Appendix B: Environmental Reports

Large and Small Bird Use Report
2021–2022

Riverbend Wind Energy Facility
Sanilac County, Michigan

Confidential Business Information

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1.0 Introduction

This report summarizes the large and small bird use study (Study) conducted by TRC Environmental Corporation (TRC) at the proposed Riverbend Wind Energy Facility (Project) between March 2021 and February 2022. The Project was located on 37,194 acres (ac; 15,052 hectares [ha]) in Sanilac County, Michigan, approximately 12 miles (mi; 20 kilometers [km]) south of the city of Sandusky (Figure 1).

This pre-construction Study at the Project was conducted in compliance with the US Fish and Wildlife Service's (USFWS) Land-based Wind Energy Guidelines (WEG; USFWS 2012), the Eagle Conservation Plan Guidance Module 1—Land-based Wind Energy Version 2 (ECPG; USFWS 2013), and Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (USFWS 2016).

The Study included all bird species, but separate surveys were conducted for large and small birds. The species considered to be large birds included all raptors and any non-passerines of at least 10 inches (in; 25 centimeters [cm]) in length; the species considered to be small birds included all passerines and any non-passerines, excluding raptors, of less than 10 in (25 cm) in length (Sibley 2000). The size definitions for this Study were developed to be exhaustive yet simple and considered species behavior and ecology as well as size in order to assign bird species to a suitable category.

The objectives of the Study included: (1) developing a complete list of bird species observed in the Project area, including those observed incidentally, (2) assessing temporal and spatial use of large and small birds in the Project area, and (3) documenting use of the Project area by threatened, endangered, and other sensitive bird species. Sensitive bird species considered in this study include both federal and state listed species, eagles protected by the Bald and Golden Eagle Protection Act (BGEPA), non-listed state species of concern identified in the Michigan Natural Features Inventory (MNFI) online list (MNFI 2021), and non-listed federal species of concern identified in a Project-specific Information for Planning and Consultation (IPaC) report (USFWS 2021).

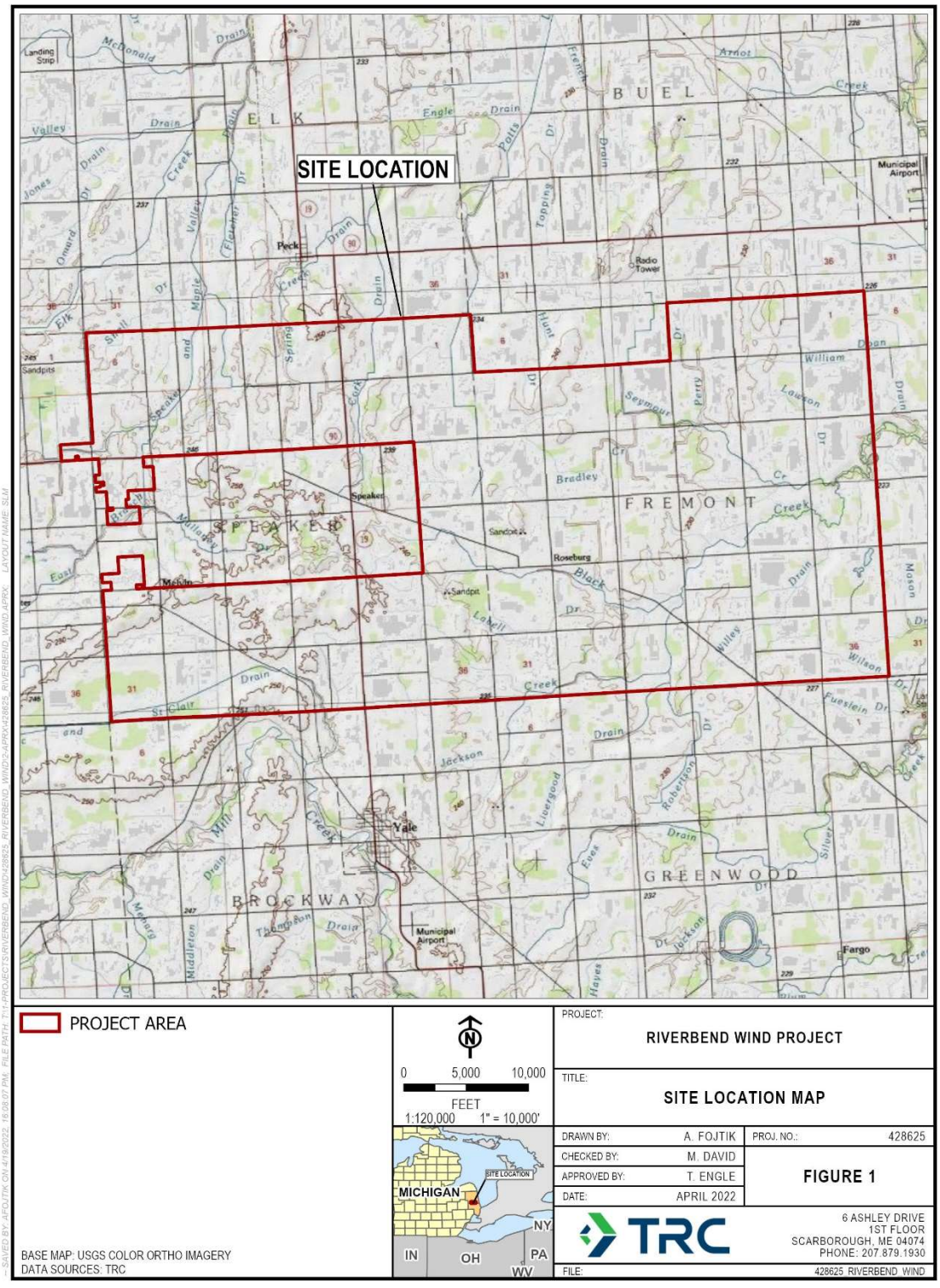


Figure 1. Project Area for the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

2.0 Background

2.1 General Site Description

The Project lies within the Saginaw Lake Plain Level IV Ecoregion, which is characterized by clayey lake deposits, beach ridges, and dunes of low relief (USEPA 2021). Historically, the native habitat was mostly forested, with extensive coastal marches and wet prairies along Saginaw Bay in Lake Huron. Today, the majority of the land is used to cultivate crops, dairy, and livestock; natural habitats remaining in the area include swamp forest, wet prairie, and marsh (Albert 1995). Elevation within the Project area ranges from approximately 755 feet (ft; 230 meters [m]) to 820 ft (250 m) above mean sea level.

The National Land Cover Database (NLCD; Homer et al. 2020) characterized the Project area as 76% cultivated crops; 8% woody wetlands; 8% deciduous forest; 3% developed, open space; 3% pasture/hay; 2% developed, low intensity; and less than 1% each of mixed forest; evergreen forest; emergent herbaceous wetlands; grassland/herbaceous; open water; shrub/scrub; developed, medium intensity; barren land; and developed, high intensity (Figure 2; Table 1).

According to the USFWS National Wetlands Inventory, wetland features covered 1,942 ac (786 ha) of the Project area (USFWS 2014). These features included freshwater emergent wetlands (47 ac; 19 ha), freshwater forested/shrub wetlands (1,871 ac; 757 ha), and freshwater ponds (24 ac; 10 ha; Figure 2, Table 2).

The U.S. Geological Survey (USGS) National Hydrology Dataset (NHD) identified 130.8 mi (210.6 km) of watercourses within the Project area (USGS 2020; Figure 2; Table 3). The watercourses included 93.6 mi (150.6 km) of canal/ditches, 37.2 mi (59.9 km) of stream/rivers, and less than 0.1 mi (0.1 km) of artificial paths (Table 3). There were 23 named streams distributed throughout the Project area; the most significant of these are Black Creek on the eastern edge of the Project and Sanilac and Saint Clair Drain in the southwest corner of the Project (Figure 2).

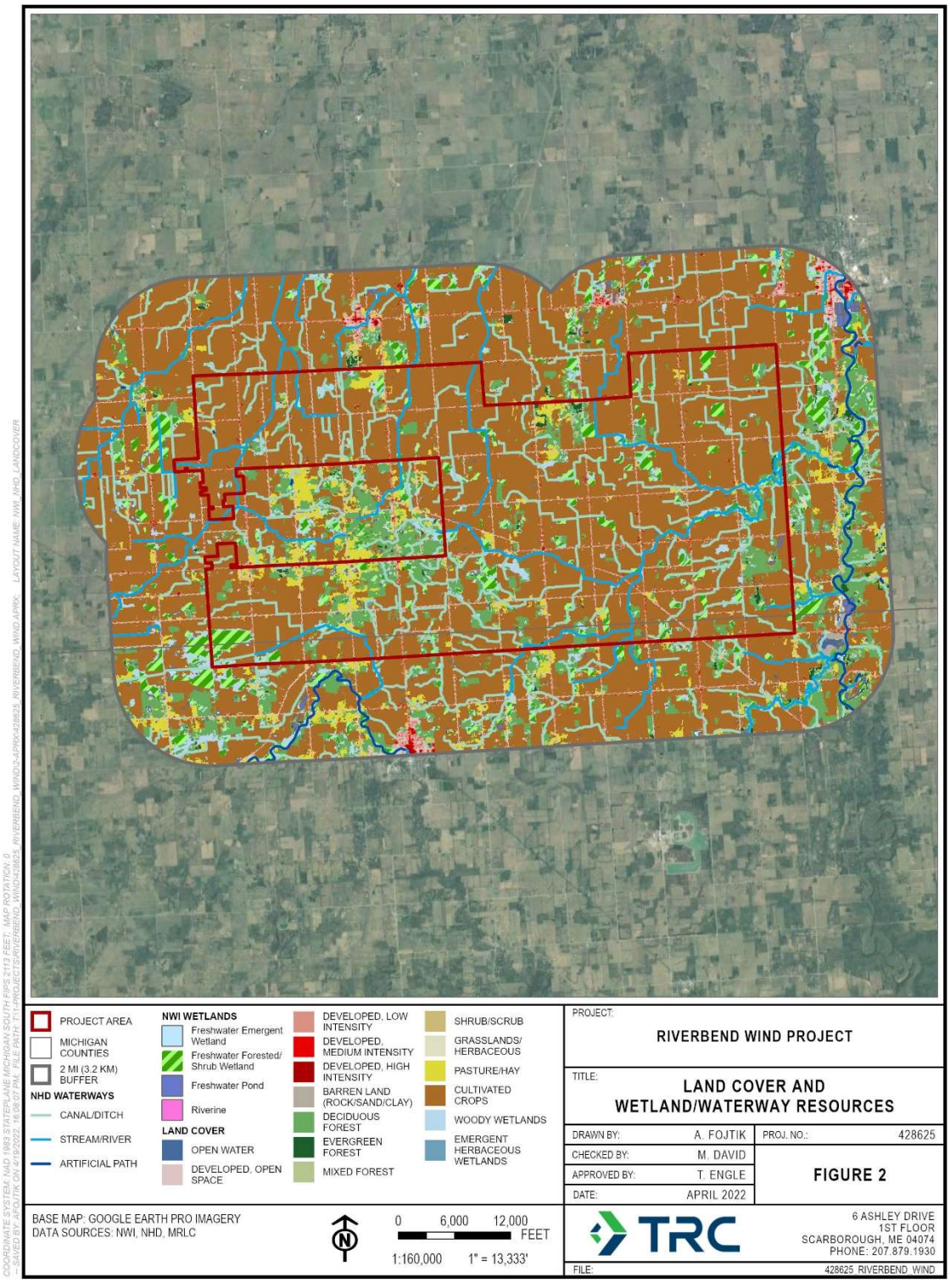


Figure 2. Land cover types, wetlands, and watercourses within the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

Table 1. National Land Cover Database land cover types within the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Land Cover Type[1]	Acres	Hectares	% Composition	Definition[2]
Cultivated Crops	28,103	11373	76%	Areas used for the production of annual crops (>20% of total vegetation) such as corn, soybeans, vegetables, tobacco, and cotton, as well as perennial woody crops (e.g., orchards and vineyards). This class also includes all land being actively tilled.
Woody Wetlands	2,899	1,173	8%	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Deciduous Forest	2,829	1,145	8%	Dominated by trees generally greater than 16 ft (5 m) tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal changes.
Developed, Open Space	1,180	478	3%	Mixture of constructed materials, mostly vegetation in the form of lawn grasses. Impervious surfaces less than 20% of the total cover. Includes large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Pasture/Hay	1,034	418	3%	Grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of the total vegetation.
Developed, Low Intensity	704	285	2%	A mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% of the total cover. These areas most commonly include single-family housing units.
Mixed Forest	192	78	< 1%	Dominated by trees generally greater than 16 ft (5 m) tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of the total tree cover.
Evergreen Forest	102	41	< 1%	Dominated by trees generally greater than 16 ft (5 m) tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
Emergent Herbaceous Wetlands	77	31	< 1%	Perennial herbaceous vegetation accounts for greater than 80% of vegetative cover, and the soil or substrate is periodically saturated with or covered with water.
Grassland/Herbaceous	27	11	< 1%	Dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management, such as tilling, but can be utilized for grazing.

Table 1. National Land Cover Database land cover types within the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Land Cover Type[1]	Acres	Hectares	% Composition	Definition[2]
Open Water	20	8	< 1%	Open water, generally with less than 25% vegetation cover or soil.
Shrub/Scrub	14	5	< 1%	Dominated by shrubs less than 16 ft (5 m) tall, typically greater than 20% of the total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.
Developed, Medium Intensity	12	5	< 1%	A mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
Barren Land	1	<1	< 1%	Bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of the total cover.
Developed, High Intensity	< 1	< 1	< 1%	Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
Total:	**37,194**	**15,052**	**100%**	

[1]Land cover data were obtained from the 2016 NLCD (Homer et al. 2020)

[2]Multi-Resolution Land Characteristic Consortium 2016

Table 2. National Wetlands Inventory wetland types within the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Wetland Type[1]	Project Area Wetland Features		
	# of Features	Acres	Hectares
Freshwater Emergent Wetland	38	47	19
Freshwater Forested/Shrub Wetland	226	1,871	757
Freshwater Pond	21	24	10
Total:	**285**	**1,942**	**786**

[1]USFWS 2014

Table 3. National Hydrology Dataset watercourse types within the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Watercourse Type[1]	Project Area Watercourse Features		
	# of Features	Miles	Kilometers
Canal/Ditch	119	93.6	150.6
Stream/River	54	37.2	59.9
Artificial Path	1	< 0.1	0.1
Total:	**174**	**130.8**	**210.6**

[1]National Hydrography Dataset; NHD Feature Catalog (USGS 2020)

2.2 Birds

The official bird list for Michigan currently contains 448 extant species, two extant species groups (pertaining to individuals identified only at a higher taxonomic level), and four extinct or extirpated species (Michigan Bird Records Committee [MBRC] 2022). The extant species and species groups represent 21 orders and 60 families. Out of the 450 extant species and species groups on the MBRC list, 193 fall under this Study's definition of large bird species, representing 19 orders and 32 families, and 257 fall under this Study's definition of small bird species, representing seven orders and 36 families (MBRC 2022).

The IPaC report (USFWS 2021), BGEPA, and MNFI (MNFI 2021) were used to assemble a list of listed and non-listed sensitive bird species that may be encountered during the Study.

The IPaC report identified two federal listed bird species that have a known or expected range which includes the Project area: piping plover (*Charadrius melodus*) and red knot (*Calidris canutus rufa*; USFWS 2021).

The IPaC also identified six non-listed federal species of concern (USFWS 2021). The MNFI, which identifies federal and state listed bird species and non-listed state species of concern in Michigan, included 46 species. The BGEPA federally protects bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*), both of which may occur in the region (Table 4). Some bird species were returned from more than one of these sources.

Together, these sources designated 53 bird species of concern (USFWS 2021, MNFI 2021). Twenty-five of these species were classified as large for this Study and 28 were classified as small. The seasonal potential for occurrence within the Project area was determined for these 53 species by referencing county-level bar charts from eBird (eBird 2021). Seasons were defined as: spring (March–May), summer (June–August), fall (September–November), and winter (December–February).

Based on desktop evaluation, 39 species of concern, including one federal and 16 state listed species, were determined to have potential to occur in the Project area during at least one season (Table 4).

Table 4. Bird species of concern and their seasons of potential occurrence in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Common Name	Scientific Name	Listing Status[1]	Seasons of Potential Occurrence in Project Area			
			Spring	Summer	Fall	Winter
Anatidae (Ducks, Geese, & Swans)						
Trumpeter Swan	Cygnus buccinator	ST			X	X
Cuculidae (Cuckoos)						
Black-billed Cuckoo	Coccyzus erythropthalmus	FSC	X	X	X	
Caprimulgidae (Nightjars)						
Common Nighthawk	Chordeiles minor	SSC	X	X	X	
Eastern Whip-poor-will	Antrostomus vociferus	SSC	X	X		
Rallidae (Rails & Allies)						
Common Gallinule	Gallinula galeata	ST	X	X		
Charadriidae (Plovers)						
Piping Plover	Charadrius melodus	FE, SE	X	X		
Scolopacidae (Sandpipers & Allies)						
Wilson's Phalarope	Phalaropus tricolor	SSC		X		
Laridae (Gulls & Allies)						
Caspian Tern	Hydroprogne caspia	ST	X	X		
Black Tern	Chlidonias niger	SSC		X		
Common Tern	Sterna hirundo	ST	X	X	X	
Forster's Tern	Sterna forsteri	ST	X	X	X	
Gaviidae (Loons)						
Common Loon	Gavia immer	ST	X	X	X	X
Ardeidae (Herons & Allies)						
American Bittern	Botaurus lentiginosus	SSC	X	X		
Least Bittern	Ixobrychus exilis	ST	X			
Black-crowned Night-Heron	Nycticorax nycticorax	SSC	X	X	X	
Pandionidae (Osprey)						
Osprey	Pandion haliaetus	SSC	X	X	X	
Accipitridae (Hawks, Eagles, & Kites)						
Golden Eagle	Aquila chrysaetos	BGEPA	X			X
Northern Harrier	Circus hudsonius	SSC	X	X	X	X
Bald Eagle	Haliaeetus leucocephalus	BGEPA, SSC	X	X	X	X
Red-shouldered Hawk	Buteo lineatus	ST	X	X		X
Strigidae (Owls)						
Long-eared Owl	Asio otus	ST	X	X		X
Short-eared Owl	Asio flammeus	SE	X		X	X
Picidae (Woodpeckers)						
Red-headed Woodpecker	Melanerpes erythrocephalus	SSC	X	X	X	X

Table 4. Bird species of concern and their seasons of potential occurrence in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Common Name	Scientific Name	Listing Status[1]	Seasons of Potential Occurrence in Project Area			
			Spring	Summer	Fall	Winter
Falconidae (Falcons)						
Merlin	Falco columbarius	ST	X	X	X	X
Peregrine Falcon	Falco peregrinus	SE	X	X	X	
Tyrannidae (Flycatchers)						
Willow Flycatcher	Empidonax traillii	FSC	X	X		
Laniidae (Shrikes)						
Loggerhead Shrike	Lanius ludovicianus	SE		X		
Troglodytidae (Wrens)						
Marsh Wren	Cistothorus palustris	SSC	X	X	X	
Turdidae (Thrushes)						
Wood Thrush	Hylocichla mustelina	FSC	X	X	X	
Passerellidae (Sparrows & Allies)						
Grasshopper Sparrow	Ammodramus savannarum	SSC	X	X		
Henslow's Sparrow	Centronyx henslowii	SE		X		
Icteridae (Blackbirds & Allies)						
Yellow-headed Blackbird	Xanthocephalus	SSC	X	X		
Bobolink	Dolichonyx oryzivorus	FSC	X	X	X	
Rusty Blackbird	Euphagus carolinus	FSC	X		X	
Parulidae (Wood-Warblers)						
Louisiana Waterthrush	Parkesia motacilla	ST	X			
Golden-winged Warbler	Vermivora chrysoptera	SSC	X	X		
Hooded Warbler	Setophaga citrina	SSC		X		
Cerulean Warbler	Setophaga cerulea	ST	X	X		
Cardinalidae (Cardinals & Allies)						
Dickcissel	Spiza americana	SSC		X		

[1]Listing Status definitions: BGEPA = Bald and Golden Eagle Protection Act; FE = Federal Endangered; SE = State Endangered; ST = State Threatened; SX = State Probably Extirpated; SSC = Non-listed State Special Concern; FSC = Non-listed Federal Species of Concern

3.0 Methods

Study methods were based on the guidelines set forth in the USFWS Land-based Wind Energy Guidelines (WEG; USFWS 2012), the Eagle Conservation Plan Guidance Module 1—Land-based Wind Energy Version 2 (ECPG; USFWS 2013), and Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (USFWS 2016).

3.1 Survey Point Locations, Timing, and Frequency

A fixed-radius point count method (Hutto et al. 1986) was used to survey the birds present within the Project area. Twenty-four survey points (termed points, hereafter) were distributed throughout the Project area with a minimum of 1.0 mi (1.6 km) spacing between points (Figure 3). The number of points was chosen to achieve 30% minimum coverage of the Project area by large bird survey plots (see section 3.1.1 below). Point locations were selected using aerial imagery based on accessibility, safety, viewshed, and coverage across the Project area. Locations were then inspected in the field to verify each as acceptable and adjusted if necessary. One set of surveys at all points was termed a visit (a visit would span multiple days). Surveys for large and small birds were conducted separately, but the same points were used for both survey types.

3.1.1 Large Bird Surveys

Survey visits were conducted 12 times between March 2021 and February 2022. One visit was conducted each month.

A 2,625-ft (800-m) radius circle was designated as the plot surrounding each point. Each survey was 60 minutes in duration, initiated after sunrise, and completed before sunset. The order in which points were surveyed was varied between visits to ensure each point was surveyed at different times of day.

3.1.2 Small Bird Surveys

Survey visits were conducted 12 times between March 2021 and February 2022 on the same schedule as large bird surveys. Each survey was typically conducted directly before a large bird survey at the same point; large bird and small bird surveys did not overlap.

A 328-ft (100-m) radius circle was designated as the plot surrounding each point. Each survey was 10 minutes in duration, initiated after sunrise, and completed before sunset.

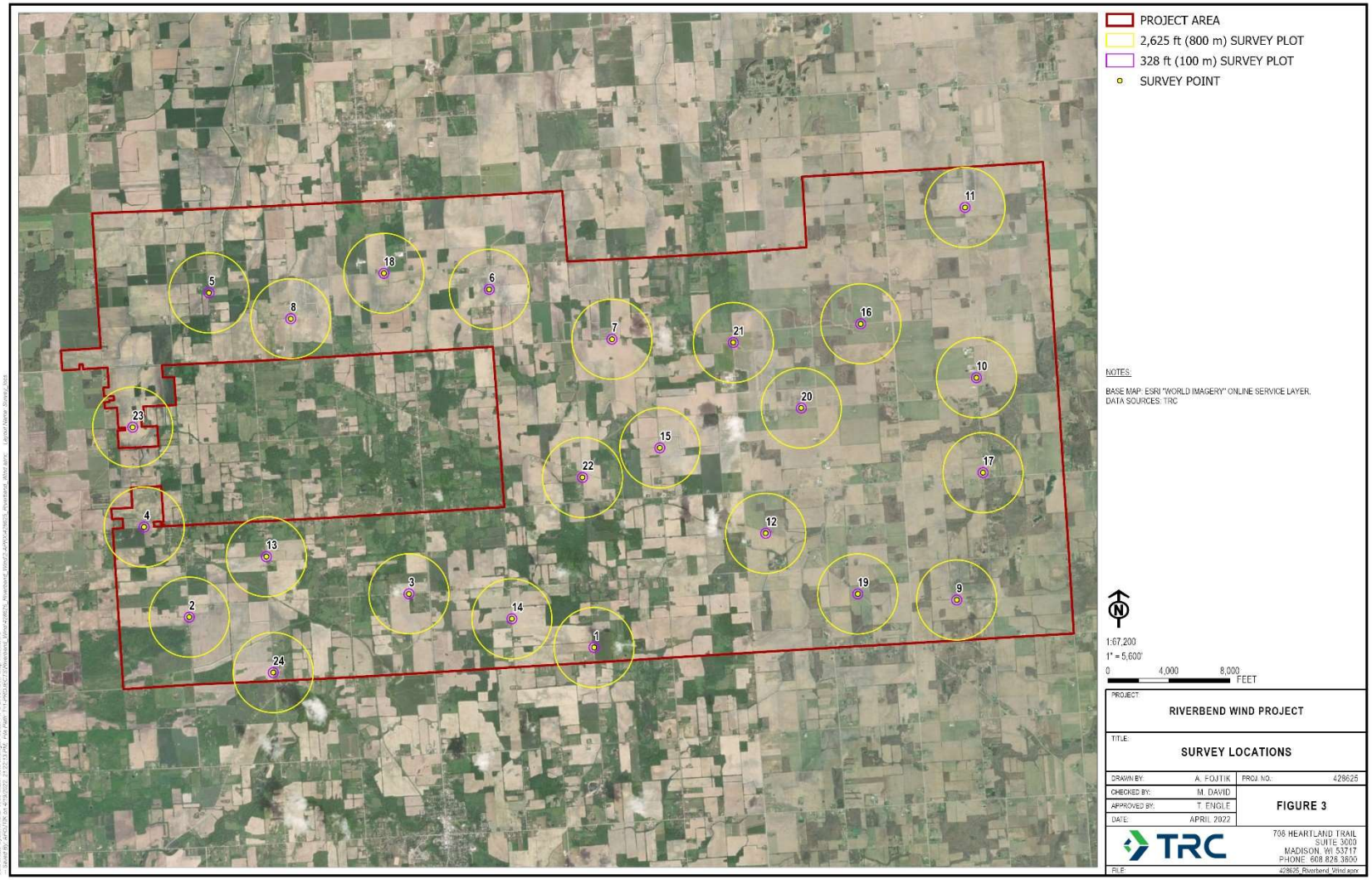


Figure 3. Survey points, 2,625-ft (800-m) radius large bird plots, and 328-ft (100-m) radius small bird plots for the large and small bird use study in the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

3.2 Data Collection

3.2.1 Large and Small Bird Surveys

The date, point number, start time, end time, and weather were documented for each survey. Weather data collected included temperature (degrees Celsius), wind speed (meters/second), wind direction (16-point compass directions), and cloud cover (0–25%, 25–75%, or 75–100%). Fog and precipitation were recorded if present.

Surveys were conducted during any weather unless fog or precipitation inhibited horizontal vision to 2,625 ft (800 m) or vertical vision to 656 ft (200 m). If the weather was unsafe (e.g., lightning) or not suitable for surveys, they were postponed until conditions were appropriate to continue.

Each time a bird or group of birds was detected (either visually or audibly) within the plot during the corresponding large or small bird survey, the observer collected the following information:

- Species
- Number of individuals
- Age; categorized as adult, subadult, juvenile, or unknown
- Sex; categorized as male, female, or unknown
- Estimated distance of a bird's closest approach to the point; categorized as 0–164 ft (0–50 m), 164–328 ft (50–100 m), 328–1,312 ft (100–400 m), or 1,312–2,625 ft (400–800 m); an additional distance category (> 2,625 ft [> 800 m]) was available for recording eagle minutes beyond the plot boundary and any incidental observations (see section 3.2.3 below)
- Behavior of the bird; categorized as flapping flight, soaring flight, gliding flight, eating/hunting, perched/landed, swimming, antagonistic interaction, breeding/nesting activity, singing, calling/other vocal sound, or drumming/non-vocal sound. All applicable behavior codes were assigned to a single observation.
- Flight height; categorized as less than 115 ft (35 m), 115–656 ft (35–200 m), or more than 656 ft (200 m) above ground level. Birds that occupied multiple flight height categories while within the plot were assigned all relevant flight heights.
- Habitat type(s) in which the bird was observed; categorized according to the NLCD land cover codes (Homer et al. 2020).

3.2.2 Eagle Observations

Additional information was collected for all eagles, whether observed during a large bird survey or incidentally. For each individual observed, the observer recorded the total number of observation minutes and the eagle's distance from the point, flight height, and behavior during each minute of the observation. A sketch of the flight path and a written description of the observation were also recorded.

3.2.3 Incidental Observations

Incidental bird observations were recorded with the objectives of (1) providing information on bird species of concern (see section 2.2) observed outside of the standard survey protocols and

(2) contributing to the complete lists of large and small bird species observed in the Project area. All observations of species of concern were recorded regardless of when they were encountered, as were any observations of species not yet recorded within the Project area. Incidental observations were recorded in a similar fashion to data collected during surveys. An additional distance category (> 2,625 ft [800 m]) was used for birds observed during a survey but beyond the survey plot, and for any birds observed within the Project area but not during a survey.

3.3 Data Analysis

Large and small bird data were analyzed separately. All analyses described in Sections 3.3.2–3.3.5 were completed for both large and small birds. Data from incidental observations were not included in the analyses described in Sections 3.3.2–3.3.6 and are reported separately from data collected during standard surveys.

Survey data were compiled and summarized by species and taxonomic family. Families, unlike species, have no standardized common name equivalent to their scientific name; thus, we referred to families by scientific name.

3.3.1 Weather

Weather data for each survey were presented in tabular format.

3.3.2 Observations, Relative Abundance, and Diversity

Metrics were defined as follows:

- *observation*—each bird recorded
- *group*—one or more observations recorded together
- *relative abundance*—the percent of the total number of survey observations
- *diversity*—number of different species or families

Groups, observations, and diversity were calculated for the entire Study period and by season for all species combined. Groups, observations, and relative abundance were calculated for the entire Study period and by season for each species and family.

3.3.3 Use, Frequency of Occurrence, and Spatial Distribution

Use was defined for large birds as number of observations per 2,625-ft (800-m) plot per 60-minute survey, and for small birds as number of observations per 328-ft (100-m) plot per 10-minute survey (abbreviated as obs/plot/survey). Use and associated standard error (SE)[1] were calculated for all species combined in total, by season, and by point. Use and standard error by point were displayed on a bar chart.

Use was also calculated in total and by season for each species and family. For the five highest-use species recorded during the surveys, and for any additional species with the highest or second-highest use in any one season, a single-species SE was calculated in total and by

[1] Standard error (SE) is defined as the sample standard deviation divided by the square root of the sample size.

season. Histograms of use and SE by season were created for each of these species and for all species combined.

Frequency of occurrence (abbreviated as *frequency*) was defined as the proportion of surveys during which one or more observations were made. Frequency was calculated in total and by season for each species, for each family, and for all species combined.

Use and *frequency* were also calculated by point for each species and family. Species and family *diversity* were also calculated for each point.

The spatial distribution of bird use within the Project area was evaluated by mapping use and species diversity by point in a geographic information system (GIS). In addition, for each point, it was determined how many families had their highest single-point use at that point. This analysis was repeated for frequency.

3.3.4 Flight Height

Group and observation counts, use, and *percent of observations flying*—the percent of all observations that included flight behavior— were calculated for flying birds by species, family, and overall.

Observations were also calculated for each flight height category (see section 3.2.1 above.) Flight height category observations were divided by observations of flying birds to give *percent of flying observations in flight height categories* for each species, family, and overall. The flight height category of 115–656 ft (35–200 m) above the ground was considered the rotor-swept zone (RSZ). *Use* and *frequency* within the RSZ were calculated for each species, family, and overall.

3.3.5 Threatened or Endangered Species and Other Sensitive Species

Observations of bird species that were federally or state listed as threatened or endangered, or were considered non-listed federal or state species of concern, were summed and tabulated. Use and frequency were reported in total, by season, and by point for each listed species observed during the surveys and for non-listed species of concern observed at two or more points. For non-listed species of concern that were observed at only one point, we detailed the location and timing of each observation instead of summarizing their use and frequency.

3.3.6 Eagle Use Minutes

Each eagle observation was divided into 1-minute intervals (see section 3.2.2). Each eagle observation interval during a large bird survey in which the eagle was:

1) within the survey plot;
2) flying; and
3) at a height no more than 656 ft (200 m) above the ground;

was termed an *eagle use minute*. Eagle use minutes were summed and tabulated in total and by month, season, and point. The number of eagle use minutes per survey hour was also calculated for each of these categories. The eagle use minutes for each point were visually represented on a map created in a GIS.

3.3.7 Eagle Flight Paths

All flight paths and perch locations, which were sketched in the field for each eagle observation (including incidental observations), were digitized in a GIS and plotted on a map of the Project area. The flight paths and perch locations were examined qualitatively for any tendencies in flight direction/style or associations with land cover or terrain features.

4.0 Results

4.1 Survey Summary

In total, 283 large bird surveys and 286 small bird surveys were completed during 12 visits between March 2021 and February 2022 (Table 5). These totals exclude five scheduled large bird surveys and two scheduled small bird surveys which were performed but not fully completed between sunrise and sunset. Data from the excluded surveys were retained but all observations were designated as incidental.

Weather conditions for all surveys are presented in Attachment A. No scheduled surveys were canceled or interrupted due to unsuitable weather conditions.

Table 5. Summary of the surveys completed for each visit during the large and small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Visit	Start Date	Finish Date	Large Bird Surveys Completed	Small Bird Surveys Completed
1	3/17/2021	3/19/2021	22	22
2	4/8/2021	4/11/2021	24	24
3	5/13/2021	5/15/2021	24	24
4	6/14/2021	6/16/2021	24	24
5	7/13/2021	7/15/2021	24	24
6	8/15/2021	8/17/2021	23	24
7	9/14/2021	9/16/2021	23	24
8	10/12/2021	10/15/2021	24	24
9	11/15/2021	11/18/2021	24	24
10	12/14/2021	12/17/2021	23	24
11	1/10/2022	1/13/2022	24	24
12	2/15/2022	2/18/2022	24	24
Total:			**283**	**286**

4.2 Large Bird Use Surveys

4.2.1 Observations, Relative Abundance, and Diversity

During the surveys, 3,673 observations in 1,445 groups were recorded (Attachment B; Table B-1).[2] Observations by season consisted of 801 observations in 422 groups in spring, 746 observations in 377 groups in summer, 1,406 observations in 441 groups in fall, and 702 observations in 205 groups in winter (Table B-1).

[2] Tables B-1 to B-7 are provided in Attachment B.

The five most numerous large bird species observed during the surveys were mourning dove (*Zenaida macroura*; 1,349 observations), rock pigeon (*Columba livia*; 736 observations), turkey vulture (*Cathartes aura*; 574 observations), Canada goose (*Branta canadensis*; 311 observations), and killdeer (*Charadrius vociferus*; 184 observations; Table B-1). Relative abundances for these species were 36.7%, 20.0%, 15.6%, 8.5%, and 5.0% of all large bird observations, respectively (Table B-1). None of these five species are federally listed or state listed species.

The most-observed families were Columbidae (pigeons and doves; 2,085 observations), Cathartidae (vultures; 574 observations), and Anatidae (ducks, geese, and swans; 331 observations; Table B-1). Relative abundances for these families were 56.8%, 15.6%, and 9.0%, respectively (Table B-1).

Twenty-four species from 12 taxonomic families were recorded during the surveys, with 18 species observed in spring, 15 in summer, 19 in fall, and 10 in winter (Table B-1). Two additional species were recorded incidentally (Table B-2). In total, 26 large bird species from 12 families were recorded during the Study (Table B-2).

4.2.2 Use and Frequency of Occurrence

Overall use recorded during the surveys was 12.98 (SE = 0.85) obs/plot/survey (Table B-3). Mourning dove use was 4.77 (SE = 0.46) obs/plot/survey, rock pigeon use was 2.60 (SE = 0.48) obs/plot/survey, turkey vulture use was 2.03 (SE = 0.23) obs/plot/survey, Canada goose use was 1.10 (SE = 0.31) obs/plot/survey, and killdeer was 0.65 (SE = 0.08) obs/plot/survey (Table B-3; Figure 4).

Among families, Columbidae use was 7.37 obs/plot/survey, Cathartidae use was 2.03 obs/plot/survey, and Anatidae use was 1.17 obs/plot/survey (Table B-3).

The species with the highest frequency were mourning dove (0.72), red-tailed hawk (*Buteo jamaicensis*; 0.44), turkey vulture (0.43), rock pigeon (0.31), and killdeer (0.29; Table B-3).

Families with the highest frequency were Columbidae (0.84), Accipitridae (hawks, eagles, and kites; 0.53), and Cathartidae (0.43; Table B-3).

4.2.2.1 Temporal Variation in Use

Large bird use was 11.44 (SE = 1.01) obs/plot/survey in spring, 10.51 (SE = 1.02) obs/plot/survey in summer, 19.80 (SE = 2.41) obs/plot/survey in fall, and 10.14 (SE = 1.68) in winter (Figure 4). In spring, turkey vulture had the highest use, followed by killdeer; in summer, mourning dove had the highest use, followed by turkey vulture; in fall, mourning dove had the highest use, followed by rock pigeon; and in winter, rock pigeon had the highest use, followed by mourning dove (Figure 4; Table B-3).

Mourning dove use was 1.16 (SE = 0.21) obs/plot/survey in spring, 4.89 (SE = 0.71) obs/plot/survey in summer, 9.72 (SE = 1.41) obs/plot/survey in fall, and 3.25 (SE = 0.57) obs/plot/survey in winter (Figure 4). Mourning dove comprised 10.1% of spring, 46.5% of summer, 49.1% of fall, and 32.1% of winter observations (Table B-1). Frequency for the species was 0.49 in spring, 0.87 in summer, 0.87 in fall, and 0.65 in winter (Table B-3).

Rock pigeon use was 1.21 (SE = 0.24) obs/plot/survey in spring, 0.86 (SE = 0.24) obs/plot/survey in summer, 4.52 (SE = 1.62) obs/plot/survey in fall, and 3.79 (SE = 0.94)

obs/plot/survey in winter (Figure 4). Rock pigeon comprised 10.6% of spring, 8.2% of summer, 22.8% of fall, and 37.4% of winter observations (Table B-1). Frequency for the species was 0.31 in spring, 0.23 in summer, 0.34 in fall, and 0.37 in winter (Table B-3).

Turkey vulture use was 4.01 (SE = 0.61) obs/plot/survey in spring, 2.01 (SE = 0.36) obs/plot/survey in summer, and 2.11 (SE = 0.52) obs/plot/survey in fall; the species was not observed in winter (Figure 4). Turkey vulture comprised 35.1% of spring, 19.2% of summer, and 10.7% of fall observations (Table B-1). Frequency for the species was 0.74 in spring, 0.61 in summer, and 0.37 in fall (Table B-3).

Canada goose use was 1.14 (SE = 0.37) obs/plot/survey in spring, 0.39 (SE = 0.26) obs/plot/survey in summer, 1.58 (SE = 0.59) obs/plot/survey in fall, and 1.28 (SE = 0.97) in winter (Figure 4). Canada goose comprised 10.0% of spring, 3.8% of summer, 8.0% of fall, and 12.6% of winter observations (Table B-1). Frequency for the species was 0.26 in spring, 0.04 in summer, 0.18 in fall, and 0.04 in winter (Table B-3).

Killdeer use was 1.54 (SE = 0.23) obs/plot/survey in spring, 0.72 (SE = 0.15) obs/plot/survey in summer, and 0.35 (SE = 0.12) obs/plot/survey in fall; the species was not observed in winter (Figure 4). Killdeer comprised 13.5% of spring, 6.8% of summer, and 1.8% of fall observations (Table B-1). Frequency for the species was 0.57 in spring, 0.39 in summer, and 0.18 in fall (Table B-3).

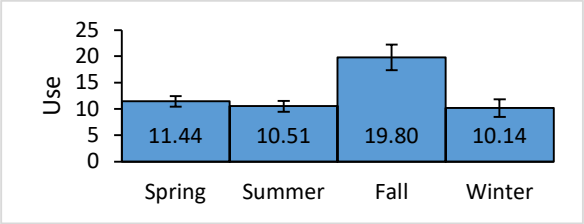
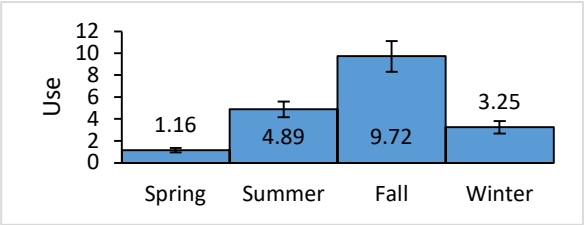
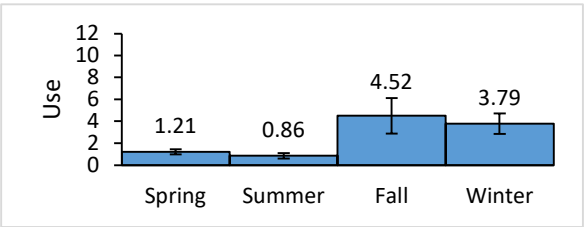
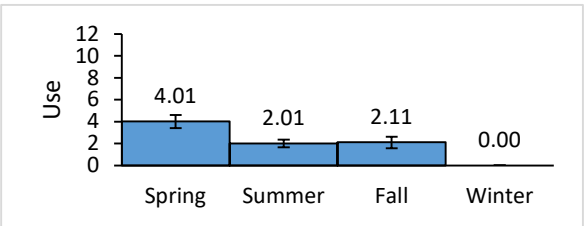
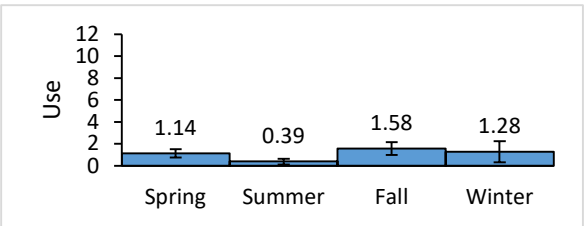
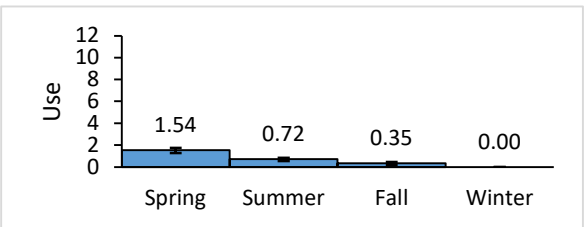
Common Name Scientific Name	Use Histogram	Use (Standard Error) for All Seasons Combined
All Large Bird Species		12.98 (0.85)
Mourning Dove *Zenaida macroura*		4.77 (0.46)
Rock Pigeon *Columba livia*		2.60 (0.48)
Turkey Vulture *Cathartes aura*		2.03 (0.23)
Canada Goose *Branta canadensis*		1.10 (0.31)
Killdeer *Charadrius vociferus*		0.65 (0.08)

Figure 4. Histograms of large bird use (observations/plot/survey) and standard error of use (indicated by error bars) for all species and for each of the five species with highest overall use during the large bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

In spring, Cathartidae was the family with the highest use, at 4.01 obs/plot/survey (Table B-3). Relative abundance for Cathartidae was 35.1% in spring (Table B-1); frequency was 0.74 in spring (Table B-3). In summer, fall, and winter, Columbidae was the family with the highest use, at 5.75 obs/plot/survey in summer, 14.24 obs/plot/survey in fall, and 7.04 obs/plot survey in winter (Table B-3). Relative abundance for Columbidae was 54.7% in summer, 71.9% in fall, and 69.4% in winter (Table B-1). Frequency for Columbidae was 0.90 in summer, 0.94 in fall, and 0.85 in winter (Table B-3).

4.2.2.2 Spatial Variation in Use and Diversity

Comparisons among points in this section include results from all points; however, note that points 14 and 15 had ten surveys each and point 24 had 11 surveys, while the remaining points had 12 surveys each.

Overall large bird use was highest at point 10 (39.42 obs/plot/survey, SE = 9.77), followed by point 8 (16.83 obs/plot/survey, SE = 5.05) and point 13 (16.50 obs/plot/survey, SE = 4.62; Figure 5; Figure 6; Table B-4). Use was lowest at point 9 (5.92 obs/plot/survey, SE = 1.40), followed by point 3 (6.25 obs/plot/survey, SE = 1.67) and point 17 (6.92 obs/plot/survey, SE = 1.71; Figure 5; Figure 6; Table B-4).

Point 5 had the highest species diversity (13 species), followed by point 7 (12 species) and points 13, 14, and 18 (11 species each; Figure 6; Table B-4). Point 22 had the lowest species diversity (5 species), followed by point 3 (8 species) and points 8, 11, 15, 21, and 24 (9 species each; Figure 6; Table B-4). Family diversity was highest at points 5 and 17 (9 families), followed by points 4, 6, 7, 10, 12, 14, 18, 19, and 24 (8 families each; Figure 6; Table B-4). Family diversity was lowest at points 8, 16, and 22 (5 families each; Figure 6; Table B-4).

When use by point for each family was examined, point 10 had the highest use for four families: Anatidae, Columbidae, Gruidae (cranes), and Laridae (gulls and their allies; Table B-4). Point 21 had the highest use for two families: Charadriidae (plovers) and Accipitridae (Table B-4). Points 4, 5, 13, 14, 15, 18 and 24 had the highest or tied-highest use for one family each: point 4 for Strigidae (owls), point 5 for Ardeidae (herons and their allies), point 13 for Falconidae (falcons), point 14 for Picidae (woodpeckers), point 15 for Picidae, point 18 for Cathartidae, and point 24 for Phasianidae (grouse and their allies; Table B-4).

When frequency by point for each family was examined, point 10 had the highest or tied-highest frequency for three families (Table B-5). Points 14, 15, and 21 had the highest or tied-highest frequency for two families each, and points 1, 2, 3, 4, 5, 7, 9, 13, 16, 17, 18, 19, 20, and 24 had the highest or tied-highest frequency for one family each (Table B-5).

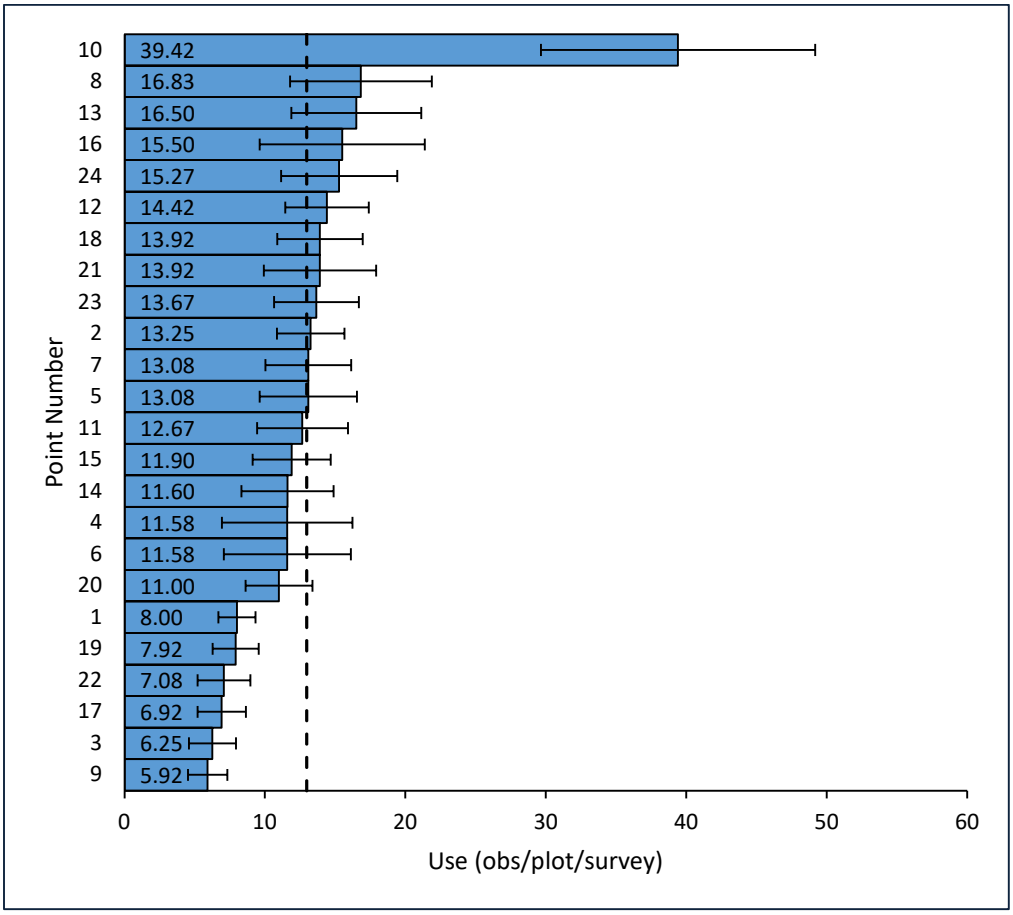


Figure 5. Large bird use (observations/plot/survey), standard error of use (represented by error bars), and average use (represented by dashed line) by point during the large bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

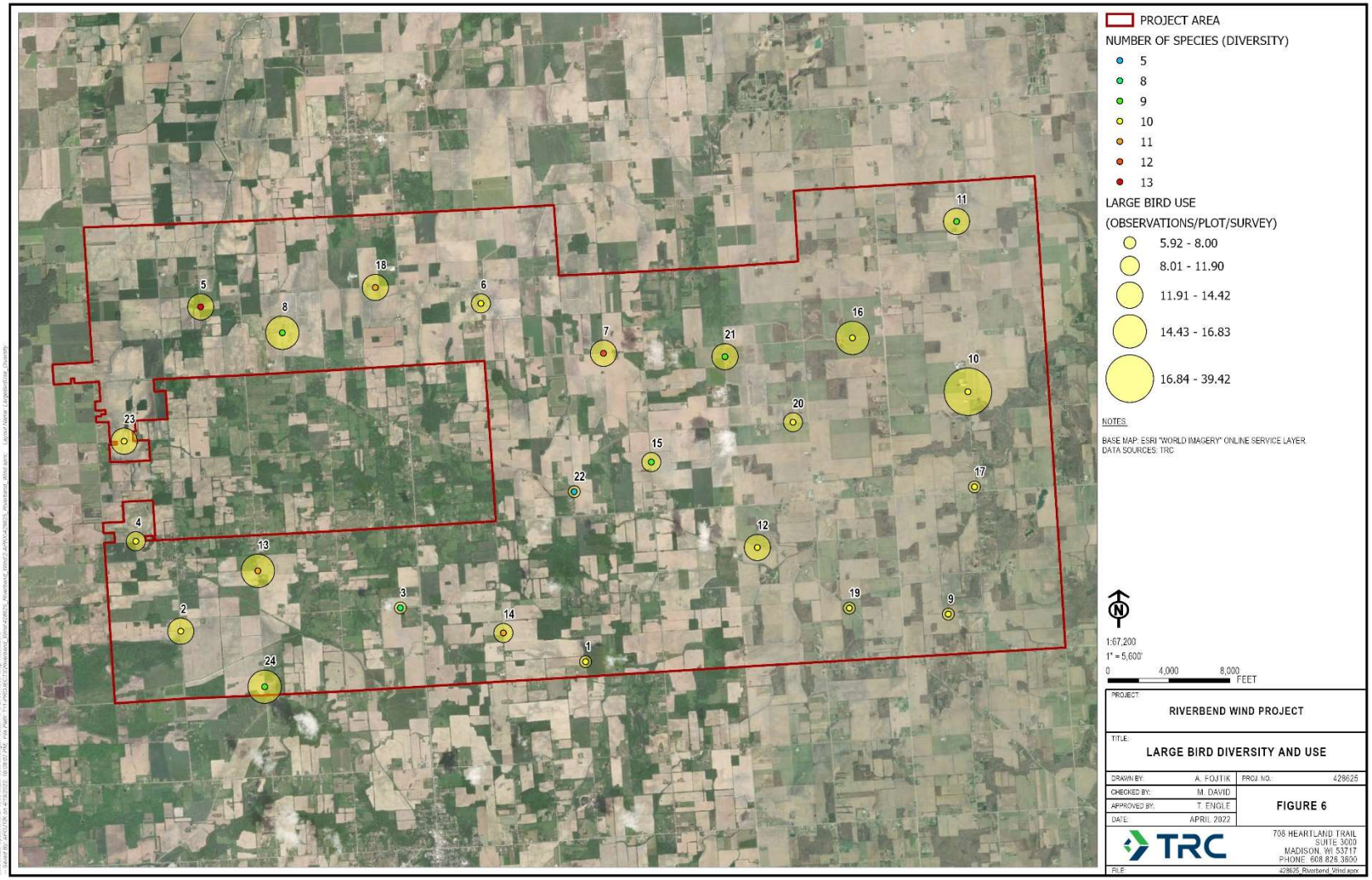


Figure 6. Map of large bird use (observations/plot/survey) and species diversity recorded at each point during the large bird use study in the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

4.2.3 Flight Height Characteristics

During the surveys, 2,334 observations of flying birds in 1,042 groups were recorded (Table B-6). This represented 63.5% of all survey observations (Table B-6). Of all large birds observed flying, 23.6% (551 observations) were estimated to be within the height range for the RSZ (115–656 ft; 35–200 m; Table B-6).

Overall use within the RSZ was 1.95 obs/plot/survey (Table B-6). Species with the highest RSZ use were turkey vulture (1.37 obs/plot/survey), Canada goose (0.20 obs/plot/survey), sandhill crane (*Antigone canadensis*; 0.15 obs/plot/survey), and red-tailed hawk (0.12 obs/plot/survey; Table B-6). Use for all other species within the RSZ was ≤ 0.04 obs/plot/survey each (Table B-6).

4.3 Small Bird Use Surveys

4.3.1 Observations, Relative Abundance, and Diversity

During the surveys, 6,899 observations in 1,454 groups were recorded (Attachment C; Table C-1).[3] Observations by season consisted of 1,193 observations in 454 groups in spring, 1,070 observations in 507 groups in summer, 3,250 observations in 303 groups in fall, and 1,386 observations in 190 groups in winter (Table C-1).

The most numerous small bird species observed during the surveys were European starling (*Sturnus vulgaris*; 4,324 observations), red-winged blackbird (*Agelaius phoeniceus*; 907 observations), American robin (*Turdus migratorius*; 362 observations), horned lark (*Eremophila alpestris;* 265 observations), and barn swallow (*Hirundo rustica*; 238 observations; Table C-1). These observations made up 62.7%, 13.1%, 5.2%, 3.8%, and 3.4% of all small bird observations, respectively (Table C-1).

The most-observed families were Sturnidae (starlings; 4,324 observations), Icteridae (blackbirds and their allies; 1,080 observations), and Turdidae (thrushes; 366 observations; Table C-1). Relative abundances for these families were 62.7%, 15.7%, and 5.3%, respectively (Table C-1).

Forty-two species from 20 taxonomic families were recorded during the surveys, with 21 species observed in spring, 22 in summer, 27 in fall, and 14 in winter (Table C-1). One additional species was recorded incidentally; thus, in total, 43 small bird species from 20 families were recorded during the Study (Table C-2).

4.3.2 Use and Frequency of Occurrence

Overall use recorded during the surveys was 24.12 (SE = 2.72) obs/plot/survey (Table C-3). European starling use was 15.12 (SE = 2.72) obs/plot/survey, red-winged blackbird use was 3.17 (SE = 0.57) obs/plot/survey, American robin use was 1.27 (SE = 0.14) obs/plot/survey, horned lark use was 0.93 (SE = 0.11) obs/plot/survey, and barn swallow use was 0.83 (SE = 0.14) obs/plot/survey (Table C-3; Figure 7).

Among families, Sturnidae use was 15.12 obs/plot/survey, Icteridae use was 3.78 obs/plot/survey, and Turdidae use was 1.28 obs/plot/survey (Table C-3).

[3] Tables C-1 to C-7 are provided in Attachment C.

The species with the highest frequency were American robin (0.44), red-winged blackbird (0.43), horned lark (0.37), European starling (0.35), and blue jay (*Cyanocitta cristata*; 0.24; Table C-3).

The families with the highest frequency were Icteridae (0.45), Turdidae (0.45), and Alaudidae (larks; 0.37; Table C-3).

4.3.2.1 Temporal Variation in Use

Small bird use was 17.04 (SE = 1.67) obs/plot/survey in spring, 14.86 (SE = 2.23) obs/plot/survey in summer, 45.14 (SE = 8.95) obs/plot/survey in fall, and 19.25 (SE = 4.62) in winter (Figure 7). In spring, European starling had the highest use, followed by America robin; in summer, red-winged blackbird had the highest use, followed by barn swallow; in fall, European starling had the highest use, followed by horned lark; and in winter, European starling had the highest use, followed by American tree sparrow (*Spizelloides arborea*; Figure 7; Table C-3).

European starling use was 6.91 (SE = 1.57) obs/plot/survey in spring, 38.50 (SE = 9.04) obs/plot/survey in fall, and 14.83 (SE = 4.69) obs/plot/survey in winter; the species was not observed in summer (Figure 7). Relative abundance for European starling was 40.6% in spring, 85.3% in fall, and 77.1% in winter (Table C-1). Frequency for the species was 0.41 in spring, 0.61 in fall, and 0.38 in winter (Table C-3).

Red-winged blackbird use was 2.94 (SE = 0.57) obs/plot/survey in spring, 8.28 (SE = 2.02) obs/plot/survey in summer, and 1.46 (SE = 0.56) obs/plot/survey in fall; the species was not observed in winter (Figure 7). Relative abundance for red-winged blackbird was 17.3% in spring, 55.7% in summer, and 3.2% in fall (Table C-1). Frequency for the species was 0.69 in spring, 0.89 in summer, and 0.17 in fall (Table C-3).

American robin use was 3.06 (SE = 0.41) obs/plot/survey in spring, 1.71 (SE = 0.18) obs/plot/survey in summer, and 0.35 (SE = 0.16) obs/plot/survey in fall; the species was not observed in winter (Figure 7). Relative abundance for American robin was 17.9% in spring, 11.5% in summer, and 0.8% in fall (Table C-1). Frequency for the species was 0.90 in spring, 0.78 in summer, and 0.11 in fall (Table C-3).

Horned lark use was 0.76 (SE = 0.16) obs/plot/survey in spring, 0.39 (SE = 0.10) obs/plot/survey in summer, 1.50 (SE = 0.22) obs/plot/survey in fall, and 1.06 (SE = 0.34) obs/plot/survey in winter (Figure 7). Relative abundance for horned lark was 4.4% in spring, 2.6% in summer, 3.3% in fall, and 5.5% in winter (Table C-1). Frequency for the species was 0.34 in spring, 0.25 in summer, 0.58 in fall, and 0.31 in winter (Table C-3).

Barn swallow use was 0.71 (SE = 0.22) obs/plot/survey in spring, 2.46 (SE = 0.43) obs/plot/survey in summer, and 0.15 (SE = 0.11) obs/plot/survey in fall; the species was not observed in winter (Figure 7). Relative abundance for barn swallow was 4.2% in spring, 16.5% in summer, and 0.3% in fall (Table C-1). Frequency for the species was 0.21 in spring, 0.64 in summer, and 0.03 in fall (Table C-3).

In spring, fall, and winter, Sturnidae was the family with the highest use. Use for Sturnidae was 6.91, 38.50, and 14.83 obs/plot/survey in spring, fall, and winter, respectively (Table C-3). Relative abundance for Sturnidae was 40.6% in spring, 85.3% in fall, and 77.1% in winter (Table C-1). Frequency for the species was 0.41 in spring, 0.61 in fall, and 0.38 in winter (Table C-3).

In summer, Icteridae was the family with the highest use, at 8.82 obs/plot/survey (Table C-3). Relative abundance for Icteridae was 59.3% in summer (Table C-1); frequency was 0.89 in summer (Table C-3).

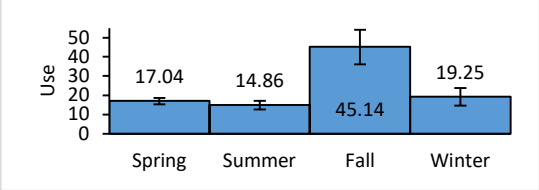
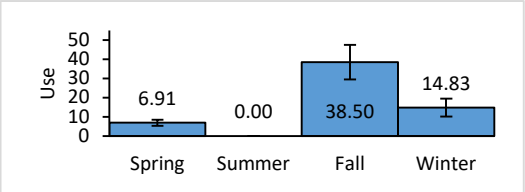
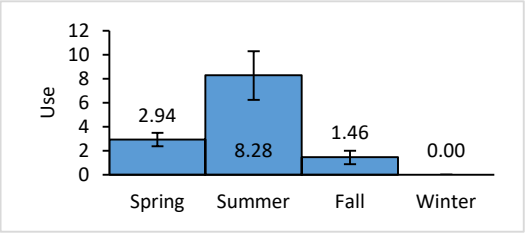
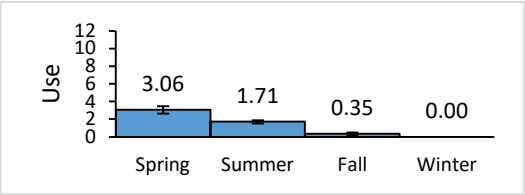
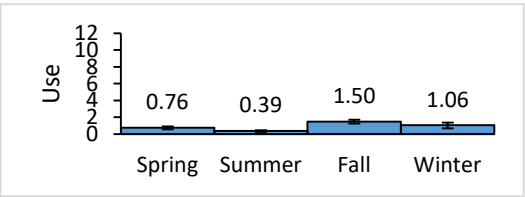
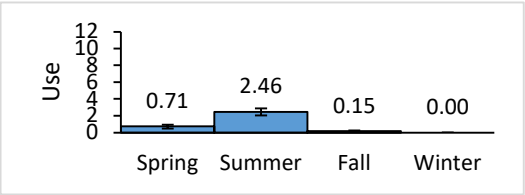
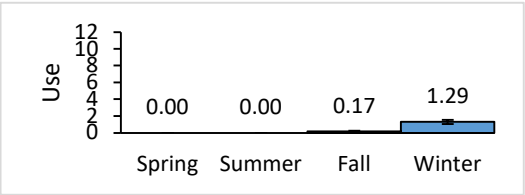
Common Name Scientific Name	Use Histogram	Use (Standard Error) for All Seasons Combined
All Small Bird Species		24.12 (2.72)
European Starling *Sturnus vulgaris*		15.12 (2.72)
Red-winged Blackbird *Agelaius phoeniceus*		3.17 (0.57)
American Robin *Turdus migratorius*		1.27 (0.14)
Horned Lark *Eremophila alpestris*		0.93 (0.11)
Barn Swallow *Hirundo rustica*		0.83 (0.14)
American Tree Sparrow *Spizelloides arborea*		0.37 (0.07)

Figure 7. Histograms of small bird use (observations/plot/survey) and standard error of use (indicated by error bars) for all species combined, for each of the five species with highest overall use, and for one species with the second-highest winter use during the small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

4.3.2.2 Spatial Variation in Use and Diversity

Comparisons among points in this section include results from all points; however, note that points 14 and 24 had 11 surveys, while the remaining points had 12 surveys each.

Overall small bird use was highest at point 19 (54.92 obs/plot/survey, SE = 39.94), followed by point 10 (48.75 obs/plot/survey, SE = 12.91) and point 21 (44.08 obs/plot/survey, SE = 23.67; Figure 8; Figure 9; Table C-4). Use was lowest at point 23 (10.25 obs/plot/survey, SE = 2.07), followed by point 4 (10.75 obs/plot/survey, SE = 4.46) and point 20 (10.92 obs/plot/survey, SE = 5.55; Figure 8; Figure 9; Table C-4).

Point 5 had the highest species diversity (22 species), followed by point 24 (19 species) and point 17 (18 species; Figure 9; Table C-4). Point 16 had the lowest species diversity (8 species), followed by points 11 and 12 (11 species each; Figure 9; Table C-4). Family diversity was highest at point 5 (15 families), followed by point 17 (13 families) and points 1, 2, 23, and 24 (12 families each; Figure 9; Table C-4). Family diversity was lowest at points 10, 11, 16, and 20 (8 families each; Figure 9; Table C-4).

When use by point for each family was examined, point 5 had the highest or tied-highest use for five families: Tyrannidae (flycatchers), Vireonidae (vireos), Paridae (chickadees and titmice), Regulidae (kinglets), and Sittidae (nuthatches; Table C-4).

Point 19 had the highest or tied-highest use for three families: Corvidae (crows and their allies), Sturnidae, and Cardinalidae (cardinals and their allies; Table C-4).

Points 1, 2, 10, 17, 18, and 24 had the highest or tied-highest use for two families each: point 1 for Paridae and Cardinalidae, point 2 for Picidae and Turdidae, point 10 for Passeridae (old world sparrows) and Icteridae, point 17 for Paridae and Parulidae (wood-warblers), point 18 for Fringillidae (finches) and Passerellidae (sparrows), and point 24 for Hirundinidae (swallows) and Calcariidae (longspurs and their allies; Table C-4).

Points 3, 9, 13, 21, and 23 had the highest or tied-highest use for one family each: point 3 for Paridae, point 9 for Sittidae, point 13 for Laniidae (shrikes), point 21 for Alaudidae, and point 23 for Mimidae (thrashers and their allies; Table C-4).

When frequency by point for each family was examined, point 5 had the highest or tied-highest frequency for five families (Table C-5). Point 24 had the highest frequency for four families (Table C-5). Points 1 and 18 had the highest or tied-highest frequency for three families each; points 13, 17, 22, and 23 did for two families each; and points 2, 3, 6, 9, 10, 16, and 21 did for one family each (Table C-5).

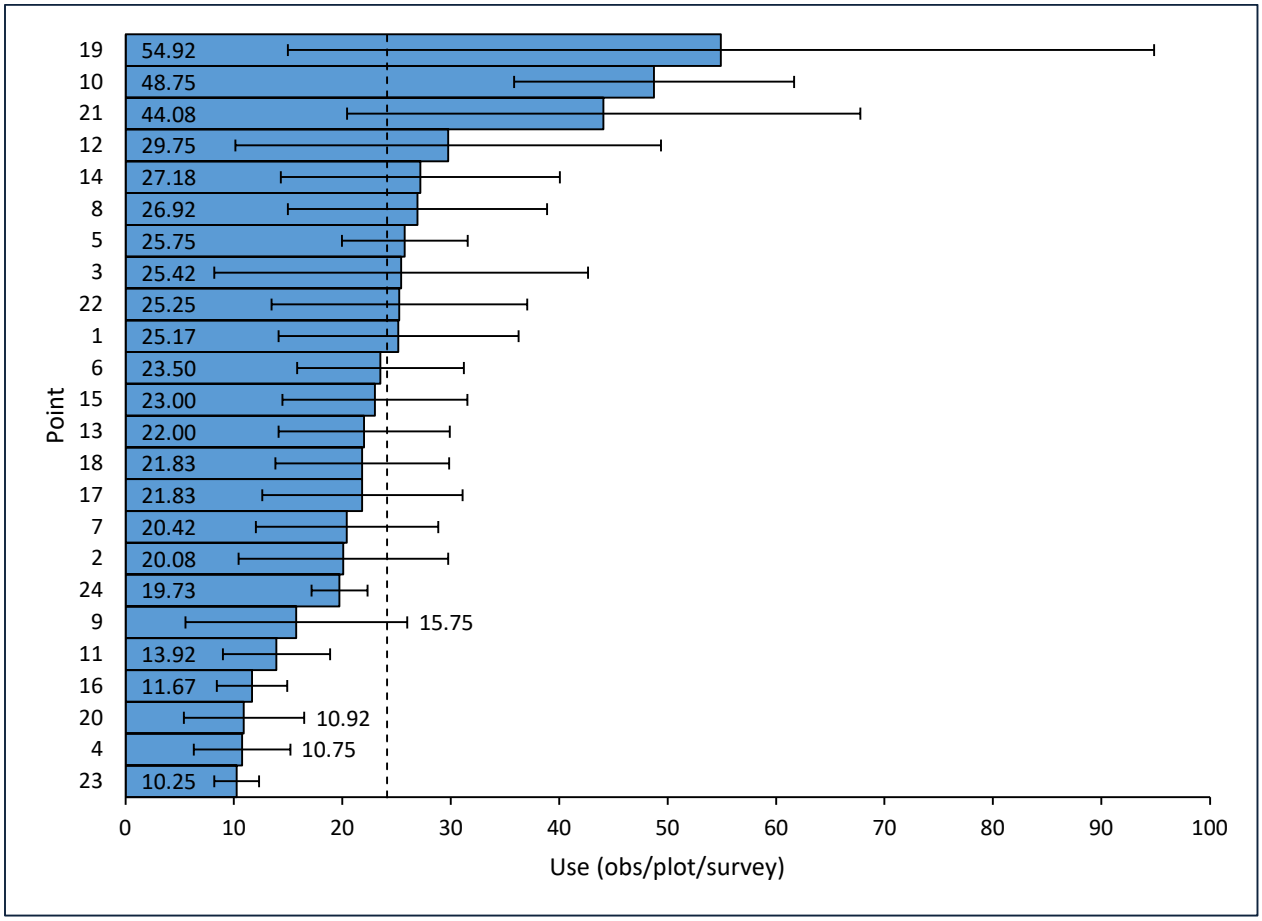


Figure 8. Small bird use (observations/plot/survey), standard error of use (represented by error bars), and average use (represented by vertical dashed line) by point during the small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

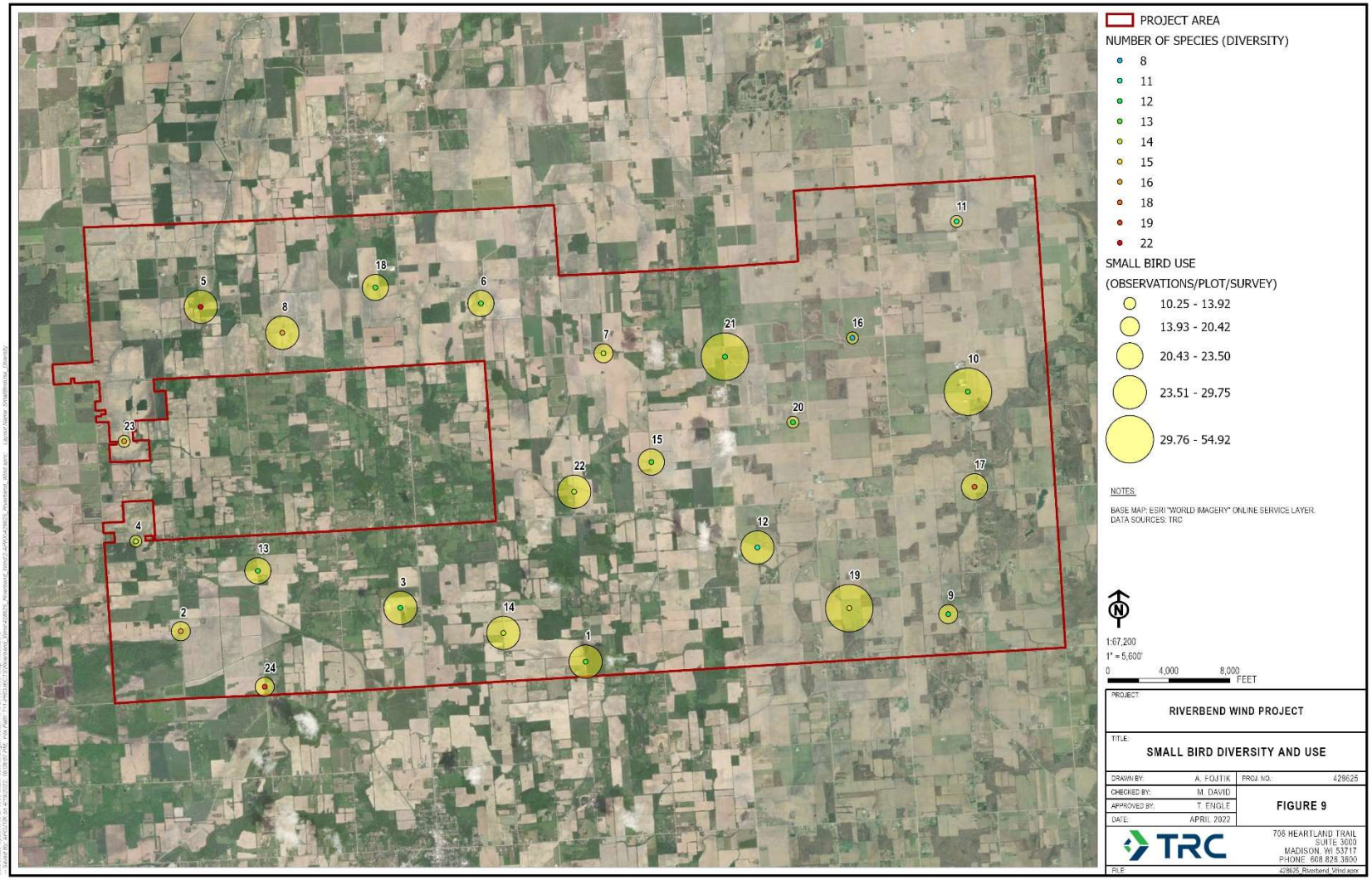


Figure 9. Map of small bird use (observations/plot/survey) and species diversity recorded at each point during the small bird use study in the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

4.3.2.3 Flight Height Characteristics

During the surveys, 5,477 observations of flying birds in 1,187 groups were recorded (Table C-6). This represented 79.4% of all survey observations (Table C-6). Of the small birds observed flying, 0.9% (48 observations) were estimated to be within the RSZ (Table C-6).

Overall use within the RSZ was 0.17 obs/plot/survey (Table C-7). The two species with use in the RSZ were red-winged blackbird (0.16 obs/plot/survey) and American robin (0.01 obs/plot/survey; Table C-6). Use for all other species within the RSZ was ≤ 0.02 obs/plot/survey each (Table C-7).

4.4 Observations of Sensitive Species

No federally listed or state listed threatened or endangered species were observed during the Study. There were four protected or non-listed state special concern species observed: northern harrier (*Circus hudsonius*), bald eagle, grasshopper sparrow (*Ammodramus savannarum*), and dickcissel (*Spiza americana*; Table 6).

During the surveys, bald eagle was observed at 12 points, northern harrier was observed at four points, and grasshopper sparrow and dickcissel were observed at one point each (Tables B-4, C-4).

The highest number of sensitive species recorded at a single point was three at point 8, followed by two each at points 7, 13, and 16, and one each at points 1, 2, 10, 11, 15, 18, 20, 21, and 23 (Tables B-4, C-4).

Northern harrier was observed four times during the surveys (Table 6). Northern harrier use was 0.01 obs/plot/survey overall; seasonal use was 0.01 obs/plot/survey in fall and 0.04 obs/plot/survey in winter, with no observations in other seasons (Table B-3). Use by point was 0.08 obs/plot/survey at points 2, 7, 8, and 16, with no observations at other points (Table B-4). Northern harrier frequency was 0.01 overall; seasonal frequency was 0.01 in fall and 0.04 in winter (Table B-3). Frequency was 0.08 each at points 2, 7, 8, and 16 (Table B-5).

See Section 4.5 for details on bald eagle observations.

Grasshopper sparrow was observed two times during the surveys (Table 6). Both observations occurred at point 8 in fall (Tables C-1, C-4).

Dickcissel was observed once during the surveys (Table 6). The observation occurred at point 13 in summer (Tables C-1, C-4).

Table 6. Summary of the listed, protected, and non-listed special concern species observed during the large and small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Common Name (Scientific Name)	Listing Status[1]	# Groups During Surveys	# Obs During Surveys	# Incidental Groups	# Incidental Obs	# Total Groups	# Total Obs
Northern Harrier (*Circus hudsonius*)	SSC	4	4	0	0	4	4
Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA, SSC	19	26	2	2	21	28
Grasshopper Sparrow (*Ammodramus savannarum*)	SSC	1	2	0	0	1	2
Dickcissel (*Spiza americana*)	SSC	1	1	0	0	1	1

[1]Listing Status definitions: BGEPA = Bald and Golden Eagle Protection Act; SSC = Non-listed State Species of Concern

4.5 Eagle Use

4.5.1 Bald Eagles

Bald eagle was observed 26 times during the surveys, and two times incidentally (Table 6). Bald eagle use was 0.09 obs/plot/survey overall; seasonal use was 0.03 obs/plot/survey in spring, 0.06 obs/plot/survey in summer, 0.06 obs/plot/survey in fall, and 0.23 obs/plot/survey in winter (Table B-3). Use was highest at point 10 (0.50 obs/plot/survey; Table B-4). Bald eagle frequency was 0.06 overall; seasonal frequency was 0.03 in spring, 0.06 in summer, 0.04 in fall, and 0.13 in winter (Table B-3). Frequency was highest (0.25) at point 21 (Table B-5).

4.5.2 Golden Eagles

No golden eagles were observed during the Study.

4.5.3 Bald Eagle Use Minutes

For bald eagles, 50 use minutes were recorded during 26 observations over 283 survey hours (Table 7). There were also two incidental observations (Table 7).

During the surveys, bald eagle observations by season consisted of two in spring, four in summer, four in fall, and 16 in winter (Table 7). One incidental observation occurred in fall, and the other occurred in winter (Table 7). Bald eagle use minutes by season consisted of four use minutes during 70 survey hours in spring, 14 use minutes during 71 survey hours in summer, four use minutes during 71 survey hours in fall, and 28 use minutes during 71 survey hours in winter (Table 7).

Bald eagle use minutes per survey hour were 0.06 in spring, 0.20 in summer, 0.06 in fall, and 0.39 in winter (Table 7; Figure 10).

Bald eagle was observed at 12 points during the surveys: point 1 (four use minutes), point 7 (five use minutes), point 8 (four use minutes), point 10 (zero use minutes), point 11 (three use minutes), point 13 (seven use minutes), point 15 (five use minutes), point 16 (zero use minutes),

point 18 (five use minutes), point 20 (eight use minutes), point 21 (six use minutes), and point 23 (three use minutes; Table 8; Figure 11).

