impacted by the Project. No mitigation is proposed.

### **5.2 Short-term Construction Impacts**

The No Build Alternative would not result in any short-term construction impacts on threatened or endangered bird species.

Threatened and endangered bird species were not found in the environmental survey area of the FEIS Preferred Alternative and would not be impacted by the Project.



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## 6 Conclusion

The desktop review identified limited habitat for the target birds within the survey corridor. Field surveys revealed a bird community dominated by common urban-adapted species. None of the 19 target species were detected during the field surveys. Considering the amount of urbanization and the early successional stage of areas along the survey corridor, it is likely that the target species would be absent along the corridor and therefore unlikely that these species would be affected by the Project.



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## 7 Preparers

**Table 7.1-1: ESI Staff**

ESI Staff	Position	Contribution
Shane Brodnick	Scientist	Report preparation
Robert Jean, PhD	Senior entomologist	Desktop analysis
Joseph Johnson	Scientist	Field data collection, report preparation
Chris Kemmerer	Geospatial analyst	Desktop analysis, mapping production
Nathanael Light	Scientist	Report preparation
Dale W. Sparks, PhD	Senior project manager	Desktop analysis, report preparation
David Tull	Scientist	Report preparation

Source: ESI 2017.



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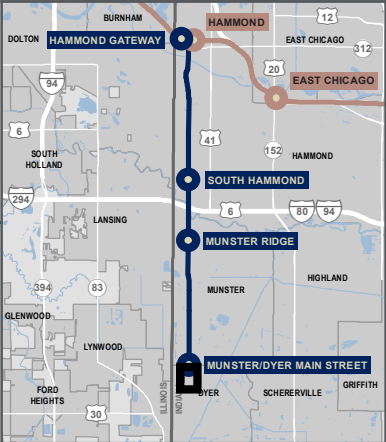
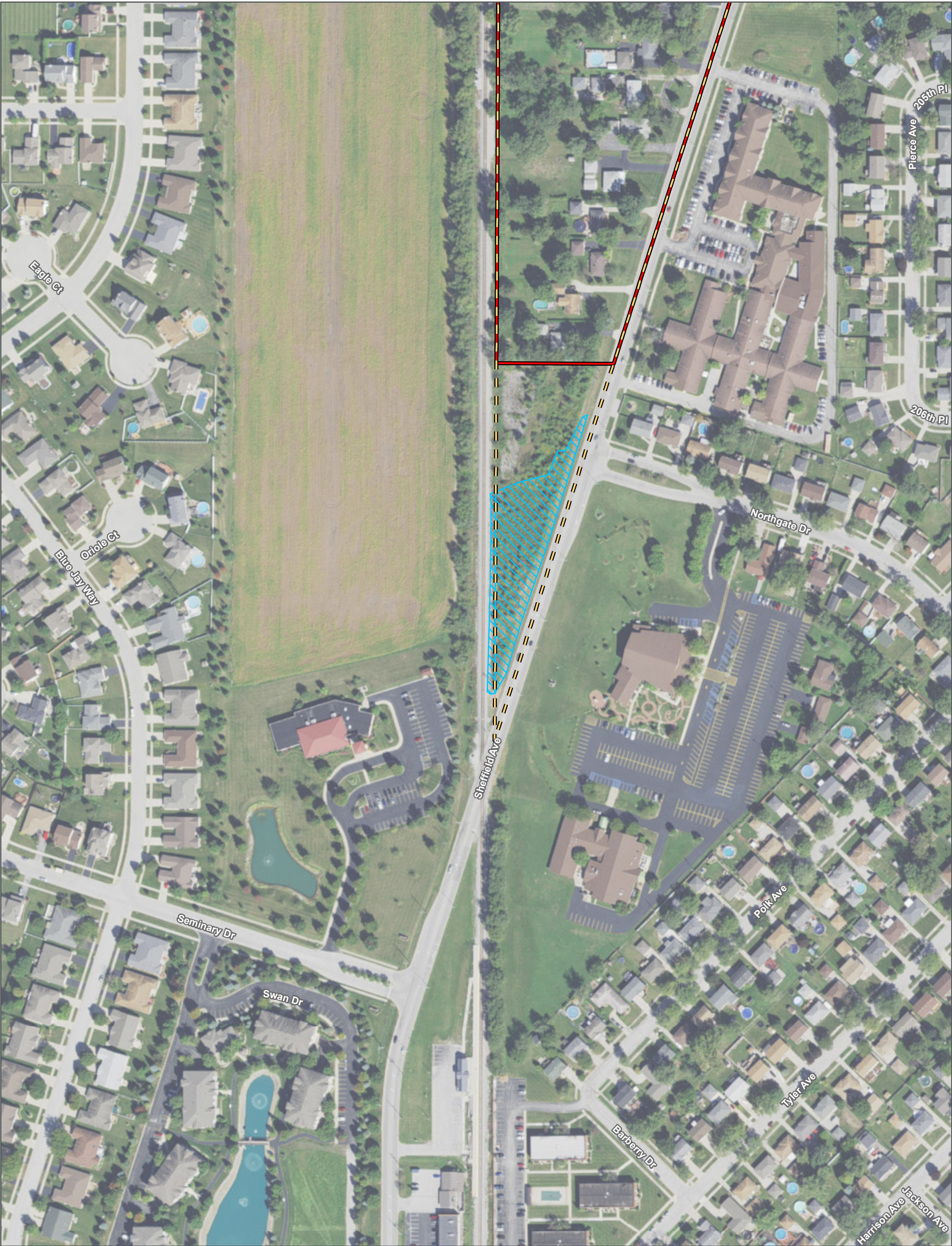
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## **Appendix A. Point Count Locations for Target Bird Species**

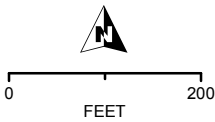


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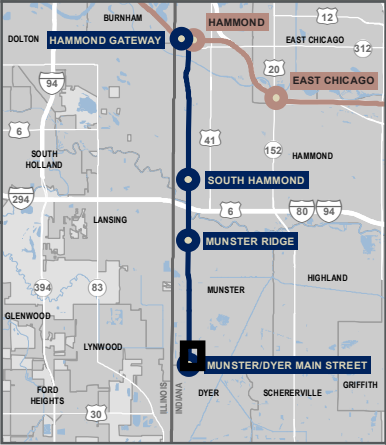
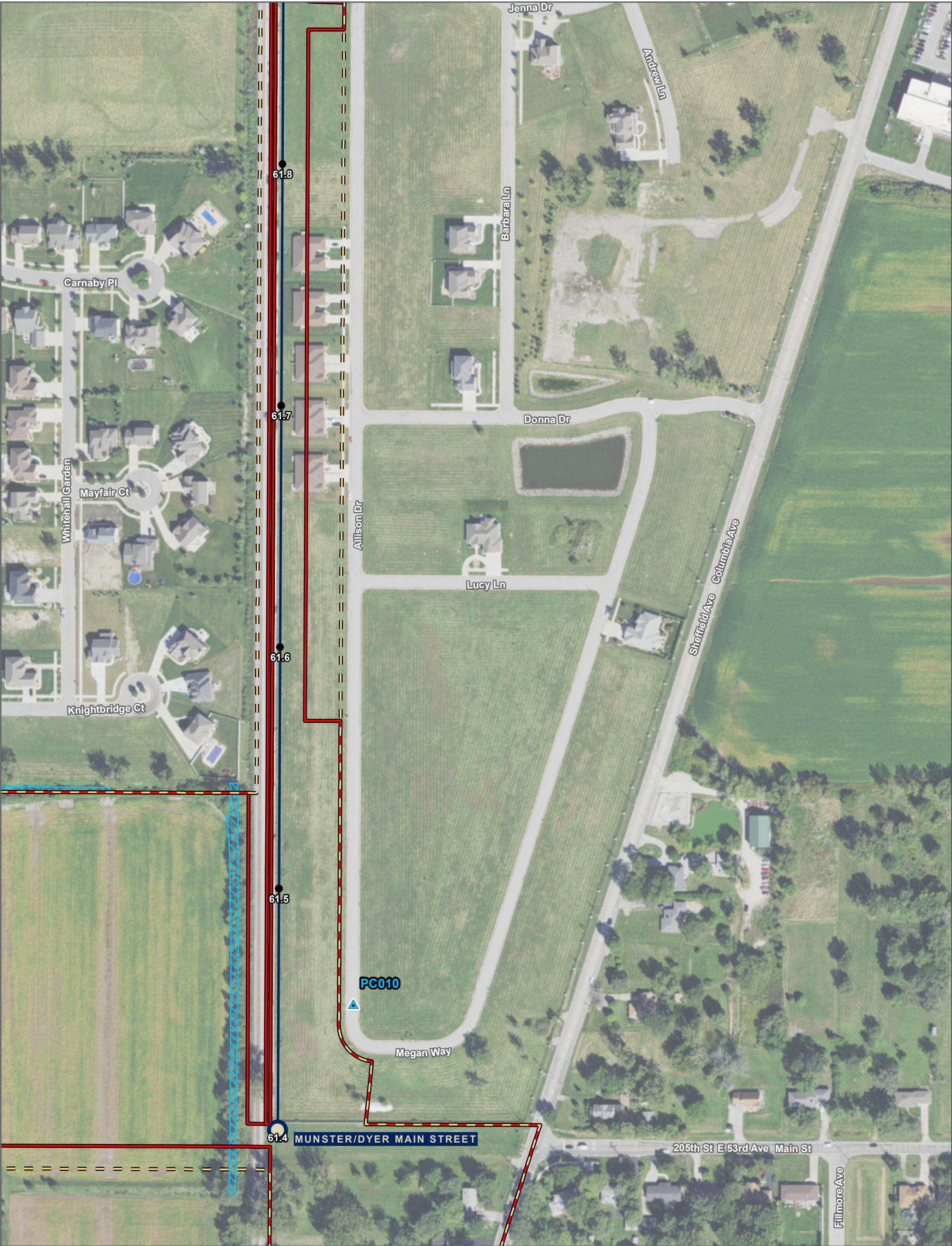


- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

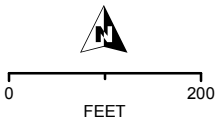


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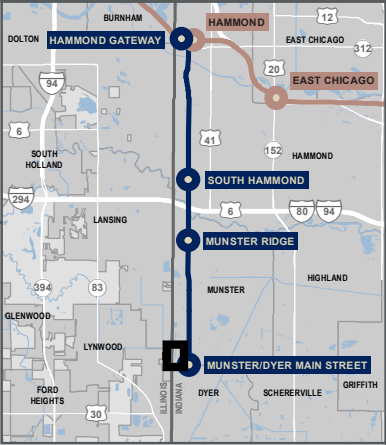


- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES



SHEET 2 OF 18  
Data for Reference Only



Existing Station

Proposed Station

Existing South Shore Line

FIES Alternative

Milepost

Milepost Stationing

Environmental Survey Area

Project Footprint

Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

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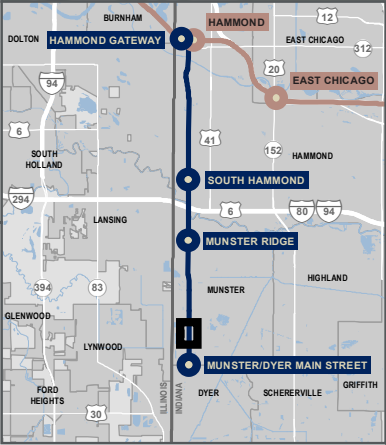
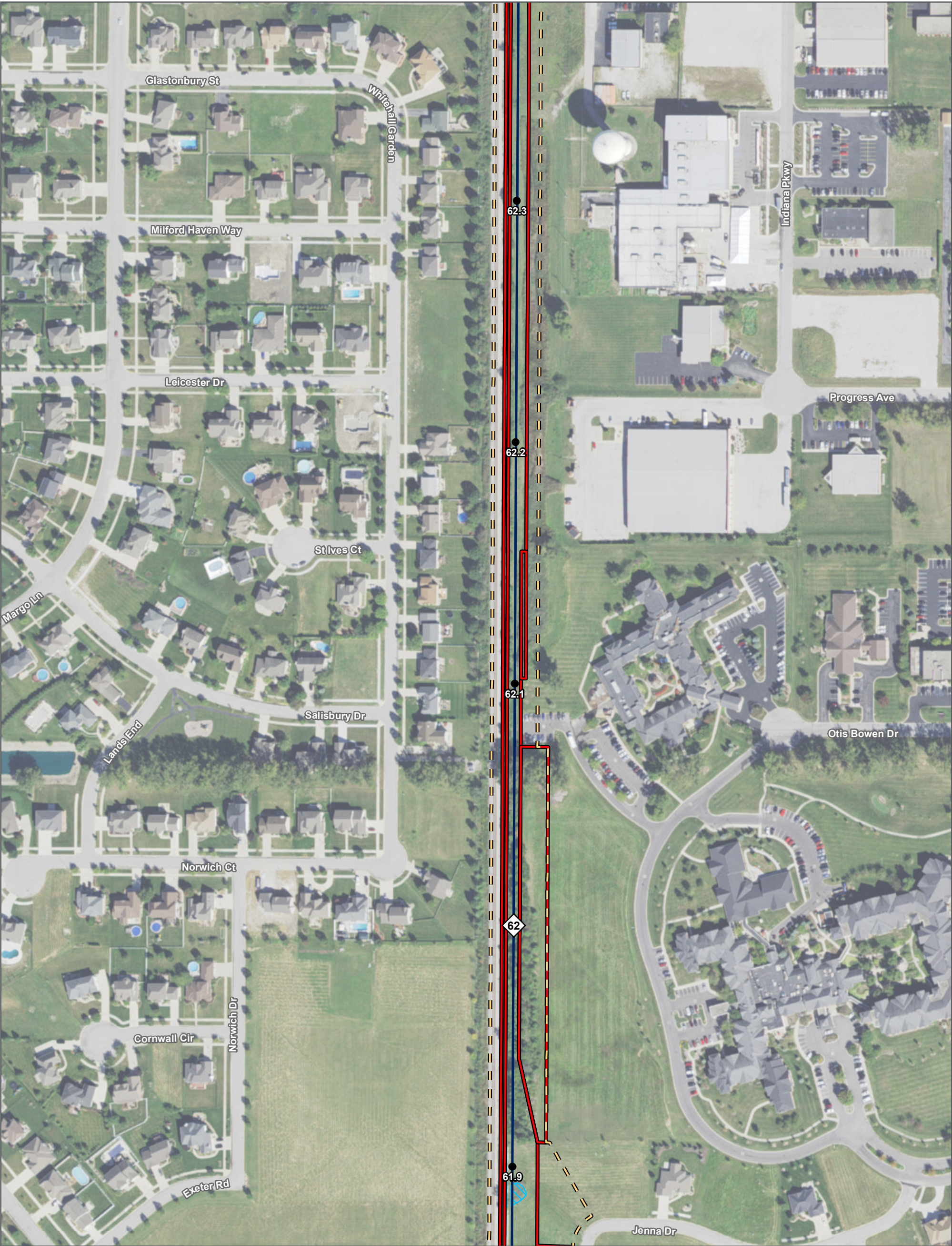
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WEST LAKE  
CORRIDOR

SHEET 3 OF 18

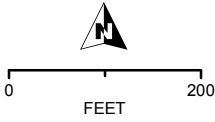
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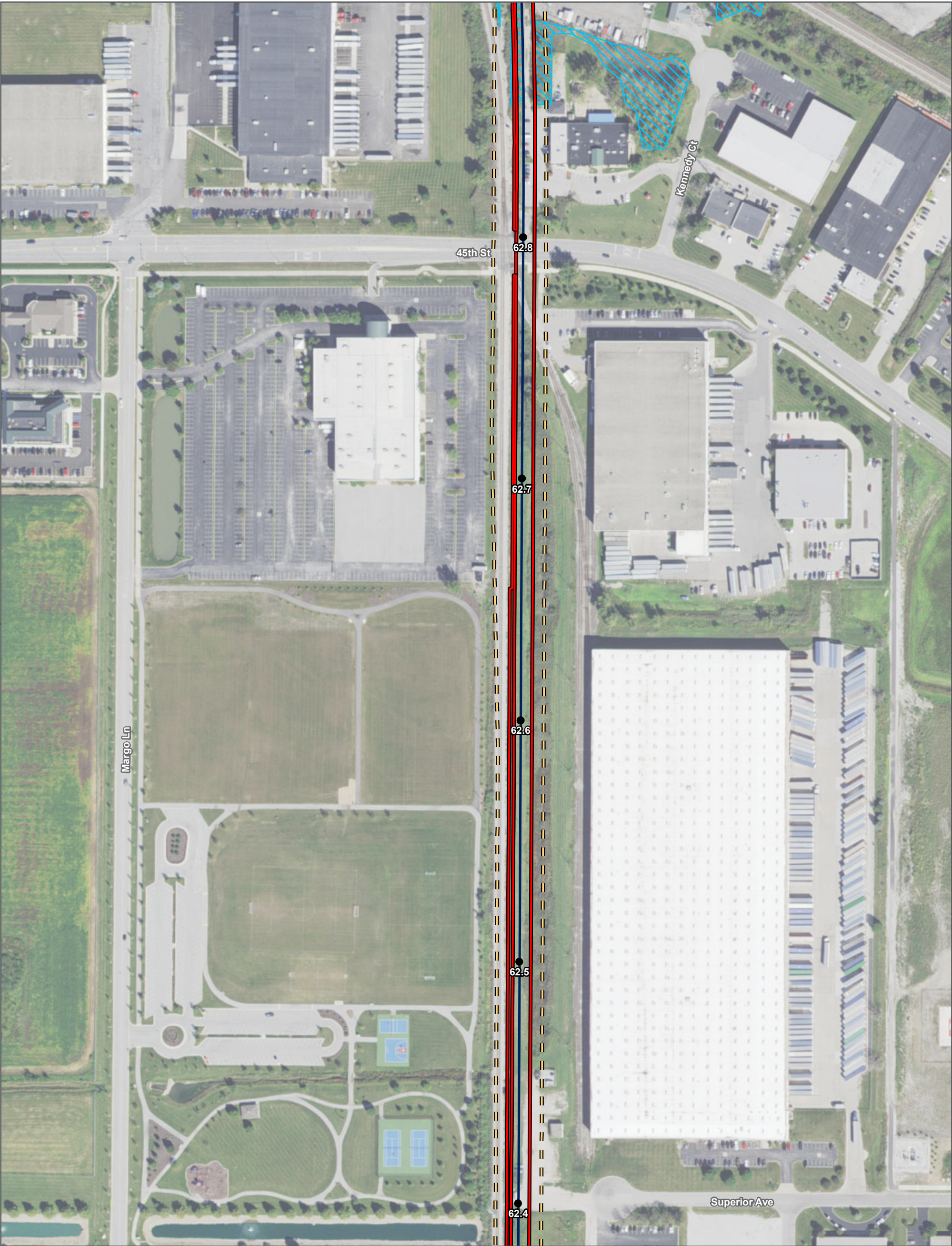
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DATA SOURCES: Environmental Systems Research Institute, Indiana Department of Environmental Management, National Resource Commission, Northern Indiana Commuter Transportation District, U.S. Geological Survey, U.S. Department of the Interior, U.S. Fish & Wildlife Service



- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES



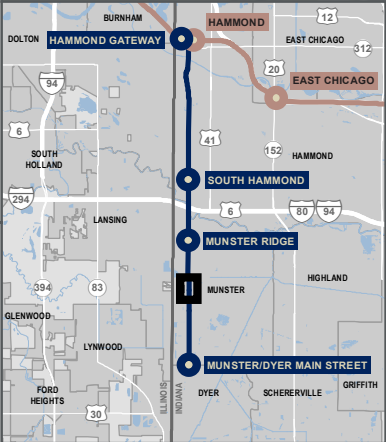
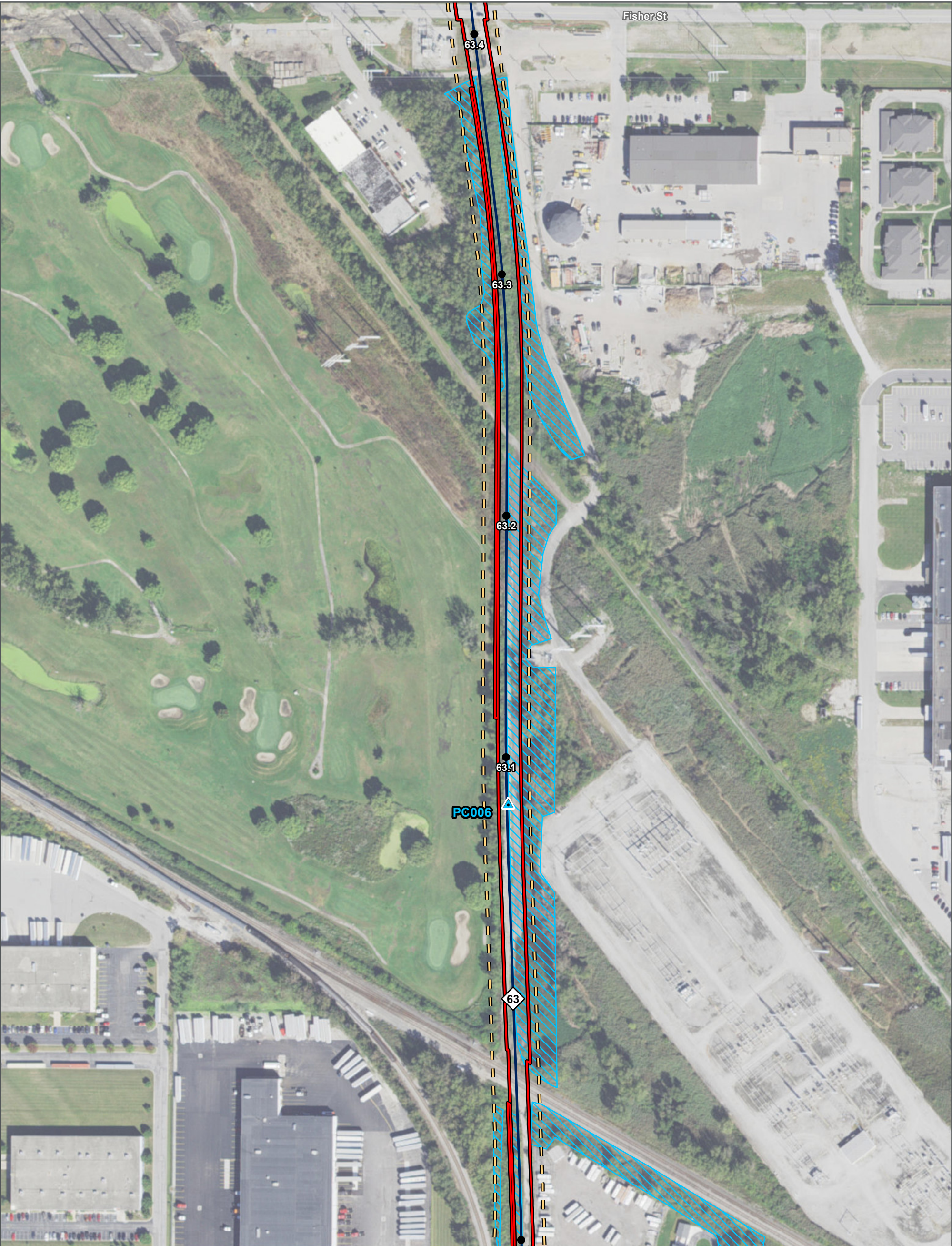


- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

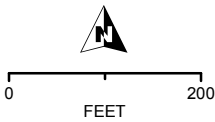


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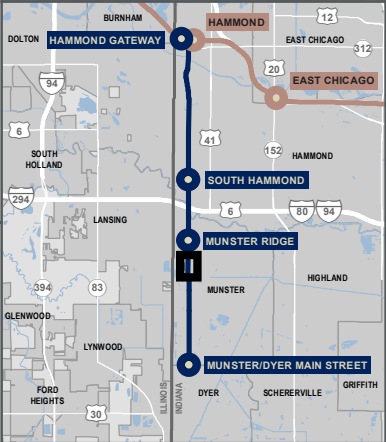
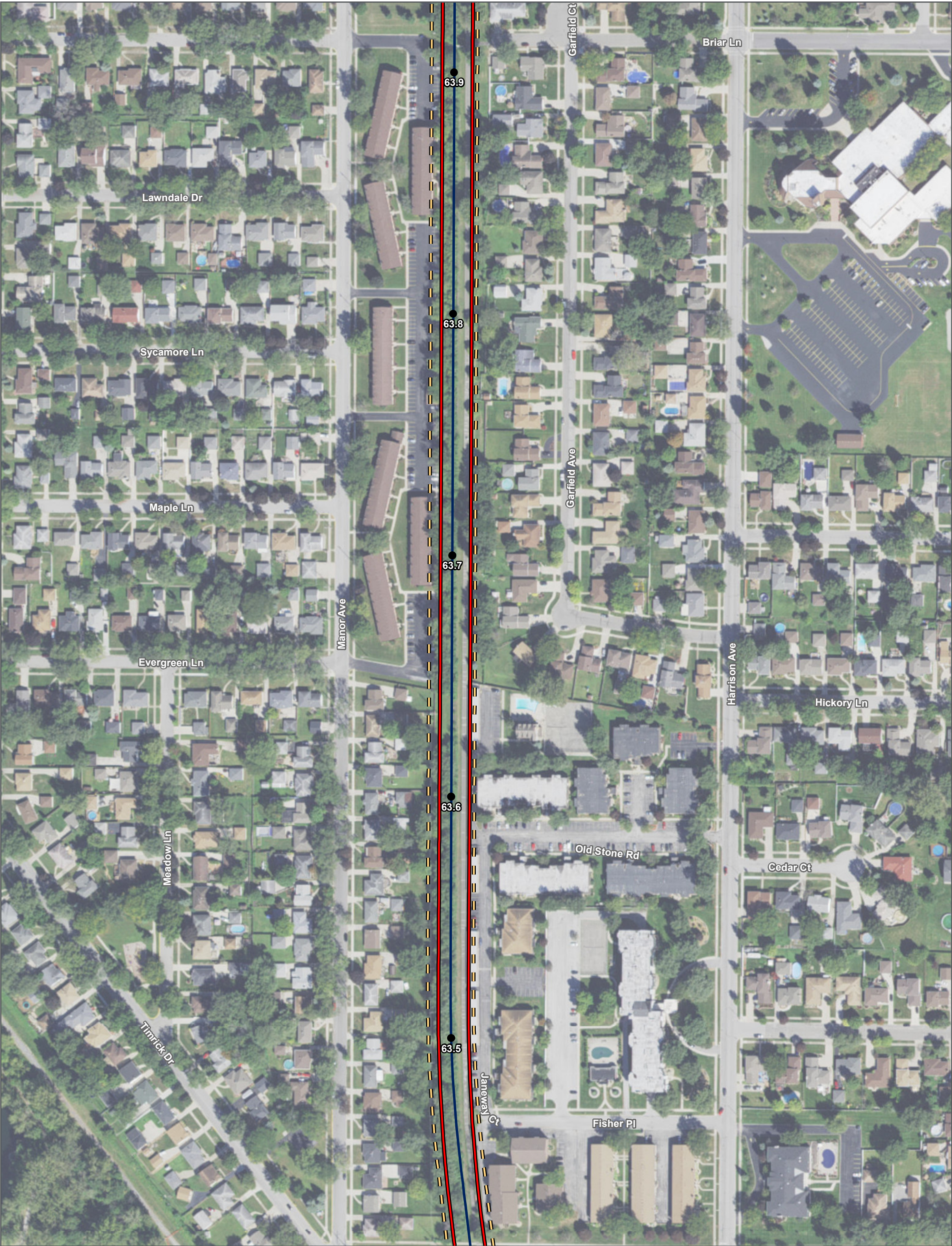


- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES



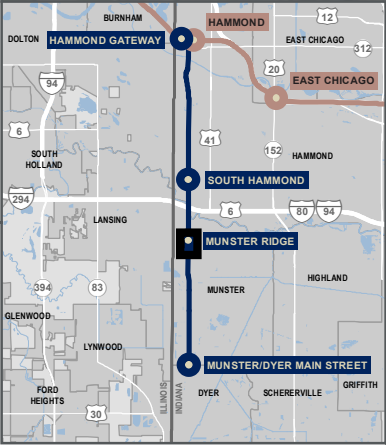
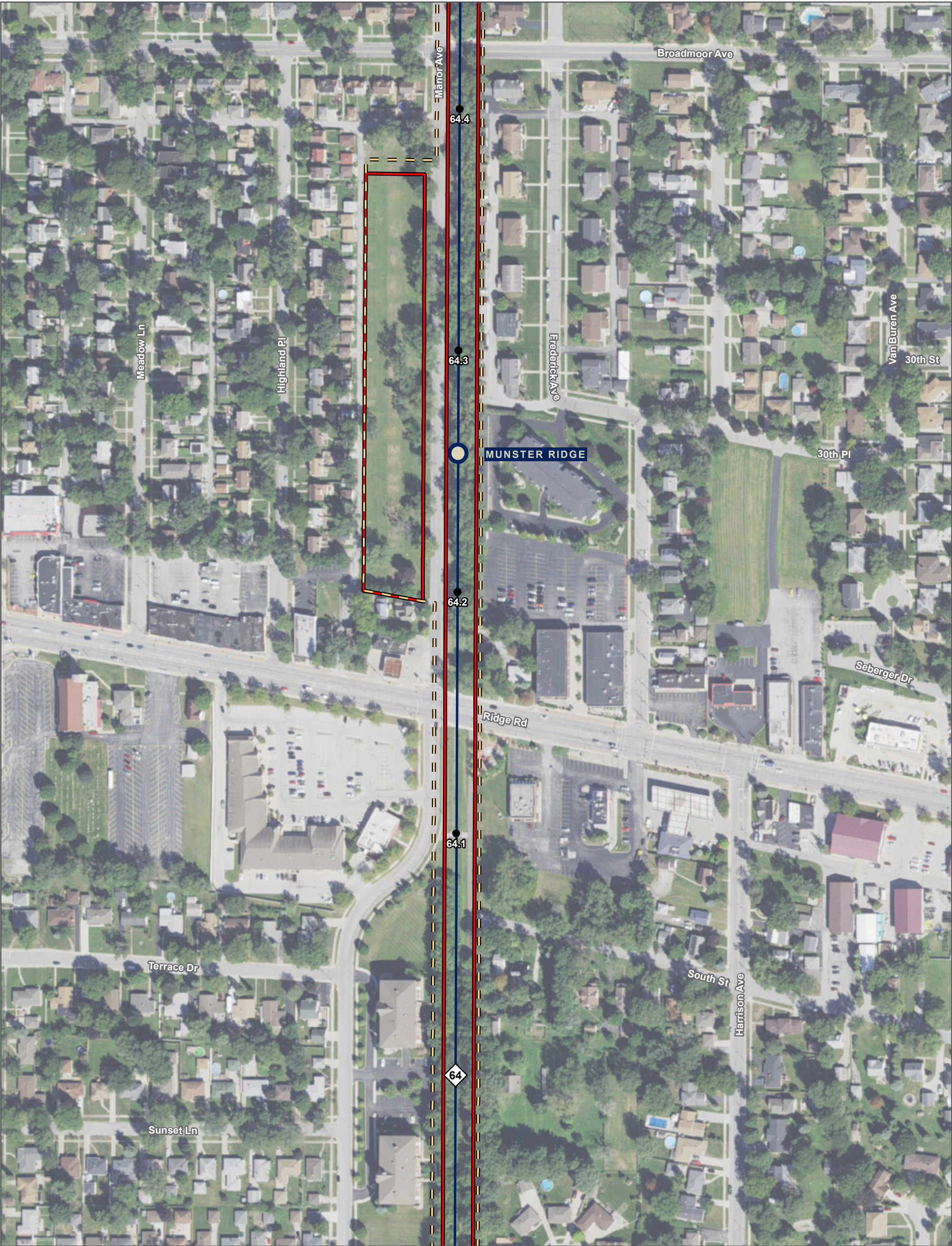
SHEET 6 OF 18  
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- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

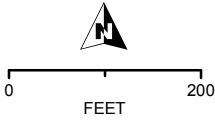
POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

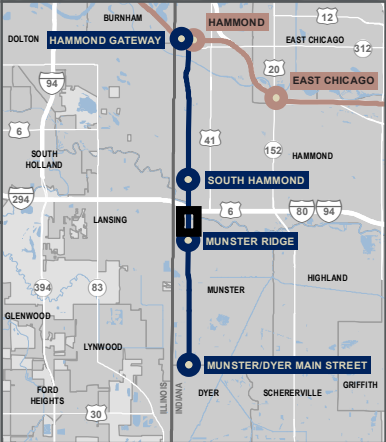
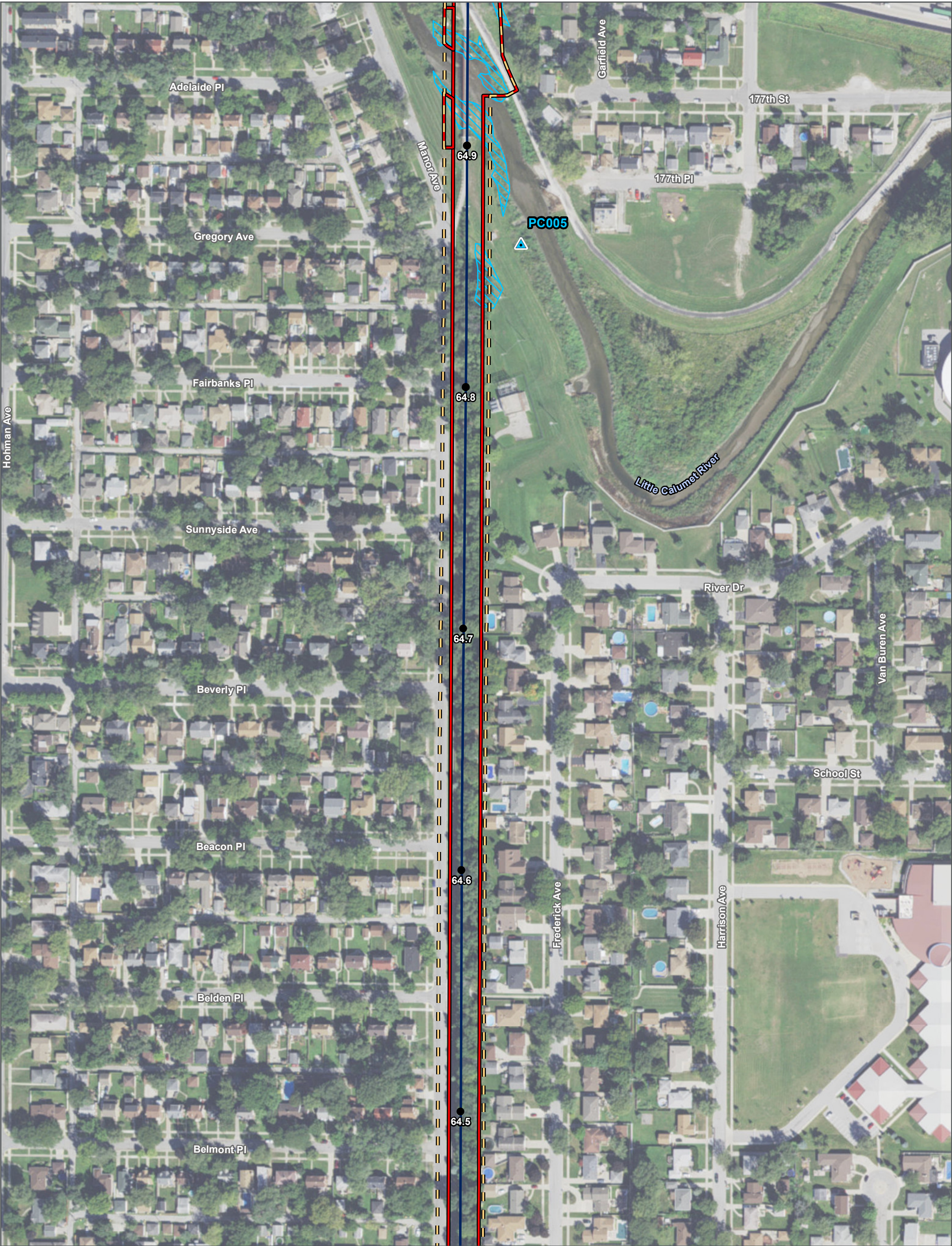




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- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

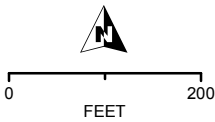
POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