Table 7. Number of bald eagle observations, use minutes, survey hours, and use minutes per survey hour by month, season, and overall, during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Month or Season	# Eagle Observations	# Eagle Use Minutes	Survey Hours	Eagle Minutes / Survey Hour	# Incidental Eagles
March	0	0	22	0.00	0
April	0	0	24	0.00	0
May	2	4	24	0.17	0
June	1	0	24	0.00	0
July	3	14	24	0.58	0
August	0	0	23	0.00	0
September	0	0	23	0.00	1
October	2	0	24	0.00	0
November	2	4	24	0.17	0
December	11	11	23	0.48	1
January	3	9	24	0.38	0
February	2	8	24	0.33	0
Spring (Mar-May)	2	4	70	0.06	0
Summer (Jun-Aug)	4	14	71	0.20	0
Fall (Sep-Nov)	4	4	71	0.06	1
Winter (Dec-Feb)	16	28	71	0.39	1
All Seasons	**26**	**50**	**283**	**0.18**	**2**

Table 8. Number of bald eagle observations, use minutes, survey hours, and use minutes per survey hour by point during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Point	# Eagle Observations	# Eagle Use Minutes	Survey Hours	Eagle Minutes/Survey Hour
1	2	4	12	0.33
2	0	0	12	0.00
3	0	0	12	0.00
4	0	0	12	0.00
5	0	0	12	0.00
6	0	0	12	0.00
7	2	5	12	0.42
8	1	4	12	0.33
9	0	0	12	0.00
10	6	0	12	0.00
11	2	3	12	0.25
12	0	0	12	0.00
13	3	7	12	0.58
14	0	0	10	0.00
15	2	5	10	0.50
16	1	0	12	0.00
17	0	0	12	0.00
18	1	5	12	0.42
19	0	0	12	0.00
20	1	8	12	0.67
21	4	6	12	0.50
22	0	0	12	0.00
23	1	3	12	0.25
24	0	0	11	0.00
Total	**26**	**50**	**283**	**0.18**

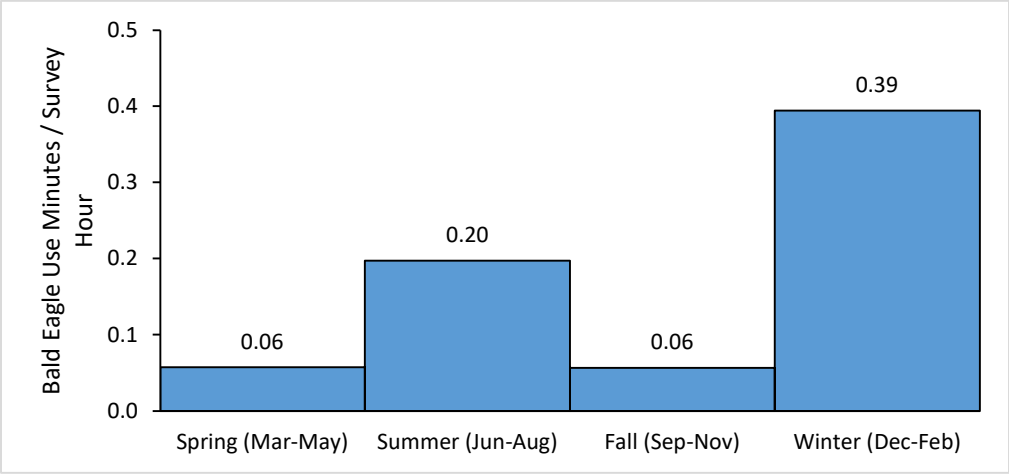


Figure 10. Bald eagle use minutes per survey hour by season during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

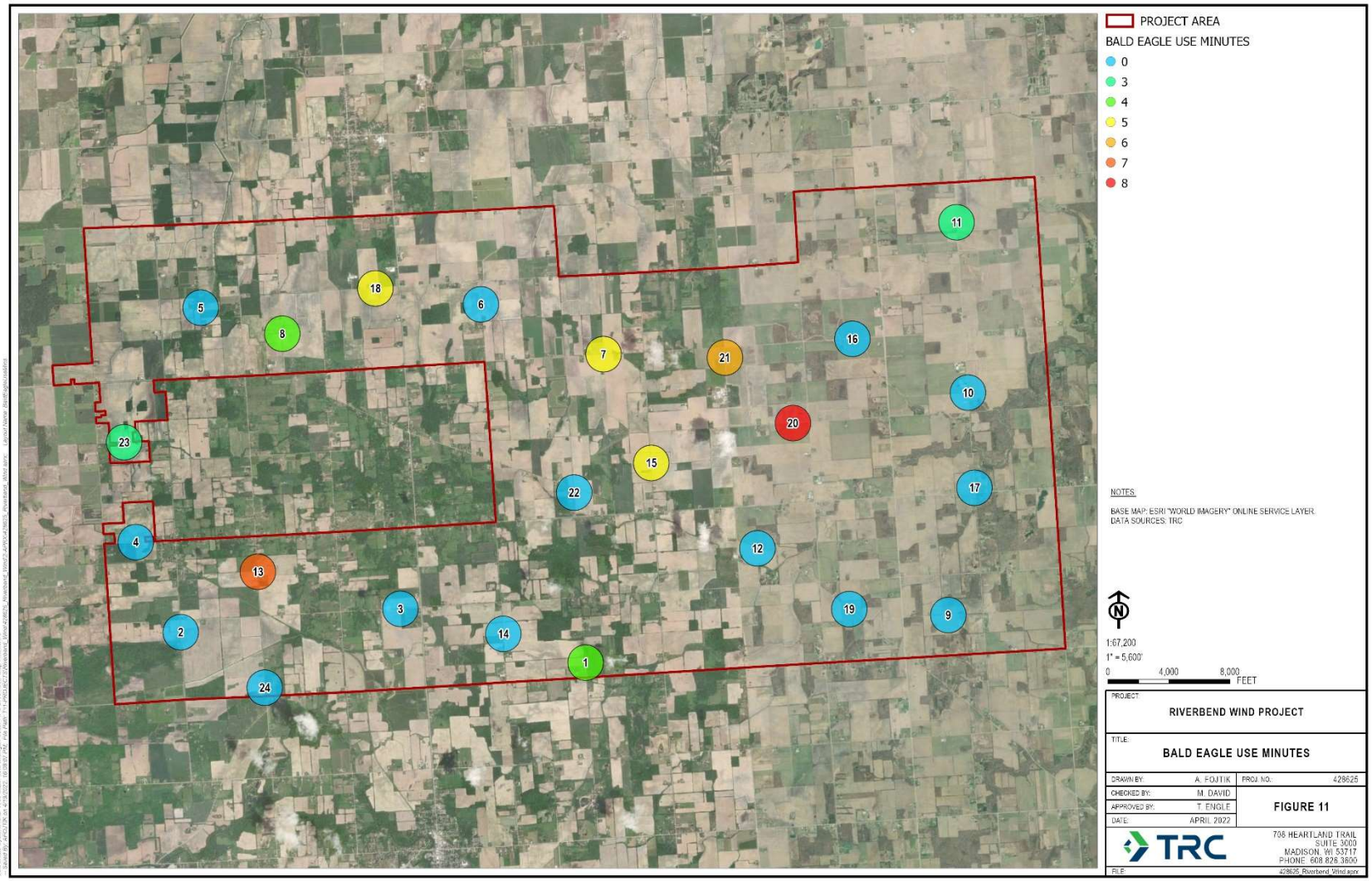


Figure 11. Map of bald eagle use minutes documented during the large bird use surveys in the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

4.5.4 Eagle Flight Paths and Perch Locations

The eagle flight paths and perch locations documented during the Study are mapped in Figure 12.

Out of the 28 bald eagles observed during the study, including incidental observations, 15 observations (53.6%) included perching behavior, and 13 (46.4%) included only flight behaviors. Most flight paths included circling or direction changes; there were no apparent trends in overall flight directions.

Flight paths and perch locations were spread across most of the Project Area, but there were a few areas with a noticeably higher concentration. Six bald eagles were observed on the ground together east of point 10. This group was feeding on animal remains and were likely drawn to this temporary resource, though the area includes a forested riparian corridor which may have contributed to their presence. The other points with more than two observations were points 13 and 21. Land cover in these locations is more varied than in most of the Project Area and includes a patchwork of pasture/hay, forest, and woody wetland, with less cultivated crop cover.

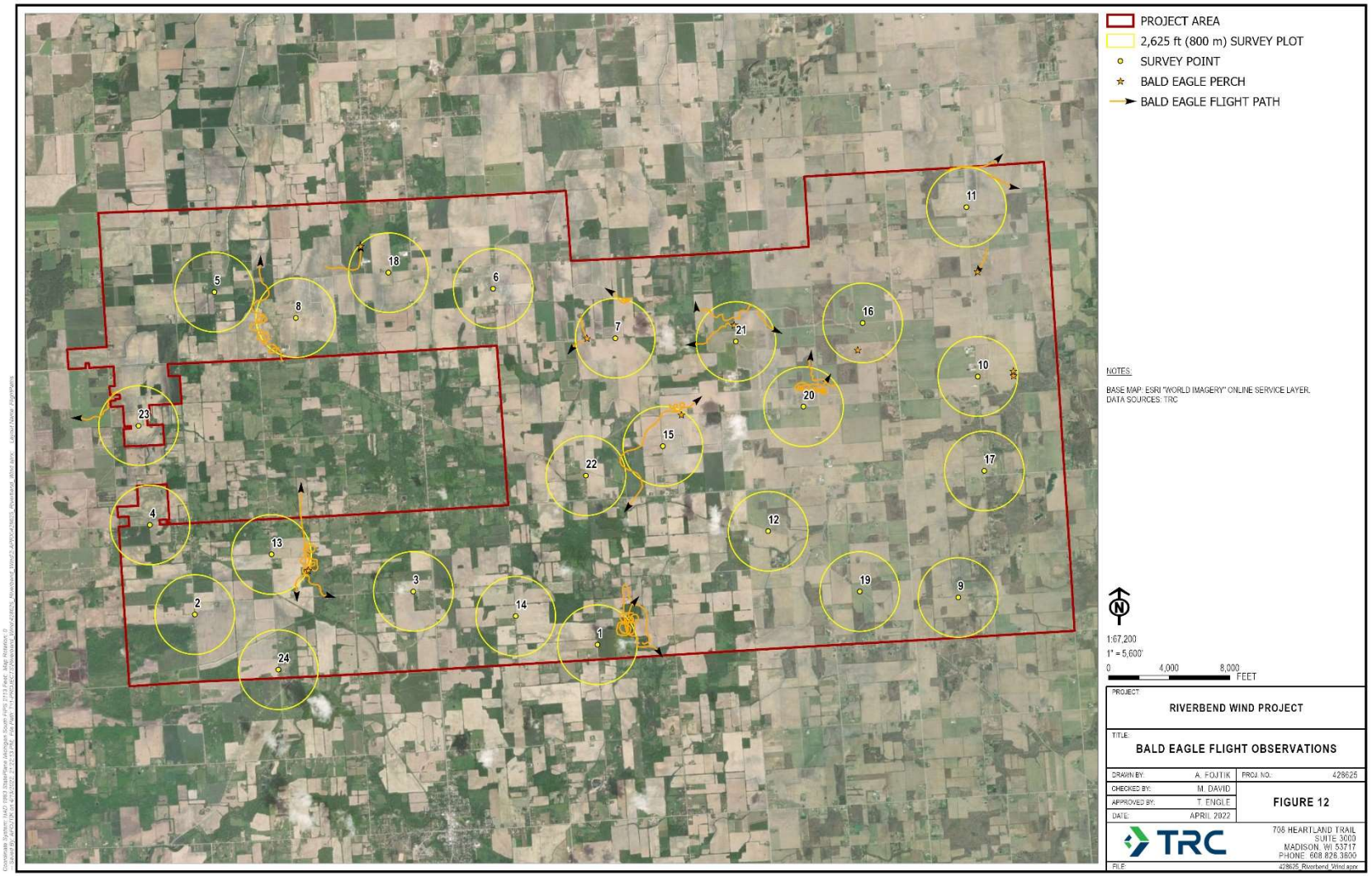


Figure 12. Map of bald eagle flight paths documented during the large bird use study in the proposed Riverbend Wind Energy Facility, Sanilac County, Michigan, March 2021–February 2022.

5.0 Summary

5.1 Large Bird Use Surveys

In total, 283 60-minute large bird use surveys were conducted over 12 visits during the Study (Table 5).

During the surveys, 3,673 observations were recorded (Table B-1). The five most numerous large bird species observed during the surveys were, in order: mourning dove, rock pigeon, turkey vulture, Canada goose, and killdeer (Table B-1).

Twenty-four species were recorded during the surveys, and two others were observed incidentally (Table B-2).

Overall use recorded during the surveys was 12.98 (SE = 0.85) obs/plot/survey (Table B-3). Use was highest in fall, followed by spring, then summer, then winter (Figure 4). Use by point ranged from 5.92 (SE = 1.40) to 39.42 (SE = 9.77) obs/plot/survey (Table B-4).

5.2 Small Bird Use Surveys

In total, 286 ten-minute surveys were conducted over 12 visits during the Year 1 surveys (Table 5). During the surveys, 6,899 observations were recorded (Table C-1). The five most numerous small bird species observed during the surveys were, in order: European starling, red-winged blackbird, American robin, horned lark, and barn swallow (Table C-1).

Forty-two species were recorded during the surveys, and one other was observed incidentally (Table C-2). Overall use recorded during the surveys was 24.12 (SE = 2.72) obs/plot/survey (Table C-3). Use was highest in fall, followed by winter, then spring, then summer (Figure 7).

5.3 Observations of Sensitive Species

No federally or state listed threatened or endangered species were observed during the Study. There were four protected or non-listed state special concern species observed (Table 6).

5.4 Eagle Use

For bald eagles, 50 use minutes were recorded during 26 survey observations; there were also two incidental observations (Table 7). Bald eagle use minutes per survey hour were highest in winter, then summer, then spring tied with fall (Table 7). Bald eagles were observed during surveys at 12 of the 24 survey points (Table 8).

No golden eagles were observed during the Study.

6.0 References

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Attachment A. Weather data from each survey during the large and small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Attachment A. Weather data from each survey during the bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Survey Event	Point ID	Date	Temperature °C (°F)		Wind Speed m/s (mph)		Wind Direction		Cloud Cover (%)		Precipitation	
			Start	End	Start	End	Start	End	Start	End	Start	End
1	1	3/17/2021	14 (57)	13 (55)	4 (9)	4 (8)	ENE	ENE	75-100	75-100	None	None
1	2	3/17/2021	12 (54)	9 (48)	4 (8)	6 (13)	ENE	ENE	75-100	75-100	None	None
1	3	3/17/2021	8 (46)	7 (45)	6 (13)	6 (14)	ENE	ENE	75-100	75-100	None	None
1	4	3/17/2021	6 (43)	4 (39)	6 (14)	4 (10)	NE	NE	75-100	75-100	None	None
1	5	3/18/2021	2 (36)	2 (36)	9 (20)	9 (20)	NE	NE	75-100	75-100	None	None
1	6	3/18/2021	2 (36)	3 (37)	9 (20)	9 (21)	NE	NNE	75-100	75-100	None	None
1	7	3/18/2021	2 (36)	3 (37)	9 (21)	10 (22)	NNE	NE	75-100	75-100	None	None
1	8	3/18/2021	3 (37)	4 (39)	11 (24)	11 (25)	NE	NE	75-100	75-100	None	None
1	9	3/18/2021	4 (39)	4 (39)	11 (25)	11 (24)	NNE	NNE	75-100	75-100	None	None
1	10	3/18/2021	5 (41)	4 (39)	11 (24)	11 (25)	NNE	NNE	75-100	75-100	None	None
1	11	3/18/2021	4 (39)	4 (39)	12 (26)	12 (26)	NNE	NNE	75-100	75-100	None	None
1	12	3/18/2021	2 (36)	2 (36)	12 (26)	13 (29)	N	N	75-100	75-100	None	None
1	13	3/18/2021	2 (36)	1 (34)	13 (29)	12 (26)	NNE	NNE	75-100	25-75	None	None
1	15	3/19/2021	-3 (27)	-1 (30)	8 (18)	8 (17)	NNE	NE	25-75	25-75	None	None
1	16	3/19/2021	0 (32)	2 (36)	8 (17)	7 (15)	NE	NE	25-75	25-75	None	None
1	17	3/19/2021	2 (36)	2 (36)	7 (15)	6 (14)	NE	NE	0-25	0-25	None	None
1	18	3/19/2021	7 (45)	6 (43)	4 (9)	3 (7)	NE	NE	0-25	0-25	None	None
1	19	3/19/2021	3 (37)	4 (39)	6 (13)	5 (12)	NE	NE	0-25	0-25	None	None
1	20	3/19/2021	4 (39)	4 (39)	5 (12)	4 (10)	NE	NE	0-25	0-25	None	None
1	21	3/19/2021	4 (39)	4 (39)	4 (10)	4 (10)	NNE	NNE	0-25	0-25	None	None
1	22	3/19/2021	6 (43)	6 (43)	4 (10)	4 (9)	NE	NE	0-25	0-25	None	None
1	23	3/19/2021	7 (45)	6 (43)	2 (5)	1 (2)	NE	ENE	0-25	0-25	None	None
2	1	4/8/2021	24 (75)	20 (68)	8 (17)	4 (8)	SSE	S	75-100	75-100	None	Rain
2	2	4/9/2021	13 (55)	14 (57)	4 (10)	6 (14)	S	S	75-100	75-100	None	None
2	3	4/9/2021	14 (57)	16 (61)	6 (14)	6 (13)	S	S	75-100	25-75	None	None
2	4	4/9/2021	18 (64)	19 (66)	6 (13)	7 (15)	S	S	25-75	25-75	None	None
2	5	4/9/2021	20 (68)	20 (68)	8 (18)	9 (21)	S	S	0-25	0-25	None	None
2	6	4/9/2021	21 (70)	21 (70)	9 (21)	10 (22)	S	S	25-75	25-75	None	None
2	7	4/9/2021	21 (70)	22 (72)	10 (22)	8 (18)	S	S	25-75	75-100	None	None
2	8	4/9/2021	21 (70)	21 (70)	10 (22)	9 (21)	S	SSE	25-75	25-75	None	None
2	9	4/9/2021	22 (72)	22 (72)	9 (21)	8 (18)	SSE	S	25-75	25-75	None	None
2	10	4/9/2021	22 (72)	20 (68)	4 (10)	6 (13)	S	S	75-100	75-100	None	None
2	11	4/10/2021	8 (46)	9 (48)	3 (6)	4 (8)	SSE	ESE	75-100	75-100	None	None
2	12	4/10/2021	13 (55)	16 (61)	4 (8)	3 (6)	ESE	SE	75-100	75-100	None	None
2	13	4/10/2021	17 (63)	18 (64)	3 (6)	3 (7)	ESE	ESE	25-75	25-75	None	None
2	14	4/10/2021	20 (68)	22 (72)	4 (8)	2 (5)	ESE	ESE	25-75	25-75	None	None
2	15	4/10/2021	22 (72)	22 (72)	2 (5)	4 (9)	ENE	ENE	25-75	25-75	None	None
2	16	4/10/2021	22 (72)	22 (72)	4 (9)	5 (12)	ENE	E	75-100	75-100	None	None
2	17	4/10/2021	22 (72)	20 (68)	6 (14)	5 (12)	E	E	75-100	75-100	None	None
2	18	4/10/2021	20 (68)	20 (68)	5 (12)	4 (8)	ESE	E	75-100	75-100	None	None
2	19	4/10/2021	18 (64)	18 (64)	4 (8)	3 (6)	E	E	75-100	75-100	None	None
2	20	4/11/2021	12 (54)	13 (55)	4 (9)	4 (8)	SSW	SSW	25-75	25-75	None	None
2	21	4/11/2021	12 (54)	13 (55)	4 (9)	4 (10)	SSW	SSW	25-75	25-75	None	None
2	22	4/11/2021	14 (57)	16 (61)	5 (12)	4 (9)	SW	SSW	25-75	25-75	None	None
2	23	4/11/2021	15 (59)	16 (61)	4 (9)	7 (16)	SSW	SSW	25-75	75-100	None	None
2	24	4/11/2021	17 (63)	17 (63)	7 (16)	6 (13)	SSW	S	25-75	25-75	None	None
3	1	5/13/2021	13 (55)	14 (57)	4 (8)	4 (10)	NNW	NW	0-25	0-25	None	None
3	2	5/13/2021	16 (61)	17 (63)	4 (10)	5 (12)	NW	NW	0-25	0-25	None	None
3	3	5/13/2021	17 (63)	18 (64)	5 (12)	5 (12)	NNW	NNW	0-25	0-25	None	None
3	4	5/13/2021	18 (64)	19 (66)	6 (13)	5 (12)	NW	NW	0-25	0-25	None	None
3	5	5/13/2021	19 (66)	19 (66)	5 (12)	5 (12)	N	NE	0-25	0-25	None	None
3	6	5/13/2021	19 (66)	18 (64)	5 (12)	6 (13)	E	E	0-25	0-25	None	None
3	7	5/13/2021	18 (64)	15 (59)	4 (10)	2 (5)	E	E	0-25	0-25	None	None
3	8	5/13/2021	17 (63)	15 (59)	2 (5)	3 (6)	E	ESE	0-25	0-25	None	None
3	9	5/14/2021	4 (39)	6 (43)	1 (3)	1 (3)	W	W	0-25	0-25	None	None
3	10	5/14/2021	7 (45)	11 (52)	2 (5)	4 (8)	W	W	0-25	0-25	None	None
3	11	5/14/2021	11 (52)	14 (57)	4 (8)	3 (6)	W	WNW	0-25	0-25	None	None
3	12	5/14/2021	14 (57)	18 (64)	3 (6)	4 (8)	WNW	NW	0-25	0-25	None	None
3	13	5/14/2021	20 (68)	20 (68)	2 (5)	3 (6)	NW	NW	0-25	0-25	None	None
3	14	5/14/2021	21 (70)	23 (73)	3 (6)	4 (10)	NW	NW	0-25	0-25	None	None
3	15	5/14/2021	21 (70)	23 (73)	4 (10)	3 (6)	E	E	25-75	25-75	None	None
3	16	5/14/2021	23 (73)	19 (66)	4 (9)	4 (8)	E	E	25-75	25-75	None	None
3	17	5/14/2021	20 (68)	20 (68)	4 (8)	3 (6)	E	SE	25-75	25-75	None	None
3	18	5/14/2021	20 (68)	19 (66)	3 (6)	3 (6)	SE	SE	25-75	25-75	None	None
3	22	5/14/2021	19 (66)	18 (64)	1 (2)	1 (2)	SE	SE	0-25	0-25	None	None
3	19	5/15/2021	5 (41)	9 (48)	3 (6)	0 (0)	W	WSW	0-25	0-25	None	None
3	20	5/15/2021	10 (50)	14 (57)	1 (3)	3 (6)	W	W	0-25	0-25	None	None
3	21	5/15/2021	17 (63)	19 (66)	3 (6)	1 (3)	W	W	0-25	0-25	None	None
3	23	5/15/2021	20 (68)	21 (70)	1 (3)	2 (5)	W	W	0-25	0-25	None	None
3	24	5/15/2021	22 (72)	22 (72)	4 (10)	4 (8)	W	WSW	25-75	25-75	None	None

Attachment A. Weather data from each survey during the bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Survey Event	Point ID	Date	Temperature °C (°F)		Wind Speed m/s (mph)		Wind Direction		Cloud Cover (%)		Precipitation	
			Start	End	Start	End	Start	End	Start	End	Start	End
4	1	6/14/2021	22 (72)	20 (68)	5 (12)	4 (10)	NNW	NNW	25-75	25-75	None	None
4	2	6/14/2021	20 (68)	19 (66)	4 (10)	4 (8)	NNW	NNE	25-75	25-75	None	None
4	3	6/14/2021	19 (66)	19 (66)	4 (9)	4 (9)	N	NW	25-75	25-75	None	None
4	4	6/14/2021	22 (72)	20 (68)	4 (9)	3 (6)	N	NNW	0-25	0-25	None	None
4	5	6/15/2021	15 (59)	17 (63)	8 (17)	8 (18)	NNW	N	25-75	25-75	None	None
4	6	6/15/2021	17 (63)	18 (64)	8 (18)	9 (21)	N	N	0-25	0-25	None	None
4	7	6/15/2021	18 (64)	19 (66)	9 (21)	8 (18)	N	N	0-25	0-25	None	None
4	8	6/15/2021	21 (70)	22 (72)	9 (20)	11 (25)	N	N	0-25	0-25	None	None
4	9	6/15/2021	22 (72)	22 (72)	11 (25)	11 (25)	N	N	0-25	25-75	None	None
4	10	6/15/2021	22 (72)	21 (70)	10 (23)	10 (22)	N	N	25-75	25-75	None	None
4	11	6/15/2021	21 (70)	20 (68)	10 (22)	9 (21)	N	NNE	25-75	25-75	None	None
4	12	6/15/2021	22 (72)	21 (70)	9 (21)	9 (20)	N	NNE	25-75	25-75	None	None
4	13	6/15/2021	20 (68)	19 (66)	7 (16)	6 (13)	NNE	NNE	25-75	25-75	None	None
4	14	6/15/2021	17 (63)	14 (57)	6 (13)	5 (12)	NNE	N	25-75	25-75	None	None
4	15	6/16/2021	7 (45)	11 (52)	3 (6)	3 (6)	N	NNE	25-75	25-75	None	None
4	16	6/16/2021	13 (55)	14 (57)	3 (6)	4 (8)	NE	NE	25-75	25-75	None	None
4	17	6/16/2021	16 (61)	18 (64)	3 (7)	3 (6)	N	NNE	25-75	25-75	None	None
4	18	6/16/2021	20 (68)	20 (68)	3 (6)	5 (12)	NNW	NNW	25-75	0-25	None	None
4	19	6/16/2021	20 (68)	21 (70)	5 (12)	7 (15)	NNW	NNW	0-25	0-25	None	None
4	20	6/16/2021	21 (70)	23 (73)	7 (15)	7 (16)	ENE	NE	0-25	0-25	None	None
4	21	6/16/2021	23 (73)	22 (72)	7 (16)	6 (14)	NE	NE	0-25	0-25	None	None
4	22	6/16/2021	22 (72)	20 (68)	6 (14)	6 (13)	NE	NE	0-25	0-25	None	None
4	23	6/16/2021	24 (75)	23 (73)	6 (13)	4 (10)	N	NNE	0-25	0-25	None	None
4	24	6/16/2021	19 (66)	18 (64)	4 (10)	3 (7)	E	ESE	0-25	0-25	None	None
5	1	7/13/2021	24 (75)	24 (75)	3 (6)	5 (12)	SSW	SSW	75-100	75-100	None	None
5	2	7/13/2021	24 (75)	23 (73)	6 (13)	4 (8)	SSW	SW	75-100	75-100	None	Drizzle
5	3	7/13/2021	22 (72)	21 (70)	4 (8)	1 (2)	SW	SW	75-100	75-100	None	None
5	4	7/13/2021	21 (70)	21 (70)	1 (2)	1 (3)	SW	SW	75-100	75-100	None	None
5	5	7/14/2021	18 (64)	19 (66)	4 (8)	3 (6)	W	W	25-75	0-25	None	None
5	6	7/14/2021	19 (66)	22 (72)	1 (3)	3 (7)	W	W	0-25	0-25	None	None
5	7	7/14/2021	22 (72)	23 (73)	3 (7)	3 (7)	WSW	WSW	0-25	0-25	None	None
5	8	7/14/2021	26 (79)	27 (81)	3 (7)	3 (7)	W	W	0-25	25-75	None	None
5	9	7/14/2021	26 (79)	27 (81)	3 (7)	3 (7)	W	WSW	25-75	25-75	None	None
5	10	7/14/2021	28 (82)	28 (82)	3 (7)	4 (8)	W	SW	25-75	25-75	None	None
5	11	7/14/2021	29 (84)	29 (84)	4 (8)	4 (9)	S	S	25-75	25-75	None	None
5	12	7/14/2021	29 (84)	28 (82)	5 (12)	5 (12)	SW	SW	25-75	25-75	None	None
5	13	7/14/2021	27 (81)	27 (81)	5 (12)	3 (7)	SW	SW	25-75	25-75	None	None
5	14	7/14/2021	27 (81)	26 (79)	3 (7)	3 (7)	SW	SW	25-75	25-75	None	None
5	15	7/15/2021	21 (70)	22 (72)	5 (12)	7 (15)	SSW	S	25-75	25-75	None	None
5	16	7/15/2021	22 (72)	23 (73)	7 (15)	7 (16)	S	SSW	25-75	25-75	None	None
5	17	7/15/2021	24 (75)	27 (81)	7 (16)	7 (15)	SSW	SSW	25-75	25-75	None	None
5	18	7/15/2021	27 (81)	27 (81)	7 (15)	5 (12)	SSW	SW	25-75	25-75	None	None
5	19	7/15/2021	26 (79)	26 (79)	5 (12)	6 (13)	SW	SW	25-75	25-75	None	None
5	20	7/15/2021	28 (82)	27 (81)	6 (14)	6 (14)	SW	SW	25-75	25-75	None	None
5	21	7/15/2021	27 (81)	27 (81)	6 (14)	6 (14)	SW	SW	25-75	25-75	None	None
5	22	7/15/2021	26 (79)	26 (79)	6 (14)	7 (16)	SW	SW	25-75	25-75	None	None
5	23	7/15/2021	24 (75)	24 (75)	7 (15)	4 (9)	WSW	W	25-75	25-75	None	None
5	24	7/15/2021	24 (75)	24 (75)	4 (9)	5 (12)	W	W	25-75	25-75	None	None
6	1	8/15/2021	24 (75)	25 (77)	4 (9)	4 (9)	ESE	ESE	25-75	25-75	None	None
6	2	8/15/2021	26 (79)	26 (79)	4 (9)	4 (8)	ESE	ENE	25-75	0-25	None	None
6	3	8/15/2021	26 (79)	24 (75)	4 (8)	3 (7)	ENE	ENE	0-25	0-25	None	None
6	4	8/15/2021	24 (75)	24 (75)	2 (5)	2 (5)	ENE	E	0-25	0-25	None	None
6	5	8/16/2021	13 (55)	14 (57)	1 (2)	2 (5)	E	ENE	25-75	0-25	None	None
6	6	8/16/2021	14 (57)	17 (63)	2 (5)	3 (6)	ENE	ENE	25-75	25-75	None	None
6	7	8/16/2021	17 (63)	21 (70)	3 (6)	2 (5)	ENE	ENE	25-75	25-75	None	None
6	8	8/16/2021	21 (70)	22 (72)	4 (9)	3 (7)	E	E	25-75	25-75	None	None
6	9	8/16/2021	22 (72)	23 (73)	3 (7)	3 (7)	ENE	ENE	25-75	25-75	None	None
6	10	8/16/2021	23 (73)	23 (73)	3 (7)	3 (7)	ENE	ENE	25-75	25-75	None	None
6	11	8/16/2021	23 (73)	24 (75)	3 (7)	1 (3)	ENE	E	25-75	75-100	None	None
6	12	8/16/2021	21 (70)	22 (72)	2 (5)	1 (3)	SE	SE	75-100	75-100	Drizzle	None
6	13	8/16/2021	21 (70)	22 (72)	2 (5)	3 (6)	SE	ESE	75-100	25-75	None	None
6	14	8/16/2021	22 (72)	22 (72)	1 (2)	1 (2)	ESE	E	25-75	25-75	None	None
6	15	8/16/2021	22 (72)	20 (68)	1 (2)	2 (5)	E	E	25-75	25-75	None	None
6	16	8/17/2021	15 (59)	16 (61)	2 (5)	2 (5)	NNW	WNW	25-75	25-75	None	None
6	17	8/17/2021	16 (61)	18 (64)	2 (5)	4 (8)	WNW	NW	25-75	25-75	None	None
6	18	8/17/2021	18 (64)	20 (68)	4 (9)	4 (8)	NW	WNW	25-75	25-75	None	None
6	19	8/17/2021	23 (73)	24 (75)	2 (5)	3 (7)	NE	E	25-75	25-75	None	None
6	20	8/17/2021	24 (75)	25 (77)	3 (7)	4 (8)	E	W	25-75	25-75	None	None
6	21	8/17/2021	26 (79)	27 (81)	4 (8)	3 (6)	E	W	25-75	25-75	None	None
6	22	8/17/2021	27 (81)	28 (82)	3 (6)	2 (5)	W	SW	25-75	0-25	None	None
6	23	8/17/2021	28 (82)	28 (82)	4 (8)	3 (7)	SW	ESE	0-25	0-25	None	None
6	24	8/17/2021	27 (81)	25 (77)	3 (7)	3 (7)	ESE	ESE	25-75	0-25	None	None

Attachment A. Weather data from each survey during the bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Survey Event	Point ID	Date	Temperature °C (°F)		Wind Speed m/s (mph)		Wind Direction		Cloud Cover (%)		Precipitation	
			Start	End	Start	End	Start	End	Start	End	Start	End
7	1	9/14/2021	27 (81)	28 (82)	6 (13)	9 (20)	SSW	SSW	75-100	75-100	None	None
7	2	9/14/2021	28 (82)	29 (84)	9 (20)	10 (23)	SSW	SW	75-100	75-100	None	None
7	3	9/14/2021	29 (84)	29 (84)	9 (21)	7 (16)	SW	SW	75-100	75-100	None	Rain
7	4	9/14/2021	24 (75)	23 (73)	7 (16)	7 (15)	WSW	SW	75-100	75-100	None	None
7	5	9/14/2021	23 (73)	23 (73)	7 (15)	3 (7)	SW	WSW	75-100	75-100	None	None
7	6	9/15/2021	15 (59)	15 (59)	4 (8)	2 (5)	W	W	25-75	25-75	None	None
7	7	9/15/2021	16 (61)	18 (64)	3 (6)	4 (8)	W	WNW	25-75	25-75	None	None
7	8	9/15/2021	18 (64)	19 (66)	4 (8)	4 (8)	W	WNW	25-75	25-75	None	None
7	9	9/15/2021	20 (68)	21 (70)	4 (8)	3 (6)	S	W	75-100	25-75	None	None
7	10	9/15/2021	23 (73)	23 (73)	3 (7)	0 (0)	NW	NW	75-100	75-100	None	None
7	11	9/15/2021	23 (73)	23 (73)	0 (0)	4 (8)	NW	E	25-75	25-75	None	None
7	12	9/15/2021	23 (73)	23 (73)	4 (8)	3 (7)	NW	NW	25-75	25-75	None	None
7	13	9/15/2021	22 (72)	22 (72)	4 (8)	3 (7)	NW	NW	25-75	25-75	None	None
7	14	9/15/2021	22 (72)	21 (70)	3 (7)	4 (10)	NNW	NNW	25-75	25-75	None	None
7	15	9/15/2021	20 (68)	19 (66)	4 (10)	3 (6)	NNW	NW	25-75	25-75	None	None
7	16	9/16/2021	11 (52)	12 (54)	2 (5)	2 (5)	ESE	ESE	25-75	25-75	None	None
7	17	9/16/2021	12 (54)	14 (57)	2 (5)	4 (9)	ESE	SE	25-75	25-75	None	None
7	18	9/16/2021	17 (63)	17 (63)	3 (6)	2 (5)	SE	SE	25-75	25-75	None	None
7	19	9/16/2021	23 (73)	23 (73)	4 (9)	2 (5)	SE	ESE	25-75	25-75	None	None
7	20	9/16/2021	24 (75)	24 (75)	2 (5)	3 (6)	SE	ESE	25-75	25-75	None	None
7	21	9/16/2021	24 (75)	24 (75)	4 (10)	2 (5)	S	S	25-75	25-75	None	None
7	22	9/16/2021	26 (79)	26 (79)	3 (7)	4 (10)	S	S	25-75	25-75	None	None
7	23	9/16/2021	26 (79)	24 (75)	1 (3)	6 (13)	SE	SSE	25-75	25-75	None	None
7	24	9/16/2021	24 (75)	24 (75)	6 (13)	4 (9)	SSE	SE	25-75	25-75	None	None
8	1	10/12/2021	21 (70)	21 (70)	7 (15)	8 (18)	SW	SW	75-100	75-100	None	None
8	2	10/12/2021	21 (70)	20 (68)	8 (18)	8 (17)	SW	SW	75-100	75-100	None	None
8	3	10/12/2021	20 (68)	20 (68)	8 (17)	6 (13)	SW	SW	75-100	75-100	None	None
8	4	10/12/2021	20 (68)	20 (68)	6 (13)	4 (9)	SW	SW	75-100	75-100	None	None
8	5	10/13/2021	16 (61)	16 (61)	3 (7)	3 (6)	WSW	WSW	0-25	0-25	None	None
8	6	10/13/2021	17 (63)	18 (64)	3 (7)	4 (9)	WSW	WSW	0-25	0-25	None	None
8	7	10/13/2021	18 (64)	19 (66)	4 (9)	4 (8)	SW	SW	0-25	0-25	None	None
8	8	10/13/2021	19 (66)	21 (70)	6 (14)	5 (12)	SW	SW	0-25	25-75	None	None
8	9	10/13/2021	21 (70)	21 (70)	5 (12)	4 (9)	SW	SW	25-75	25-75	None	None
8	10	10/13/2021	21 (70)	22 (72)	4 (9)	5 (12)	SW	SW	25-75	25-75	None	None
8	11	10/13/2021	22 (72)	22 (72)	4 (8)	3 (6)	SW	SW	25-75	25-75	None	None
8	12	10/13/2021	22 (72)	20 (68)	3 (6)	2 (5)	SW	SW	25-75	0-25	None	None
8	13	10/14/2021	17 (63)	17 (63)	4 (8)	3 (7)	S	SSW	75-100	75-100	None	None
8	14	10/14/2021	18 (64)	19 (66)	4 (8)	4 (8)	S	S	75-100	75-100	None	None
8	15	10/14/2021	20 (68)	22 (72)	4 (8)	4 (9)	S	SSW	75-100	25-75	None	None
8	16	10/14/2021	22 (72)	23 (73)	4 (10)	4 (10)	SSW	SSW	75-100	75-100	None	None
8	17	10/14/2021	23 (73)	24 (75)	4 (10)	5 (12)	SSW	SW	25-75	25-75	None	None
8	18	10/14/2021	25 (77)	25 (77)	4 (9)	5 (12)	SW	SW	25-75	25-75	None	None
8	19	10/14/2021	25 (77)	23 (73)	4 (10)	3 (7)	SW	WSW	75-100	75-100	None	None
8	20	10/14/2021	22 (72)	22 (72)	3 (7)	4 (10)	WSW	WSW	75-100	75-100	None	Rain
8	21	10/15/2021	13 (55)	14 (57)	3 (6)	3 (6)	SE	E	75-100	75-100	Drizzle	Drizzle
8	22	10/15/2021	14 (57)	14 (57)	2 (5)	0 (0)	E	WSW	75-100	75-100	Drizzle	Drizzle
8	23	10/15/2021	15 (59)	15 (59)	1 (2)	1 (3)	E	N	75-100	75-100	Drizzle	Drizzle
8	24	10/15/2021	14 (57)	14 (57)	1 (2)	1 (3)	N	NE	75-100	75-100	Drizzle	None
9	1	11/15/2021	2 (36)	2 (36)	6 (14)	6 (14)	WNW	WNW	75-100	75-100	None	None
9	2	11/15/2021	3 (37)	4 (39)	6 (14)	6 (14)	WNW	W	75-100	25-75	None	None
9	3	11/15/2021	4 (39)	4 (39)	6 (14)	7 (15)	W	W	25-75	25-75	None	None
9	4	11/15/2021	4 (39)	4 (39)	6 (13)	7 (15)	W	W	75-100	75-100	None	None
9	5	11/15/2021	3 (37)	3 (37)	7 (15)	4 (10)	W	W	25-75	25-75	None	None
9	6	11/16/2021	-2 (28)	0 (32)	1 (3)	3 (7)	W	W	25-75	25-75	None	None
9	7	11/16/2021	0 (32)	1 (34)	3 (7)	3 (6)	W	WNW	25-75	25-75	None	None
9	8	11/16/2021	1 (34)	3 (37)	3 (6)	3 (7)	W	W	25-75	25-75	None	None
9	9	11/16/2021	3 (37)	4 (39)	1 (3)	0 (0)	W	W	25-75	25-75	None	None
9	10	11/16/2021	5 (41)	6 (43)	0 (0)	1 (2)	S	S	25-75	25-75	None	None
9	11	11/16/2021	6 (43)	6 (43)	1 (2)	2 (5)	S	SE	25-75	25-75	None	None
9	13	11/16/2021	6 (43)	5 (41)	1 (2)	1 (3)	SSW	SSE	25-75	75-100	None	None
9	14	11/17/2021	8 (46)	8 (46)	5 (12)	4 (10)	S	S	75-100	75-100	Drizzle	Drizzle
9	15	11/17/2021	10 (50)	12 (54)	4 (9)	4 (9)	S	SSW	75-100	75-100	None	Drizzle
9	16	11/17/2021	12 (54)	13 (55)	4 (10)	5 (12)	SSW	SSW	75-100	75-100	Drizzle	None
9	17	11/17/2021	13 (55)	14 (57)	6 (14)	8 (17)	SSW	SSW	75-100	75-100	None	None
9	18	11/17/2021	14 (57)	15 (59)	8 (17)	7 (16)	SSW	SW	75-100	75-100	None	None
9	19	11/17/2021	15 (59)	15 (59)	7 (16)	6 (14)	SW	SSW	75-100	75-100	None	None
9	20	11/17/2021	16 (61)	14 (57)	7 (16)	8 (17)	SSW	SSW	75-100	75-100	Drizzle	None
9	12	11/18/2021	4 (39)	3 (37)	5 (12)	7 (15)	W	W	75-100	75-100	None	None
9	21	11/18/2021	3 (37)	2 (36)	4 (10)	4 (9)	WNW	W	75-100	75-100	None	None
9	22	11/18/2021	3 (37)	4 (39)	4 (9)	3 (7)	W	W	75-100	75-100	None	None
9	23	11/18/2021	4 (39)	4 (39)	3 (7)	4 (8)	W	W	75-100	25-75	None	None
9	24	11/18/2021	4 (39)	4 (39)	8 (17)	5 (12)	W	W	25-75	75-100	None	None

Attachment A. Weather data from each survey during the bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Survey Event	Point ID	Date	Temperature °C (°F)		Wind Speed m/s (mph)		Wind Direction		Cloud Cover (%)		Precipitation	
			Start	End	Start	End	Start	End	Start	End	Start	End
10	1	12/14/2021	-1 (30)	2 (36)	3 (6)	2 (5)	E	ESE	25-75	75-100	None	None
10	2	12/14/2021	3 (37)	5 (41)	2 (5)	3 (6)	ESE	E	25-75	25-75	None	None
10	3	12/14/2021	5 (41)	7 (45)	3 (6)	6 (13)	E	ESE	25-75	25-75	None	None
10	4	12/14/2021	6 (43)	7 (45)	6 (13)	4 (10)	E	ESE	25-75	25-75	None	None
10	5	12/14/2021	7 (45)	7 (45)	4 (10)	4 (8)	ESE	ESE	25-75	25-75	None	None
10	6	12/14/2021	7 (45)	7 (45)	5 (12)	4 (10)	ESE	ESE	25-75	25-75	None	None
10	7	12/14/2021	7 (45)	5 (41)	4 (10)	4 (9)	ESE	SE	25-75	25-75	None	None
10	8	12/15/2021	6 (43)	6 (43)	6 (14)	7 (16)	S	S	75-100	75-100	None	None
10	9	12/15/2021	7 (45)	7 (45)	6 (14)	7 (16)	S	S	75-100	75-100	None	None
10	10	12/15/2021	7 (45)	8 (46)	7 (16)	7 (16)	S	S	75-100	75-100	None	None
10	11	12/15/2021	9 (48)	10 (50)	7 (16)	7 (16)	S	S	75-100	75-100	None	None
10	12	12/15/2021	8 (46)	9 (48)	7 (16)	7 (16)	SSE	S	75-100	75-100	None	None
10	13	12/15/2021	10 (50)	11 (52)	6 (14)	6 (14)	S	S	75-100	75-100	None	None
10	14	12/15/2021	11 (52)	11 (52)	6 (14)	6 (13)	SSW	SSW	75-100	75-100	None	None
10	15	12/16/2021	14 (57)	14 (57)	13 (28)	15 (33)	SSW	SW	75-100	75-100	None	None
10	16	12/16/2021	14 (57)	15 (59)	15 (33)	13 (30)	SW	SW	75-100	75-100	None	None
10	17	12/16/2021	15 (59)	16 (61)	13 (30)	12 (26)	SW	SW	25-75	25-75	None	None
10	18	12/16/2021	17 (63)	15 (59)	13 (30)	11 (25)	SW	WSW	25-75	75-100	None	None
10	19	12/16/2021	17 (63)	15 (59)	12 (26)	11 (25)	WSW	WSW	75-100	75-100	None	None
10	20	12/16/2021	15 (59)	14 (57)	10 (22)	7 (16)	WSW	SW	75-100	25-75	None	None
10	21	12/16/2021	14 (57)	12 (54)	7 (16)	9 (21)	WSW	WSW	25-75	25-75	None	None
10	22	12/17/2021	-1 (30)	-1 (30)	3 (7)	4 (8)	WNW	WNW	25-75	25-75	None	None
10	23	12/17/2021	0 (32)	1 (34)	4 (9)	4 (10)	WNW	WNW	25-75	25-75	None	None
10	24	12/17/2021	1 (34)	2 (36)	4 (10)	2 (5)	WNW	WNW	25-75	25-75	None	None
11	1	1/10/2022	-10 (14)	-10 (14)	1 (3)	1 (2)	WNW	WNW	75-100	75-100	None	None
11	2	1/10/2022	-10 (14)	-10 (14)	1 (2)	0 (0)	WNW	WNW	75-100	75-100	None	None
11	3	1/10/2022	-10 (14)	-11 (12)	0 (0)	1 (3)	WNW	WNW	75-100	75-100	None	None
11	4	1/11/2022	-15 (5)	-14 (7)	3 (7)	2 (5)	WSW	SW	25-75	25-75	None	None
11	5	1/11/2022	-14 (7)	-12 (10)	2 (5)	6 (13)	SW	SSW	25-75	75-100	None	None
11	6	1/11/2022	-12 (10)	-11 (12)	4 (10)	4 (8)	SSW	SSW	75-100	75-100	None	None
11	7	1/11/2022	-9 (16)	-8 (18)	4 (8)	5 (12)	SSW	SSW	75-100	75-100	None	None
11	8	1/11/2022	-9 (16)	-8 (18)	5 (12)	4 (10)	SSW	SSW	25-75	25-75	None	None
11	9	1/11/2022	-8 (18)	-8 (18)	6 (13)	5 (12)	S	SSW	25-75	25-75	None	None
11	10	1/11/2022	-8 (18)	-8 (18)	5 (12)	5 (12)	S	S	25-75	75-100	None	None
11	11	1/12/2022	-1 (30)	-1 (30)	7 (15)	5 (12)	W	W	75-100	75-100	None	None
11	12	1/12/2022	0 (32)	1 (34)	5 (12)	6 (13)	W	W	75-100	75-100	None	None
11	13	1/12/2022	1 (34)	1 (34)	6 (13)	7 (15)	W	W	75-100	75-100	None	None
11	14	1/12/2022	1 (34)	1 (34)	7 (15)	6 (14)	W	W	75-100	75-100	None	None
11	15	1/12/2022	1 (34)	2 (36)	7 (15)	7 (15)	W	W	75-100	75-100	None	None
11	16	1/12/2022	2 (36)	2 (36)	6 (14)	7 (15)	W	W	75-100	75-100	None	None
11	17	1/12/2022	2 (36)	1 (34)	7 (15)	6 (13)	W	NW	75-100	75-100	None	None
11	18	1/13/2022	-2 (28)	-2 (28)	7 (15)	5 (12)	NNE	NNE	75-100	75-100	None	None
11	19	1/13/2022	-1 (30)	-1 (30)	6 (13)	6 (14)	NNE	NNE	75-100	75-100	None	None
11	20	1/13/2022	0 (32)	0 (32)	6 (13)	7 (16)	NE	NE	75-100	75-100	None	None
11	21	1/13/2022	0 (32)	0 (32)	7 (15)	7 (16)	NE	ENE	75-100	75-100	None	None
11	22	1/13/2022	0 (32)	0 (32)	7 (16)	7 (16)	ENE	N	75-100	75-100	None	None
11	23	1/13/2022	1 (34)	1 (34)	6 (13)	6 (13)	N	N	75-100	75-100	None	None
11	24	1/13/2022	1 (34)	0 (32)	6 (13)	4 (10)	NNW	N	75-100	75-100	None	None
12	1	2/15/2022	-2 (28)	-5 (23)	6 (14)	7 (15)	SE	SE	75-100	75-100	None	None
12	2	2/16/2022	2 (36)	3 (37)	12 (26)	10 (23)	SSW	SSW	75-100	75-100	None	None
12	3	2/16/2022	5 (41)	7 (45)	9 (20)	9 (20)	SSW	SSW	75-100	75-100	None	None
12	4	2/16/2022	7 (45)	8 (46)	9 (20)	8 (18)	SSW	S	75-100	75-100	None	None
12	5	2/16/2022	8 (46)	9 (48)	8 (17)	8 (18)	S	SSW	75-100	75-100	None	None
12	6	2/16/2022	9 (48)	10 (50)	8 (17)	7 (15)	SSW	SSW	75-100	75-100	None	None
12	7	2/16/2022	11 (52)	11 (52)	9 (20)	11 (24)	SSW	SSW	75-100	75-100	None	None
12	8	2/16/2022	10 (50)	10 (50)	10 (22)	10 (23)	SSW	SSW	75-100	75-100	None	None
12	9	2/16/2022	10 (50)	9 (48)	8 (18)	6 (13)	SSW	SSW	75-100	75-100	Drizzle	Rain
12	10	2/17/2022	2 (36)	0 (32)	1 (2)	2 (5)	NNE	NNE	75-100	75-100	Rain	None
12	11	2/17/2022	0 (32)	-1 (30)	1 (3)	1 (3)	NNE	N	75-100	75-100	None	None
12	12	2/17/2022	-1 (30)	-2 (28)	1 (3)	1 (3)	N	N	75-100	75-100	None	Drizzle
12	13	2/17/2022	-2 (28)	-2 (28)	1 (3)	2 (5)	N	N	75-100	75-100	None	None
12	14	2/17/2022	-2 (28)	-2 (28)	2 (5)	3 (6)	N	N	75-100	75-100	Drizzle	Snow
12	15	2/17/2022	-2 (28)	-3 (27)	3 (7)	4 (8)	N	N	75-100	75-100	Snow	Snow
12	16	2/17/2022	-3 (27)	-4 (25)	4 (8)	4 (8)	N	N	75-100	75-100	Snow	Snow
12	17	2/18/2022	-13 (9)	-13 (9)	4 (9)	4 (8)	WNW	WNW	25-75	25-75	None	None
12	18	2/18/2022	-12 (10)	-11 (12)	3 (6)	4 (8)	WNW	WNW	25-75	25-75	None	None
12	19	2/18/2022	-9 (16)	-9 (16)	4 (8)	4 (9)	WNW	WNW	25-75	25-75	None	None
12	20	2/18/2022	-8 (18)	-8 (18)	4 (9)	4 (9)	WNW	W	25-75	25-75	None	None
12	21	2/18/2022	-7 (19)	-6 (21)	3 (6)	4 (8)	WSW	SW	25-75	25-75	None	None
12	22	2/18/2022	-7 (19)	-6 (21)	4 (10)	6 (13)	SW	SW	0-25	25-75	None	None
12	23	2/18/2022	-6 (21)	-6 (21)	4 (10)	6 (13)	SW	SW	25-75	75-100	None	None
12	24	2/18/2022	-6 (21)	-7 (19)	5 (12)	6 (14)	SSW	S	25-75	25-75	None	None

Attachment B. Data tables of large birds from the large and small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Table B-1. Group counts, observation counts, and relative abundance, by season, for each species and family observed during the large bird use surveys in the Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	Spring: Mar–May			Summer: Jun–Aug			Fall: Sep–Nov			Winter: Dec–Feb			All Seasons		
			# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)
Anatidae (Ducks, Geese, & Swans)	Canada Goose	*Branta canadensis*	27	80	10.0	3	28	3.8	15	112	8.0	10	91	12.6	55	311	8.5
	Wood Duck	*Aix sponsa*	1	2	0.2	0	0	0.0	0	0	0.0	0	0	0.0	1	2	0.1
	Mallard	*Anas platyrhynchos*	4	16	2.0	1	2	0.3	0	0	0.0	0	0	0.0	5	18	0.5
	Family Subtotal:		**32**	**98**	**12.2**	**4**	**30**	**4.0**	**15**	**112**	**8.0**	**10**	**91**	**12.6**	**61**	**331**	**9.0**
Phasianidae (Grouse & Allies)	Wild Turkey	*Meleagris gallopavo*	9	44	5.5	8	17	2.3	3	21	1.5	6	48	6.7	26	130	3.5
	Ring-necked Pheasant	*Phasianus colchicus*	3	4	0.5	4	8	1.1	1	2	0.1	0	0	0.0	8	14	0.4
	Family Subtotal:		**12**	**48**	**6.0**	**12**	**25**	**3.4**	**4**	**23**	**1.6**	**6**	**48**	**6.7**	**34**	**144**	**3.9**
Columbidae (Pigeons & Doves)	Rock Pigeon	*Columba livia*	31	85	10.6	19	61	8.2	39	321	22.8	39	269	37.4	128	736	20.0
	Mourning Dove	*Zenaida macroura*	55	81	10.1	148	347	46.5	207	690	49.1	76	231	32.1	486	1349	36.7
	Family Subtotal:		**86**	**166**	**20.7**	**167**	**408**	**54.7**	**246**	**1011**	**71.9**	**115**	**500**	**69.4**	**614**	**2085**	**56.8**
Gruidae (Cranes)	Sandhill Crane	*Antigone canadensis*	3	49	6.1	6	35	4.7	2	6	0.4	0	0	0.0	11	90	2.5
	Family Subtotal:		**3**	**49**	**6.1**	**6**	**35**	**4.7**	**2**	**6**	**0.4**	**0**	**0**	**0.0**	**11**	**90**	**2.5**
Charadriidae (Plovers)	Killdeer	*Charadrius vociferus*	73	108	13.5	46	51	6.8	17	25	1.8	0	0	0.0	136	184	5.0
	Family Subtotal:		**73**	**108**	**13.5**	**46**	**51**	**6.8**	**17**	**25**	**1.8**	**0**	**0**	**0.0**	**136**	**184**	**5.0**
Laridae (Gulls & Allies)	Ring-billed Gull	*Larus delawarensis*	0	0	0.0	0	0	0.0	2	6	0.4	0	0	0.0	2	6	0.2
	Herring Gull	*Larus argentatus*	6	9	1.1	0	0	0.0	1	3	0.2	0	0	0.0	7	12	0.3
	Family Subtotal:		**6**	**9**	**1.1**	**0**	**0**	**0.0**	**3**	**9**	**0.6**	**0**	**0**	**0.0**	**9**	**18**	**0.5**
Ardeidae (Herons & Allies)	Great Blue Heron	*Ardea herodias*	3	3	0.4	4	4	0.5	3	3	0.2	0	0	0.0	10	10	0.3
	Green Heron	*Butorides virescens*	1	1	0.1	0	0	0.0	0	0	0.0	0	0	0.0	1	1	0.0
	Family Subtotal:		**4**	**4**	**0.5**	**4**	**4**	**0.5**	**3**	**3**	**0.2**	**0**	**0**	**0.0**	**11**	**11**	**0.3**
Cathartidae (Vultures)	Turkey Vulture	*Cathartes aura*	170	281	35.1	89	143	19.2	85	150	10.7	0	0	0.0	344	574	15.6
	Family Subtotal:		**170**	**281**	**35.1**	**89**	**143**	**19.2**	**85**	**150**	**10.7**	**0**	**0**	**0.0**	**344**	**574**	**15.6**
Accipitridae (Hawks, Eagles, & Kites)	Northern Harrier	*Circus hudsonius*	0	0	0.0	0	0	0.0	1	1	0.1	3	3	0.4	4	4	0.1
	Sharp-shinned Hawk	*Accipiter striatus*	2	2	0.2	0	0	0.0	2	2	0.1	0	0	0.0	4	4	0.1
	Cooper's Hawk	*Accipiter cooperii*	0	0	0.0	4	4	0.5	1	1	0.1	0	0	0.0	5	5	0.1
	Bald Eagle	*Haliaeetus leucocephalus*	2	2	0.2	4	4	0.5	3	4	0.3	10	16	2.2	19	26	0.7
	Red-tailed Hawk	*Buteo jamaicensis*	27	29	3.6	35	36	4.8	45	45	3.2	51	52	7.2	158	162	4.4
	Rough-legged Hawk	*Buteo lagopus*	0	0	0.0	0	0	0.0	0	0	0.0	6	6	0.8	6	6	0.2
	Family Subtotal:		**31**	**33**	**4.1**	**43**	**44**	**5.9**	**52**	**53**	**3.8**	**70**	**77**	**10.7**	**196**	**207**	**5.6**
Strigidae (Owls)	Great Horned Owl	*Bubo virginianus*	0	0	0.0	1	1	0.1	0	0	0.0	0	0	0.0	1	1	0.0
	Family Subtotal:		**0**	**0**	**0.0**	**1**	**1**	**0.1**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**1**	**1**	**0.0**
Picidae (Woodpeckers)	Northern Flicker	*Colaptes auratus*	2	2	0.2	0	0	0.0	1	1	0.1	1	1	0.1	4	4	0.1
	Pileated Woodpecker	*Dryocopus pileatus*	0	0	0.0	0	0	0.0	1	1	0.1	0	0	0.0	1	1	0.0
	Family Subtotal:		**2**	**2**	**0.2**	**0**	**0**	**0.0**	**2**	**2**	**0.1**	**1**	**1**	**0.1**	**5**	**5**	**0.1**
Falconidae (Falcons)	American Kestrel	*Falco sparverius*	3	3	0.4	5	5	0.7	12	12	0.9	3	3	0.4	23	23	0.6
	Family Subtotal:		**3**	**3**	**0.4**	**5**	**5**	**0.7**	**12**	**12**	**0.9**	**3**	**3**	**0.4**	**23**	**23**	**0.6**
	Total:		**422**	**801**	**100.0**	**377**	**746**	**100.0**	**441**	**1406**	**100.0**	**205**	**720**	**100.0**	**1445**	**3673**	**100.0**
	Species Diversity:			**18**			**15**			**19**			**10**			**24**	

Table B-2. Complete list of large bird species observed in the Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Common Name	Scientific Name	Family	Incidental Observations Only
Canada Goose	*Branta canadensis*	Anatidae	
Wood Duck	*Aix sponsa*		
Mallard	*Anas platyrhynchos*		
Common Merganser	*Mergus merganser*		*
Wild Turkey	*Meleagris gallopavo*	Phasianidae	
Ring-necked Pheasant	*Phasianus colchicus*		
Rock Pigeon	*Columba livia*	Columbidae	
Mourning Dove	*Zenaida macroura*		
Sandhill Crane	*Antigone canadensis*	Gruidae	
Killdeer	*Charadrius vociferus*	Charadriidae	
Ring-billed Gull	*Larus delawarensis*	Laridae	
Herring Gull	*Larus argentatus*		
Great Blue Heron	*Ardea herodias*	Ardeidae	
Green Heron	*Butorides virescens*		
Turkey Vulture	*Cathartes aura*	Cathartidae	
Northern Harrier	*Circus hudsonius*	Accipitridae	
Sharp-shinned Hawk	*Accipiter striatus*		
Cooper's Hawk	*Accipiter cooperii*		
Bald Eagle	*Haliaeetus leucocephalus*		
Red-tailed Hawk	*Buteo jamaicensis*		
Rough-legged Hawk	*Buteo lagopus*		
Great Horned Owl	*Bubo virginianus*	Strigidae	
Snowy Owl	*Bubo scandiacus*		*
Northern Flicker	*Colaptes auratus*	Picidae	
Pileated Woodpecker	*Dryocopus pileatus*		
American Kestrel	*Falco sparverius*	Falconidae	

Table B-3. Use and frequency of occurrence, by season, for each species and family observed during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	Use (observations/plot/survey)					Frequency				
			Spring	Summer	Fall	Winter	Total	Spring	Summer	Fall	Winter	Total
Anatidae (Ducks, Geese, & Swans)	Canada Goose	*Branta canadensis*	1.14	0.39	1.58	1.28	1.10	0.26	0.04	0.18	0.04	0.13
	Wood Duck	*Aix sponsa*	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	< 0.01
	Mallard	*Anas platyrhynchos*	0.23	0.03	0.00	0.00	0.06	0.06	0.01	0.00	0.00	0.02
		Family Subtotal:	**1.40**	**0.42**	**1.58**	**1.28**	**1.17**	**0.30**	**0.06**	**0.18**	**0.04**	**0.14**
Phasianidae (Grouse & Allies)	Wild Turkey	*Meleagris gallopavo*	0.63	0.24	0.30	0.68	0.46	0.13	0.08	0.04	0.06	0.08
	Ring-necked Pheasant	*Phasianus colchicus*	0.06	0.11	0.03	0.00	0.05	0.04	0.06	0.01	0.00	0.03
		Family Subtotal:	**0.69**	**0.35**	**0.32**	**0.68**	**0.51**	**0.17**	**0.13**	**0.06**	**0.06**	**0.10**
Columbidae (Pigeons & Doves)	Rock Pigeon	*Columba livia*	1.21	0.86	4.52	3.79	2.60	0.31	0.23	0.34	0.37	0.31
	Mourning Dove	*Zenaida macroura*	1.16	4.89	9.72	3.25	4.77	0.49	0.87	0.87	0.65	0.72
		Family Subtotal:	**2.37**	**5.75**	**14.24**	**7.04**	**7.37**	**0.66**	**0.90**	**0.94**	**0.85**	**0.84**
Gruidae (Cranes)	Sandhill Crane	*Antigone canadensis*	0.70	0.49	0.08	0.00	0.32	0.04	0.07	0.03	0.00	0.04
		Family Subtotal:	**0.70**	**0.49**	**0.08**	**0.00**	**0.32**	**0.04**	**0.07**	**0.03**	**0.00**	**0.04**
Charadriidae (Plovers)	Killdeer	*Charadrius vociferus*	1.54	0.72	0.35	0.00	0.65	0.57	0.39	0.18	0.00	0.29
		Family Subtotal:	**1.54**	**0.72**	**0.35**	**0.00**	**0.65**	**0.57**	**0.39**	**0.18**	**0.00**	**0.29**
Laridae (Gulls & Allies)	Ring-billed Gull	*Larus delawarensis*	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.03	0.00	0.01
	Herring Gull	*Larus argentatus*	0.13	0.00	0.04	0.00	0.04	0.06	0.00	0.01	0.00	0.02
		Family Subtotal:	**0.13**	**0.00**	**0.13**	**0.00**	**0.06**	**0.06**	**0.00**	**0.04**	**0.00**	**0.02**
Ardeidae (Herons & Allies)	Great Blue Heron	*Ardea herodias*	0.04	0.06	0.04	0.00	0.04	0.04	0.06	0.04	0.00	0.04
	Green Heron	*Butorides virescens*	0.01	0.00	0.00	0.00	< 0.01	0.01	0.00	0.00	0.00	< 0.01
		Family Subtotal:	**0.06**	**0.06**	**0.04**	**0.00**	**0.04**	**0.06**	**0.06**	**0.04**	**0.00**	**0.04**
Cathartidae (Vultures)	Turkey Vulture	*Cathartes aura*	4.01	2.01	2.11	0.00	2.03	0.74	0.61	0.37	0.00	0.43
		Family Subtotal:	**4.01**	**2.01**	**2.11**	**0.00**	**2.03**	**0.74**	**0.61**	**0.37**	**0.00**	**0.43**
Accipitridae (Hawks, Eagles, & Kites)	Northern Harrier	*Circus hudsonius*	0.00	0.00	0.01	0.04	0.01	0.00	0.00	0.01	0.04	0.01
	Sharp-shinned Hawk	*Accipiter striatus*	0.03	0.00	0.03	0.00	0.01	0.03	0.00	0.03	0.00	0.01
	Cooper's Hawk	*Accipiter cooperii*	0.00	0.06	0.01	0.00	0.02	0.00	0.06	0.01	0.00	0.02
	Bald Eagle	*Haliaeetus leucocephalus*	0.03	0.06	0.06	0.23	0.09	0.03	0.06	0.04	0.13	0.06
	Red-tailed Hawk	*Buteo jamaicensis*	0.41	0.51	0.63	0.73	0.57	0.36	0.38	0.44	0.59	0.44
	Rough-legged Hawk	*Buteo lagopus*	0.00	0.00	0.00	0.08	0.02	0.00	0.00	0.00	0.08	0.02
		Family Subtotal:	**0.47**	**0.62**	**0.75**	**1.08**	**0.73**	**0.41**	**0.48**	**0.52**	**0.69**	**0.53**
Strigidae (Owls)	Great Horned Owl	*Bubo virginianus*	0.00	0.01	0.00	0.00	< 0.01	0.00	0.01	0.00	0.00	< 0.01
		Family Subtotal:	**0.00**	**0.01**	**0.00**	**0.00**	**< 0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**< 0.01**
Picidae (Woodpeckers)	Northern Flicker	*Colaptes auratus*	0.03	0.00	0.01	0.01	0.01	0.03	0.00	0.01	0.01	0.01
	Pileated Woodpecker	*Dryocopus pileatus*	0.00	0.00	0.01	0.00	< 0.01	0.00	0.00	0.01	0.00	< 0.01
		Family Subtotal:	**0.03**	**0.00**	**0.03**	**0.01**	**0.02**	**0.03**	**0.00**	**0.03**	**0.01**	**0.02**
Falconidae (Falcons)	American Kestrel	*Falco sparverius*	0.04	0.07	0.17	0.04	0.08	0.04	0.06	0.13	0.04	0.07
		Family Subtotal:	**0.04**	**0.07**	**0.17**	**0.04**	**0.08**	**0.04**	**0.06**	**0.13**	**0.04**	**0.07**
		Total:	**11.44**	**10.51**	**19.80**	**10.14**	**12.98**	**1.00**	**1.00**	**1.00**	**0.99**	**1.00**
		Standard Error:	**1.01**	**1.02**	**2.41**	**1.68**	**0.85**			**-**		

Table B-4. Use of each species and family observed at each point during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	# Points	Use by Point Number																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Anatidae (Ducks, Geese, & Swans)	Canada Goose	*Branta canadensis*	20	0.50	1.83		3.58	0.17	2.25	0.08	0.92		6.75	1.92	0.83	3.58	0.90		0.25	0.25	0.33	0.17	0.25	0.17		0.67	0.73
	Wood Duck	*Aix sponsa*	1					0.17																			
	Mallard	*Anas platyrhynchos*	5					0.17								0.67	0.20		0.25		0.25						
		Family Subtotal:	**20**	**0.50**	**1.83**		**3.58**	**0.50**	**2.25**	**0.08**	**0.92**		**6.75**	**1.92**	**0.83**	**4.25**	**1.10**		**0.50**	**0.25**	**0.58**	**0.17**	**0.25**	**0.17**		**0.67**	**0.73**
Phasianidae (Grouse & Allies)	Wild Turkey	*Meleagris gallopavo*	11	0.67	2.58	0.58	0.58		1.33			0.17			0.25	0.50				0.08						0.33	4.09
	Ring-necked Pheasant	*Phasianus colchicus*	7		0.17	0.17		0.33							0.08		0.20				0.08					0.17	
		Family Subtotal:	**14**	**0.67**	**2.75**	**0.75**	**0.58**	**0.33**	**1.33**			**0.17**			**0.33**	**0.50**	**0.20**			**0.08**	**0.08**					**0.50**	**4.09**
Columbidae (Pigeons & Doves)	Rock Pigeon	*Columba livia*	22	1.33	2.00	1.08	0.42	2.50	2.50	1.50	7.33	0.67	19.17	2.75	1.50	1.25	1.30	4.30	2.42	0.17	2.33	0.33	2.00	2.33		3.08	
	Mourning Dove	*Zenaida macroura*	24	2.50	4.50	1.58	3.17	7.17	3.50	8.08	4.58	1.25	4.92	4.33	10.33	6.33	2.00	3.90	8.67	3.08	3.67	3.42	4.33	5.25	4.08	7.08	6.18
		Family Subtotal:	**24**	**3.83**	**6.50**	**2.67**	**3.58**	**9.67**	**6.00**	**9.58**	**11.92**	**1.92**	**24.08**	**7.08**	**11.83**	**7.58**	**3.30**	**8.20**	**11.08**	**3.25**	**6.00**	**3.75**	**6.33**	**7.58**	**4.08**	**10.17**	**6.18**
Gruidae (Cranes)	Sandhill Crane	*Antigone canadensis*	8		0.83		1.92			0.17			3.50	0.08			0.20						0.17				0.73
		Family Subtotal:	**8**		**0.83**		**1.92**			**0.17**			**3.50**	**0.08**			**0.20**						**0.17**				**0.73**
Charadriidae (Plovers)	Killdeer	*Charadrius vociferus*	24	0.25	0.42	1.42	0.33	0.83	0.50	0.33	0.17	0.08	0.92	0.17	0.17	0.67	1.20	1.30	0.33	1.17	0.92	1.00	0.50	1.50	1.00	0.25	0.36
		Family Subtotal:	**24**	**0.25**	**0.42**	**1.42**	**0.33**	**0.83**	**0.50**	**0.33**	**0.17**	**0.08**	**0.92**	**0.17**	**0.17**	**0.67**	**1.20**	**1.30**	**0.33**	**1.17**	**0.92**	**1.00**	**0.50**	**1.50**	**1.00**	**0.25**	**0.36**
Laridae (Gulls & Allies)	Ring-billed Gull	*Larus delawarensis*	2	0.25																0.25							
	Herring Gull	*Larus argentatus*	5			0.25				0.08		0.17	0.33								0.17						
		Family Subtotal:	**7**	**0.25**		**0.25**				**0.08**		**0.17**	**0.33**							**0.25**	**0.17**						
Ardeidae (Herons & Allies)	Great Blue Heron	*Ardea herodias*	9					0.17	0.08						0.08			0.10		0.08	0.08	0.08		0.08	0.08		
	Green Heron	*Butorides virescens*	1					0.08																			
		Family Subtotal:	**9**					**0.25**	**0.08**						**0.08**			**0.10**		**0.08**	**0.08**	**0.08**		**0.08**	**0.08**		
Cathartidae (Vultures)	Turkey Vulture	*Cathartes aura*	24	1.58	0.58	0.67	1.00	0.75	0.67	1.83	2.83	2.58	2.67	2.75	0.67	2.17	5.10	1.70	2.75	0.92	5.42	1.67	2.83	3.17	1.42	1.25	2.18
		Family Subtotal:	**24**	**1.58**	**0.58**	**0.67**	**1.00**	**0.75**	**0.67**	**1.83**	**2.83**	**2.58**	**2.67**	**2.75**	**0.67**	**2.17**	**5.10**	**1.70**	**2.75**	**0.92**	**5.42**	**1.67**	**2.83**	**3.17**	**1.42**	**1.25**	**2.18**
Accipitridae (Hawks, Eagles, & Kites)	Northern Harrier	*Circus hudsonius*	4		0.08					0.08	0.08								0.08								
	Sharp-shinned Hawk	*Accipiter striatus*	4				0.08					0.08		0.08		0.08											
	Cooper's Hawk	*Accipiter cooperii*	5							0.08	0.08	0.08					0.10									0.08	
	Bald Eagle	*Haliaeetus leucocephalus*	12	0.17						0.17	0.08		0.50	0.17		0.25		0.20	0.08		0.08		0.08	0.33		0.08	
	Red-tailed Hawk	*Buteo jamaicensis*	24	0.67	0.25	0.50	0.42	0.58	0.50	0.58	0.75	0.67	0.58	0.42	0.33	0.67	0.30	0.20	0.58	0.83	0.58	0.92	0.58	0.83	0.50	0.67	0.73
	Rough-legged Hawk	*Buteo lagopus*	6	0.08					0.08										0.08			0.08	0.08				0.09
		Family Subtotal:	**24**	**0.92**	**0.33**	**0.50**	**0.50**	**0.58**	**0.58**	**0.92**	**1.00**	**0.83**	**1.08**	**0.67**	**0.33**	**1.00**	**0.40**	**0.40**	**0.83**	**0.83**	**0.67**	**1.00**	**0.75**	**1.17**	**0.50**	**0.83**	**0.82**
Strigidae (Owls)	Great Horned Owl	*Bubo virginianus*	1				0.08																				
		Family Subtotal:	**1**				**0.08**																				
Picidae (Woodpeckers)	Northern Flicker	*Colaptes auratus*	4					0.08									0.10			0.08		0.08					
	Pileated Woodpecker	*Dryocopus pileatus*	1															0.10									
		Family Subtotal:	**5**					**0.08**									**0.10**	**0.10**		**0.08**		**0.08**					
Falconidae (Falcons)	American Kestrel	*Falco sparverius*	12					0.08	0.17	0.08		0.17	0.08		0.17	0.33		0.10				0.17	0.17	0.25			0.18
		Family Subtotal:	**12**					**0.08**	**0.17**	**0.08**		**0.17**	**0.08**		**0.17**	**0.33**		**0.10**				**0.17**	**0.17**	**0.25**			**0.18**
		Total:		**8.00**	**13.25**	**6.25**	**11.58**	**13.08**	**11.58**	**13.08**	**16.83**	**5.92**	**39.42**	**12.67**	**14.42**	**16.50**	**11.60**	**11.90**	**15.50**	**6.92**	**13.92**	**7.92**	**11.00**	**13.92**	**7.08**	**13.67**	**15.27**
		Standard Error:		**1.31**	**2.41**	**1.67**	**4.65**	**3.46**	**4.52**	**3.06**	**5.05**	**1.40**	**9.77**	**3.23**	**2.98**	**4.62**	**3.27**	**2.79**	**5.89**	**1.71**	**3.05**	**1.64**	**2.38**	**4.00**	**1.88**	**3.01**	**4.14**
		Species Diversity:		**10**	**10**	**8**	**10**	**13**	**10**	**12**	**9**	**10**	**10**	**9**	**10**	**11**	**11**	**9**	**10**	**10**	**11**	**10**	**10**	**9**	**5**	**10**	**9**
		Family Diversity:		**7**	**7**	**6**	**8**	**9**	**8**	**8**	**5**	**7**	**8**	**6**	**8**	**7**	**8**	**7**	**5**	**9**	**8**	**8**	**7**	**7**	**5**	**6**	**8**

Table B-5. Frequency of occurrence of each species and family observed at each point during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	Frequency by Point Number																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Anatidae (Ducks, Geese, & Swans)	Canada Goose	*Branta canadensis*	0.17	0.25		0.17	0.08	0.17	0.08	0.17		0.33	0.17	0.17	0.33	0.10		0.08	0.08	0.17	0.08	0.08	0.08		0.25	0.09
	Wood Duck	*Aix sponsa*					0.08																			
	Mallard	*Anas platyrhynchos*					0.08								0.08	0.10		0.08		0.08						
		Family Subtotal:	**0.17**	**0.25**		**0.17**	**0.25**	**0.17**	**0.08**	**0.17**		**0.33**	**0.17**	**0.17**	**0.33**	**0.20**		**0.17**	**0.08**	**0.17**	**0.08**	**0.08**	**0.08**		**0.25**	**0.09**
Phasianidae (Grouse & Allies)	Wild Turkey	*Meleagris gallopavo*	0.17	0.33	0.25	0.08		0.25			0.08			0.08	0.17				0.08						0.17	0.18
	Ring-necked Pheasant	*Phasianus colchicus*		0.08	0.08		0.08							0.08		0.20				0.08					0.08	
		Family Subtotal:	**0.17**	**0.42**	**0.33**	**0.08**	**0.08**	**0.25**			**0.08**			**0.17**	**0.17**	**0.20**			**0.08**	**0.08**					**0.17**	**0.18**
Columbidae (Pigeons & Doves)	Rock Pigeon	*Columba livia*	0.25	0.25	0.25	0.08	0.25	0.33	0.42	0.67	0.08	0.58	0.50	0.33	0.08	0.20	0.70	0.58	0.08	0.50	0.08	0.42	0.50		0.33	
	Mourning Dove	*Zenaida macroura*	0.75	0.75	0.58	0.58	0.75	0.58	0.67	0.58	0.67	0.83	0.67	0.83	0.92	0.60	0.70	0.92	0.67	0.83	0.75	0.83	0.33	0.83	0.75	0.91
		Family Subtotal:	**0.83**	**0.75**	**0.75**	**0.67**	**0.83**	**0.75**	**0.92**	**0.92**	**0.75**	**1.00**	**0.92**	**0.92**	**0.92**	**0.60**	**1.00**	**1.00**	**0.67**	**0.83**	**0.75**	**1.00**	**0.75**	**0.83**	**0.83**	**0.91**
Gruidae (Cranes)	Sandhill Crane	*Antigone canadensis*		0.17		0.08			0.08			0.08	0.08			0.10						0.08				0.18
		Family Subtotal:		**0.17**		**0.08**			**0.08**			**0.08**	**0.08**			**0.10**						**0.08**				**0.18**
Charadriidae (Plovers)	Killdeer	*Charadrius vociferus*	0.17	0.25	0.33	0.08	0.25	0.25	0.25	0.17	0.08	0.42	0.17	0.17	0.17	0.60	0.30	0.25	0.42	0.33	0.42	0.33	0.58	0.42	0.25	0.27
		Family Subtotal:	**0.17**	**0.25**	**0.33**	**0.08**	**0.25**	**0.25**	**0.25**	**0.17**	**0.08**	**0.42**	**0.17**	**0.17**	**0.17**	**0.60**	**0.30**	**0.25**	**0.42**	**0.33**	**0.42**	**0.33**	**0.58**	**0.42**	**0.25**	**0.27**
Laridae (Gulls & Allies)	Ring-billed Gull	*Larus delawarensis*	0.08																0.08							
	Herring Gull	*Larus argentatus*			0.08				0.08		0.08	0.08								0.08						
		Family Subtotal:	**0.08**		**0.08**				**0.08**		**0.08**	**0.08**							**0.08**	**0.08**						
Ardeidae (Herons & Allies)	Great Blue Heron	*Ardea herodias*					0.17	0.08						0.08			0.10		0.08	0.08	0.08		0.08	0.08		
	Green Heron	*Butorides virescens*					0.08																			
		Family Subtotal:					**0.25**	**0.08**						**0.08**			**0.10**		**0.08**	**0.08**	**0.08**		**0.08**	**0.08**		
Cathartidae (Vultures)	Turkey Vulture	*Cathartes aura*	0.42	0.17	0.17	0.25	0.33	0.25	0.33	0.42	0.58	0.58	0.58	0.25	0.42	0.20	0.50	0.42	0.42	0.58	0.58	0.58	0.67	0.58	0.42	0.55
		Family Subtotal:	**0.42**	**0.17**	**0.17**	**0.25**	**0.33**	**0.25**	**0.33**	**0.42**	**0.58**	**0.58**	**0.58**	**0.25**	**0.42**	**0.20**	**0.50**	**0.42**	**0.42**	**0.58**	**0.58**	**0.58**	**0.67**	**0.58**	**0.42**	**0.55**
Accipitridae (Hawks, Eagles, & Kites)	Northern Harrier	*Circus hudsonius*		0.08					0.08	0.08								0.08								
	Sharp-shinned Hawk	*Accipiter striatus*				0.08					0.08		0.08		0.08											
	Cooper's Hawk	*Accipiter cooperii*							0.08	0.08	0.08					0.10									0.08	
	Bald Eagle	*Haliaeetus leucocephalus*	0.08						0.17	0.08		0.08	0.17		0.17		0.20	0.08		0.08		0.08	0.25		0.08	
	Red-tailed Hawk	*Buteo jamaicensis*	0.42	0.25	0.50	0.33	0.58	0.42	0.58	0.58	0.50	0.50	0.25	0.33	0.25	0.30	0.20	0.58	0.58	0.42	0.75	0.42	0.42	0.42	0.42	0.55
	Rough-legged Hawk	*Buteo lagopus*	0.08					0.08										0.08			0.08	0.08				0.09
		Family Subtotal:	**0.50**	**0.33**	**0.50**	**0.42**	**0.58**	**0.42**	**0.75**	**0.75**	**0.67**	**0.50**	**0.50**	**0.33**	**0.42**	**0.40**	**0.30**	**0.75**	**0.58**	**0.50**	**0.83**	**0.50**	**0.58**	**0.42**	**0.50**	**0.55**
Strigidae (Owls)	Great Horned Owl	*Bubo virginianus*				0.08																				
		Family Subtotal:				**0.08**																				
Picidae (Woodpeckers)	Northern Flicker	*Colaptes auratus*					0.08									0.10			0.08		0.08					
	Pileated Woodpecker	*Dryocopus pileatus*															0.10									
		Family Subtotal:					**0.08**									**0.10**	**0.10**		**0.08**		**0.08**					
Falconidae (Falcons)	American Kestrel	*Falco sparverius*					0.08	0.17	0.08		0.17	0.08		0.17	0.08		0.10				0.17	0.08	0.25			0.18
		Family Subtotal:					**0.08**	**0.17**	**0.08**		**0.17**	**0.08**		**0.17**	**0.08**		**0.10**				**0.17**	**0.08**	**0.25**			**0.18**

Table B-6. Flight height characteristics of each species and family observed during the large bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	# Groups Flying	# Obs Flying	Flying Use	% Obs Flying	# (%) within Flight Height Categories			Use in RSZ	Frequency in RSZ
							< 35 m (115 ft)	RSZ: 35 - 200 m (115 - 656 ft)	> 200 m (656 ft)		
Anatidae (Ducks, Geese, & Swans)	Canada Goose	*Branta canadensis*	41	219	0.77	70.4	162 (74.0)	57 (26.0)	0 (0.0)	0.20	0.03
	Wood Duck	*Aix sponsa*	1	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
	Mallard	*Anas platyrhynchos*	4	16	0.06	88.9	16 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**46**	**237**	**0.84**	**71.6**	**180 (75.9)**	**57 (24.1)**	**0 (0.0)**	**0.20**	**0.03**
Phasianidae (Grouse & Allies)	Wild Turkey	*Meleagris gallopavo*	1	1	< 0.01	0.8	1 (100.0)	0 (0.0)	0 (0.0)		
	Ring-necked Pheasant	*Phasianus colchicus*	0	0	0.00	0.0	0 (-)	0 (-)	0 (-)		
		Family Subtotal:	**1**	**1**	**< 0.01**	**0.7**	**1 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Columbidae (Pigeons & Doves)	Rock Pigeon	*Columba livia*	84	448	1.58	60.9	448 (100.0)	0 (0.0)	0 (0.0)		
	Mourning Dove	*Zenaida macroura*	287	681	2.41	50.5	673 (98.8)	8 (1.2)	0 (0.0)	0.03	0.01
		Family Subtotal:	**371**	**1129**	**3.99**	**54.1**	**1121 (99.3)**	**8 (0.7)**	**0 (0.0)**	**0.03**	**0.01**
Gruidae (Cranes)	Sandhill Crane	*Antigone canadensis*	8	81	0.29	90.0	39 (48.1)	42 (51.9)	0 (0.0)	0.15	< 0.01
		Family Subtotal:	**8**	**81**	**0.29**	**90.0**	**39 (48.1)**	**42 (51.9)**	**0 (0.0)**	**0.15**	**< 0.01**
Charadriidae (Plovers)	Killdeer	*Charadrius vociferus*	102	137	0.48	74.5	134 (97.8)	2 (1.5)	1 (0.7)	0.01	< 0.01
		Family Subtotal:	**102**	**137**	**0.48**	**74.5**	**134 (97.8)**	**2 (1.5)**	**1 (0.7)**	**0.01**	**< 0.01**
Laridae (Gulls & Allies)	Ring-billed Gull	*Larus delawarensis*	2	6	0.02	100.0	6 (100.0)	0 (0.0)	0 (0.0)		
	Herring Gull	*Larus argentatus*	7	12	0.04	100.0	10 (83.3)	2 (16.7)	0 (0.0)	0.01	< 0.01
		Family Subtotal:	**9**	**18**	**0.06**	**100.0**	**16 (88.9)**	**2 (11.1)**	**0 (0.0)**	**0.01**	**< 0.01**
Ardeidae (Herons & Allies)	Great Blue Heron	*Ardea herodias*	10	10	0.04	100.0	9 (90.0)	1 (10.0)	0 (0.0)	< 0.01	< 0.01
	Green Heron	*Butorides virescens*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**11**	**11**	**0.04**	**100.0**	**10 (90.9)**	**1 (9.1)**	**0 (0.0)**	**< 0.01**	**< 0.01**
Cathartidae (Vultures)	Turkey Vulture	*Cathartes aura*	332	554	1.96	96.5	187 (33.8)	389 (70.2)	26 (4.7)	1.37	0.34
		Family Subtotal:	**332**	**554**	**1.96**	**96.5**	**187 (33.8)**	**389 (70.2)**	**26 (4.7)**	**1.37**	**0.34**
Accipitridae (Hawks, Eagles, & Kites)	Northern Harrier	*Circus hudsonius*	4	4	0.01	100.0	4 (100.0)	0 (0.0)	0 (0.0)		
	Sharp-shinned Hawk	*Accipiter striatus*	4	4	0.01	100.0	2 (50.0)	2 (50.0)	0 (0.0)	0.01	0.01
	Cooper's Hawk	*Accipiter cooperii*	4	4	0.01	80.0	1 (25.0)	3 (75.0)	0 (0.0)	0.01	0.01
	Bald Eagle	*Haliaeetus leucocephalus*	16	17	0.06	65.4	10 (58.8)	12 (70.6)	0 (0.0)	0.04	0.04
	Red-tailed Hawk	*Buteo jamaicensis*	104	107	0.38	66.0	74 (69.2)	33 (30.8)	2 (1.9)	0.12	0.10
	Rough-legged Hawk	*Buteo lagopus*	4	4	0.01	66.7	4 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**136**	**140**	**0.49**	**67.6**	**95 (67.9)**	**50 (35.7)**	**2 (1.4)**	**0.18**	**0.15**
Strigidae (Owls)	Great Horned Owl	*Bubo virginianus*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**1**	**1**	**< 0.01**	**100.0**	**1 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Picidae (Woodpeckers)	Northern Flicker	*Colaptes auratus*	4	4	0.01	100.0	4 (100.0)	0 (0.0)	0 (0.0)		
	Pileated Woodpecker	*Dryocopus pileatus*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**5**	**5**	**0.02**	**100.0**	**5 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Falconidae (Falcons)	American Kestrel	*Falco sparverius*	20	20	0.07	87.0	20 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**20**	**20**	**0.07**	**87.0**	**20 (100.0)**	**0 (0.0)**	**0 (0.0)**		
		Total	**1042**	**2334**	**8.25**	**63.5**	**1809 (77.5)**	**551 (23.6)**	**29 (1.2)**	**1.95**	**0.44**

Attachment C. Data tables of small birds from the large and small bird use study in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022.