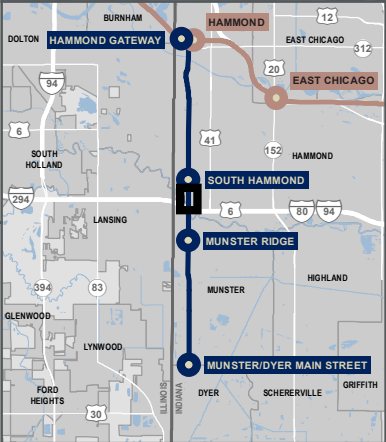
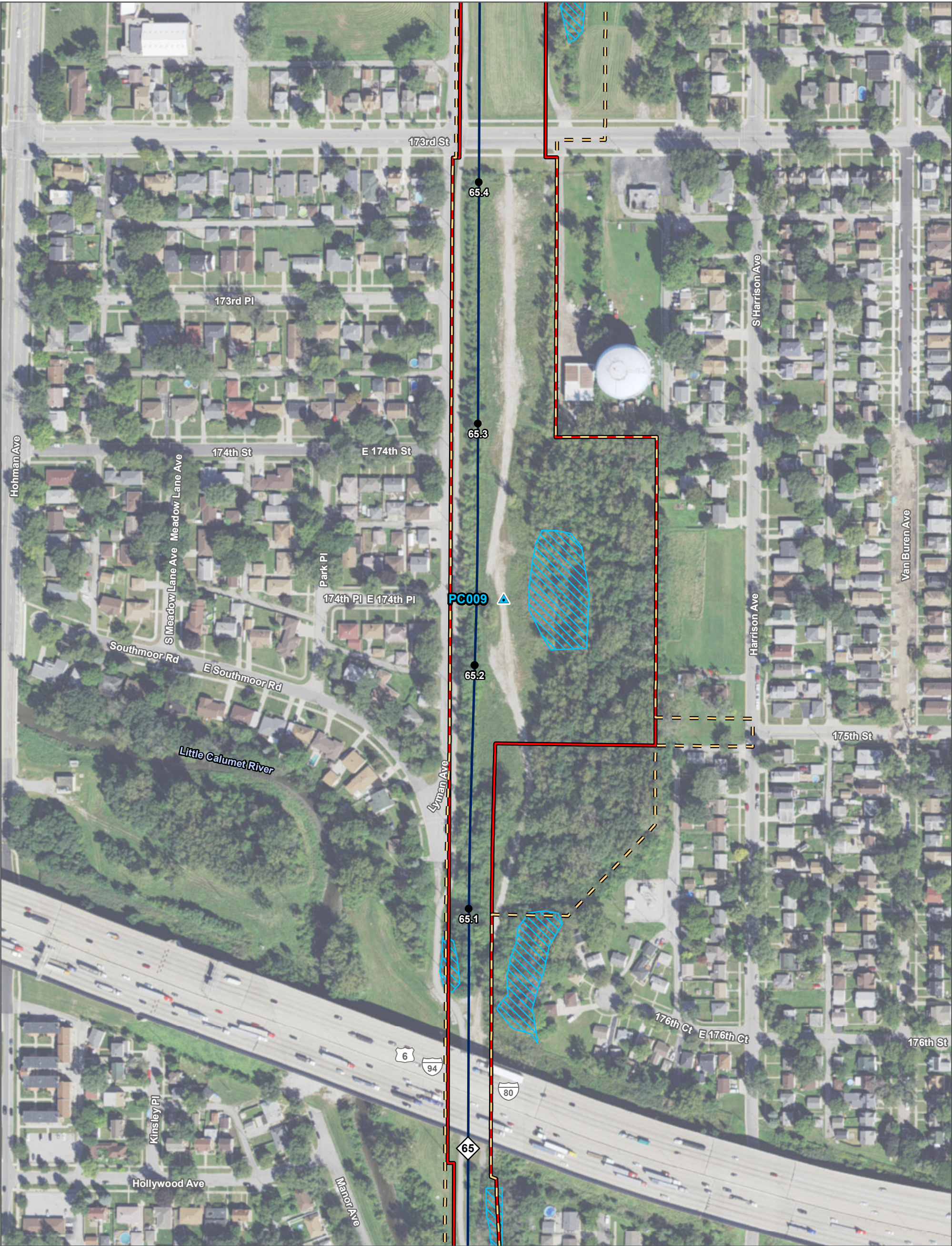




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- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

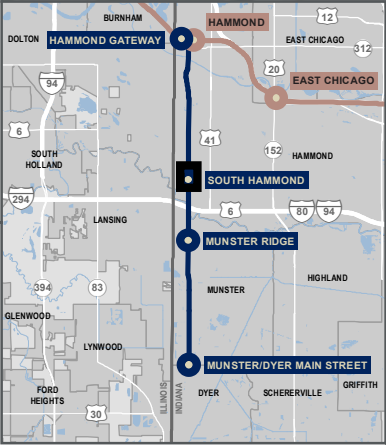
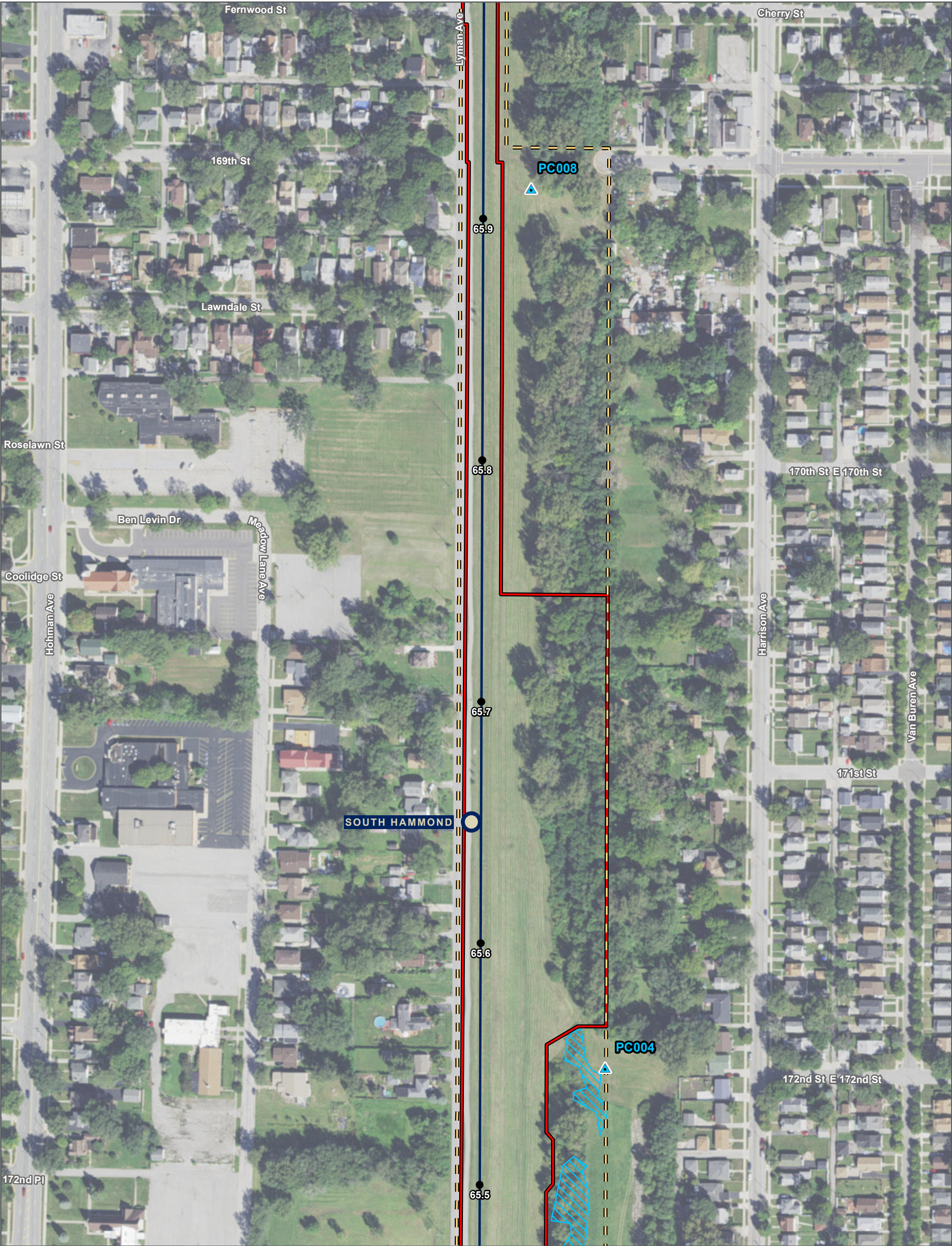




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- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

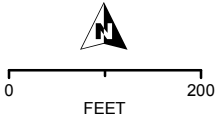
POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

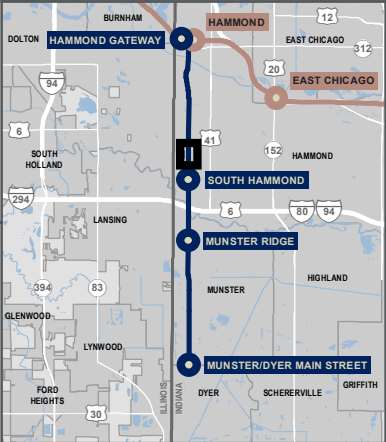
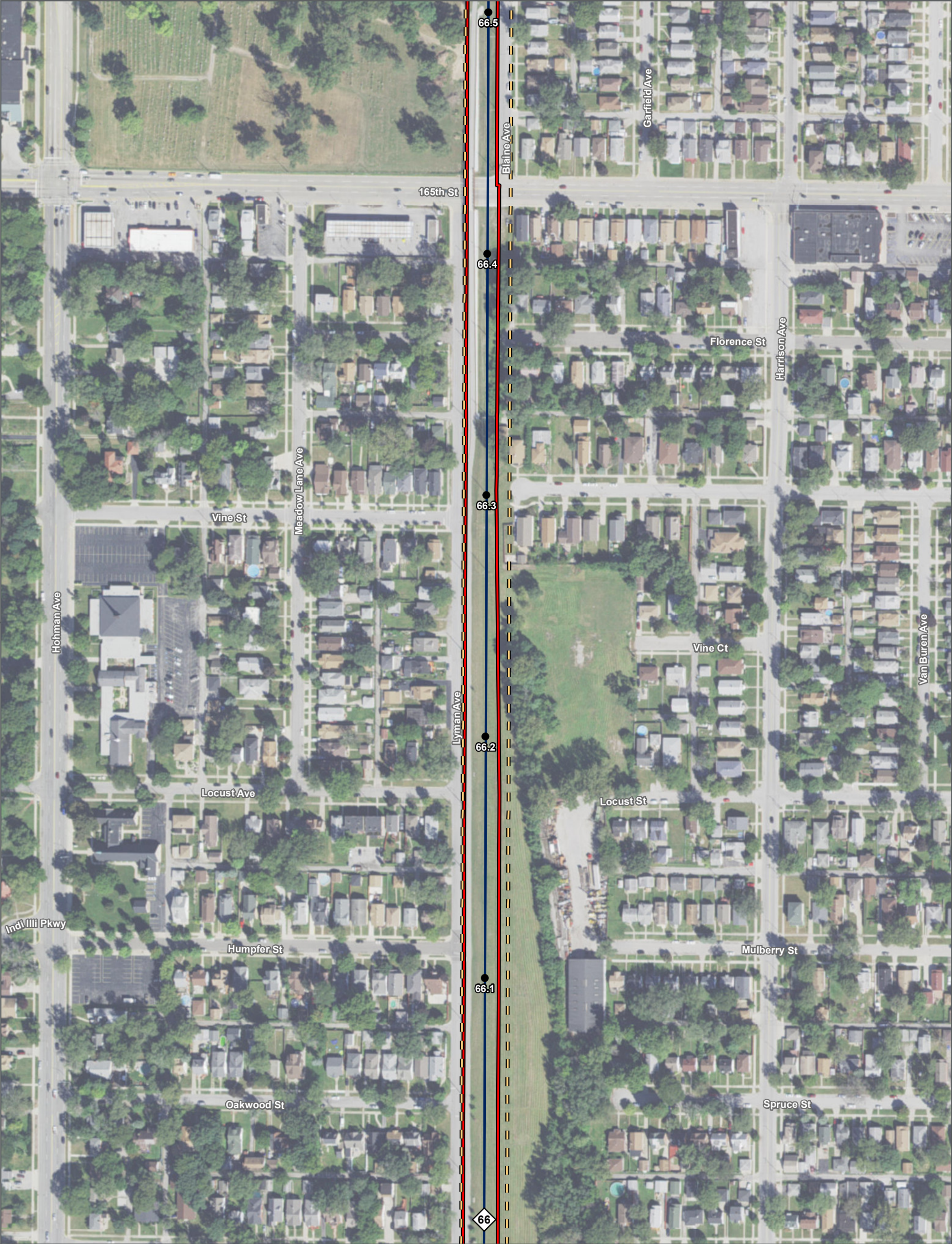




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- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

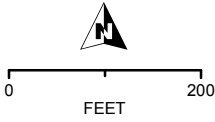
POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES



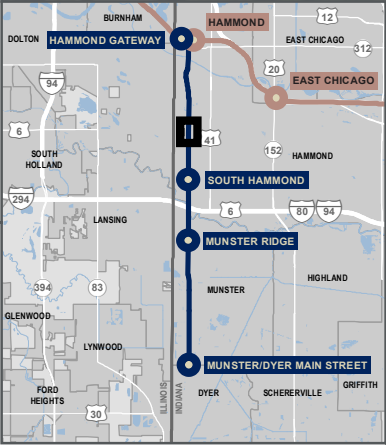
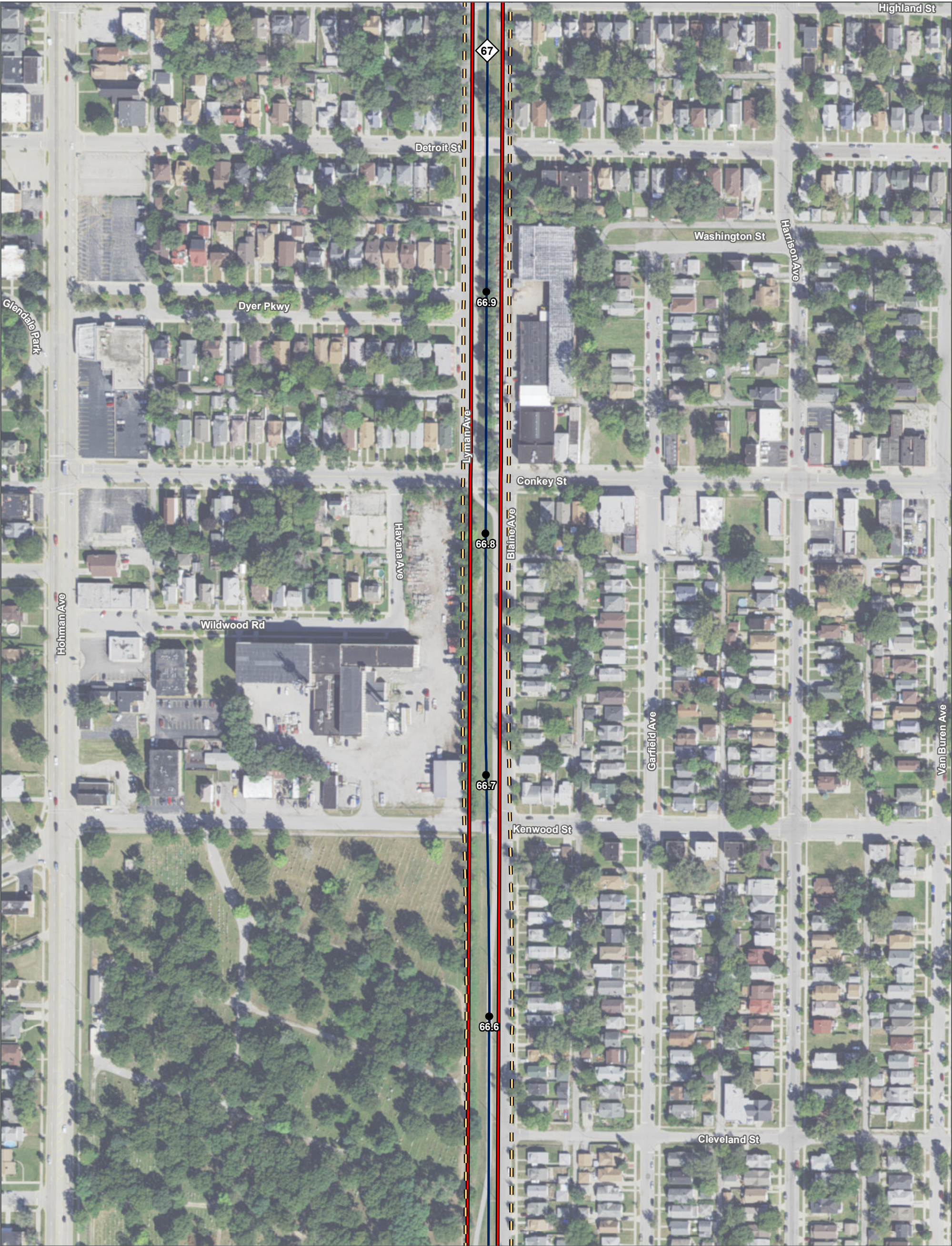


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- Proposed Station
- Existing South Shore Line
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- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

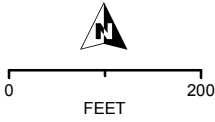


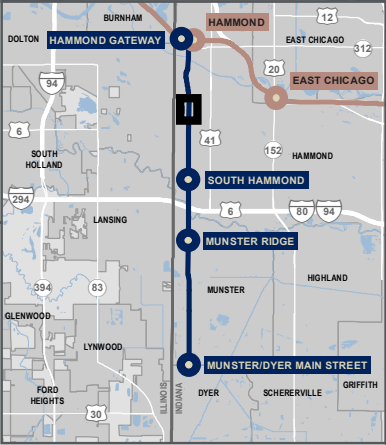
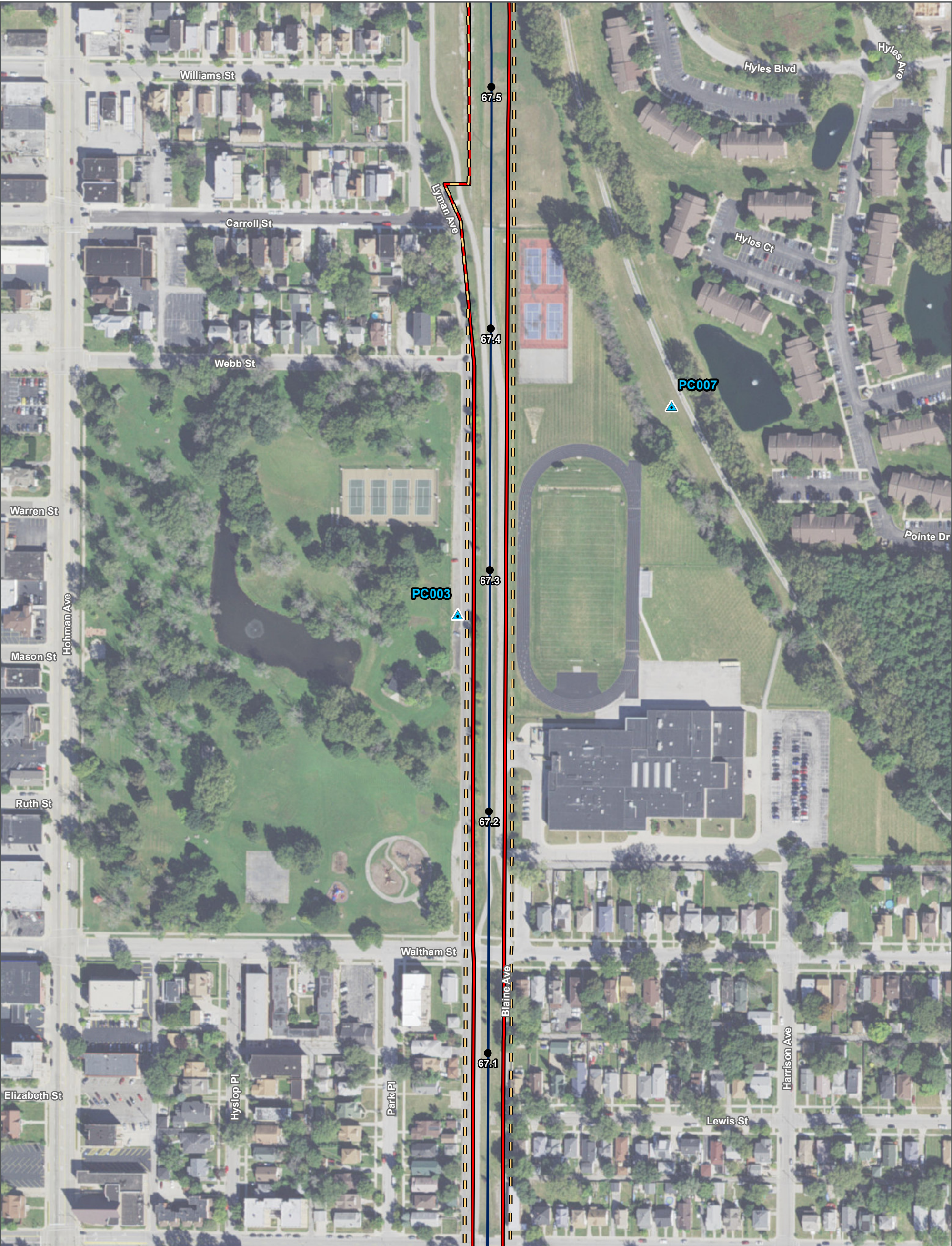
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- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