Table C-1. Group counts, observation counts, and relative abundance, by season, for each species and family observed during the small bird use surveys in the Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	Spring: Mar–May			Summer: Jun–Aug			Fall: Sep–Nov			Winter: Dec–Feb			All Seasons		
			# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)	# Groups	# Obs	Rel. Abund. (%)
Picidae (Woodpeckers)	Red-bellied Woodpecker	*Melanerpes carolinus*	0	0	0.0	1	1	0.1	2	2	0.1	2	2	0.1	5	5	0.1
	Downy Woodpecker	*Dryobates pubescens*	2	2	0.2	4	4	0.4	4	4	0.1	5	5	0.4	15	15	0.2
	Hairy Woodpecker	*Dryobates villosus*	0	0	0.0	0	0	0.0	5	5	0.2	1	1	0.1	6	6	0.1
	Family Subtotal:		**2**	**2**	**0.2**	**5**	**5**	**0.5**	**11**	**11**	**0.3**	**8**	**8**	**0.6**	**26**	**26**	**0.4**
Tyrannidae (Flycatchers)	Eastern Kingbird	*Tyrannus tyrannus*	0	0	0.0	7	8	0.7	0	0	0.0	0	0	0.0	7	8	0.1
	Eastern Wood-Pewee	*Contopus virens*	0	0	0.0	0	0	0.0	1	3	0.1	0	0	0.0	1	3	< 0.1
	Family Subtotal:		**0**	**0**	**0.0**	**7**	**8**	**0.7**	**1**	**3**	**0.1**	**0**	**0**	**0.0**	**8**	**11**	**0.2**
Vireonidae (Vireos)	Red-eyed Vireo	*Vireo olivaceus*	0	0	0.0	1	1	0.1	0	0	0.0	0	0	0.0	1	1	< 0.1
	Family Subtotal:		**0**	**0**	**0.0**	**1**	**1**	**0.1**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**1**	**1**	**< 0.1**
Laniidae (Shrikes)	Northern Shrike	*Lanius borealis*	0	0	0.0	0	0	0.0	0	0	0.0	1	1	0.1	1	1	< 0.1
	Family Subtotal:		**0**	**0**	**0.0**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**1**	**1**	**0.1**	**1**	**1**	**< 0.1**
Corvidae (Crows & Allies)	Blue Jay	*Cyanocitta cristata*	10	11	0.9	6	6	0.6	41	46	1.4	22	30	2.2	79	93	1.3
	Family Subtotal:		**10**	**11**	**0.9**	**6**	**6**	**0.6**	**41**	**46**	**1.4**	**22**	**30**	**2.2**	**79**	**93**	**1.3**
Paridae (Chickadees & Titmice)	Black-capped Chickadee	*Poecile atricapillus*	1	2	0.2	0	0	0.0	2	4	0.1	1	2	0.1	4	8	0.1
	Family Subtotal:		**1**	**2**	**0.2**	**0**	**0**	**0.0**	**2**	**4**	**0.1**	**1**	**2**	**0.1**	**4**	**8**	**0.1**
Alaudidae (Larks)	Horned Lark	*Eremophila alpestris*	34	53	4.4	22	28	2.6	52	108	3.3	37	76	5.5	145	265	3.8
	Family Subtotal:		**34**	**53**	**4.4**	**22**	**28**	**2.6**	**52**	**108**	**3.3**	**37**	**76**	**5.5**	**145**	**265**	**3.8**
Hirundinidae (Swallows)	Tree Swallow	*Tachycineta bicolor*	3	4	0.3	4	10	0.9	2	3	0.1	0	0	0.0	9	17	0.2
	Barn Swallow	*Hirundo rustica*	30	50	4.2	114	177	16.5	2	11	0.3	0	0	0.0	146	238	3.4
	Family Subtotal:		**33**	**54**	**4.5**	**118**	**187**	**17.5**	**4**	**14**	**0.4**	**0**	**0**	**0.0**	**155**	**255**	**3.7**
Regulidae (Kinglets)	Golden-crowned Kinglet	*Regulus satrapa*	0	0	0.0	0	0	0.0	4	12	0.4	0	0	0.0	4	12	0.2
	Ruby-crowned Kinglet	*Corthylio calendula*	0	0	0.0	0	0	0.0	1	3	0.1	0	0	0.0	1	3	< 0.1
	Family Subtotal:		**0**	**0**	**0.0**	**0**	**0**	**0.0**	**5**	**15**	**0.5**	**0**	**0**	**0.0**	**5**	**15**	**0.2**
Sittidae (Nuthatches)	White-breasted Nuthatch	*Sitta carolinensis*	0	0	0.0	0	0	0.0	0	0	0.0	2	2	0.1	2	2	< 0.1
	Family Subtotal:		**0**	**0**	**0.0**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**2**	**2**	**0.1**	**2**	**2**	**< 0.1**
Mimidae (Thrashers & Allies)	Brown Thrasher	*Toxostoma rufum*	1	1	0.1	2	2	0.2	0	0	0.0	0	0	0.0	3	3	< 0.1
	Family Subtotal:		**1**	**1**	**0.1**	**2**	**2**	**0.2**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**3**	**3**	**< 0.1**
Sturnidae (Starlings)	European Starling	*Sturnus vulgaris*	39	484	40.6	0	0	0.0	105	2772	85.3	45	1068	77.1	189	4324	62.7
	Family Subtotal:		**39**	**484**	**40.6**	**0**	**0**	**0.0**	**105**	**2772**	**85.3**	**45**	**1068**	**77.1**	**189**	**4324**	**62.7**
Turdidae (Thrushes)	Eastern Bluebird	*Sialia sialis*	0	0	0.0	0	0	0.0	1	4	0.1	0	0	0.0	1	4	0.1
	American Robin	*Turdus migratorius*	126	214	17.9	100	123	11.5	12	25	0.8	0	0	0.0	238	362	5.2
	Family Subtotal:		**126**	**214**	**17.9**	**100**	**123**	**11.5**	**13**	**29**	**0.9**	**0**	**0**	**0.0**	**239**	**366**	**5.3**
Passeridae (Old World Sparrows)	House Sparrow	*Passer domesticus*	0	0	0.0	1	1	0.1	7	31	1.0	1	4	0.3	9	36	0.5
	Family Subtotal:		**0**	**0**	**0.0**	**1**	**1**	**0.1**	**7**	**31**	**1.0**	**1**	**4**	**0.3**	**9**	**36**	**0.5**
Fringillidae (Finches)	House Finch	*Haemorhous mexicanus*	2	3	0.3	0	0	0.0	0	0	0.0	0	0	0.0	2	3	< 0.1
	American Goldfinch	*Spinus tristis*	5	8	0.7	28	38	3.6	10	18	0.6	0	0	0.0	43	64	0.9
	Family Subtotal:		**7**	**11**	**0.9**	**28**	**38**	**3.6**	**10**	**18**	**0.6**	**0**	**0**	**0.0**	**45**	**67**	**1.0**
Calcariidae (Longspurs & Allies)	Snow Bunting	*Plectrophenax nivalis*	0	0	0.0	0	0	0.0	2	16	0.5	1	19	1.4	3	35	0.5
	Family Subtotal:		**0**	**0**	**0.0**	**0**	**0**	**0.0**	**2**	**16**	**0.5**	**1**	**19**	**1.4**	**3**	**35**	**0.5**
Passerellidae (Sparrows & Allies)	Grasshopper Sparrow	*Ammodramus savannarum*	0	0	0.0	0	0	0.0	1	2	0.1	0	0	0.0	1	2	< 0.1
	Chipping Sparrow	*Spizella passerina*	1	1	0.1	0	0	0.0	0	0	0.0	0	0	0.0	1	1	< 0.1
	Field Sparrow	*Spizella pusilla*	11	18	1.5	19	24	2.2	7	13	0.4	0	0	0.0	37	55	0.8
	American Tree Sparrow	*Spizelloides arborea*	0	0	0.0	0	0	0.0	4	12	0.4	45	93	6.7	49	105	1.5
	Dark-eyed Junco	*Junco hyemalis*	0	0	0.0	0	0	0.0	10	25	0.8	22	78	5.6	32	103	1.5
	White-crowned Sparrow	*Zonotrichia leucophrys*	0	0	0.0	0	0	0.0	2	4	0.1	0	0	0.0	2	4	0.1
	Savannah Sparrow	*Passerculus sandwichensis*	0	0	0.0	2	2	0.2	0	0	0.0	0	0	0.0	2	2	< 0.1
	Song Sparrow	*Melospiza melodia*	0	0	0.0	3	3	0.3	0	0	0.0	0	0	0.0	3	3	< 0.1
	Family Subtotal:		**12**	**19**	**1.6**	**24**	**29**	**2.7**	**24**	**56**	**1.7**	**67**	**171**	**12.3**	**127**	**275**	**4.0**
Icteridae (Blackbirds & Allies)	Eastern Meadowlark	*Sturnella magna*	0	0	0.0	2	2	0.2	0	0	0.0	0	0	0.0	2	2	< 0.1
	Baltimore Oriole	*Icterus galbula*	1	2	0.2	0	0	0.0	0	0	0.0	0	0	0.0	1	2	< 0.1
	Red-winged Blackbird	*Agelaius phoeniceus*	136	206	17.3	171	596	55.7	20	105	3.2	0	0	0.0	327	907	13.1
	Brown-headed Cowbird	*Molothrus ater*	22	72	6.0	9	25	2.3	1	6	0.2	0	0	0.0	32	103	1.5
	Common Grackle	*Quiscalus quiscula*	17	46	3.9	4	12	1.1	1	8	0.2	0	0	0.0	22	66	1.0
	Family Subtotal:		**176**	**326**	**27.3**	**186**	**635**	**59.3**	**22**	**119**	**3.7**	**0**	**0**	**0.0**	**384**	**1080**	**15.7**
Parulidae (Wood-Warblers)	Cape May Warbler	*Setophaga tigrina*	0	0	0.0	0	0	0.0	1	4	0.1	0	0	0.0	1	4	0.1
	Yellow Warbler	*Setophaga petechia*	1	1	0.1	0	0	0.0	0	0	0.0	0	0	0.0	1	1	< 0.1
	Unidentified Warbler	-	0	0	0.0	0	0	0.0	1	2	0.1	0	0	0.0	1	2	< 0.1
	Family Subtotal:		**1**	**1**	**0.1**	**0**	**0**	**0.0**	**2**	**6**	**0.2**	**0**	**0**	**0.0**	**3**	**7**	**0.1**
Cardinalidae (Cardinals & Allies)	Scarlet Tanager	*Piranga olivacea*	1	1	0.1	0	0	0.0	0	0	0.0	0	0	0.0	1	1	< 0.1
	Northern Cardinal	*Cardinalis cardinalis*	10	12	1.0	5	5	0.5	2	2	0.1	5	5	0.4	22	24	0.3
	Indigo Bunting	*Passerina cyanea*	1	2	0.2	1	1	0.1	0	0	0.0	0	0	0.0	2	3	< 0.1
	Dickcissel	*Spiza americana*	0	0	0.0	1	1	0.1	0	0	0.0	0	0	0.0	1	1	< 0.1
	Family Subtotal:		**12**	**15**	**1.3**	**7**	**7**	**0.7**	**2**	**2**	**0.1**	**5**	**5**	**0.4**	**26**	**29**	**0.4**
	Total:		**454**	**1193**	**100.0**	**507**	**1070**	**100.0**	**303**	**3250**	**100.0**	**190**	**1386**	**100.0**	**1454**	**6899**	**100.0**
	Species Diversity:			**21**			**22**			**27**			**14**			**42**	

Table B-2. Complete list of small bird species observed in the Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Common Name	Scientific Name	Family	Incidental Observations Only
Red-bellied Woodpecker	*Melanerpes carolinus*	Picidae	
Downy Woodpecker	*Dryobates pubescens*		
Hairy Woodpecker	*Dryobates villosus*		
Eastern Kingbird	*Tyrannus tyrannus*	Tyrannidae	
Eastern Wood-Pewee	*Contopus virens*		
Red-eyed Vireo	*Vireo olivaceus*	Vireonidae	
Northern Shrike	*Lanius borealis*	Laniidae	
Blue Jay	*Cyanocitta cristata*	Corvidae	
American Crow	*Corvus brachyrhynchos*		*
Black-capped Chickadee	*Poecile atricapillus*	Paridae	
Horned Lark	*Eremophila alpestris*	Alaudidae	
Tree Swallow	*Tachycineta bicolor*	Hirundinidae	
Barn Swallow	*Hirundo rustica*		
Golden-crowned Kinglet	*Regulus satrapa*	Regulidae	
Ruby-crowned Kinglet	*Corthylio calendula*		
White-breasted Nuthatch	*Sitta carolinensis*	Sittidae	
Brown Thrasher	*Toxostoma rufum*	Mimidae	
European Starling	*Sturnus vulgaris*	Sturnidae	
Eastern Bluebird	*Sialia sialis*	Turdidae	
American Robin	*Turdus migratorius*		
House Sparrow	*Passer domesticus*	Passeridae	
House Finch	*Haemorhous mexicanus*	Fringillidae	
American Goldfinch	*Spinus tristis*		
Snow Bunting	*Plectrophenax nivalis*	Calcariidae	
Grasshopper Sparrow	*Ammodramus savannarum*	Passerellidae	
Chipping Sparrow	*Spizella passerina*		
Field Sparrow	*Spizella pusilla*		
American Tree Sparrow	*Spizelloides arborea*		
Dark-eyed Junco	*Junco hyemalis*		
White-crowned Sparrow	*Zonotrichia leucophrys*		
Savannah Sparrow	*Passerculus sandwichensis*		
Song Sparrow	*Melospiza melodia*		
Eastern Meadowlark	*Sturnella magna*	Icteridae	
Baltimore Oriole	*Icterus galbula*		
Red-winged Blackbird	*Agelaius phoeniceus*		
Brown-headed Cowbird	*Molothrus ater*		
Common Grackle	*Quiscalus quiscula*		
Cape May Warbler	*Setophaga tigrina*	Parulidae	
Yellow Warbler	*Setophaga petechia*		
Scarlet Tanager	*Piranga olivacea*	Cardinalidae	
Northern Cardinal	*Cardinalis cardinalis*		
Indigo Bunting	*Passerina cyanea*		
Dickcissel	*Spiza americana*		

Table C-3. Use and frequency of occurrence, by season, for each species and family observed during the small bird use surveys in the Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	Use (observations/plot/survey)					Frequency				
			Spring	Summer	Fall	Winter	Total	Spring	Summer	Fall	Winter	Total
Picidae (Woodpeckers)	Red-bellied Woodpecker	*Melanerpes carolinus*	0.00	0.01	0.03	0.03	0.02	0.00	0.01	0.03	0.01	0.01
	Downy Woodpecker	*Dryobates pubescens*	0.03	0.06	0.06	0.07	0.05	0.03	0.06	0.06	0.07	0.05
	Hairy Woodpecker	*Dryobates villosus*	0.00	0.00	0.07	0.01	0.02	0.00	0.00	0.07	0.01	0.02
		Family Subtotal:	**0.03**	**0.07**	**0.15**	**0.11**	**0.09**	**0.03**	**0.07**	**0.15**	**0.08**	**0.08**
Tyrannidae (Flycatchers)	Eastern Kingbird	*Tyrannus tyrannus*	0.00	0.11	0.00	0.00	0.03	0.00	0.08	0.00	0.00	0.02
	Eastern Wood-Pewee	*Contopus virens*	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.01	0.00	< 0.01
		Family Subtotal:	**0.00**	**0.11**	**0.04**	**0.00**	**0.04**	**0.00**	**0.08**	**0.01**	**0.00**	**0.02**
Vireonidae (Vireos)	Red-eyed Vireo	*Vireo olivaceus*	0.00	0.01	0.00	0.00	< 0.01	0.00	0.01	0.00	0.00	< 0.01
		Family Subtotal:	**0.00**	**0.01**	**0.00**	**0.00**	**< 0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**< 0.01**
Laniidae (Shrikes)	Northern Shrike	*Lanius borealis*	0.00	0.00	0.00	0.01	< 0.01	0.00	0.00	0.00	0.01	< 0.01
		Family Subtotal:	**0.00**	**0.00**	**0.00**	**0.01**	**< 0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**< 0.01**
Corvidae (Crows & Allies)	Blue Jay	*Cyanocitta cristata*	0.16	0.08	0.64	0.42	0.33	0.14	0.07	0.46	0.28	0.24
		Family Subtotal:	**0.16**	**0.08**	**0.64**	**0.42**	**0.33**	**0.14**	**0.07**	**0.46**	**0.28**	**0.24**
Paridae (Chickadees & Titmice)	Black-capped Chickadee	*Poecile atricapillus*	0.03	0.00	0.06	0.03	0.03	0.01	0.00	0.03	0.01	0.01
		Family Subtotal:	**0.03**	**0.00**	**0.06**	**0.03**	**0.03**	**0.01**	**0.00**	**0.03**	**0.01**	**0.01**
Alaudidae (Larks)	Horned Lark	*Eremophila alpestris*	0.76	0.39	1.50	1.06	0.93	0.34	0.25	0.58	0.31	0.37
		Family Subtotal:	**0.76**	**0.39**	**1.50**	**1.06**	**0.93**	**0.34**	**0.25**	**0.58**	**0.31**	**0.37**
Hirundinidae (Swallows)	Tree Swallow	*Tachycineta bicolor*	0.06	0.14	0.04	0.00	0.06	0.04	0.06	0.01	0.00	0.03
	Barn Swallow	*Hirundo rustica*	0.71	2.46	0.15	0.00	0.83	0.21	0.64	0.03	0.00	0.22
		Family Subtotal:	**0.77**	**2.60**	**0.19**	**0.00**	**0.89**	**0.23**	**0.67**	**0.04**	**0.00**	**0.23**
Regulidae (Kinglets)	Golden-crowned Kinglet	*Regulus satrapa*	0.00	0.00	0.17	0.00	0.04	0.00	0.00	0.06	0.00	0.01
	Ruby-crowned Kinglet	*Corthylio calendula*	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.01	0.00	< 0.01
		Family Subtotal:	**0.00**	**0.00**	**0.21**	**0.00**	**0.05**	**0.00**	**0.00**	**0.06**	**0.00**	**0.01**
Sittidae (Nuthatches)	White-breasted Nuthatch	*Sitta carolinensis*	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.03	0.01
		Family Subtotal:	**0.00**	**0.00**	**0.00**	**0.03**	**0.01**	**0.00**	**0.00**	**0.00**	**0.03**	**0.01**
Mimidae (Thrashers & Allies)	Brown Thrasher	*Toxostoma rufum*	0.01	0.03	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.01
		Family Subtotal:	**0.01**	**0.03**	**0.00**	**0.00**	**0.01**	**0.01**	**0.03**	**0.00**	**0.00**	**0.01**
Sturnidae (Starlings)	European Starling	*Sturnus vulgaris*	6.91	0.00	38.50	14.83	15.12	0.41	0.00	0.61	0.38	0.35
		Family Subtotal:	**6.91**	**0.00**	**38.50**	**14.83**	**15.12**	**0.41**	**0.00**	**0.61**	**0.38**	**0.35**
Turdidae (Thrushes)	Eastern Bluebird	*Sialia sialis*	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.01	0.00	< 0.01
	American Robin	*Turdus migratorius*	3.06	1.71	0.35	0.00	1.27	0.90	0.78	0.11	0.00	0.44
		Family Subtotal:	**3.06**	**1.71**	**0.40**	**0.00**	**1.28**	**0.90**	**0.78**	**0.13**	**0.00**	**0.45**
Passeridae (Old World Sparrows)	House Sparrow	*Passer domesticus*	0.00	0.01	0.43	0.06	0.13	0.00	0.01	0.08	0.01	0.03
		Family Subtotal:	**0.00**	**0.01**	**0.43**	**0.06**	**0.13**	**0.00**	**0.01**	**0.08**	**0.01**	**0.03**
Fringillidae (Finches)	House Finch	*Haemorhous mexicanus*	0.04	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01
	American Goldfinch	*Spinus tristis*	0.11	0.53	0.25	0.00	0.22	0.07	0.29	0.14	0.00	0.13
		Family Subtotal:	**0.16**	**0.53**	**0.25**	**0.00**	**0.23**	**0.09**	**0.29**	**0.14**	**0.00**	**0.13**
Calcariidae (Longspurs & Allies)	Snow Bunting	*Plectrophenax nivalis*	0.00	0.00	0.22	0.26	0.12	0.00	0.00	0.03	0.01	0.01
		Family Subtotal:	**0.00**	**0.00**	**0.22**	**0.26**	**0.12**	**0.00**	**0.00**	**0.03**	**0.01**	**0.01**
Passerellidae (Sparrows & Allies)	Grasshopper Sparrow	*Ammodramus savannarum*	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.00	< 0.01
	Chipping Sparrow	*Spizella passerina*	0.01	0.00	0.00	0.00	< 0.01	0.01	0.00	0.00	0.00	< 0.01
	Field Sparrow	*Spizella pusilla*	0.26	0.33	0.18	0.00	0.19	0.14	0.26	0.08	0.00	0.12
	American Tree Sparrow	*Spizelloides arborea*	0.00	0.00	0.17	1.29	0.37	0.00	0.00	0.06	0.47	0.13
	Dark-eyed Junco	*Junco hyemalis*	0.00	0.00	0.35	1.08	0.36	0.00	0.00	0.11	0.25	0.09
	White-crowned Sparrow	*Zonotrichia leucophrys*	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.03	0.00	0.01
	Savannah Sparrow	*Passerculus sandwichensis*	0.00	0.03	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.01
	Song Sparrow	*Melospiza melodia*	0.00	0.04	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.01
		Family Subtotal:	**0.27**	**0.40**	**0.78**	**2.38**	**0.96**	**0.16**	**0.33**	**0.26**	**0.60**	**0.34**
Icteridae (Blackbirds & Allies)	Eastern Meadowlark	*Sturnella magna*	0.00	0.03	0.00	0.00	0.01	0.00	0.01	0.00	0.00	< 0.01
	Baltimore Oriole	*Icterus galbula*	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	< 0.01
	Red-winged Blackbird	*Agelaius phoeniceus*	2.94	8.28	1.46	0.00	3.17	0.69	0.89	0.17	0.00	0.43
	Brown-headed Cowbird	*Molothrus ater*	1.03	0.35	0.08	0.00	0.36	0.23	0.10	0.01	0.00	0.08
	Common Grackle	*Quiscalus quiscula*	0.66	0.17	0.11	0.00	0.23	0.23	0.04	0.01	0.00	0.07
		Family Subtotal:	**4.66**	**8.82**	**1.65**	**0.00**	**3.78**	**0.74**	**0.89**	**0.19**	**0.00**	**0.45**
Parulidae (Wood-Warblers)	Cape May Warbler	*Setophaga tigrina*	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.01	0.00	< 0.01
	Yellow Warbler	*Setophaga petechia*	0.01	0.00	0.00	0.00	< 0.01	0.01	0.00	0.00	0.00	< 0.01
	Unidentified Warbler	-	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.00	< 0.01
		Family Subtotal:	**0.01**	**0.00**	**0.08**	**0.00**	**0.02**	**0.01**	**0.00**	**0.03**	**0.00**	**0.01**
Cardinalidae (Cardinals & Allies)	Scarlet Tanager	*Piranga olivacea*	0.01	0.00	0.00	0.00	< 0.01	0.01	0.00	0.00	0.00	< 0.01
	Northern Cardinal	*Cardinalis cardinalis*	0.17	0.07	0.03	0.07	0.08	0.11	0.07	0.03	0.07	0.07
	Indigo Bunting	*Passerina cyanea*	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01
	Dickcissel	*Spiza americana*	0.00	0.01	0.00	0.00	< 0.01	0.00	0.01	0.00	0.00	< 0.01
		Family Subtotal:	**0.21**	**0.10**	**0.03**	**0.07**	**0.10**	**0.13**	**0.10**	**0.03**	**0.07**	**0.08**
		Total:	**17.04**	**14.86**	**45.14**	**19.25**	**24.12**	**1.00**	**1.00**	**1.00**	**0.99**	**1.00**
		Standard Error:	**1.67**	**2.23**	**8.95**	**4.62**	**2.72**			**-**		

Table B-4. Use of each species and family observed at each point during the small bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	# Points	Use by Point Number																						
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Picidae (Woodpeckers)	Red-bellied Woodpecker	*Melanerpes carolinus*	4		0.17																0.08					0.08	0.09
	Downy Woodpecker	*Dryobates pubescens*	8		0.33			0.08		0.08										0.08		0.08			0.17	0.17	0.27
	Hairy Woodpecker	*Dryobates villosus*	6				0.08				0.08						0.09			0.08		0.08		0.08			
		Family Subtotal:	**13**		**0.50**		**0.08**	**0.08**		**0.08**	**0.08**						**0.09**			**0.17**	**0.08**	**0.17**		**0.08**	**0.17**	**0.25**	**0.36**
Tyrannidae (Flycatchers)	Eastern Kingbird	*Tyrannus tyrannus*	5		0.08			0.17														0.08	0.08				0.27
	Eastern Wood-Pewee	*Contopus virens*	1					0.25																			
		Family Subtotal:	**5**		**0.08**			**0.42**														**0.08**	**0.08**				**0.27**
Vireonidae (Vireos)	Red-eyed Vireo	*Vireo olivaceus*	1					0.08																			
		Family Subtotal:	**1**					**0.08**																			
Laniidae (Shrikes)	Northern Shrike	*Lanius borealis*	1													0.08											
		Family Subtotal:	**1**													**0.08**											
Corvidae (Crows & Allies)	Blue Jay	*Cyanocitta cristata*	23	0.17	0.58	0.17	0.25	0.58	0.17	0.17	0.08	0.50		0.08	0.33	0.33	0.36	0.33	0.08	0.50	0.17	0.83	0.42	0.08	0.50	0.50	0.64
		Family Subtotal:	**23**	**0.17**	**0.58**	**0.17**	**0.25**	**0.58**	**0.17**	**0.17**	**0.08**	**0.50**		**0.08**	**0.33**	**0.33**	**0.36**	**0.33**	**0.08**	**0.50**	**0.17**	**0.83**	**0.42**	**0.08**	**0.50**	**0.50**	**0.64**
Paridae (Chickadees & Titmice)	Black-capped Chickadee	*Poecile atricapillus*	4	0.17		0.17		0.17												0.17							
		Family Subtotal:	**4**	**0.17**		**0.17**		**0.17**												**0.17**							
Alaudidae (Larks)	Horned Lark	*Eremophila alpestris*	23	0.67	0.50	0.50	0.67	0.17	1.17	0.83	1.58	0.75	1.25	1.17	0.33		0.45	0.42	2.42	1.00	1.17	0.50	0.75	2.83	0.42	1.25	1.45
		Family Subtotal:	**23**	**0.67**	**0.50**	**0.50**	**0.67**	**0.17**	**1.17**	**0.83**	**1.58**	**0.75**	**1.25**	**1.17**	**0.33**		**0.45**	**0.42**	**2.42**	**1.00**	**1.17**	**0.50**	**0.75**	**2.83**	**0.42**	**1.25**	**1.45**
Hirundinidae (Swallows)	Tree Swallow	*Tachycineta bicolor*	6			0.08							0.08							0.25	0.50				0.08		0.45
	Barn Swallow	*Hirundo rustica*	24	0.83	1.42	0.83	0.58	0.75	0.33	0.92	0.83	0.17	3.08	0.58	0.42	0.58	0.45	0.67	0.08	0.25	0.50	0.17	0.67	0.42	0.50	0.67	4.55
		Family Subtotal:	**24**	**0.83**	**1.42**	**0.92**	**0.58**	**0.75**	**0.33**	**0.92**	**0.83**	**0.17**	**3.17**	**0.58**	**0.42**	**0.58**	**0.45**	**0.67**	**0.08**	**0.50**	**1.00**	**0.17**	**0.67**	**0.42**	**0.58**	**0.67**	**5.00**
Regulidae (Kinglets)	Golden-crowned Kinglet	*Regulus satrapa*	4	0.25				0.50	0.17							0.08											
	Ruby-crowned Kinglet	*Corthylio calendula*	1					0.25																			
		Family Subtotal:	**4**	**0.25**				**0.75**	**0.17**							**0.08**											
Sittidae (Nuthatches)	White-breasted Nuthatch	*Sitta carolinensis*	2					0.08				0.08															
		Family Subtotal:	**2**					**0.08**				**0.08**															
Mimidae (Thrashers & Allies)	Brown Thrasher	*Toxostoma rufum*	2							0.08																0.17	
		Family Subtotal:	**2**							**0.08**																**0.17**	
Sturnidae (Starlings)	European Starling	*Sturnus vulgaris*	24	20.08	3.17	20.00	1.00	14.92	13.67	14.08	17.58	10.42	28.50	8.83	25.00	16.25	16.09	12.50	4.58	13.75	9.92	46.00	5.58	35.67	19.17	0.25	5.09
		Family Subtotal:	**24**	**20.08**	**3.17**	**20.00**	**1.00**	**14.92**	**13.67**	**14.08**	**17.58**	**10.42**	**28.50**	**8.83**	**25.00**	**16.25**	**16.09**	**12.50**	**4.58**	**13.75**	**9.92**	**46.00**	**5.58**	**35.67**	**19.17**	**0.25**	**5.09**
Turdidae (Thrushes)	Eastern Bluebird	*Sialia sialis*	1								0.33																
	American Robin	*Turdus migratorius*	24	1.42	2.83	1.08	1.08	1.83	1.08	0.83	0.50	1.50	0.58	0.58	0.50	1.42	1.55	1.75	0.92	1.33	1.67	2.17	0.58	0.92	1.08	1.58	1.64
		Family Subtotal:	**24**	**1.42**	**2.83**	**1.08**	**1.08**	**1.83**	**1.08**	**0.83**	**0.83**	**1.50**	**0.58**	**0.58**	**0.50**	**1.42**	**1.55**	**1.75**	**0.92**	**1.33**	**1.67**	**2.17**	**0.58**	**0.92**	**1.08**	**1.58**	**1.64**
Passeridae (Old World Sparrows)	House Sparrow	*Passer domesticus*	6	0.08						0.08	0.58		1.58				0.36			0.33							
		Family Subtotal:	**6**	**0.08**						**0.08**	**0.58**		**1.58**				**0.36**			**0.33**							
Fringillidae (Finches)	House Finch	*Haemorhous mexicanus*	2										0.08														0.18
	American Goldfinch	*Spinus tristis*	18	0.17	0.17			0.33	0.25	0.17	0.17			0.17	0.17	0.33	0.55	0.17	0.17	0.17	1.00	0.50		0.08		0.17	0.73
		Family Subtotal:	**19**	**0.17**	**0.17**			**0.33**	**0.25**	**0.17**	**0.17**		**0.08**	**0.17**	**0.17**	**0.33**	**0.55**	**0.17**	**0.17**	**0.17**	**1.00**	**0.50**		**0.08**		**0.17**	**0.91**
Calcariidae (Longspurs & Allies)	Snow Bunting	*Plectrophenax nivalis*	3		0.33																					1.00	1.73
		Family Subtotal:	**3**		**0.33**																					**1.00**	**1.73**
Passerellidae (Sparrows & Allies)	Grasshopper Sparrow	*Ammodramus savannarum*	1								0.17																
	Chipping Sparrow	*Spizella passerina*	1																	0.08							
	Field Sparrow	*Spizella pusilla*	20		0.25	0.17	0.17		0.25	0.08	0.42	0.17	0.17	0.08	0.08	0.08	0.09	0.42	0.33		0.67	0.17	0.25	0.42	0.08	0.25	
	American Tree Sparrow	*Spizelloides arborea*	20	0.08	0.08		0.58	0.42	0.50	0.33	0.67		0.17	0.08	0.17	0.08		0.75		0.75	1.50	0.83	0.50	0.50	0.25	0.33	0.18
	Dark-eyed Junco	*Junco hyemalis*	16		0.17	0.58	0.58	0.25	0.50		0.92	0.42	0.42	0.25		0.67	0.64	0.42			0.67	1.17				0.50	0.55
	White-crowned Sparrow	*Zonotrichia leucophrys*	2																						0.17		0.18
	Savannah Sparrow	*Passerculus sandwichensis*	2				0.08	0.08																			
	Song Sparrow	*Melospiza melodia*	3				0.08	0.08										0.08									
		Family Subtotal:	**24**	**0.08**	**0.50**	**0.75**	**1.50**	**0.83**	**1.25**	**0.42**	**2.17**	**0.58**	**0.75**	**0.42**	**0.25**	**0.83**	**0.73**	**1.67**	**0.33**	**0.83**	**2.83**	**2.17**	**0.75**	**0.92**	**0.50**	**1.08**	**0.91**
Icteridae (Blackbirds & Allies)	Eastern Meadowlark	*Sturnella magna*	1								0.17																
	Baltimore Oriole	*Icterus galbula*	1																				0.17				
	Red-winged Blackbird	*Agelaius phoeniceus*	24	0.83	9.83	1.17	5.33	3.83	4.50	1.33	2.42	0.67	11.75	1.75	2.17	1.83	4.73	5.33	3.08	1.67	3.42	1.83	1.17	2.50	1.83	1.92	1.18
	Brown-headed Cowbird	*Molothrus ater*	18	0.08	0.08	0.50	0.17	0.58	0.75	0.08	0.42	0.50	1.00	0.33	0.50		1.27			0.17	0.58		0.58	0.42	0.67			
	Common Grackle	*Quiscalus quiscula*	14					0.17	0.17	1.33		0.42	0.08			0.17	0.45			0.67		0.17	0.17	0.17	0.17	1.17	0.27
		Family Subtotal:	**24**	**0.92**	**9.92**	**1.67**	**5.50**	**4.58**	**5.42**	**2.75**	**3.00**	**1.58**	**12.83**	**2.08**	**2.67**	**2.00**	**6.45**	**5.33**	**3.08**	**2.50**	**4.00**	**2.00**	**2.08**	**3.08**	**2.67**	**3.08**	**1.45**
Parulidae (Wood-Warblers)	Cape May Warbler	*Setophaga tigrina*	1																	0.33							
	Yellow Warbler	*Setophaga petechia*	1																							0.08	
	Unidentified Warbler	-	1																							0.17	
		Family Subtotal:	**2**																	**0.33**						**0.25**	
Cardinalidae (Cardinals & Allies)	Scarlet Tanager	*Piranga olivacea*	1																								0.09
	Northern Cardinal	*Cardinalis cardinalis*	12	0.33	0.08	0.17	0.08	0.17				0.17			0.08		0.09	0.08		0.25		0.33			0.17		
	Indigo Bunting	*Passerina cyanea*	2															0.08									0.18
	Dickcissel	*Spiza americana*	1													0.08											
		Family Subtotal:	**14**	**0.33**	**0.08**	**0.17**	**0.08**	**0.17**				**0.17**			**0.08**	**0.08**	**0.09**	**0.17**		**0.25**		**0.33**			**0.17**		**0.27**
		Total:		**25.17**	**20.08**	**25.42**	**10.75**	**25.75**	**23.50**	**20.42**	**26.92**	**15.75**	**48.75**	**13.92**	**29.75**	**22.00**	**27.18**	**23.00**	**11.67**	**21.83**	**21.83**	**54.92**	**10.92**	**44.08**	**25.25**	**10.25**	**19.73**
		Standard Error:		**11.07**	**9.66**	**17.24**	**4.46**	**5.80**	**7.69**	**8.41**	**11.94**	**10.23**	**12.91**	**4.94**	**19.61**	**7.90**	**12.86**	**8.53**	**3.25**	**9.24**	**8.02**	**39.94**	**5.55**	**23.67**	**11.78**	**2.07**	**2.59**
		Species Diversity:		**13**	**16**	**12**	**14**	**22**	**13**	**14**	**16**	**12**	**13**	**11**	**11**	**13**	**14**	**13**	**8**	**18**	**13**	**15**	**12**	**12**	**14**	**16**	**19**
		Family Diversity:		**12**	**12**	**9**	**9**	**15**	**9**	**11**	**10**	**9**	**8**	**8**	**9**	**10**	**11**	**9**	**8**	**13**	**9**	**11**	**8**	**9**	**9**	**12**	**12**

Table B-5. Frequency of occurrence of each species and family observed at each point during the small bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	Frequency by Point Number																						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Picidae (Woodpeckers)	Red-bellied Woodpecker	*Melanerpes carolinus*		0.08																0.08					0.08	0.09
	Downy Woodpecker	*Dryobates pubescens*		0.33			0.08		0.08										0.08		0.08			0.17	0.17	0.27
	Hairy Woodpecker	*Dryobates villosus*				0.08				0.08						0.09			0.08		0.08		0.08			
		Family Subtotal:		**0.33**		**0.08**	**0.08**		**0.08**	**0.08**						**0.09**			**0.17**	**0.08**	**0.17**		**0.08**	**0.17**	**0.25**	**0.36**
Tyrannidae (Flycatchers)	Eastern Kingbird	*Tyrannus tyrannus*		0.08			0.08														0.08	0.08				0.18
	Eastern Wood-Pewee	*Contopus virens*					0.08																			
		Family Subtotal:		**0.08**			**0.17**														**0.08**	**0.08**				**0.18**
Vireonidae (Vireos)	Red-eyed Vireo	*Vireo olivaceus*					0.08																			
		Family Subtotal:					**0.08**																			
Laniidae (Shrikes)	Northern Shrike	*Lanius borealis*													0.08											
		Family Subtotal:													**0.08**											
Corvidae (Crows & Allies)	Blue Jay	*Cyanocitta cristata*	0.17	0.50	0.17	0.17	0.33	0.17	0.17	0.08	0.33		0.08	0.33	0.33	0.27	0.25	0.08	0.42	0.08	0.33	0.25	0.08	0.50	0.33	0.27
		Family Subtotal:	**0.17**	**0.50**	**0.17**	**0.17**	**0.33**	**0.17**	**0.17**	**0.08**	**0.33**		**0.08**	**0.33**	**0.33**	**0.27**	**0.25**	**0.08**	**0.42**	**0.08**	**0.33**	**0.25**	**0.08**	**0.50**	**0.33**	**0.27**
Paridae (Chickadees & Titmice)	Black-capped Chickadee	*Poecile atricapillus*	0.08		0.08		0.08												0.08							
		Family Subtotal:	**0.08**		**0.08**		**0.08**												**0.08**							
Alaudidae (Larks)	Horned Lark	*Eremophila alpestris*	0.25	0.25	0.33	0.25	0.08	0.42	0.42	0.50	0.25	0.58	0.67	0.17		0.36	0.25	0.75	0.25	0.50	0.42	0.50	0.58	0.25	0.50	0.36
		Family Subtotal:	**0.25**	**0.25**	**0.33**	**0.25**	**0.08**	**0.42**	**0.42**	**0.50**	**0.25**	**0.58**	**0.67**	**0.17**		**0.36**	**0.25**	**0.75**	**0.25**	**0.50**	**0.42**	**0.50**	**0.58**	**0.25**	**0.50**	**0.36**
Hirundinidae (Swallows)	Tree Swallow	*Tachycineta bicolor*			0.08							0.08							0.17	0.08				0.08		0.18
	Barn Swallow	*Hirundo rustica*	0.25	0.25	0.25	0.33	0.17	0.08	0.25	0.33	0.08	0.33	0.25	0.17	0.33	0.18	0.25	0.08	0.17	0.17	0.08	0.33	0.25	0.17	0.17	0.36
		Family Subtotal:	**0.25**	**0.25**	**0.33**	**0.33**	**0.17**	**0.08**	**0.25**	**0.33**	**0.08**	**0.33**	**0.25**	**0.17**	**0.33**	**0.18**	**0.25**	**0.08**	**0.25**	**0.17**	**0.08**	**0.33**	**0.25**	**0.25**	**0.17**	**0.45**
Regulidae (Kinglets)	Golden-crowned Kinglet	*Regulus satrapa*	0.08				0.08	0.08							0.08											
	Ruby-crowned Kinglet	*Corthylio calendula*					0.08																			
		Family Subtotal:	**0.08**				**0.08**	**0.08**							**0.08**											
Sittidae (Nuthatches)	White-breasted Nuthatch	*Sitta carolinensis*					0.08				0.08															
		Family Subtotal:					**0.08**				**0.08**															
Mimidae (Thrashers & Allies)	Brown Thrasher	*Toxostoma rufum*							0.08																0.17	
		Family Subtotal:							**0.08**																**0.17**	
Sturnidae (Starlings)	European Starling	*Sturnus vulgaris*	0.33	0.25	0.33	0.17	0.50	0.42	0.42	0.42	0.17	0.50	0.25	0.42	0.33	0.27	0.42	0.25	0.50	0.50	0.42	0.17	0.58	0.33	0.08	0.36
		Family Subtotal:	**0.33**	**0.25**	**0.33**	**0.17**	**0.50**	**0.42**	**0.42**	**0.42**	**0.17**	**0.50**	**0.25**	**0.42**	**0.33**	**0.27**	**0.42**	**0.25**	**0.50**	**0.50**	**0.42**	**0.17**	**0.58**	**0.33**	**0.08**	**0.36**
Turdidae (Thrushes)	Eastern Bluebird	*Sialia sialis*								0.08																
	American Robin	*Turdus migratorius*	0.50	0.50	0.42	0.42	0.58	0.42	0.42	0.42	0.50	0.25	0.25	0.42	0.50	0.45	0.50	0.42	0.50	0.42	0.50	0.33	0.42	0.58	0.50	0.45
		Family Subtotal:	**0.50**	**0.50**	**0.42**	**0.42**	**0.58**	**0.42**	**0.42**	**0.50**	**0.50**	**0.25**	**0.25**	**0.42**	**0.50**	**0.45**	**0.50**	**0.42**	**0.50**	**0.42**	**0.50**	**0.33**	**0.42**	**0.58**	**0.50**	**0.45**
Passeridae (Old World Sparrows)	House Sparrow	*Passer domesticus*	0.08						0.08	0.08		0.25				0.09			0.08							
		Family Subtotal:	**0.08**						**0.08**	**0.08**		**0.25**				**0.09**			**0.08**							
Fringillidae (Finches)	House Finch	*Haemorhous mexicanus*										0.08														0.09
	American Goldfinch	*Spinus tristis*	0.08	0.08			0.25	0.17	0.08	0.08			0.08	0.08	0.25	0.18	0.08	0.08	0.17	0.50	0.33		0.08		0.08	0.36
		Family Subtotal:	**0.08**	**0.08**			**0.25**	**0.17**	**0.08**	**0.08**		**0.08**	**0.08**	**0.08**	**0.25**	**0.18**	**0.08**	**0.08**	**0.17**	**0.50**	**0.33**		**0.08**		**0.08**	**0.36**
Calcariidae (Longspurs & Allies)	Snow Bunting	*Plectrophenax nivalis*		0.08																					0.08	0.09
		Family Subtotal:		**0.08**																					**0.08**	**0.09**
Passerellidae (Sparrows & Allies)	Grasshopper Sparrow	*Ammodramus savannarum*								0.08																
	Chipping Sparrow	*Spizella passerina*																	0.08							
	Field Sparrow	*Spizella pusilla*		0.17	0.08	0.08		0.17	0.08	0.08	0.08	0.17	0.08	0.08	0.08	0.09	0.25	0.17		0.42	0.17	0.17	0.25	0.08	0.17	
	American Tree Sparrow	*Spizelloides arborea*	0.08	0.08		0.17	0.17	0.25	0.17	0.08		0.08	0.08	0.08	0.08		0.25		0.17	0.33	0.17	0.17	0.25	0.08	0.25	0.18
	Dark-eyed Junco	*Junco hyemalis*		0.08	0.17	0.17	0.08	0.08		0.17	0.17	0.08	0.08		0.17	0.18	0.08			0.17	0.17				0.17	0.18
	White-crowned Sparrow	*Zonotrichia leucophrys*																						0.08		0.09
	Savannah Sparrow	*Passerculus sandwichensis*				0.08	0.08																			
	Song Sparrow	*Melospiza melodia*				0.08	0.08										0.08									
		Family Subtotal:	**0.08**	**0.33**	**0.25**	**0.58**	**0.33**	**0.42**	**0.25**	**0.25**	**0.25**	**0.33**	**0.25**	**0.17**	**0.33**	**0.27**	**0.58**	**0.17**	**0.25**	**0.75**	**0.33**	**0.33**	**0.50**	**0.25**	**0.50**	**0.36**
Icteridae (Blackbirds & Allies)	Eastern Meadowlark	*Sturnella magna*								0.08																
	Baltimore Oriole	*Icterus galbula*																				0.08				
	Red-winged Blackbird	*Agelaius phoeniceus*	0.42	0.33	0.33	0.42	0.50	0.42	0.50	0.42	0.33	0.33	0.42	0.42	0.50	0.55	0.58	0.58	0.42	0.58	0.17	0.33	0.50	0.50	0.50	0.36
	Brown-headed Cowbird	*Molothrus ater*	0.08	0.08	0.08	0.08	0.25	0.08	0.08	0.08	0.08	0.17	0.08	0.08		0.18			0.08	0.17		0.08	0.17	0.08		
	Common Grackle	*Quiscalus quiscula*					0.08	0.08	0.17		0.17	0.08			0.08	0.18			0.08		0.08	0.08	0.08	0.08	0.25	0.18
		Family Subtotal:	**0.42**	**0.33**	**0.33**	**0.42**	**0.58**	**0.42**	**0.50**	**0.42**	**0.33**	**0.42**	**0.42**	**0.42**	**0.50**	**0.55**	**0.58**	**0.58**	**0.50**	**0.67**	**0.17**	**0.42**	**0.50**	**0.50**	**0.58**	**0.36**
Parulidae (Wood-Warblers)	Cape May Warbler	*Setophaga tigrina*																	0.08							
	Yellow Warbler	*Setophaga petechia*																							0.08	
	Unidentified Warbler	-																							0.08	
		Family Subtotal:																	**0.08**						**0.17**	
Cardinalidae (Cardinals & Allies)	Scarlet Tanager	*Piranga olivacea*																								0.09
	Northern Cardinal	*Cardinalis cardinalis*	0.25	0.08	0.08	0.08	0.17				0.17			0.08		0.09	0.08		0.25		0.17			0.17		
	Indigo Bunting	*Passerina cyanea*															0.08									0.09
	Dickcissel	*Spiza americana*													0.08											
		Family Subtotal:	**0.25**	**0.08**	**0.08**	**0.08**	**0.17**				**0.17**			**0.08**	**0.08**	**0.09**	**0.17**		**0.25**		**0.17**			**0.17**		**0.09**

Table C-6. Flight height characteristics of each species and family observed during the small bird use surveys in the proposed Riverbend Wind Energy Project area, Sanilac County, Michigan, March 2021–February 2022

Family (Description)	Common Name	Scientific Name	# Groups Flying	# Obs Flying	Flying Use	% Obs Flying	# (%) within Flight Height Categories			Use in RSZ	Frequency in RSZ
							< 35 m (115 ft)	RSZ: 35 - 200 m (115 - 656 ft)	> 200 m (656 ft)		
Picidae (Woodpeckers)	Red-bellied Woodpecker	*Melanerpes carolinus*	5	5	0.02	100.0	5 (100.0)	0 (0.0)	0 (0.0)		
	Downy Woodpecker	*Dryobates pubescens*	15	15	0.05	100.0	15 (100.0)	0 (0.0)	0 (0.0)		
	Hairy Woodpecker	*Dryobates villosus*	6	6	0.02	100.0	6 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**26**	**26**	**0.09**	**100.0**	**26 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Tyrannidae (Flycatchers)	Eastern Kingbird	*Tyrannus tyrannus*	4	4	0.01	50.0	4 (100.0)	0 (0.0)	0 (0.0)		
	Eastern Wood-Pewee	*Contopus virens*	1	3	0.01	100.0	3 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**5**	**7**	**0.02**	**63.6**	**7 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Vireonidae (Vireos)	Red-eyed Vireo	*Vireo olivaceus*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**1**	**1**	**< 0.01**	**100.0**	**1 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Laniidae (Shrikes)	Northern Shrike	*Lanius borealis*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**1**	**1**	**< 0.01**	**100.0**	**1 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Corvidae (Crows & Allies)	Blue Jay	*Cyanocitta cristata*	75	88	0.31	94.6	88 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**75**	**88**	**0.31**	**94.6**	**88 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Paridae (Chickadees & Titmice)	Black-capped Chickadee	*Poecile atricapillus*	4	8	0.03	100.0	8 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**4**	**8**	**0.03**	**100.0**	**8 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Alaudidae (Larks)	Horned Lark	*Eremophila alpestris*	125	242	0.85	91.3	242 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**125**	**242**	**0.85**	**91.3**	**242 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Hirundinidae (Swallows)	Tree Swallow	*Tachycineta bicolor*	6	13	0.05	76.5	13 (100.0)	0 (0.0)	0 (0.0)		
	Barn Swallow	*Hirundo rustica*	139	219	0.77	92.0	219 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**145**	**232**	**0.81**	**91.0**	**232 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Regulidae (Kinglets)	Golden-crowned Kinglet	*Regulus satrapa*	4	12	0.04	100.0	12 (100.0)	0 (0.0)	0 (0.0)		
	Ruby-crowned Kinglet	*Corthylio calendula*	1	3	0.01	100.0	3 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**5**	**15**	**0.05**	**100.0**	**15 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Sittidae (Nuthatches)	White-breasted Nuthatch	*Sitta carolinensis*	2	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**2**	**2**	**0.01**	**100.0**	**2 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Mimidae (Thrashers & Allies)	Brown Thrasher	*Toxostoma rufum*	2	2	0.01	66.7	2 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**2**	**2**	**0.01**	**66.7**	**2 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Sturnidae (Starlings)	European Starling	*Sturnus vulgaris*	148	3388	11.85	78.4	3388 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**148**	**3388**	**11.85**	**78.4**	**3388 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Turdidae (Thrushes)	Eastern Bluebird	*Sialia sialis*	1	4	0.01	100.0	4 (100.0)	0 (0.0)	0 (0.0)		
	American Robin	*Turdus migratorius*	181	268	0.94	74.0	266 (99.3)	2 (0.7)	0 (0.0)	0.01	< 0.01
		Family Subtotal:	**182**	**272**	**0.95**	**74.3**	**270 (99.3)**	**2 (0.7)**	**0 (0.0)**	**0.01**	**< 0.01**
Passeridae (Old World Sparrows)	House Sparrow	*Passer domesticus*	9	36	0.13	100.0	36 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**9**	**36**	**0.13**	**100.0**	**36 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Fringillidae (Finches)	House Finch	*Haemorhous mexicanus*	2	3	0.01	100.0	3 (100.0)	0 (0.0)	0 (0.0)		
	American Goldfinch	*Spinus tristis*	40	58	0.20	90.6	58 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**42**	**61**	**0.21**	**91.0**	**61 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Calcariidae (Longspurs & Allies)	Snow Bunting	*Plectrophenax nivalis*	3	35	0.12	100.0	35 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**3**	**35**	**0.12**	**100.0**	**35 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Passerellidae (Sparrows & Allies)	Grasshopper Sparrow	*Ammodramus savannarum*	1	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
	Chipping Sparrow	*Spizella passerina*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
	Field Sparrow	*Spizella pusilla*	34	51	0.18	92.7	51 (100.0)	0 (0.0)	0 (0.0)		
	American Tree Sparrow	*Spizelloides arborea*	46	102	0.36	97.1	102 (100.0)	0 (0.0)	0 (0.0)		
	Dark-eyed Junco	*Junco hyemalis*	30	96	0.34	93.2	96 (100.0)	0 (0.0)	0 (0.0)		
	White-crowned Sparrow	*Zonotrichia leucophrys*	2	4	0.01	100.0	4 (100.0)	0 (0.0)	0 (0.0)		
	Savannah Sparrow	*Passerculus sandwichensis*	2	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
	Song Sparrow	*Melospiza melodia*	3	3	0.01	100.0	3 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**119**	**261**	**0.91**	**94.9**	**261 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Icteridae (Blackbirds & Allies)	Eastern Meadowlark	*Sturnella magna*	2	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
	Baltimore Oriole	*Icterus galbula*	1	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
	Red-winged Blackbird	*Agelaius phoeniceus*	232	662	2.31	73.0	616 (93.1)	46 (6.9)	0 (0.0)	0.16	0.01
	Brown-headed Cowbird	*Molothrus ater*	22	65	0.23	63.1	65 (100.0)	0 (0.0)	0 (0.0)		
	Common Grackle	*Quiscalus quiscula*	11	37	0.13	56.1	37 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**268**	**768**	**2.69**	**71.1**	**722 (94.0)**	**46 (6.0)**	**0 (0.0)**	**0.16**	**0.01**
Parulidae (Wood-Warblers)	Cape May Warbler	*Setophaga tigrina*	1	4	0.01	100.0	4 (100.0)	0 (0.0)	0 (0.0)		
	Yellow Warbler	*Setophaga petechia*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
	Unidentified Warbler	-	1	2	0.01	100.0	2 (100.0)	0 (0.0)	0 (0.0)		
		Family Subtotal:	**3**	**7**	**0.02**	**100.0**	**7 (100.0)**	**0 (0.0)**	**0 (0.0)**		
Cardinalidae (Cardinals & Allies)	Scarlet Tanager	*Piranga olivacea*	1	1	< 0.01	100.0	1 (100.0)	0 (0.0)	0 (0.0)		
	Northern Cardinal	*Cardinalis cardinalis*	19	21	0.07	87.5	21 (100.0)	0 (0.0)	0 (0.0)		
	Indigo Bunting	*Passerina cyanea*	2	3	0.01	100.0	3 (100.0)	0 (0.0)	0 (0.0)		
	Dickcissel	*Spiza americana*	0	0	0.00	0.0	0 (-)	0 (-)	0 (-)		
		Family Subtotal:	**22**	**25**	**0.09**	**86.2**	**25 (100.0)**	**0 (0.0)**	**0 (0.0)**		
		Total	**1187**	**5477**	**19.15**	**79.4**	**5429 (99.1)**	**48 (0.9)**	**0 (0.0)**	**0.17**	**0.01**

Report on Riverbend Wind Energy Facility
- Phase 2 Presence/Absence Bat Acoustic Survey

Sanilac County, Michigan

Report date: October 18, 2021

Prepared by:

Sanders Environmental Inc.
322 Borealis Way
Bellefonte, Pennsylvania 16823

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List of Appendices

1.0 Executive Summary

Sanders Environmental, Inc. (Sanders) was contracted to perform an acoustic bat survey to determine the presence or probable absence of the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*Myotis septentrionalis*) for the Riverbend Wind Energy Facility (Project) located in Sanilac County, Michigan.

Forty-nine sites were surveyed at two acoustic detector locations for four nights each for total of eight detector nights per site and 392 detector nights for the Project. Collectively, the detectors recorded 226,548 files containing bat calls that were processed and analyzed. Bat calls were recorded every night of the survey.

Automated analysis determined statistical probable presence of the Indiana bat at one site (Site 5) and the northern long-eared bat at two sites (Sites 5 and 41). In response, a manual review of the files classified to the respective species identification was conducted on the site nights where the Maximum Likelihood Estimator determined presence. All such files were manually identified as non-myotis, no federal species presence was found by this survey.

2.0 Introduction

The Project is in the early stages of development process of the Riverbend Wind Energy Facility. The Project is proposed within an approximately 45,721-acre (185 square kilometers [km^2]) focus area (Figure 1). The Project area is a mostly agricultural land. Forest in the Project area is fragmented along drainage areas and small woodlots among active agriculture.

This survey was undertaken per the United States Fish and Wildlife Service (USFWS) recommendations to survey for presence of Indiana bats and northern long-eared bats for the proposed Project. This report summarizes an acoustic survey for bats conducted by Sanders at the proposed Riverbend Wind Energy Facility in June and July2021.

3.0 Methods

Surveys followed the methods outlined and described in the US Fish and Wildlife Service (USFWS) Range-Wide Indiana Bat Survey Guidelines – Appendix A (March 23, 2020) (USFWS Guidelines).

A Phase I desktop analysis as described in the USFWS Guidelines of the Project was conducted using Google Earth and National Land Cover Database (NLCD). This habitat assessment determined 24.4 square kilometers (km^2) of potential summer habitat were located within the Project boundary. An acoustic study plan (Appendix B) was submitted to and approved by the USFWS (6/22/2021, Jennifer Wong, USFWS Biologist, Ecological Services; email).

Personnel:
Elise Merrill, a qualified and USFWS permitted bat surveyor with more than nine years of acoustic work, was present at all site selections and detector deployments. Qualitative analysis was completed by Elise Merrill. A second opinion was completed by Janet Tyburec, a wildlife biologist with thirty years of experience recording bat echolocation, including work with all *Myotis* species in the eastern US.

Level of Effort:
For summer bat surveys, one area acoustic sampling site, which requires eight detector nights, is required for each 123.5 ac (0.5 km^2) of potential bat habitat (USFWS 2020). Therefore, forty-nine area sites of acoustic effort were needed to sample the potential bat habitat of the Project (Figure 1). Each site consisted of eight successful detector nights for a total of 392 detector nights of sampling.

Detector Deployment:
Detectors were deployed in locations considered to be most effective in detecting threatened and endangered species of bat[1]. Sampling sites were initially selected from aerial imagery and are marked as sampled in Figure 1. Some proposed detector sites submitted in the study plan to the agencies shifted greater than 656 feet (ft; 200 meters [m]) due to land access and the conditions found by biologists onsite (Figure 1; Appendix B).

[1] A recommendation from USFWS protocol "(d) at least 49 feet (15 meters) from known or suitable roosts (e.g., trees/snags, buildings, bridges, bat houses, cave or mine portal entrances)" was interpreted not to include trees unless they are known roosts. Otherwise, detectors would have needed to be placed 49 feet from forest edges, which would have limited both detections and available detector placement locations.

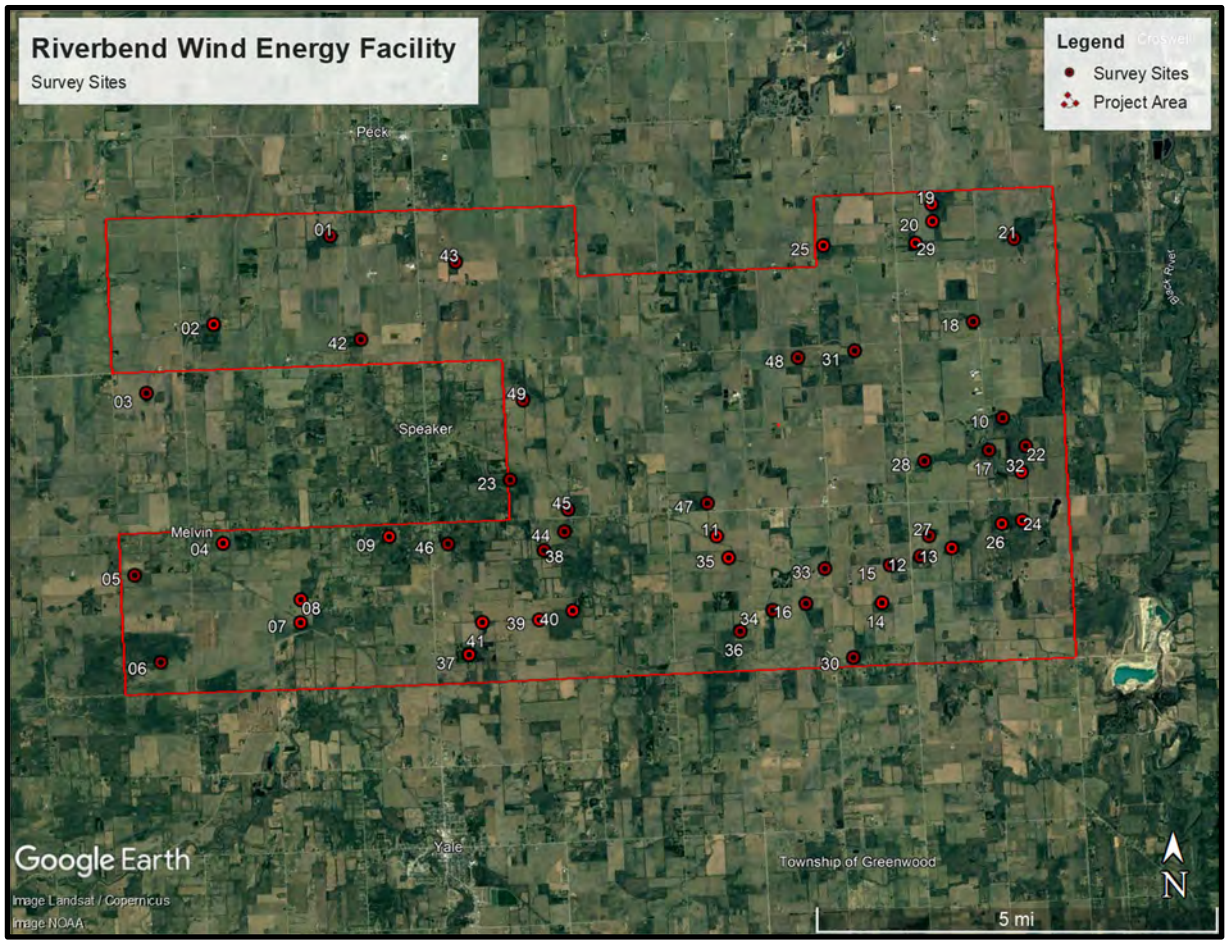


Figure 1: Presence/Absence acoustic bat survey locations within the Riverbend Project, Sanilac County, Michigan.

Detectors started recording 30 minutes prior to sunset and continued until 30 minutes after sunrise. Microphones were deployed at least 8.2 ft (2.5 m) above ground level and oriented approximately level with the ground's slope.

Equipment:

A Wildlife Acoustics Song Meter SM4BAT FS recorder(detector) was deployed with an SMM-U2 cardioid microphone at each detector location. The detector settings for each deployment were set as follows:

Sampling Frequency: 384 kHz	**Minimum Duration:** 1.5ms	**Trigger Level:** 12db
High-Pass Filter: On	**Maximum Duration:** None	**Trigger Window:** 3 seconds
Input Gain: 12db	**Trigger Frequency:** 16kHz	**Maximum Length:** 5 seconds

All acoustic detectors were tested to ensure proper functioning by jingling keys or snapping fingers to elicit a response from the detector.

Kaleidoscope Pro Analysis:
Files were recorded in full-spectrum, converted to zero-crossing, and analyzed by site by night with Kaleidoscope Pro (KPro). Files were processed using the USFWS approved KPro Bats of North America version 5.4.0 (classifier) at a neutral sensitivity setting (0 balanced).

Eight species of bats (Table 1) were considered by the classifier, the species were selected based on species ranges for the state of Michigan. To date, the current version of the Maximum Likelihood Estimator (MLE; the statistical methods used to confirm likely presence) has only been tested and approved for Indiana bats and northern long-eared bats by the US Geological Survey (USGS)[2].

Table 1: Bat species used in the Kaleidoscope Pro analyses.

Common Bat Name	Scientific Bat Name	Species Code[1]
Big Brown Bat	*Eptesicus fuscus*	EPTFUS
Eastern Red Bat	*Lasiurus borealis*	LASBOR
Hoary Bat	*Lasiurus cinereus*	LASCIN
Silver-haired Bat	*Lasionycteris noctivagans*	LASNOC
Little Brown Bat	*Myotis lucifugus*	MYOLUC
Northern Long-eared Bat	*Myotis septentrionalis*	MYOSEP
Indiana Bat	*Myotis sodalis*	MYOSOD
Tri-colored Bat	*Perimyotis subflavus*	PERSUB

[1] As output by Kaleidoscope Pro.

Qualitative Analysis:
A qualitative, manual review was conducted on files used in the positive MLE determination for the Indiana bat and northern long-eared bat. This review was conducted by Elise Merrill as well as by an outside acoustic expert, Janet Tyburec of Bat Survey Solutions (BSS).

4.0 Results

Forty-nine sites were surveyed with acoustic detectors at two locations for four nights each from June 25, 2021 through July 2, 2021 and July 19, 2021 through July 27, 2021.

[2] The USGS has not tested and approved the current MLE for confirming the presence of any other bat species.

Photos of the detector deployment locations and datasheets for each detector can be found in Appendix C. Nights that did not meet the weather condition requirements described in the USFWS Guidelines were re-sampled and not included in the analysis.

Kaleidoscope Pro Analysis Results

A total of 226,548 files containing calls (as determined by KPro) were recorded for the Project and analyzed by site by night. The bat species indicated as likely present by Kaleidoscope Pro Maximum Likelihood Estimator (MLE) can be found in Table 2. The KPro classifier results by site by night (files identified as containing calls that are then identified to species by the program) can be found in Table 3.

Table 2: Bat species indicated as likely present by the Kaleidoscope Pro (v5.4.0) Maximum Likelihood Estimator (MLE) at the Riverbend Facility, 2021.

Species	MLE Indicated Presence	Status	Sites Detected
Indiana Bat	Yes	Federally and State Endangered	5
Northern Long-eared Bat	Yes	Federally Threatened, Special Concern	5, 41
Little Brown Bat	Yes	Special Concern	3, 5-6, 11, 13-14, 18, 21-23, 25, 27-28, 34-36, 39, 42-43, 45-47
Tri-colored Bat	Yes	Special Concern	2
Big Brown Bat	Yes	None	1-49 (all sites)
Eastern Red Bat	Yes	None	1-49 (all sites)
Hoary Bat	Yes	None	1-49 (all sites)
Silver-haired Bat	Yes	None	13, 25, 38, 46, 48

Table 3: Bat species indicated as likely present by the Kaleidoscope Pro (v5.4.0) Maximum Likelihood Estimator (MLE) at the Riverbend Facility, 2021

Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
1	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
2	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	0.0000004

Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
3	1	0	0.3734819	0.3165475	1	0.0002091	1	1	1
	2	0	0	0.0108888	1	0	1	1	1
	3	0	0	0.0000722	1	0.0012659	1	1	1
	4	0	0	0	1	0.0000057	1	1	1
4	1	0	0	0	1	1	1	1	1
	2	0	0.0000345	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
5	1	0	0	1	1	1	0.0226446	0.8581439	1
	2	0	0	1	1	0.0007453	1	1	1
	3	0	0	0.0000004	1	1	0.0227984	0.7808627	1
	4	0	0	0	1	1	1	0.0002761	1
6	1	0	0	1	1	0.0000005	1	1	1
	2	0	0	1	1	0.0000266	1	1	1
	3	0	0	0	1	0.0000001	1	1	1
	4	0	0	0	1	0.0009807	1	1	1
7	1	0	0	1	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0.0739666	1	1	1	1	1
	4	0	0	0.0000019	1	1	1	1	1
8	1	0	0	0	1	0.7733456	1	1	0.7644142
	2	0	0	0.0000048	1	1	1	1	1
	3	0	0	0	1	1	1	0.1357571	1
	4	0	0	0	1	1	1	1	1
9	1	0	0	0	1	1	1	1	1
	2	0	0	0.0000002	1	1	1	1	1
	3	0	0	0.0136765	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
10	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
11	1	0	0	0	1	0	1	1	0.5346608
	2	0	0	0.0003222	1	0.0863351	1	1	1
	3	0	0	1	1	0.2232309	1	1	1
	4	0	0	0	1	0.0088152	1	1	1

Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
12	1	0	0	1	1	1	1	1	1
	2	0	0	0	0.8170616	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	0.9063406	1	1	1
13	1	0	0	0	1	0.002987	0.8605728	1	1
	2	0	0	0	0.0002761	0.5288446	1	1	1
	3	0	0	0	1	0.5874639	1	1	1
	4	0.0017205	0	0	1	1	1	0.4438592	1
14	1	0	0	0	1	1	1	1	1
	2	0	0	1	1	0.975469	1	1	1
	3	0	0	0.1564383	0.8658579	0.0002781	1	1	1
	4	0	0	0	1	0.6730048	1	0.3316248	1
15	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	1	1	1	1	1	1
	4	0	0	0	1	0.6749282	1	0.8534863	1
16	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	0.3398449	0.2432294	0.8936275	1
	3	0	0	0.062748	1	0.7021303	1	1	1
	4	0	0	1	1	0.0526938	1	1	1
17	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
18	1	0	0	0	1	0	1	0.9579447	1
	2	0	0	0	1	0	1	1	1
	3	0	0	0	0.4056492	1	1	1	1
	4	0	0	0.000001	1	0.001725	1	1	1
19	1	0	0	1	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0.0088381	0	0	0.9716654	1	1	1	1
	4	0.0012565	0	0	1	1	1	1	1
20	1	0	0	1	1	1	1	0.4401896	1
	2	0	0	0	1	1	1	1	1
	3	0.0224031	0	0	0.2867058	0.2192132	1	1	1
	4	0.000092	0	0	0.1035999	1	1	1	1

Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
21	1	0	0	0	1	0.3268565	1	1	1
	2	0	0	1	1	0	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0.0302148	1	1	1	1	1
22	1	0	0.0000586	1	1	1	1	1	0.4737634
	2	0	0	0	1	1	1	1	1
	3	0	0	0.0077497	1	1	1	1	1
	4	0	0	0.0115121	1	0.000715	1	1	1
23	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0.1741835	1	1	1	1	1
	4	0	0	0.0057918	1	0.010524	1	0.2441905	1
24	1	0	0	0	1	1	0.1030495	1	1
	2	0	0	0	1	0.162412	1	0.8006551	1
	3	0	0	0	1	1	1	1	1
	4	1	0	0	0.9839413	1	1	1	1
25	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	0.0000124	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	0.0000005	0.1156167	1	1	1
26	1	0	0	1	1	1	1	1	1
	2	0	0	0.0000021	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	0.4417326	1	1	1	1
27	1	0	0	0	1	1	1	1	1
	2	0	0	0.5517091	1	1	1	1	1
	3	0	0	0	1	0.7472889	1	1	1
	4	0	0	0.1458939	1	0.0079647	1	1	1
28	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	0	1	1	1
	3	0	0	0	1	0.7582967	1	1	1
	4	0	0	0	1	1	1	1	1
	5	0	0	0	1	0.4616495	1	1	1
29	1	0	0	0	1	0.1940499	1	1	1
	2	0	0	0	1	0.3610064	1	1	1
	3	0	0	0	0.8993644	1	1	1	1
	4	0	0	0	0.1533223	1	1	1	1

Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
30	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	0.1631207	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
31	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	0.9959081	1	1	1
32	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0.0219071	0	0	1	1	1	1	1
33	1	0	0.0004576	0.5661794	1	1	1	1	1
	2	0	0	0.0008066	1	1	1	1	1
	3	0	0	1	1	0.7965726	1	1	1
	4	0	0	0.9998458	1	1	1	1	1
34	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	0.7945288	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	0	1	1	1
35	1	0	0	0	1	0.9595692	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	0.0144778	1	1	0.4099286
36	1	0	0	0	1	1	1	1	1
	2	0	0	0.0000046	1	0.0573362	1	1	1
	3	0	0	1	1	1	1	1	1
	4	0	0	0.5943767	1	0.0047697	1	0.1750992	0.7741063
37	1	0	0.0000094	0.0000003	1	0.949997	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	0.5279798
	4	0	0	0	1	1	1	1	1
38	1	0	0	0	0	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0.0060769	1	1	1	1	1
	4	0	0	0	1	1	1	1	1

Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
39	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	0.0248716	1	1	0.2698203
40	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	1	1	1	1
	4	0	0	0	1	1	1	1	1
41	1	0	0	0	1	0.4155146	0.8375359	1	1
	2	0	0	0.0999083	1	1	1	1	1
	3	0	0	0	1	0.3844506	0.0212528	1	1
	4	0	0	0	1	1	1	1	1
42	1	0	0	0.0013626	1	0.1039768	1	1	0.9858687
	2	0	0	0.0504599	1	0	1	1	1
	3	0	0	0	1	0	1	1	1
	4	0	0	0	1	0.0004249	1	1	1
43	1	0	0	0	1	0	1	1	1
	2	0	0	0	1	0.0160767	1	1	1
	3	0	0	0	1	0	1	1	1
	4	0	0	0	1	0.895188	1	1	1
44	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	0.9718868	1	1	1
	4	0	0.0010589	0	1	1	1	1	1
45	1	0	0	0	0.5465152	0.0030468	0.6350119	1	1
	2	0	0	0	1	0.9872508	1	1	1
	3	0	0	0	1	0.738125	1	1	1
	4	0	0	0	1	0.8139604	1	1	1
46	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	0	1	1	1
	4	0	0	0	0.0004807	0	1	1	1
47	1	0	0	0	1	0	1	1	1
	2	0	0	0	1	0	1	1	1
	3	0	0	0	1	0	1	1	1
	4	0	0	0	1	0	1	1	1

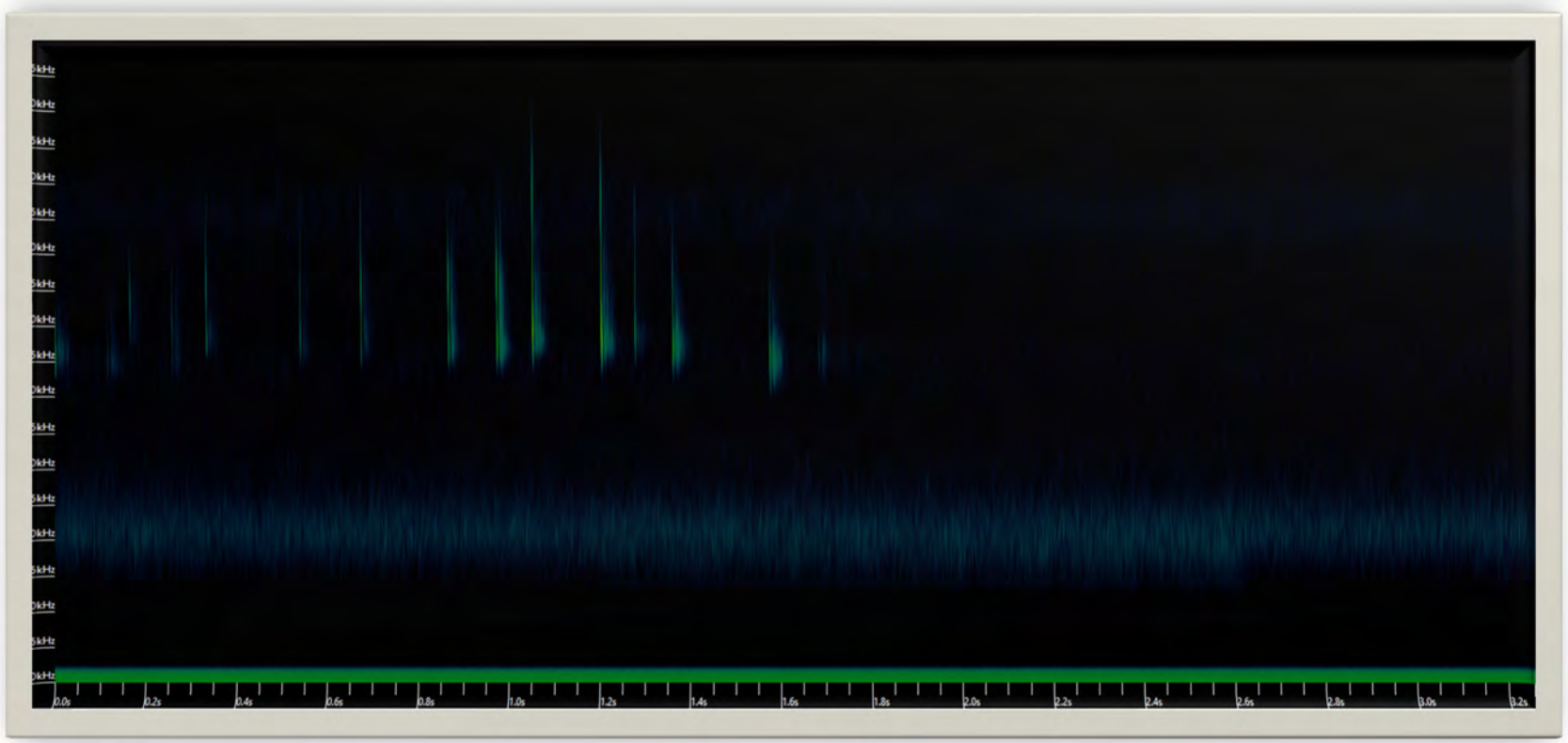
Site	Nights	Kaleidoscope Pro Maximum (v5.4.0) Likelihood Estimator Presence Results							
		EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB
48	1	0	0	0	1	1	1	1	1
	2	0	0	0	0.7725811	1	1	1	1
	3	0	0	0	0.0006964	0.7959408	1	1	1
	4	0	0	0	1	0.990023	1	1	1
49	1	0	0	0	1	1	1	1	1
	2	0	0	0	1	1	1	1	1
	3	0	0	0	1	0.6247416	1	1	1
	4	0	0	0	1	1	1	1	1

Qualitative Analysis Results

Federal species MLE positives occurred at two sites, site 5 on two nights of sampling and Site 41 on one night. A manual review of the files from those nights identified as federal species was conducted. Sanders concludes that there is no visual confirmation of probable Indiana bats or northern long-eared bats on any of the nights. None of the calls that triggered MLE+ results appear to even be made by *myotis* genus bats. A second, more detailed, opinion was provided by Janet Tyburec (BSS) and can be found in Appendix D – Echolocation Call Review.