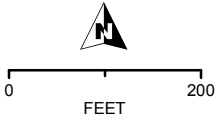
POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES





- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES

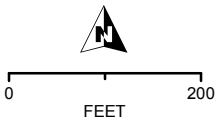


SHEET 14 OF 18  
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- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

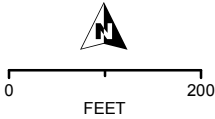
POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES



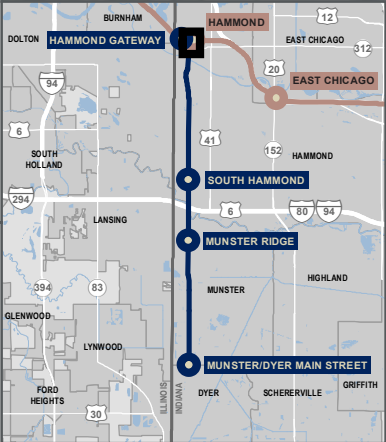
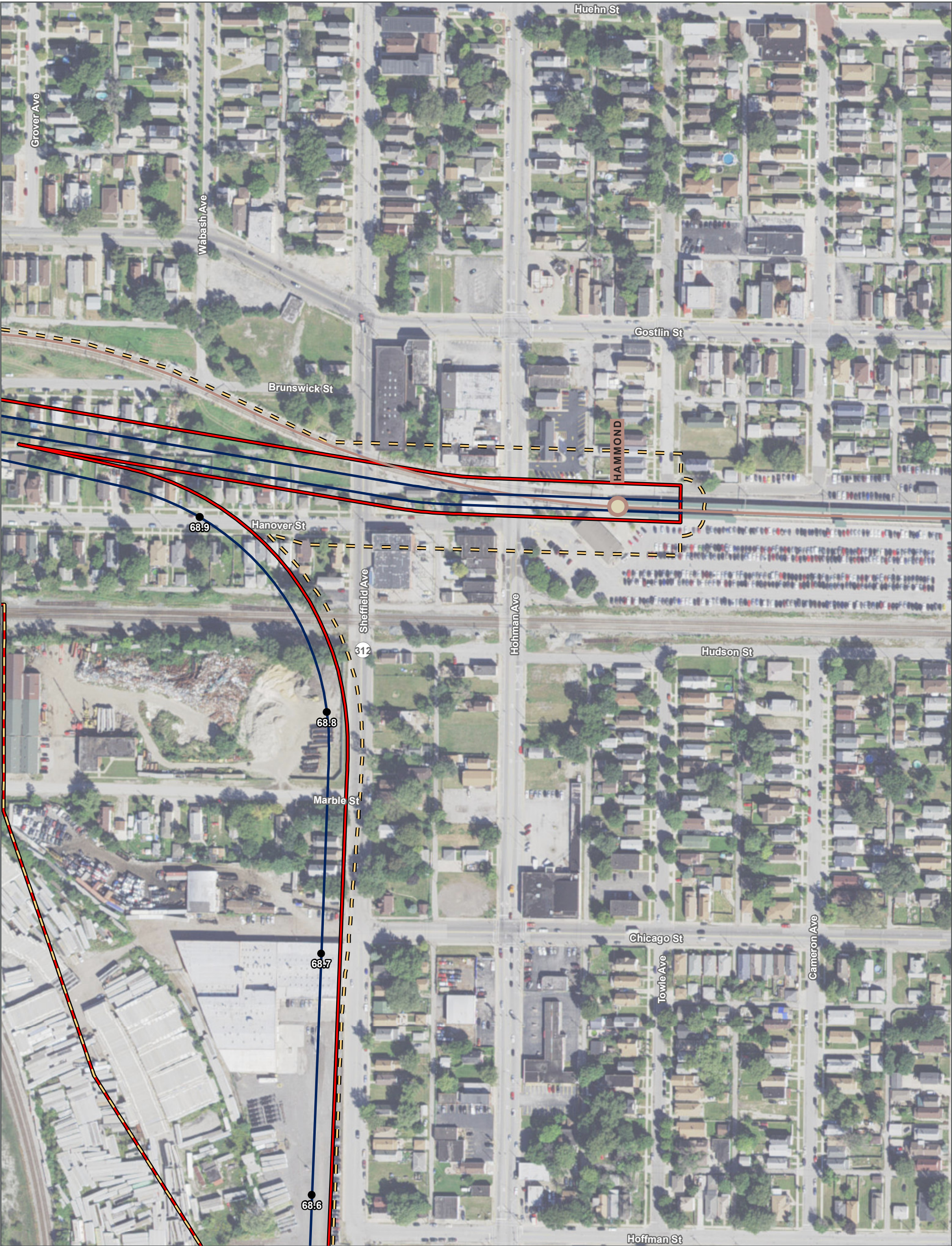


- Existing Station
- Proposed Station
- Existing South Shore Line
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- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES



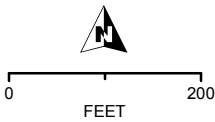
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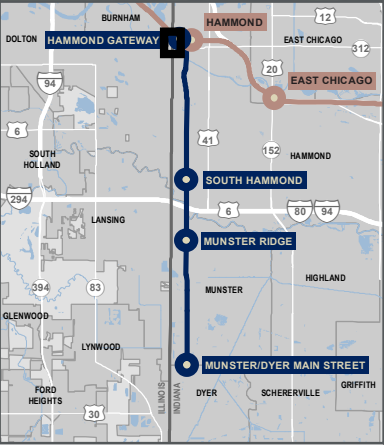
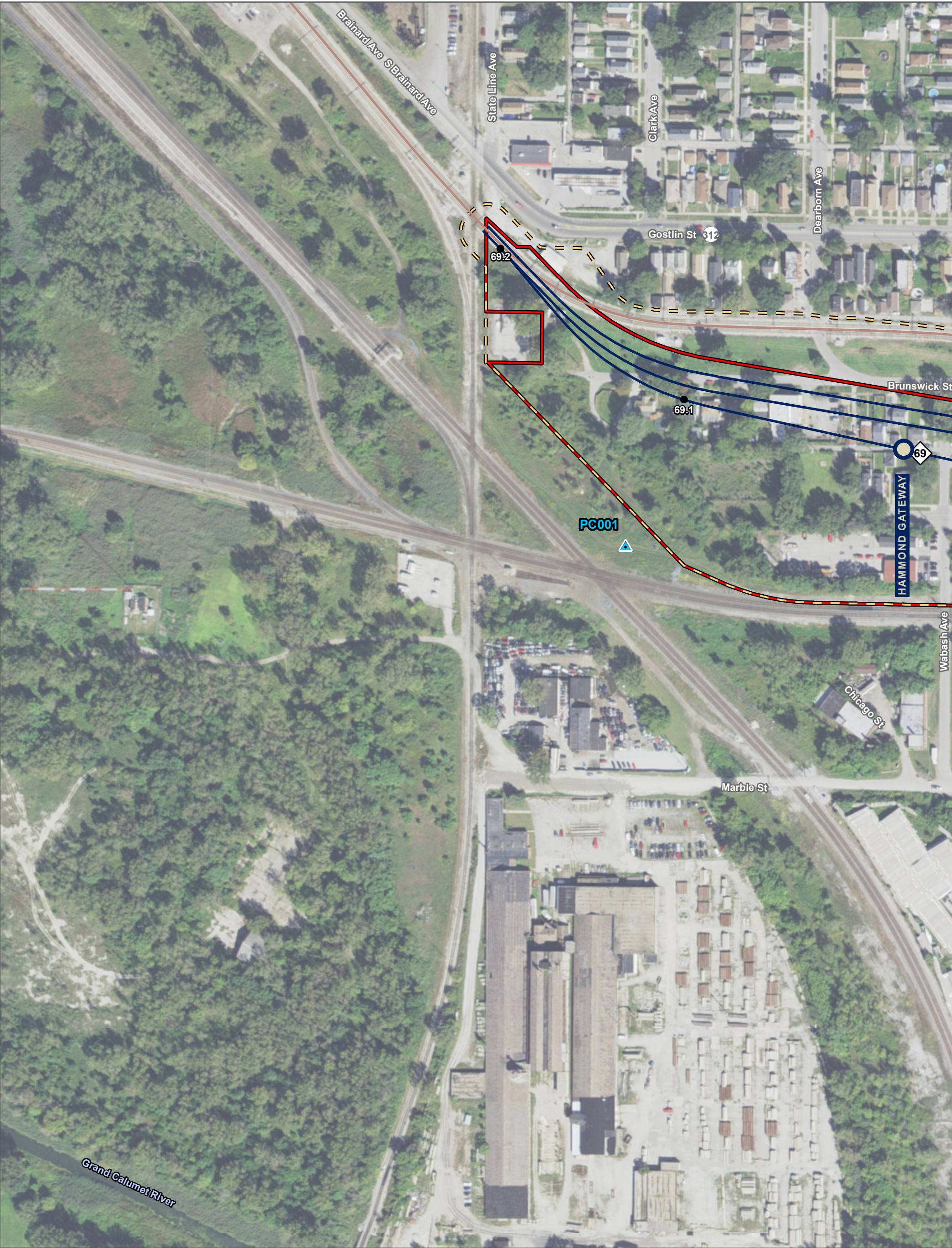
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- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint

Avian Point Count Location

### POINT COUNT LOCATIONS FOR TARGET BIRD SPECIES



SHEET 17 OF 18  
Data for Reference Only



- Existing Station
- Proposed Station
- Existing South Shore Line
- FIES Alternative
- Milepost
- Milepost Stationing
- Environmental Survey Area
- Project Footprint
- Avian Point Count Location

POINT COUNT LOCATIONS  
FOR TARGET BIRD SPECIES





West Lake Corridor  
Habitat Surveys for Rare Birds

Appendix B

## **Appendix B. Résumés of Qualified Surveyors**



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## ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

### Résumé

Dale W. Sparks, Ph.D.

#### EDUCATION

Ph.D., Biology, Indiana State University, 2003. Dissertation: "How does urbanization impact bats?"

M.S., Biology, Fort Hays State University, 1996. Thesis: "Distribution, Natural History, Conservation Status, and Biogeography of Bats in Kansas"

B.S., Biology, Murray State University, 1993.

#### PROFESSIONAL CERTIFICATIONS

Certified Wildlife Biologist: The Wildlife Society, 2012

Certified Senior Ecologist: Ecological Society of America, 2012

Qualified Indiana Bat Surveyor: Commonwealth of Pennsylvania

ODOT Ecological Training, 2013



#### QUALIFICATIONS AND EXPERIENCE

Dr. Sparks is a wildlife biologist involved in a variety of terrestrial ecology research positions involving herpetology, ornithology, and mammalogy and has extensively studied bats and their habitat. Many of Dr. Sparks' projects concern federally endangered Indiana bats (*Myotis sodalis*) and the federally threatened northern long-eared bat (*M. septentrionalis*). He is experienced in many ecological field techniques, including: species identification, habitat assessment, trapping, netting, radio-telemetry and tracking, guano analysis, and GPS/GIS, mapping and orientation. Dr. Sparks has extensive experience conducting acoustic sampling including assisting in the collection of reference calls, site selection for both obtaining quantity (i.e. a measure of activity) or quality (i.e. those that can be identified) of recordings. He routinely identifies bat calls collected during a project using both quantitative (using the most current and approved analysis programs available) and qualitative (visual) analysis. Dr. Sparks visually reviews call sequences in light of known error rates and the temporal pattern of detection and rates the confidence that a particular species was detected. Dr. Sparks regularly serves as a peer reviewer for scientific journals upon the submission of acoustic surveys.

Dr. Sparks directed long-term studies in support of a Biological Assessment (Sec. 7 of the ESA) and a Habitat Conservation Plan (Sec. 10) associated with developments at the Indianapolis International Airport and the near-by Six-Points highway project, respectively. Studies included mist-net, acoustic monitoring, population estimates using both emergence counts and DNA-based approaches, and radiotelemetry studies, requiring coordination with state, federal, and local agencies. These combined projects were the first large-scale mitigation for loss of summer habitat for the Indiana bat and they have produced some of the most definitive research on the interaction of the Indiana bat with human developments, with many resulting publications that bear the name of Dr. Sparks.

Dr. Sparks is an experienced public speaker, having taught university-level courses, presented educational lectures to the public, and presented technical papers to professional organizations. Dr. Sparks serves as a technical advisor to U.S. Fish and Wildlife Service for summer habitat conservation and population characteristics of the endangered Indiana bat. He has recently been added to a USFWS group working to develop forest management practices for the northern long-eared bat. He is also a member of the Indiana Department of Natural Resources Mammal Technical Advisory Committee and chairs the Legislation and Regulations Committee of the American Society of Mammalogists.

Dr. Sparks has authored and co-authored numerous papers, poster and oral presentations, and book chapters and is a technical reviewer for Biological Conservation, Journal of Wildlife Management; Journal of Mammalogy; American Midland Naturalist, Acta Theriologica, Northeastern Naturalist, Landscape and Urban Planning, The Southwestern Naturalist; The Prairie Naturalist; Urban Naturalist, USFWS Indiana Bat Recovery Plan; and the National Science Foundation.

### **SPECIALIZED TRAINING IN ACOUSTIC ANALYSIS**

Robbins Invitational Workshop hosted by Dr. Lynn W. Robbins of Missouri State University. Subjects included: Recognition of false-positives during presence/probable absence surveys, comparison of error rates and types among the three candidate software packages, addressing problem identifications, simultaneous comparison of multiple acoustic monitoring instruments, and ethical considerations of biological consulting (note Dr. Sparks present the ethics talk). 2014

Introduction to Acoustic Monitoring Studies by C. Ryan Allen of Bat Call Identification Inc. Subjects included: basic operation of bat detectors, study design, use of identification software, USFWS guidelines, and a specific review of techniques and equipment used by ESI. 2013

Identification of Eastern Bat Calls Using Quantitative Techniques by Dr. Justin G. Boyles of the University of Pretoria, South Africa. Subjects included: operation and navigation within the Analook Software, Identification of eastern bats including all federally-listed species east of the Rocky Mountains. 2010

### **PROJECT EXPERIENCE**

**Lead Technical Scientist** – Lake States Forest Management Habitat Conservation Plan (HCP) for Bats: 2015-Present. Lead Technical Scientist for an HCP designed to allow forest management in the presence of four bat species impacted by White Nose Syndrome (Indiana, northern long-eared, little brown, and tri-colored bats). Responsible for developing landscape-level models of bats and how these species are impacted by forest management practices in the states of Minnesota, Wisconsin, and Michigan.

**Lead Technical Scientist** – Pennsylvania Game Commission and Pennsylvania Department of Conservation and Natural Resources, Pennsylvania State Lands Bat

and Forestry HCP: 2013-Present. Lead Technical Scientist for Pennsylvania state forest lands HCP and NEPA documentation for Indiana and northern long-eared bats.

**Project Manager** – Indiana Department of Transportation, Interstate 69, Pre- and Post-construction Surveys: 2010-Present. Completed long-term monitoring of bat responses to highway development, as well as additional studies aimed at pre-construction compliance efforts. Completed summer mist net surveys for federally endangered Indiana bat along final ROW for Sections 1, 2, 3, 5, and 6, and tracked multiple bats to roosts. Completed quantitative (using programs) and qualitative (visual) analysis of bat calls collected during the project.

**Lead Chiropteran Scientist** – Midwest Energy HCP, Environmental Impact Statement: 2015-Present. Evaluated impacts of developing more than 51,000 megawatts of wind energy across an eight-state region. Evaluated potential impacts to three species of bats covered by the HCP as well as all other bats in the region. Evaluation included development of models to estimate mortality of bats that were used to compare four alternatives. Further managed biologists responsible for completing similar analyses for aquatic macroinvertebrates and surface waters.

**Project Manager/Technical Lead** – EQT, Multiple Gas Well Pads and Pipelines: 2012-Present. Directed detailed habitat assessments, general habitat evaluations, and portal searches for Indiana and Virginia big-eared bats on multiple proposed projects throughout Wetzel and Doddridge counties in West Virginia. Responsible to client for all aspects of project management and interaction with USFWS.

**Project Manager** – NextEra Energy, Wind Resource Area: 2010-2016. Completed Tier I and Tier II analysis of bat impacts for proposed wind energy facility in Fayette, Rush, and Henry counties, Indiana. Phase III studies (field surveys) for bats were initiated in 2011 and completed in 2014. Studies resulted in capture and telemetry of Indiana bats associated with four maternity colonies, as well as multiple colonies of northern long-eared bats. Compliance measures for this facility are awaiting final decision on potential addition of the northern long-eared bat to the endangered species list.

**Project Manager** – NextEra Energy, Wind Resource Area: 2011-2016. Managed mist netting, acoustic surveys, and telemetry for federally endangered Indiana bat within 23,468.7-acre wind resource area in Jay and Randolph counties, Indiana. Completed take model and portions of HCP under Section 10 of the ESA. Coordinated with prime consultant and completed associated reporting.

**Project Manager** – American Electric Power, Wyoming-Jackson's Ferry 765 kV Transmission Line: 2012-2016. Directed monitoring effort associated with upland ponds and artificial roosts as required under a Biological Opinion issued by USFWS. Conducted quantitative (using programs) and qualitative (visual) analysis of bat calls collected during the project.

**Project Manager** – Indiana Michigan Power Company, Endangered Species Compliance Efforts: 2015-Present. Worked closely with IM's environmental coordinator and USFWS to avoid take of listed bats for multiple projects in both Indiana and Michigan. Compliance measures ranged from identifying means to avoid impacts to suitable habitat to permitting removal of suitable habitat within areas of known

occurrence for federally threatened northern long-eared bat within weeks after the species was listed. Produced multiple reports and coordinated repeated changes in study design across three USFWS offices. Responsible for all aspects of project management and reporting.

**Project Manager** – AEP Ohio Power Company, Endangered Species Compliance Efforts: 2016. Worked closely with AEP's environmental coordinator and USFWS to avoid take of listed bats for multiple projects throughout Ohio. Compliance measures ranged from identifying means to avoid impacts to suitable habitat to completing mist-net surveys. Produced appropriate technical reports and coordinated repeated changes in study design with USFWS offices. Responsible for all aspects of project management and reporting.

**Lead Technical Scientist** – Dominion Transmission, Atlantic Coast Pipeline: 2015-2016. Completed habitat assessment for state-listed southeastern bats and eastern subspecies of Rafinesque's big-eared bat along portions of approximately 564-mile interstate natural gas pipeline system in Virginia and North Carolina in 2015. Studies consisted of desktop analysis, field verification, and exploratory mist-net surveys at four sites. No southeastern *Myotis* or Rafinesque's big-eared bats were captured, but 30 – 40 were observed roosting under a highway bridge within the survey corridor. Assisted in management of additional studies in 2016 in West Virginia and North Carolina.

**Project Manager** – Ohio Department of Natural Resources, Lewisburg Mine: 2014-2016. Coordinated efforts and performed counts of hibernating bats in Lewisburg Mine. The mine is currently distinguished as a Priority 2 and the largest Indiana bat hibernaculum in Ohio. Identified and counted all bats and recorded microclimate data for large portion of the mine, coordinated with federal and state agencies and the landowner, and organized volunteer participation.

**Project Manager** – EQT, Equitrans Expansion Project: 2015-Present. Directed rare, threatened, and endangered species studies along portions of proposed natural gas pipeline traversing Allegheny, Washington, and Greene counties, Pennsylvania and Wetzel County, West Virginia. Efforts included assisting prime environmental contractor in completing agency correspondence to identify and address natural resource issues. Issues included: surveys for federally protected bats during both summer (netting and telemetry) and winter (assessment and trapping of mine portals); surveys for freshwater mussels; studies of rare plants along the line; and compliance measures for a newly-listed species (rusty patched bumble bee). Also assisted client in responding to information requests from agencies including FERC. Responsible for all aspects of project management and reporting.

**Lead Technical Scientist** – Rice Energy, Odin Pipeline: 2015. Completed Biological Assessment (BA) for Indiana and northern long-eared bats within 109.5-acre project area for proposed 7.5-mile dual natural gas pipeline system in Monroe County, Ohio. Turned BA around within short timeframe to accommodate projects tight schedule and need to obtain permission for tree removal before winter clearing.

**Lead Technical Scientist** – Beaver Excavating Company, Jewett Interchange Railway Improvement: 2015. Coordinated Indiana and northern long-eared bat studies for

proposed 90-acre mine development site in Harrison County, Ohio. Prepared conservation measures and Biological Assessment.

**Project Manager** – Northern Indiana Commuter Transportation District, South Shore Commuter Rail Line: 2016. Managed habitat assessment studies for Massasauga rattlesnake, Kirtland's snake, northern leopard frog, and spotted turtles along a 22-mile railway expansion in Lake, Porter, and LaPorte counties of Indiana. Studies were completed as part of Environmental Impact Statement and required coordination with the client; multiple state, federal, and local agencies; and four other members of the consulting team.

**Project Manager** – Northern Indiana Commuter Transportation District, West Side Line: 2016-Present. Managed habitat assessment studies for Massasauga rattlesnake, Kirtland's snake, northern leopard frog, spotted turtles, and Karner blue butterflies along a railway expansion in Lake County, Indiana, and Cook County, Illinois. Studies were completed as part of Environmental Impact Statement, and required coordination with the client; multiple state, federal, and local agencies; and four other members of the consulting team.

**Senior Technical Scientist** – Ameren, Mark Twain Maywood to Zachary Transmission Line: 2016. Provided technical review and assistance with impacts assessment and ESA compliance after more than 70 Indiana bats were captured along proposed electrical line project in Adair, Knox, Shelby, Schuyler, and Marion counties Missouri.

**Project Manager** – Port of Cincinnati Development Authority, 2100 Section Road Redevelopment: 2016. Completed site visit and avoidance and minimization plan for endangered bats at the site of a former factory in Hamilton County, Ohio resulting from last-second request for ESA compliance. Coordinated with client and USFWS.

**Project Manager** – Home Road Improvement, Delaware County, Ohio: 2016. Managed mist netting surveys for federally endangered Indiana bat and federally threatened northern long-eared bat at proposed highway expansion. Responsible to the client for all financial and technical aspects of the project.

**Lead Technical Scientist** – EQT, Ohio Valley Connector Pipeline: 2015-2016. Conducted analysis of best available science aimed at determining the time when northern long-eared bats move from trees to caves. Worked directly with environmental lead and outside council to help identify and address legal and biological requirements under ESA.

**Lead Technical Scientist** – Clermont County Park District, East Fork State Bicycle Trail: 2016. Provided technical review and supervision of site visit and avoidance and minimization plan for endangered bats at a site where an abandoned road was being converted into a bicycle path.

**Project Manager** – Invenergy Wind Development, Wind Resource Area: 2016-Present. Managed freshwater mussel surveys for seven stream crossings within a 23,000-acre wind resource area in Hardin County, Ohio. Coordinated with prime consultant and completed associated reporting.

**Project Manager** – Indiana Forest Alliance, Ecoblitz: 2016. Used mist nets, acoustic monitoring, and telemetry to study rare bats within area client would like removed from active timber harvest. Explained ESA compliance requirements, silvicultural techniques, and bat sampling efforts to members of this grass roots group. Coordinated between the client, INDR's Division of Forestry, and USFWS.

**Senior Technical Scientist** – Arkansas Electric Cooperative, Gainesville Transmission Line: 2016. Provided technical review and assistance with impacts assessment for proposed electric line in Greene County, Arkansas.

**Team Leader** – Minnesota Department of Natural Resources, Beltrami State Forest Bat Census: 2016. Used mist nets and acoustic monitoring to study bats within the state forest. Coordinated with the client, and USFWS.

**Team Leader** – USFWS, Ozark Plateau National Wildlife Refuge Bat Census: 2016. Used mist nets, harp traps, and acoustic monitoring to study bats swarming at caves within the refuge. Worked directly with USFWS and Oklahoma DNR staff.

**Project Manager** – Kentucky Transportation Cabinet (KYTC), 68/80 Cadiz Bypass: 2014. Designed and conducted field surveys of bats using bridges over two streams within area considered known occupied habitat for Indiana, gray, and northern long-eared bats in Trigg County, Kentucky. Assessed 23 karst features for their potential to support protected bats. Documented presence of federally endangered gray bat and assisted KYTC in completing section 7 consultation with USFWS. Responsible for all aspects of project management and reporting.

**Biologist** – RW Orange County, Sterling Forest Resort: 2014. Completed visual review of all call sequences identified as federally endangered species during quantitative analysis, and supplied final decision about presence or absence of Indiana and northern long-eared bats for acoustic monitoring study in Orange County, New York. Indiana bats were deemed likely present and a Biological Assessment was in preparation at the time the state failed to issue a gaming license to the client.

**Lead Technical Scientist** – Ohio Department of Transportation, Sunday River Mitigation Site: 2014-2015. Evaluated potential of existing stream mitigation site to provide suitable mitigation for the endangered Indiana bat. Provided analysis of best available science which included confidential distributional data maintained by the U.S. Forest Service and the Ohio Department of Natural Resources, publicly available mine maps, field surveys to locate and observe bat activity at mine openings, as well as evaluation of extensive acoustic monitoring. Data indicated that 1) the site was within multiple protective buffers associated with both summer and winter roosts of Indiana bats, 2) mine openings on the site connect directly to underground voids known to be used by hibernating bats, including the Indiana bat, and 3) the site is used throughout the year by Indiana bats and several other bats severely affected by White Nose Syndrome. The site is now an accepted mitigation site.

**Project Manager** – Confidential Client, Electric Transmission: 2014-2016. Retained by council to supervise surveys for multiple rare plants along three alternate proposed linear and multiple potential area-based sites. Worked directly with council to provide a

confidential assessment of potential impacts along all proposed alternatives. Responsible for all aspects of project management and reporting.

**Project Manager** – Common Ground Capital, Conceptual Mitigation Plan: 2015. Developed conceptual mitigation for Indiana and northern long-eared bats related to project designed to connect wind energy sites in Oklahoma with Memphis, Tennessee by crossing the length of Arkansas.

**Biologist** – Kinder Morgan, Pad L & Pad G Pipelines: 2015. Helped client develop novel approach to addressing potential presence of migrating northern long-eared bat along two proposed pipelines in Pittsburgh County, Oklahoma. To meet client's timeline constraints, ESI completed acoustic surveys and then processed, analyzed (both qualitatively and quantitatively), and provided the client with results within hours of completion of fieldwork.

**Biologist** – Confidential Client, Crystal Cave Telecommunications Tower: 2015. Helped client develop a study that illustrated a raptor nest on a communications tower had been abandoned in order to demonstrate avoidance of take pursuant to Migratory Bird Treaty Act and allow restoration of the tower.

**Biologist** – RW Orange County, Resorts World Hudson Valley Project: 2014. Completed visual review of all call sequences identified as federally endangered species during quantitative analysis, and supplied final decision about presence or absence of Indiana and northern long-eared bats for acoustic monitoring study in Orange County, New York. Acoustic data indicate that neither species was present.

**Project Manager** – Dominion Transmission, Jetersville to Ponton 115 kv Transmission Line: 2015. Completed presence and absence surveys for smooth coneflower along 8-mile transmission line and multiple access roads in Amelia County, Virginia. Responsible for all aspects of project management and reporting.

**Project Manager** – Marathon Oil, Grayling Well Pad: 2015. Supervised collection and analysis of acoustic data at 4 acoustic monitoring stations and associated reporting within one week for proposed oil pad in Crawford County, Michigan. Responsible for all aspects of project management and reporting.

**Project Manager** – Rice Energy, Beta McNichols to Parry and Beta Parry to Cholak Pipelines: 2015. Completed mist netting at 29 sites for total of 179 complete net nights along two proposed natural gas pipelines in Greene County, Pennsylvania. Netting resulted in capture of 265 bats representing six species, including federally threatened northern long-eared bat. Ten northern long-eared bats and a single evening bat were subsequently radio-tagged and tracked to roosts. Completed searches for potential hibernacula. Responsible for all aspects of project management and reporting.

**Project Manager** – Columbia Gas Transmission, Tri-County Bare Steel Replacement Project: 2015. Completed summer mist net surveys in accordance with Multi-Species Habitat Conservation Plan for proposed replacement and modernization of 32 miles of natural gas pipeline. Surveys resulted in capture of 111 bats including 33 federally threatened northern long-eared bats. Radio-tagged four northern long-eared bats and tracked to roosts where emergence counts were completed. Responsible for all aspects of project management and reporting.

**Project Manager** – NextEra Energy, Wind Resource Area: 2015. Managed mist netting surveys for federally endangered Indiana bat and federally threatened northern long-eared bat within wind resource area in Osborne County, Missouri.

**Biologist** – Confidential Client, Kansas Expressway Expansion: 2015. Assisted client in understanding regulatory requirements under the Endangered Species Act and how these requirements intersect with the National Environmental Policy Act relative to a highway expansion project.

**Field Supervisor** – Eclipse Resources, Madzia Well Pad: 2014. Completed portal searches and mist net surveys for federally endangered Indiana bat in Harrison County, Ohio. No Indiana bats were captured and no portals were located.

**Project Manager** – SUNOCO, 9-Mile Pipeline Improvement: 2014. Supervised emergence counts for Indiana bats at proposed steam crossing site along the Clinton River in Rochester, Michigan. No bats were observed and the project was able to proceed within 48 hours of the first field survey. Responsible for all aspects of project management and reporting.

**Field Assistant** – Cincinnati/Northern Kentucky International Airport, Gunpowder Creek and Elijah Creek Drainage Basin Maintenance: 2014. Completed nine net nights of surveys for Indiana and gray bats at each of two sites in Boone, County Kentucky. No endangered bats were captured. Prepared report and interacted with client.

**Biologist** – Hawks Nest Hydro, Hawks Nest and Glen Ferris Hydroelectric Developments: 2013. Completed visual review of all call sequences identified as federally endangered species during quantitative analysis.

**Biologist** – Consol Pennsylvania Coal Company, Bailey Mine Crabapple Overland Belt: 2013-2014. Completed visual review of all call sequences identified as federally endangered species during quantitative analysis. Based on known error rates and patterns, temporal and spatial clustering of identified sequences, and biology of the species, determined the likelihood that a species was or was not present at those sites where potential bat calls were detected.

**Project Manager** – Spectra Energy, Ohio Pipeline Expansion Network: 2013-2014. Managed summer and winter bats surveys along approximately 75 miles of alternate routes in five counties in Ohio. Assisted client in addressing regulatory concerns following proposed listing of the northern long-eared bat.

**Project Manager** – PVR Marcellus Gas Gathering, Ohio River Pipeline: 2013-2014. Completed summer mist netting and portal searches for Indiana and northern long-eared bats along approximately 75 miles of alternate routes in eastern Ohio. The northern long-eared bat, proposed for federal listing by USFWS, was captured at multiple locations, and coordination was undertaken under section 10 of the ESA.

**Project Manager** – Forest Preserve District of Kane County, Bat Inventory: 2011 and 2013. Managed summer bat mist net and acoustic surveys at four forest preserves in Kane County, Illinois. Coordinated with client and completed associated reporting. Completed quantitative (using programs) and qualitative (visual) analysis of bat calls collected during the project.

**Project Manager** – Cartersville Ranch: 2013 and 2012. Managed project involving summer mist netting and acoustic surveys on 1800-acre privately owned ranch in Bartow County, Georgia. Responsible for client and agency coordination, reporting, and budget. Completed quantitative (using programs) and qualitative (visual) analysis of bat calls collected during the project.

**Project Manager** – Coal Mines in eastern Kentucky: 2013. Managed summer bat mist net and acoustic surveys, as well as assessment of portals at four proposed coal mines. One site contained over 100 mining features that were assessed as potential habitat for Indiana and Virginia big-eared bats. Ten of these openings were rated as potentially suitable and thus were trapped. No endangered bats were captured.

**Biologist** – Spectra Energy, TEAM 2014: 2012-2014. Supervised pre-construction surveys and mitigation design for Allegheny woodrats and eastern small-footed bats along 3 gas pipeline loops in Pennsylvania. Responsible for quality control of data and coordination among ESI, client, and the Pennsylvania Game Commission.

**Field Supervisor** – CNX Gas Company, NBL 39 Well Site: 2013. Completed summer mist netting and portal searches for Indiana bats on proposed well pad site in Noble County Ohio.

**Project Manager** – Indiana Michigan Power Company, Greater Fort Wayne Area Reliability Improvements: 2013. Completed habitat evaluation in Allen County, Indiana to determine whether a 7.8-acre forested area along Pleasant Run Creek contained suitable Indiana bat habitat.

**Project Manager** – EQT, NILO S002 and NILO-D001 pipelines: 2012. Managed project involving detailed habitat assessments and portal searches for suitable small-footed bat habitat for two projects in Elk and McKean counties, Pennsylvania, respectively. Responsible for field team coordination, client and agency coordination, reporting and budget.

**Project Manager** – Sunoco Pipeline, Tiffin-Easton Pipeline: 2012. Completed summer mist netting surveys for bats and massasauga rattlesnakes along 82-mile pipeline project in Seneca, Huron, Ashland, and Wayne counties, Ohio. Responsible for all aspects of project including field work, client and agency coordination, reporting and budget.

**Project Manager** – Sunoco Pipeline, Fostoria Connection Pipeline: 2012. Completed summer mist netting surveys on 48-acre site in Wood and Hancock counties, Ohio. Responsible for all aspects of project including field work, client and agency coordination, reporting and budget.

**Project Manager** – Confidential Client, Wind Resource Area: 2011. Completed acoustic surveys of bats using combination of detectors on MET towers and ground-based detectors at a site in Huron County, Michigan. Responsible for project management and data analysis.

**Project Manager** – Confidential Client, Wind Resource Area: 2011. Implemented a mortality study on a site containing 20 turbines along 3-mile stretch of Backbone

Mountain in Garrett County, Maryland. Managed project including development of survey protocol.

**Project Manager** – Confidential Client, Wind Resource Area: 2011. Completed habitat assessment for potential use by endangered bats on 45,293-acre site in Sanilac and Lapeer Counties, Michigan as part of Tier II analysis.

**Project Manager** – Confidential Client, Wind Resource Area: 2011. Managed endangered bat mist net and acoustic surveys and telemetry within 19,926-acre wind resource area in Seneca and Crawford counties, Ohio. Coordinated with prime consultant and completed associated reporting.

**Project Manager** – Confidential Client, Wind Resource Area: 2011. Managed endangered bat mist net and acoustic surveys and telemetry within 39,607-acre wind resource area in Seneca and Sandusky counties, Ohio. Coordinated with prime consultant and completed associated reporting.

**Project Manager** – Confidential Client, Wind Resource Area: 2011. Managed endangered bat mist net and acoustic surveys within 8151-acre wind resource area in Darke County, Ohio. Coordinated with prime consultant and completed associated reporting.

**Biologist** – American Electric Power, Bonnyman-Softshell 138kV Transmission Line: 2011. Completed summer mist netting survey along 19.6-mile transmission line in Perry and Knott counties, Kentucky. Responsible for mist net site set up and habitat assessment, bat identification, morphometric processing, and implementation of White Nose Syndrome protocols.

**Biologist** – American Electric Power, Wyoming-Jackson's Ferry 765 kV Transmission Line: 2004-2009. Participated in mist net surveys at three wildlife mitigation ponds along transmission line ROW in Virginia.

**Project Manager** – Confidential Client, Wind Resource Area: 2010. Completed bat sampling, using mist netting and ground-based acoustic detectors, on site proposed to contain 100-130 wind turbines, in Montgomery and Boone counties, Indiana.

**Project Manager** – Confidential Client, Wind Resource Area: 2010. Completed summer mist netting and associated acoustic studies for endangered bats on 61,256-acre, 300-megawatt wind energy generation facility in Wells, Adams, Blackford, and Jay counties, Indiana. Contributing author to Habitat Conservation Plan including development of new and comprehensive technique of estimating take.

**Biologist** – Equitrans, Sunrise Pipeline: 2010. Completed Indiana bat summer mist net survey in Greene County, Pennsylvania, and Doddridge, Marion, Harrison, Taylor, and Wetzel counties, West Virginia.

**Project Manager** – Burr Oak Wind Resource Area: 2010. Completed desk-top analysis of bat impacts for proposed wind energy facility in Marshall and Fulton counties, Indiana.

**Project Manager** – Fayette Wind Resource Area: 2010. Completed desk-top analysis of bat impacts and phase II surveys for bat habitat for proposed wind energy facility in Fayette, Rush and Henry counties, Indiana.

**Biologist** – Duke Energy, Lawrenceburg Road Site: 2010. Completed summer mist net survey for federally endangered Indiana bat on 220-acre parcel near confluence of the Great Miami and Ohio rivers in Hamilton County, Ohio.

**Biologist** – Confidential Client: 2010. Prepared Protection and Enhancement Plan for federally endangered Indiana bats in partial mitigation for construction at mine in Greene County, Pennsylvania.

**Biologist** – Entergy, James A. FitzPatrick Nuclear Power Plant: 2009. Completed data analysis for Indiana bat habitat evaluation for expanding nuclear facility in Oswego County, New York. Coauthored technical report.

**Biologist** – Indiana Department of Transportation, SR 641 Bypass (Phases III and IV): 2009. Author for Biological Assessment to investigate effects along approximately six miles of proposed new roadway in Vigo County, Indiana.