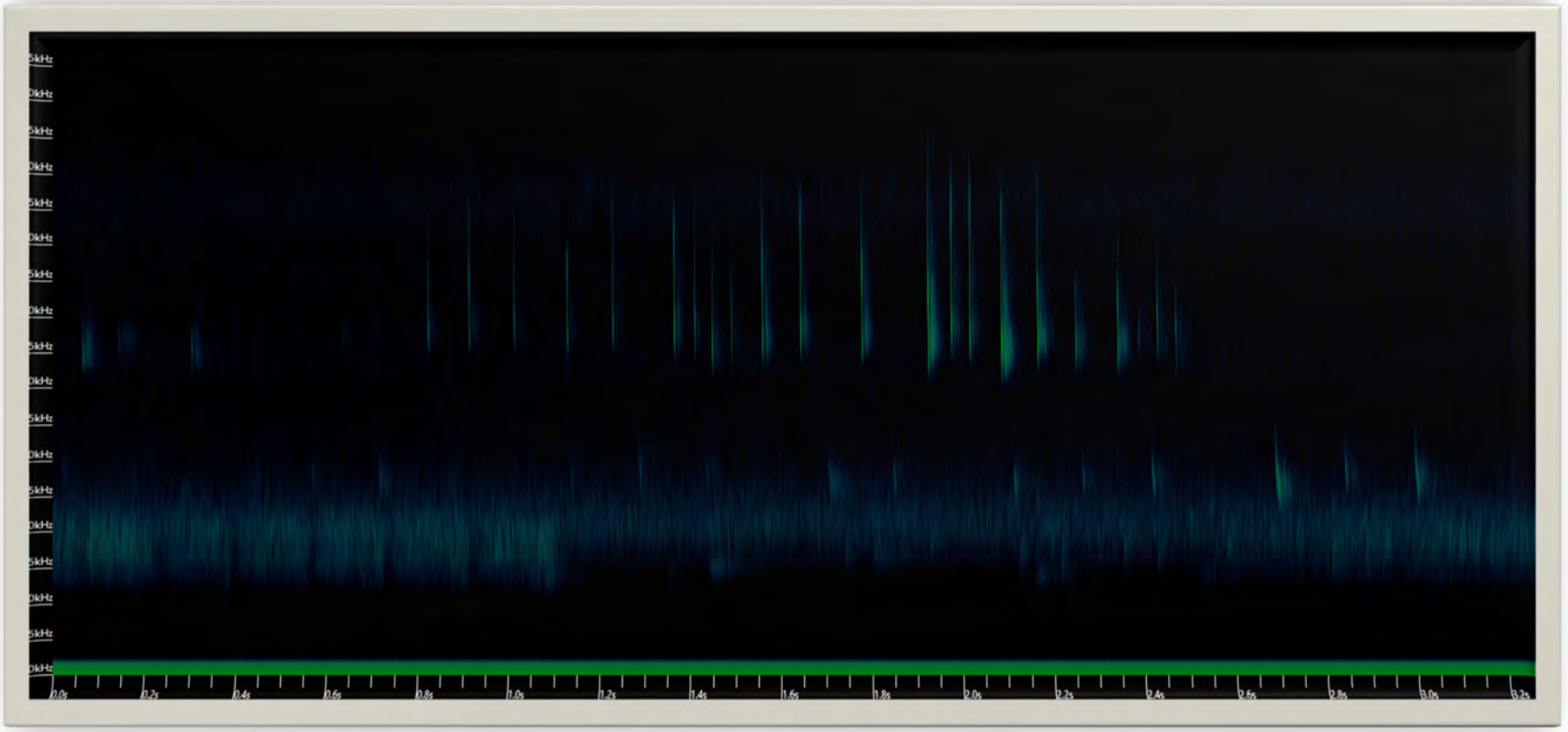
Kpro Classified Files – Indiana bat

MLE determined probable presence of the Indiana bat (by Kpro) at site 5 was based off the 5 following files which primarily consisted of the eastern red bat.



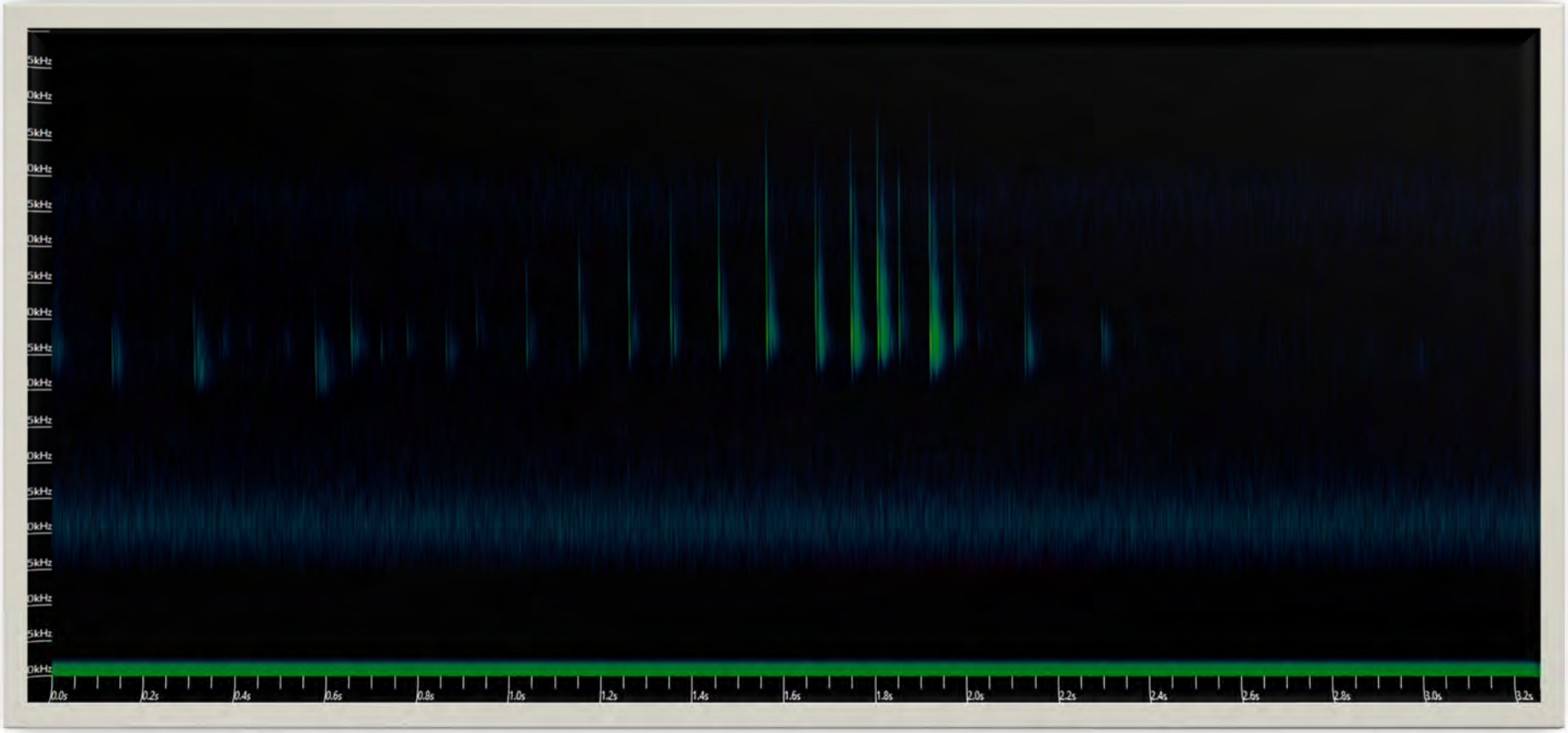
S4U11087_20210719_213407_000.00

This file contains an out-of-range eastern red bat emitting a search phase call type as it flew into detector range.



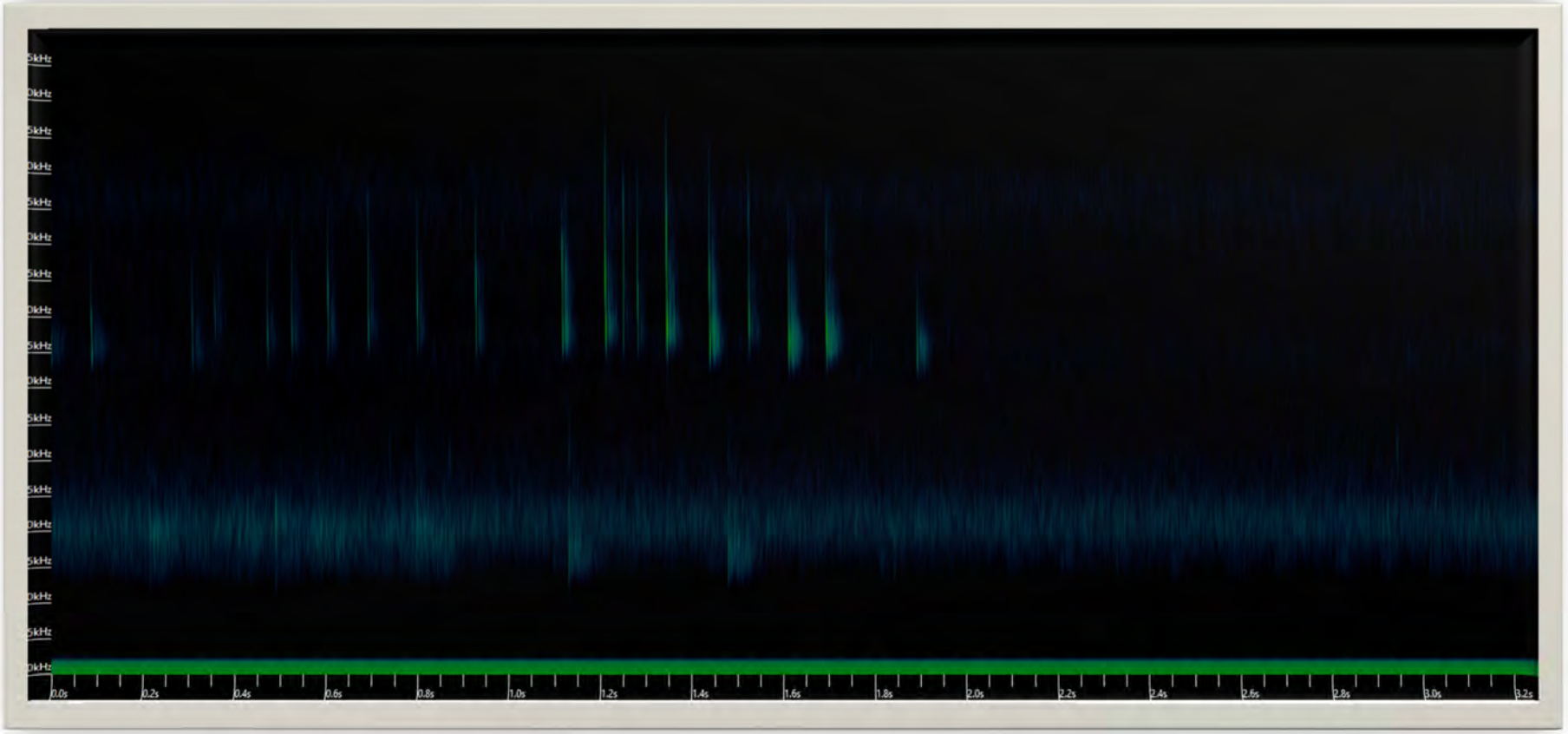
S4U11087_20210719_214509_000.00

This file contains two bats, both high and low frequency bats. When bats share the same air space, they may change their calling behavior is response to the presence of the other bat and is therefore unreliable for an autoclassification program. Based on the pulses recorded, the high frequency bat is likely an eastern red bat exhibiting search to investigative call types. The low frequency bat pulses are of poor quality and should be considered an unknown low frequency bat.



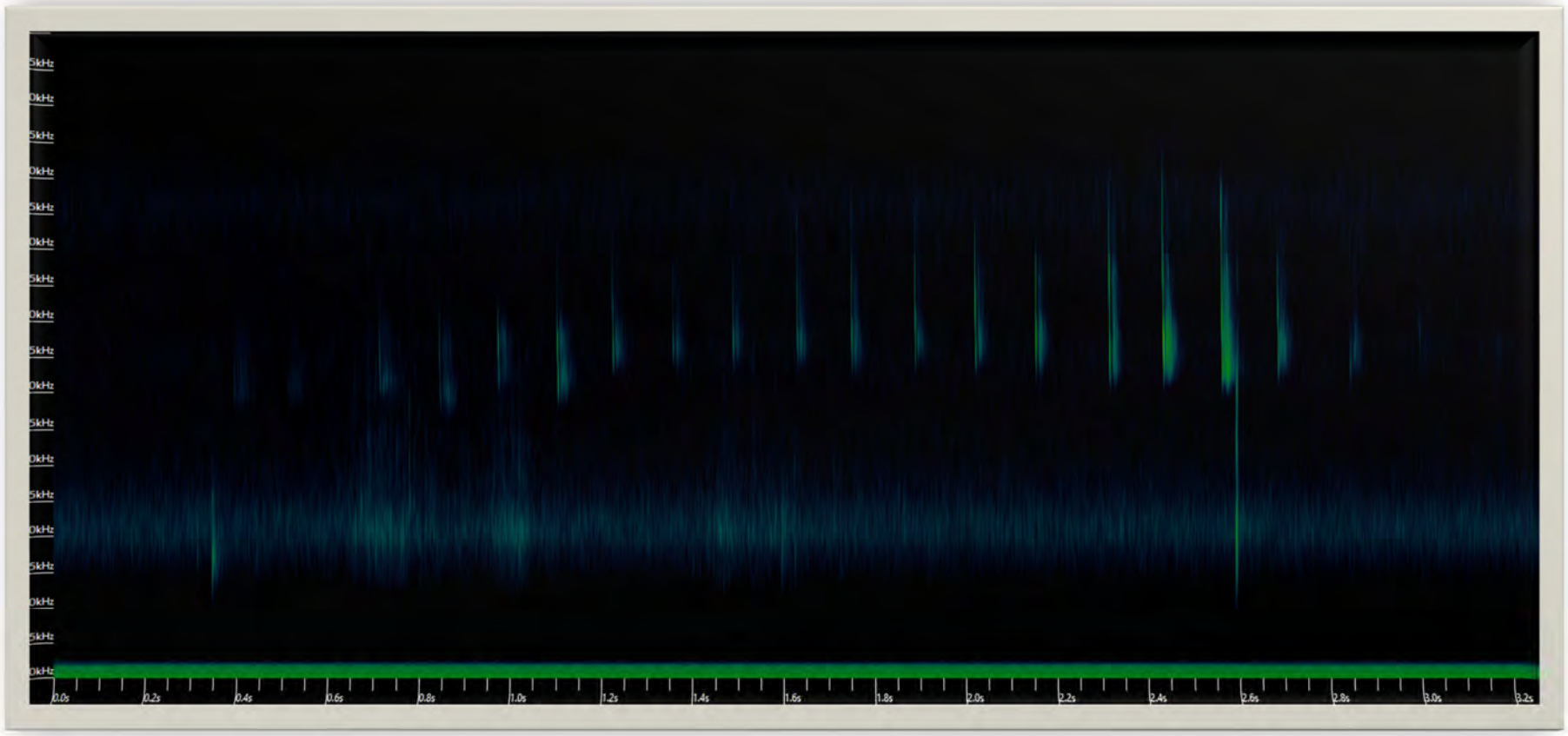
S4U11087_20210719_211610_000.00

This file contains a slightly out-of-range eastern red bat emitting a search phase call type and then switching to an approach phase call type as it flew into range.



S4U11087_20210719_213335_000.00

This file contains search phase and investigative pulses from an eastern red bat.

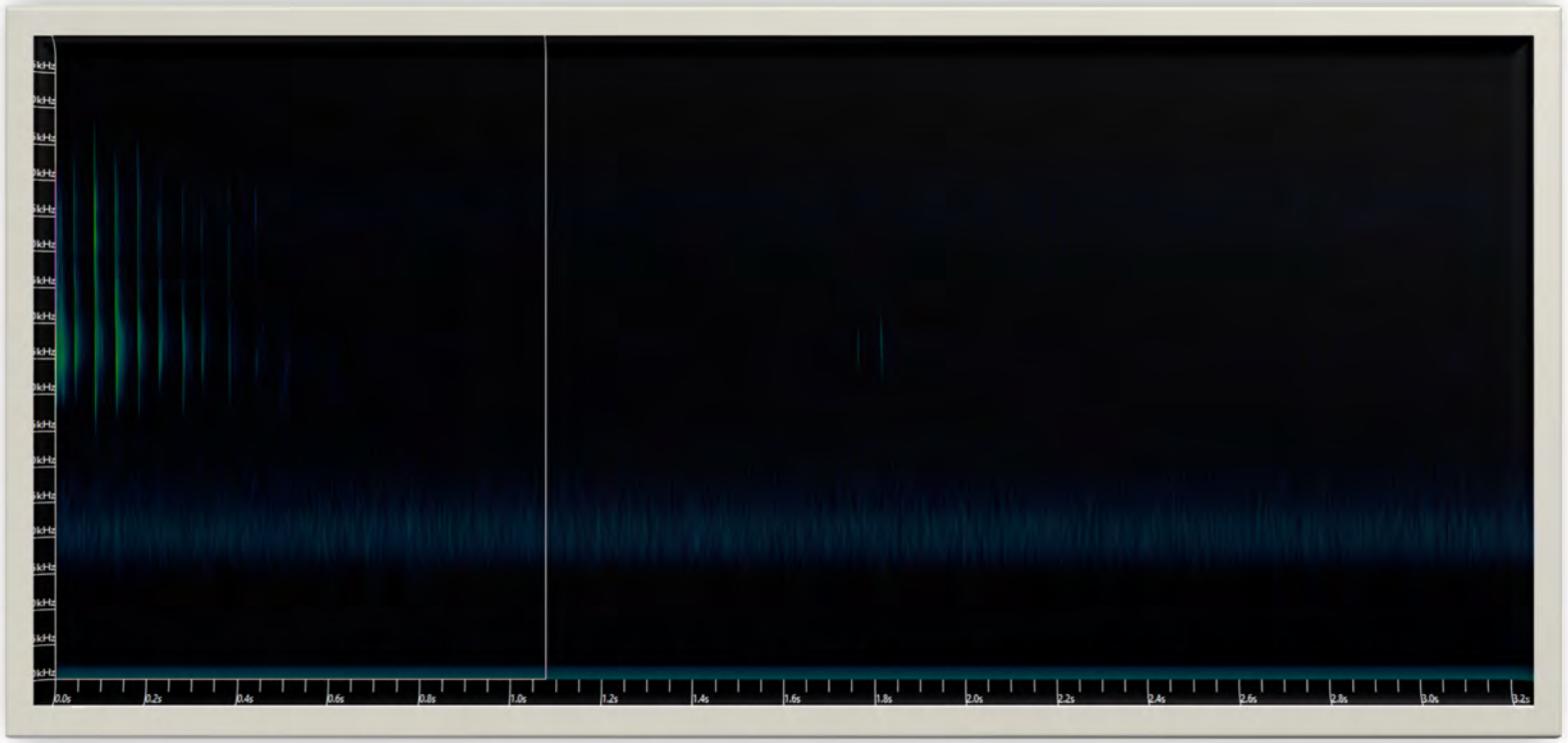


S4U11087_20210719_213045_000.00

This file contains an eastern red bat emitting a search phase call type.

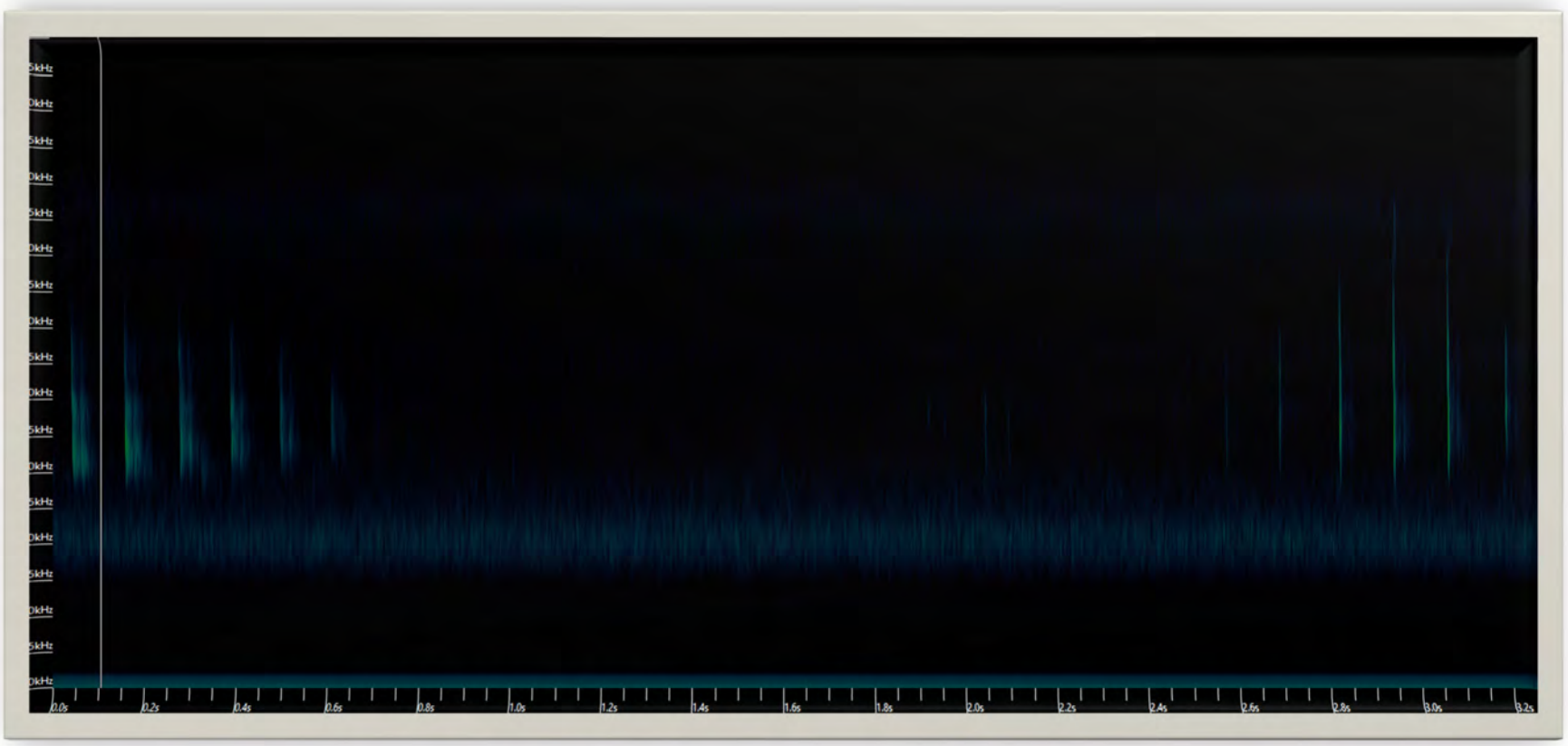
Classified files – northern long-eared bat

MLE+ probable presence determination by KPro of northern long-eared bat at site 5 occurred on night 1 and night 3. Both determinations were based off of 1 file per night. The MLE+ probable presence determination at site 41 was based off of 2 files. Three of the files were eastern red bats and the remaining, a big brown bat.



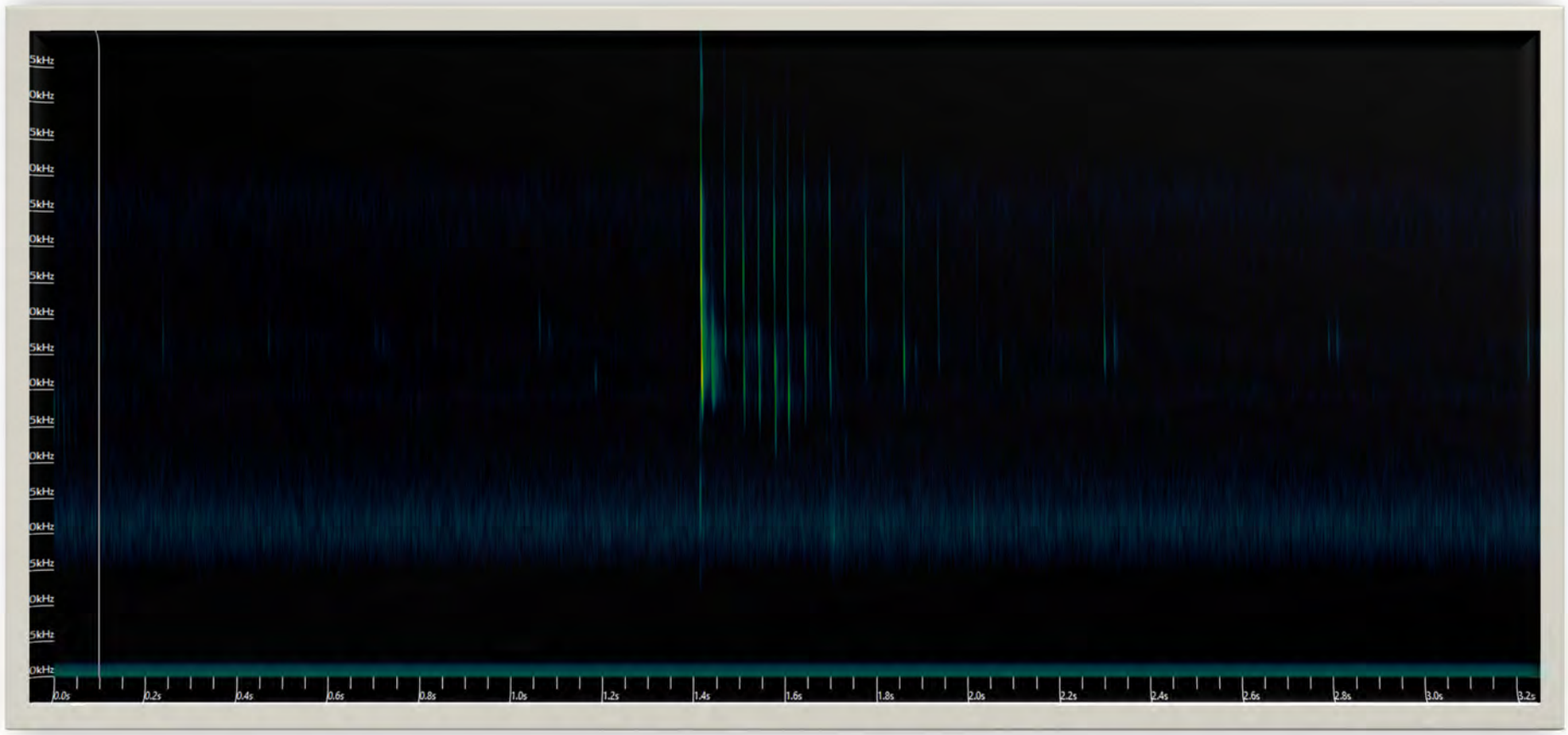
S4U10922_20210717_025858_000.00

This file contains an approach phase sequence of the eastern red bat and is relatively short in length at 9 pulses. These 9 pulses occur in the first 0.4s of the file. There are two high-frequency pulses detected around 1.8s of this nearly 4 second file.



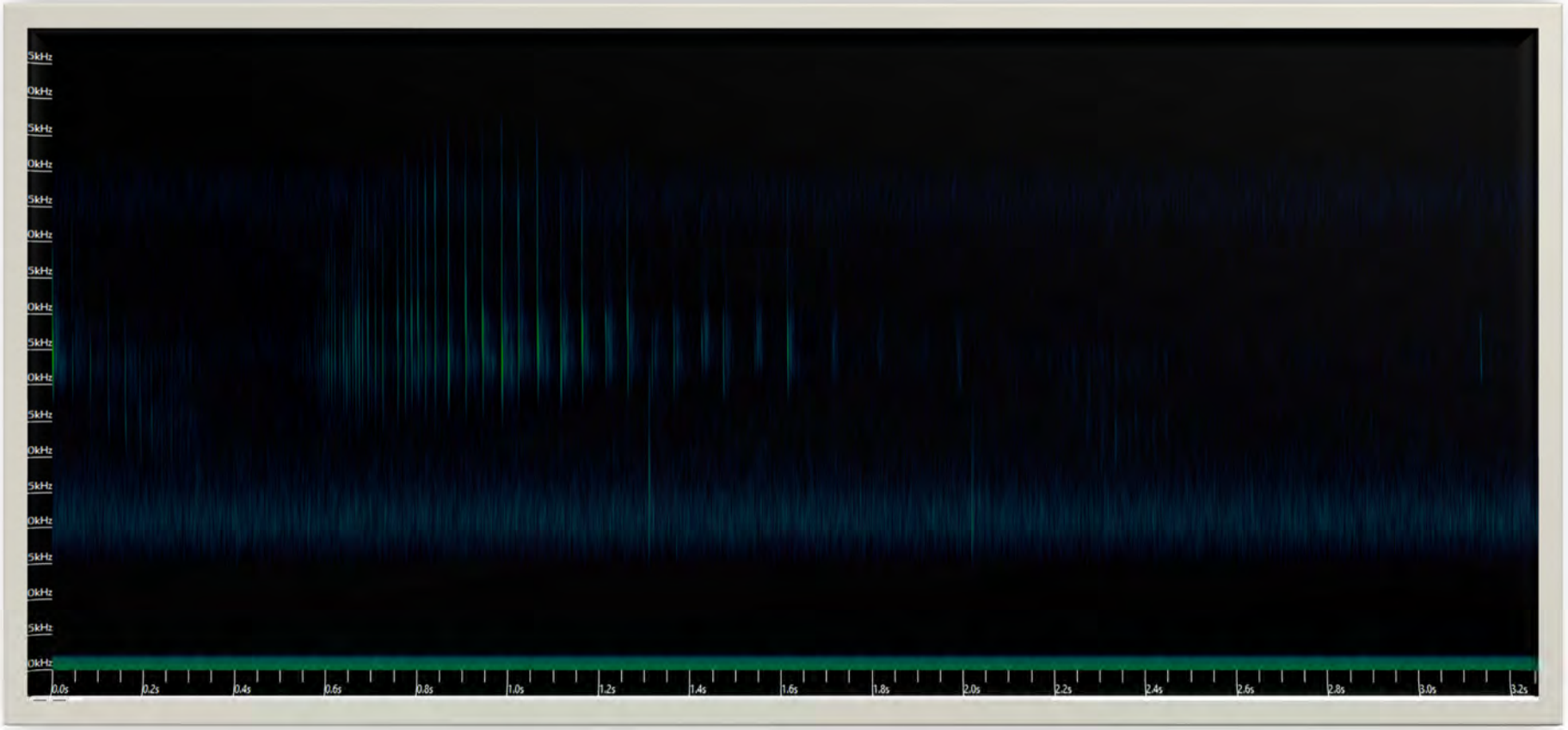
S4U10922_20210718_232623_000.00

This file contains echolocation pulses from a big brown. The bat was slightly out of range of the microphone therefore detected more ambient noise.



S4U11109_20210630_035558_000.00

This file contains approach phase calls from an eastern red bat as it approaches the microphone.



S4U11101_20210630_040230_000.00

This file contains approach phase to buzz feed call types as the eastern red bat flies into and then out of the microphone ran

5.0 Conclusion

Forty-nine area sites were surveyed with acoustic detectors for eight successful detector nights per site for a total of 392 detector nights for the Project.

Automated analysis determined statistical probable presence of the Indiana bat at one site and the northern long-eared bat at two sites. In response, a manual review was conducted. The review concluded that the probable presence statistically determined for both species was incorrect as no files which triggered the MLE+ results were made by *myotis* genus bat species.

The USFWS approved KPro MLE indicated presence of common bat species for the Riverbend Wind Energy Facility (Table 3, Table 4).

6.0 References

United States Fish and Wildlife Service (USFWS). 2020. *Range-wide Indiana Bat Survey Guidelines, Appendix H: Potential Hibernacula Survey Guidance.* March 2020.

Appendix A: US Fish and Wildlife Service (USFWS) Range-Wide Indiana Bat Survey Guidelines (March 23, 2020)

U.S. Fish and Wildlife Service

RANGE-WIDE INDIANA BAT SURVEY GUIDELINES

March 2020

Table of Contents

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RANGE-WIDE INDIANA BAT SURVEY GUIDELINES

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

INTRODUCTION

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

The following guidance is designed to determine whether Indiana bats are present[1] or absent (P/A)[2] at a given site during the summer (May 15 to August 15; Table 1). The phased-approach, which includes coordination with the USFWS[3], habitat assessments, and acoustic, mist-net, radio-tracking, emergence, "outer-tier project", and potential bat hibernacula surveys, supersedes all prior summer survey guidance. Future changes to this guidance may occur and will be posted on the USFWS Indiana bat survey guidance website (http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html). Please check this website to ensure use of the most current version of the guidance.

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

NOTE: These protocols can also be used for northern long-eared bat (NLEB) P/A summer surveys. The only differences from Indiana bat guidelines at present are 1) our definition of suitable summer habitat for NLEBs, 2) a weather-related exception in the northern portion of the NLEB range, and 3) that internal P/A surveys of potential hibernacula are not allowed for NLEB due to difficulty/low confidence in visually detecting their presence.

OBJECTIVES

The objectives of Indiana bat survey guidelines are to: (1) standardize range-wide survey procedures; (2) maximize the potential for detection/capture of Indiana bats at a minimum acceptable level of

[1] The guidance are not intended to be rigorous enough to provide sufficient data to fully determine population size or structure.
[2] Recognizing protocols are not 100% likely to detect Indiana bats when present and identification errors may occur.
[3] Coordinate with the appropriate state natural resource agencies and any involved federal agency(ies) whenever "USFWS" coordination is listed. USFWS FO(s) may direct project sponsors to state agencies for existing occurrence information. Coordinate with your local USFWS FO(s) to understand the process for their area of jurisdiction.
[4] Loeb et al. 2015 available at https://www.fort.usgs.gov/products/23886

effort; (3) make accurate presence/absence determinations; and (4) aid in conservation efforts for the species by identifying areas where the species is present.

BACKGROUND

In 2011, the USFWS developed a multi-agency team to determine whether improvements could be made to the 2007 Indiana Bat Mist-Net Protocols. The team included members of the four USFWS regions (Midwest, Northeast, Southeast, and Southwest) where Indiana bats are known to occur, representatives of state natural resource agencies from three of those four regions (Midwest, Northeast, and Southeast), and representatives from three federal agencies (U.S. Geological Survey (USGS), Department of Defense, and U.S. Forest Service). We obtained informal peer review of the draft guidelines in February 2012, gathered additional information in 2012, and made a revised version available for public comment in 2013 [78 FR 1879, January 9, 2013, and 78 FR 9409, February 8, 2013]. The USFWS implemented revised guidance in 2014. The USFWS made some additional revisions to the guidelines each year from 2015 to 2019. The USGS conducted initial independent testing of automated acoustic software programs during the winter of 2014-15 and continues to test new versions of available software using software testing procedures updated in January 2019[5]. The USFWS continues to make revisions to the guidelines each year as appropriate.

We considered the best available information for all aspects of the guidance. For example, please see our white paper[6] and 2018 addendum outlining the methodologies used to determine the minimum level of survey effort. The USFWS continues to work with local, State, and Federal biologists; scientific and academic institutions; commercial organizations; and other interested parties to collect additional data on the distribution, ecology, and biology of the Indiana bat and looks forward to receiving any additional pertinent information.

GENERAL PROCESS

Indiana bat surveys for some proposed projects will require modification (or clarification) of this guidance through coordination with the USFWS FO(s) responsible for the state(s) in which the project occurs[7]. If not already required by federal permit, federal action agencies and surveyors should develop a proposed survey study plan in coordination with the USFWS FO(s) so that all parties fully understand which methods will be deployed, what assumptions will be made, and what the various outcomes would be based on the results of each step. Project proponents may stop survey work at any point once an assumption or documentation of Indiana bat presence occurs. Pre-survey

[5] Revised USFWS Software Testing Procedures are discussed at: https://www.fws.gov/midwest/Endangered/mammals/inba/surveys/pdf/USFWS_Software_Testing_Procedures_13Jan2019.pdf

[6] The white paper and 2018 addendum are available at: http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

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

coordination typically will preclude the need for subsequent reviews of intermediate steps by USFWS FO(s) during the busy field season. An online directory of USFWS FO(s) is available at http://www.fws.gov/offices/. Unless otherwise agreed to by the USFWS, negative P/A survey results obtained using this guidance are valid for a minimum of five years[8] from their completion unless new information (e.g., other nearby surveys) suggest otherwise. If survey results are older than 5 years, please coordinate with the USFWS FO to discuss the pros and cons of conducting any additional surveys. If not already required by federal permit, please submit all results (negative or positive) from any phase to the USFWS FO(s). We strongly encourage this coordination as it improves the USFWS' understanding of (1) the level of survey effort underway and (2) the distribution of the species. A single report can be submitted at the end of all phases conducted for a given project.

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

Because surveys that result in the capture of Indiana bats result in take, such surveys should only be conducted by a qualified biologist[9]. Generally, a recovery permit for the Indiana bat authorizes the capture of bats for identification, and handling of bats for measurements, photography, and radio transmitter attachment; some (but not all) may also authorize entry into potential hibernacula to conduct internal surveys. Following this survey guidance will meet standard USFWS requirements; however, surveyors also need to ensure they meet all applicable state permitting and reporting requirements. Failure to follow the survey guidance, as written, and/or failure to follow a study plan which has received concurrence from the local USFWS FO(s), may result in a USFWS FO requesting additional survey effort.

The following provides a step-by-step outline of how Indiana bat summer surveys and/or potential hibernacula surveys should be conducted in 2020. Some of these steps can occur concurrently.

PHASE 1 – INITIAL PROJECT SCREENING

Step 1. Coordinate with the U.S. Fish and Wildlife Service Field Office(s)[10] regarding existing Indiana bat summer and/or winter occurrence information. [*Projects located within known Indiana bat summer habitat and/or known hibernacula/spring-staging/fall-*

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

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

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

***swarming zones will not proceed to Phase 2 of this process unless the project meets the definition of an "outer-tier project" outlined in Appendix G.*]**

a) If a project (located within or outside of a known maternity colony home range or spring-staging/fall-swarming zone of a known hibernaculum) is already covered under an existing Endangered Species Act (ESA) incidental take authorization (e.g., HCP, BO), then no further summer and/or potential hibernacula surveys are needed, follow the procedures previously authorized by the USFWS FO(s).

b) If there are known Indiana bat occurrences (e.g., known roost trees, capture locations, foraging locations or hibernacula) within the project action area[11]; **OR**

   if there are no known Indiana bat summer or spring/fall/winter occurrences within the proposed project area itself, but the project area is located within a known maternity colony home range and/or the spring-staging and fall-swarming zone of a known hibernaculum[12]; **OR**

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

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

a) If suitable summer habitat and/or a potential hibernaculum(a) is present within the action area, then proceed to Step 3.

b) If both suitable summer and winter habitat (i.e., potential hibernaculum) are absent within the action area, then no further P/A surveys are recommended; however, additional coordination with the USFWS FO(s) may be recommended if Indiana bats may be present in an action area during other seasons (e.g., spring and fall migration) and may be affected by the proposed project.

Step 3. Assess potential for adverse effects to Indiana bats.

a) If the project is not anticipated to result in adverse effects to Indiana bats (as proposed), then no further summer and/or potential hibernacula surveys are recommended, coordinate with the USFWS FO(s).

b) If the project may result in adverse effects to Indiana bats, but the impacts can be adequately assessed and conservation measures can be designed to minimize those effects without additional P/A information (this includes **all** proposed projects within known summer maternity colony home ranges and/or at known hibernacula and their

[11] The "action area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. [50 CFR Section 402.02]
[12] See USFWS Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (Questions 4 & 5) http://www.fws.gov/midwest/endangered/mammals/inba/WindEnergyGuidance.html

surrounding spring-staging and fall-swarming zones, but may include other areas as well), then no further surveys are recommended. Coordinate with the USFWS FO(s) regarding an assessment of the project's potential effects, development of conservation measures, determination of the need for any ESA incidental take authorization, and discussion of value of additional surveys.

c) If the project does not meet the conditions of 3a or 3b, then proceed to **Phase 2** and/or **Phase 5.**

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

Presence/probable absence of Indiana bats may be determined by conducting either Step 4 (mist-netting; see Appendix B) or Step 5 (acoustics; see Appendix C) as outlined below. It is the project proponent's choice as to which option to use, but they can only choose one method for each survey area unit (i.e., ≤123-acre area or 1-km section of linear project). Under no scenario can a project proponent use either mist-netting or acoustic Phase 2 surveys to challenge the other methods results. The USFWS accepts the results of either option and has no preference for methods. The USFWS FO(s) can discuss pros and cons of different approaches depending on project sponsor needs.

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

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

The summer survey season is from 15 May through 15 August[14] for either survey option. The minimum prescribed survey level of effort for any given survey area unit (i.e., ≤123-acre area or 1-km section of linear project) **cannot** be completed in a single calendar night regardless of which

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

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

survey method (netting or acoustic) is used (i.e., minimum survey effort must be spread over at least 2 calendar nights). If netting is chosen as the preferred P/A method and an Indiana bat(s) is captured, then surveyors may immediately begin Phase 4/radio-tracking. Project proponents must decide whether they will proceed to Phase 4 in coordination with the USFWS FO before any mist netting occurs. Submit Phase 2 study plans to USFWS FO prior to conducting surveys.

Step 4. Conduct Mist-Netting Surveys following Recovery Unit-based Protocols[15] (see Figures 1 and 2 and Appendix B)

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

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

Non-linear projects: a minimum of 42 net nights per 123 acres (0.5 km^2) of suitable summer habitat.

For example:

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

*Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

a) If no capture of Indiana bats, then no further summer surveys are recommended[16].

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

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

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

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km^2) of suitable

[15] The Indiana bat populations in the Northeast and Appalachia Recovery Units have been most heavily impacted by white-nose syndrome to date; therefore, we recommend higher survey effort when compared to the Midwest and Ozark-Central Recovery Units. We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Level of effort is based on detection probabilities and occupancy estimates that were derived from past survey efforts that used the same acreage threshold. Level of effort is designed to reach 90% confidence in negative survey results (see Niver et al. 2013).

[16] NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase "no further summer surveys are recommended" occurs within this document, the USFWS FO(s) is in affect assuming probable absence of Indiana bats.

summer habitat.

For Example:

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

The sampling period for each net shall begin at sunset[17] and continue for at least 5 hours (longer survey periods may also improve success).

*Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

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

OR

Step 5. Conduct Acoustic Surveys[18] (see Figures 1 and 2 and Appendix C)

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

Non-linear projects: a minimum of 8 detector nights per 123 acres (0.5 km^2) of suitable summer habitat.

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

For example:

- 4 detectors for 2 nights each (can sample the same location or move within the site)
- 2 detectors for 4 nights each (can sample the same location or move within the site)
- 1 detector for 8 nights (must sample at least 2 locations and move within the site – we recommend evenly distributing LOE among locations)

The acoustic sampling period for each site must begin at sunset[19] and end at sunrise each

[17] Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: http://aa.usno.navy.mil/data/docs/RS_OneYear.php

[18] Acoustic surveys are available as a Presence/Absence option throughout the range (i.e., Northeast, Appalachian, Midwest, and Ozark-Central Recovery Units).

[19] Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: http://aa.usno.navy.mil/data/docs/RS_OneYear.php

night of sampling.

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

i) If no positive detection of HF calls[20] (≥35 kHz) or myotid calls, no further summer surveys recommended.

ii) If positive detection of HF or myotid calls, then
(a) proceed to Step 6 for further acoustic analysis; **OR**
(b) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
(c) assume presence and proceed to **Phase 3**.

Step 6. Conduct Automated Acoustic Analyses for each site that had HF or Myotid calls from Step 5 or ALL sites if Step 5 was not conducted.
(NOTE: cannot skip this step and proceed directly to Step 7)

Use **one or more** of the currently available 'approved' acoustic bat ID programs[21] (use most current approved software versions available and manufacturer's recommended settings for Indiana bat P/A surveys). 'Candidate' programs are not yet approved by USFWS for stand-alone use for Indiana bat P/A surveys, but may be used in conjunction with one or more of the approved programs. Include your plans for which specific software program(s) you will use in your survey study plan and submit for USFWS FO(s) review prior to conducting surveys. Beginning with acoustic data from night one at each acoustic site, run each night's data for each site through your chosen ID program(s). Review results by site by night from each acoustic ID program used[22].

a) If Indiana bat presence is considered unlikely by all of the approved and candidate program(s) used in analysis, then no further summer surveys recommended.

b) If Indiana bat presence is considered likely at one or more sites on one or more nights by any approved or candidate program(s) used in analysis, then

i) proceed to Step 7 for qualitative ID; **OR**
ii) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
iii) assume presence and proceed to **Phase 3**.

Step 7. Conduct Qualitative Analysis of Calls.

At a minimum, for each detector site/night a program considered Indiana presence likely

[20] HF calls are defined as individual call pulses whose minimum frequency is ≥35 kHz.
[21] Approved and candidate programs are listed at http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/inbaAcousticSoftware.html
[22] The approved acoustic identification programs all have implemented a maximum likelihood estimator (MLE) at this time. If the analysis of collected calls at a given site on a given night results in the probable presence of Indiana bats with high levels of certainty ($P<0.05$), then select one of the options available in Step 6b.

(from MLE results) review all files (including no IDs) from that site/night. Qualitative analysis[23] (i.e., manual vetting) must also include a comparison of the results of each acoustic ID program by site and night (see Reporting Requirements in Appendix C).

a) If no visual confirmation of probable Indiana bats, then no further summer surveys recommended[24].

b) If visual confirmation of probable Indiana bats, then

   i) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
   ii) assume presence and proceed to **Phase 3**.

PHASE 3. CONDUCT MIST-NETTING SURVEYS TO CAPTURE INDIANA BATS.

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

a) If no Indiana bats are captured, then coordinate with the USFWS FO.

b) If Indiana bats are captured, then proceed to **Phase 4**.

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

PHASE 5. CONDUCT POTENTIAL HIBERNACULA SURVEYS

(See Appendix H)

REFERENCES

Amelon, S.K. 2007. Multi-scale factors influencing detection, site occupancy, and resource use by foraging bats in the Ozark Highlands of Missouri. PhD Dissertation. University of Missouri – Columbia.

Duchamp, J.E., M. Yates, R. Muzika, and R.K. Swihart. 2006. Estimating probabilities of detection for bat echolocation calls: an application of the double-observer method. Wildlife Society Bulletin 34(2):408-412.

[23] Qualitative analysis of each acoustic site and night with probable detections of Indiana bats during Step 6 must include the entire night's high-frequency call data and not just those files making it through the acoustic analysis tools as probable Indiana bats.

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

Loeb, S.C., T.J. Rodhouse, L.E. Ellison, C.L. Lausen, J.D. Reichard, K.M. Irvine, T.E. Ingersoll, J.T.H. Coleman, W.E. Thogmartin, J.R. Sauer, C.M. Francis, M.L. Bayless, T.R. Stanley, and D.H. Johnson. 2015. A plan for the North American Bat Monitoring Program (NABat). General Technical Report SRS-208. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 112 p.

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TABLE 1. Standard survey seasons for conducting P/A surveys for Indiana bats.

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

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

[2] conducted using harp traps or mist nets at cave/mine entrances.

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

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

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

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

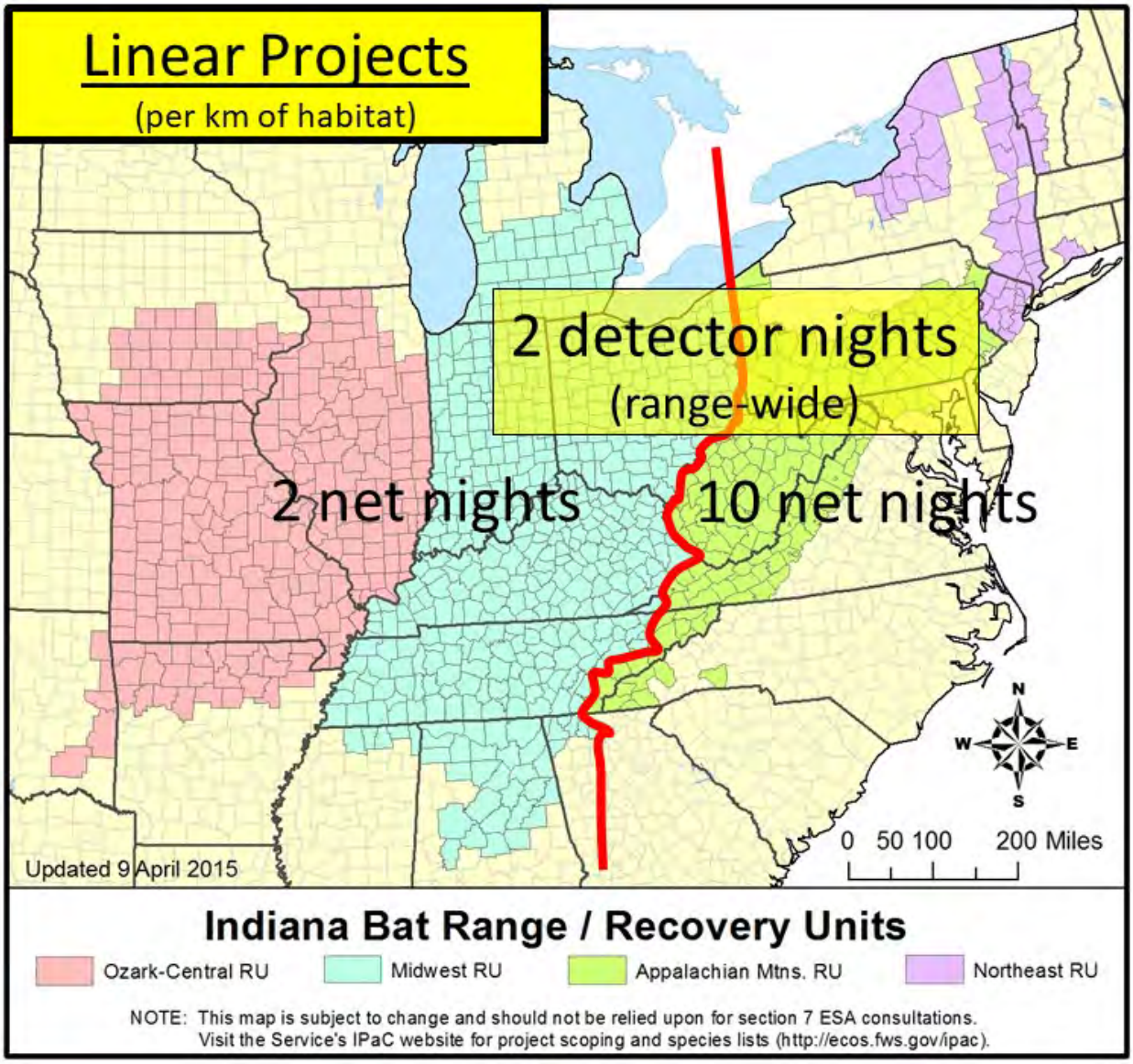

FIGURE 1. Minimum survey level of effort for mist netting and/or acoustic options for linear projects by recovery unit.

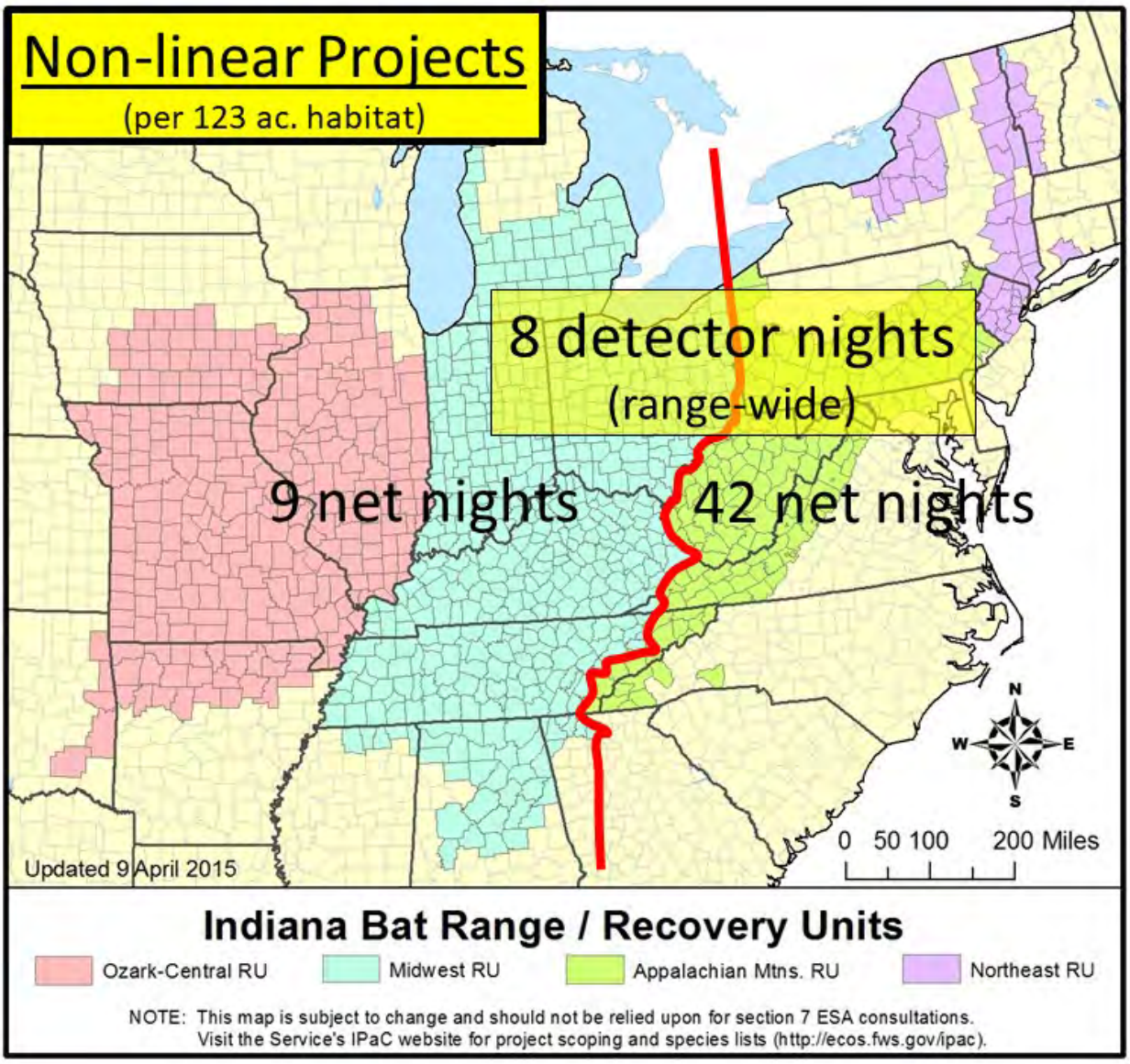

FIGURE 2. Minimum survey level of effort for mist netting and/or acoustic options for non-linear projects by recovery unit.

APPENDIX A: PHASE 1 HABITAT ASSESSMENTS

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

PERSONNEL

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

DEFINITION FOR POTENTIALLY SUITABLE INDIANA BAT SUMMER HABITAT

Suitable summer habitat for Indiana bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats[25] such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches dbh[26] (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat.

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

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

Indiana bats have also been observed roosting in human-made structures, such as bridges and bat houses (artificial roost structures); therefore, these structures should also be considered potential summer habitat[27]. We recommend that project proponents or their representatives coordinate with the appropriate USFWS Field Office to more clearly define suitable habitat for their particular region as some differences in state/regional suitability criteria may be warranted (e.g., high-elevation areas may be excluded as suitable habitat in some states).

Examples of unsuitable habitat:

- Individual trees that are greater than 1,000 feet from forested/wooded areas;
- Trees found in highly-developed urban areas (e.g., street trees, downtown areas); and
- A pure stand of less than 3-inch dbh[28] trees that are not mixed with larger trees.

DEFINITION FOR POTENTIALLY SUITABLE NORTHERN LONG-EARED BAT SUMMER HABITAT

Suitable summer habitat for NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat[29]. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat[30]. NLEBs typically occupy their summer habitat from mid-May through mid-August each year[31] and the species may arrive or leave some time before or after this period.

Examples of unsuitable habitat:

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

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

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

[29] This number is based on observations of bat behavior indicating that such an isolated tree (i.e., ≥1000 feet) would be extremely unlikely to be used as a roost. This distance has also been evaluated and vetted for use for the Indiana bat. See the "Indiana bat Section 7 and Section 10 Guidance for wind Energy Projects," question 33, found at: http://www.fws.gov/midwest/endangered/mammals/inba/WindEnergyGuidance.html

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

[31] Exact dates vary by location.

APPENDIX A: PHASE 1 HABITAT ASSESSMENTS

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

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

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

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

1. A statement as to which type of P/A surveys will be conducted (i.e., mist netting or acoustic surveys) and how the proposed survey level of effort (i.e., total # of net nights or detector nights) was calculated/determined;
2. A map depicting the proposed number of survey sites (mist netting or acoustic) and their tentative distribution throughout the project area;
3. A tentative list of surveyors names and copies of relevant federal permits (if applicable);
4. A tentative survey schedule (e.g., start date, duration, end date);
5. For mist netting surveys with planned Phase 4 radio-tracking – the approximate number and distribution of transmitters (e.g., prioritization of sex/age, maximum number per site)

and a request that bats targeted for tracking may be held for up to 45 minutes[32] to allow for application of transmitters; and

6. For acoustic surveys - information on which specific program(s) will be used and what level of acoustic analyses will be conducted.

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

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

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

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: _____ Date: _____

Township/Range/Section: _____

Lat Long/UTM/ Zone: _____ Surveyor: _____

Brief Project Description

Project Area

	Total Acres	Forest Acres	Open Acres
Project			

	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
Proposed Tree Removal (ac)			

Vegetation Cover Types

Pre-Project	Post-Project

Landscape within 5 mile radius

Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

Proximity to Public Land

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

Use additional sheets to assess discrete habitat types at multiple sites in a project area

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

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

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

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

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

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____

Additional Comments:

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

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

APPENDIX B: PHASE 2 or 3 MIST-NETTING

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

SUMMER MIST-NETTING SEASON: May 15[33] – August 15[34]

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

PERSONNEL

A qualified biologist(s)[35] must (1) select/approve mist-net set-ups in areas that are most suitable for capturing Indiana bats, (2) be physically present at each mist-net site throughout the survey period, and (3) confirm all bat species identifications. This biologist may oversee other biological technicians and manage mist-net set-ups in close proximity to one another as long as the net-check timing (i.e., every 10 minutes) can be maintained while **walking** between nets.

COORDINATION WITH USFWS FO(s)

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

EQUIPMENT

Use the finest, lowest visibility mesh mist-nets commercially available, as practicable. Currently, the finest net on the market is 75 denier, 2 ply, denoted 75/2 (Arndt and Schaetz 2009); however, the 50 denier nets are still acceptable for use at this time. The finest mesh size available is approximately 1½ inches (38 millimeters).

[33] Due to concerns with transmission of white-nose syndrome, some USFWS FO(s) and state natural resource agencies have delayed the start of the Indiana bat summer field survey season/mist-netting until June 1. Surveyors/applicants should always coordinate with local USFWS FO(s) and state natural resource agencies before beginning surveys.
[34] With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15.
[35] A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for Indiana bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to net and handle Indiana bats. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

No specific hardware is required. There are many suitable systems of ropes and/or poles to hold nets. The system of Gardner et al. (1989) has been widely used. See NET PLACEMENT for minimum net heights, habitats, and other netting requirements that affect the choice of hardware.

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

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

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

Conduct Mist-Netting Surveys following Recovery Unit-based protocols[36] (See Figures 1 and 2)

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

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

Non-linear projects: a minimum of 42 net nights per 123 acres[37] (0.5 km^2) of suitable summer habitat.

For example:

- 7 sites[38], 2 nets[39]/site for 3 calendar nights = 42 net nights
- 7 sites, 3 nets/site for 2 calendar nights = 42 net nights
- 3 sites, 2 nets/site for 7 calendar nights* = 42 net nights

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

[37] We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Detection probabilities and occupancy estimates were derived from past survey efforts that used the same acreage threshold (see Niver et al. 2013).

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

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

Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

a) If no capture of Indiana bats, then no further summer surveys are recommended[40].
b) If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

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

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

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km^2) of suitable summer habitat.

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

Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

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

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

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

a) If no Indiana bats are captured, then coordinate with the USFWS FO.
b) If Indiana bats are captured, then proceed to **Phase 4** as previously decided in coordination with the FO(s).

[40] NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase "no further summer surveys are recommended" occurs within this document, the USFWS FO(s) is in affect assuming probable absence of Indiana bats during the summer.

NET PLACEMENT

Potential travel corridors (e.g., streams, logging trails) typically are the most effective places to net (although other places may also be productive; see Carroll et al. 2002). Place nets approximately perpendicular across the corridor. Nets should fill the corridor from side to side, extending beyond the corridor boundaries when possible, and from stream (or ground) level up to the overhanging canopy. Nets of varying widths and heights may be used as the situation dictates. A typical set is at least 5 m to 9 m high consisting of two or more nets stacked on top one another and from 6 m to 18 m wide. If netting over water, ensure there is enough space between the net and the water so that captured bats will not get wet.

Occasionally it may be necessary or desirable to net where a suitable corridor is lacking. The typical equipment described in the section above may be inadequate for these situations, requiring innovation on the part of the surveyor (see Humphrey et al. 1968). See Kiser and MacGregor (2005) for additional discussion about net placement.

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

SURVEY PERIOD

The survey period for each net shall begin at sunset[41] and continue for at least 5 hours (longer survey periods may also improve success).

CHECKING NETS

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

[41] Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: http://aa.usno.navy.mil/data/docs/RS_OneYear.php.

Capture and handling are stressful for bats. Emphasis should be on minimizing handling and holding bats to as short a time as possible to achieve field study objectives. Indiana bats should not be held for more than 30 minutes after capture, unless the individual is targeted for radio-tracking. Bats targeted for radio-tracking should be released as quickly as possible, but no longer than 30 minutes[42] after capture, or as allowed in federal and state permits. See Kunz and Kurta (1988) for general recommendations for holding bats.

WEATHER, LIGHTING, AND OTHER ENVIRONMENTAL CONDITIONS

Severe weather adversely affects capture of bats. Some Indiana bats may remain active despite inclement weather and may still be captured while others in the same area become inactive. Therefore, negative surveys combined with any of the following weather conditions throughout all or most of a sampling period are likely to require an additional night of mist-netting[43]: (a) temperatures that fall below 50°F (10°C)[44]; (b) precipitation, including rain and/or heavy fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/seconds; 3 on Beaufort scale) for 30 or more minutes.

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

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

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

DOCUMENTATION OF INDIANA BAT CAPTURES

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

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

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

[44] If using this guidance for NLEB: Overnight survey temperatures may be lower in northern portions of the NLEB range, please coordinate with the local USFWS FO in the northern portion of the range for any variation in temperature requirements.

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

Photo-documentation should include diagnostic characteristics:

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

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

SUBMISSION OF MIST-NETTING RESULTS

Provide results of netting surveys to the appropriate USFWS FO(s) in accordance with previously agreed upon[45] timeframes and formats[46]. If Indiana bats are captured, this report should also include the results of subsequent radio-tracking and emergence counts. Reports should include the following:

1. Copy of prior phase reports (if not previously provided).
2. Explanation of any modifications from original survey plan (e.g., altered net locations).[47]
3. Description of net locations (including site diagrams), net set-ups (include net heights), survey dates, duration of surveys, weather conditions, and a summary of findings.
4. Map identifying netting locations and information regarding net set-ups, including lat/long or UTM, individual net placement, net spacing (i.e., include mist-netting

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

[46] In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using the standardized permit reporting spreadsheets available on the R3 Indiana Bat Summer Survey Guidance webpage (http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html).

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

equipment in photographs of net locations), and adequate justification if net set-ups are not evenly distributed across suitable habitat within the project area.

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

REFERENCES

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Sample Data Sheets for Indiana Bat Surveys

Site No.				Project/Firm:								Date:
Location:												
County:				State:		Quad:						Quadrant:
Lat/Long (DMS):		N		W				Zone:				Surveyors:

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
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21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

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

Moon Phase:		%
	Rise	Set
Moon:		
Sun:		

Time	Temp	Sky	Wind	# Bats
Avg				

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

Sample Data Sheets for Indiana Bat Surveys

Net Site Diagram	Dominant Vegetation
	1
	2
	3
	4
	5

Net Site(s) by Habitat				
Habitat	A	B	C	
River				
Stream				
Pond				
Road Rut				
Corridor				
Cave/mine				
Total				

No. of Poles X Net length				
A	=		X	
B	=		X	
C	=		X	
D	=		X	

Other Species:

Comments:

APPENDIX C: PHASE 2 ACOUSTIC SURVEYS

SUMMER ACOUSTIC SURVEY SEASON: May 15 – August 15[48]

PERSONNEL[49]

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

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

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

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

COORDINATION WITH USFWS FO(s)

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

DETECTOR AND MICROPHONE REQUIRED CHARACTERISTICS

Full-spectrum (FS) and/or zero-crossing (ZC) detectors are suitable for use in this survey protocol. Directional, hemispherical, and omnidirectional microphones are acceptable for acoustic surveys. The use of external microphones on an extension cable is the preferred deployment as it further limits

[48] With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15.
[49] Coordinate with your local FO regarding any state-specific requirements.

degradation of call quality. Recording without directional horns on hemispherical and omnidirectional microphones is preferred as the addition of these systems may result in some signal degradation and directional microphones are commercially available.

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

ACOUSTIC SAMPLING PROTOCOL

Detector/Microphone Placement

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

Many features (e.g., vegetation, water, wind turbines, high-tensile power-lines, micro-wave towers) can obstruct and reflect call sequences recorded in the field and thereby reduce the surveyor's ability to record high-quality bat call sequences. The following recommendations are provided to aid surveyors in their selection of acoustic sites (also see Chenger and Tyburec 2014). If surveyors choose acoustic sites outside of these recommendations, then adequate justification for doing so should be provided with the acoustic survey report provided to the USFWS FO(s); otherwise, results from these sites will not be accepted. Surveyors should deploy microphones: (a) at least 10 feet (3 meters) in any direction from vegetation or other obstructions (Hayes 2000; Weller and Zabel 2002; Chenger and Tyburec 2014); (b) in areas without, or with minimal[50], vegetation within 100 feet (30 meters) of highly directional microphones or 33 feet (10 meters) from other microphones; (c) parallel to woodland edges; and (d) at least 49 feet (15 meters) from known or suitable roosts[51] (e.g., trees/snags, buildings, bridges, bat houses, cave or mine portal entrances).

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

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

Elevating a detector greater than 3 meters above ground level (AGL) vegetation may dramatically improve recording quality. Microphones can be attached horizontally to a pole to listen out into flight space, rather than just listening up from the ground. This will serve to increase the volume of airspace sampled and avoid the distortion effect of recording near the ground. However, the relationship between the zone of detection and the vegetation, not the placement of the detector is the most important consideration during site selection.

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

Verification of Deployment Location

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

Verification of Proper Functioning

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

It is also recommended to ensure equipment is working during set-up in the field. This can be done simply by producing ultrasound (e.g., finger rubs, calibrator, or follow the equipment manufacturer's testing recommendations) in front of the microphone at survey start and survey finish. These tests document that the equipment was working when deployed and when picked up (and by assumption throughout the entire period). Detector field settings (e.g., sensitivity, frequency, etc.) should follow the recommendations provided by the manufacturer. Surveyors should also save files produced by detectors (e.g., log files, status files, sensor files) as an excellent way to provide documentation when equipment was functioning within the survey period. Many types of detectors allow for setting timers that initiate and end recording sessions. This saves battery life as well as reducing the number of extraneous noise files recorded. However, if the units are visited when the timer is on (i.e., unit is in standby mode), the surveyor cannot verify that the unit is functioning properly. This is particularly important in areas where no bat activity is recorded for the entire night or during the last portion of the night. In these cases, if the surveyor cannot demonstrate that the detector was indeed functioning properly throughout the survey period, then the site will need to be re-sampled, unless adequate justification can be provided to the USFWS FO(s).

Selection of acoustic sites is similarly important. Suitable set-up of the equipment should result in high-quality call sequences that are adequate for species identification. Nights of sampling at individual sites that produce no bat calls may need to be re-sampled unless adequate justification (e.g., areas with significant bat population declines due to WNS) can be provided to the USFWS FO(s). Modifications of the equipment (e.g., changing the orientation and/or microphone type) at the

same location on subsequent nights may improve quantity and quality of call sequences recorded, which can be determined through daily data downloads. If modifications of the equipment do not improve call identification, then the detectors will need to be moved to a new location.

Orientation

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

Weather Conditions

If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night[52]: (a) temperatures fall below 50°F (10°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours of the survey period. At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports.

Weatherproofing

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

For directional microphones, the use of a polyvinyl chloride (PVC) tube[53], generally in the form of a 45-degree elbow the same diameter as the microphone (Britzke et al. 2010) is acceptable, if the situation requires the use of after-market weatherproofing. The microphone should be placed facing

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

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

the open end of the elbow and as close to the opening as is consistent with the aim of weatherproofing. The microphone should be pointing at an angle below horizontal so water will not collect in it. Corben & Livengood (2014) showed that the direction of greatest sensitivity of tubes like this varies greatly depending on details of the specific tube shape and the exact position of the microphone. Often the greatest sensitivity will be pointed up at a substantial angle (up to 45 degrees) above horizontal when the microphone itself is pointing 45 degrees below horizontal. Users should be aware of the characteristics of the setup they use so they can know what region is actually being sampled. Again, the preferred option for weatherproofing detectors is to detach the microphone from the detector so that the detector can be placed in a weatherproof container but the microphone (tethered by a cable) remains unobstructed.

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

MINIMUM LEVEL OF EFFORT (applies to all Recovery Units/range-wide) (See Figures 1 and 2)

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

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

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

Non-linear projects: a minimum of 8 detector nights per 123 acres (0.5 km^2) of suitable summer habitat.

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

For example:

- 4 detectors for 2 nights each (can sample the same location or move within the site)
- 2 detectors for 4 nights each (can sample the same location or move within the site)
- 1 detector for 8 nights (must sample at least 2 locations and move within the site – we recommend evenly distributing LOE among locations)

The acoustic sampling period for each site must begin at sunset[54] and ends at sunrise each night of sampling.

ANALYSIS OF RECORDED ECHOLOCATION CALLS

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

a) If no positive detection of HF calls[55] (≥35 kHz) or myotid calls, no further summer surveys recommended.

b) If positive detection of HF or myotid calls, then
   i) proceed to Step 6 for further acoustic analysis; **OR**
   ii) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
   iii) assume presence and proceed to **Phase 3**.

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

Use **one or more** of the currently available 'approved' acoustic bat ID programs[56] (use most current approved software versions available and manufacturer's recommended settings for Indiana bat P/A surveys) as previously identified in your Phase 2 study plan. 'Candidate' programs are not yet approved by USFWS for stand-alone use for Indiana bat P/A surveys, but may be used in conjunction with one or more of the approved programs. Include your plans for which specific software program(s) you will use in your survey study plan and submit for USFWS FO(s) review prior to conducting surveys. Beginning with acoustic data from night one at each acoustic site, run each night's data for each site through your chosen ID program(s). Review results by site by night from each acoustic ID program used[57].

a) If Indiana bat presence is considered unlikely by the approved and candidate program(s) used in analysis, then no further summer surveys recommended.

b) If Indiana bat presence is considered likely at one or more sites on one or more nights by any approved or candidate program(s) used in analysis, then
   i) proceed to Step 7 for qualitative ID; **OR**
   ii) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
   iii) assume presence and proceed to **Phase 3**.

Step 7. Conduct Qualitative Analysis of Calls.

[54] Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: http://aa.usno.navy.mil/data/docs/RS_OneYear.php

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

[56] Approved and candidate programs are listed at http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/inbaAcousticSoftware.html

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

At a minimum, for each detector site/night a program considered Indiana presence likely, review all files (including no IDs) from that site/night. Qualitative analysis[58] (i.e., manual vetting) must also include and present within a written report a comparison of the results of each acoustic ID program by site and night (see Reporting Requirements below).

a) If no visual confirmation of probable Indiana bats, then no further summer surveys recommended[59].

b) If visual confirmation of probable Indiana bats, then

i) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
ii) assume presence and proceed to **Phase 3**.

SUBMISSION OF ACOUSTIC SURVEY RESULTS

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

Provide results of acoustic surveys to the appropriate USFWS FO(s) within 10 days of completing the survey unless otherwise agreed upon with the local USFWS FO(s)[60]. Each acoustic survey report should include the following[61] (also, see checklist at end of this appendix):

1. Copy of habitat assessment (if not previously provided)
2. Explanation of any modifications from original survey plan (e.g., altered site locations)[62]
3. Full names of all personnel conducting acoustic surveys, including those that selected acoustic sites and deployed detectors
4. Full name and resume of individual(s) conducting qualitative acoustic analyses (if applicable)

[58] Qualitative analysis of each acoustic site and night with probable detections of Indiana bats during Step 6 should include the entire night's high frequency call data, including "no ID" files, and not just those files making it through the acoustic analysis tools as probable Indiana bats in Step 6.
[59] If you identify any suspected mis-identifications from programs, the Service will share those results with the software manufacturer(s) and the USGS to assist with future improvements and testing of software.
[60] As discussed in the Introduction, we encourage coordination with USFWS FO(s) prior to implementation of any surveys to ensure that all parties agree upon the need for surveys, the methods proposed, and the decisions from various survey results.
[61] In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using the standardized permit reporting spreadsheets available on the Indiana Bat Summer Survey Guidance webpage (http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html).
[62] If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods.

5. Description of acoustic monitoring sites, survey dates, duration of survey, weather conditions, and a summary of findings
6. Table with information on acoustic monitoring and resulting data, including but not limited to: detector GPS coordinates for each detector, survey dates, survey hours
7. Map identifying acoustic detector locations and a corresponding table including the GPS coordinates. Include arrow(s) showing direction(s) of microphone(s)
8. Photographs documenting the location of each detector, the orientation of the detector, and the intended sampling area. Please include detector and something for scale (e.g., vehicle, person) in photographs of acoustic sites
9. Description of acoustic detector and microphone brand(s) and model(s) used, microphone type, use of weatherproofing, acoustic monitoring equipment settings (e.g., sensitivity, audio division ratios), deployment data (i.e., deployment site, habitat, date, time started, time stopped, orientation), and call analysis methods used
10. A description of how proper functioning of bat detectors was verified
11. Discussion of what software program(s) was/were used (including settings)
12. Acoustic detector log files renamed by site identifier
13. Acoustic analysis software program output/summary results by site by night (i.e., number of calls detected, species composition, MLE results, settings files)
14. Discussion for any site/nights with zero bat calls (were additional nights added? was detector functioning? was placement appropriate?)
15. If manual vetting was used, discussion of how this was done (e.g., what keys were used?)
16. If manual vetting was used, detailed analysis and results of any qualitative acoustic analysis conducted on those projects where a program(s) considered Indiana bat presence likely, including justification for rejecting any program MLE results (if applicable). We recommend providing a table with each species ID from the program(s), suggested species ID from manual vetting, and rationale for any changes.
17. Any other information requested by the local USFWS FO(s) related to the project

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General Checklist for Acoustic Surveys of Indiana Bats

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

.

ACOUSTIC SURVEY INFO

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

ACOUSTIC ANALYSIS INFO

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

APPENDIX D: PHASE 4 RADIO-TRACKING

PERSONNEL

Transmitter Attachment: A qualified biologist[63] who is experienced in handling Indiana bats and attaching radio transmitters must perform transmitter attachments, as further explained in the protocol below.

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

METHODS

If one or more Indiana bats are captured, the following radio-tracking protocols will be applicable:

1. Biologists should coordinate in advance with USFWS FO(s) regarding recommendations for the number and distribution of transmitters (e.g., prioritization of sex/age, maximum number per site) and whether foraging data would be beneficial to collect. Also, professional judgment should be used to determine whether attachment of transmitters could compromise the health of a bat. Since the maximum holding times for Indiana bats targeted for radio-tracking is 30 minutes[64], or as allowed in federal and state permits, surveyors should be prepared to place transmitters on bats immediately following their capture to minimize holding times.

2. The radio transmitter, adhesive, and any other markings (e.g., wing bands) should weigh less than 5% of pre-attachment body weight (Aldridge and Brigham 1988, American Society of Mammalogists 1998), the total weight of the package (transmitter and adhesive) may not exceed 6% of the bat's body weight, and must comply with any USFWS and state permits. In all cases, the lightest transmitters capable of the required task should be used, particularly with pregnant females and volant juveniles. With pregnant bats, biologists should always use the lightest transmitter possible but no more than 5% of their expected non-pregnant weight.

3. Proposed radio telemetry equipment (e.g., receivers, antennas, and transmitters) and frequencies should be coordinated with the appropriate state natural resource agency and USFWS FO(s).

4. The qualified biologist or biological technician(s) should track all radio-tagged bats captured to diurnal roosts in accordance with permit requirements. We generally recommend tracking until the transmitter fails, fall off, or cannot be located for at least 7 days and should conduct

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

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

a minimum of 2 evening emergence counts at each identified roost (See Appendix E for Emergence Survey Protocols). However, biologists are encouraged to continue radio-tracking efforts for the life of the transmitter. Biologists should contact the USFWS FO(s) immediately if they plan to cease tracking efforts before the 7-day tracking period ends. If landowner access is denied, approximate roost locations (i.e., coordinates) should be determined using triangulation.

5. Daily radio telemetry searches for roosts must be conducted during daylight hours and should be conducted until the bat(s) is located or for a minimum of 4 hours of ground or 1 hour of aerial-searching effort per tagged bat per day for 7 days. However, multiple bats captured at the same net location or nearby may be tracked simultaneously. Once a signal is detected, tracking should continue until the roost is located. At a minimum, biologists should document all ground and aerial-searching effort for all bats not recovered during radio-tracking for submittal with the survey report. For each roost identified during tracking, the biologist should complete a "USFWS Indiana Bat Roost Datasheet".

6. To minimize potential for disease transmission, any equipment that comes in contact with bats should be kept clean and disinfected, following approved protocols; this is particularly a concern relative to WNS. Protocols are posted at http://www.whitenosesyndrome.org/. Federal and state permits may also have specific equipment restrictions and disinfection requirements.

SUBMISSION OF RADIO-TRACKING RESULTS

Phase 4 radio-tracking results should be included with the Phase 2 or 3 mist-netting report and submitted to the appropriate USFWS FO(s). Each report should include the following information related to radio-tracking efforts[65]:

1. Copy of prior phase reports (if not previously provided)
2. Explanation of any modifications from original survey plan (e.g., number of transmitters used, frequency of transmitters changed)[66]
3. Map and narrative detailing all ground and aerial searching effort for all bats not recovered during radio-tracking and relative to the negotiated or agreed effort as determined by the appropriate USFWS FO(s)
4. Map summarizing Indiana bat data collected from summer surveys for the proposed project (e.g., project area boundary and results from the site habitat assessment, acoustic survey, mist-net survey, radio-tracking, and emergence surveys)
5. Full names and permit numbers of personnel who attached transmitters to Indiana bats and full names of all personnel conducting radio-tracking efforts
6. Photographs of all roosts identified during radio-tracking
7. Legible copies of all original USFWS Indiana Bat Roost Datasheets
8. Any other information requested by the local USFWS FO(s) where work was conducted

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

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

REFERENCES

Aldridge, H., and R.M. Brigham. 1988. Load carrying and maneuverability in an insectivorous bat: a test of the 5% "rule." Journal of Mammalogy 69:379-382.

American Society of Mammalogists. 1998. Guidelines for the capture, handling and care of mammals. Journal of Mammalogy 79:1416-1431.

USFWS INDIANA BAT ROOST DATASHEET

Biologists (Full Name):_____ Date:_____

UTM: Zone_____ Easting _____ Northing_____ *OR*

LAT_____ LONG_____

Property Owner:_____ Phone#_____

State_____ County_____ Site #_____

Roost #_____ Roost Name:_____

Roost Tree Data

Species: _____ Live __ Snag __ Other __

(if other, explain) _____

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

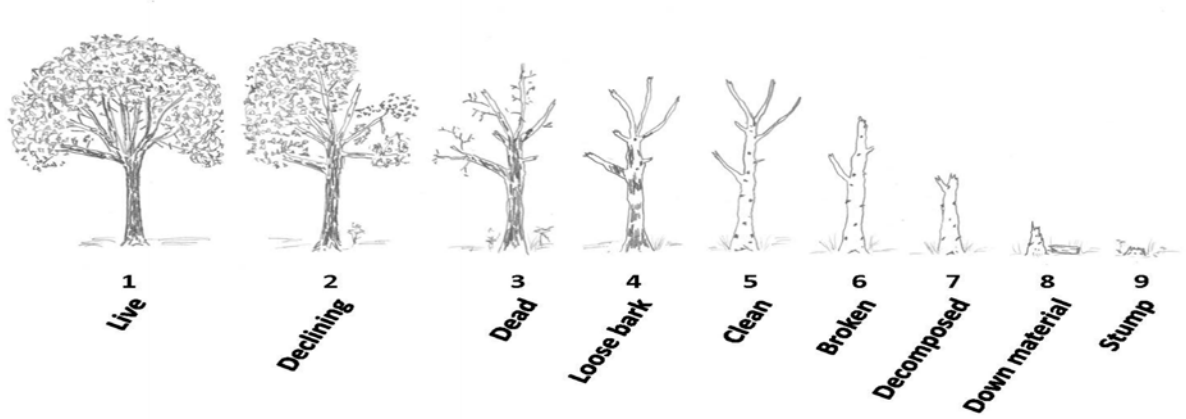
Height of roost area (if known)_____Dist. from capture site_____

Roost position aspect (deg)_____

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

Cavities present? ____ If so, describe:_____

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



Roost tree or snag canopy position: Dominant __ Co-Dominant __ Suppressed __

Surrounding Habitat Condition

Canopy closure at roost (%) _____

Approximate woodlot size (ac or ha)_____ Distance to non-forest (ft or m)_____

Describe forest/woodlot current condition (mature, partially cut-over, burned, insect damage, etc.)
_____

_____

_____
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Additional Comments_____

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APPENDIX E: PHASE 4 EMERGENCE SURVEYS

PERSONNEL

Qualified biologists[67], biological technicians, and any other individuals deemed qualified by a local USFWS FO may conduct emergence surveys for Indiana bats by following the protocols below.