**Biologist** – Metropolitan Sewer District of Greater Cincinnati, Mt. Airy Forest Sewer Replacement: 2009. Analyzed habitat quality measurements taken during surveys for federally endangered Indiana bat, cave salamander, hellbender, and running buffalo clover on 1469-acre urban forest in Hamilton County, Ohio.

**Biologist** – Confidential Client, Wind Resource Area: 2009. Completed technical report sections for endangered species studies and biological assessment at 84 windmill, 250-megawatt capacity wind farm on an island in the Great Lakes in Jefferson and Oswego counties, New York.

**Biologist** – Consol Pennsylvania Coal Company, Bailey Mine: 2009. Author for Biological Assessment to investigate effects of coal refuse disposal on Indiana bats. Responsible for analysis of effects of coal mining related to competition of Indiana bats to both other bats and conspecifics, effects of acid mine drainage, and groundwater.

**Project Manager** – The Conservation Fund: 2009-2010. Managed project involving multiple field teams to complete AnaBat studies across the eastern range of the Indiana bat in nine states. Studies include examination of species distribution in potentially impacted areas and forest condition surveys. Coordinate and oversee field work (including on-site visits to ensure sampling QA/QC), interpret collected data, and coordinate with client, resource agencies, and landowners.

**Field Supervisor** – AES Sparrows Point LNG Terminal and Mid-Atlantic Express Pipeline: 2009. Completed endangered bat surveys along the 88-mile Sparrows Point LNG Terminal and Mid-Atlantic Express Pipeline in Baltimore, Hartford, and Cecil counties, Maryland and Lancaster and Chester counties, Pennsylvania. Responsible for mist net site set up and habitat assessment, bat identification, morphometric processing and implementation of White Nose Syndrome protocols.

**Research Scientist** – Indianapolis International Airport: 1997-2009. Directed mitigation project for Sec. 7 and Sec. 10 (HCP) of ESA including conducting artificial roosts studies and directing mist-net and AnaBat surveys. Studies required extensive use of

radiotelemetry and coordination of mitigation activities with state, federal, and local agencies, directing field work, interviewing and hiring student workers, and preparing final reports. In addition, provided assistance to the airport on a variety of wildlife management issues ranging from crop deprivation to animal hazards at the airfield and on local roadways.

**Project Manager** – Interactions with Bats and Roadways: 2004-Present. Used combination of radio-telemetry data, direct field observation of bats crossing roads, and behavioral models in an effort to understand the impacts of roadways on bats.

**Project Manager** – Community Structure and Behavior of Small Mammals along Interstate Highways: 2007. Used Sherman live traps to capture small mammals in medians and along roadsides of Interstate 70 in eastern Illinois. Between trapping sessions, behavioral approaches were used to compare the perceived habitat quality between roadsides and medians. In this study area, highways provided high-quality habitat for a community of small mammals comparable with that found in local nature preserves.

**Project Manager** – Comparison of Traditional and Molecular Techniques to Estimate Summer Indiana Bat Colony Sizes: 2006-2008. Directed field work and conducted regular emergence counts at known roost trees of Indiana bats at least twice per week in effort to determine colony sizes. Results were used for further study and were compared with mark-recapture estimations obtained by developing and using DNA signatures of individual bats in manner similar to traditional mark-recapture analysis.

**Project Manager** – Food Resources of Bats across an Urban/Rural Gradient: 2005-2008. Supervised research project in which GIS was used to select points within landscape classes that were later sampled for insects. Captured insects were compared to those eaten by Indiana bats from this site and to the diets of other species in Indiana. Findings indicated urban areas provide sufficient food for bats; however, telemetry data indicated rare use of urban areas when rural habitats were available.

**Project Manager** – Nocturnal Habitat of the Eastern Red Bat (*Lasiurus borealis*) at an Urban/Rural Interface: 2003-2004. Supervised research project using radio-telemetry, and GIS to examine habitat selection by eastern pipistrelles near the Indianapolis Airport. Work resulted in the only published use of radio-telemetry to track free-ranging eastern red bats during migration.

**Project Manager** – Diet of Black and Turkey Vultures in a Forested Landscape. Directed research project involving identification of hair, scale, and bone fragments within pellets of black and turkey vultures. Data were then combined with movement data to inform Bird Avoidance Models.

**Project Manager** – Habitat Use by a Juvenile Hoary Bat at an Urban/Rural Interface: 2004. Used radio-telemetry and GIS techniques to provide insight into the behavior of a rarely captured species.

**Project Manager** – Nocturnal Habitat Selection by the Federally Endangered Indiana Bat (*Myotis sodalis*) at an Urban/Rural Interface: 2002. Used combination of radio-telemetry and GIS to examine Indiana bat habitat selection near the Indianapolis Airport.

**Project Manager** – Comparison of Habitat Selection by Big Brown and Evening Bats at the Indianapolis International Airport: 2001. Supervised research project involving use of radio-telemetry and GIS to compare habitats used by evening bats (a locally endangered species) and big brown bats (locally abundant) near the Indianapolis Airport. Published field data were the first to support the hypothesis that loss of foraging habitat is a primary cause of endangerment for bats.

**Project Manager** – Changes in Fish Community Structure along an Urban to Rural Gradient in an Indianapolis Stream: 2002. Completed fish sampling at 10 sites on multiple occasions to demonstrate changes in community structure (using Index of Biological Integrity and species richness).

**Project Manager** – Amphibians and Reptiles of the Indianapolis International Airport: 2001-2002. Completed reptile and amphibian surveys at the Indianapolis Airport using field observation techniques ranging from searching under debris to modified frog call routes to detect herps throughout an urban and rural matrix.

**Research Associate** – Sternberg Museum of Natural History: 1994-1996. Completed state-wide survey of bats of Kansas including capturing and preparing specimens, recruiting and directing volunteer field assistants, interacting with landowners, conducting public education programs, reexamining existing specimens, photographing bats, and preparing reports for publication. QMC Models 1 and 2 bat detectors were also used to detect echolocation signals.

**Project Director** – Indiana State University, Hardwood Ecosystem Experiment: 2006-2008. Initiated protocols for determining effects of timber harvest on bats and other species in Morgan-Monroe and Yellowwood State Forests. Completed mist netting surveys including net site reconnaissance, bat habitat assessments; mist net set-up, bat handling and identification, and AnaBat surveys. Also directed multiple research projects involving fish, herp, and insect surveys and several studies that examined wildlife response to highways.

**Wildlife Technician** – Kansas Department of Wildlife and Parks: 1994-1995. Aided in efforts to understand decline of ring-necked pheasant in Kansas. Sampled agricultural habitats for evidence of use by pheasants, song birds, and short-eared owls.

**AmeriCorps Volunteer** – USDA Natural Resources Conservation Service: 1995-1996. Provided assistance in Hays Kansas and surrounding area to help restore habitats damaged by historic floods in 1993.

**Wildlife Technician** – Kentucky Department of Fish and Wildlife Resources: 1993. Aided in efforts to reintroduce peregrine falcons in Kentucky including growth and behavior monitoring, general public and media liaison, and arranging for treatment and conducting first aid for injured falcons.

**Wildlife Technician** – USDA Forest Service: 1992. Completed surveys of federally-threatened northern spotted owls and several species of local conservation concern in the Pacific Northwest including: northern goshawks, red-legged frogs, and Townsend's big-eared bats.

**Coordinator** – Murray State University Student Chapter of The Wildlife Society Raptor Rehabilitation Center: 1991-1993. Supervised day-to-day operation of student-run rehabilitation center including supervising and training volunteers, administering first aid to injured birds, coordinating treatment with veterinarian, presenting public education programs, and coordinating education program at the National Museum of the Boy Scouts of America.

**Wildlife Technician** – U.S. Forest Service, McKenzie River District: 1992. Completed surveys for spotted owls, goshawks, Townsend's big eared bats, and red-legged frogs.

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- Weber, T. C. and D. W. Sparks. 2013. Summer habitat identification of an endangered bat, *Myotis sodalis*, across its eastern range of the USA. *Journal of Conservation Planning* 9:53 – 68.
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## **EDUCATIONAL PUBLICATIONS**

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## **POSTER AND ORAL PRESENTATIONS**

- Sparks, D. W. and V. Brack, Jr.: 2011. Lewisburg Mine, Preble County Ohio. Presented at 2013 Ohio Bat Working Group, December 9, Columbus Ohio.
- Sparks, D. W., V. Brack, Jr., K. Francl, J. Boyles. 2012. Will the evening bat (*Nycticeius humeralis*) become the dominant tree-roosting bat of the Midwest following White Nose Syndrome? Presented at the 42nd North American Symposium on Bat Research, October 24-27, San Juan, Puerto Rico.
- Sparks, D. W. and V. Brack, Jr.: 2011. Conservation and Management of Habitat for Maternity Colonies of the Indiana bat: Possibilities for Transportation Projects. Presented at 2011 International Conference on Ecology and Transportation: Sustainability in Motion. August 21-25, Seattle, Washington.

- Francl, K.E., J. Timpone, D. W. Sparks, and V. Brack, Jr. 2010. Tracking White-nose Syndrome in summer bat communities – spatial and temporal patterns in the eastern United States. Presented at joint meeting of the Virginia Chapters of The Wildlife Society and American Fisheries Society, Wirtz, VA.
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- Brack, V., Jr., D. W. Sparks, and J. O. Whitaker, Jr. 2009. Landscape Scale Movements of Maternity Colonies of the Indiana bat Through Time: Examples and Possibilities. Paper Presented To: National Military Fish and Wildlife Federation.
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- Gonzalez-Olimon, G., J. R. St. Juliana, and D. W. Sparks. 2008. Small mammal communities along highways: species composition and behavior. Poster Presented To: American Society of Mammalogists.
- Gonzalez-Olimon, G., J. R. St. Juliana, W. A. Mitchell, and D. W. Sparks. 2007. Small mammal antipredator behavior in highway triangles, medians, and road sides in selected areas in Terre Haute, IN. Poster Presented To: Indiana Academy of Science.
- Farrell Sparks, J. K., D. W. Sparks, and V. Brack, Jr. 2007. Utility poles as bat roosts. Poster Presented to: American Society of Mammalogists.
- Tuttle, N. M. and D. W. Sparks. 2007. Indiana bats may be avoiding urban habitats for reasons other than prey availability. Poster Presented to: American Society of Mammalogists and American Society of Mammalogists (2006).
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- Helms, J. S., D. W. Sparks, and J. O. Whitaker, Jr. 2007 Nocturnal behavior and roosting ecology of *Perimyotis subflavus* (Eastern Pipistrelle) near Indianapolis International Airport. Poster Presented To: American Society of Mammalogists, Indiana Academy of Science (2006), and North American Bat Research Symposium (2006)
- Judy, D. J., D. W. Sparks, and J. O. Whitaker. 2006. Obtaining fecal samples under Indiana bat roosts: a word of caution. Poster Presented to: American Society of Mammalogists.
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- Gikas, N. S, W. A. Lebsack, and D. W. Sparks. 2008. Information sharing about roosting areas by Indiana bats (*Myotis sodalis*). Paper Presented To: Indiana Academy of Science.
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- Sparks, D. W., C. M. Ritzi, and J. O. Whitaker, Jr. 2004. What do Indiana myotis do when they lose a roost. Presented to: American Society of Mammalogists.
- Sparks, D. W., C. M. Ritzi., B. L. Everson. 2003. The Indiana bat as an umbrella species for wildlife near Indianapolis. Presented to: Indiana Academy of Science.
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- Sparks, D. W., A. R. Krochmal, and W. A. Mitchell. 2001. Comparison of the reproductive biology of the northern myotis (*Myotis septentrionalis*) and the little brown myotis (*Myotis lucifugus*) in Indiana. Presented to: Indiana Academy of Science.
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- Sparks, D. W., and A. R. Krochmal. 2001. Evidence for geographic variation in birth size of *Myotis lucifugus*. Presented to: Indiana State University Graduate/Undergraduate Research Showcase.
- Sparks, D. W., and A. R. Krochmal. 2000. Growth and Development of (*Myotis lucifugus*) in Poland, Indiana. Presented to: North American Bat Research Symposia.
- Farrell, J. K., D. W. Sparks, and B. J. Foster. 2000. Vegetation surrounding the roosts of *Myotis septentrionalis*—a preliminary analysis. Presented to: Indiana Academy of Science.
- Sparks, D. W., and A. R. Krochmal. 2000. Development of (*Myotis lucifugus*) in Poland, Indiana with comments on geographic variation. Presented to: Indiana Academy of Science.
- Sparks, D. W., B. J. Foster, and J. O. Whitaker, Jr. 1999. Behavioral correlates of swarming bats. Presented to: American Society of Mammalogists
- Farrell, J. K., D. W. Sparks, and J. A. Laborda. 2000. Preliminary analysis of the vegetation surrounding the roosts of *Myotis septentrionalis*. Presented to: Indiana State University Graduate/Undergraduate Research Showcase. Winner (JKF): Outstanding Undergraduate Presentation (Science).
- Sparks, D. W., T. S. Crowe, and A. R. Krochmal. 2000. Patterns of growth and development of little brown myotis (*Myotis lucifugus*) at Poland, Indiana.

Presented to: Indiana State University Graduate/Undergraduate Research Showcase.

Sparks, D. W., B. J. Foster, and J. O. Whitaker, Jr. 1999. Notes on bats swarming at Copperhead Cave. Presented to: Indiana Academy of Science.

Sparks, D. W., J. A. Laborda, and P. A. Zollner. 1998. Orientation of northern myotis following release in daytime. Presented to: Indiana State University Graduate/Undergraduate Research Showcase.

Sparks, D. W., J. A. Laborda, and P. A. Zollner. 1998. Orientation of northern myotis following release in daytime. Presented to: Indiana Academy of Science.

Sparks, D. W., and J. R. Choate. 1998. Impacts of settlement on three species of bats in status of bats in Kansas. Presented to: American Society of Mammalogists and Indiana State University Graduate/Undergraduate Research Showcase.

Sparks, D. W., and J. R. Choate. 1997. Impacts of settlement on the distribution and conservation status of bats in Kansas. Presented to: Indiana Academy of Sciences

Sparks, D. W., and J. R. Choate. 1995. Preliminary notes on the distribution and biogeography of bats in Kansas. Presented to: American Society of Mammalogists.

Sparks, D. W., and J. R. Choate. 1995. Preliminary notes on the distribution and biogeography of bats in Kansas. Presented to: Southwestern Association of Naturalists.

Sparks, D. W. 2008. Demography of the endangered Indiana bat. Presented to: USFWS Indiana Bat Demographic Model Rapid Prototyping and Structured Decision Making Workshop, National Conservation Training Center.

Sparks, D. W. 2007. How Biologists Use Museum Specimens. Presented to: Department of Forestry and Natural Resources, Purdue University.

Sparks, D. W. 2007. Indiana Bats and Urbanization—Lessons Learned at the Indianapolis International Airport. Presented to: Department of Forestry and Natural Resources, Purdue University and Center for Urban and Environmental Change, Indiana State University, Department of Geography, Geology, and Anthropology.

Sparks, D. W. 2006. Over-view of the Indianapolis Airport Project: What is the Benefit of Research for the Regulated? Presented to American Association of State Transportation Officials workshop on Indiana Bats.

Sparks, D. W. 2005. Landscape ecology of the endangered Indiana bat. Presented to: Indiana Bat Survival Workshop, National Conservation Training Center.

Sparks, D. W. 2005. Natural history of the endangered Indiana bat. Presented to: Indiana Bat Survival Workshop, National Conservation Training Center.

- Sparks, D. W., J. O. Whitaker, Jr, and C. M. Ritzi. 2004. Foraging ecology of the endangered Indiana bat. Presented to: Indiana Bats and Coal Mining, An Interactive Technical Forum.
- Sparks, D. W. 2004. Bats and Urbanization Near Indianapolis, Indiana. Presented to: Murray State University Wildlife and Fisheries Society.
- Sparks, D. W. C. M. Ritzi, and J. O. Whitaker, Jr. 2004. Managing a forest bat in the suburban jungle: conserving the Indiana myotis near Indianapolis. Presented to: Second Bats and Forest Symposium (Section on Managing Indiana Bats).
- Sparks, D. W. 2003. How does urbanization impact bats? Presented as: Sternberg Museum Lecture Series.
- Sparks, D. W. , and T. P. Simon. 2002. Managing small collections. Presented to: Indiana Academy of Science.
- Sparks, D. W. 2002. Reproductive biology of the northern myotis. Presented to: Department of Life Sciences, Indiana State University.
- Sparks, D. W. 2000. Copulation, growth, development, and roosting ecology of the northern myotis, *Myotis septentrionalis*. Presented to: Ball State University Student Wildlife Society.
- Sparks, D. W. 1998. Distribution, conservation status, and historical biogeography of bats in Kansas. Presented to: Department of Life Sciences, Indiana State University.
- Sparks, D. W. 1998. Orientation of northern myotis, *Myotis septentrionalis*, following release in Daytime. Presented to: Department of Biology, Fort Hays State University.

## **PROFESSIONAL AFFILIATIONS**

American Society of Mammalogists, Life member  
Southwestern Association of Naturalists, 1994  
Society for Conservation Biology, 1996-2006  
The Wildlife Society, 2000-Present



## ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

### Résumé

Robert P. Jean, Ph.D.

#### EDUCATION

Ph.D., Ecology/Entomology, Indiana State University, 2010. Dissertation: "Studies in bee diversity in Indiana: the influence of collection methods on species capture, and a state checklist based on museum collections"

M.A., Ecology, Indiana State University, 2002. Thesis: "The pollinator fauna of two spring wildflowers of Midwestern deciduous forest, *Erigenia bulbosa* and *Claytonia virginica*"

B.S., Life Sciences, Indiana State University, 1998

A.S., Biological Education, Lake Land College, 1995

#### PROFESSIONAL CERTIFICATIONS

NEPA Refresher Course, INDOT, 2017

Bat Investigations for Field Personnel, INDOT University, 2016

National Environmental Policy Act (Initial Training), INDOT University, 2016

National Environmental Policy Act (NEPA) – Categorical Exclusion Course, INDOT and FHWA, 2016

Metals Stabilization: Concept to Completion, MSECA

Incremental Sampling Method, MSECA

Manufactured Gas Plant Coal Tar Remediation, MSECA

#### QUALIFICATIONS AND EXPERIENCE

Dr. Jean is an authority in pollination biology, a specialty requiring proficiency in both plant and insect identification. The focus of his studies includes bees, their habitat, and their relationships to various plant species. Over the last fifteen years, he has become a recognized expert in the identification and taxonomy of bees, with particular emphasis on species of the eastern U.S. He frequently designs and implements survey protocols and is currently advising several state agencies and the U.S. Fish and Wildlife Service on appropriate survey protocols for the endangered rusty patched bumble bee (*Bombus affinis*) and he holds a federal recovery permit for the species. He routinely conducts workshops on native bees and how to attract them. His credentials include assisting with development of matrix-driven bee genus and species identification guides, a teaching tool available for use on the internet. Over the course of his career, Dr. Jean collected, observed, identified, and processed well over 100,000 pollinators including numerous listed species: more than 50 rusty patched bumble bees; 100 regal fritillaries (*Speyeria idalia*); 3 karner blue butterflies (*Lycaeides melissa samuelis*); and hundreds of individuals in the bee genus *Hylaeus*. Additionally he holds a federal permit for karner blue butterfly and Mitchell's Satyr butterfly (*Neonympha mitchelli mitchelli*).