EMERGENCE SURVEYS FOR KNOWN INDIANA BAT ROOSTS

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

1. Bat emergence surveys should begin one half hour before sunset[68] and continue until at least one hour after sunset or until it is otherwise too dark to see emerging bats. The surveyor(s) should be positioned so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. There should be at least one surveyor per roost. Surveyors must be close enough to the roost to observe all exiting bats but not close enough to influence emergence. That is, do not stand directly beneath the roost, do not make noise or carry on a conversation, and minimize use of lights (use a small flashlight or similar to record data, if necessary). Do not shine a light on the roost as this may prevent or delay bats from emerging. Use of an infra-red, night vision, or thermal-imaging video camera or spotting scope is encouraged but not required. Likewise, use of an ultrasonic bat detector may aid in identifying the exact timing of bats emerging and may be used to help differentiate between low- and high-frequency bats species, and therefore, is strongly recommended. If multiple roosts are known within a colony, then simultaneous emergence surveys are encouraged to estimate population size. [NOTE: If a roost cannot be adequately silhouetted, then the local USFWS FO(s) should be contacted to discuss alternative survey methods].

2. Bat activity is affected by weather; therefore emergence surveys should not be conducted when the following conditions exist: (a) temperatures that fall below 50°F (10°C); (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale).

3. Surveyors should use the attached (or similar) “Bat Emergence Survey Datasheet”.

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

[68] Surveys may need to start a little earlier or later than one half hour before official sunset times (i.e., before “dusk”) in some settings such as deep/dark forested valleys or ridge tops, respectively. Sunset tables for the location of survey can be found at: http://aa.usno.navy.mil/data/docs/RS_OneYear.php

4. Surveyors should also complete an "Indiana Bat Roost Datasheet" for each roost known to be used by one or more Indiana bats (see Appendix D for an example).

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

EMERGENCE SURVEYS FOR POTENTIAL INDIANA BAT ROOSTS

In some limited cases (e.g., individual hazard tree removal during the active season), surveyors may have the option of conducting emergence surveys for individual potential Indiana bat roosts to determine use prior to removal. The following protocol applies to these surveys:

1. Consult with the local USFWS FO(s) to determine whether a tree(s) that needs to be felled/ cleared may be potential roosting habitat for Indiana bats and whether conducting an emergence survey is an appropriate means of avoiding take of Indiana bats[69]. In general, the USFWS only approves of conducting emergence surveys as a means of avoiding direct take of bats for projects that only affect a very small number of potential roosts (e.g., less than or equal to 10)[70] in relatively small project areas. An online directory of USFWS offices is available at: http://www.fws.gov/offices/.

2. If the USFWS FO(s) approves/concurs with Step 1, then follow the emergence guidelines for Emergence Surveys for Known Indiana Bat Roosts (above) to determine if any bats are roosting in the tree(s).

3. At the conclusion of the emergence survey:

    a. If **no** bats were observed emerging from the potential roost(s), then it maybe felled immediately. If safety concerns dictate that a tree cannot be felled immediately (i.e., in the dark), then the tree(s) should be felled as soon as possible after sunrise on the following day. If a tree is not felled during the daytime immediately following an emergence survey, then the survey has to be repeated, because bats may switch roosts on a nightly basis. Immediately after the tree is felled, a visual inspection of the downed tree must be completed to ensure that no bats were present, injured, or killed. The USFWS FO(s) should be contacted immediately, if bats are discovered during this inspection.

    b. If **1 or more** bats (regardless of species, because species identification cannot reliably be made during visual emergence counts alone) are observed emerging from the roost, then it should **not** be felled, and the USFWS FO(s) should be contacted the next working day for further guidance.

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

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

SUBMISSION OF EMERGENCE SURVEY RESULTS

Emergence survey results should be included with the mist-netting survey report, unless the survey was completed as an evaluation of potential roosts, and should be submitted to the appropriate USFWS FO(s) for review. Each survey report should include the following information related to emergence survey efforts[71]:

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

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

USFWS BAT EMERGENCE SURVEY DATASHEET

Date: _____ Surveyor(s) Full Name:_____

State: _____ County: _____ Project Name: _____

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

Lat/Long or UTM of Roost: _____

Description of Roost/Habitat Feature Surveyed: _____

_____

Bat Species Known to be using this Roost/Feature (if not known, leave blank):

_____

Other Suspected Bat Species (explain): _____

Weather Conditions during Survey (temperature, precipitation, wind speed):

_____

Survey Start Time: _____ Time of Sunset: _____ Survey End Time: _____

NOTE: Emergence surveys should begin ½ hour before sunset and continue until at least one hour after sunset or until it is otherwise too dark to see emerging bats. The surveyor(s) should position him or herself so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. Please ensure that surveyor(s) are close enough to the roost to observe all exiting/returning bats, but not close enough to influence emergence (i.e., do not stand directly beneath the roost and do not make unnecessary noise and/or conversation, and minimize use of lights other than a small flashlight to record data, if necessary). Do not shine a light on the roost tree crevice/cave/mine entrance itself as this may prevent or delay bats from emerging. If available, use of an infra-red, night vision, or thermal-imaging video camera or spotting scope and an ultrasonic bat detector are strongly recommended but not required.

Time	Number of Bats Leaving Roost*	Comments / Notes

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

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

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

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

_____

_____

_____

APPENDIX F: LINEAR PROJECT GUIDANCE

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

Tentative survey site locations along linear projects should be included in a proposed study plan to be reviewed and approved by the USFWS FO. Adequate survey effort should be conducted within each approximate 1-km segment that contains suitable forested habitat along the proposed workspace. It is not appropriate to cumulatively add up each habitat block crossed until 1km of habitat has been traversed. Segments along a linear project that do not contain suitable habitat should be skipped until the next patch of suitable habitat is encountered (Figure 3). Establishing exactly how many survey sites are needed for presence/absence surveys along a linear project often involves some give and take particularly in fragmented habitat areas (Figure 3, rows B and C). The final number of survey sites could be greater than the minimum number of sites prescribed in the protocol in order to adequately cover the areas of suitable habitat to be impacted. When available, habitat quality and quantity (e.g., size and location of suitable maternity roost trees) from on-the-ground habitat assessments can be used to fine tune and guide the placement of survey sites. In some marginal habitat areas, the quality and quantity of the existing habitat may be low enough to justify skipping some survey segments (e.g., Figure 3, Site 11). Likewise, some isolated woodlots, fencelines or individual trees may be considered too isolated and/or small to independently support bats and may be skipped if the USFWS FO concurs. Habitat suitability in fragmented areas should be assessed on a site-specific basis and consider habitat configuration and connectivity to other suitable habitat patches. In general, we recommend surveying a few more sites for a project than the absolute minimum required.

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

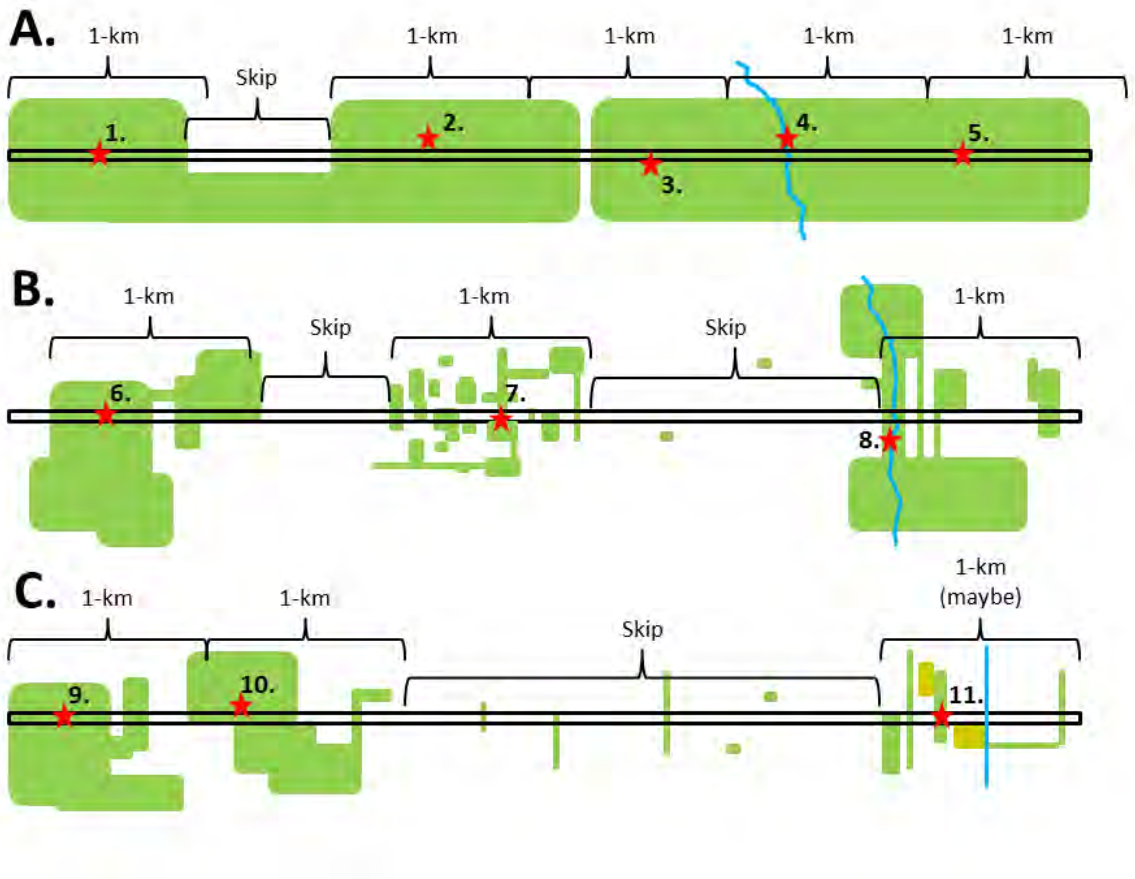


FIGURE 3. Conceptual linear project (black double lines) through relatively contiguous (A.) and fragmented (B. and C.) forested habitats (green patches) delineated into approximate 1-km survey sections. Numbered red stars represent suitable survey sites (1-11) on or near the project boundaries. Blue lines represent natural streams (A. and B.) and a ditch (C.). Yellow-green patches near Site 11 represent low-quality habitat.

APPENDIX G: THE OUTER–TIER GUIDANCE

Since early radio-tracking studies in Illinois, it has become standard practice for USFWS FOs to assume that an Indiana bat summer maternity colony will utilize suitable habitat within approximately 2.5 miles of its primary roost tree(s)/focal roosting area. However, if a reproductive adult female or juvenile Indiana bat is captured (or Indiana bats are acoustically detected), but not radio-tracked to a roost site, then FOs typically assign its capture site a 5-mile conservation buffer and assume that its roost tree is located somewhere within 2.5 miles of the capture site. This approach is further detailed in the Service's Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects[72]. **NOTE**: The same principles used for Indiana bat can be used for NLEB pertaining to NLEB capture/ detections having been assigned a 3-mile conservation buffer.

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

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

[72] https://www.fws.gov/midwest/Endangered/mammals/inba/pdf/inbaS7and10WindGuidanceFinal26Oct2011.pdf

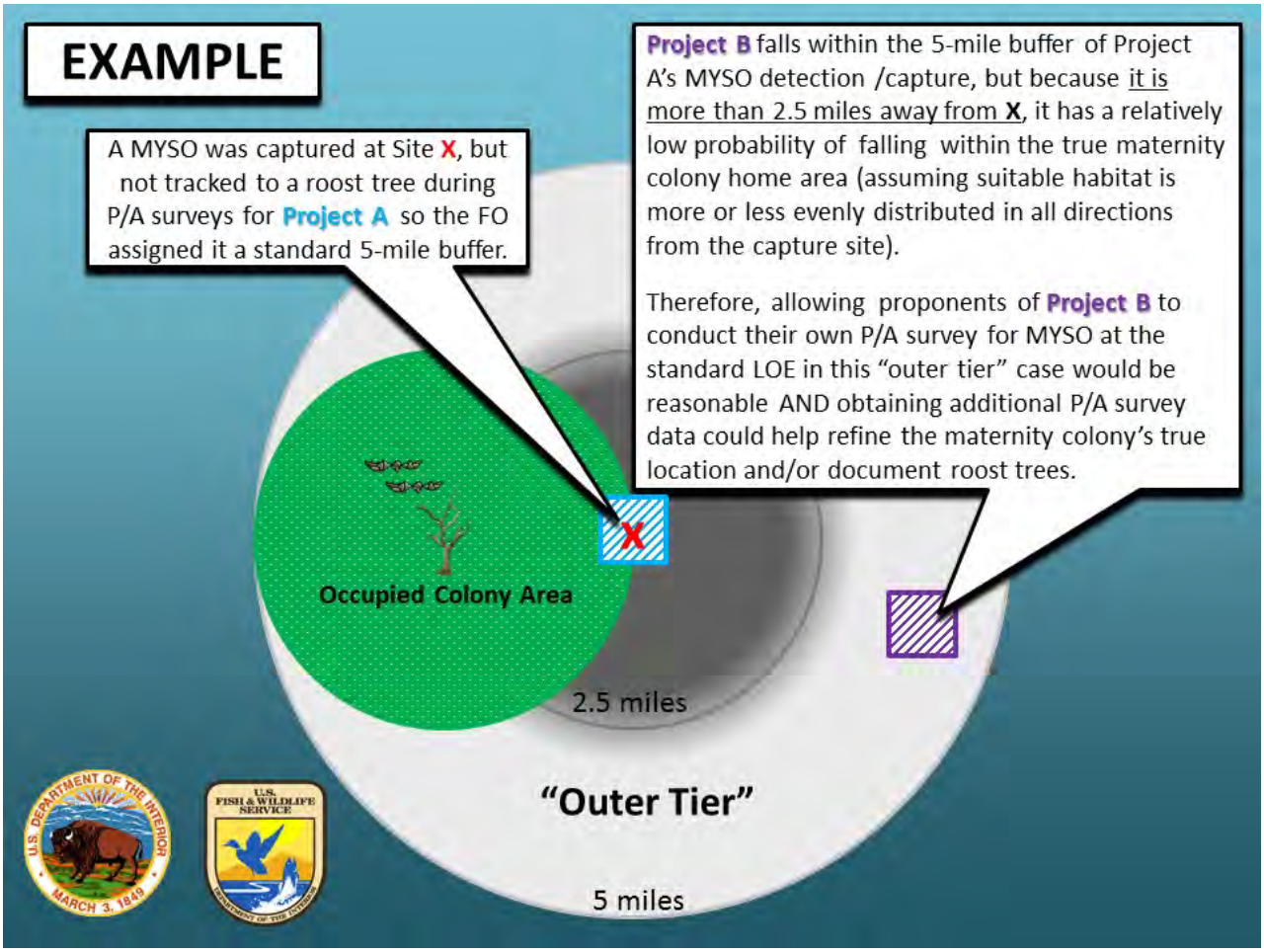


FIGURE 4. Graphical example depicting the proper application of the outer-tier guidance.

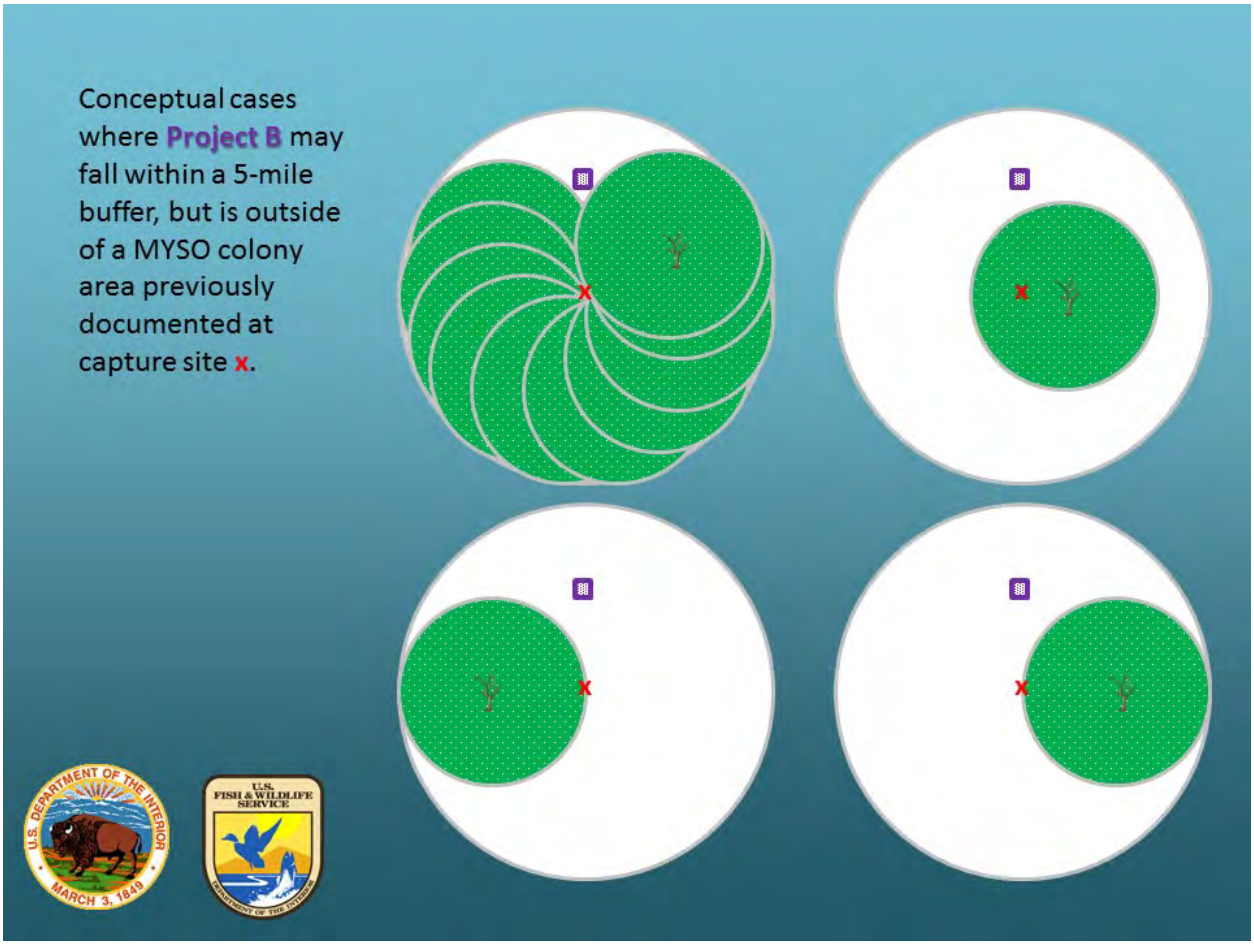


FIGURE 5. Hypothetical outer-tier scenarios where a proposed project area (depicted by a purple square) falls outside of the “true” Indiana bat maternity colony area(s) (depicted in green).

APPENDIX H: POTENTIAL HIBERNACULUM SURVEY GUIDANCE

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

PHASE 1 – INITIAL PROJECT SCREENING

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

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

Step 2. Desktop Analysis and Initial Field Reconnaissance.

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

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

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

a) There is only one horizontal opening, and it is less than 6 inches (15.2 cm) in diameter;

b) Vertical shafts are < 1 foot (0.3 m) in diameter;

c) Passage continues < 50 feet (15.2 m) and terminates with no visible fissures that bats can access;

d) Openings are prone to flooding, collapsed shut and completely sealed, or otherwise are inaccessible to bats; and

e) Openings that have occurred recently (i.e., within the past 12 months) due to human activity or subsidence. (Include written documentation verifying this determination).

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

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

If underground openings are documented during field surveys in Step 2 and cannot be dismissed during initial project screening above, then a qualified biologist[73] will need to conduct a Phase 1 Habitat Assessment to determine whether bats using a potentially suitable hibernaculum within a project area could be adversely affected by the proposed project as described below (see Phase 1 Habitat Assessment Sample Data Sheet).

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

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

PHASE 2 – PRESENCE/ABSENCE SURVEYS

Surveys to Confirm Use of Suitable Winter Habitat

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

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

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

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

White-nose syndrome (WNS) is a devastating fungal disease that has killed unprecedented numbers of hibernating bats in eastern North America. WNS and/or *Pseudogymnoascus destructans* (Pd), the fungus causing the disease has been detected throughout the range of the Indiana bat. Users of this guidance must follow the recommendations provided in the most recent USFWS Cave Advisory[74] as they relate to reducing the potential for humans to disturb hibernating bats or inadvertently transporting Pd to uncontaminated bat habitats. All surveys conducted at caves/mines should be coordinated with the USFWS FO(s) and appropriate state natural resources agencies prior to initiation (see example USFWS Project Proposal Form).

Winter (Internal) Surveys

Working near and within abandoned mines and caves can be inherently dangerous due to a variety of potential hazards (e.g., ceiling collapse and presence of toxic gases)[75]. Therefore, surveyors must thoroughly assess their work sites for any known and potential health and safety hazards and must use appropriate personal protective equipment and take proper precautions to avoid and minimize identified risks. Only sites that are deemed safe should be entered at the surveyor's discretion.

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

[74] https://www.whitenosesyndrome.org/sites/default/files/files/final-cave_access_advisory_2016_2.pdf.

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

Fall or Spring Emergence Surveys

1A. Fall surveys of mine/cave entrances must be conducted between September 15 and October 31[76] and prior to any tree clearing by the project applicant. A minimum of one night of harp trap sampling per week for 6 weeks (i.e., 6 nights of sampling) is required at each suitable entrance as determined by the Phase 1 Habitat Assessment. Each night of sampling should be separated by at least one week of the survey window if weather conditions allow it. However, multiple nights of sampling per week can be accepted in the last two weeks of October if forecasted weather conditions require it, at least 3 nights of sampling were completed during the first 3 weeks of the survey period, and the modification is approved by the appropriate USFWS FO(s). Survey effort may be suspended if no bats (of any species) are captured after the first 2 nights of acceptable survey effort in the fall. Surveys of a potential hibernaculum are in addition to any summer P/A surveys that may be required for a proposed project.

OR

1B. Spring surveys of mine/cave entrances must be conducted between April 1 and April 21[77] and prior to any tree clearing by the project applicant. Conducting surveys during the spring emergence is typically more complex than conducting fall surveys due to a greater number of uncontrollable factors (e.g., weather related factors). Thus, a minimum of three nights of harp trap sampling per week for three weeks (i.e., 9 nights of sampling) is required at each suitable entrance as determined by the Phase 1 Habitat Assessment. Due to the need to monitor weather conditions closely, each proposed spring mine/cave survey must be coordinated with the USFWS FO(s) and appropriate state natural resource agencies prior to surveying to ensure that adequate survey results are achieved. Surveys of a potential hibernaculum are in addition to any summer P/A surveys that may be required for a proposed project.

2. Unless otherwise approved by the USFWS FO[78], the capture of an Indiana and/or northern long-eared bat during a fall or spring mine/cave survey requires that the applicant complete three additional nights of sampling per week for three consecutive weeks (9 additional nights LOE) in order to determine the relative significance of the mine(s) and/or cave(s) and their associated underground workings to the Indiana and/or northern long-eared bat. If the mine/cave survey season (i.e., September 15 to October 31 for fall sampling and April 1 to April 21 for spring sampling) ends prior to the completion of the required additional sampling, then sampling must be completed the following fall or spring.

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

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

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

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

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

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

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

6. The sampling period should begin at sunset and continue for at least 5 hours each night. During this time, harp traps (most preferable method) and/ or mist nets (acceptable method, but less preferable from a bat-handling perspective) should be monitored for captured bats on 30- and 10-minute intervals, respectively, to minimize the number of bats that escape.

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

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

9. All bats captured during fall or spring surveys must be temporarily marked with a FO-approved non-toxic material that will last for the remainder of the survey period in order to identify any recaptures during subsequent survey nights.

10. If Indiana and/or northern long-eared bats (or other federally listed species) are captured during fall or spring mine/cave surveys, notification to the local USFWS FO is required within 48 hours (or in accordance with permit conditions), and the sex and reproductive condition of the bat and GPS coordinates of the capture site should be provided.

11. A bat detector/roost logger should be on site to monitor general bat activity when trapping or netting. Bat passes should be monitored and tallied hourly. Bat tallies should be reported

along with the time sampled. Report the beginning time and number of bat passes in hour blocks. Analysis of recorded bat calls to attempt species identification should not be completed as these calls are not expected to be foraging calls.

12. Noise, the use of lights, or other potential disturbances should be kept to, at a minimum, no closer than 300 feet (91.4 m) of the sampling site.

13. At least one member of each survey crew must hold, and have in his or her possession, a valid endangered species collection permit issued by USFWS and/or[79] the appropriate state natural resource agency that allows the qualified biologist to collect bats, including federally listed species. All activities must be carried out with strict adherence to permit conditions and authorizations specified in your federal permit, as well as any State authorizations. A qualified biologist(s) must (1) select/approve harp trap/mist-net set-ups, (2) be physically present at each site throughout the survey period, and (3) confirm all bat species identifications. This biologist may oversee other biological technicians and manage set-ups in close proximity to one another as long as the trap/net-check timing (i.e., every 30 min. for harp traps and every 10 min. for mist-nets) can be maintained while walking between sites.

14. All survey efforts must follow the most recent USFWS decontamination protocols regarding WNS.

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

Phase I Habitat Assessment Sample Data Sheet

Location _____

Observers (include permit numbers) _____

Latitude _____ **Longitude**[80] _____

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

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

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

Any observable side passages?

Additional comments:

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

[80] Provide coordinates for each opening.

Sample Data Sheet for Fall or Spring Surveys of a Potential Hibernaculum

DATE:				TEMPERATURE		Start:		End:
PRECIPITATION*:						WIND*:		
MOONLIGHT:				TIME		Start:		End:
PERSONNEL (include permit numbers):								LOCATION (lat/long):
Time	Species	Age	Sex	Repro Cond.	RFA (mm)	Mass (g)	Flight Direction (in or out)	Notes and General Comments

***Precipitation and Wind should be measured hourly**

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

USFWS Potential Hibernaculum Project Proposal Form

CONTACT INFORMATION

Permittee Name(s): _____

State Permit # _____ Section 10 USFWS Permit # _____

Institution/Company Name (as on Permit): _____

Address: _____

City: _____ State: _____ Zip: _____

Email address: _____

Phone #: _____

PROPOSED PROJECT OR ACTIVITY INFORMATION

County: _____ Quad: _____

Project location: latitude: longitude:

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

USFWS Project Number (if known): _____

Mining Project ☐ SMCRA Permit Number: _____

Transportation Project ☐ DOT Item Number: _____

Utility Project: _____

AML Project: _____

Other: _____

Acres of suitable Indiana bat habitat within project/activity area: _____

Is the project/activity linear? Yes: ☐ No: ☐

If yes, indicate length of suitable Indiana bat habitat in km (mi): _____

Are caves or portals present? Yes: ☐ No: ☐

METHODOLOGY & SURVEY EFFORT

Coordinates of cave/portal (if multiple, please provide locations on project map): latitude: _____ longitude: _____

Name of cave (if known): _____

Estimated Start Date of Fieldwork: _____

# of Acoustic Activity Nights: _____ Number of Mist Net/Harp Trap Nights: _____

Other _____

_____

_____

_____

_____ _____

Signature **Date**

Appendix B: Study Plan

322 Borealis Way
Bellefonte, PA 16823
814-659-8257 (cell)
sanders@batgate.com

SANDERS
ENVIRONMENTAL INC.

June 17, 2021

Jenny Wong, Biologist
U.S. Fish and Wildlife Service
East Lansing (Ecological Services) Field Office
2651 Coolidge Road East Lansing, MI 48823

Tammy Giroux, Wildlife Biologist – Thumb Region
Michigan DNR Wildlife Division
Cass City Field Office
4017 E Caro Road
Cass City, MI 48726

Re: Riverbend Presence/Absence Acoustic Survey Study Plan

Riverbend Wind Energy Facility is in the early stages of the development process for the 45,721-acre (ac; 18,503-hectare [ha]) Riverbend Wind Project (Project) in southern Sanilac County, Michigan. The Project is requesting the United State Fish and Wildlife Service (USFWS) and Michigan Department of Natural Resources (MDNR) to please review a presence/absence bat acoustic sampling plan for the Project.

Sanders Environmental (Sanders) conducted a Phase 1 desktop analysis as described in the 2020 USFWS Range Wide Indiana Bat Survey Guidance (Guidance): Appendix A. The dominant landcover within the Project area is agricultural land. Forest in the Project area consists primarily of deciduous species. According to the National Cover Database (NLCD) the Project area contains approximately 24.4 square kilometers of potential summer habitat. Two detector sites are required per square kilometer; therefore, Sanders proposes collecting acoustic data at 49 sites (Attachment 1) consisting of two detectors per site, deployed for four successful nights. This will complete the USFWS recommendation of 8 detector nights per site for a total of 392 detector nights for the Project. The survey will occur within the timeframe in the USFWS guidance in 2020.

Wildlife Acoustics Song Meter SM4BAT FS recorders (detectors) will be deployed at each detector location for four nights, weather permitting. Detectors will start recording 30 minutes prior to sunset and continue until 30 minutes after sunrise. Detectors will be deployed in accordance with the Guidance and at least 2.5 meters above ground level for an optimal zone of detection. Detectors will be deployed in locations where they are most likely to be effective in detecting threatened, endangered, and candidate

species. Sampling locations were selected from aerial imagery and are shown in Attachment 1. Proposed detector locations are subject to change based on conditions found by permitted biologist onsite. If any shifts in detector locations are needed, most will be under 200 meters from the shown locations. Acoustic detector locations were selected based on occurrence of suitable bat habitat and property access limitations.

Files recorded will be processed and analyzed by site and by night with the most recent version of Kaleidoscope Pro software. If the analysis indicates that there is probable presence of federally threatened, endangered, or candidate species by the Maximum Likelihood Estimator (MLE), we will proceed with qualitative identification of all files recorded from that night at that site. If the MLE determines probable presence of federally threatened/endangered or candidate species, USFWS will be notified within 20 days. Furthermore, the final report on this study will be provided to the USFWS and MDNR upon completion of the acoustic survey.

Please let me know if you have any questions or concerns about the study plan and level of effort. We look forward to your review and continuing working together on this Project.

Sincerely,

Christopher Sanders, President

Attached:

Attachment 1 - Map of Project area with proposed acoustic sites

Appendix C: Completed Datasheets and Location Photographs

SM4 Detector Deployment Data Sheet

Site Name: 01 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.24000 Longitude: -082.82706 UTC: -4

Site Description: on edge of corn field of forest

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 10 Microphone #: 64 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 280

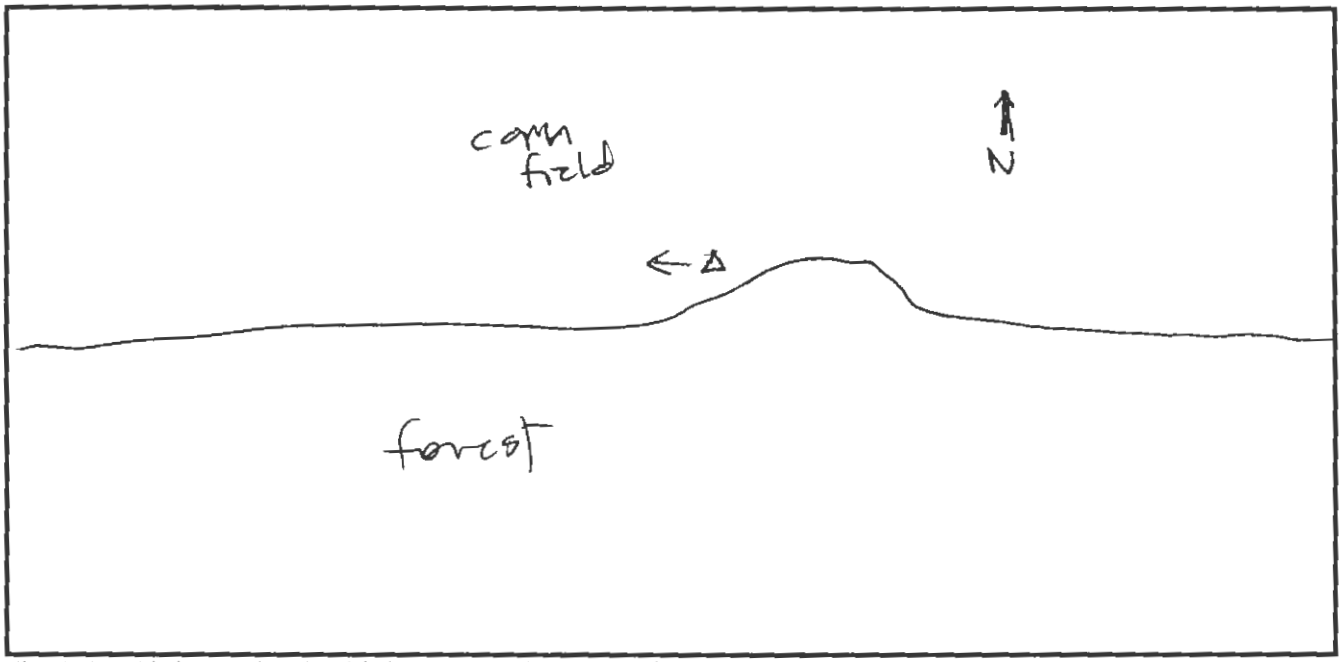
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	3B4kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 01 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/20/2021

Detector: 10 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 149

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 01 Location A

SM4 Detector Deployment Data Sheet

Site Name: 91 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23919 Longitude: -082.83096 UTC: -4

Site Description: small locust grove in grasslands of edge/corner of hay field. Shooting along forest edge and field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 68 Microphone #: 73 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 268

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12)db
(circle one)

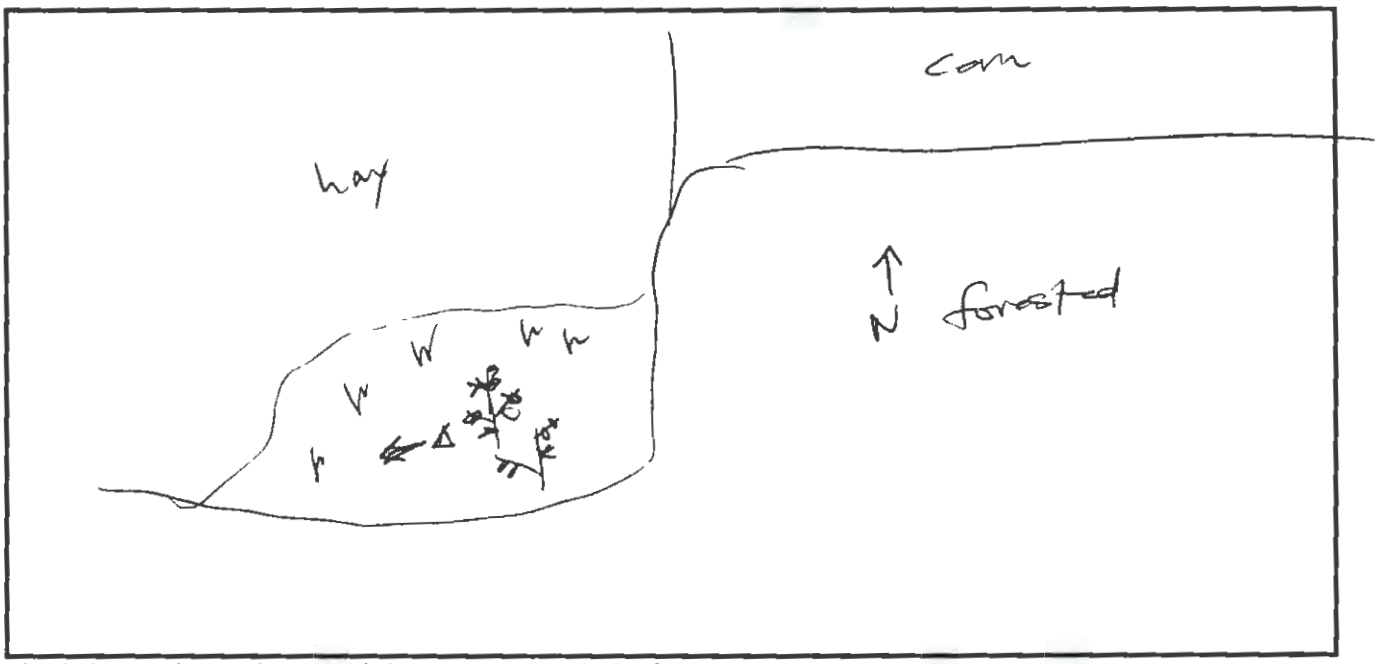
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 01 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/20/2021

Detector: 68 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

if detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 147

Log file Present? Yes

Card ID: —

Log file Present? —

revised 6/2021

Site 01 Location B

SM4 Detector Deployment Data Sheet

Site Name: Ø2 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill Date: 06/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.22403 Longitude: -82.85580 UTC: -4

Site Description: Shooting down Field edge in farm field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 24 Microphone #: 78 Directional PVC present?: No

Mic Height (m): .3 Mic Inclination: Ø Mic Azimuth: 295°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

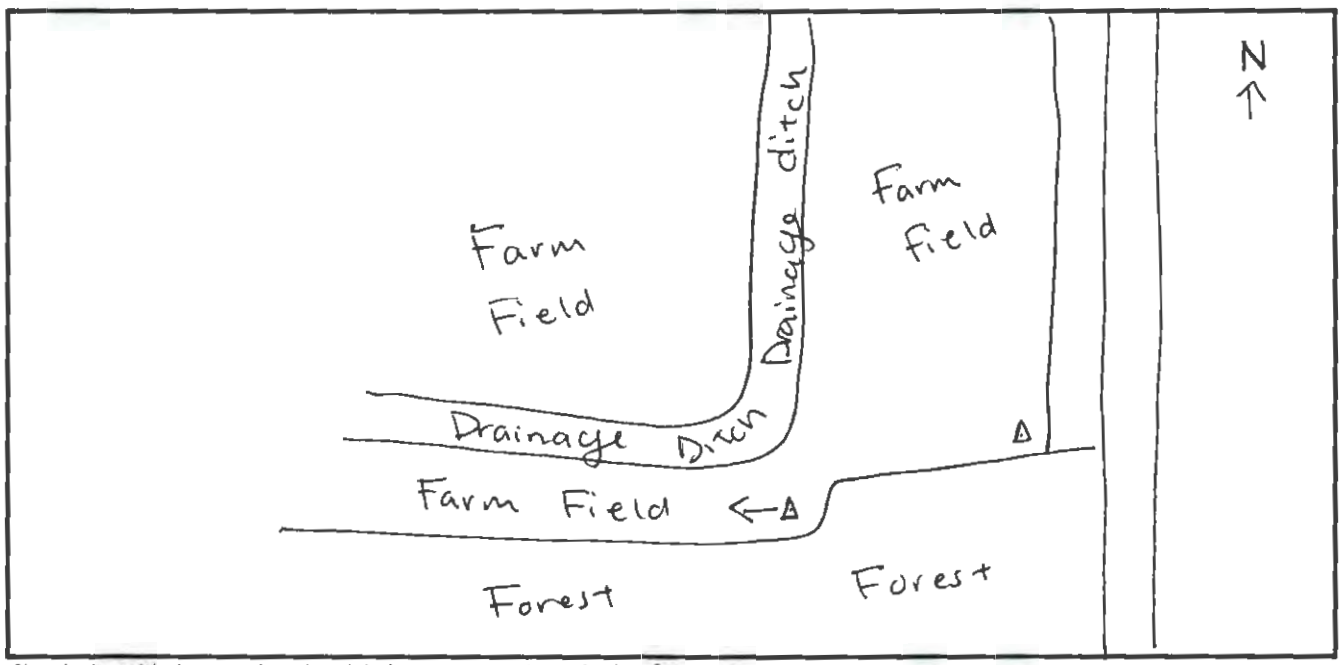
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 02 A Project Name: 2021 Riverbend

Biologists: E. Mcmill Date: 7/1/21

Detector: 24 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 48 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 02 Location A

SM4 Detector Deployment Data Sheet

Site Name: 02 B Project Name: 2021 Riverbend

Biologists: A.Goebel, E. Merrill, M. Zollars Date: 6/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.22427 Longitude: -82.85448 UTC: -4

Site Description: Shooting down Field edge in farm field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 44 Microphone #: 49 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 10°

User Profile/Settings:

WA SM4BAT FS SMM-U2

Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

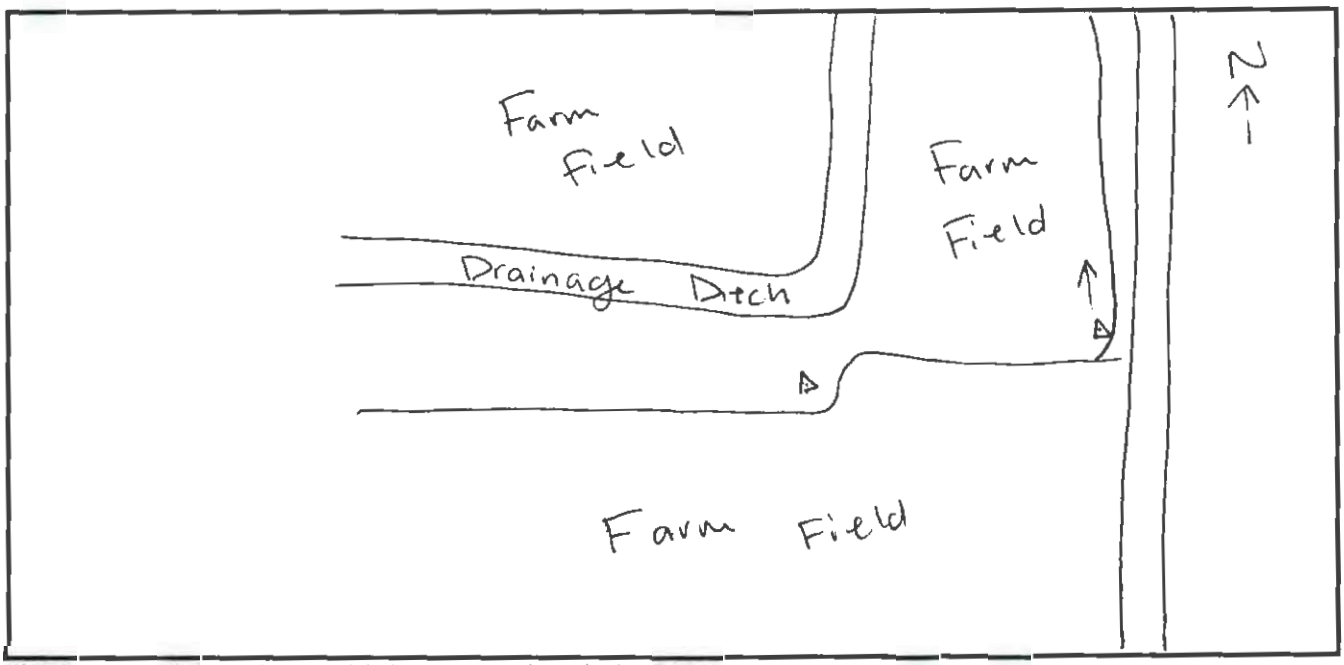
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: Q2 B Project Name: 2021 Riverjam

Biologists: E. Mcmill Date: 7/1/21

Detector: 44 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0626
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 46 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 02 Location B

SM4 Detector Deployment Data Sheet

Site Name: 03 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.21162 Longitude: -082.87230 UTC: -4

Site Description: grassy opening in bottomland forest surrounded by corn fields

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 12 Microphone #: 60 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 50

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

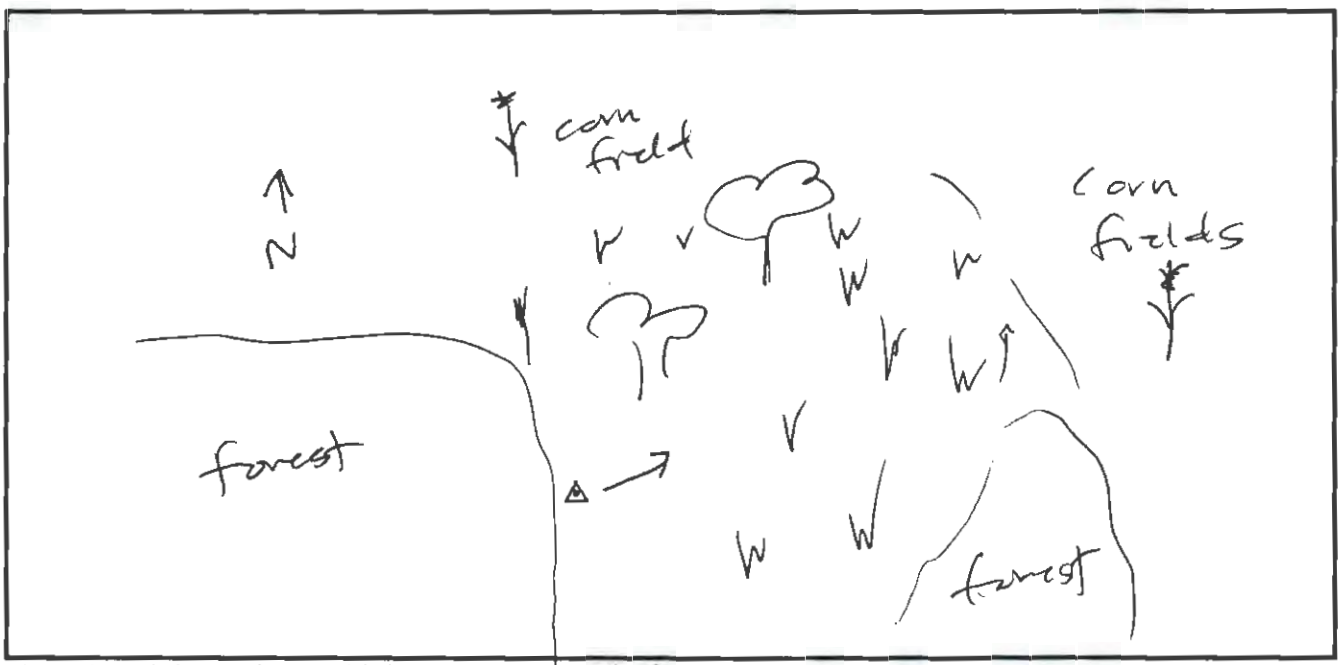
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 03 A Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/20/2021

Detector: 12 (circle one) Detector Status: ~~ON:~~Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 150 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 03 Location A

SM4 Detector Deployment Data Sheet

Site Name: 03 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.21165 Longitude: -082.87191 UTC: -4

Site Description: shooting towards grassy + wetlands in bottomland forest surrounded by cornfields

Habitat being sampled: Riparian Field Edge Open Field ~~Bottomland Forest~~ Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 59 Microphone #: 83 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 170

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12)db
(circle one)

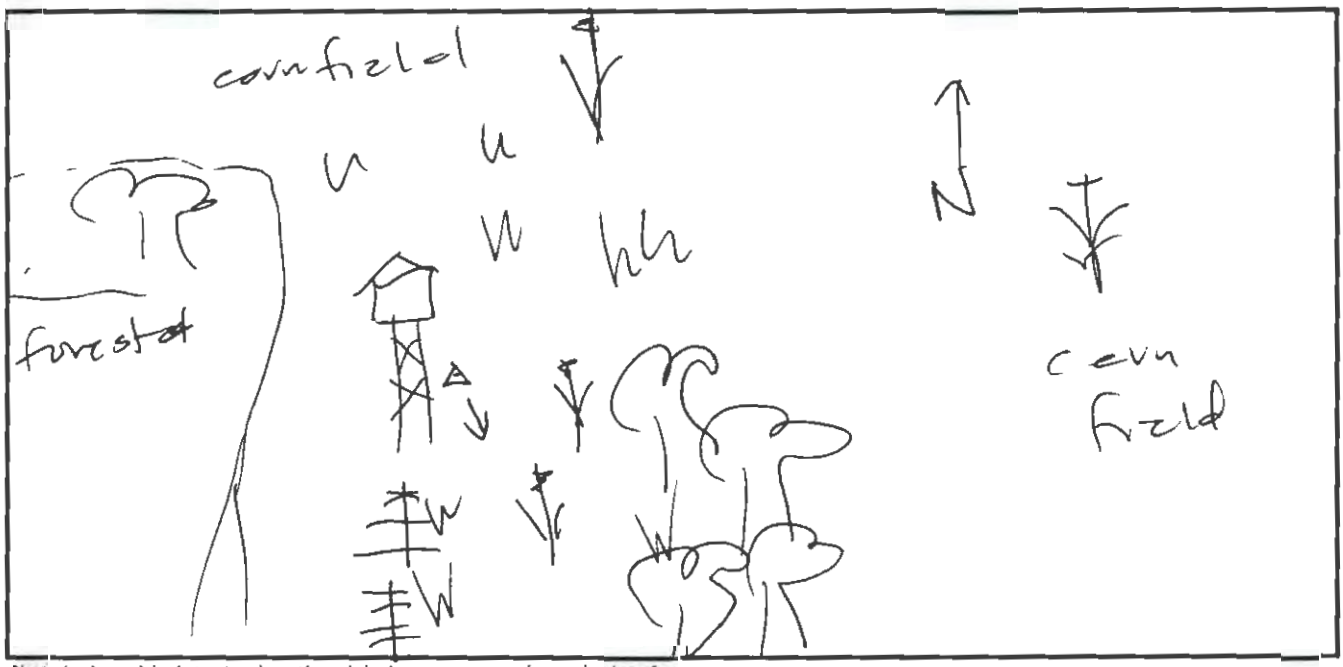
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 03 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/20/2021

Detector: 59 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 149 Card ID: —

Log file Present? YES Log file Present? —

revised 6/2021

Site 03 Location B

SM4 Detector Deployment Data Sheet

Site Name: Ø4 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18465 Longitude: -82.85315 UTC: -4

Site Description: Shooting down tight tree row leading into forested wood lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 09 Microphone #: 55 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 5°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

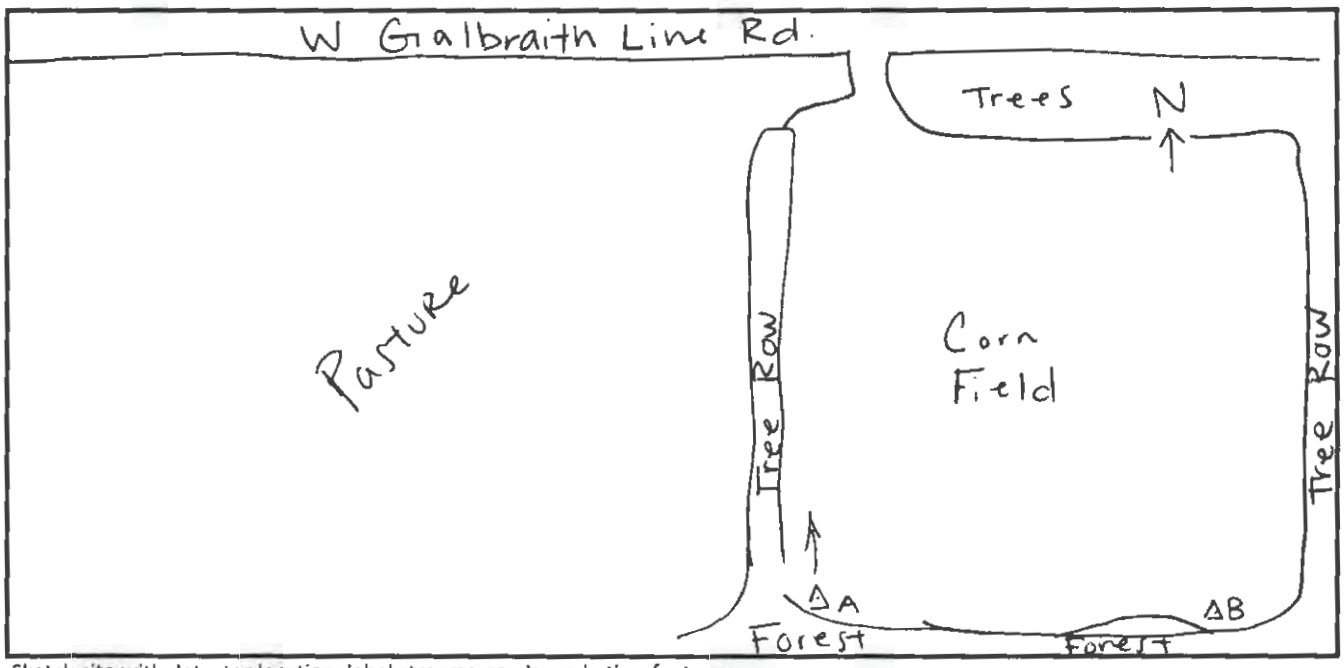
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: S Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 94A Project Name: 2021 Riverbend

Biologists: E. Merrill Date: 7/1/21

Detector: 09 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0625	0625	0626	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 16 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 04 Location A

SM4 Detector Deployment Data Sheet

Site Name: 04 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18463 Longitude: -82.85187 UTC: -4

Site Description: Shooting down tight tree row that surrounds small corn field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 32 Microphone #: 57 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 8°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

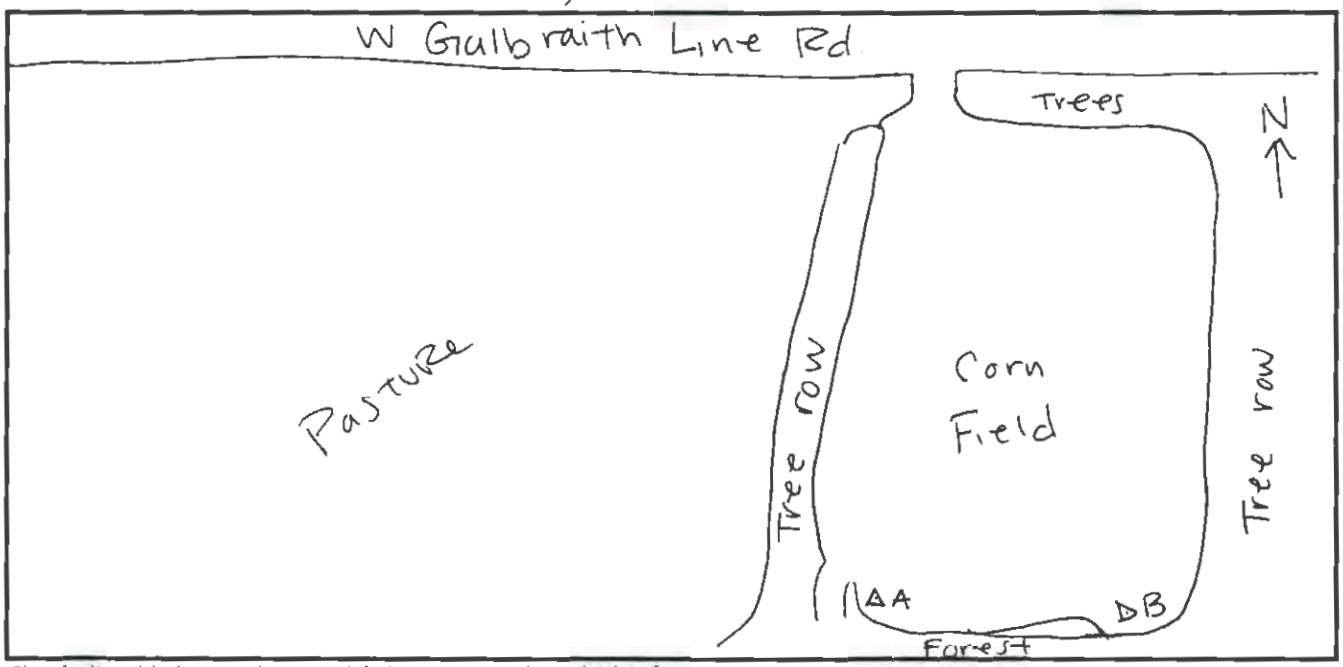
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: 1.JPG Site: 1.JPG Mic orientation: 1.JPG



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: Q4B

Project Name: 2021 RiverSound

Biologists: E. Mcmll

Date: 7/1/21

Detector: 32
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	~	2045	2045	2045	2045	
End time	—	0624	0625	0625	0626	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 211

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 04 Location B

SM4 Detector Deployment Data Sheet

Site Name: 05 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17886 Longitude: -082.87492 UTC: -4

Site Description: edge of soybean field and treeline connecting to forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 22 Microphone #: 68 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 276

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

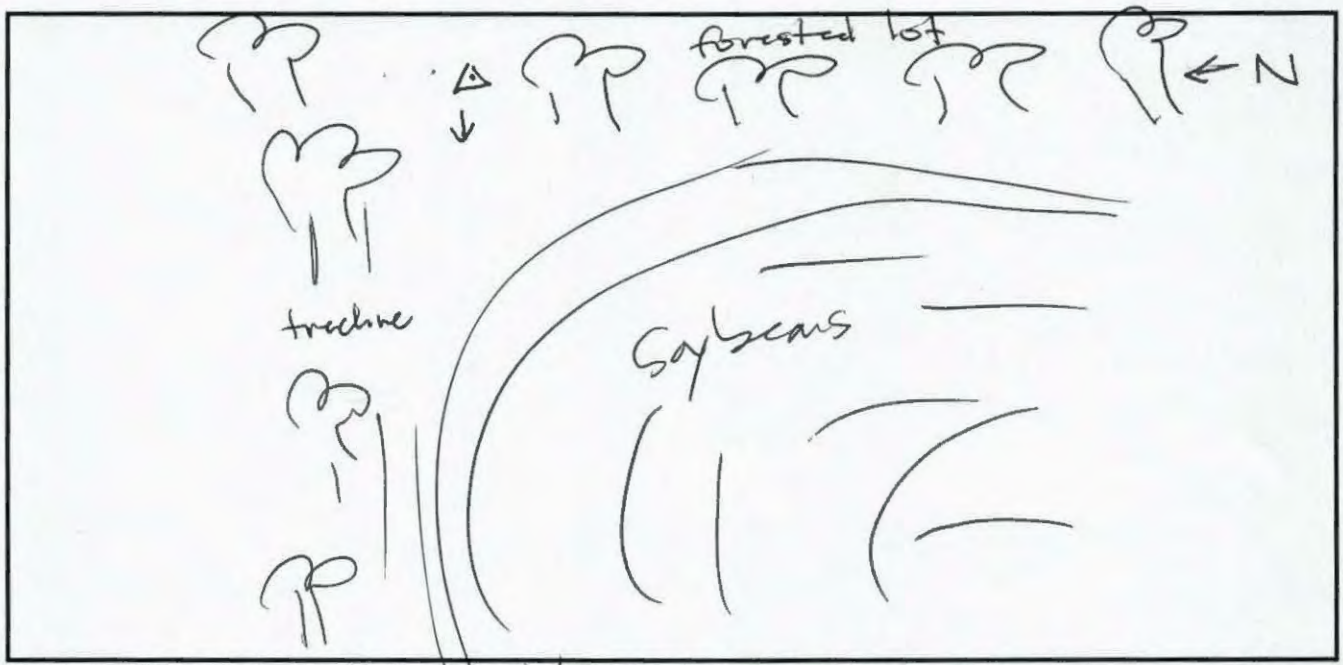
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 05 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/20/2021

Detector: 22
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 152

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 05 Location A

SM4 Detector Deployment Data Sheet

Site Name: 05 B Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17768 Longitude: -082.87478 UTC: -4

Site Description: mowed trail through woodlot

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 34 Microphone #: 51 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 185

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

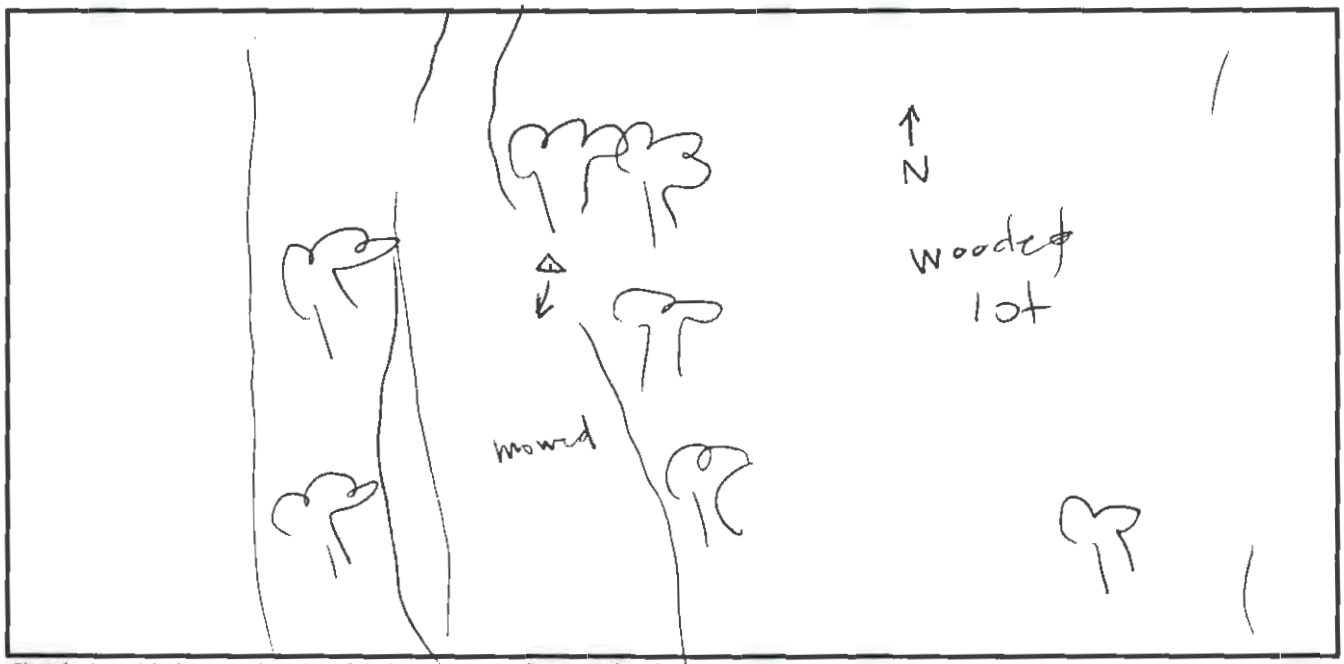
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 05 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/20/2021

Detector: 34 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 151

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 05 Location B

SM4 Detector Deployment Data Sheet

Site Name: 06 A Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16325 Longitude: -082.86839 UTC: -4

Site Description: edged of forested lot and grasslands

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 69 Microphone #: 45 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 65

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

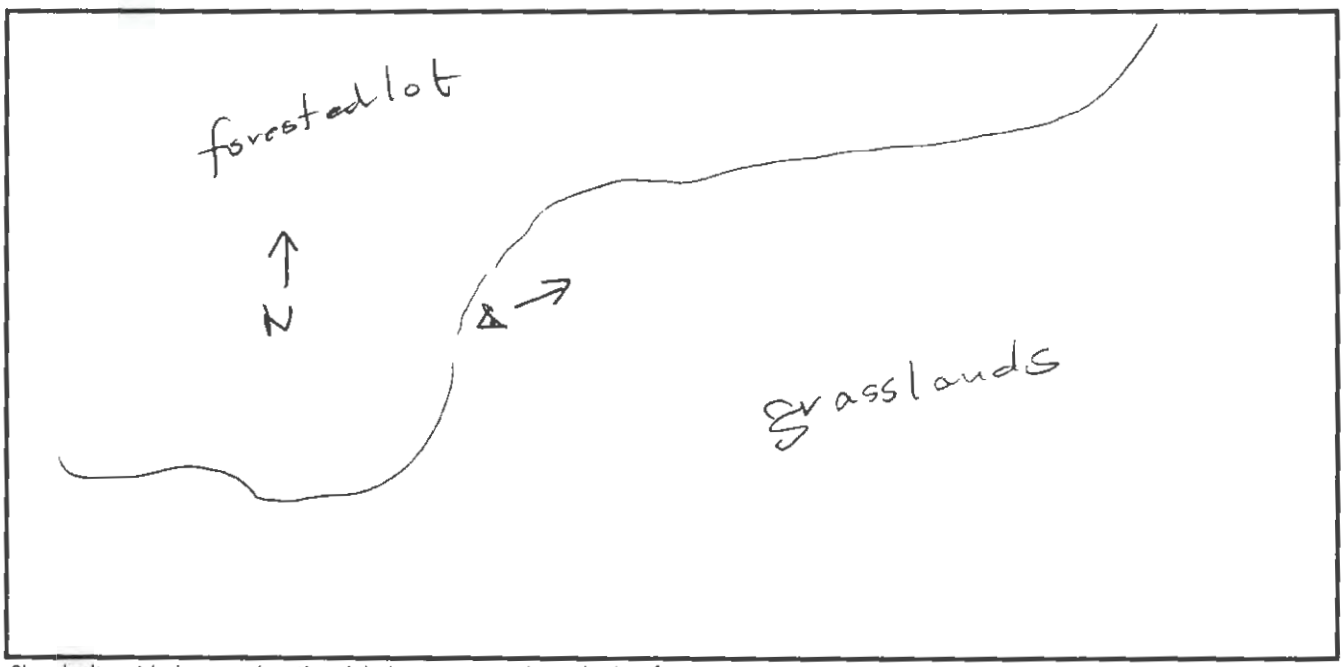
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 06 A Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/20/2021

Detector: 69 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: –

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 138 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 06 Location A

SM4 Detector Deployment Data Sheet

Site Name: 06 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16282 Longitude: -082.86893 UTC: -4

Site Description: edge of forested lot and grasslands

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 49 Microphone #: 18 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 275

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12)db
(circle one)

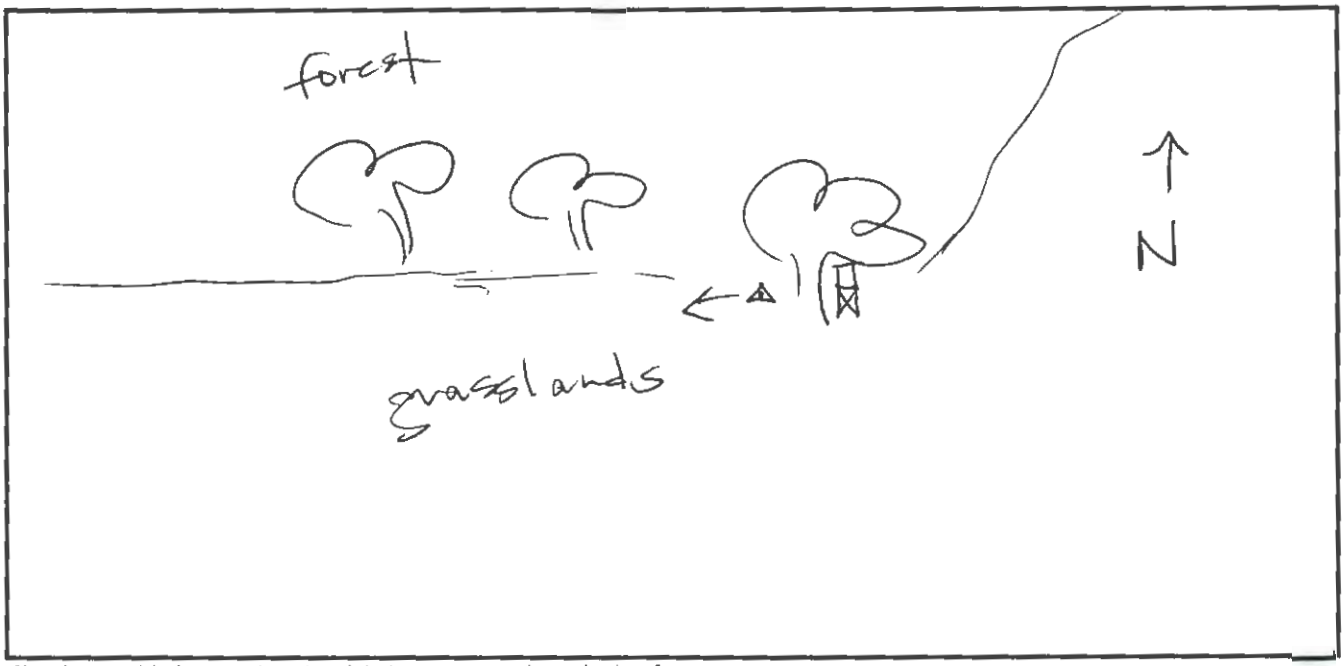
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 06 B

Project Name: 2021 Riverbend

Biologists: E. Mccill, R. Fitzpatrick

Date: 7/20/2021

Detector: 49 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 137

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 06 Location B

SM4 Detector Deployment Data Sheet

Site Name: 07 A Project Name: 2021

Biologists: E. Merrill, A. Graebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17041° Longitude: -82.83401° UTC: -4

Site Description: Soybean field edge shooting down tight Forest tree row.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 28 Microphone #: 75 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 307°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

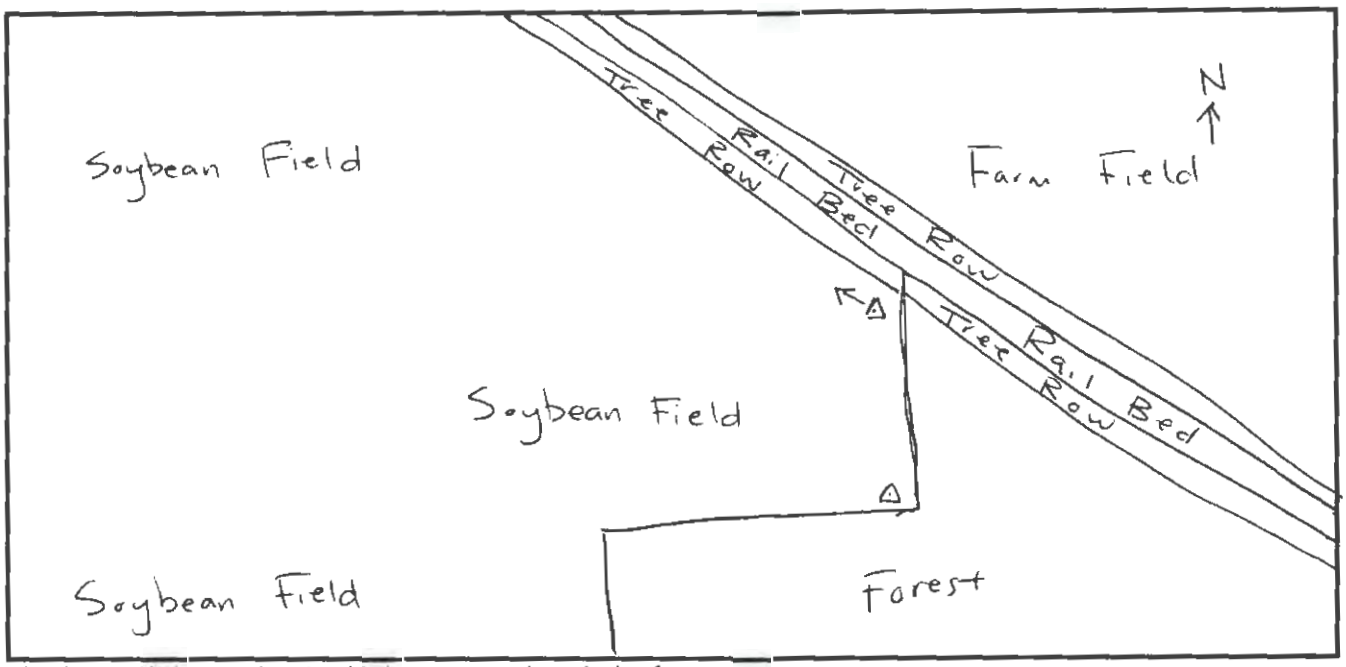
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (Y) Site: (Y) Mic orientation: (Y)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 07 A

Project Name: 2021 Riverbend

Biologists: E. Mcnull

Date: 7/1/21

Detector: 28 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0625	0625	0626	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	YES	Yes	

Data download

Card ID: 202

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 07 Location A

SM4 Detector Deployment Data Sheet

Site Name: 07 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16933° Longitude: -82.83408° UTC: -4

Site Description: Tight forest edge along soybean field.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 54 Microphone #: 74 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 270°

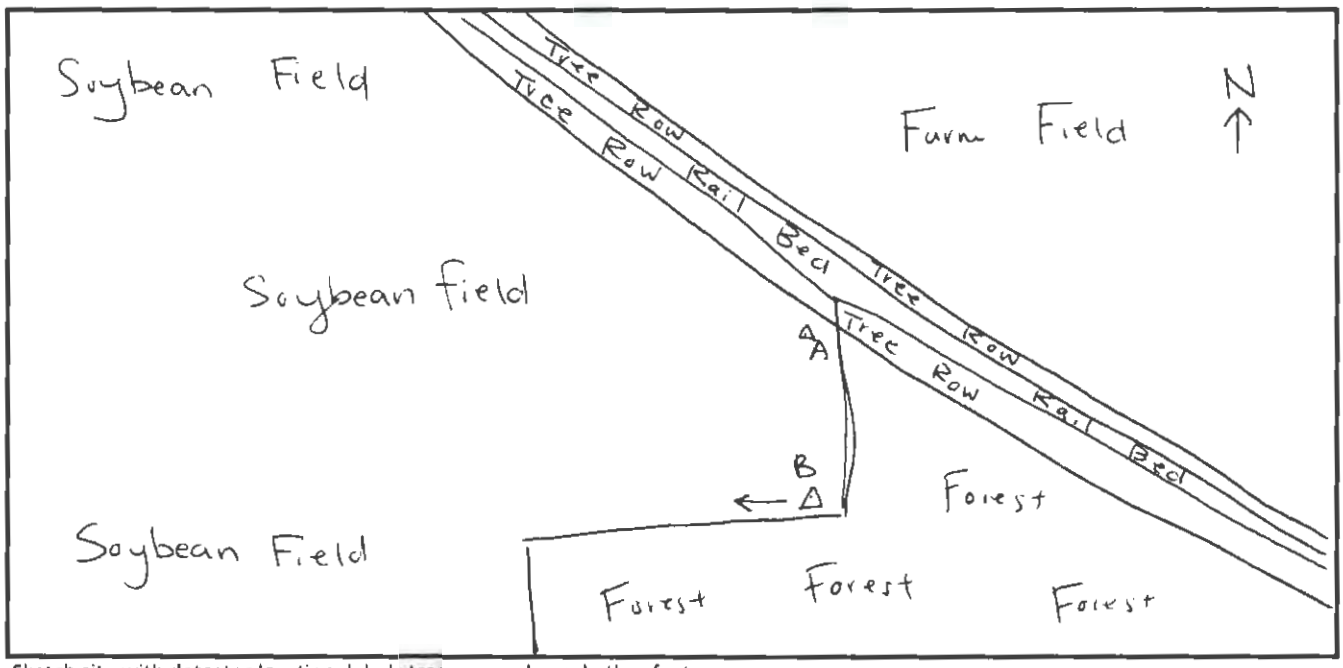
User Profile/Settings:

WA SM4BAT FS SMM-U2	Samp. Freq: 384kHz	Min. Dur.: 1.5 ms	Trig. Level	12db
Firmware: 2.3.1	HP-Filter: On	Max Dur.: none	Trig. Window	3 sec
	Input Gain: 0 or (12 db) (circle one)	Trig Freq: 16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 07 B Project Name: 2021 Riverbend

Biologists: E Mcmill Date: 7/1/21

Detector: 54 (circle one) Detector Status: ~~ON:Armed~~ ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0625	0625	0626	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 204 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 07 Location B

SM4 Detector Deployment Data Sheet

Site Name: Ø8 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17454 Longitude: -82.83395 UTC: -4

Site Description: Open wetland at the point of a forested wood lot.

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond (Other) wetland
(circle one)

Deployment Information:

Detector #: 52 Microphone #: 61 Directional PVC present?: No

Mic Height (m): 4 Mic Inclination: Ø Mic Azimuth: Ø°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

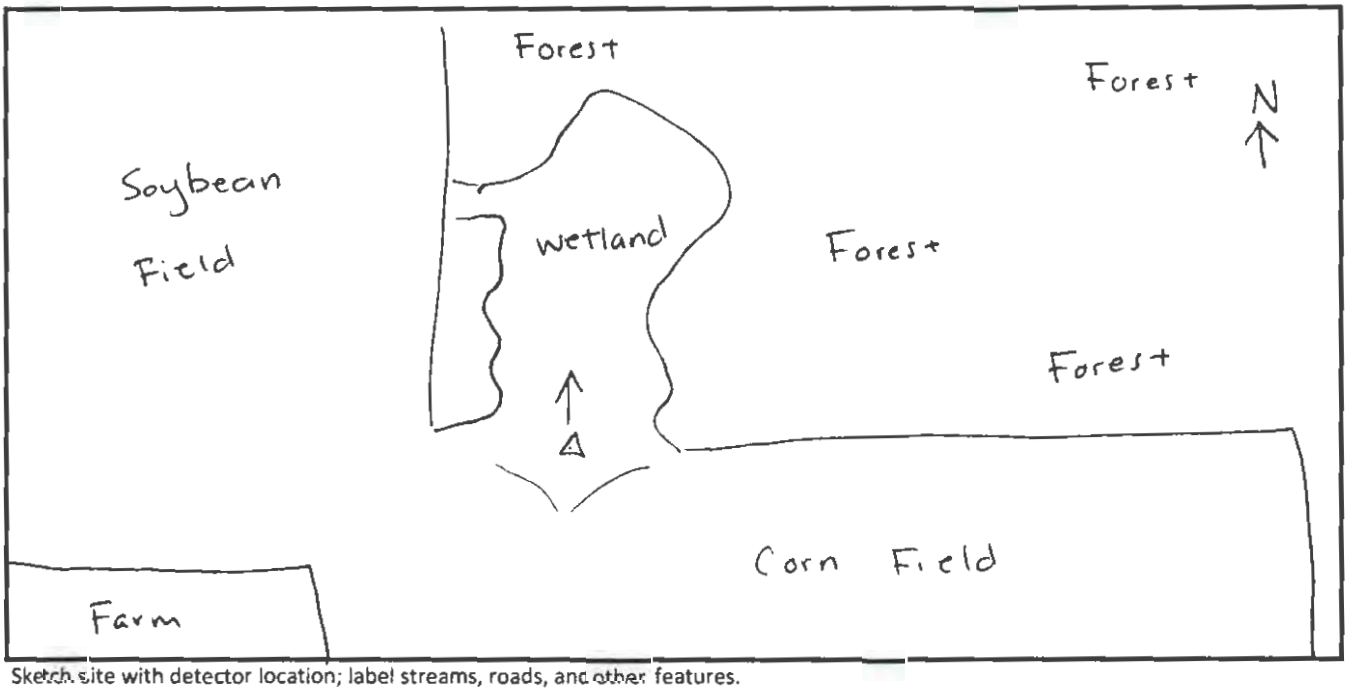
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 08 A

Project Name: 2021 Riverland

Biologists: E. Merrill

Date: 7/1/21

Detector: 52
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0625	0625	0626	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 216

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 08 Location A

SM4 Detector Deployment Data Sheet

Site Name: 08 B Project Name: 2021 Riverbend

Biologists: E. Murrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17658 Longitude: -82.83387 UTC: -4

Site Description: Open Field right inside forested woodlot.

Habitat being sampled: Riparian Field Edge (Open Field) Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 31 Microphone #: 52 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 51°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

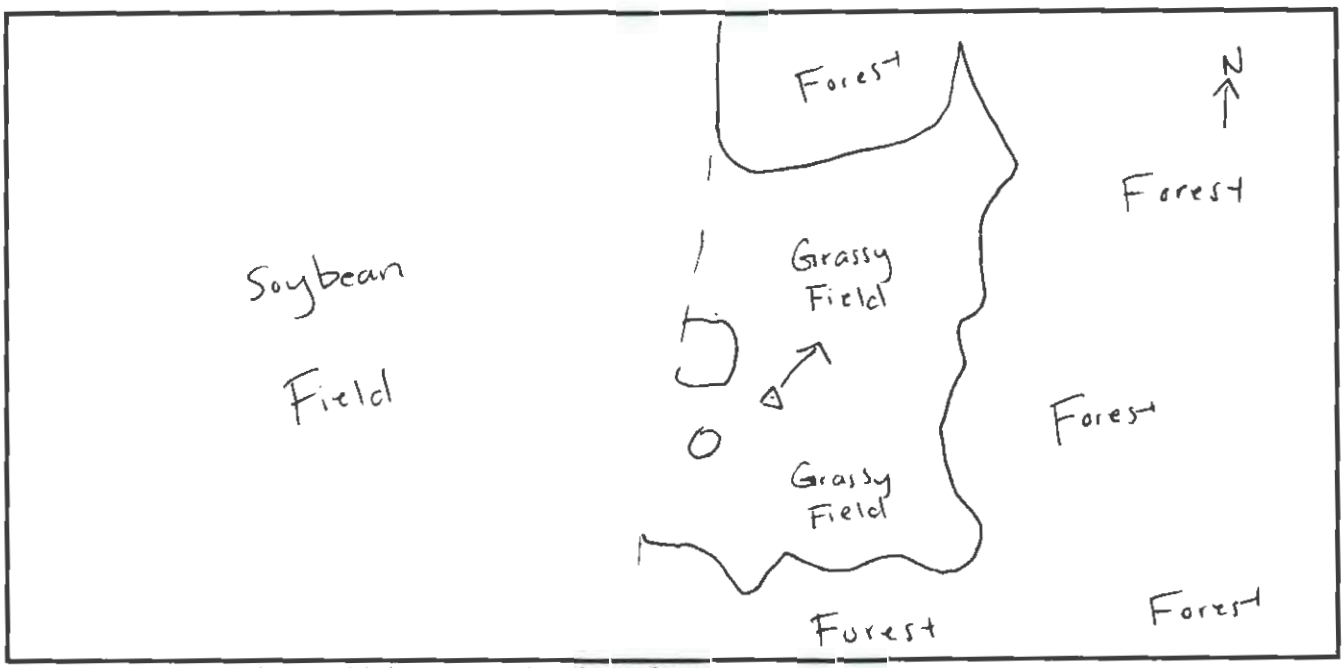
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 08B Project Name: 2021 Riverbend

Biologists: E. Mcvill Date: 7/1/21

Detector: 31 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0624	0625	0625	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 214 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 08 Location B

SM4 Detector Deployment Data Sheet

Site Name: 09 A Project Name: ~~06~~ 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18587° Longitude: -82.81224° UTC: -4

Site Description: Open field surrounded by dense forest edge. Good foraging area.

Habitat being sampled: Riparian Field Edge (Open Field) Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 26 Microphone #: 67 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 185°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

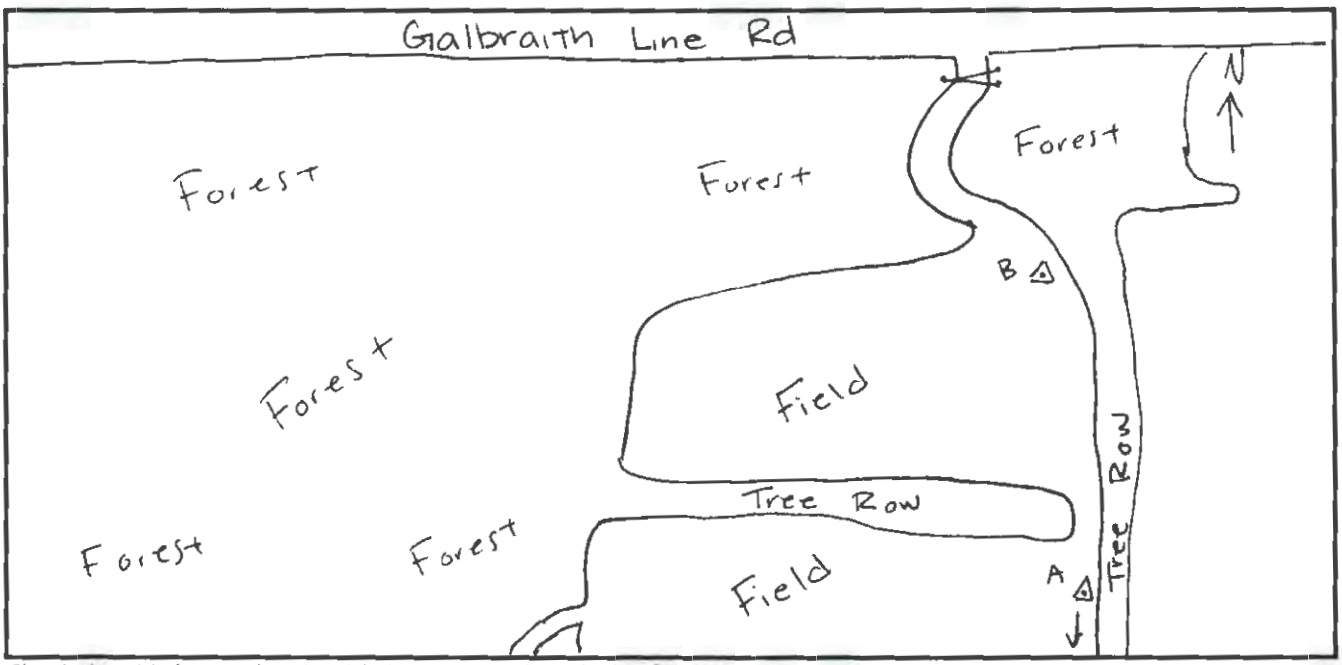
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 09 A Project Name: 2021 Riverjeand

Biologists: E. Morrill Date: 7/1/21

Detector: 26 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0624	0625	0625	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 206 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 09 Location A

SM4 Detector Deployment Data Sheet

Site Name: Ø9 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/26/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18683° Longitude: -82.81226° UTC: -4

Site Description: Open Field surrounded by tight forest.

Habitat being sampled: Riparian Field Edge (Open Field) Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 57 Microphone #: 54 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 278°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

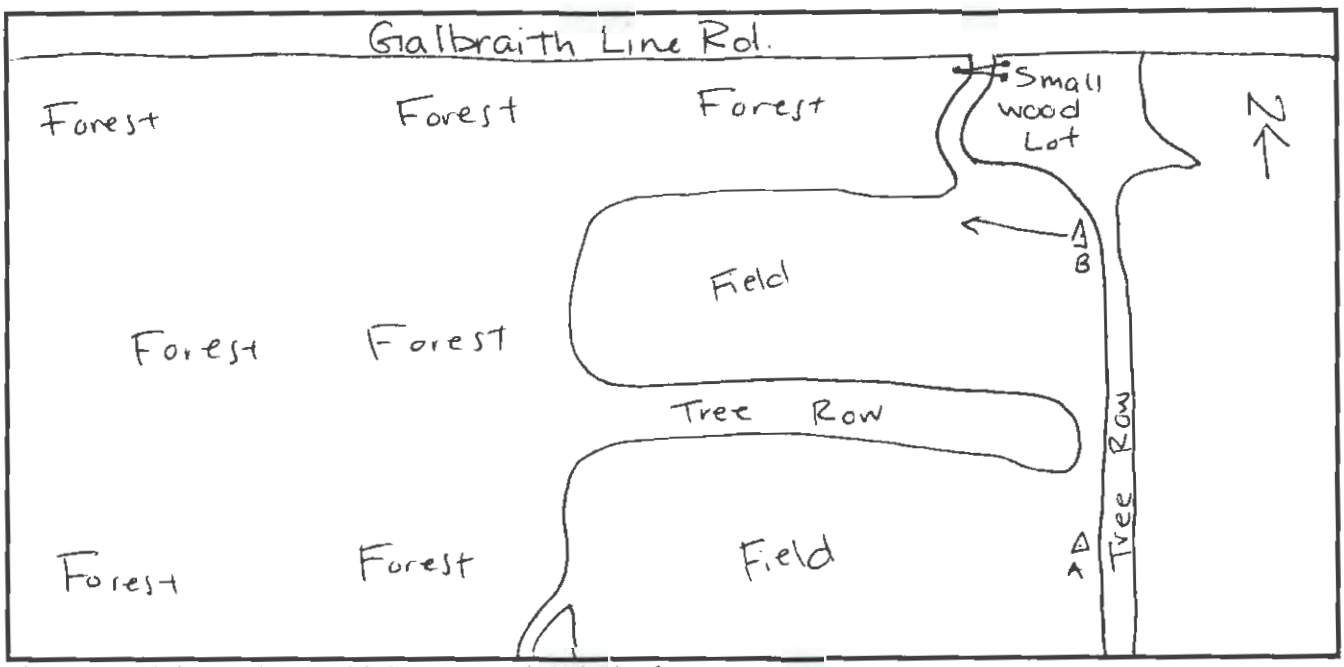
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 09B Project Name: 2021 Riverland

Biologists: E. Mcvill Date: 7/1/21

Detector: 57 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21	
Start time	—	2045	2045	2045	2045	
End time	—	0624	0624	0625	0625	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	
>9m/h wind speeds?	No	No	No	No	No	
>30 min of precip./fog?	Yes	No	No	No	No	
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	Yes	Yes	Yes	Yes	

Data download

Card ID: 208 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 09 Location B

SM4 Detector Deployment Data Sheet

Site Name: 10 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20725 Longitude: -082.66087 UTC: -4

Site Description: Grassy opening / along Seymour Creek

Habitat being sampled: Riparian Field Edge (Open Field) Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 20 Microphone #: 37 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 178

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

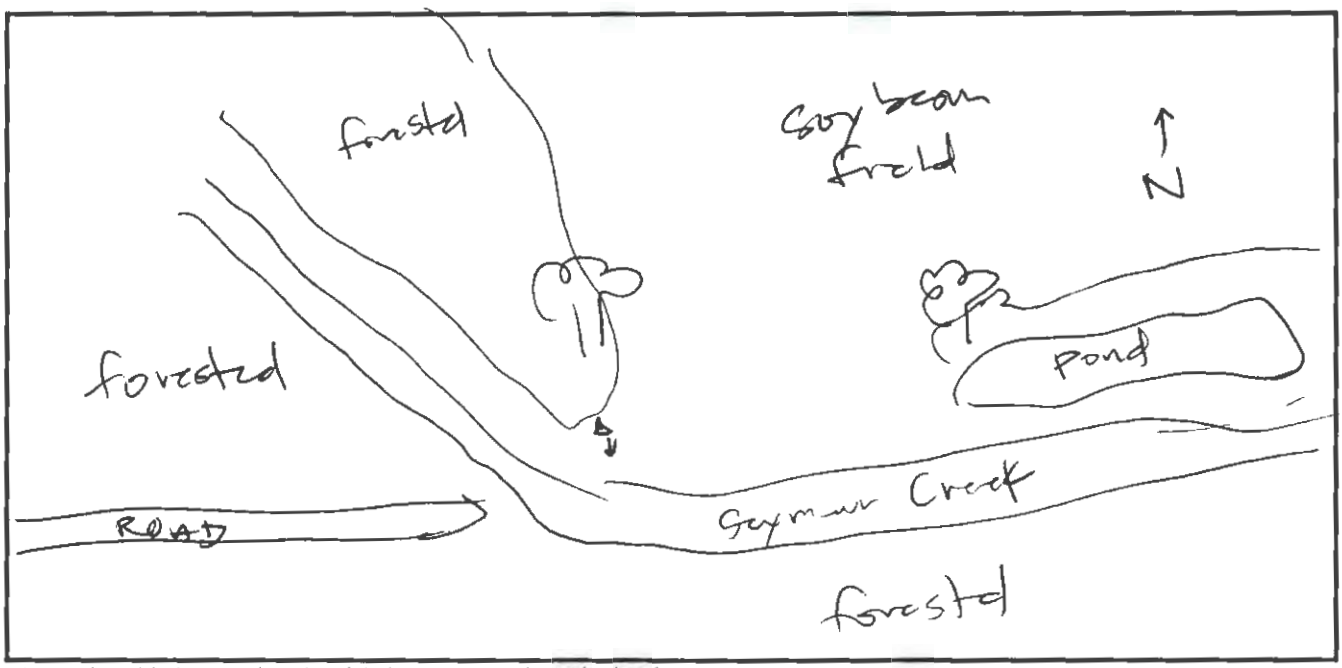
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 10 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 20 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0635	0636	0637		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 134

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 10 Location A

SM4 Detector Deployment Data Sheet

Site Name: 10 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20721 Longitude: -082.65982 UTC: -4

Site Description: opening of pond and Saymar Creek. sheating away from pond

Habitat being sampled: (Riparian) Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 53 Microphone #: 52 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 255

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

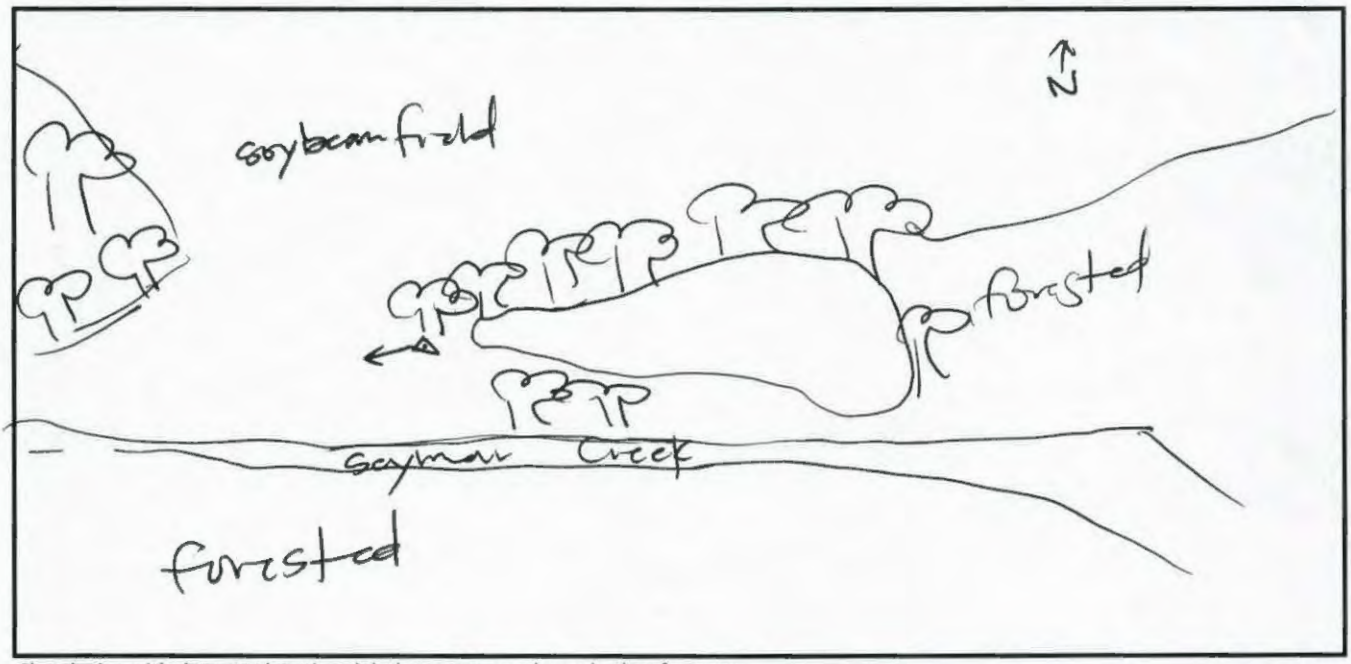
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 10 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/2021

Detector: 53 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0635	0636	0637		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 33 Card ID: —

Log file Present? YES Log file Present? —

revised 6/2021

Site 10 Location B

SM4 Detector Deployment Data Sheet

Site Name: 11 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18598° Longitude: -82.73155° UTC: -4

Site Description: Shooting down tight tree edge next to wheat field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 53 Microphone #: 76 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 196°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

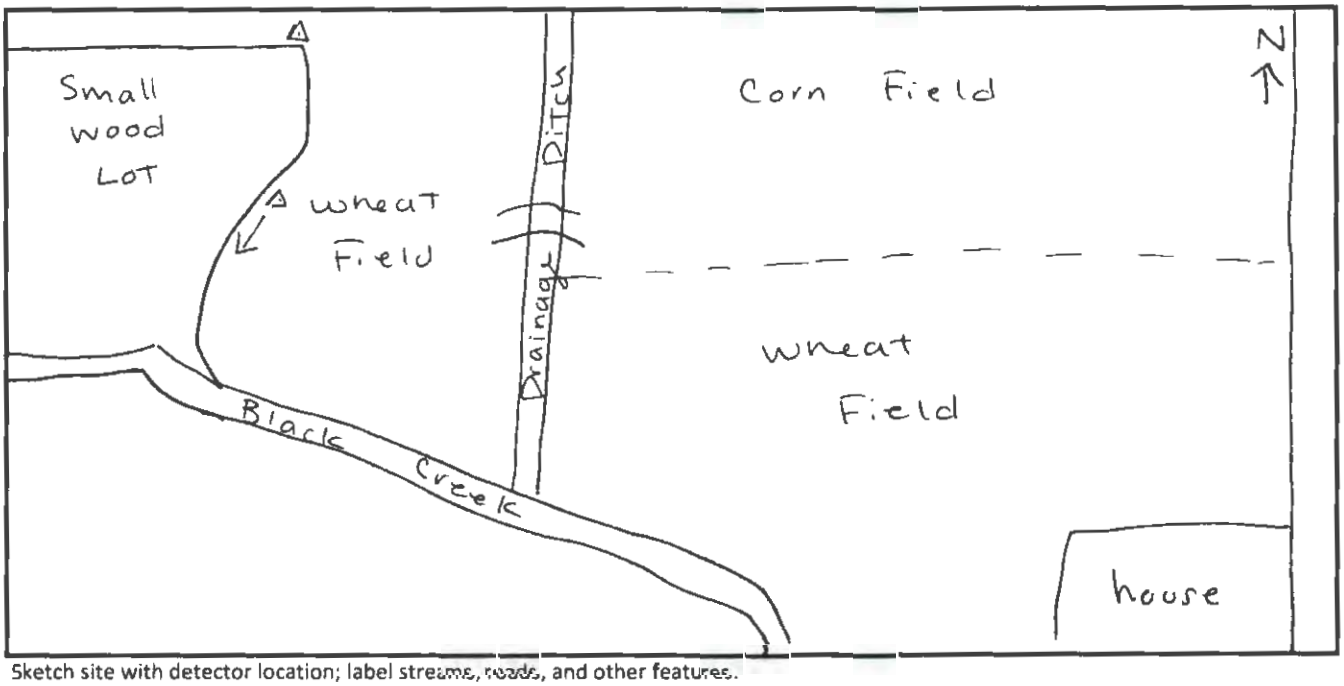
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: Ø Site: Ø Mic orientation: Ø



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 11 A Project Name: 2021 Riverland

Biologists: E. Mcmill Date: 7/1/21

Detector: 53 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/2021	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2045	2045		
End time	0624	0624	0624	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 112 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 11 Location A

SM4 Detector Deployment Data Sheet

Site Name: 11 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18679° Longitude: -82.73129° UTC: -4

Site Description: Shooting along edge of woodlot and corn field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 1 Microphone #: 43 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 283°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

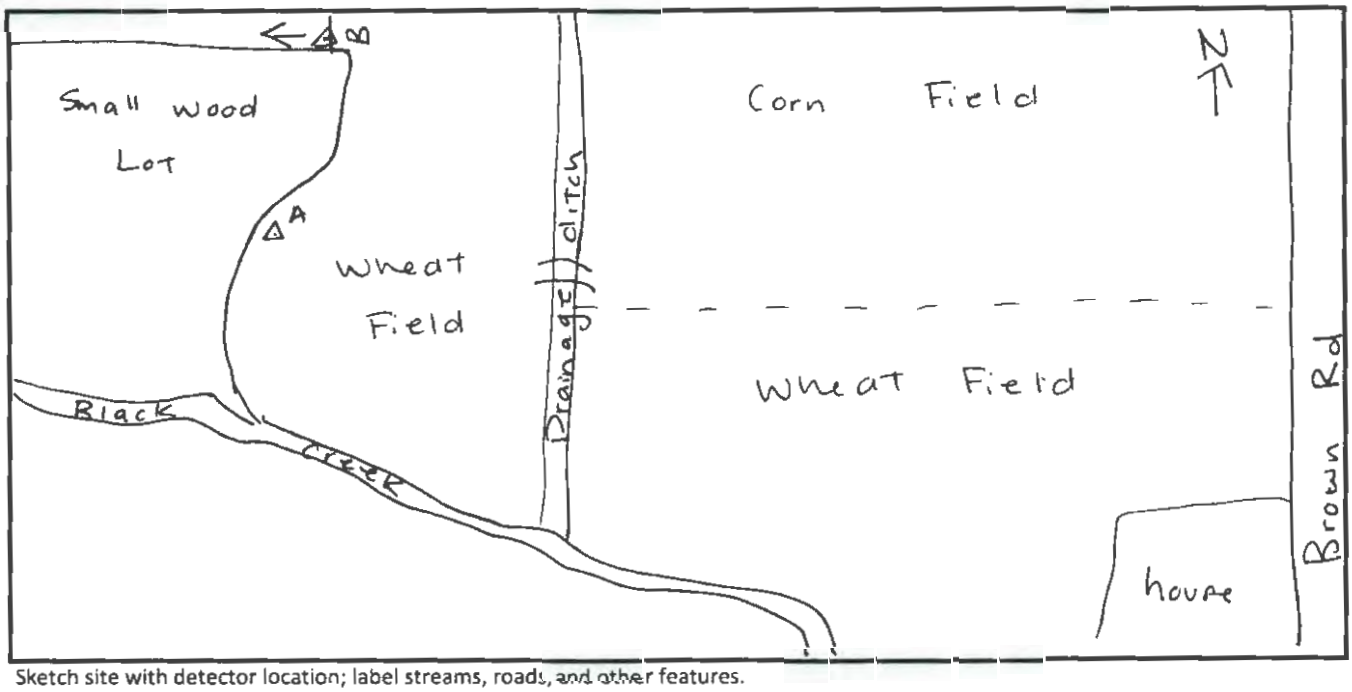
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: Y Site: Y Mic orientation: Y



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 11 B

Project Name: 2021 Riverland

Biologists: E. Merrill

Date: 7/1/21

Detector: 01 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2045	2045		
End time	0624	0624	0624	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 31

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 11 Location B

SM4 Detector Deployment Data Sheet

Site Name: 12 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18235 Longitude: -082.68133 UTC: -4

Site Description: Edge of forest shooting along ditch along turnip field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 1 Microphone #: 85 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 250

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

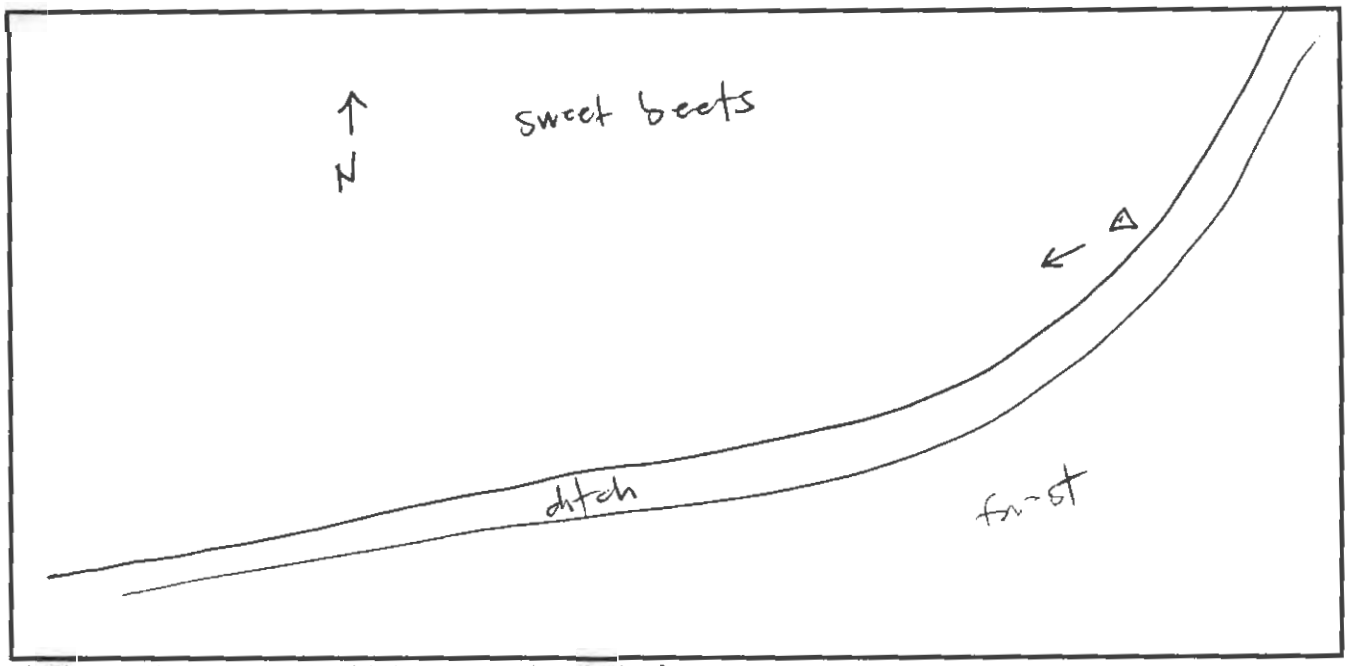
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 12 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R Fitzpatrick Date: 7/17/21

Detector: 1 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2040	2039	2038	2038		
End time	0634	0635	0636	0637		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 121 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 12 Location A

SM4 Detector Deployment Data Sheet

Site Name: 12 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18195 Longitude: -082.68307 UTC: -4

Site Description: Open area at start of trail through bottomland forest

Habitat being sampled: Riparian Field Edge Open Field (Bottomland Forest) Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 47 Microphone #: 39 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 280

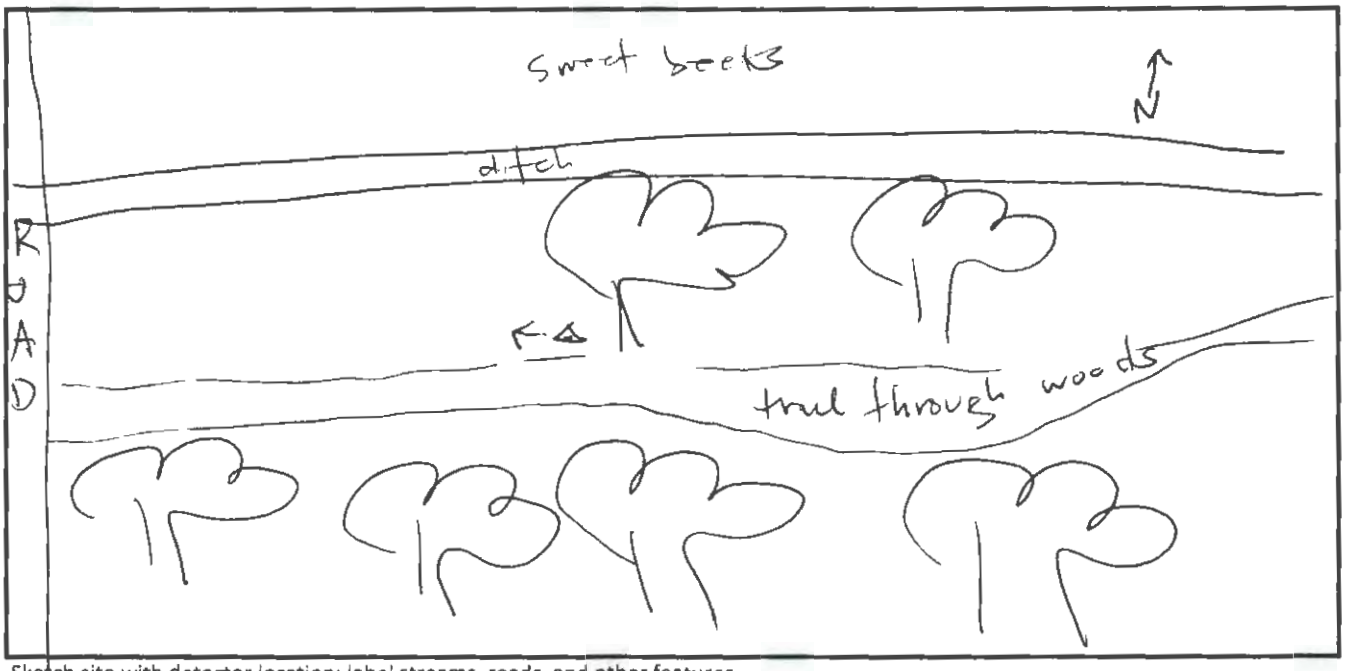
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 12 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/17/21

Detector: 47 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? if so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2040	2039	2038	2038		
End time	0634	0635	0636	0637		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 122

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 12 Location B

SM4 Detector Deployment Data Sheet

Site Name: 13 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18382° Longitude: -82.67357° UTC: -4

Site Description: Bottom land forest w/ good foraging area and close pond.

Habitat being sampled: Riparian Field Edge Open Field (Bottomland Forest) Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 12 Microphone #: 60 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 83°

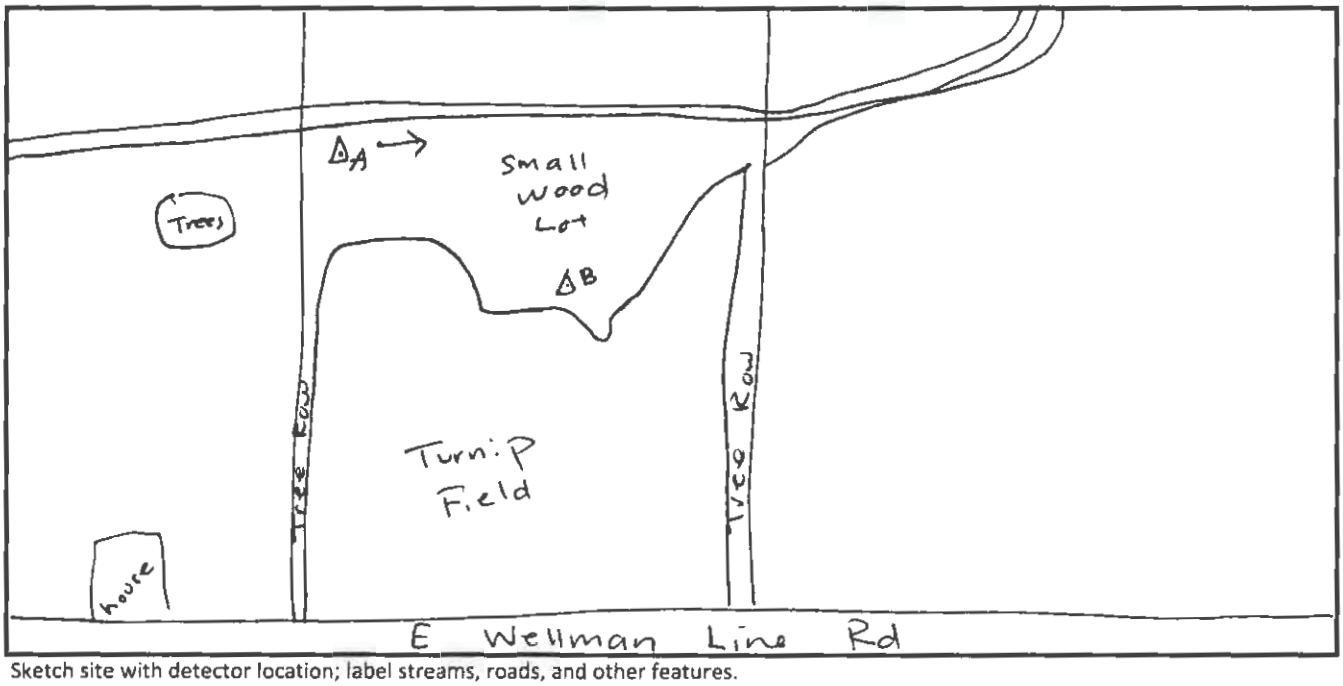
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12 db) (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 13A Project Name: 2021 Riverland

Biologists: E. Merrill Date: 7/2/21

Detector: 12 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2044	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 62 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 13 Location A

SM4 Detector Deployment Data Sheet

Site Name: 13 B Project Name: 2021 Riverbend

Biologists: E Merrill, A. Goebel, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43 18303° Longitude: −82.67122° UTC: -4

Site Description: Bottom Land forest connecting turnip field, next to drainage ditch

Habitat being sampled: Riparian Field Edge Open Field (Bottomland Forest) Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 75 Microphone #: 68 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 235°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

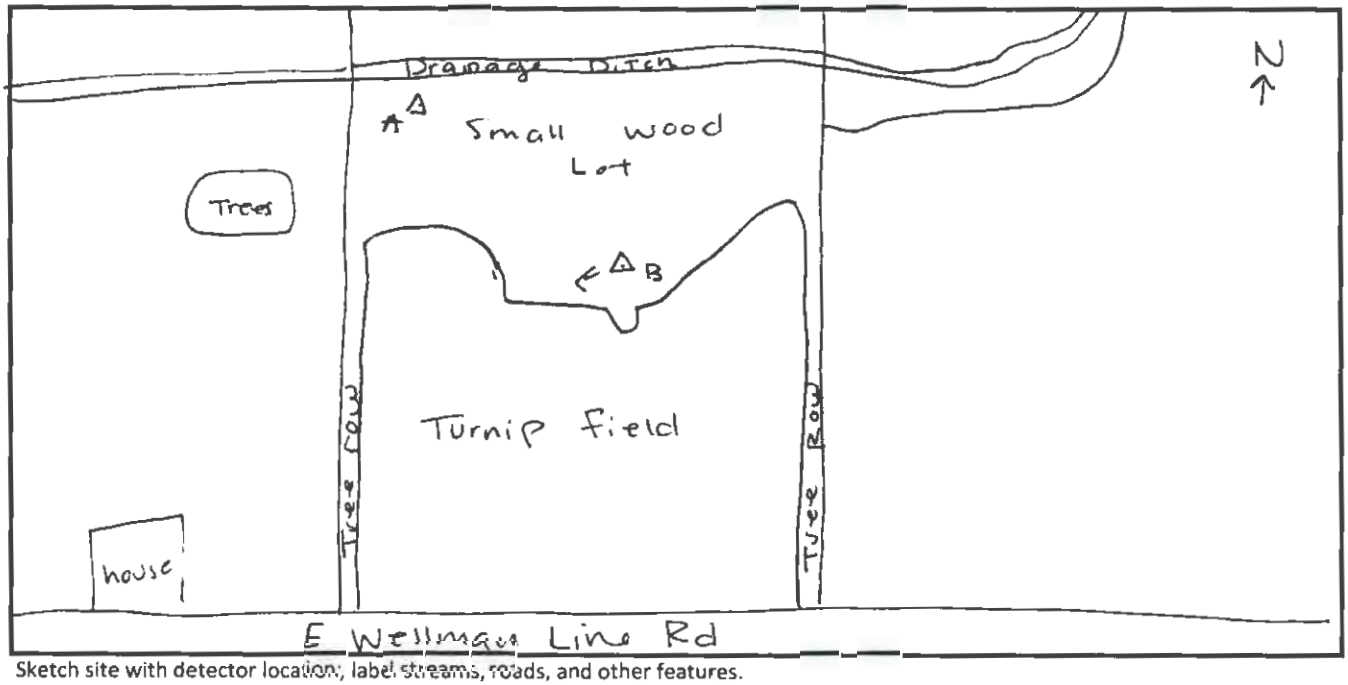
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: Ø Site: Ø Mic orientation: Ø



Sketch site with detector location, label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: LoB

Project Name: 2021 Riverbend

Biologists: E. McNill

Date: 7/2/21

Detector: 75 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2044	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	YES	YES	YES	YES		

Data download

Card ID: 64

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 13 Location B

SM4 Detector Deployment Data Sheet

Site Name: 14 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17398° Longitude: −82.69081° UTC: -4

Site Description: Shooting along wood lot forest edge next to enclosed Soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 6 Microphone #: 10 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 159°

User Profile/Settings:

WA SM4BAT FS 5MM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

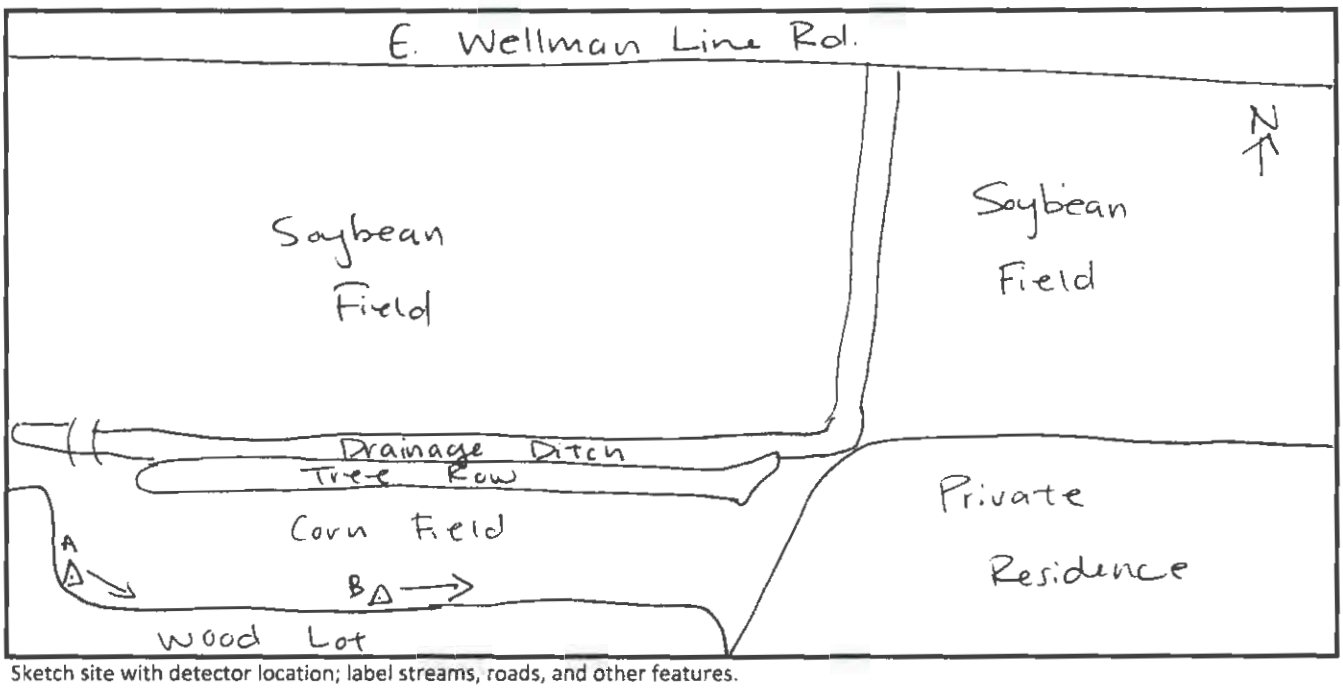
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 5ec

Comments:

Photos:

Detection area: (Y) Site: (Y) Mic orientation: (Y)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: JHA Project Name: 2021 RiverSound

Biologists: E. Morrill Date: 7/1/21

Detector: 06 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date:	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2044	2044		
End time	0623	0624	0624	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	YES	YES	YES	YES		

Data download

Card ID: 19 Card ID: _____

Log file Present? YES Log file Present? _____

revised 6/2021

Site 14 Location A

SM4 Detector Deployment Data Sheet

Site Name: 14 B Project Name: 2021 R

Biologists: A. Goebel, E. Murrill, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17360° Longitude: -82.68964° UTC: -4

Site Description: Shooting down forest edge next to soybean field.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 19 Microphone #: 22 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 89°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

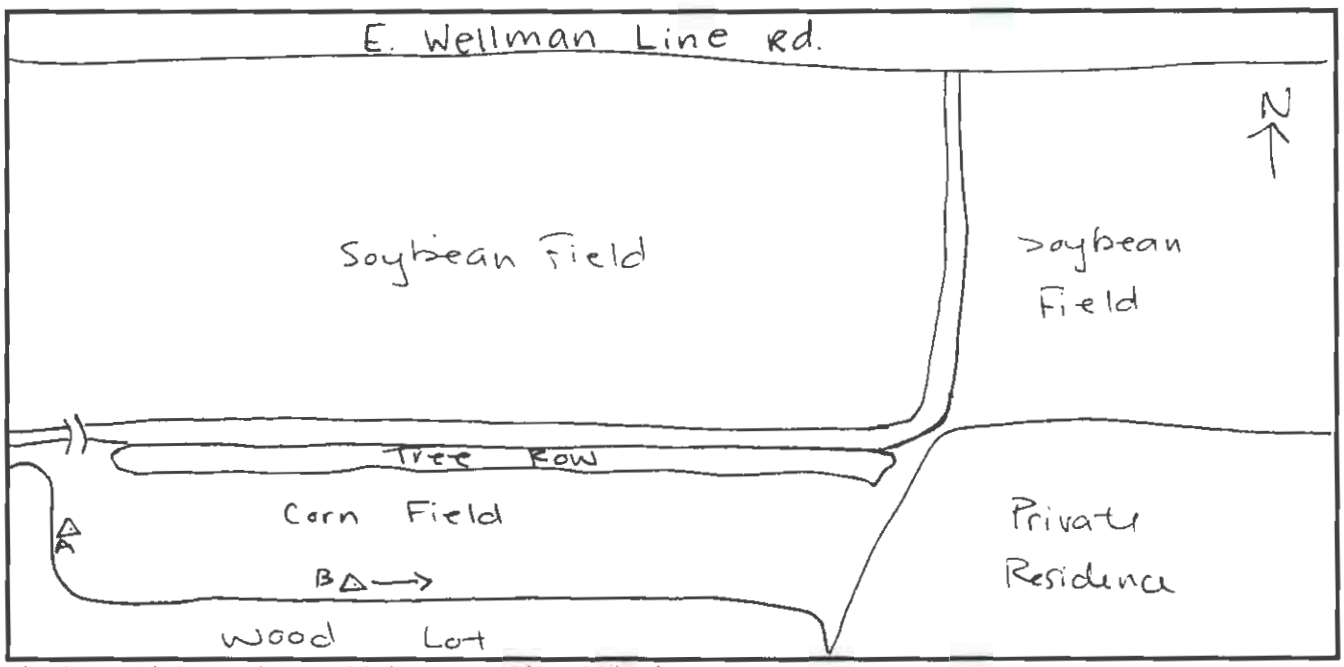
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (Y) Site: (Y) Mic orientation: (Y)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 14B

Project Name: 2021 River Sound

Biologists: E. Mcnull

Date: 7/1/21

Detector: 19
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2044	2044		
End time	0623	0624	0624	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 24

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 14 Location B

SM4 Detector Deployment Data Sheet

Site Name: 15 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18077 Longitude: -082.68878 UTC: -4

Site Description: on edge of corn field and treeline. Sheltered towards wetlands

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 26 Microphone #: 72 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 181

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

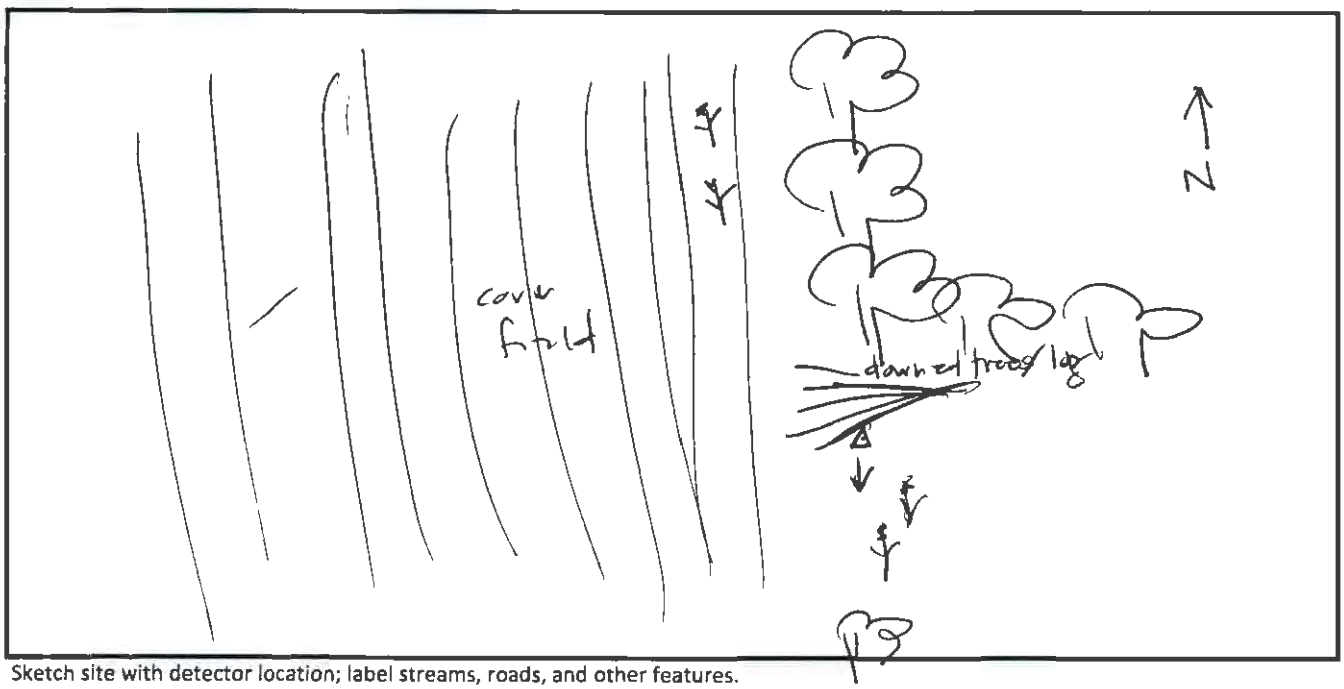
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 15 A

Project Name: 2021 Riverbend

Biologists: E.Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 26
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0637		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 131

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 15 Location A

SM4 Detector Deployment Data Sheet

Site Name: 15 B Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18024 Longitude: -082.68879 UTC: -4

Site Description: on edge of cornfield shooting treelines

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 63 Microphone #: 67 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 94

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

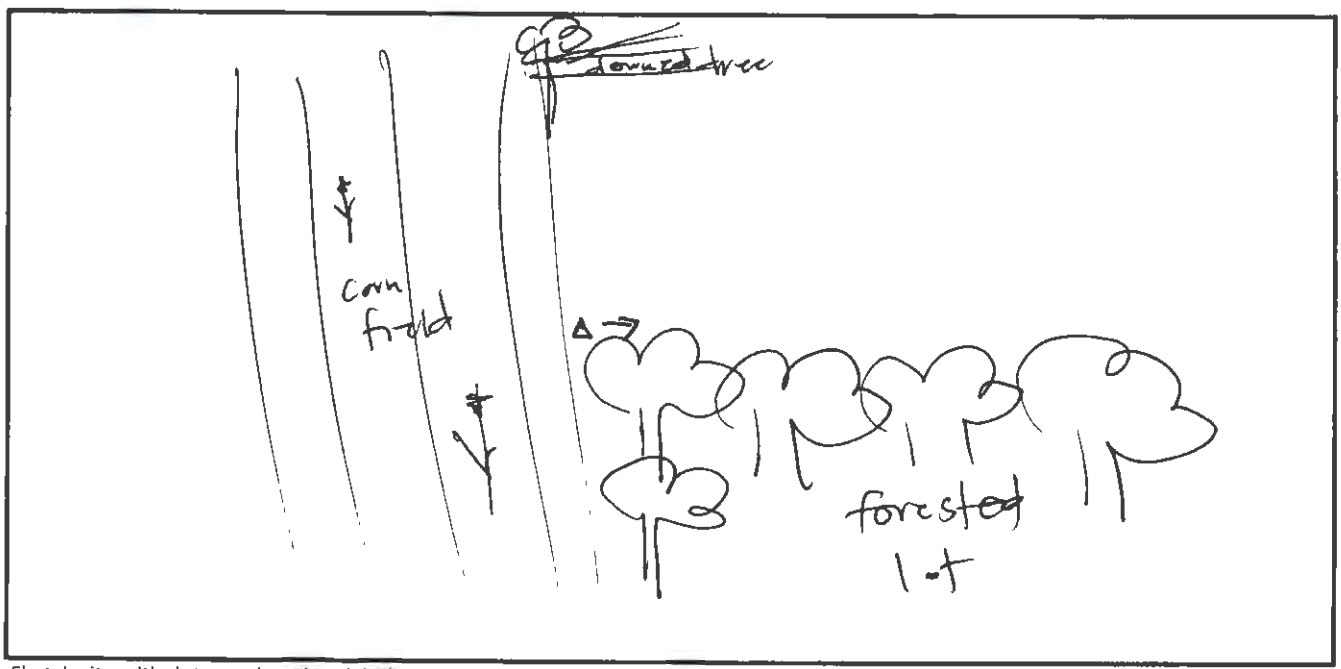
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 15 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 63
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0637		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 132

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 15 Location B

SM4 Detector Deployment Data Sheet

Site Name: 16 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17387 Longitude: -082.70958 UTC: -4

Site Description: treeline along drainage ditch and soy beanfield

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 32 Microphone #: 80 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 10

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

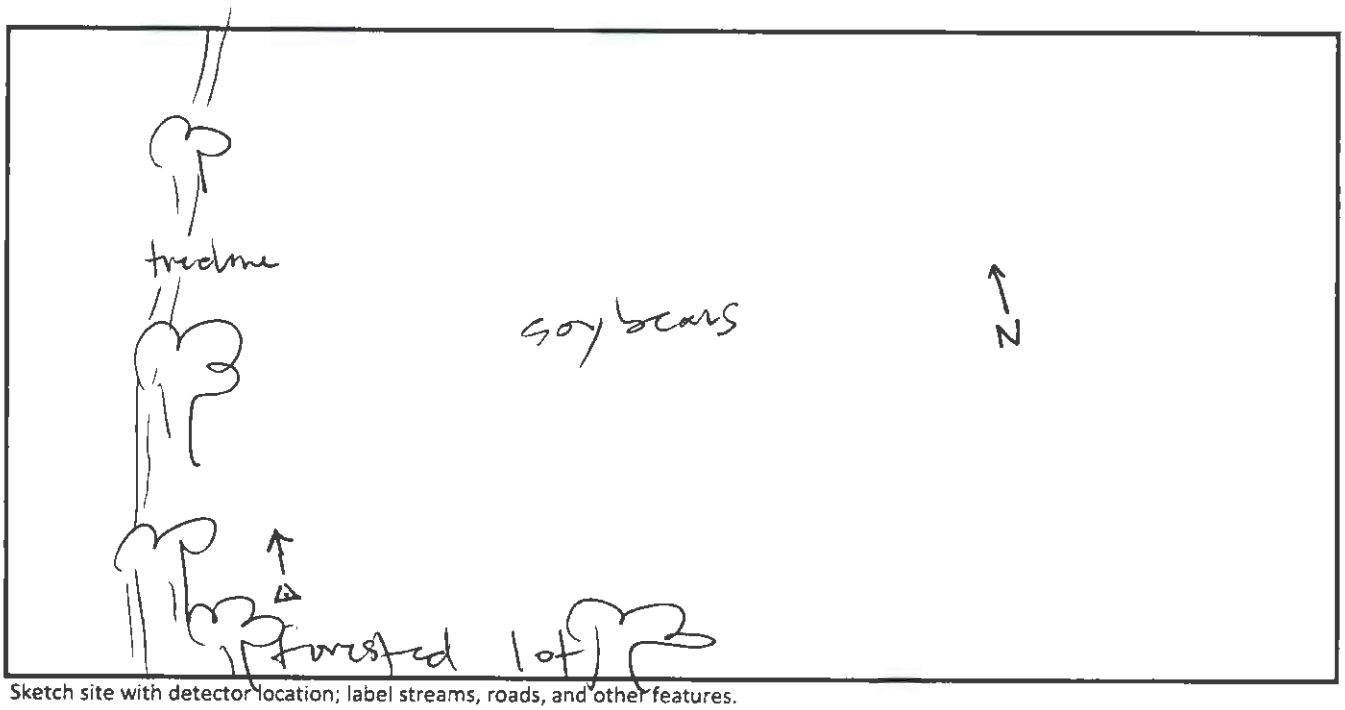
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 16 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 32
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 143

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 16 Location A

SM4 Detector Deployment Data Sheet

Site Name: 16 B | Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick | Date: 7/14/21

Location Information:

State: Michigan | County: Sunilac | Datum/Format: NAD 83/D.D

Latitude: 43.17363 | Longitude: -082.70850 | UTC: -4

Site Description: edge of soybean field and forested lot shooting towards edge of forest and hayfield

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 24 | Microphone #: 76 | Directional PVC present?: no

Mic Height (m): 3 | Mic Inclination: 0 | Mic Azimuth: 160

User Profile/Settings:

WA SM4BAT FS SMM-U2 | Samp. Freq: 384kHz | Min. Dur.: 1.5 ms | Trig. Level 12db

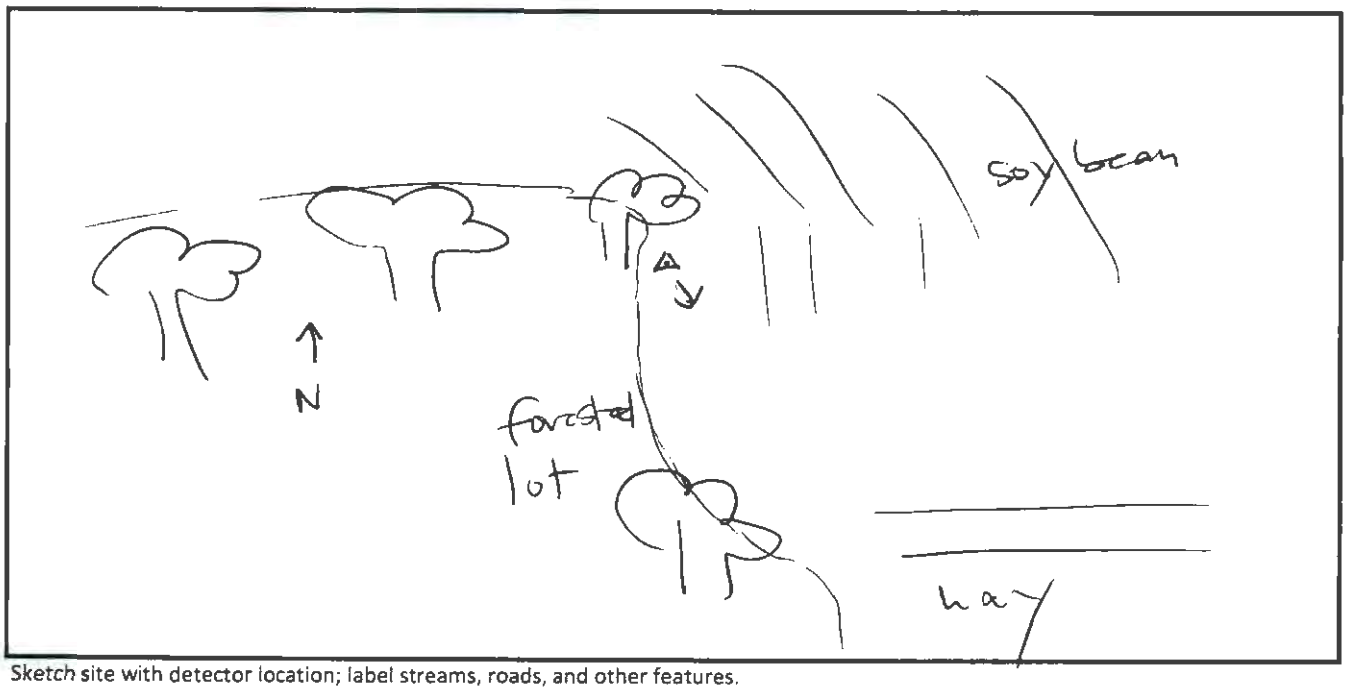
Firmware: 2.3.1 | HP-Filter: On | Max Dur.: none | Trig. Window 3 sec

Input Gain: 0 or (12) db | Trig Freq: 16kHz | Max Length: 5 Sec
(circle one)

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 16 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 24 (circle one)

Detector Status: (ON:Armed) Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 144

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 16 Location B

SM4 Detector Deployment Data Sheet

Site Name: 17 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20143 Longitude: -082.66430 UTC: -4

Site Description: shooting along corn field edge and forest at forest opening to Black Creek

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 48 Microphone #: 82 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 4

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

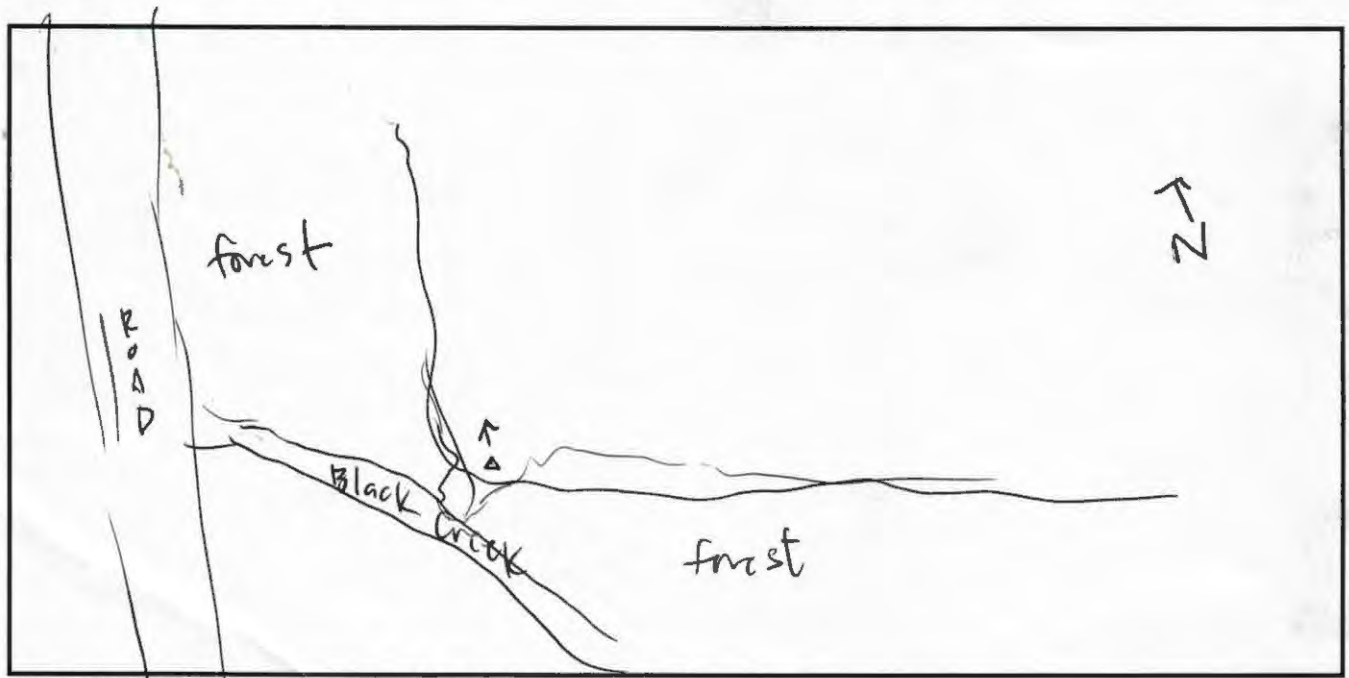
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 17 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Detector: 48 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2039	2039	2038	2038		
End time	0634	0635	0635	0636		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 37 Card ID: —

Log file Present? Yes Log file Present? —

revised 6/2021

Site 17 Location A

SM4 Detector Deployment Data Sheet

Site Name: 17 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20148 Longitude: -082.66375 UTC: -4

Site Description: Along corn field edge and forested lot with Black Creek running through

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 72 Microphone #: 59 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 110

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (D)db
(circle one)

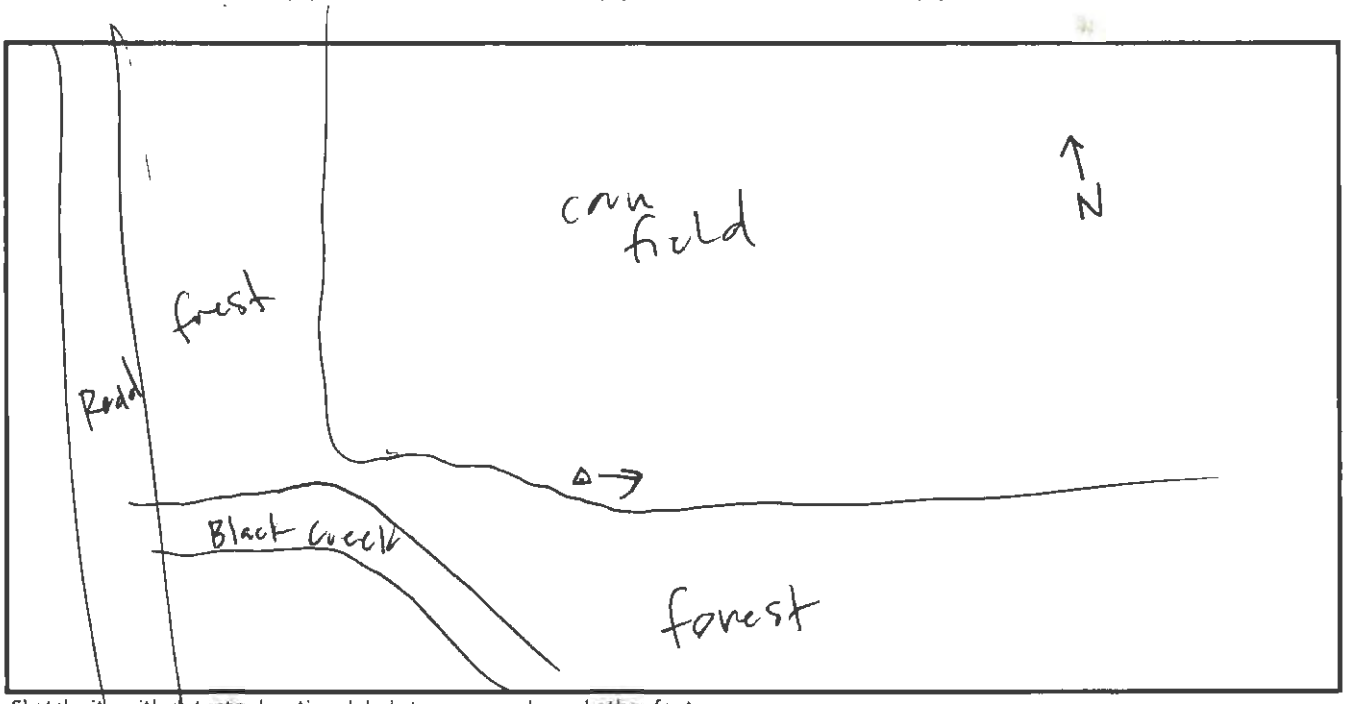
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 17 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/17/21

Detector: 72 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2039	2039	2038	2038		
End time	0634	0635	0635	0636		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 38

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 17 Location B

SM4 Detector Deployment Data Sheet

Site Name: 18 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.22462 Longitude: -082.66810 UTC: -4

Site Description: edge of forested lot and grassy way with ditch

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 46 Microphone #: 77 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 274

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

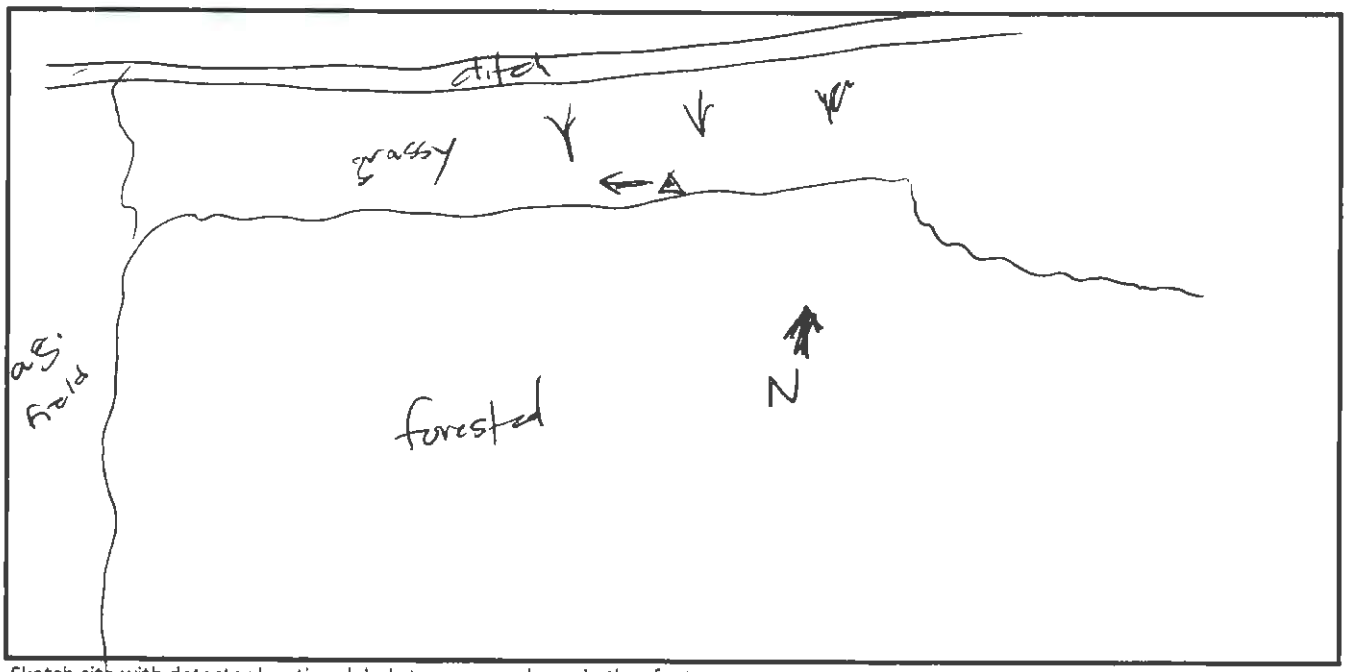
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 18 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/21/2021

Detector: 46 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2035	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 159 Card ID: _____

Log file Present? YES Log file Present? _____

revised 6/2021

Site 18 Location A

SM4 Detector Deployment Data Sheet

Site Name: 18 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.22372 Longitude: -082.66942 UTC: -4

Site Description: edge of ag. field and wooded lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 74 Microphone #: 38 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 190

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

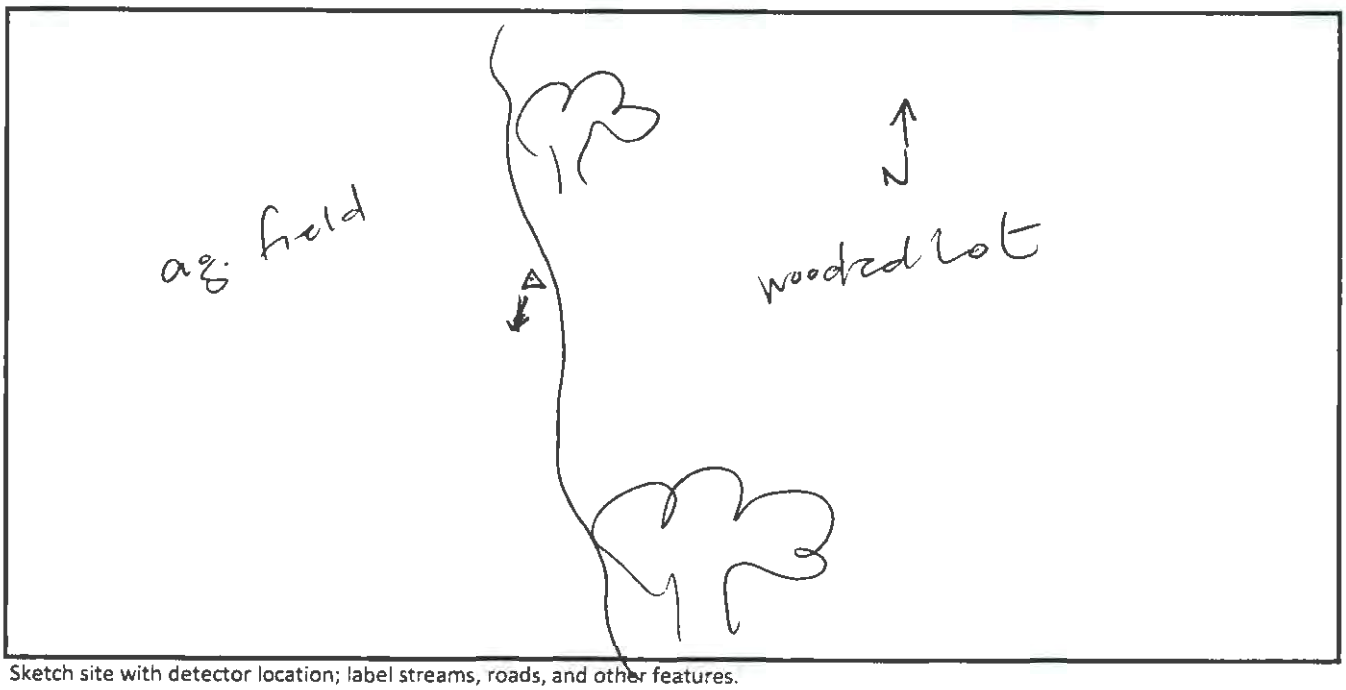
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 5ec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 18 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/21/2021

Detector: 74 (circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2035	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 160

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 18 Location B

SM4 Detector Deployment Data Sheet

Site Name: 19 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Groebel, M Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.24582° Longitude: -82.67827° UTC: -4

Site Description: Shooting in direction of pond across travel corridor

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest (Pond) Other
(circle one)

Deployment Information:

Detector #: 49 Microphone #: 36 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 13°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

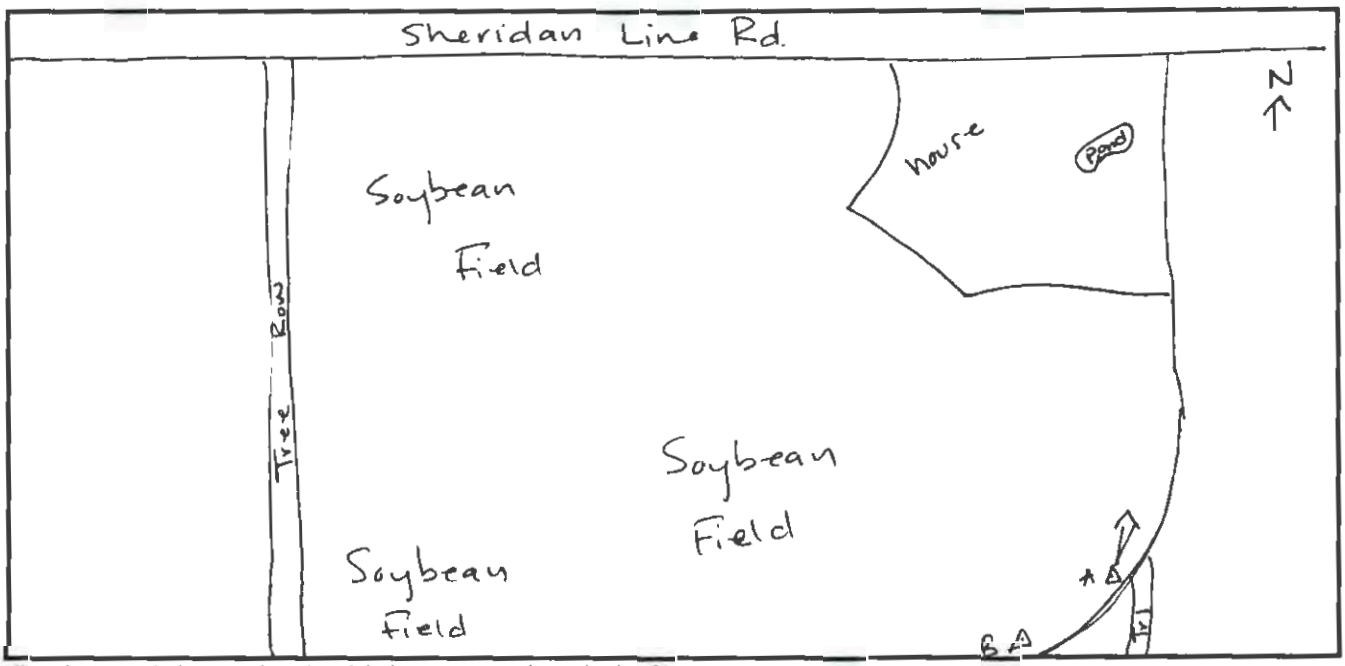
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: S Sec

Comments:

Photos:

Detection area: (Y) Site: (Y) Mic orientation: (Y)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 19A

Project Name: 2021 Riverland

Biologists: E. Murrell

Date: 7/3/21

Detector: 49
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2044	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 25

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 19 Location A

SM4 Detector Deployment Data Sheet

Site Name: 19B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.24538° Longitude: -82.67899° UTC: -4

Site Description: Shooting across travel corridor along forest edge.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 3 Microphone #: 42 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 52°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

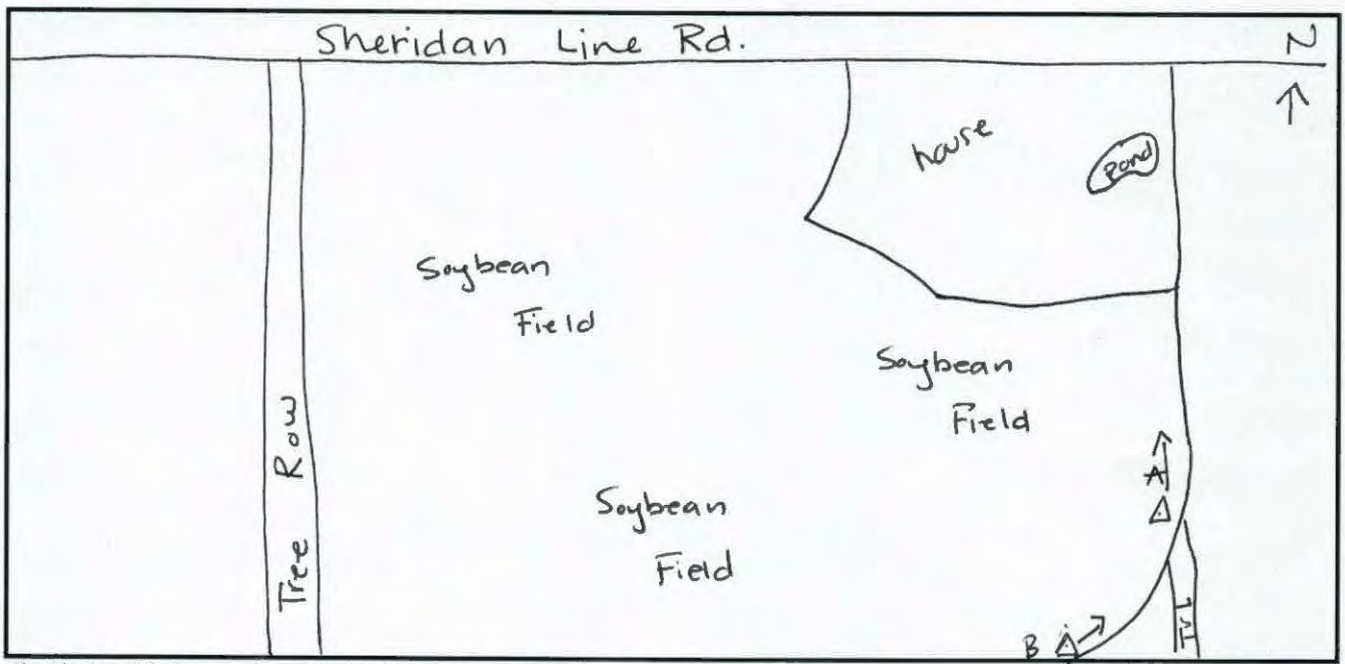
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: ~~No~~ Site: ~~No~~ Mic orientation: ~~No~~



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 19B

Project Name: 2021 Riverland

Biologists: E. Mcnull

Date: 7/3/21

Detector: 03 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2044	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 35

Log file Present? Yes

Card ID: —

Log file Present? —

revised 6/2021

Site 19 Location B

SM4 Detector Deployment Data Sheet

Site Name: 20 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.24272° Longitude: -82.67805° UTC: -4

Site Description: Shooting across travel corridor along tree edge next to soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 40 Microphone #: 77 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 6°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

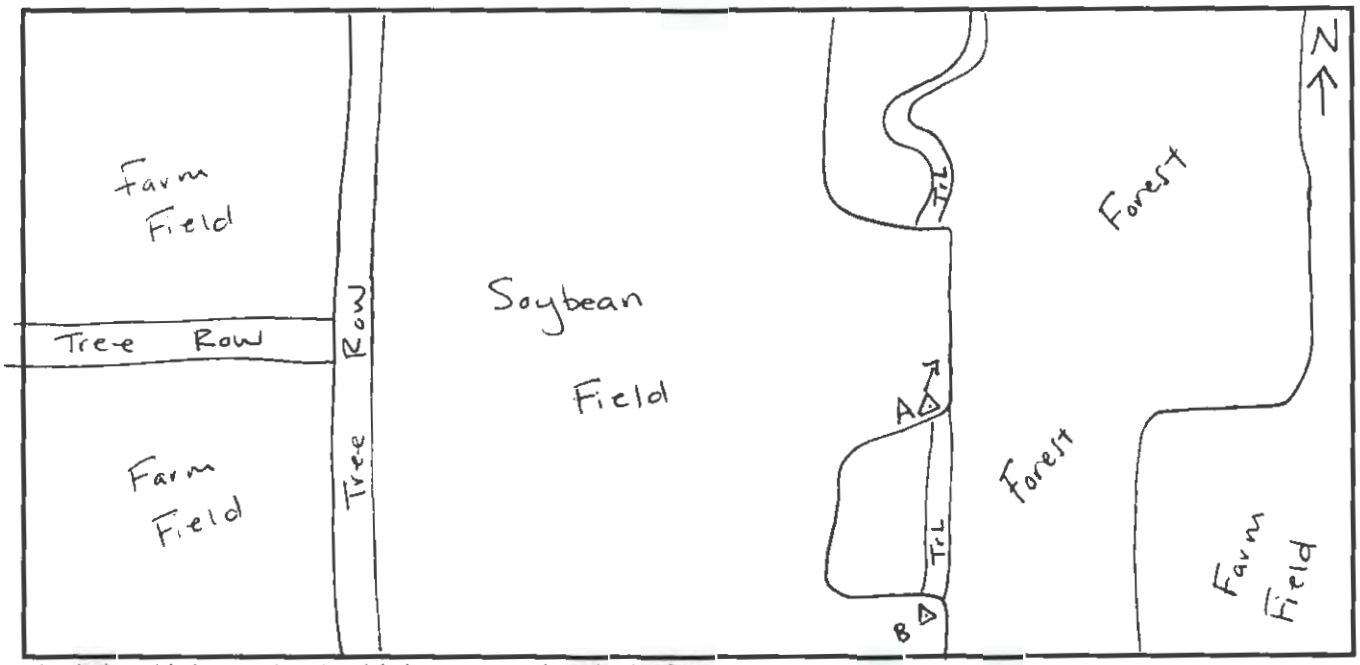
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: X Mic orientation: X



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 20A Project Name: 2021 Riverland

Biologists: E. Mcnll Date: 7/3/21

Detector: 40 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2045	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 73 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 20 Location A

SM4 Detector Deployment Data Sheet

Site Name: 20 B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.24157° Longitude: -82.67795° UTC: -4

Site Description: Shooting across travel corridor along forested edge next to soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 69 Microphone #: 70 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 180°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

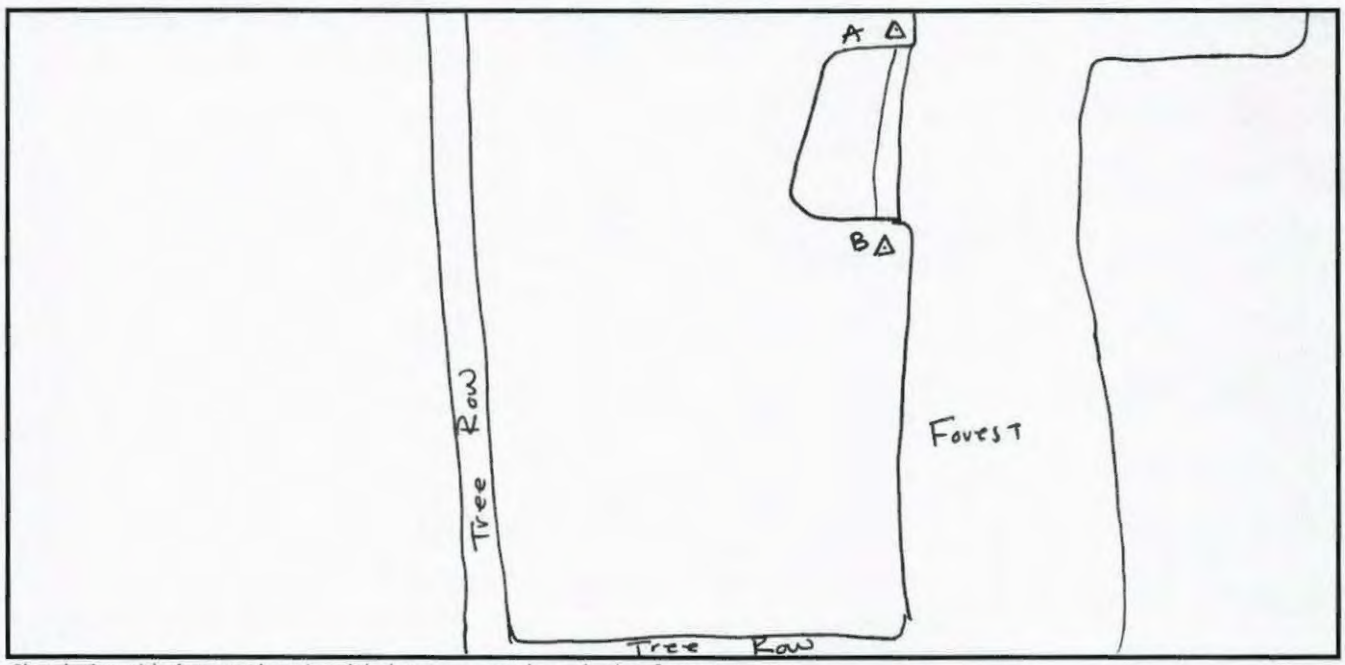
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: X Mic orientation: X



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 20 B Project Name: 2021 Riverfront

Biologists: E. Merrill Date: 7/3/21

Detector: 69 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2044	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 8 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 80 Card ID: _____