Much of Dr. Jean's botanical experience centers on surveying rare plant communities such as prairies, glades, barrens, black oak savannas, dunes, and deciduous forests, and the rare plants found within them. On multiple occasions during his tenure at the Missouri Department of Conservation and Indiana Dunes National Lakeshore, Dr. Jean located

previously unknown populations of rare plants. His broad experience with rare plants includes such species as eastern and western fringed prairie orchid, Virginia sneezeweed (*Helenium virginicum*), Missouri bladderpod (*Lesquerella filiformis*), Mead's milkweed (*Asclepias meadii*), decurrent false aster (*Boltonia decurrens*), and many *Trillium* species. Concurrent with plant surveys, Dr. Jean collects data on forests throughout the U.S., documenting tree species, invasive species cover, and suggesting management regimes designed to achieve a variety of goals ranging from wildlife habitat to aesthetic beauty. His expertise also encompasses addressing invasive plant management concerns including identification and management plan development, implementation, and monitoring.

In addition to pollinators and plant species, Dr. Jean's experience also includes the federally endangered American burying beetle (*Nicrophorus americanus*) and he holds a federal recovery permit for the species. He completed a four-year study for American burying beetle at multiple sites in western Missouri in an attempt to locate populations of this species, as well as document the presence and local abundance of other species of Silphidae, including other burying beetles. He designed a four-year monitoring program, prepared annual reports, and identified over 120,000 insects collected in traps. In 2006, he introduced over 100 pairs of American burying beetles to Waterloo Wildlife Area in Ohio. As part of this project, he handled, sexed, matched pairs by size, attached bee tags for later identification, and appropriately transported the beetles from the St. Louis Zoo to the wildlife area.

Dr. Jean is an experienced public speaker, having taught university-level courses, presented educational lectures to the public, and presented technical papers to professional organizations. He also authored and co-authored numerous papers and presentations.

## PROJECT EXPERIENCE

**Project Manager** – Michigan State University, Bee Identifications: 2015-Present. Lead insect taxonomic consultant for bees on project entitled "Integrating Native Bees into Sustainable Pollination Strategies for Specialty Crops". Project examines pollinators to specialty crops such as cranberries, blueberries, apples, watermelon, and almonds throughout the U.S., including California, Michigan, Maine, Pennsylvania, and Florida. Examined and identified all taxa of bees (Hymenoptera: Apoidea). Additionally, served as liaison between project team and other taxonomists with specialties for species that are among the most challenging to identify. The project is part of a five-year, multimillion dollar USDA-NIFA SCRI grant; and is leading to numerous scientific publications and public outreach on pollinator importance and crop production and pollination.

**Project Manager** – Pennsylvania State University, Bee Identifications: 2015-Present. Lead insect taxonomist on project researching Andrenid bees in Pennsylvania. Provided identifications on over 4,000 bees in the genus *Andrena*. Documented and verified at least three bee species previously undocumented in Pennsylvania. Identifications will advance knowledge of bees pollinating apple orchards in Pennsylvania, and of diversity of bees in general. These findings will be published and identifications will be used in future publications and to correct identification errors in past publications. In addition, all

specimens were labeled with determination labels comprising a valuable natural history collection for Pennsylvania.

**Team Lead** – Lake States Forest Management Habitat Conservation Plan (HCP): 2016. Provided consultation on rare, threatened, and endangered insects, in particular the rusty patched bumble bee, and implication for HCP.

**Taxonomic Consultant** – Center for Native Grassland Management, Bee Identifications: 2016. Provided identification and databasing of approximately 5,250 bees (Hymenoptera: Apoidea) from Pennsylvania, Tennessee, and Kansas. Identifications are being used to determine the effects of biofuel grasses on pollinator communities.

**Taxonomic Consultant** – University of Maine, Bee Identifications: 2016. Provided identification of approximately 2000 bees (Hymenoptera: Apoidea).

**Team Lead** – Confidential Client, HCP: 2016. Researched habitat requirements and status of rare, threatened, and endangered plants and insects for inclusion or exclusion of HCP.

**Team Leader** – Indiana Academy of Sciences, Goose Pond Fish and Wildlife Area Bioblitz, Greene County, Indiana: 2016. Team lead for bees. Collected, identified, and databased approximately 500 specimens. Paper in press.

**Team Leader** – Reconnecting Our Waterways, Indianapolis Urban Bioblitz, Marion County, Indiana: 2016. Team lead for bees. Collected, identified, and databased approximately 100 specimens. Paper in press.

**Team Leader/Field Supervisor** – Dominion, Atlantic Coast Pipeline: 2016. Desktop evaluation, field habitat assessments (i.e., walkthroughs), and surveys for suitable habitat to support multiple taxa in the George Washington National Forest along proposed pipeline route in Virginia. Seven dragonflies and damselflies; three beetles; and nineteen butterfly, skipper, and moth species were identified for study. Surveys resulted in discovery of rare Maureen's Minute moss beetle (*Hydraena maureenae*) and potentially adds two new county records for this species. Authored forester sensitive insect report for client.

**Project Manager** – NatureServe / Indiana Department of Natural Resources, Botanical Survey: 2016. Completed surveys for American ginseng at 18 sites in Indiana. Mapped populations, collected DNA samples from individuals, and wrote report.

**Wetland Delineator** – UTI, Oregon Lateral: 2016. Completed aquatic resource delineation, sampled vegetation, and evaluated areas near water withdrawal for potential wetlands.

**Project Manager** – EQT, Equitrans Expansion Project: 2015-2016. Completed rare, threatened, and endangered plant surveys in Pennsylvania and West Virginia. Two-hundred ninety species belonging to 82 plant families and 213 genera were identified.

**Biologist** – MVP, Mountain Valley Pipeline: 2015-2016. Completed rare plant surveys with focus on pinnate-lobed coneflower along proposed 300-mile long natural gas pipeline traversing 17 counties in Virginia and West Virginia. Specifically addressed all federal and state listed plants, as well as St. Francis's Satyr.

**Biologist** – American Electric Power, Bland Area Improvement: 2015-2016. Completed rare plant surveys with focus on rock skullcap along 7-mile 138 kV transmission rebuild project in Bland and Wythe counties, Virginia and Mercer County, West Virginia. Authored section of Biological Assessment and Biological Evaluation for plants and insects.

**Biologist** – Energy Transfer Partners, Revolution Pipeline: 2015. Completed rare plant surveys and wetland delineations for proposed 40-mile, 30-inch diameter pipeline traversing Butler, Beaver, and Washington counties in Pennsylvania.

**Biologist** – Eureka Hunter Pipeline, Multiple Pipeline Projects: 2015 Completed wetland delineations along three segments (Pyles-Miller-Pitman, Moser, and Stadler) of a natural gas pipeline in Ohio.

**Biologist** – Indiana Department of Transportation, Interstate 69, Pre- and Post-construction Surveys: 2015. Completed acoustic surveys for federally endangered Indiana and federally threatened northern long-eared bats along final ROW for Section 3, and potential ROW for section 6.

**Team Leader** – The Nature Conservancy, et al., Kankakee Sands and Conrad Savanna Bioblitz, Newton County, Indiana: 2012. Team lead for bees. Collected, processed, identified, and databased approximately 500 specimens. Produced several new county records.

**Biologist** – St. Mary-of-the-Woods, Pollinator Monitoring Program: 2011-2013. Collected, processed, identified, and databased approximately 1,000 bees.

**Team Leader** – Indiana Academy of Sciences, Goose Pond Fish and Wildlife Area Bioblitz, Greene County, Indiana: 2010. Team lead for bees. Collected, identified, and databased approximately 1000 specimens. Paper published.

**Field Ecologist/Entomologist** – U.S. Geologic Survey, Indiana Dunes National Lakeshore: 2010. Completed research on the pollination web at Howe's Prairie in Porter County, Indiana. Inventoried both plant and bee communities of the park and set up monitoring program for pollinators including Karner Blue butterflies. Assisted with design and implementation of studies. Collected approximately 5,000 bee specimens and prepared specimens and pollen for identification. Identified and databased all plant and bee specimens. Also completed plant and pollinator inventory focused on pitcher plants and yellow and pink lady slipper orchids at Pinhook Bog.

**Biologist** – The Nature Conservancy: 2009. Completed inventory of flowering plants and pollinators on the Four Canyons Natural Area in Ellis County, Oklahoma. Two new bee species were collected during the study.

**Biologist** – Equitrans, Big Sandy Pipeline: 2007. Completed Indiana bat potential roost tree and habitat assessments in Carter, Lawrence, Johnson, and Floyd counties, Kentucky.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006-2009. Sampled for rare plant and insect species using aerial nets, pan traps, and vane traps in multiple natural and conservation areas in Missouri. Preserved, pinned, labeled, and identified approximately 8,000 insects. Developed sampling regime and database for specimens. Also completed surveys focused on federally threatened Meads milkweed,

western prairie fringed orchid, and Missouri bladderpod. Participated in greater prairie chicken release.

**Field Researcher** – St. Louis Zoo: 2006-2009. Sampled for carrion beetles including federally endangered American burying beetle (*Nicrophorus americanus*) in multiple conservation areas in Missouri. Completed sampling using pit fall traps and blacklights. Designed four-year monitoring program, prepared annual reports and identified over 120,000 insects collected in traps. Sampling for ABB attracted other beetle species including dung beetles, hide beetles, tiger beetles, and rove beetles. All were tallied and identified.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006-2009. Completed rare plant and insect inventories on Wahkontah Prairie in St. Clair and Cedar counties, Missouri. Surveys focused on pollinators, plant-insect interactions, and federally threatened Mead's milkweed.

**Field Researcher** – St. Louis Zoo: 2006-2009. Completed insect inventories on WahKonTah Prairie in St. Clair and Cedar counties, Missouri. Surveys focused on federally endangered American burying beetle.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006, 2008-2009. Completed rare plant and insect surveys on Linscomb Wildlife Area, Taberville Prairie Conservation Area, and Schell-Osage Conservation Area (2006 only) in St. Clair County, Missouri. Surveys focused on pollinators and plant-insect interactions.

**Field Researcher** – St. Louis Zoo: 2006, 2008-2009. Completed insect surveys on Linscomb Wildlife Area, Taberville Prairie Conservation Area, and Schell-Osage Conservation Area (2006 only) in St. Clair County, Missouri. Surveys focused on federally endangered American burying beetle.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006, 2008-2009. Completed rare plant and insect surveys on Sky Prairie and Monegaw Prairie Conservation Areas in Cedar County, Missouri. Surveys focused on pollinators and plant-insect interactions.

**Field Researcher** – St. Louis Zoo: 2006, 2008-2009. Completed insect surveys on Sky Prairie and Monegaw Prairie Conservation Areas in Cedar County, Missouri. Surveys focused on federally endangered American burying beetle.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006, 2008. Completed rare plant and insect surveys on Osage Prairie in Vernon County, Missouri. Surveys focused on pollinators and plant-insect interactions.

**Field Researcher** – St. Louis Zoo: 2006, 2008. Completed insect surveys on Osage Prairie in Vernon County, Missouri. Surveys focused on federally endangered American burying beetle.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006. Completed rare plant and insect surveys on Osage, Ripgut, and Stillwell Prairies in Vernon County, Missouri. Surveys focused on pollinators and plant-insect interactions.

**Field Researcher** – St. Louis Zoo: 2006. Completed insect surveys on Osage, Ripgut, and Stillwell Prairies in Vernon County, Missouri. Surveys focused on federally endangered American burying beetle.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006. Completed rare plant and insect surveys on Rocky Barrens Conservation Area, Greene County, Missouri. Surveys focused on federally threatened Missouri bladderpod.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2006. Completed rare plant and insect surveys on Caney Mountain Conservation Area in Ozark County, Missouri. Surveys focused on pollinators and plant-insect interactions.

**Field Researcher** – St. Louis Zoo: 2006. Completed insect surveys on Caney Mountain Conservation Area in Ozark County, Missouri. Surveys focused on federally endangered American burying beetle.

**Assistant Natural History Biologist** – Missouri Department of Conservation: 2007. Completed rare plant and insect surveys on Grand Trace Conservation Area, Pawnee Prairie, Wayne-Helton Wildlife Area, and Dunn Ranch Prairie in Harrison County, Missouri. Surveys focused on pollinators and plant-insect interactions.

**Field Researcher** – St. Louis Zoo: 2007. Completed insect surveys on Grand Trace Conservation Area, Pawnee Prairie, Wayne-Helton Wildlife Area, and Dunn Ranch Prairie in Harrison County, Missouri. Surveys included federally endangered American burying beetle.

**Biologist** – Confidential Client: 2007. Completed survey for threatened or endangered plant species in association with proposed construction of ethanol plant in Clark County, Illinois.

**Biologist** – The Nature Conservancy: 2005. Completed inventory of savanna plants and pollinators on the Kitty Todd Nature Preserve and Oak Openings in Lucas County, Ohio.

**Curator** – Indiana State University: 2001-2008. Maintained insect collection of approximately 150,000 specimens. Preserved and pinned specimens. Maintained data base containing over 30,000 insect specimens for research purposes.

**Curator** – Indiana State University: 2006. Maintained mammal collection in the vertebrate collection. Identified, prepared, and catalogued specimens in university data base.

**Biologist** – Confidential Client: 2005. Performed emergence counts of bats at the Indianapolis Airport. Studies were conducted to help determine whether bats were using trees scheduled for removal in association with road development project near the airport.

**Biologist** – Smith Cemetery: 2002-2003. Completed multi-year survey to document prairie remnant persistence in Vermillion County, Indiana.

**Biologist** – Indiana Department of Natural Resources: 2002. Completed inventory for savanna species remnants at Jasper-Pulaski Fish & Wildlife Area in Jasper County, Indiana.

**Biologist** – Illinois Department of Natural Resources: 2001-2002. Completed plant and pollinator inventory on Hooper Branch Savanna in Kankakee County, Illinois. Studies focused on savanna dependent species such as goat's rue, lupine, etc.

**Biologist** – The Nature Conservancy: 2000-2002. Completed 3-year plant and pollinator inventory of Ober Savanna in Starke County, Indiana. Studies focused on savanna dependent species such as goat's rue, lupine, etc.

**Biologist** – The Nature Conservancy: 2000-2002. Completed 3-year plant and pollinator inventory of Prairie Border, NIPSCO Savanna, and Stoutsburg Savanna in Jasper County, Indiana. Studies focused on savanna dependent species such as goat's rue, lupine, etc.

**Biologist** – The Nature Conservancy: 2000-2002. Completed 3-year plant and pollinator inventory of Conrad Station Savanna in Newton County, Indiana. Studies focused on savanna dependent species such as goat's rue, lupine, etc.

**Biologist** – Completed research on pollination ecology of spring wildflowers in west-central Indiana forests: 1999-2001. Studies involved relationships between visitation rates and species richness of bees and flies that visit early spring wildflowers and size of the forest in which they occurred. Performed vegetation sampling and recorded phenology of flowering plants. Over 11,000 bees identified, prepared, catalogued, and entered in a database.

**Biologist** – Completed plant inventory on Kieweg Woods, Morris Landsbaum Woods, Riley Lock, and Jackson Schnyder Nature Preserve in Vigo County, Indiana: 1998-2002.

## PUBLICATIONS

Jean, R.P. and S. Messer. In preparation. New county records for the rare Maureens Hydraenan Minute Moss Beetle (Hydraenidae: *Hydraena maureenae* Perkins, 1980) in Virginia, USA. Preparing to submit to Northeastern Naturalist.

Holland, J. and R. P. Jean. In preparation. Results of a biodiversity survey in Indianapolis, Marion County, Indiana. Preparing to submit to Proceedings of the Indiana Academy of Science.

Jean, R. P. and P. E. Scott. In preparation. Characterizing bee communities of Midwestern black oak savannas: a comparison of net and bowl-trap collections. Preparing to submit to Journal of the Kansas Entomological Society.

Jean, R. P., P. E. Scott, J. Ascher, and R. Grundel. In preparation The bees of Indiana. Preparing for submission to Journal of the Kansas Entomological Society.

Lettow, M. C., L. A. Brudvig, C. A. Bahlai, J. Gibbs, R. Jean., and D. A. Landis. Bee Community Responses to a Gradient of Oak Savanna Restoration. Submitted to Restoration Ecology December 2016.

Jennifer A. Selfridge, C. T. Frye, J. Gibbs, and R. Jean. The Bee Fauna of Inland Sand Dune Communities in Worcester County, Maryland. Submitted to Northeastern Naturalist March 2017.

Ruch, D., J. D. Holland, and R. P. Jean. Results of a biodiversity survey at Goose Pond Fish and Wildlife Area, Greene County, Indiana. Submitted to Proceedings of the Indiana Academy of Science January 2017. LeBuhn, G, S. Droege, E. Connor, B. Gemmill-Herren, R. P. Jean, S. Potts, G. Frankie, R. Minckley, D. Roubik, F.

- Parker, K. Wetherill, E. Kula. 2015. Evidence based conservation: reply to Tepedino et al. *Conservation Biology* 29(1): 283-285.
- Colla, S. R.J. S. Ascher, M. Arduser, J. Cane, M. Deyrup, S. Droege, J. Gibbs, T. Griswold, H. G. Hall, C. Henne, J. Neff, R. P. Jean, M. G. Rightmyer, C. Sheffield, M. Veit, and A. Wolf. 2012. Documenting Persistence of Most Eastern North American Bee Species (Hymenoptera: Apoidea: Anthophila) to 1990–2009. *Journal of the Kansas Entomological Society* 85 (1): 14-22.
- LeBuhn, G., S. Droege, E. Connor, B. Gemmill-Herren, R. P. Jean, S. Potts, G. Frankie, R. Minckley, D. Roubik, F. Parker, K. Wetherill, J. Cane, T. Griswold, E. Kula. 2012. Detecting insect pollinator declines on regional and global scales. *Conservation Biology* 27: 113-120.
- Karns, D. R., D. G. Ruch, B. Simpson, B. Feaster, L. Sterrenburg, A. Bellian, B. E. Fisher, D. Gorney, J. D. Holland, R. P. Jean, W. W. Jones, W. McCarty, W. N. McKnight, W. L. Murphy, S. Naestnik, L. P. Tedesco, and J. O. Whitaker, Jr. 2012. Results of a biodiversity survey at Goose Pond Fish and Wildlife Area, Greene County, Indiana. *Proceedings of the Indiana Academy of Science* 121 (1): 45-53.
- Grundel, R., K. J. Frohnapple, R. P. Jean, and N. B. Pavlovic. 2011. Effectiveness of bowl trapping and netting for inventory of a bee community. *Journal of the Kansas Entomological Society* 40 (2): 374-380.
- Grundel, R., R. P. Jean, K. J. Frohnapple, J. Gibbs, G. A. Glowacki, and N. B. Pavlovic. 2011. A Survey of Bees (Hymenoptera: Apoidea) of the Indiana Dunes and Northwest Indiana. *Journal of the Kansas Entomological Society* 84: 105-138.
- Grundel, R., R. P. Jean, K. R. Frohnapple, G. A. Glowacki, P. E. Scott, and N. B. Pavlovic. 2010. Floral and nesting resources, habitat structure, and fire influence bee distributions across an open-forest gradient. *Ecological Applications* 20(6): 1678-1692.
- Bioblitz of Goose Pond Fish and Wildlife Area, Greene County Indiana June 16-17 2010. Published online at <http://www.indianaacademyofscience.org/Events-Meetings/BioBlitz-Archive.aspx>
- Jean, R. P. 2005. Quantifying a rare event: Pollen theft by honey bees from bumble bees and other bees (Apoidea: Apidae, Megachilidae) foraging at flowers. *Journal of the Kansas Entomological Society* 78 (2): 172-175.