Log file Present? Yes Log file Present? _____

Site 20 Location B

SM4 Detector Deployment Data Sheet

Site Name: 21 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23957 Longitude: -082.65789 UTC: -4

Site Description: edge of ag field and wooded lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 75 Microphone #: 40 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 6

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

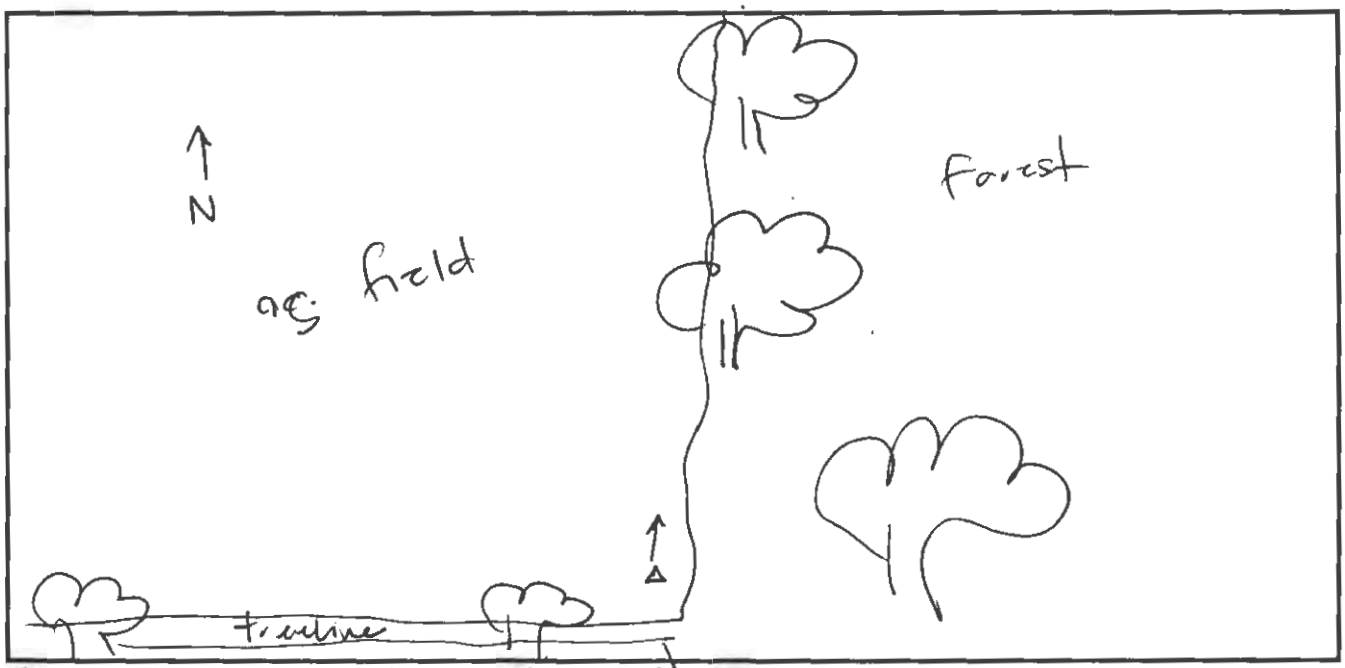
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 21 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/21/2021

Detector: 75 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: ~

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2035	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 158 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 21 Location A

SM4 Detector Deployment Data Sheet

Site Name: 21 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23948 Longitude: -082.65993 UTC: -4

Site Description: shooting along edge of treeline and ag. field

---

Habitat being sampled: Riparian, (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
{circle one}

Deployment Information:

Detector #: 6 Microphone #: 36 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 272

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12)db
(circle one)

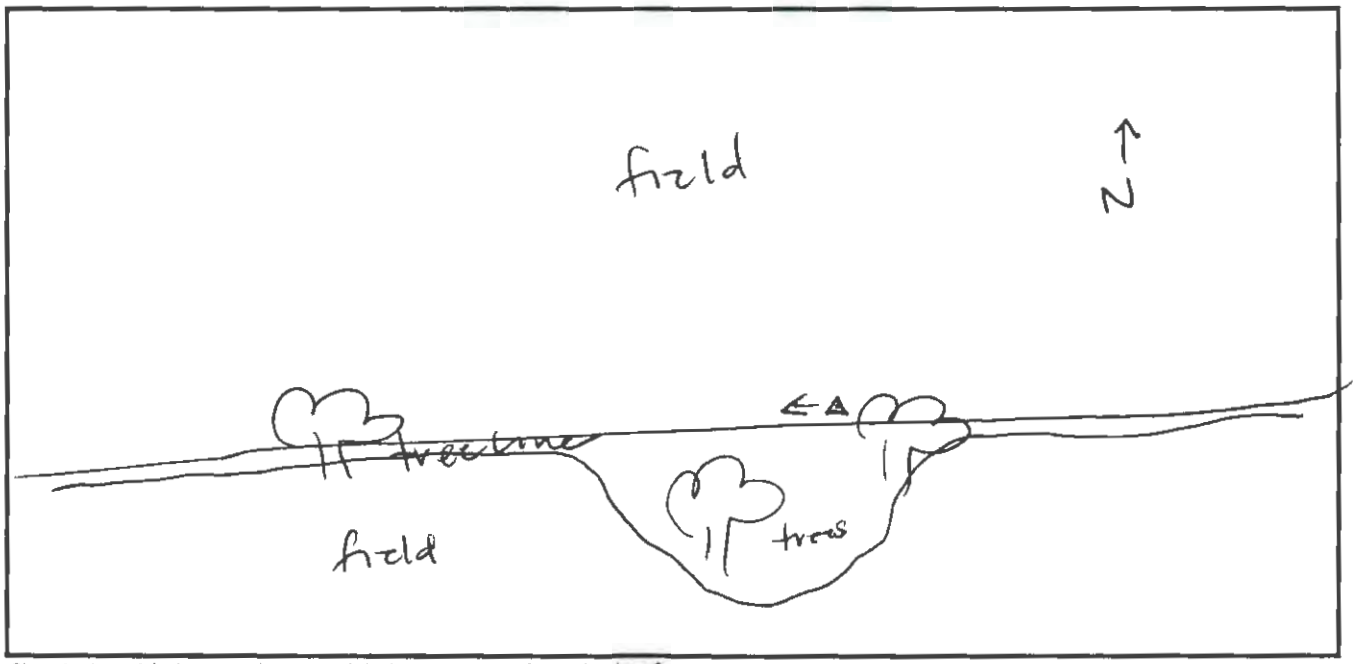
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 21 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/21/2021

Detector: 6 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2035	2034		
End time	0638	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 157

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 21 Location B

SM4 Detector Deployment Data Sheet

Site Name: 22A Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20218 Longitude: -082.65521 UTC: -4

Site Description: along corn field edge and forest. Black creek nearby

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 9 Microphone #: 74 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 182

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

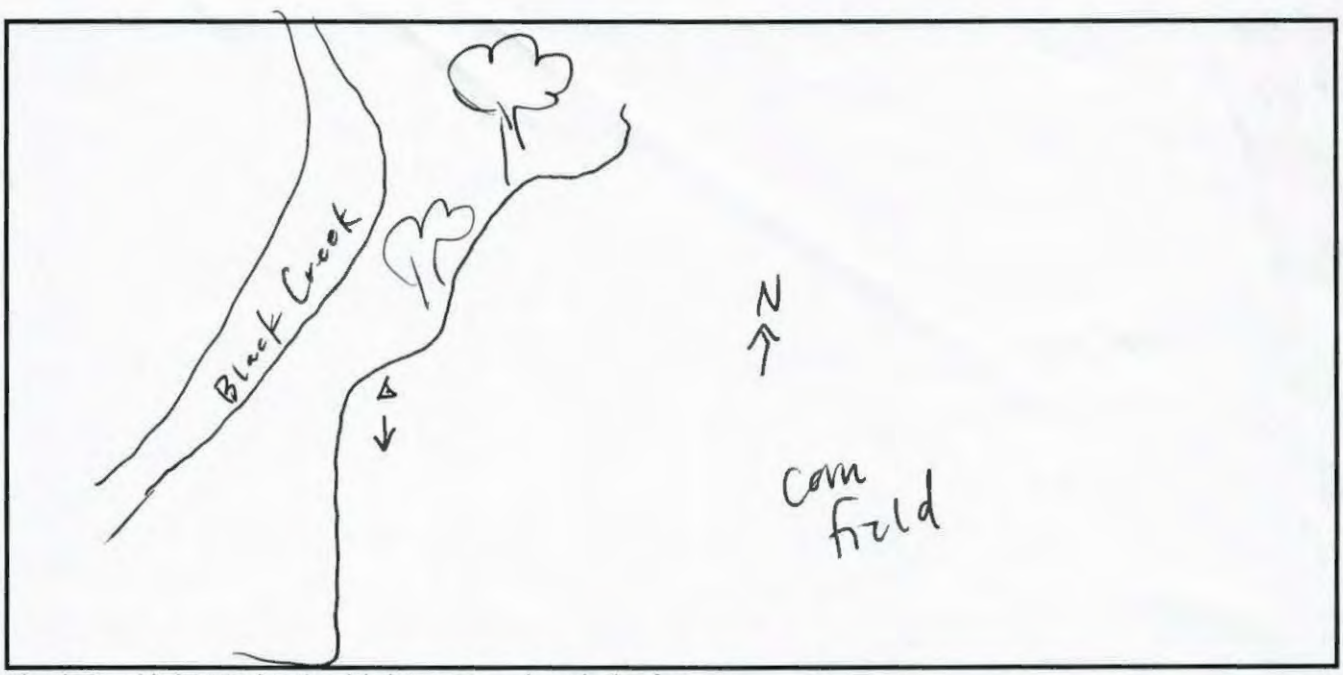
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 22 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/17/21

Detector: 9 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2039	2039	2038	2038		
End time	0634	0635	0635	0636		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 135

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 22 Location A

SM4 Detector Deployment Data Sheet

Site Name: 22 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20321 Longitude: -082.65479 UTC: -4

Site Description: along corn field edge and forest. Black Creek near.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 31 Microphone #: 56 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 184

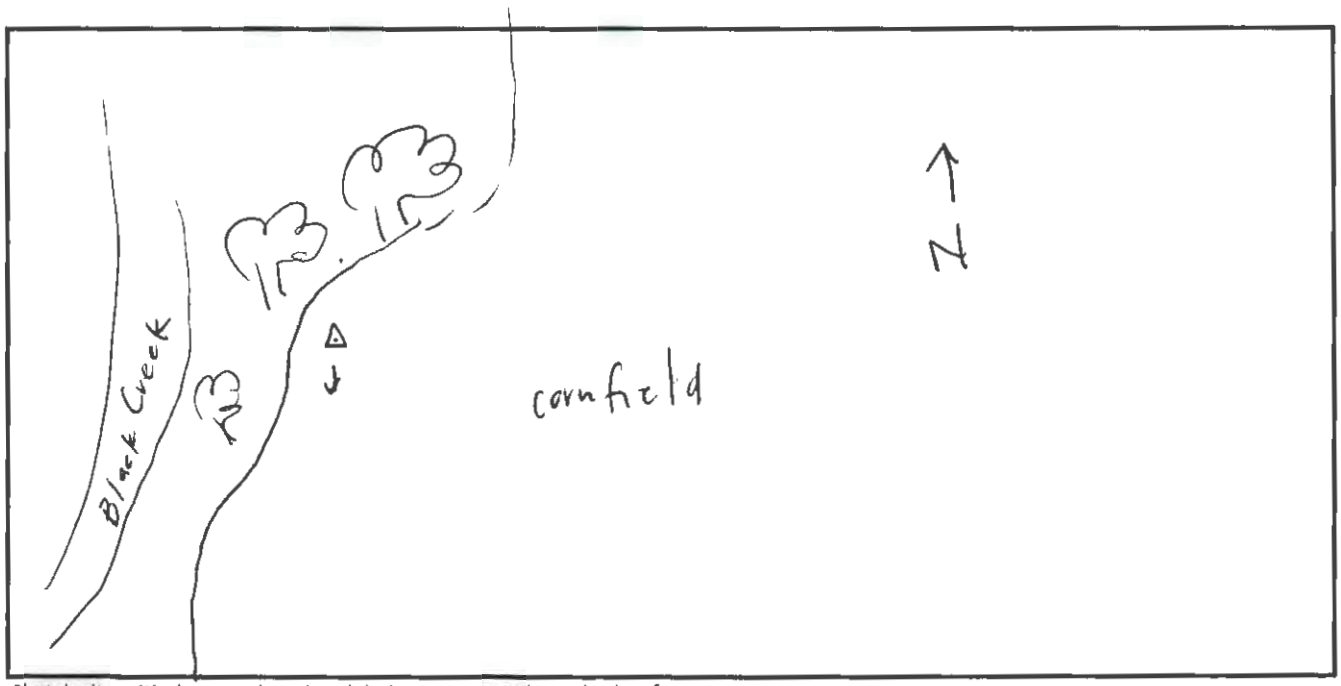
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 22 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/17/21

Detector: 31
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2039	2039	2038	2038		
End time	0634	0635	0635	0636		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Y	Y	Y		

Data download

Card ID: 136

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 22 Location B

SM4 Detector Deployment Data Sheet

Site Name: 23 A Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19609 Longitude: -082.78246 UTC: -4

Site Description: edge of soybean field and forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 28 Microphone #: 54 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 2

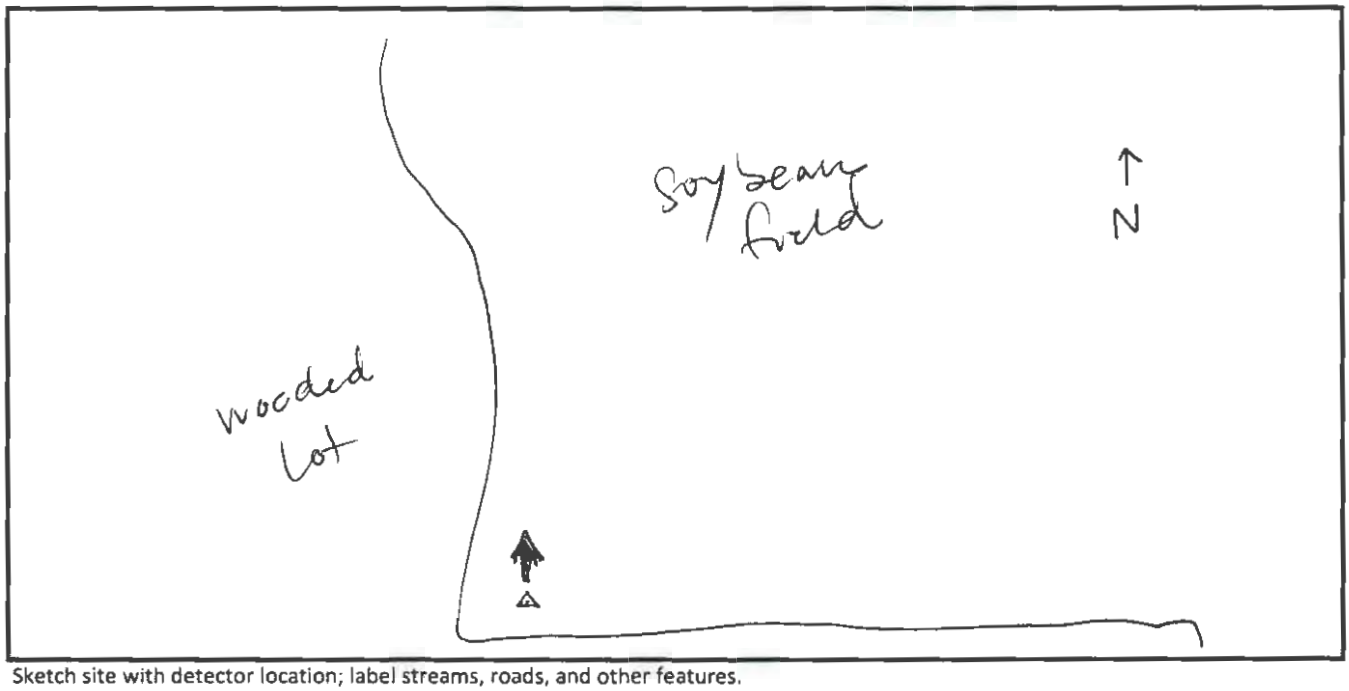
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12)db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 23 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/22/2021

Detector: 28 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2037	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 37 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 23 Location A

SM4 Detector Deployment Data Sheet

Site Name: 23 B | Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick | Date: 7/18/21

Location Information:

State: Michigan | County: Sanilac | Datum/Format: NAD 83/D.D

Latitude: 43.1963 | Longitude: -082.78134 | UTC: -4

Site Description: edge of wooded lot and soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 24 | Microphone #: 57 | Directional PVC present?: no

Mic Height (m): 3 | Mic Inclination: 0 | Mic Azimuth: 70

User Profile/Settings:

WA SM4BAT FS SMM-U2 | Samp. Freq: 384kHz | Min. Dur.: 1.5 ms | Trig. Level 12db

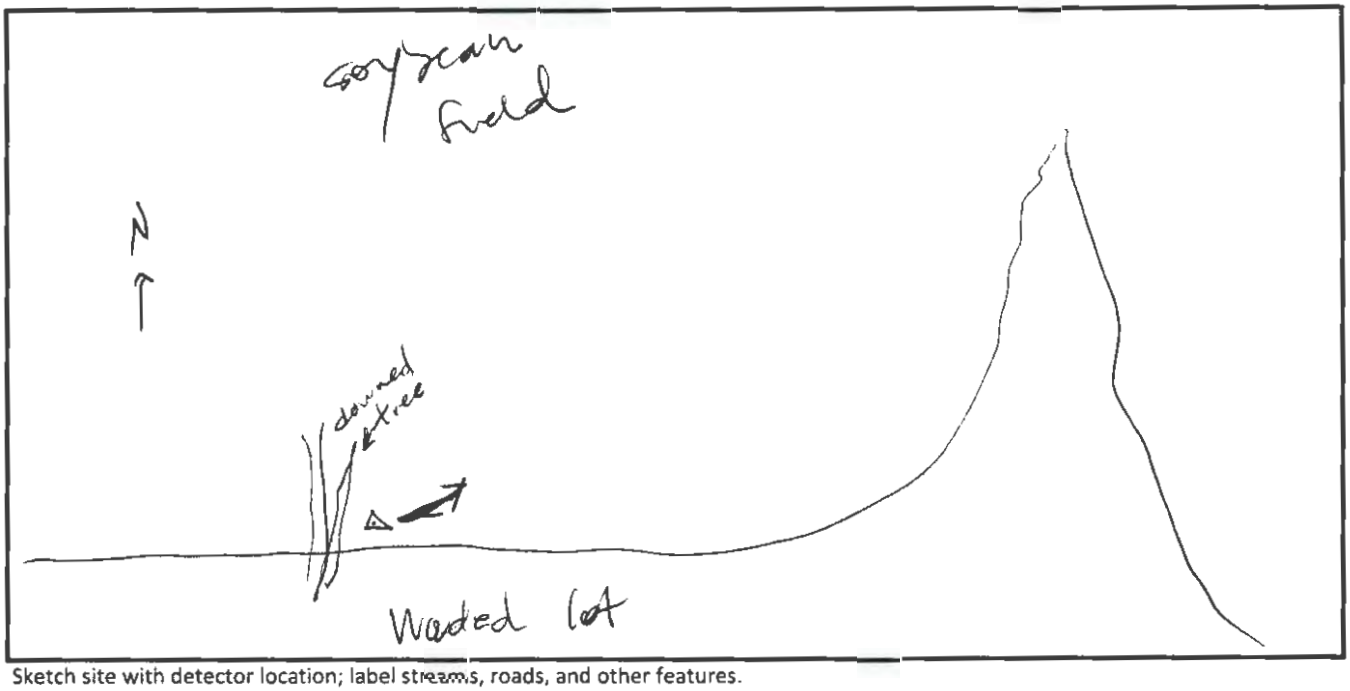
Firmware: 2.3.1 | HP-Filter: On | Max Dur.: none | Trig. Window 3 sec

Input Gain: 0 or (12) db (circle one) | Trig Freq: 16kHz | Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 23 B Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/22/2021

Detector: 24 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

if detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2037	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 135 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 23 Location B

SM4 Detector Deployment Data Sheet

Site Name: 24 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18878° Longitude: -82.65617° UTC: -4

Site Description: Shooting along forest edge next to turnip field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 35 Microphone #: 38 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 95°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

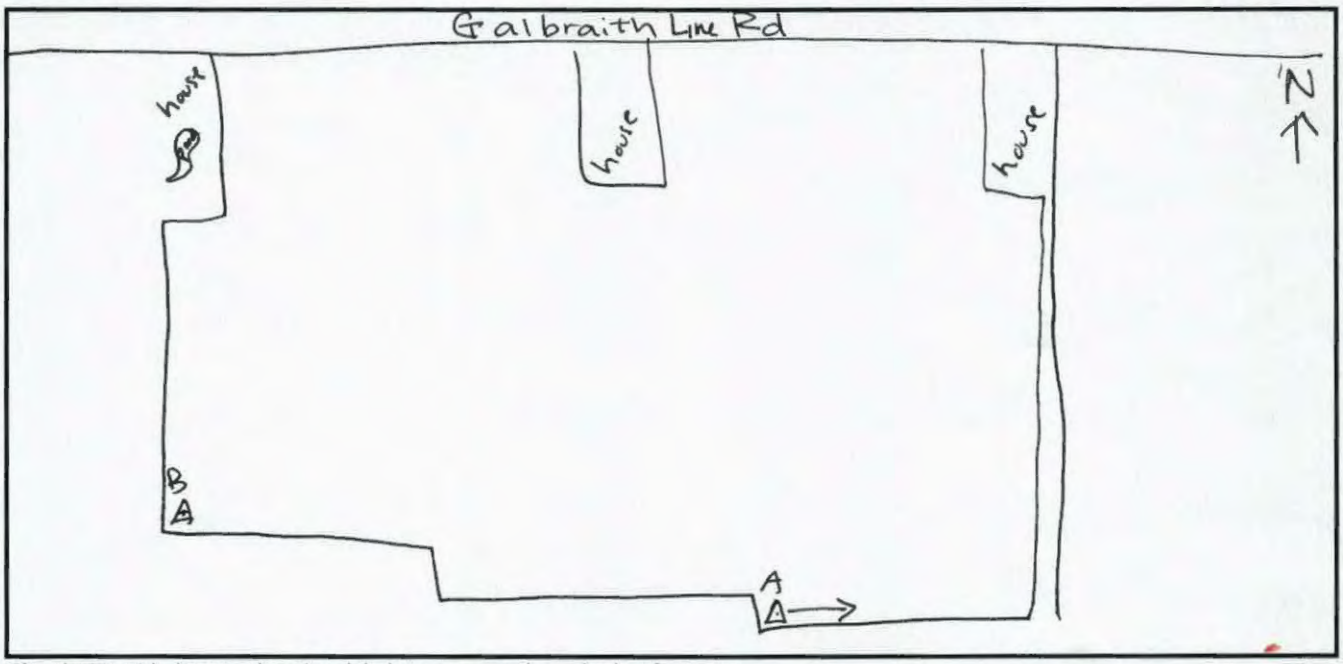
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: x



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 24A

Project Name: 2021 Riverbend

Biologists: E. Merrill

Date: 7/2/21

Detector: 35 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2044	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: CC

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 24 Location A

SM4 Detector Deployment Data Sheet

Site Name: 24 B Project Name: 2021 Riverbend

Biologists: E. Murrill, A. Goebel, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18954° Longitude: -82.65935° UTC: -4

Site Description: Shooting down forested edge next to turnip field towards small pond

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 16 Microphone #: 73 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 4°

User Profile/Settings:

WA SM4BAT FS SMM-U2 Firmware: 2.3.1

Samp. Freq: 384kHz HP-Filter: On Input Gain: 0 or (12 db)
(circle one)

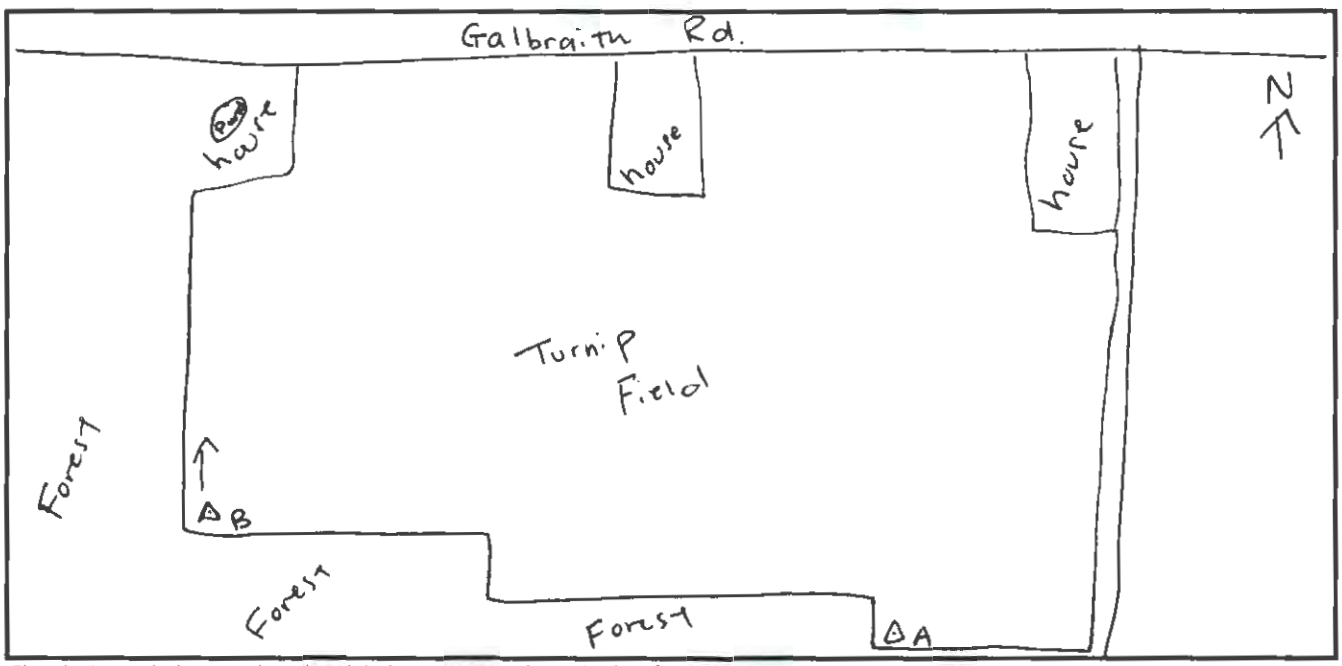
Min. Dur.: 1.5 ms Max Dur.: none Trig Freq: 16kHz

Trig. Level 12db Trig. Window 3 sec Max Length: 5 Sec

Comments:

Photos:

Detection area: Site: Mic orientation:



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 24 B

Project Name: 2021 Riverland

Biologists: E. Merrill

Date: 7/2/21

Detector: 16
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2044	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 68

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 24 Location B

SM4 Detector Deployment Data Sheet

Site Name: 25 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23832° Longitude: -82.70510° UTC: -4

Site Description: Shooting part corridor down forest edge next to soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 59 Microphone #: 79 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 266°

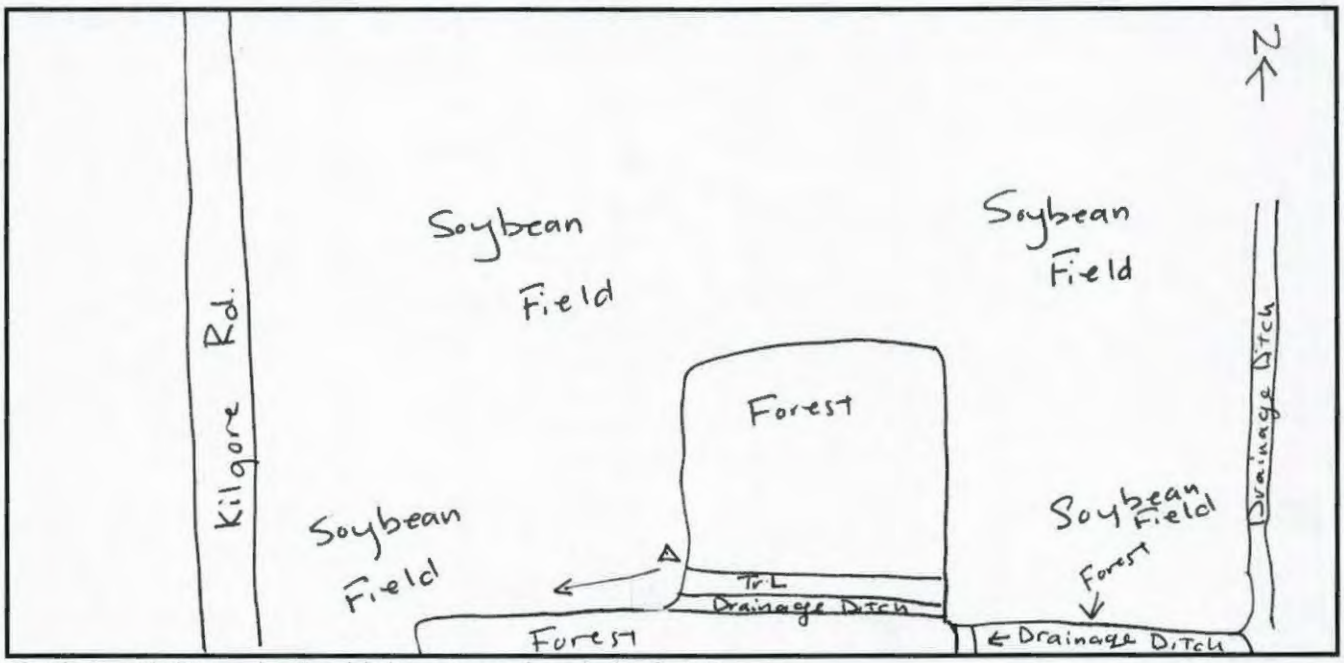
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12 db) (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: XO Site: XO Mic orientation: XO



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 25A

Project Name: 2021 Riverfund

Biologists: E. Merrill

Date: 7/3/21

Detector: 59 (circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2045	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 75

Log file Present? Yes

Card ID: —

Log file Present? —

revised 6/2021

Site 25 Location A

SM4 Detector Deployment Data Sheet

Site Name: 25 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Guebel, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23831° Longitude: −82.70358° UTC: -4

Site Description: Shooting down grassy drainage ditch between two wood lots

Habitat being sampled: (Riparian) Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 22 Microphone #: 64 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 187°

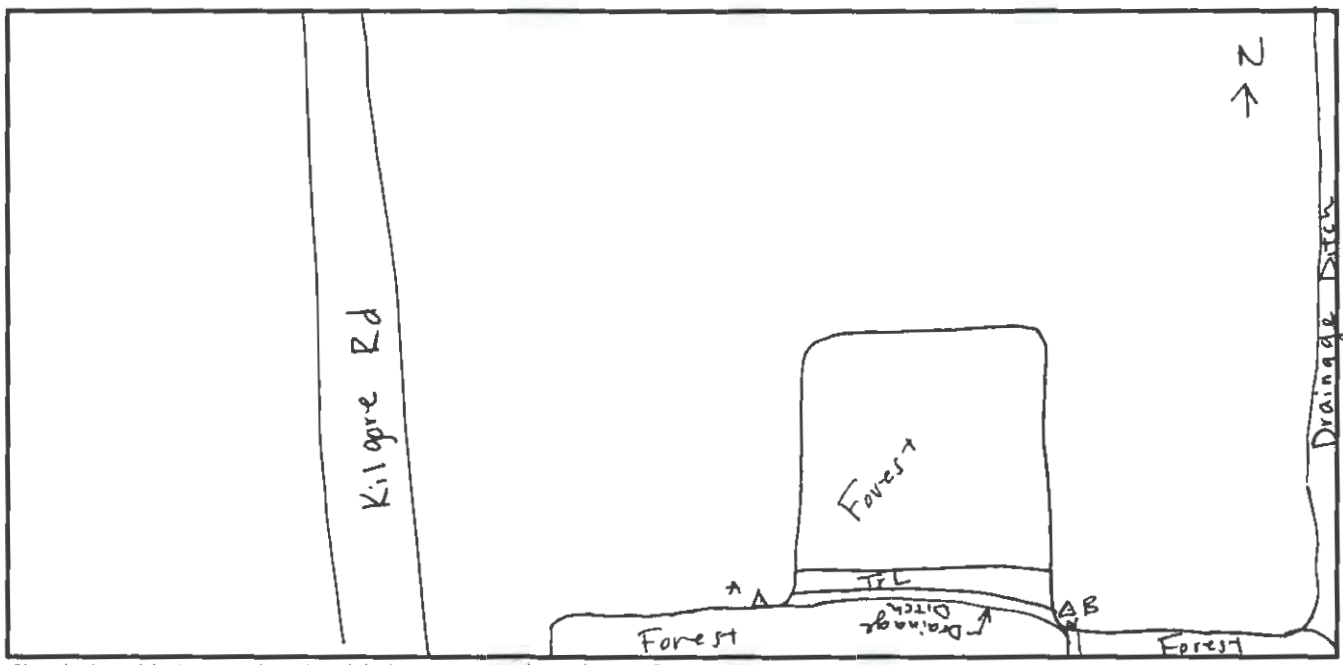
User Profile/Settings:

WA SM4BAT F5	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12 db) (circle one)	Trig Freq:	16kHz	Max Length:	5 5ec

Comments:

Photos:

Detection area: (✓) Site: (✓) Mic orientation: (✓)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 25B

Project Name: 2021 Riverbend

Biologists: E. Mcnall

Date: 7/3/21

Detector: 22 (circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF:

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2048	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 77

Log file Present? Yes

Card ID:

Log file Present?

revised 6/2021

Site 25 Location B

SM4 Detector Deployment Data Sheet

Site Name: 26A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollar Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18819° Longitude: -82.66119° UTC: -4

Site Description: Open foraging area shooting along forest edge

Habitat being sampled: Riparian Field Edge (Open Field) Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 46 Microphone #: 45 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 39°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

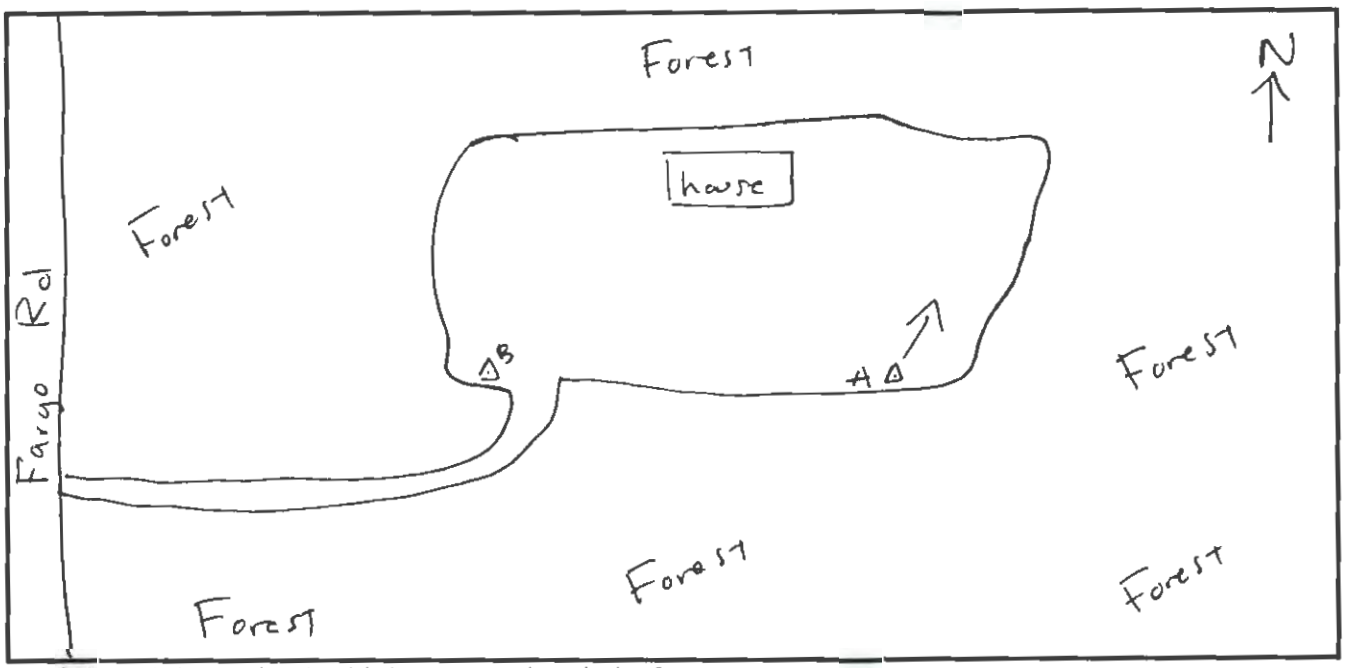
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 26A

Project Name: 2021 Riverland

Biologists: E Mcnll

Date: 7/2/21

Detector: 46
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2044	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 57

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 26 Location A

SM4 Detector Deployment Data Sheet

Site Name: 26 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18807° Longitude: -82.66225° UTC: -4

Site Description: Shooting into field next to pond

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest (Pond) Other
(circle one)

Deployment Information:

Detector #: 10 Microphone #: 81 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 6°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

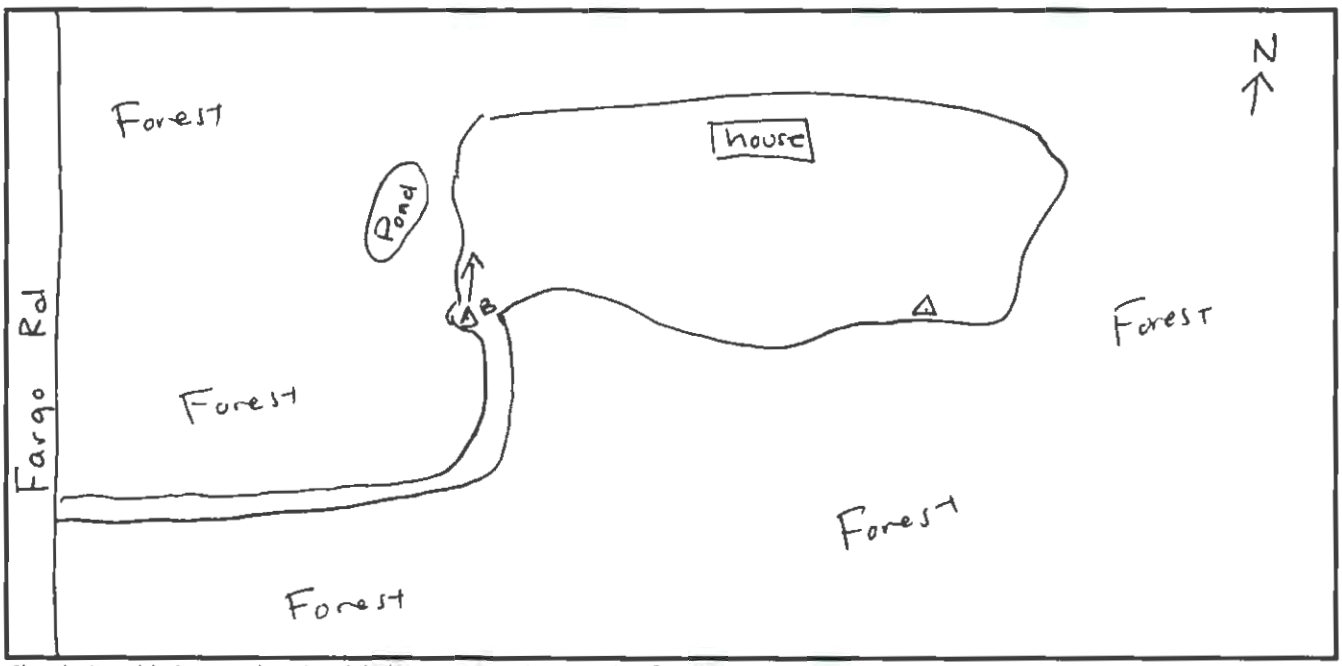
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 26 B

Project Name: 2021 Riverjeand

Biologists: E. Mavrll

Date: 7/2/21

Detector: 10
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2044	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 59

Log file Present? Yes

Card ID: —

Log file Present? —

revised 6/2021

Site 26 Location B

SM4 Detector Deployment Data Sheet

Site Name: 27 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18601 Longitude: -082.67915 UTC: -4

Site Description: Edge of beet field near forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 8 Microphone #: 44 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 2

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

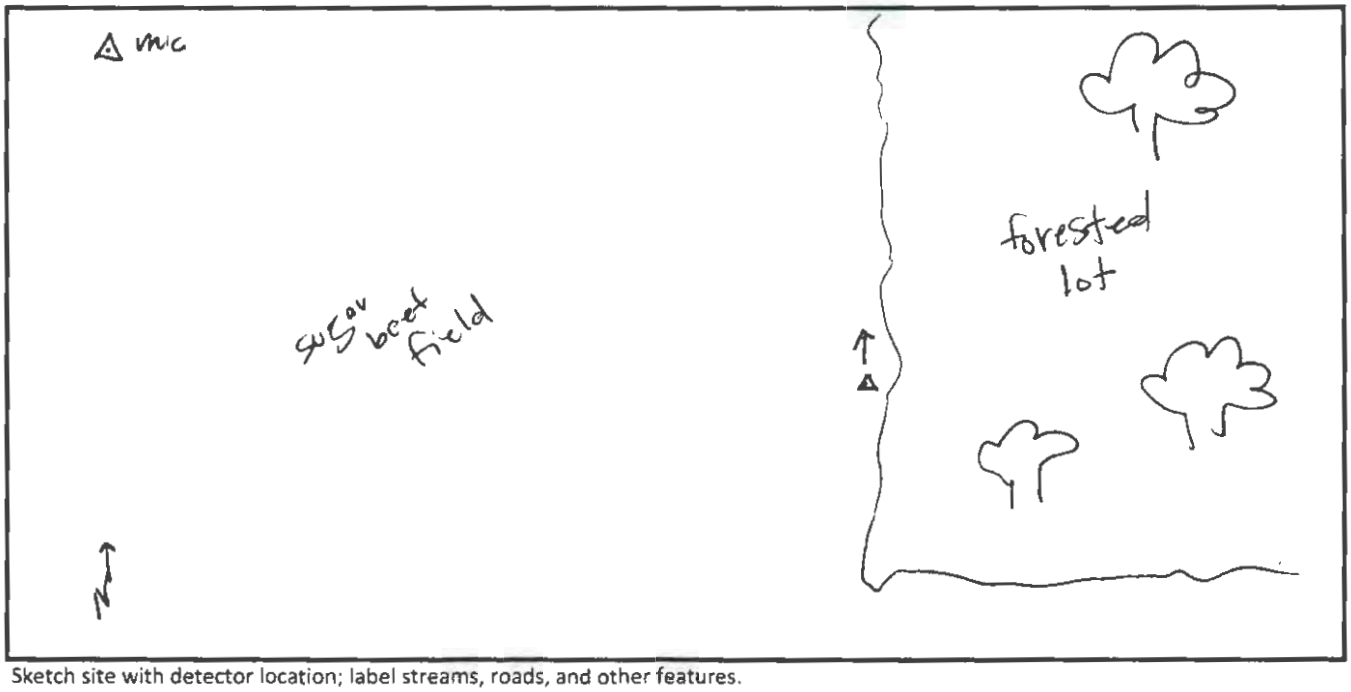
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 27 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/17/21

Detector: 8
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2040	2039	2038	2038		
End time	0634	0635	0636	0636		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*if YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 124

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 27 Location A

SM4 Detector Deployment Data Sheet

Site Name: 27 ... B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18696 Longitude: -082.67815 UTC: -4

Site Description: Edge of beet field near forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 65 Microphone #: 22 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 95

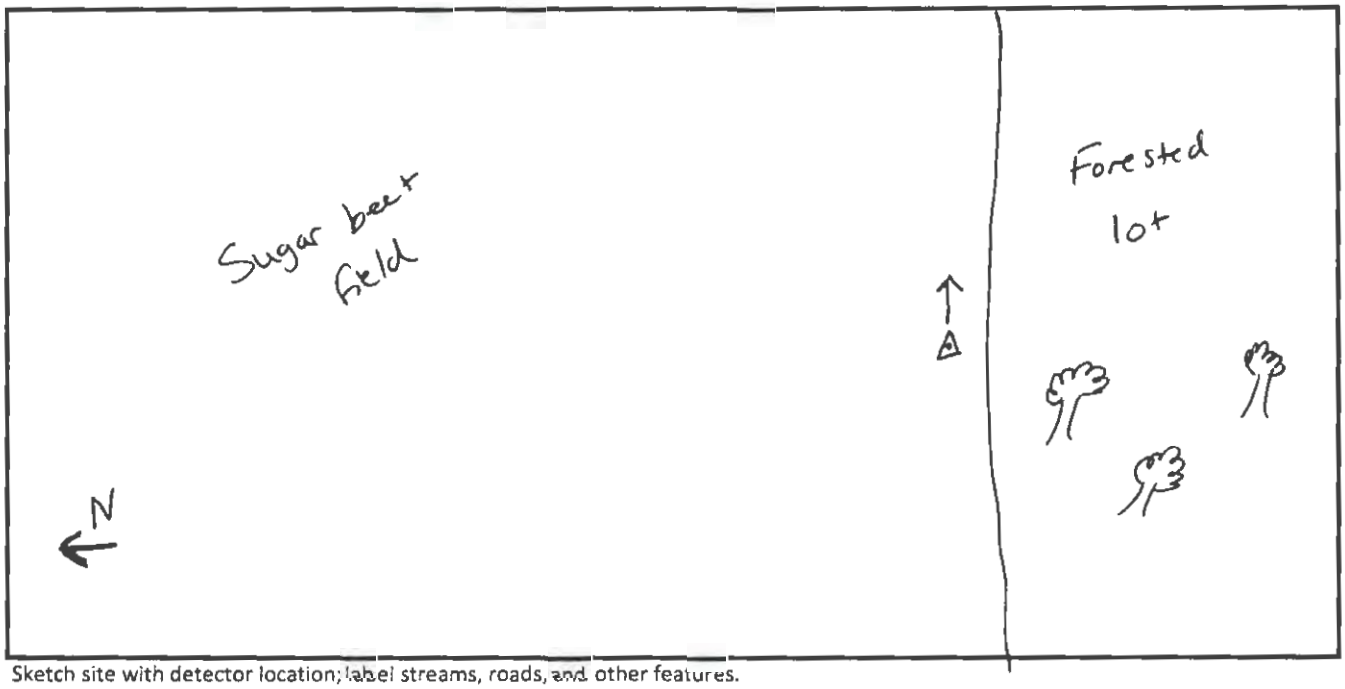
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 27 B

Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick

Date: 7/17/21

Detector: 65 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2040	2089	2038	2038		
End time	0634	0635	0636	0636		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 123

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 27 Location B

SM4 Detector Deployment Data Sheet

Site Name: 28 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19949 Longitude: -082.68024 UTC: -4

Site Description: along field/forest edge by trail cutting through forest leading to Creek

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 57 Microphone #: 10 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 15

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

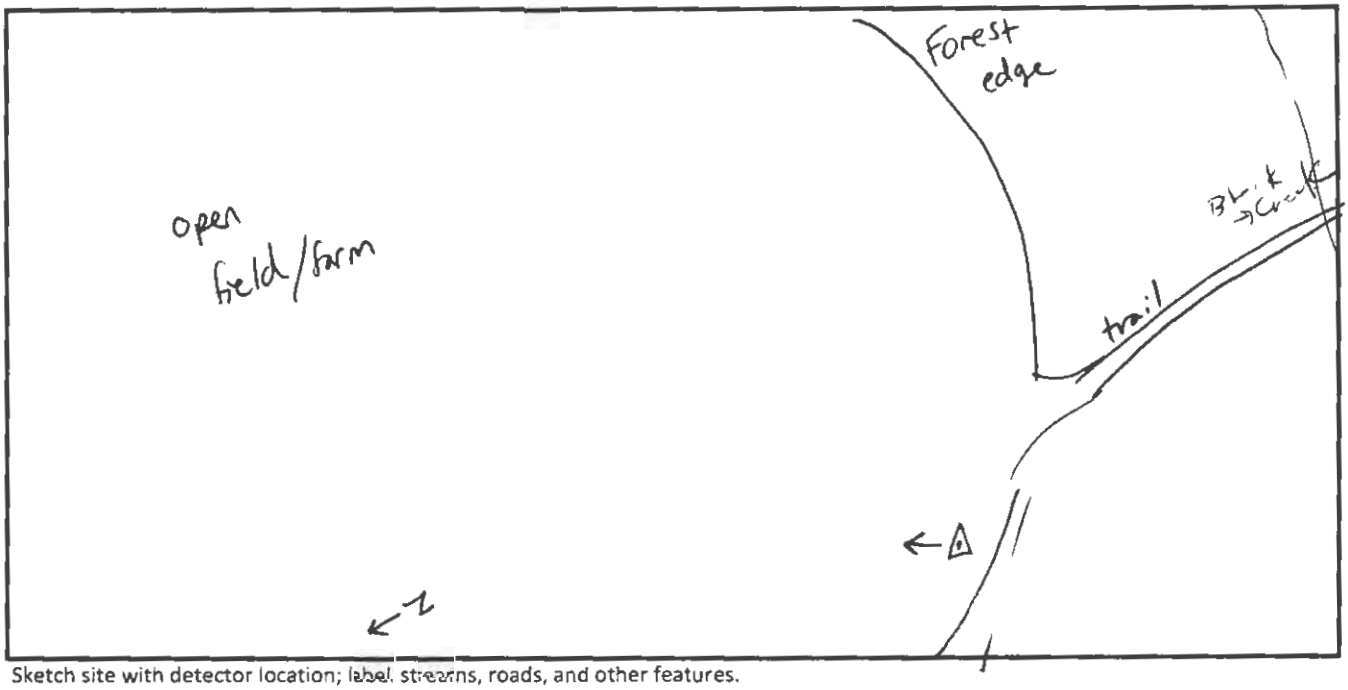
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 28 A Project Name: 2021 Riverbend

Biologists: E. Mecc'll, R. Fitzpatrick Date: 7/17/21

Detector: 57 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21		
Start time	2040	2039	2038	2038		
End time	0634	0635	0836	0836		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 34 Card ID: _____

Log file Present? YES Log file Present? _____

revised 6/2021

Site 28 Location A

SM4 Detector Deployment Data Sheet

Site Name: 28 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/13/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19933 Longitude: -082.68087 UTC: -4

Site Description: Edge of agricultural field & forested lot, black creek near by.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 54 Microphone #: 46 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 270

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12)db
(circle one)

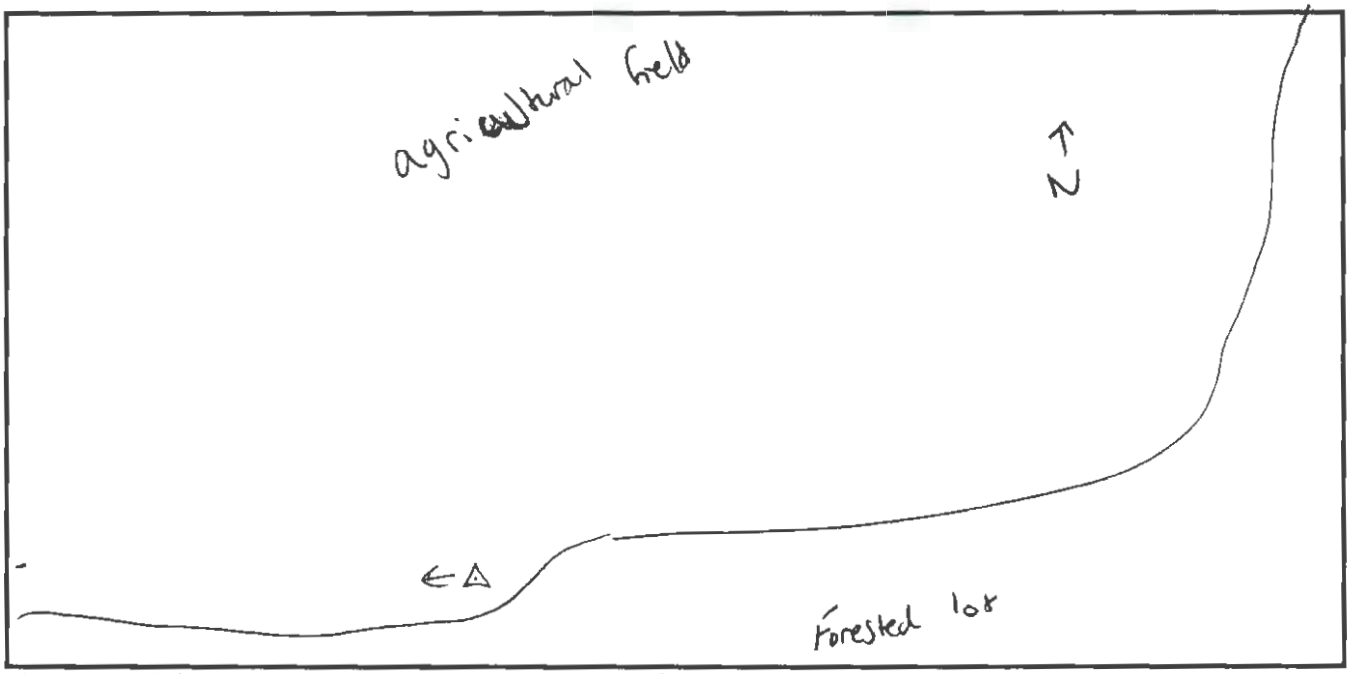
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 28 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Detector: 54 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF:

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/13/21	7/14/21	7/15/21	7/16/21	7/20/21	
Start time	0407	2039	2039	2038	2035	
End time	0635	0635	0636	0637	0640	
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N	N	
>9m/h wind speeds?	N	N	N	N	N	
>30 min of precip./fog?	N	N	N	N	N	
*If YES to any of the conditions, resample the night.						
Was the night successful?	N	Y	Y	Y	Y	

Data download

Card ID: 203 (7/14 (407 - end)) Log file Present? Yes

Card ID: 33 (ERROR) Log file Present? NO

1 CARD A - ERRORED @ 0407 on 7/14 switched to card B.

67
Yes

revised 6/2021

Site 28 Location B

SM4 Detector Deployment Data Sheet

Site Name: 29 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23878° Longitude: −82.68228° UTC: -4

Site Description: Shooting through break in tree line towards Drainage ditch

Habitat being sampled: (Riparian) Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 71 Microphone #: 71 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 40°

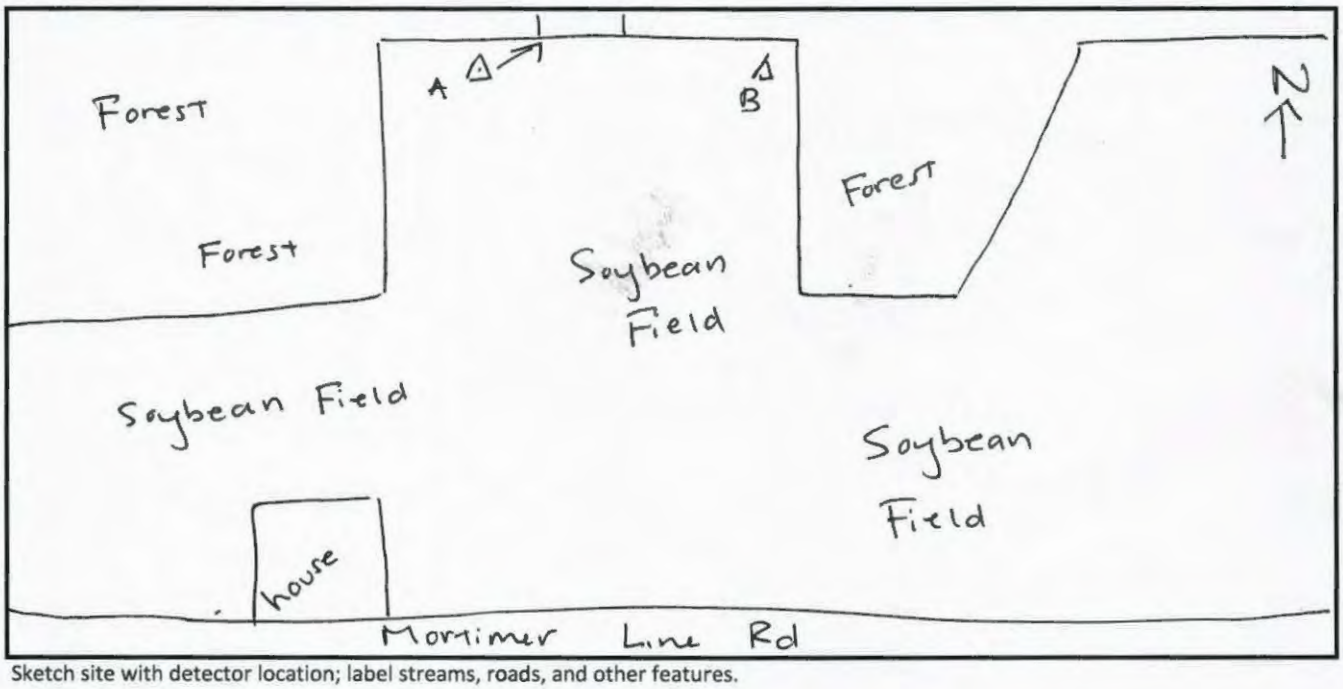
User Profile/Settings:

WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12 db) (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments: Moved site due to point on unsigned property on map.

Photos:

Detection area: 4 Site: 4 Mic orientation: 1



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 29A Project Name: 2021 Riverland

Biologists: E. Merrill Date: 7/3/21

Detector: 71 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2015	2045	2044	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 30 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 29 Location A

SM4 Detector Deployment Data Sheet

Site Name: 29 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/29/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23880° Longitude: -82.68043° UTC: -4

Site Description: Shooting down forest edge next to soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 34 Microphone #: 40 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 181°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

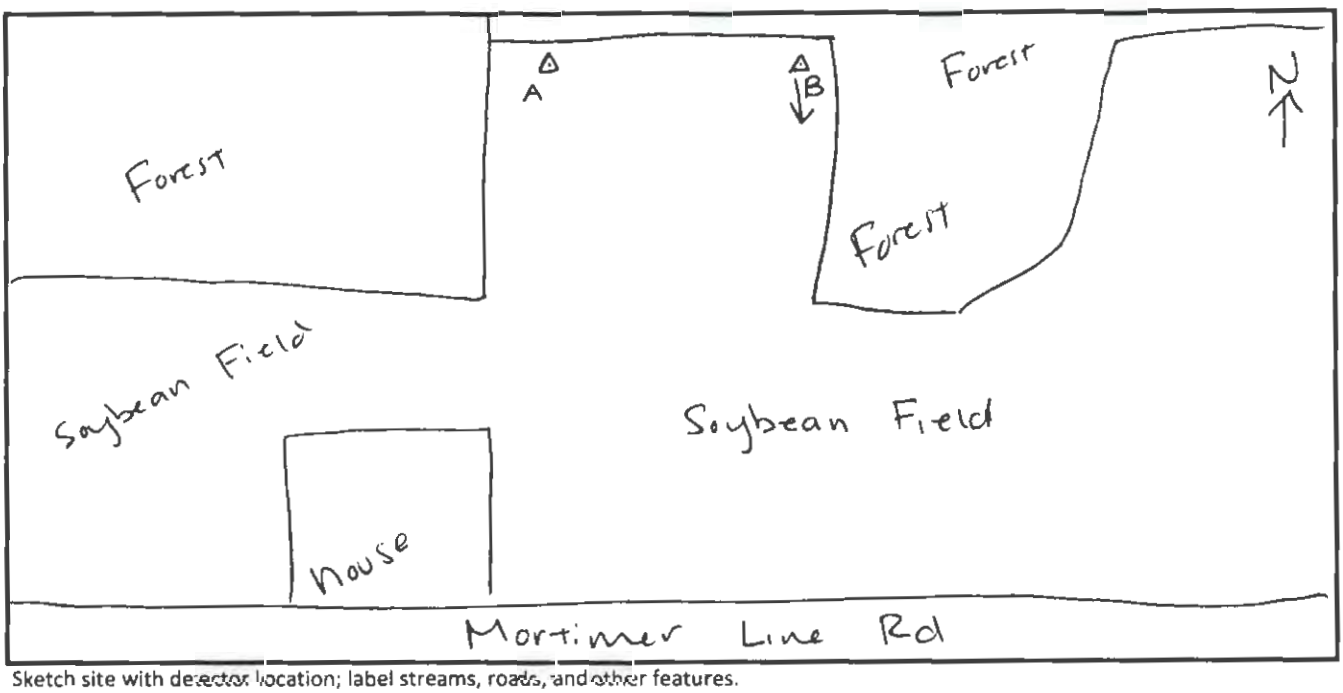
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments: Moved site due to point on unsigned property on KML file

Photos:

Detection area: (Y) Site: (Y) Mic orientation: (Y)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 29B

Project Name: 2021 Riverbend

Biologists: E. Mcnll

Date: 7/3/21

Detector: 34 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how? No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/29/21	6/30/21	7/1/21	7/2/21		
Start time	2045	2045	2044	2044		
End time	0624	0625	0625	0626		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 mln of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 40

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 29 Location B

SM4 Detector Deployment Data Sheet

Site Name: 30 A | Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick | Date: 7/14/21

Location Information:

State: Michigan | County: Sanilac | Datum/Format: NAD 83/D.D

Latitude: 43.16417 | Longitude: -082.69791 | UTC: -4

Site Description: on edge of hayfield and treeline shading ~~edge~~ of forested lot with a road cutthrough

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 52 | Microphone #: 61 | Directional PVC present?: no

Mic Height (m): 3 | Mic Inclination: 0 | Mic Azimuth: 25

User Profile/Settings:

WA SM4BAT FS SMM-U2 | Firmware: 2.3.1

Samp. Freq: 384kHz | HP-Filter: On | Input Gain: 0 or (12) db (circle one)

Min. Dur.: 1.5 ms | Max Dur.: none | Trig Freq: 16kHz

Trig. Level 12db | Trig. Window 3 sec | Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)

Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 30 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Detector: 52 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 129 Card ID: _____

Log file Present? YES Log file Present? _____

revised 6/2021

Site 30 Location A

SM4 Detector Deployment Data Sheet

Site Name: 30 B Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16493 Longitude: -082.69775 UTC: -4

Site Description: edge of hayfield and forested lot

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 17 Microphone #: 43 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 0

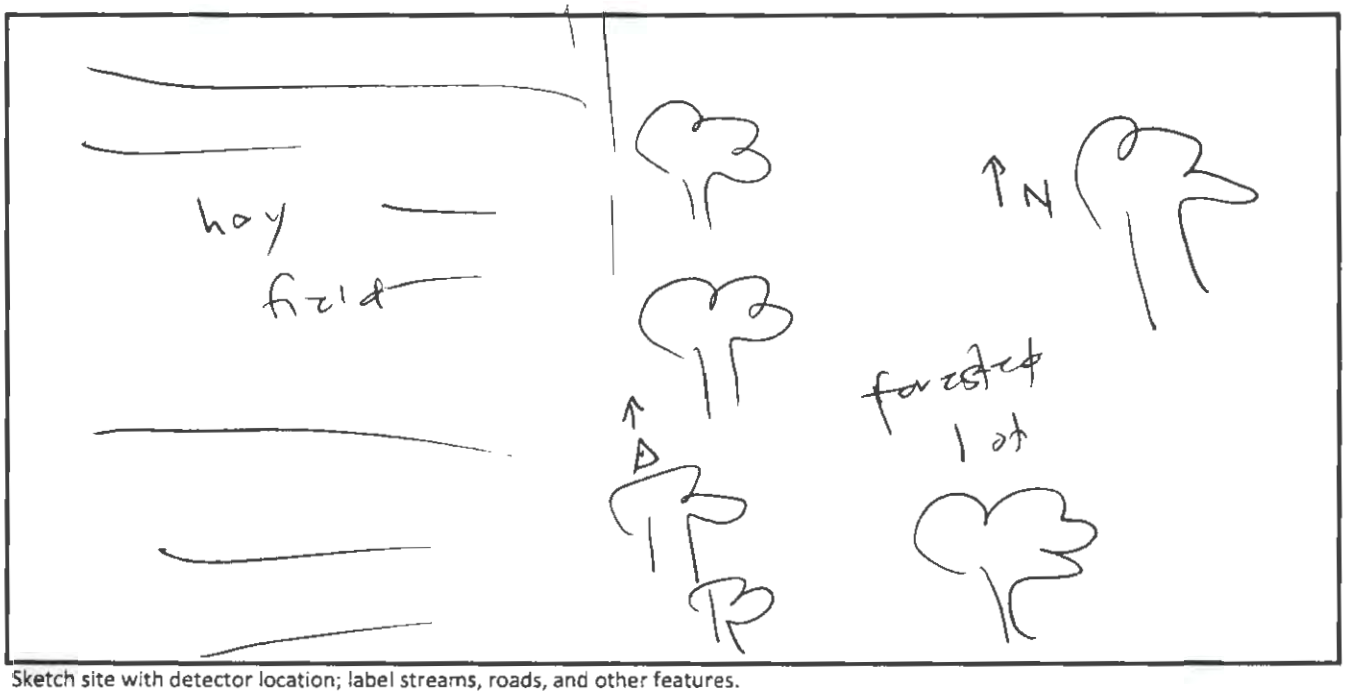
User Profile/Settings:

WA SM4BAT FS SMM-U2	Samp. Freq: 384kHz	Min. Dur.: 1.5 ms	Trig. Level	12db
Firmware: 2.3.1	HP-Filter: On	Max Dur.: none	Trig. Window	3 sec
	Input Gain: 0 or (12) db (circle one)	Trig Freq: 16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 30 B

Project Name: 2021 Riverbed

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 17
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 130

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 30 Location B

SM4 Detector Deployment Data Sheet

Site Name: 31 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.21934 Longitude: -082.69743 UTC: -4

Site Description: on edge of wooded lot shoulder towards grassy area/edge of soybean field/ Seymour Creek

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 1 Microphone #: 10 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 5

User Profile/Settings:

WA SM4BAT F5 SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

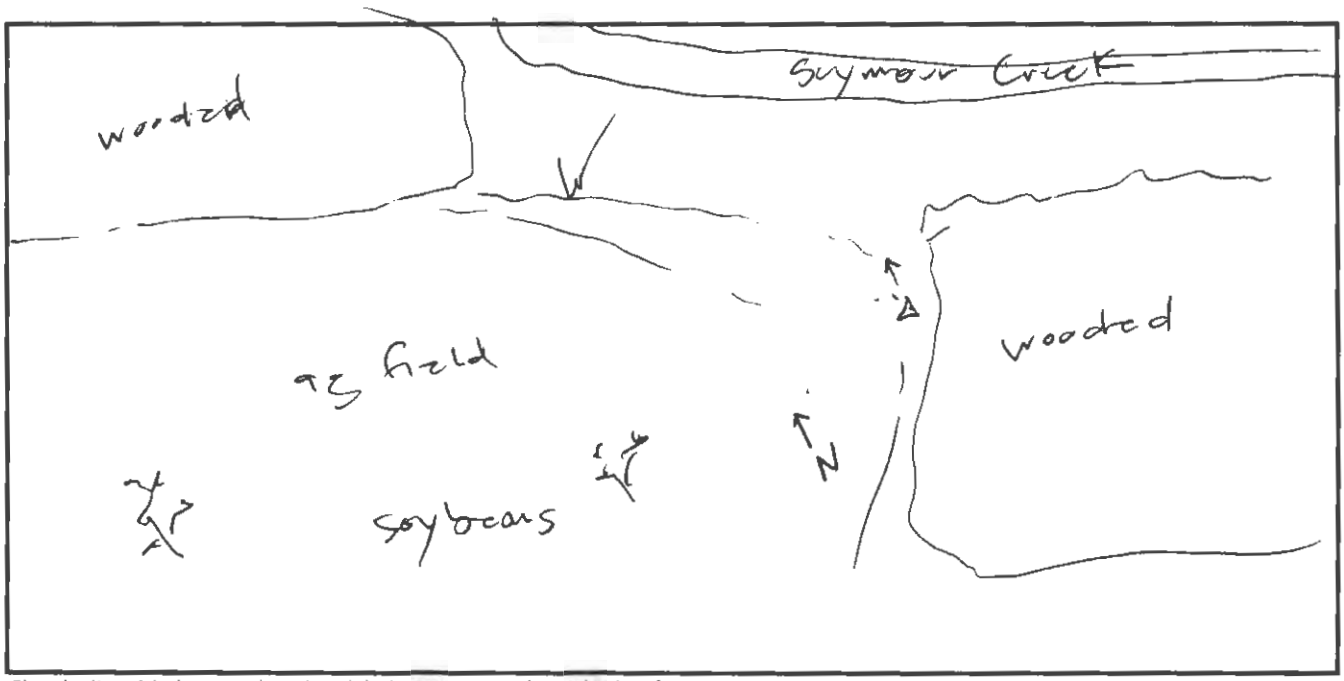
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 31 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/21/2021

Detector: 1 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2035	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 99

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 31 Location A

SM4 Detector Deployment Data Sheet

Site Name: 31 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/17/21

Location Information:

State: Michigan

County: Sanilac

Datum/Format: NAD 83/D.D

Latitude: 43.21828

Longitude: 082.69846

UTC: -4

Site Description: edge of soybean field and forested lot. Shooting towards gap in forest with little field separating

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 57

Microphone #: 39

Directional PVC present?: NO

Mic Height (m): 3

Mic Inclination: 0

Mic Azimuth: 111

User Profile/Settings:

WA SM4BAT FS SMM-U2

Firmware: 2.3.1

Samp. Freq: 384kHz

HP-Filter: On

Input Gain: 0 or (12) db
(circle one)

Min. Dur.: 1.5 ms

Max Dur.: none

Trig Freq: 16kHz

Trig. Level 12db

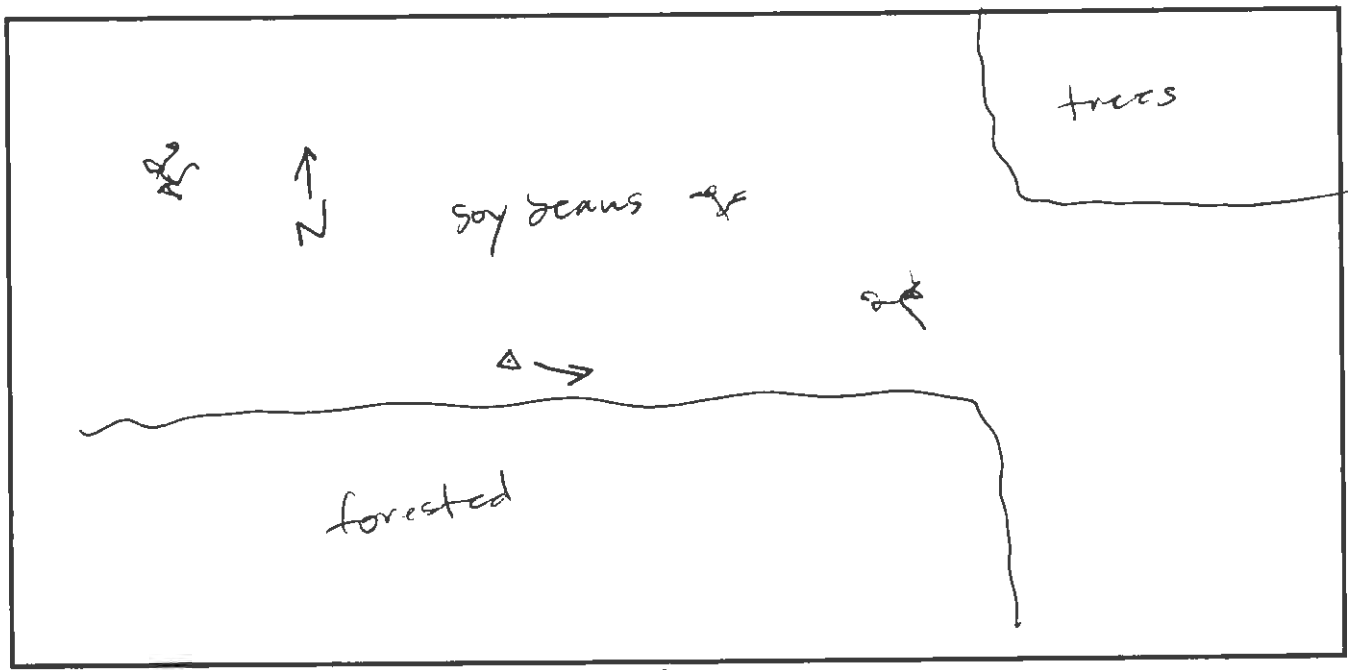
Trig. Window 3 sec

Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 31 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, L. Fitzpatrick

Date: 7/21/2021

Detector: 57
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: ~

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2035	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 97

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 31 Location B

SM4 Detector Deployment Data Sheet

Site Name: 32 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19748° Longitude: -82.65627° UTC: -4

Site Description: Shooting down field edge next to turnip Field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 68 Microphone #: 83 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 20

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

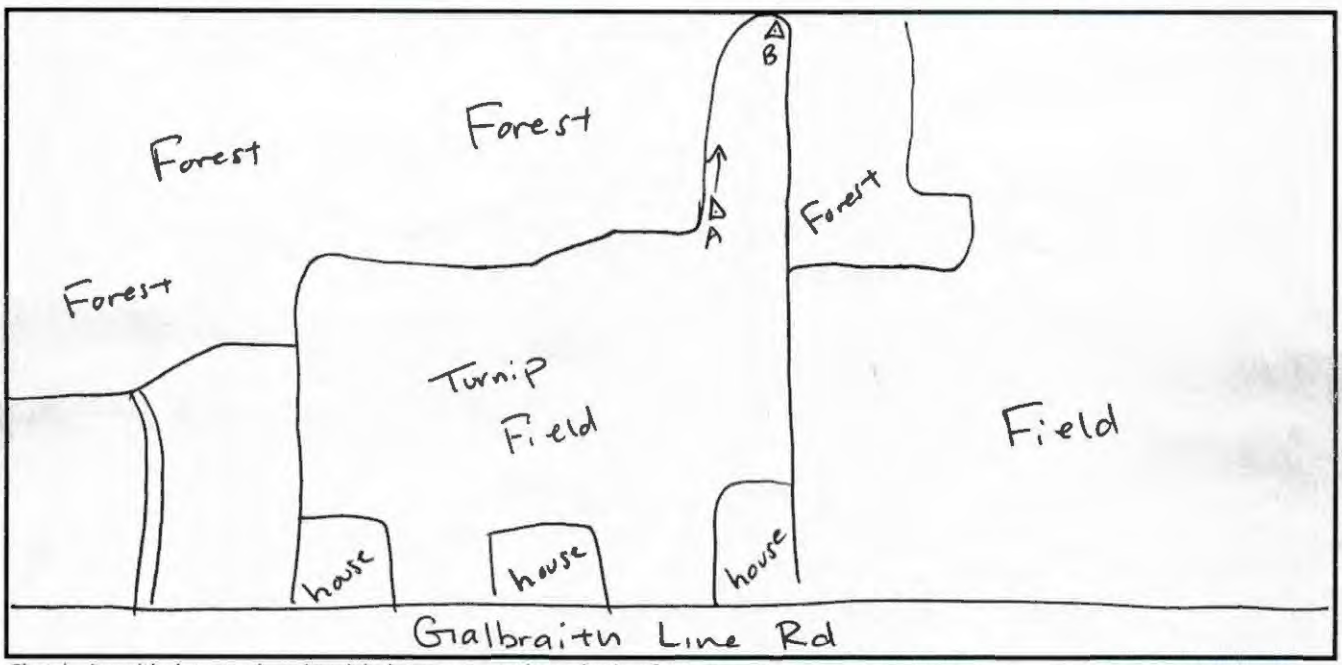
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (0) Site: (0) Mic orientation: (0)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 32 A

Project Name: 2021 Riverland

Biologists: E. Merrill

Date: 7/2/21

Detector: 68 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2045	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 72

Log file Present? Yes

Card ID: _____

Log file Present? _____

Site 32 Location A

SM4 Detector Deployment Data Sheet

Site Name: 32 B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/28/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19944° Longitude: -82.65565° UTC: -4

Site Description: Shooting across corridor opening/along field edge next to turnip field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 74 Microphone #: 51 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 264°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

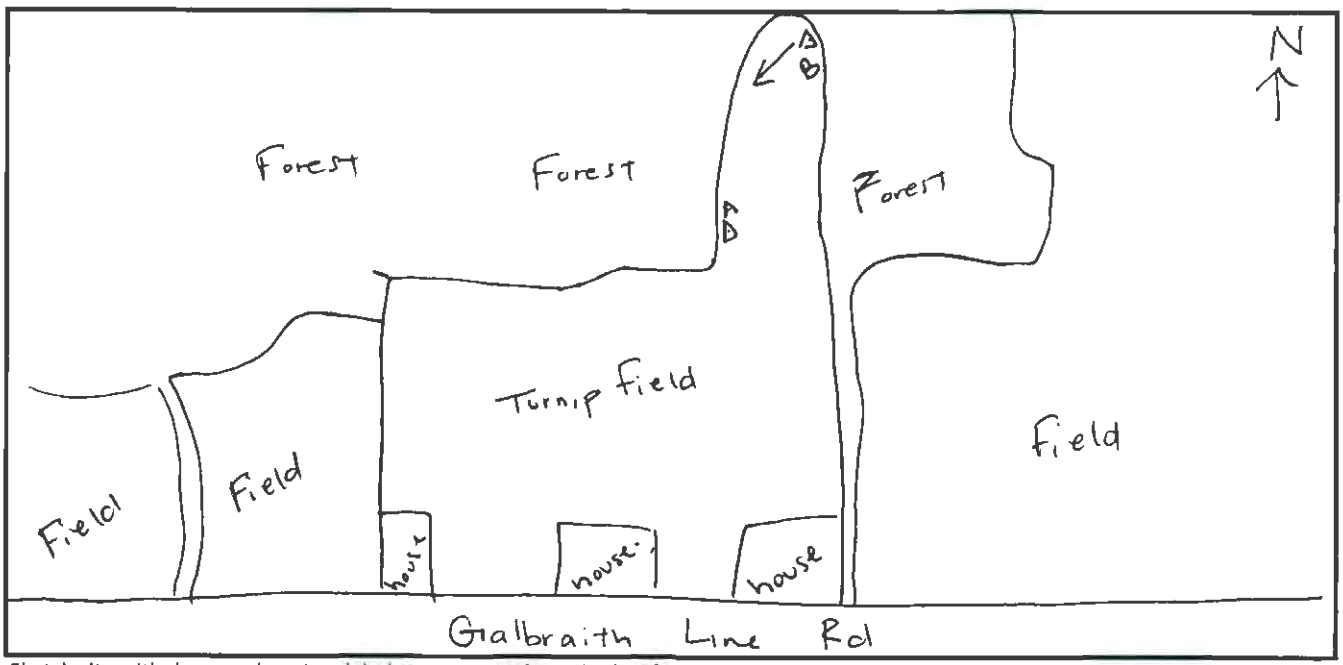
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (Y) Site: (Y) Mic orientation: (N)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 32 B

Project Name: 2021 Riverland

Biologists: E. Morrill

Date: 7/2/21

Detector: 74
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/28/21	6/29/21	6/30/21	7/1/21		
Start time	2045	2044	2044	2044		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	YES	YES	YES	YES		

Data download

Card ID: 70

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 32 Location B

SM4 Detector Deployment Data Sheet

Site Name: 33 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18014 Longitude: -082.70487 UTC: -4

Site Description: old trees in grassy riparian area (Black Creek) shooting into grassy opening

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 3 Microphone #: 55 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 260