## **PRESENTATIONS**

- 2017 How to attract native pollinators. Joint presentation with Stephanie Schuck. Indiana Academy of Science, Indianapolis, March 25.
- 2017 Native bees on the brink: An introduction to the bees of Indiana with an emphasis on rusty patched bumble bee. Indiana Department of Natural Resources, Turkey Run State Park, February 3.
- 2017 Native bees on the brink: An introduction to the bees of Indiana and how to attract them. Wabash Valley Audubon Society, Terre Haute, IN January 18.

- 2015 Native bees and their conservation. Wabash Valley Audubon Society, Terre Haute, IN, February 15.
- 2014 Native bees and how to attract them. Illinois State Beekeepers Association, Springfield IL, November 8.
- 2013 Presented workshop on bee identification for the ASPIRE team on Jan 19 in Gainesville, Florida. The ASPIRE team is a group of scientists (myself included) that have recently received a large grant to study the pollinators of many crop species across the U.S., how to manage native bees and attract them to agricultural areas and to develop public outreach to share the information we gain from these studies.
- 2013 The bees of Indiana and how to attract them. Purdue University, West Lafayette, IN.
- 2013 Bee management in forested systems, Tri-State Woodland Workshop in Southern IN.
- 2010 Bee diversity of black oak savanna remnants in Indiana. Natural Areas Conference Pollinator Symposium, Osage Beach, MO.
- 2008 Bee sampling methods and the differences between sampling with nets and pan traps. "Pollinator Conference: Information for Action." UMASS, Amherst, MA; Oct. 3-4. Can be viewed online at <http://www.millersriver.net/pollen/>
- 2005 The bees of Indiana with a focus on the bees of black oak savannas. Master Naturalist Program, Mt. Ayr, IN
- 2004 Inventorying biodiversity while restoration proceeds: native bee communities of black oak sand savannas "Restoration Ecology: current research and the future." The Wildlife Society, Bloomington, IN

#### **INVITED BEE AND INSECT IDENTIFICATION WORKSHOPS**

- 2016 "The bees of the Midwest and how to attract them", July 20; Purdue Extension, Kokomo, IN.
- 2016 "Native bees on the brink: how to attract native pollinators with native plants", June 11; Sustaining Nature and Your Land Day, Bloomington, IN.
- 2016 "Bee monitoring workshop" for the Missouri Department of Conservation; May 23, Cuivre River State Park, Troy, MO.
- 2016 "Native pollinators and forest management practices" for the Natural Resources Conservation Service and Clay County Soil & Water Conservation District, May 21, Terre Haute, IN.
- 2016 "An introduction to bee diversity and bee conservation status" for the National Association of Conservation Districts; January 13, Indianapolis, IN.
- 2015 "Native bees and their conservation", February 15; Wabash Valley Audubon Society, Terre Haute, IN.

- 2014 “Native bees and how to attract them”, November 8; Illinois State Beekeepers Association, Springfield IL.
- 2014 “Insect communities of tall grass prairies” for the Missouri Department of Conservation; July 21-25, Schell-Osage, El Dorado Springs, MO.
- 2013 “The bees of the Midwest”; Noon Optimist Club, Clinton, IN.
- 2013 “The bees of Indiana and how to attract them”; Purdue University, West Lafayette, IN.
- 2013 “Bee management in forested systems”; Tri-State Woodland Workshop in Southern Indiana.
- 2009 “How to identify insects in the Natural Communities of Missouri” for the Missouri Department of Conservation; July 20-23, Shaw Nature Preserve, Grays Summit, MO.
- 2009 Native Bee Identification, Ecology, Research and Monitoring; May 4-8; National Conservation Training Center, Shepherdstown, WV; Course CSP2225; 30 students; Co-instructors-Mike Arduser, Sam Droege, and Jason Gibbs.
- 2009 “How to catch and identify a bee”; February 9-13; Patuxent Wildlife Refuge, Beltsville, MD; 14 students; co-instructor-Sam Droege
- 2008 “How to catch and identify a bee”; December 1-5; Patuxent Wildlife Refuge, Beltsville, MD; 14 students; co-instructor-Sam Droege
- 2008 Native Bee Identification, Ecology, Research and Monitoring; March 24-28; National Conservation Training Center, Shepherdstown, WV; Course CSP2225; 14 students; co-instructor-Sam Droege.
- 2008 “How to catch and identify a bee”; February 4-8; Patuxent Wildlife Refuge, Beltsville, MD; 15 students; co-instructor-Sam Droege
- 2007 “How to catch and identify a bee”; December 10-14; Patuxent Wildlife Refuge, Beltsville, MD; 12 students; co-instructor-Sam Droege
- 2007 “How to catch and identify a bee”; April 16-20; Patuxent Wildlife Refuge, Beltsville, MD; 12 students; co-instructor-Sam Droege
- 2007 “How to catch and identify a bee”; February 5-9; Patuxent Wildlife Refuge, Beltsville, MD; 12 students; co-instructor-Sam Droege
- 2004 “How to identify the bees of Indiana: The Bee Workshop”, Indiana Academy of Science, Anderson, IN

## **PROFESSIONAL AFFILIATIONS**

Ecological Society of America

Indiana Academy of Science

Midwestern States Environmental Consultants Association

Our Green Valley Alliance for Sustainability – Board Member 2011-2014 – Education Committee

TREES Inc. – Board Member 2012-2015 – Keep Terre Haute Beautiful Committee and  
Big Trees Committee  
Ouabache Land Conservancy – Board of Directors 2013-present  
White Violet Center for Eco-Justice – Advisory Board 2015-present

# Kathryn “Kate” Lucier

Environmental Biologist



A wetland and stream biologist for Lochmueller Group (Lochgroup), Kate is an environmental scientist with more than 5 years of experience collaborating with private industry, regulators, and consultants in environmental compliance, wetland reclamation, and research ecology. Her responsibilities include all appropriate field studies and documentation in wetland delineations, mitigation and/or monitoring, permitting for wetlands and streams, and GIS analysis and mapping.

Before joining Lochgroup, Kate pursued her master's at the University of Windsor which led her to gain extensive wetland ecology experience in the wetlands of the Athabasca oil sands region in Northeastern Alberta. Her research within the Athabasca oil sands focused on the invertebrate fauna of fens and marshes, and the impacts of wetland hydrologic zonation on invertebrate assemblages. Practical applications of her research resulted in the creation of wetland sampling regimes and novel sampling techniques for sampling peat-forming wetlands. Kate's work continues to advise industry staff, consultants, and researchers attempting reclamation of peat-forming wetlands.

## REPRESENTATIVE PROJECT EXPERIENCE

**State Road 37 Improvement Project, City of Fishers** – Lead field biologist responsible for conducting wetland delineations and stream assessments along project corridor. Wrote water resources determination report and assisted with the NEPA process at the Environmental Assessment (EA) level. Roles included extensive GIS mapping, data management, and calculation of project impacts to water resources. Preliminary permitting determinations. Project ongoing.

**EIS, I-69, Bloomington to Indianapolis for INDOT** – Field Biologist responsible for conducting field studies including waters investigations to identify water resources in the project corridor. Specific field tasks included wetland delineation, streams assessments, and summer mist netting to survey for the federally endangered Indiana bat and federally threatened Northern long-eared bat. Involvement in NEPA process at EIS level: drafted chapters for DEIS including chapters on natural environment, water resources, wildlife considerations, and forest impacts as well as accompanying appendices. Assisted with public involvement and public meetings.

**Seymour District Slide Correction Projects, INDOT** – Lead field biologist responsible for wetland field studies for slide correction projects. Specific field tasks included wetland delineation and stream assessment, GIS mapping, and evaluation of project area for Threatened and Endangered Species (TES), including evaluation of potential bat habitat and inspection for endangered plant species.

**Spring Mill Road Small Structure Replacement**, Sub-consultant, City of Carmel – Lead Field biologist responsible for wetland determination and stream assessment for small structure replacement and stream realignment project. Wrote water resources determination report with GIS mapping and impact calculation for water resources. Environmental concerns included wetland boundary determination within floodplain in order to determine impacts from stream alignment.

**On-Call Environmental Services for INDOT, Crawfordsville District** – CE documents and supplemental documentation. This includes natural resource assessments (streams and wetlands), Section 106 issues, Section 4(f), Section 6(f) issues, coordination with agencies, and preliminary permitting activities. Projects have included:

- » **US 231 Intersection Safety Improvements, Montgomery County, for INDOT, Crawfordsville District** – Environmental Biologist for safety improvements along US 231 that involved road widening and the addition of designated left-turn lanes. Completed field investigations of the project area and completed the Waters of the US determination report. Major environmental concerns included minimizing impacts to the delineated wetlands.
- » **SR 142 Small Structure Replacement, Morgan County, for INDOT, Crawfordsville District** – Environmental Biologist for the replacement of the small structure over an unnamed tributary to Snake Creek. Completed the Waters of the US determination report. Major environmental concerns included impacts to the unnamed tributary and jurisdictional roadside ditches.



**WITH THE FIRM SINCE**  
2015

**YEARS OF EXPERIENCE**  
5 years

**EDUCATION**  
M.Sc., Wetland  
Ecology/Entomology,  
University of Windsor,  
Ontario, Canada, 2014

Thesis: Relative Distribution  
and biomass of Invertebrates  
in fens and marshes in the  
boreal region of  
Northeastern Alberta.

B.Sc., Biological Science,  
Minor in Agriculture,  
University of Alberta, Alberta,  
Canada, 2008

**CERTIFICATION**  
Certified Wetland Delineator  
(State of Minnesota)

**INDUSTRY ASSOCIATION**  
Society of Wetland Scientists  
(SWS member)

Indiana Association of  
Environmental Professionals  
(INAEPP Corporate Member)

» **SR 39 Bridge Replacement, Boone County, for INDOT, Crawfordsville District** – Environmental Biologist for the replacement of a bridge over Sugar Creek. Completed the Waters of the US determination Report. Major environmental concerns included impacts to Sugar Creek and delineated wetlands.

» **SR 63 Exit Ramp Bridge, Vermillion County, for INDOT, Crawfordsville District** – Environmental Biologist for the rehabilitation of an exit ramp bridge over Little Raccoon Creek. Completed field investigation and Waters of the US determination report. Major environmental concerns included impacts to the Little Raccoon Creek.

**On-Call Environmental Services for INDOT, Seymour District** – Assisted with CE documents and supplemental documentation. This includes natural resource assessments (streams and wetlands), Section 106 issues, Section 4(f), Section 6(f) issues, coordination with agencies, and preliminary permitting activities. Projects have included:

» **SR 156 Slide Correction Projects, Ohio County, for INDOT, Seymour District** – Environmental Biologist for the rehabilitation of The Ohio River Scenic Highway. Completed field investigations and Waters of the US determination report. Major environmental concerns included delineation of isolated wetlands within roadside ditches. As a result of successive slides, these culverts were damaged and are no longer effective at conveying roadside drainage, thus wetlands were formed.

**On-Call Environmental Services for INDOT, Vincennes District** – Assisted with CE documents and supplemental documentation. This includes natural resource assessments (streams and wetlands), Section 106 issues, Section 4(f), Section 6(f) issues, coordination with agencies, and preliminary permitting activities. Projects have included:

» **SR 61 Bridge Maintenance & Scour Protection, Warrick County, for INDOT, Vincennes District** – Field Biologist for the rehabilitation of a bridge over Koehler Ditch. Completed field investigation and Waters of the US determination report. Major environmental concerns included impacts to the Koehler Ditch.

**SR 252 Road Improvement Mitigation Site, Johnson County, for INDOT, Seymour District** – Drafted and submitted the Construction in a Floodway (CIF) permit for submittal to the Indiana Department of Natural Resources. Project involved erosion control on bank of Flatrock River and restoration of forested wetland by means of tree planting.

## CONTINUING EDUCATION

**Grasses, Rushes, and Sedges**, Botanic Training Institute, June 6-8, 2016

**Wetland Plant Identification**, Biotic Consultants, May 4-6, 2016

**Redefining Waters of the United States**, Wetland Training Institute, August 18, 2015

**Editing in ArcGIS**, Minnesota Department of Natural Resources, September 2014

**Introduction to ArcGIS**, Minnesota Department of Natural Resources, September 2014

**5-day Wetland Delineation Course**, Wetland Delineation Certification Program, September 15-19, 2014

Lincoln is an Environmental Scientist for Lochmueller Group (Lochgroupp). His duties in this role include stream and wetland assessments, preparation of NEPA documents, GIS, floral/faunal investigations, among other tasks. Lincoln's passion for the environment dates back to his childhood where he developed a stark interest for wildlife, the catalyst for a career in the environmental field.

Lincoln previously worked as a wildlife technician for Purdue University, Virginia Tech, and the University of Georgia at the Savannah River Ecology Lab. As a wildlife technician in various locations, Lincoln assisted in the data collection and analysis in a variety of wildlife studies on species such as the eastern hellbender, feral pigs, wood ducks, vultures, and cotton mice.

In his free time, Lincoln continues his passion for wildlife and the environment through hobbies such as birding, herping, and wildlife photography.

## REPRESENTATIVE PROJECT EXPERIENCE

**I-69 Tier 2 EIS, Evansville to Indianapolis, Indiana, for INDOT** - Assisted in the mist netting and radio-telemetry for the Indiana Bat monitoring pre-, during, and post-construction in Sections 4, 5, and 6 of I-69. 2014–Present

**I-69 Section 4 & 5 Mitigation, Evansville to Indianapolis, Indiana, for INDOT** – Assisted in the baseline plot layout, monitoring of tree plantings, and construction monitoring of 25 sites associated with impacts. 2014–Present

**SR 61 Boonville Bypass Wetland Stream and Floodway Mitigation, Spencer County, Indiana, for INDOT** – Assisted in the identification, design, and mitigation plan for the 50 acre mitigation site to address requirements of Section 404 and 401 and Construction in a Floodway permits. Site designs included excavation, planting plans and specifications. 2015

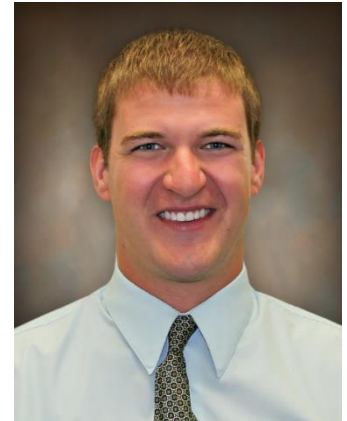
**SR403 Bridge Replacement Floodway Habitat Mitigation, Clark County, Indiana, for INDOT**– Assisted in the location and design of a 10 acre mitigation site to compensate for floodway impacts associated with the SR 403 Bridge Replacement over Silver Creek to address the construction in a floodway permit. Site design included rerouting drain tile, planting plans, and incorporation of a forested wetland to return beneficial hydrology to the site. 2015 - Present

**I-64 Pipe Liners, NEPA Documentation, Posey, Vanderburgh, Warrick, Gibson, Dubois, Spencer, and Crawford, Indiana, for INDOT, Vincennes District** – Assisted in the NEPA documentation for pipe liners in 12 I-64 small structures. The need for this project is due to the deteriorating conditions to of each culvert, respectively. The purpose of the project is to provide a hydraulically adequate and structurally sufficient structure that maintains vehicular traffic over 12 waterways. Each location represented unique conditions in regard to the waterway, existing condition of the structure, and proposed pipe liner alternatives. 2015-2016

**CE, SR61 over Koehler Ditch, Boonville, Indiana, for INDOT, Vincennes District** – Assisted in the NEPA documentation for SR 61 bridge maintenance and scour protection. The need for the project is due to the deteriorating condition of the bridge surface and overlay as well as the substrate erosion around bridge piers. The purpose of the project is to provide a structurally sufficient structure that provides safe vehicular crossing at this location. (DES 1173355) 2015

- **CE, SR 66 Bridge over Honey Creek, Washington County, Indiana, for INDOT, Vincennes District** – Assisted in the NEPA documentation for SR 66 bridge deck overlay and scour protection. The project area included a sinking stream basin of Honey Creek and adjacent karst features. Maintenance of the SR 66 bridge is due to deteriorating conditions of the existing bridge and scour beneath.

**US68/KY80 Mitigation Monitoring, Trigg County, Kentucky, for Kentucky Transportation Cabinet (KYTC)** – Assisted in the 4<sup>th</sup> and 5<sup>th</sup> year monitoring of 5 mitigation sites for impacts to streams, wetlands, and upland forests associated with construction of US68/KY80 through land between the Lakes Trigg County, Kentucky. Duties associated with monitoring included assessment of



**WITH THE FIRM**  
Since 2014

**YEARS OF EXPERIENCE**  
3

**EDUCATION**  
BS, Wildlife, Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana, 2013

**REGISTRATION**  
Scientific Purpose

plantings, wetland delineations, and documentation of invasive species, and preparation of yearly monitoring reports to ensure the sites were meeting the required performance standards. 2014 – 2015

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## **CONTINUING EDUCATION**

**Wetland Plant Identification**, Biotic Consultants, 2014 and 2015

**Roadway Environmental Impacts and Mitigation**, Forester University Webinar, November 2014



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## Appendix C. Total Avian Diversity



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### Total Avian Diversity

Species	Count
American Crow	1
American Goldfinch	11
American Robin	33
Barn Swallow	2
Blue Jay	1
Blue-winged Teal	2
Brown-headed Cowbird	8
Canada Goose	28
Carolina Wren	1
Common Grackle	10
Double-crested Cormorant	13
Downy Woodpecker	1
Eastern Towhee	1
European Starling	36
Great Egret	2
Hermit Thrush	1
House Finch	2
House Sparrow	1
House Wren	1
Killdeer	1
Mallard	8
Mourning Dove	2
Northern Cardinal	2
Northern Flicker	1
Northern Waterthrush	1
Pigeon	3

Species	Count
Red-bellied Wood pecker	1
Red-winged Blackbird	24
Ring-billed Gull	133
Solitary Sandpiper	3
Song Sparrow	9
Swamp Sparrow	1
Turkey Vulture	4
White-crowned Sparrow	1
White-throated Sparrow	10
Wood Duck	2
Yellow Warbler	1
Chipping Sparrow	7
Green Heron	1
Great Blue Heron	1
Palm Warbler	1
Total	372



## Appendix D. Representative Photographs



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Point Count Site 1



Point Count Site 2



Point Count Site 3



Point Count Site 4



Point Count Site 5



Point Count Site 6



Point Count Site 7



Point Count Site 8



Point Count Site 9



Point Count Site 10



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