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

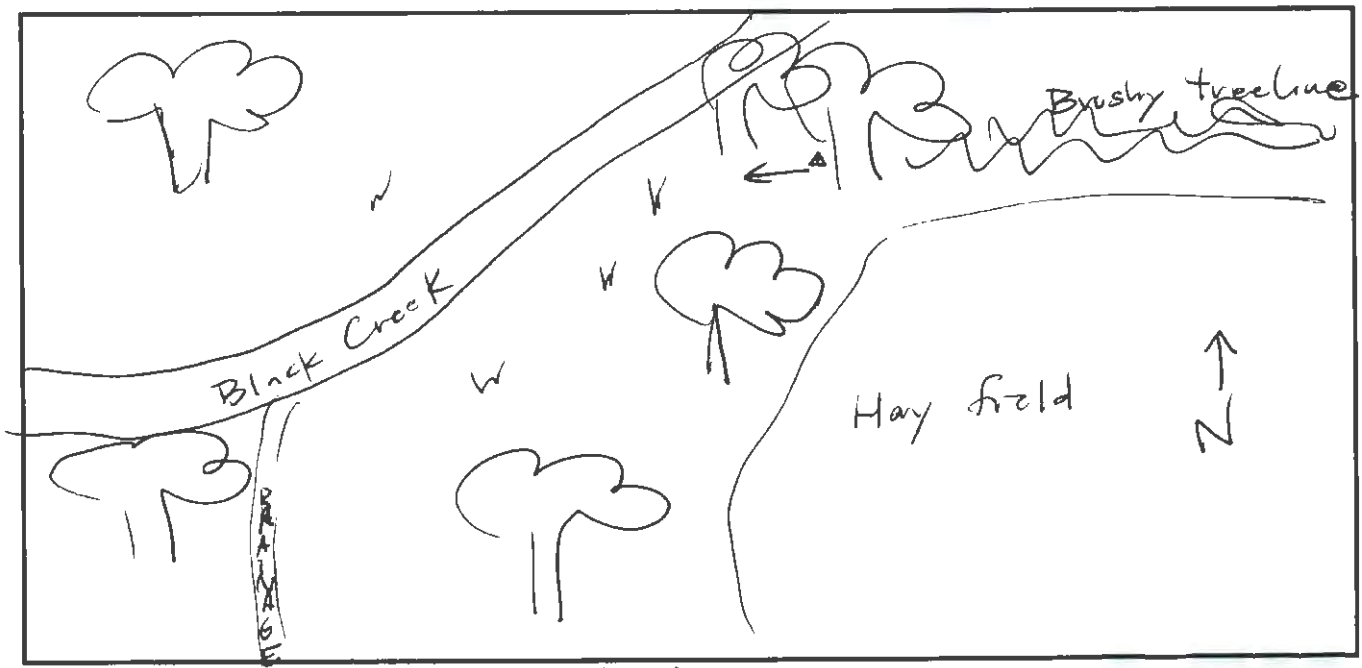
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 33 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 3
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0036	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 140

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 33 Location A

SM4 Detector Deployment Data Sheet

Site Name: 33 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17986 Longitude: -082.70585 UTC: -4

Site Description: Black Creek to North (behind) mic. Microphone shooting along treeline edge with drainage ditch and cow pasture edge.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 40 Microphone #: 78 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 147

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

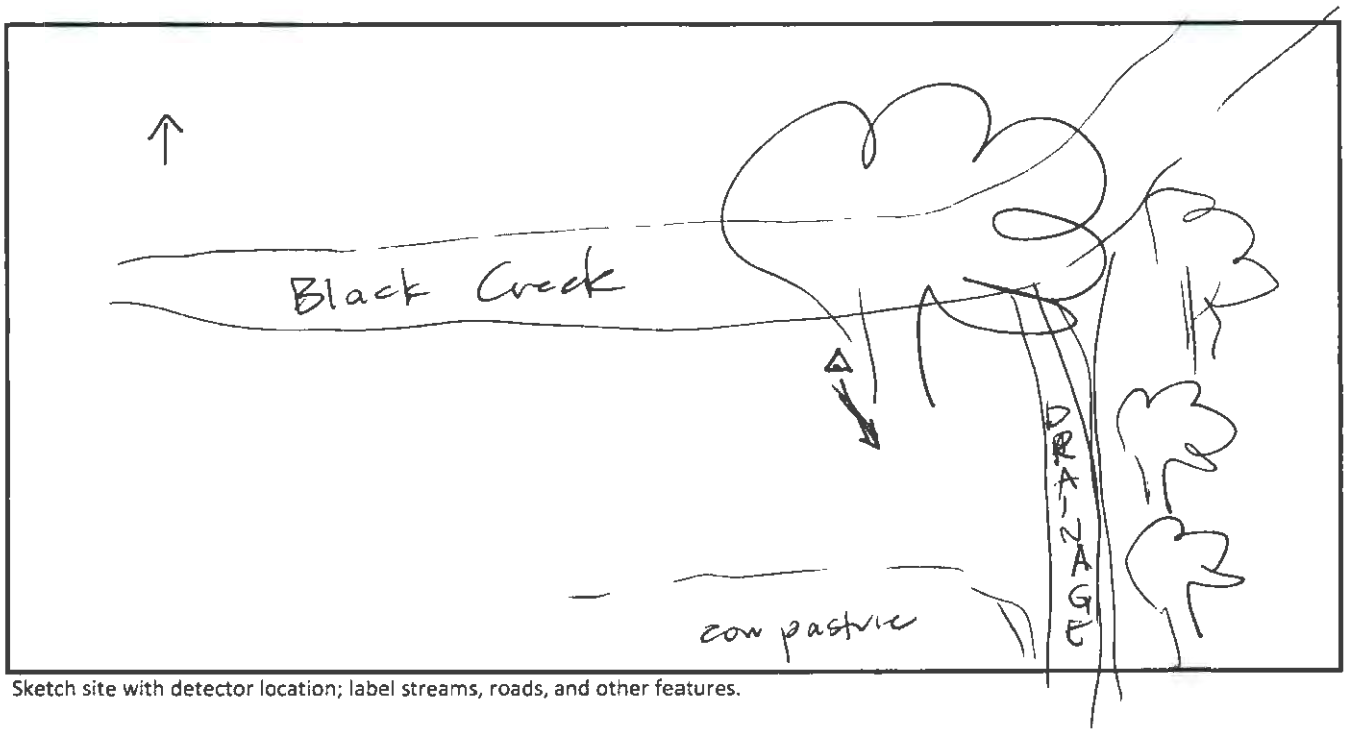
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 33 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Detector: 40 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 139 Card ID: _____

Log file Present? YES Log file Present? _____

revised 6/2021

Site 33 Location B

SM4 Detector Deployment Data Sheet

Site Name: 34A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17299 Longitude: -082.71937 UTC: -4

Site Description: shooting edge of treeline / soybean field / grassy edge

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 56 Microphone #: 57 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 19

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

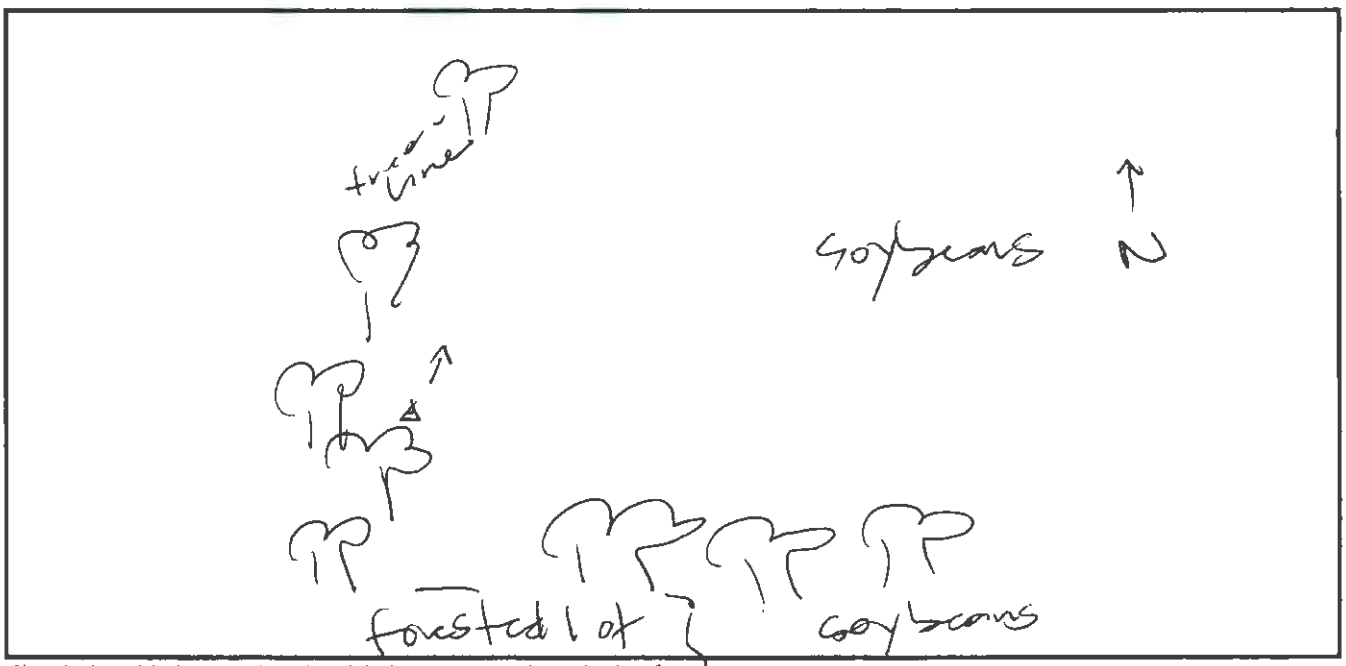
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 34 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 56
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 142

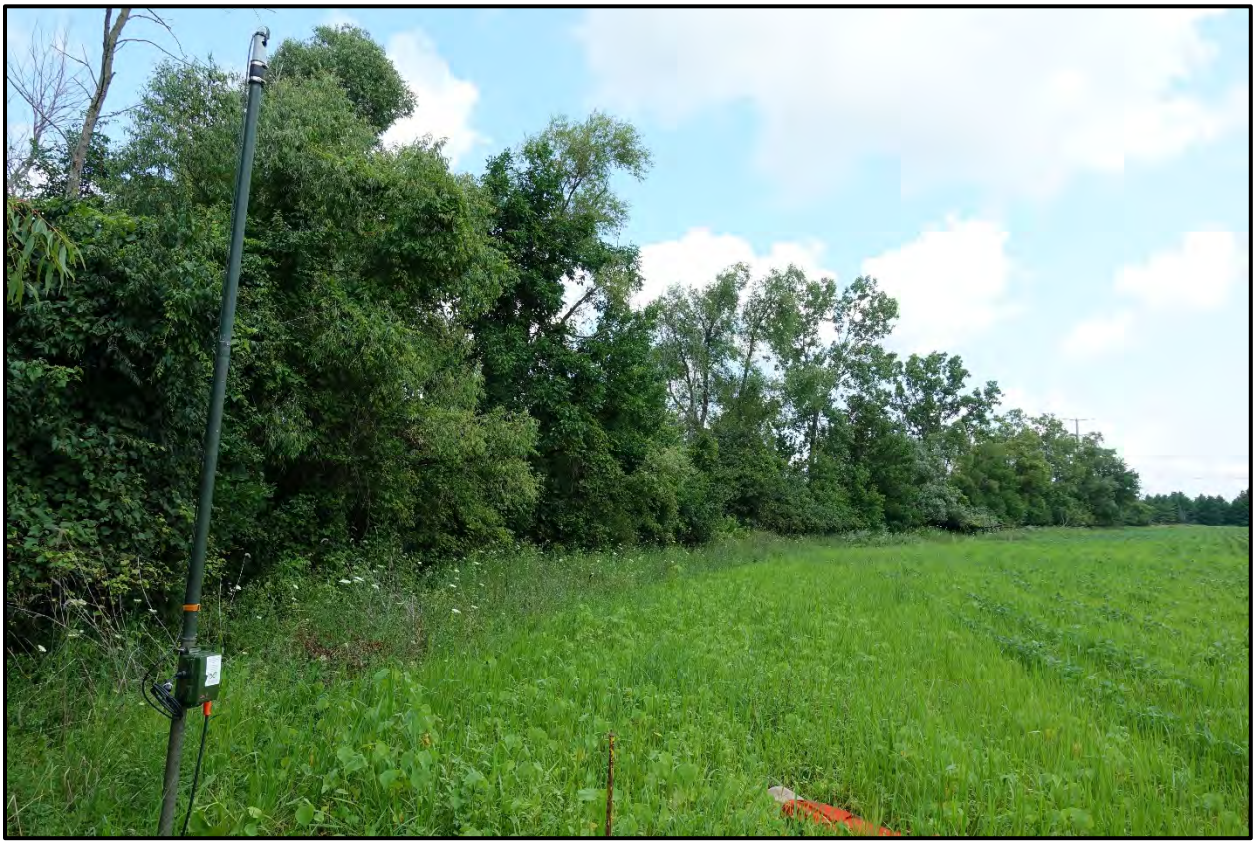
Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 34 Location A



SM4 Detector Deployment Data Sheet

Site Name: 34 B Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sunilac Datum/Format: NAD 83/D.D

Latitude: 43.17266 Longitude: -082.71775 UTC: -4

Site Description: edge of soybean field and forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 28 Microphone #: 54 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 180

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

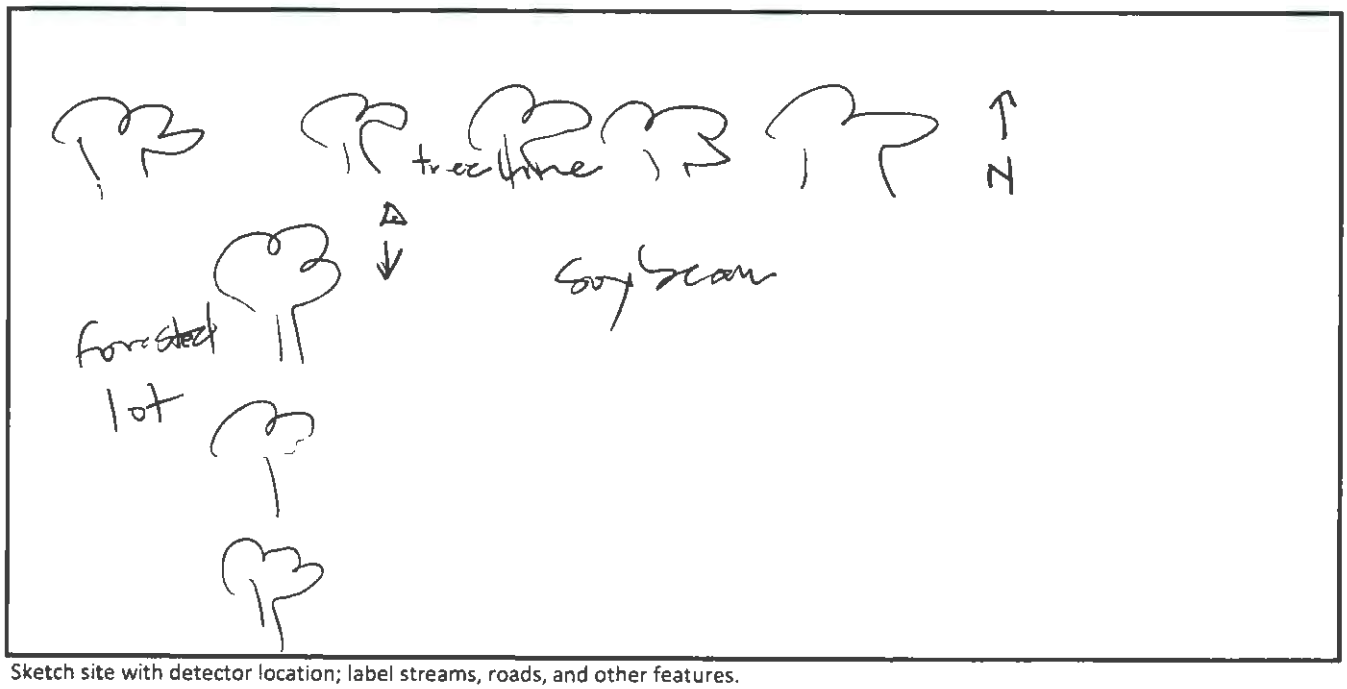
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 34 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/18/21

Detector: 28 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 141

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 34 Location B

SM4 Detector Deployment Data Sheet

Site Name: 35 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18298° Longitude: -82.72860° UTC: -4

Site Description: Shooting down field edge / Tree edge

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 50 Microphone #: 72 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 5°

User Profile/Settings:

WA SM4BAT F5 SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

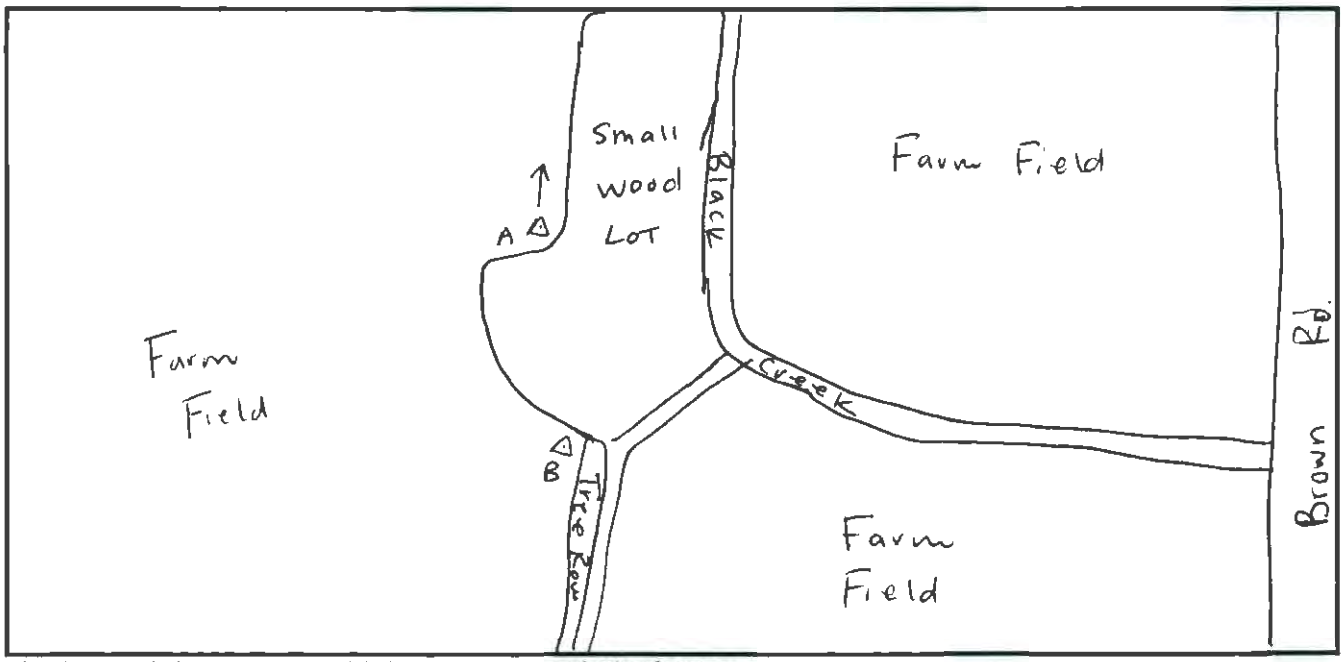
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 5ec

Comments: Changed site due to tree removal at previous point.

Photos:

Detection area: 40 Site: 60 Mic orientation: 60



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 35A

Project Name: 2021 Riverland

Biologists: E. Merrill

Date: 7/1/2021

Detector: 50
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2045	2045		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	YES	YES	YES	YES		

Data download

Card ID: 110

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 35 Location A

SM4 Detector Deployment Data Sheet

Site Name: 35 B Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Gorbel, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18133° Longitude: -82.72872° UTC: -4

Site Description: Shooting along tree row / next to creek

Habitat being sampled: (Riparian) Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 18 Microphone #: 59 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 190°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

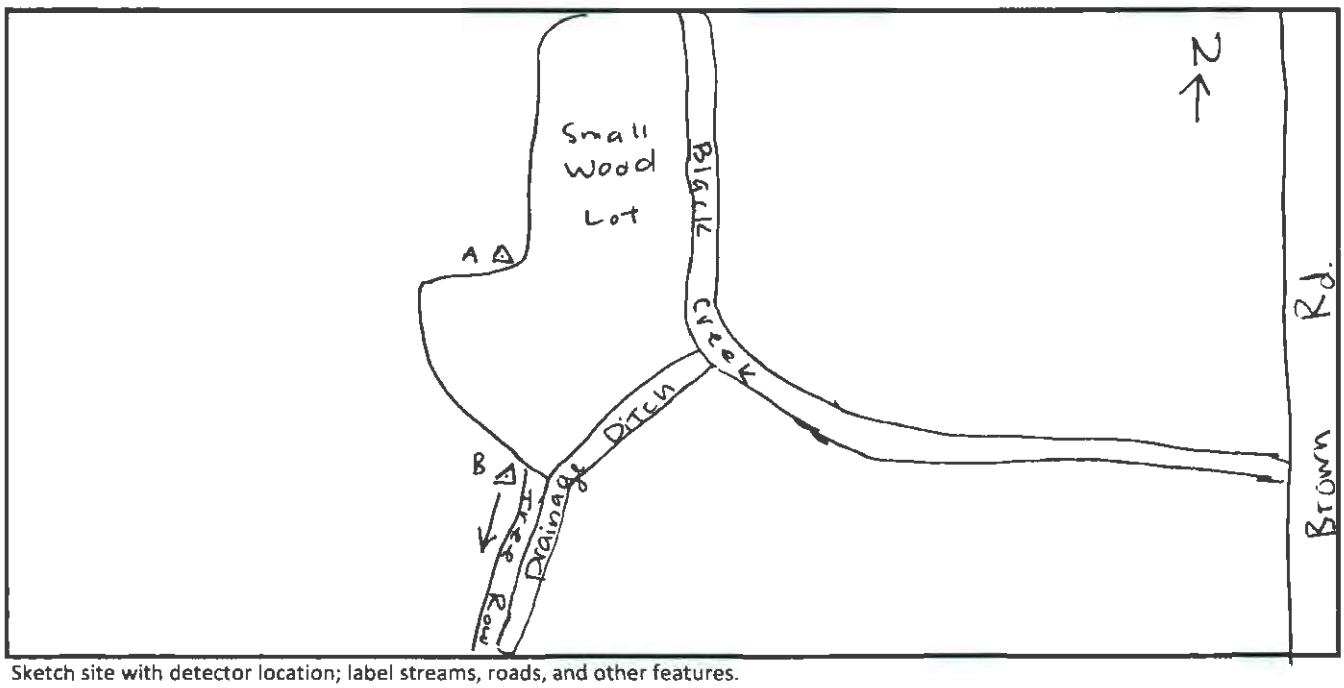
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments: Changed site due to tree removal at last Property.

Photos:

Detection area: (No) Site: (No) Mic orientation: (No)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 35B Project Name: 2021 Renewal

Biologists: E. Mevnll Date: 7/1/21

Detector: 18 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2045	2045		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 22 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 35 Location B

SM4 Detector Deployment Data Sheet

Site Name: 36 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16888 Longitude: -082.72576 UTC: -4

Site Description: shading along forested lot and soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 71 Microphone #: 49 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 0

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

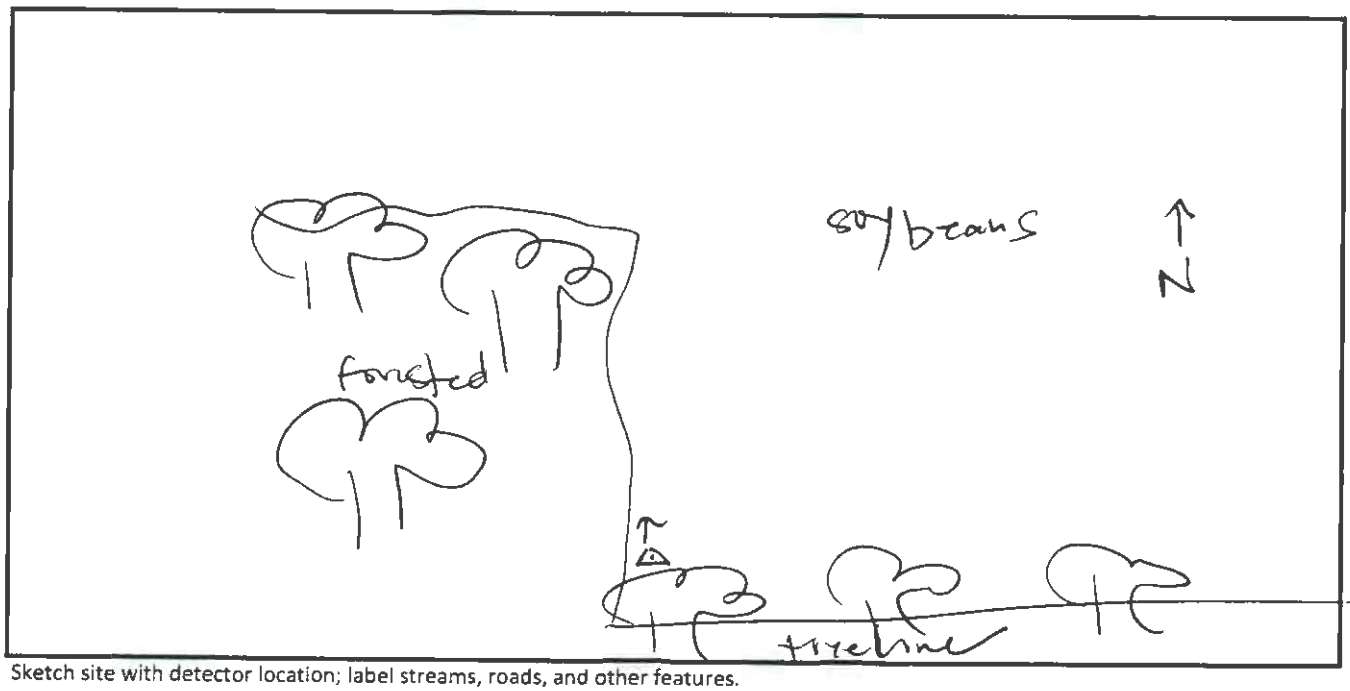
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 36 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Detector: 71 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 29 Card ID: _____

Log file Present? Yes Log file Present? _____

revised 6/2021

Site 36 Location A

SM4 Detector Deployment Data Sheet

Site Name: 36 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/14/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16990 Longitude: -082.72742 UTC: -4

Site Description: ~~shooting along treeline connecting forested lots.~~ Edge of soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 44 Microphone #: 75 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 1

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

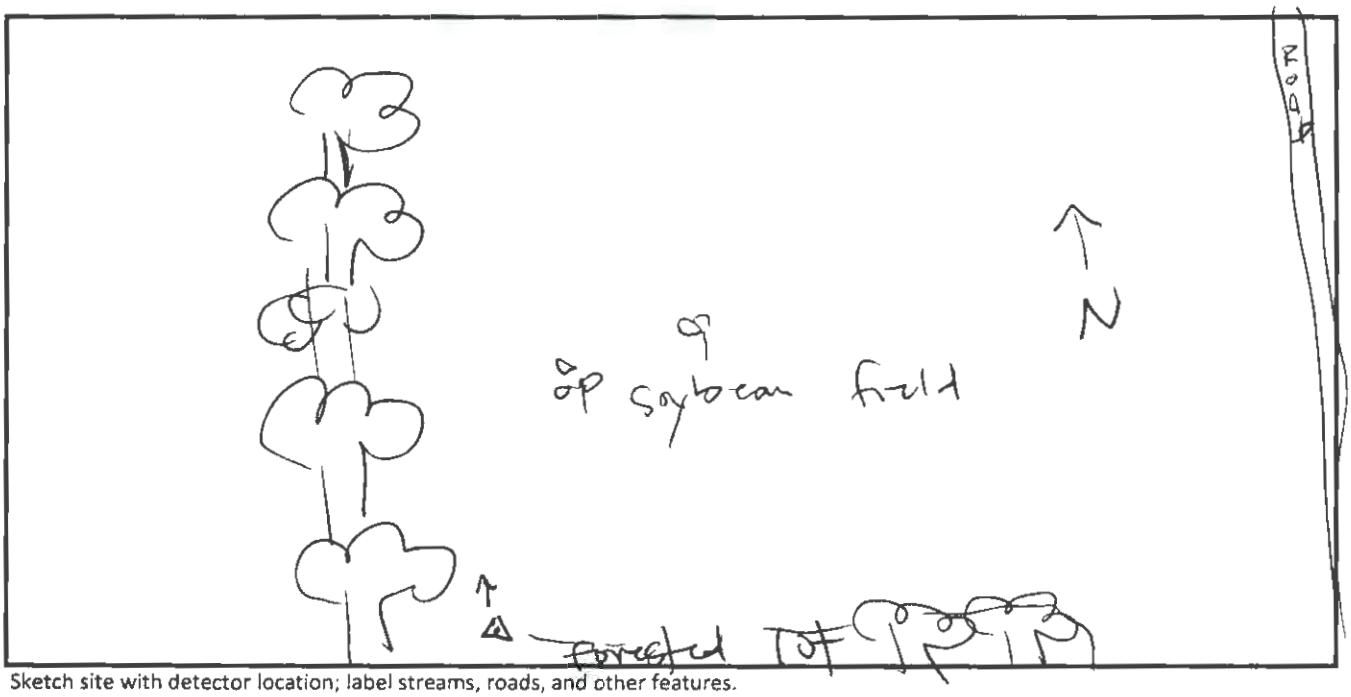
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 36 B

Project Name: 2021 Riverbend

Biologists: E. Mecrill, R. Fitzpatrick

Date: 7/18/21

Detector: 44 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/14/21	7/15/21	7/16/21	7/17/21		
Start time	2039	2038	2038	2037		
End time	0635	0636	0637	0638		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 45

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 36 Location B

SM4 Detector Deployment Data Sheet

Site Name: 37 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16470° Longitude: -82.79249° UTC: -4

Site Description: Planted pine forest with large pond and great foragng areas surrounding.

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest (Pond) Other
(circle one)

Deployment Information:

Detector #: 63 Microphone #: 44 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 19°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

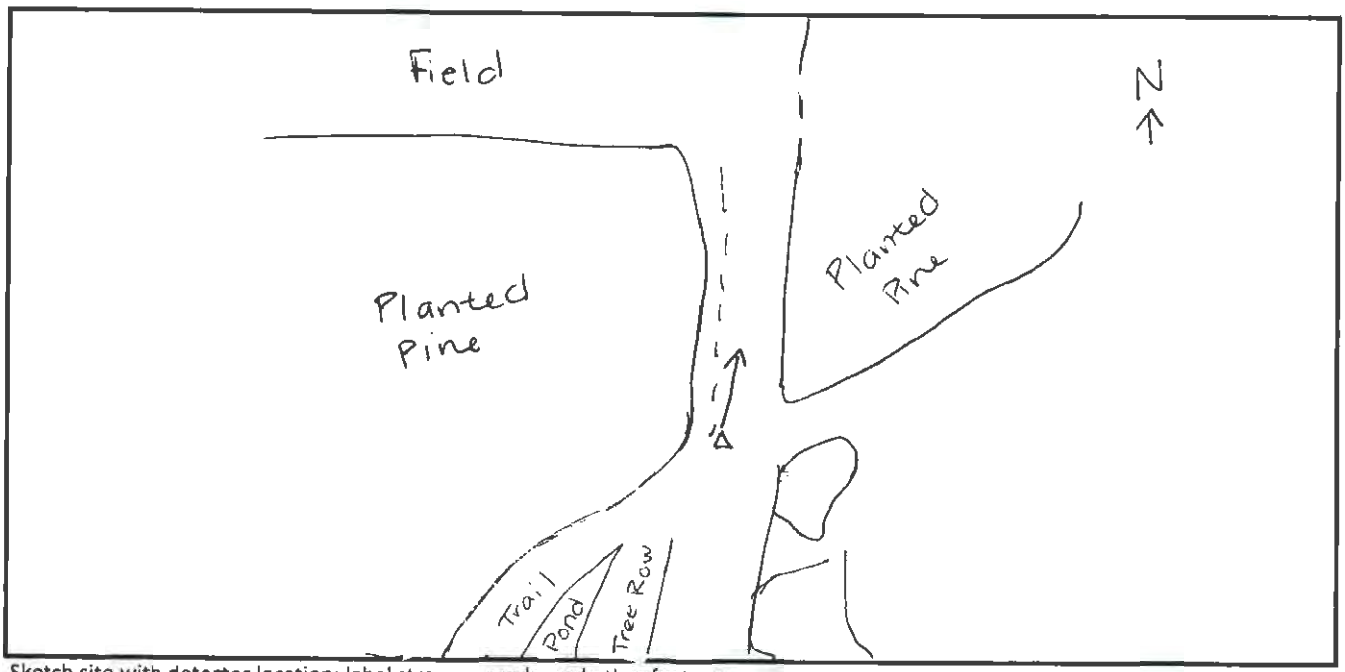
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 37 A

Project Name: 2021 Riverbend

Biologists: E. Mcvay

Date: 7/1/21

Detector: 63 (circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 50

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 37 Location A

SM4 Detector Deployment Data Sheet

Site Name: 37 B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.16497° Longitude: -82.79200° UTC: -4

Site Description: Grassy field embedded in the middle of pine wood lot

Habitat being sampled: Riparian Field Edge (Open Field) Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 72 Microphone #: 80 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: ~~0~~ Mic Azimuth: 192°

User Profile/Settings:

WA SM4BAT FS SMM-U2

Firmware: 2.3.1

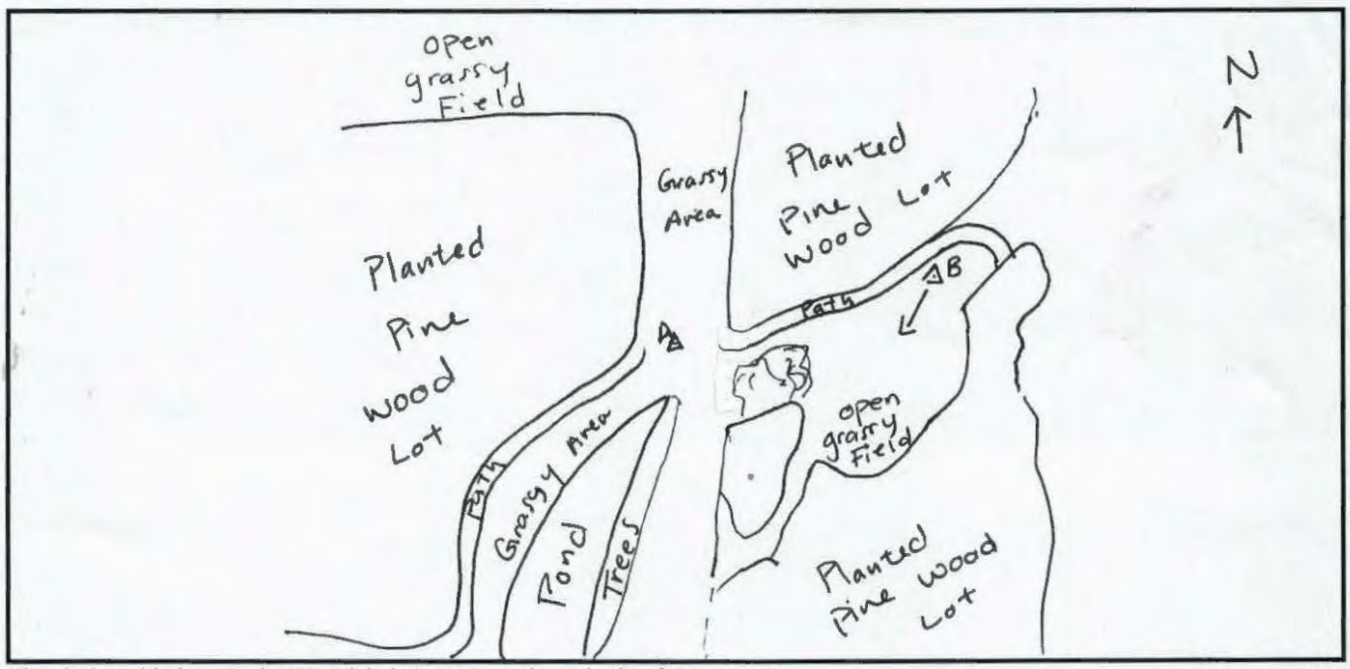
Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
Input Gain:	0 or (12 db)	Trig Freq:	16kHz	Max Length:	5 Sec

(circle one)

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 37B

Project Name: 2021 Riverbend

Biologists: E. Mcmill

Date: 7/1/21

Detector: 72
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: ~

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	–	–	2045	2045	2045	2045
End time	–	–	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 52

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 37 Location B

SM4 Detector Deployment Data Sheet

Site Name: 38 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18341 Longitude: -082.77411 UTC: -4

Site Description: edge of ag. field and forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 48 Microphone #: 56 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 24

User Profile/Settings:

WA SM4BAT F5 SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db (circle one)

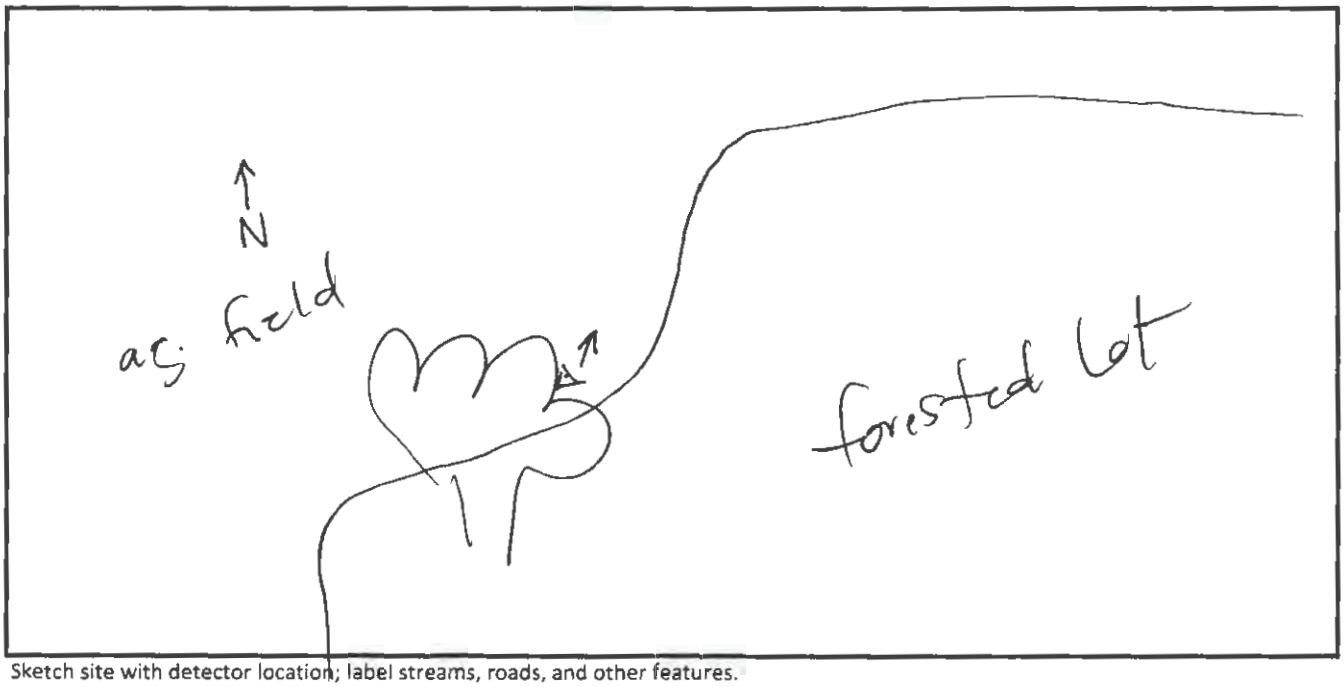
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 38 A Project Name: 2021 Riverbend

Biologists: E. Merrill, L. Fitzpatrick Date: 7/22/2021

Detector: 48 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2036	2036	2035	2034		
End time	0639	0640	0641	0642		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 23 Card ID: —

Log file Present? Yes Log file Present? —

revised 6/2021

Site 38 Location A

SM4 Detector Deployment Data Sheet

Site Name: 38 B | Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick | Date: 7/18/21

Location Information:

State: Michigan | County: Sanilac | Datum/Format: NAD 83/D.D

Latitude: 43.18283 | Longitude: 082.77446 | UTC: -4

Site Description: edge of ag. field and forested lot with ATV trail running along field and entering woods.

Habitat being sampled: Riparian Field Edge Open Field (Bottomland Forest) Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 9 | Microphone #: 82 | Directional PVC present?: no

Mic Height (m): 3 | Mic Inclination: 0 | Mic Azimuth: 20

User Profile/Settings:

WA SM4BAT F5 SMM-U2 | Firmware: 2.3.1

Samp. Freq: 384kHz | HP-Filter: On | Input Gain: 0 or (12) db (circle one)

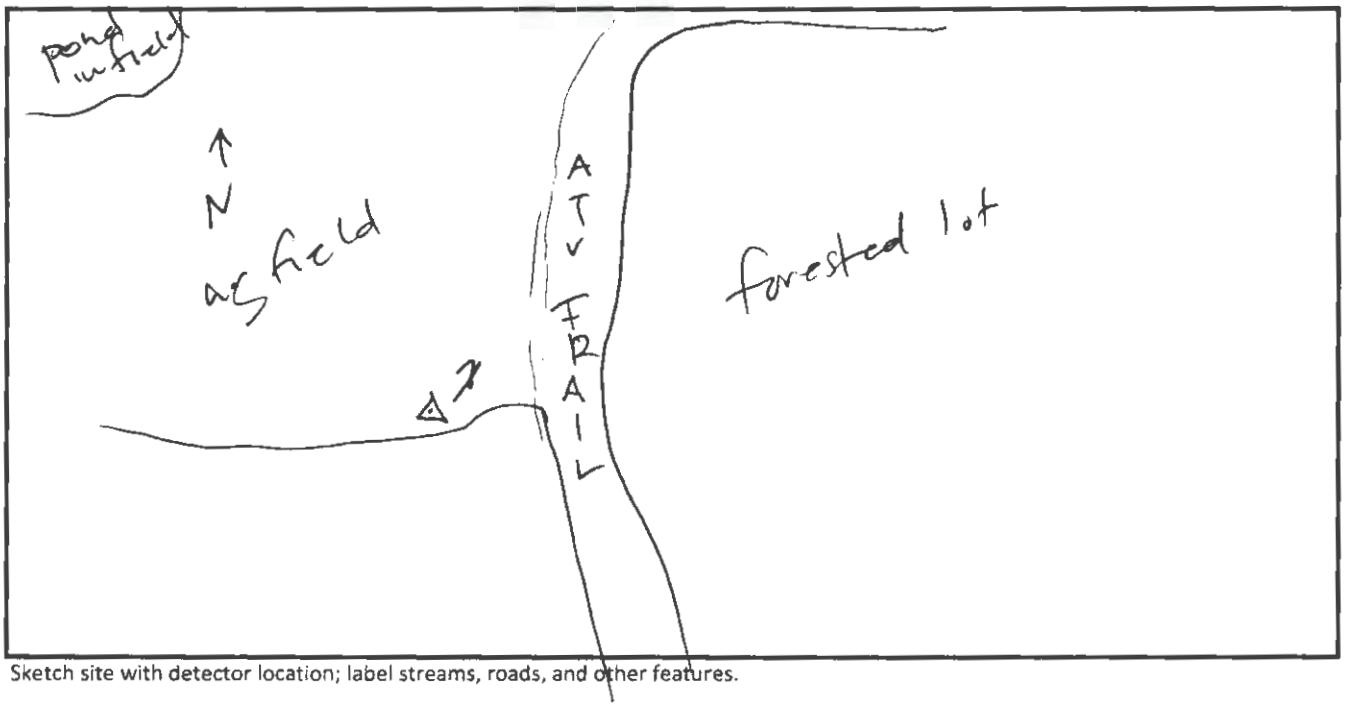
Min. Dur.: 1.5 ms | Max Dur.: none | Trig Freq: 16kHz

Trig. Level 12db | Trig. Window 3 sec | Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 38 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 9
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF:

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2036	2036	2035	2034		
End time	0639	0640	0641	0642		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 28

Log file Present? YES

Card ID:

Log file Present?

revised 6/2021

Site 38 Location B

SM4 Detector Deployment Data Sheet

Site Name: 39 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17094 Longitude: -82.77524 UTC: -4

Site Description: Shooting down tree row in farm field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 65 Microphone #: 82 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 82°

User Profile/Settings:

WA 5M4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

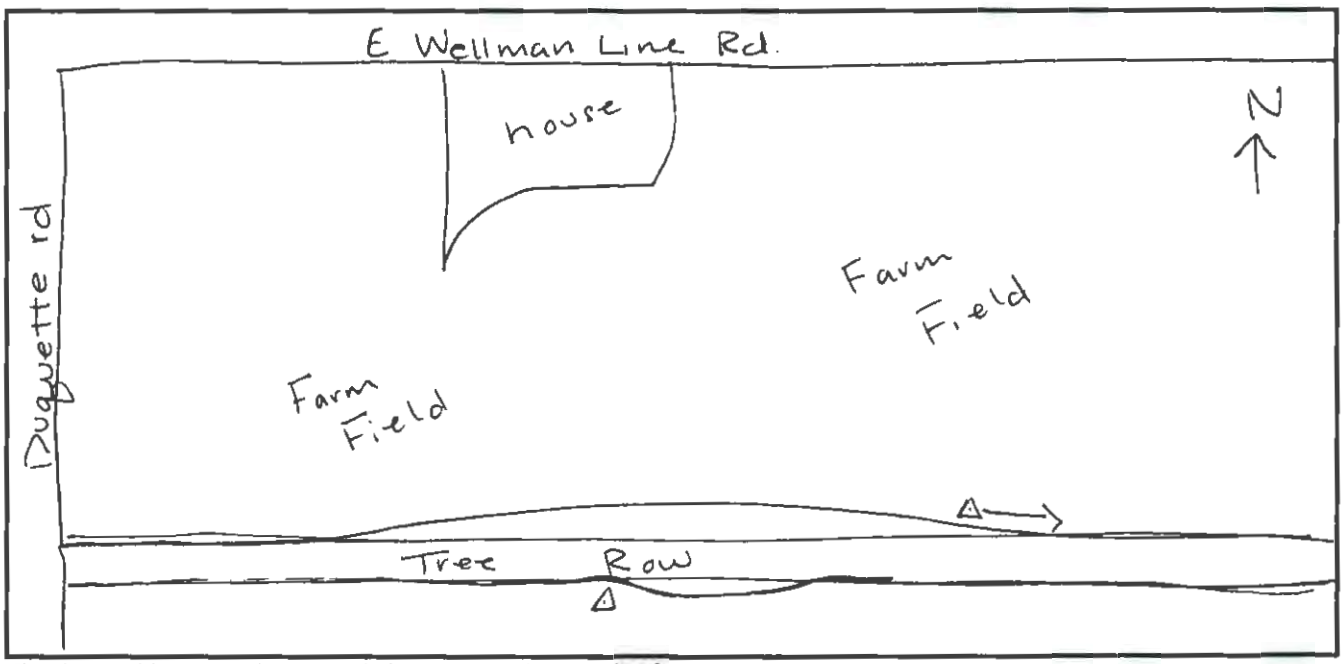
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 39A

Project Name: 2021 Riverbend

Biologists: E. Morrill

Date: 7/1/21

Detector: 65 (circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 56

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 39 Location A

SM4 Detector Deployment Data Sheet

Site Name: 39 B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17072° Longitude: -82.77573° UTC: -4

Site Description: Shooting Down tree row in farm field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 8 Microphone #: 56 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 284°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

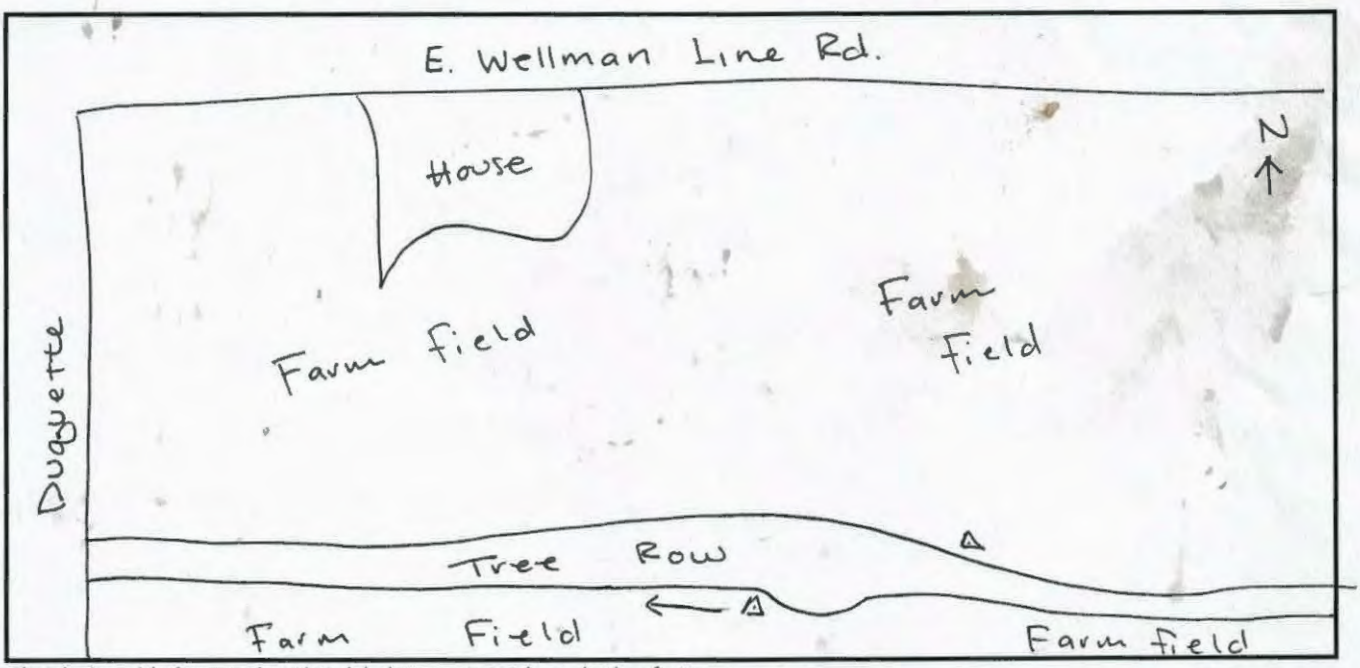
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 39B

Project Name: 2021 Riverbend

Biologists: E. Merrill

Date: 7/1/21

Detector: 08 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 54

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 39 Location B

SM4 Detector Deployment Data Sheet

Site Name: 40 A Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/25/2024

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17259° Longitude: -82.76701° UTC: -4

Site Description: Shooting along tight tree row in soybean field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 20 Microphone #: 39 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 4°

User Profile/Settings:

WA SM4BAT FS SMM-U2

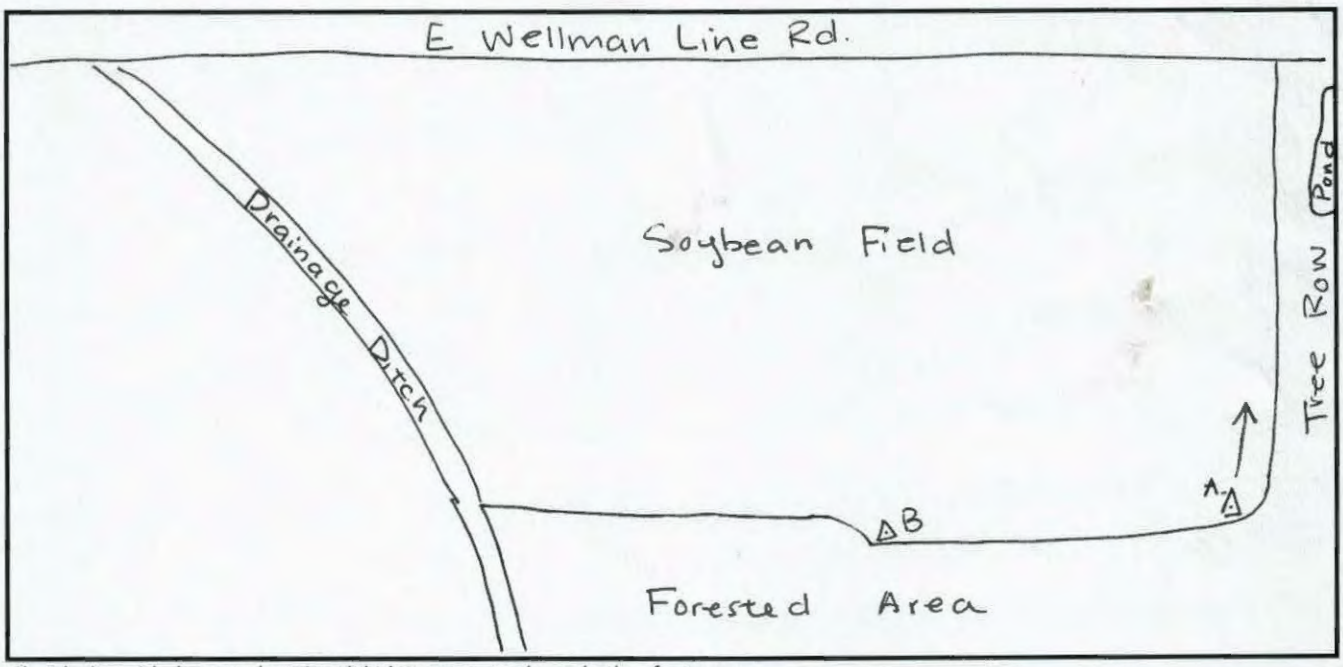
Firmware: 2.3.1

Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
Input Gain:	0 or (12 dB) (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 40A

Project Name: 2021 Riverbend

Biologists: E. Morrill

Date: 7/1/21

Detector: 20 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/21	6/25/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 41

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 40 Location A

SM4 Detector Deployment Data Sheet

Site Name: 40 B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/25/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17249° Longitude: -82.76914° UTC: -4

Site Description: Shooting down Field edge in Soybean Field.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 47 Microphone #: 85 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 95°

User Profile/Settings:

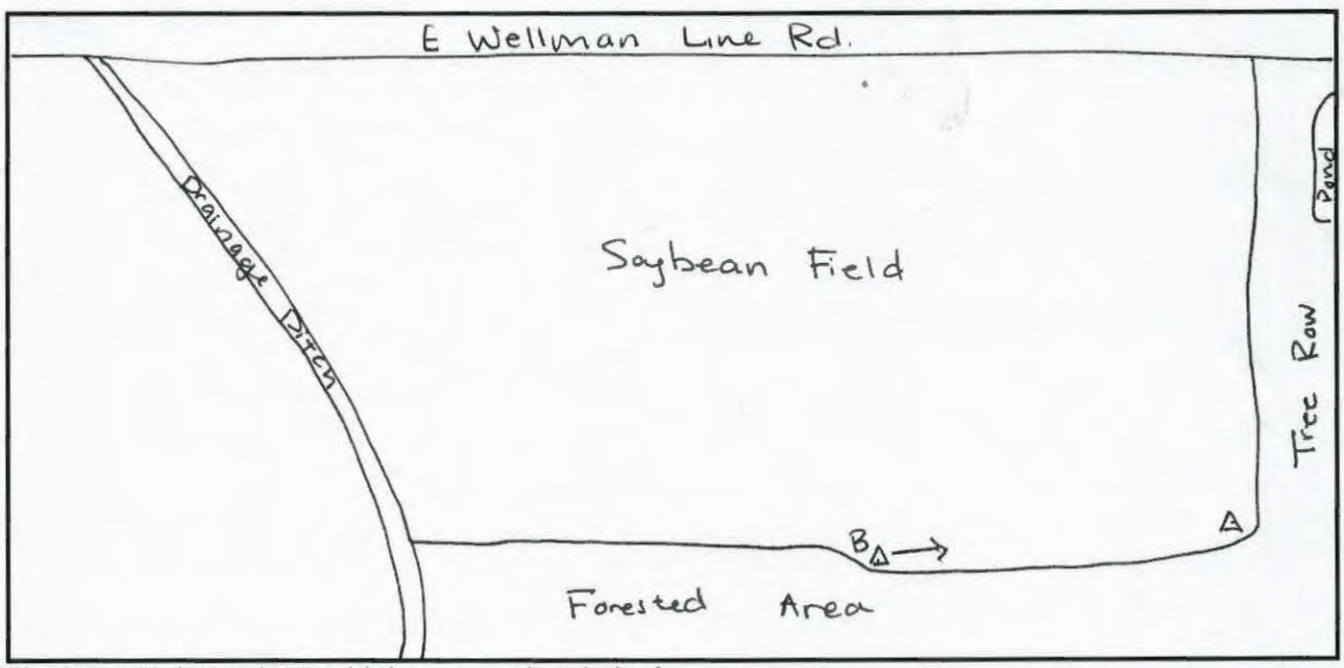
WA SM4BAT FS	SMM-U2	Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
Firmware:	2.3.1	HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
		Input Gain:	0 or (12 db)	Trig Freq:	16kHz	Max Length:	5 Sec

(circle one)

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 40 B

Project Name: 2021 Riverbend

Biologists: E. Merrill

Date: 7/1/21

Detector: 47 (circle one)

Detector Status: ON:~~Armed~~ ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/25/2021	6/26/21	6/27/21	6/28/21	6/29/21	6/30/21
Start time	—	—	2045	2045	2045	2045
End time	—	—	0624	0624	0625	0625
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No	No	No
>9m/h wind speeds?	No	No	No	No	No	No
>30 min of precip./fog?	Yes	Yes	No	No	No	No
*If YES to any of the conditions, resample the night.						
Was the night successful?	No	No	Yes	Yes	Yes	Yes

Data download

Card ID: 44

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 40 Location B

SM4 Detector Deployment Data Sheet

Site Name: 41 A Project Name: 2021 Riverbend

Biologists: E. Merrill, A. Goebel, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17049° Longitude: -82.78925° UTC: -4

Site Description: Shooting along forested wood lot next to Corn field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 48 Microphone #: 46 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 0°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

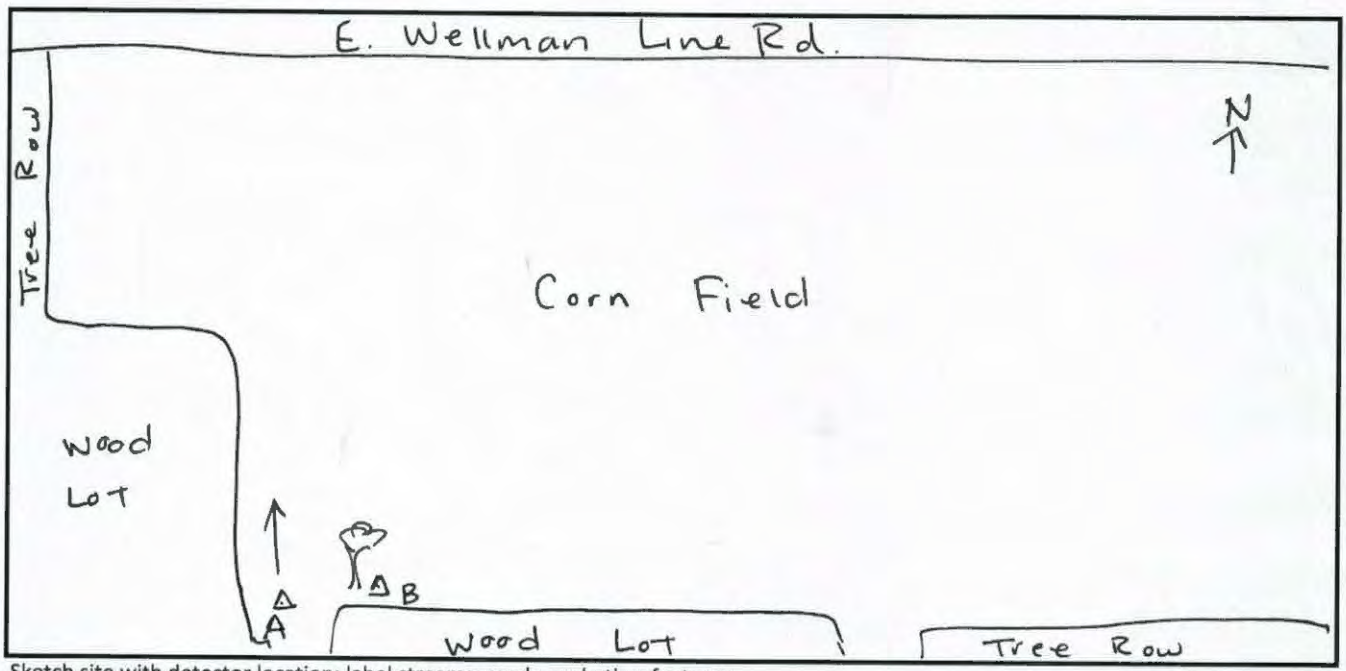
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: 40 Site: 40 Mic orientation: 40



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 41A

Project Name: 2021 Ryan Land

Biologists: E. Merrill

Date: 7/1/21

Detector: 48
(circle one)

Detector Status: ~~ON:Armed~~ ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2045	2045		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 27

Log file Present? Yes

Card ID: —

Log file Present? —

revised 6/2021

Site 41 Location A

SM4 Detector Deployment Data Sheet

Site Name: 41 B Project Name: 2021 Riverbend

Biologists: A. Goebel, E. Merrill, M. Zollars Date: 06/27/2021

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.17049° Longitude: -82.78886 UTC: -4

Site Description: Shooting along forested edge next to Corn field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 56 Microphone #: 37 Directional PVC present?: No

Mic Height (m): 3 Mic Inclination: Ø Mic Azimuth: 95°

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12 db)
(circle one)

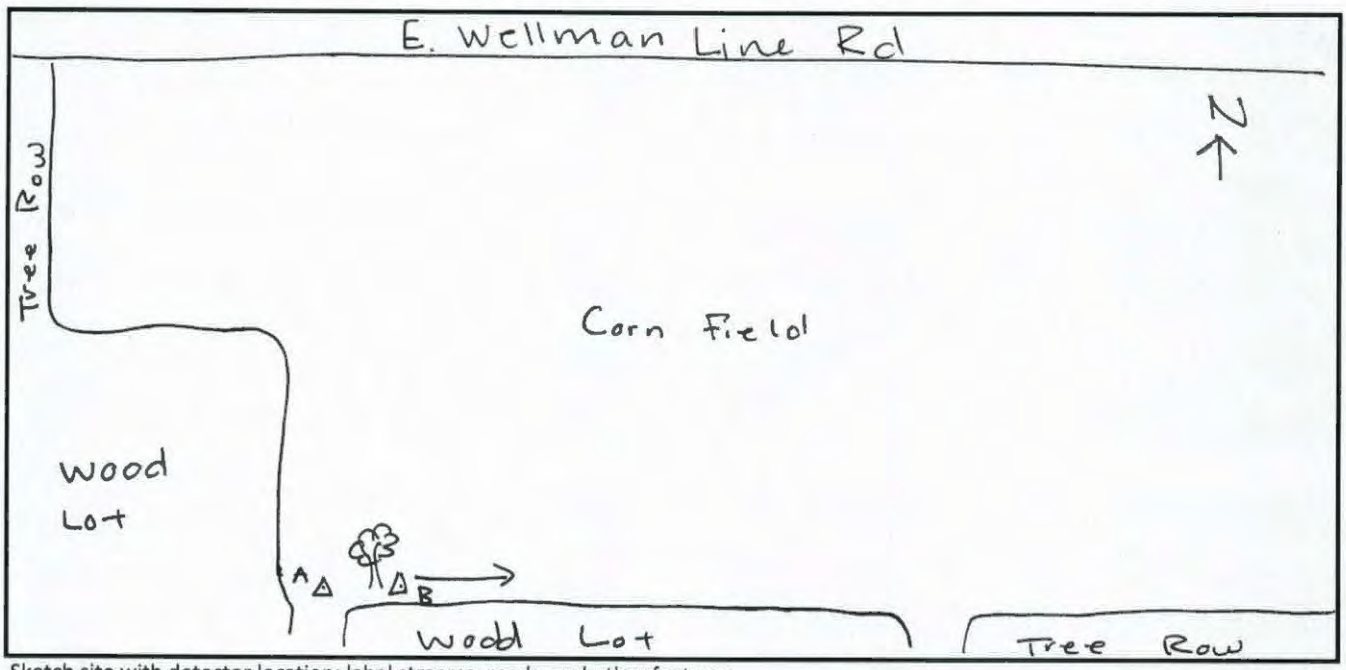
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 41B

Project Name: 2021 RiverSend

Biologists: E. Mervill

Date: 7/1/21

Detector: 56 (circle one)

Detector Status: ~~ON:Armed~~ ON:Triggered OFF: Dead

Reason for OFF: –

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	6/27/21	6/28/21	6/29/21	6/30/21		
Start time	2045	2045	2046	2045		
End time	0624	0624	0625	0625		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	No	No	No	No		
>9m/h wind speeds?	No	No	No	No		
>30 min of precip./fog?	No	No	No	No		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Yes	Yes	Yes	Yes		

Data download

Card ID: 18

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 41 Location B

SM4 Detector Deployment Data Sheet

Site Name: 42 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/16/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.22135 Longitude: -082.81937 UTC: -4

Site Description: edge of soybean field and drainage ditch/forest

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 16 Microphone #: 79 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 172

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

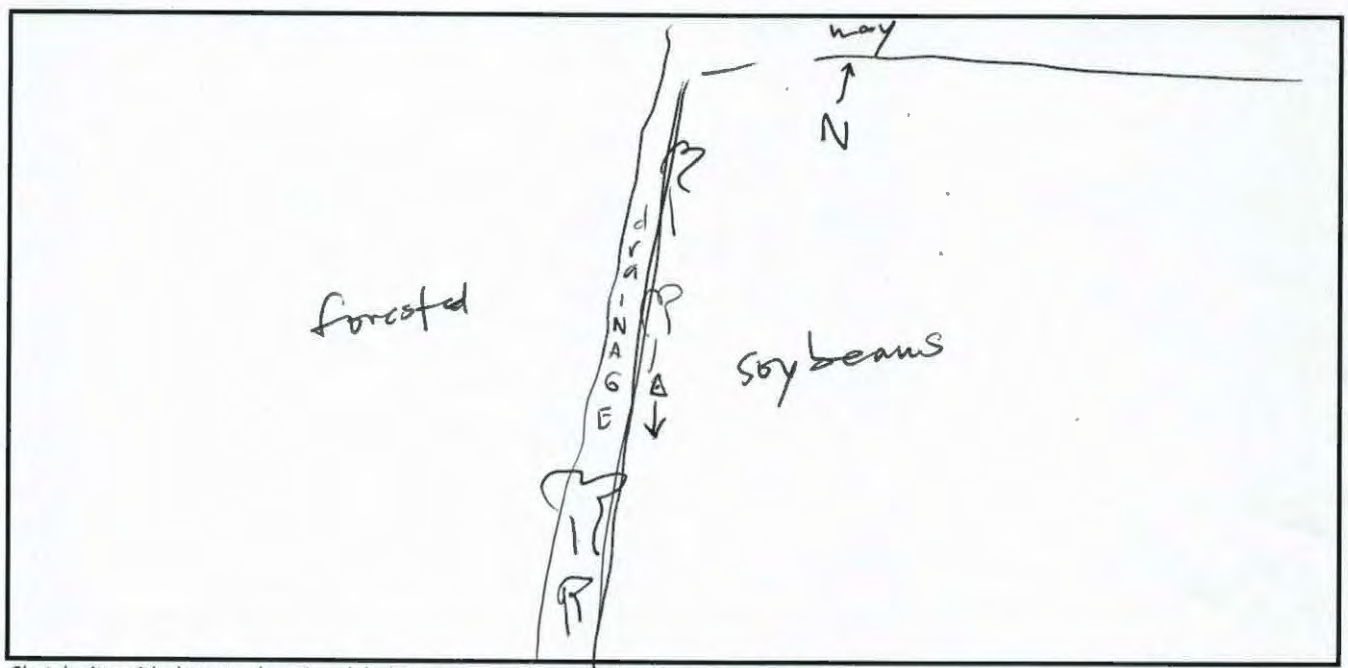
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 42 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/20/21

Detector: 16 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 145 Card ID: _____

Log file Present? YES Log file Present? _____

revised 6/2021

Site 42 Location A

SM4 Detector Deployment Data Sheet

Site Name: 42 B Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/10/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.22348 Longitude: -082.81952 UTC: -4

Site Description: shooting edge of forested lot / corner of forested lot / drainage ditch / edge of hay field

Habitat being sampled: Riparian Field Edge Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 35 Microphone #: 70 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 10

User Profile/Settings:

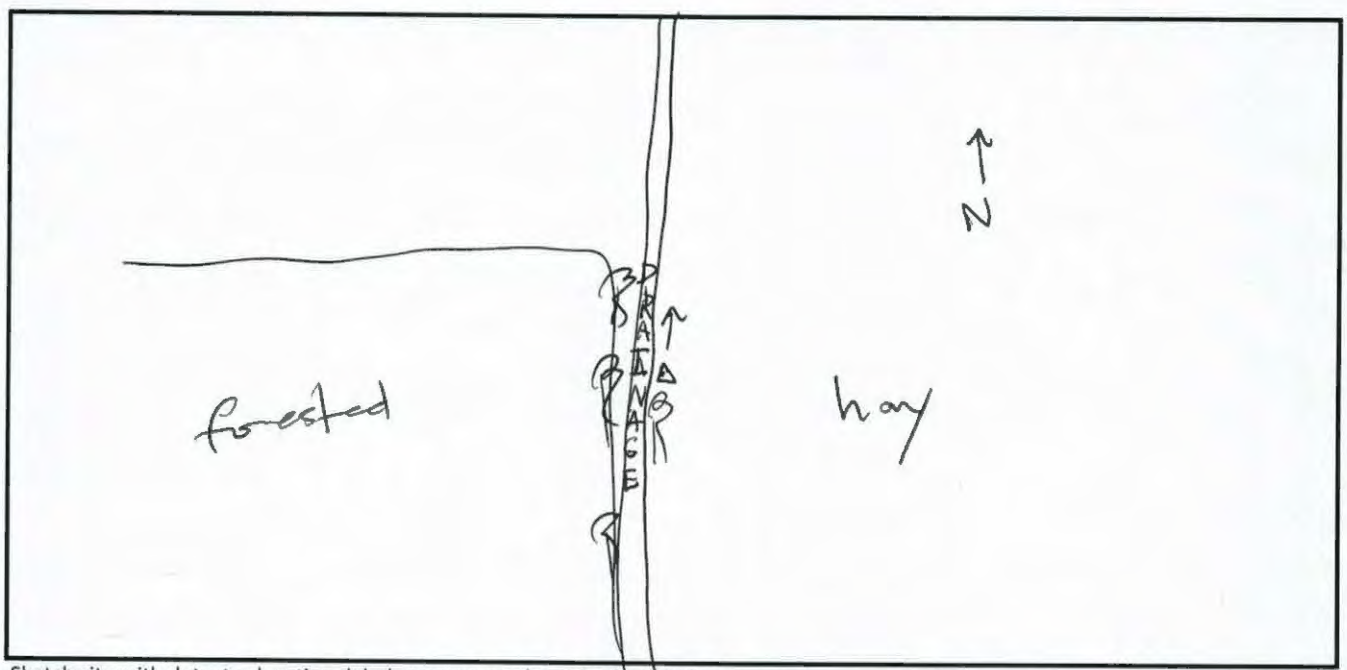
WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 42 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/20/2021

Detector: 35 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/16/21	7/17/21	7/18/21	7/19/21		
Start time	2038	2038	2037	2036		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 146

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 42 Location B

SM4 Detector Deployment Data Sheet

Site Name: 43 A | Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick | Date: 7/17/21

Location Information:

State: Michigan | County: Sanilac | Datum/Format: NAD 83/D.D

Latitude: 43.23536 | Longitude: -082.79603 | UTC: -4

Site Description: edge of wooded lot and ag. field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 54 | Microphone #: 59 | Directional PVC present?: NO

Mic Height (m): 3 | Mic Inclination: 0 | Mic Azimuth: 260

User Profile/Settings:

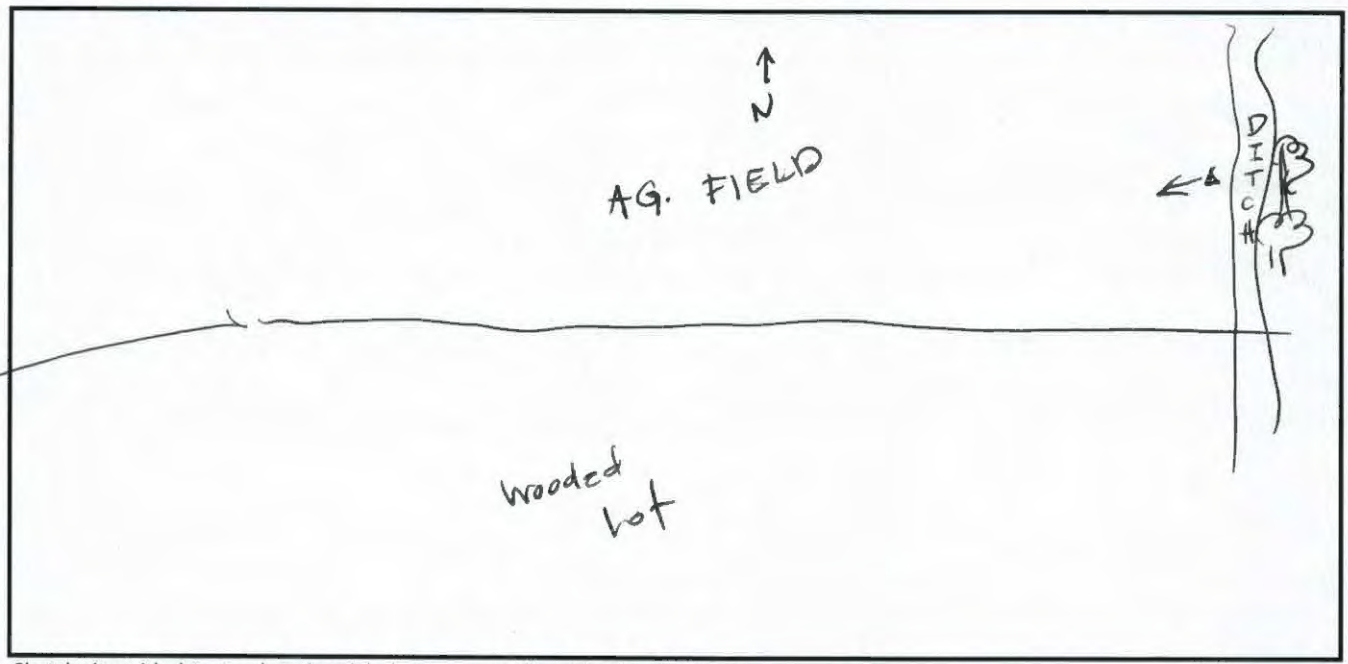
WA SM4BAT FS SMM-U2 | Firmware: 2.3.1

Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 43 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/21/2021

Detector: 54 (circle one) Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2038	2037	2036	2035		
End time	0638	0639	0640	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 51 Card ID: ____

Log file Present? Yes Log file Present? ____

revised 6/2021

Site 43 Location A

SM4 Detector Deployment Data Sheet

Site Name: 43 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.23528 Longitude: -082.79729 UTC: -4

Site Description: edge of ag. field and wooded lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 8 Microphone #: 85 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 276

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 5ec

Comments:

Photos:

Detection area: (X) Site: (x) Mic orientation: (x)

Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 43 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/21/21

Detector: 8 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2038	2037	2036	2035		
End time	0638	0639	0640	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 104

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 43 Location B

SM4 Detector Deployment Data Sheet

Site Name: 44 A Project Name: 2021 Riverbend

Biologists: E. Merrill, L. Fitzpatrick Date: 7/19/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18679 Longitude: -082. 76907 UTC: -4

Site Description: edge of ag. field and wooded lot with trails running through. Near opening to homestead

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 40 Microphone #: 74 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 190

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

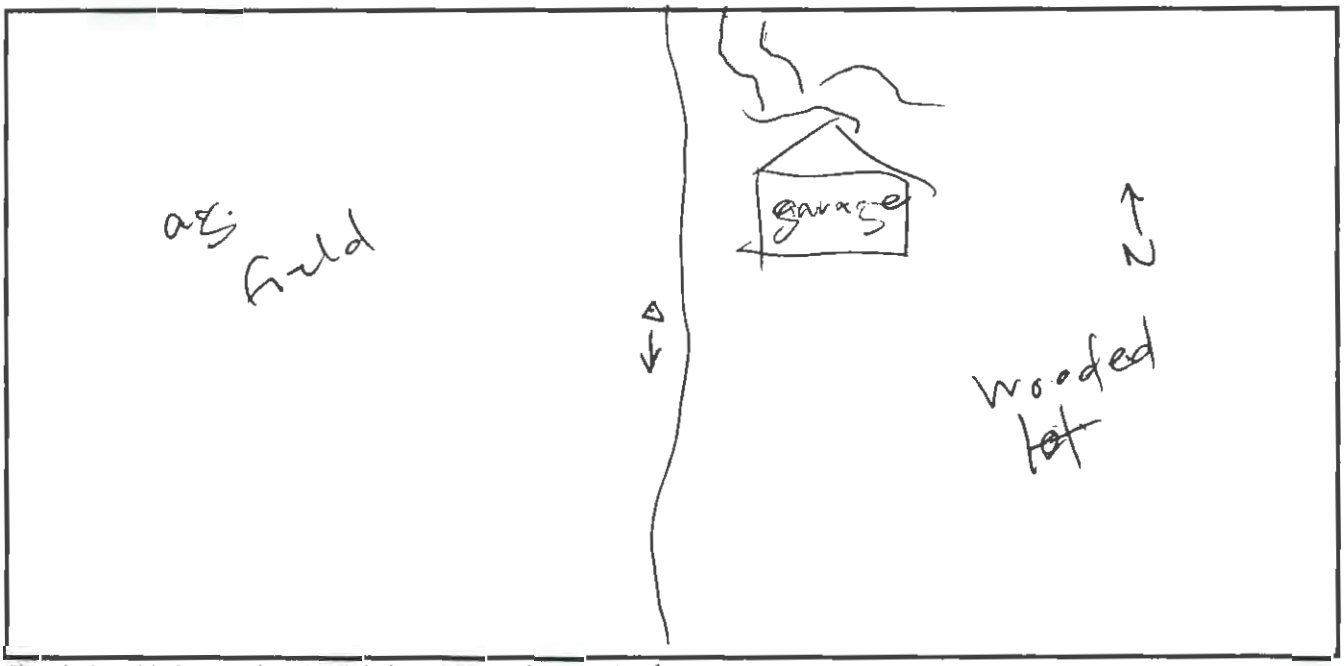
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 44 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 40
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2036	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 34

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 44 Location A

SM4 Detector Deployment Data Sheet

Site Name: 44 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18693 Longitude: -082.76908 UTC: -4

Site Description: on edge of field and wooded lot by homestead. Trails running through opening at

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 32 Microphone #: 46 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 2

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

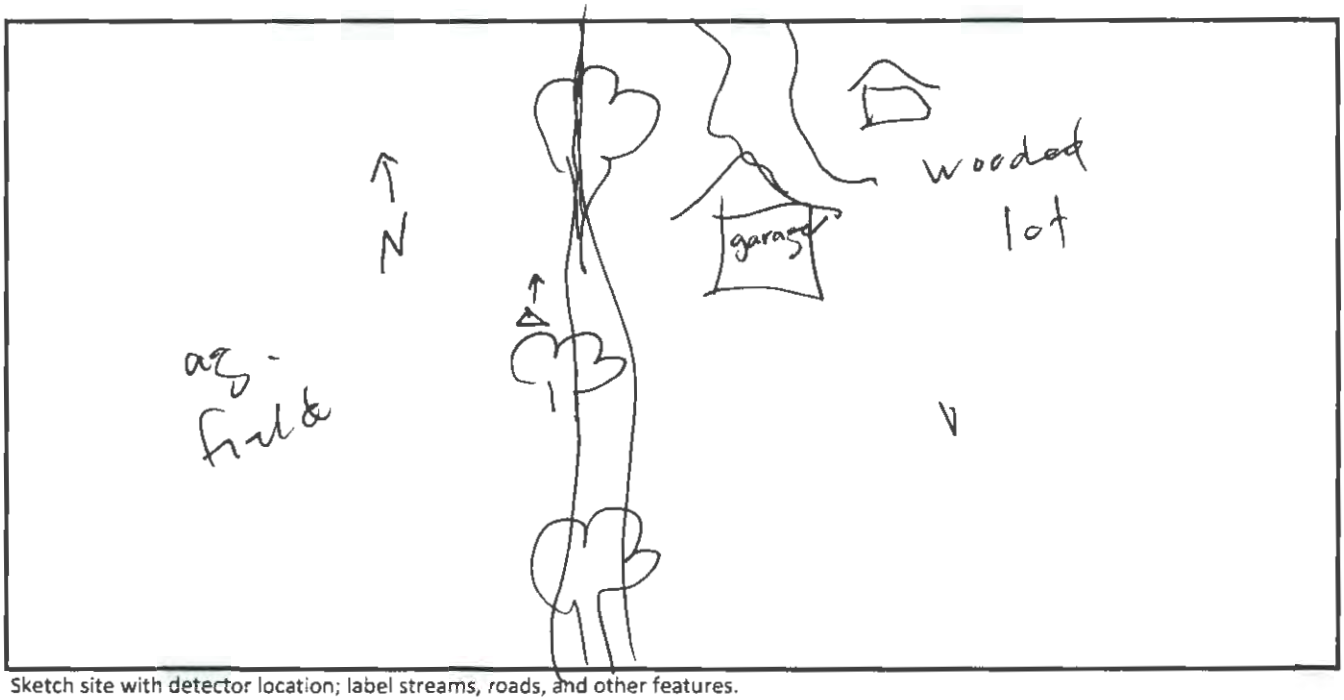
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 44 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 32
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2036	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 121

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 44 Location B

SM4 Detector Deployment Data Sheet

Site Name: 45 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19076 Longitude: -082.76817 UTC: -4

Site Description: edge of sweet beet field and forest

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 56 Microphone #: 76 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 0

User Profile/Settings:

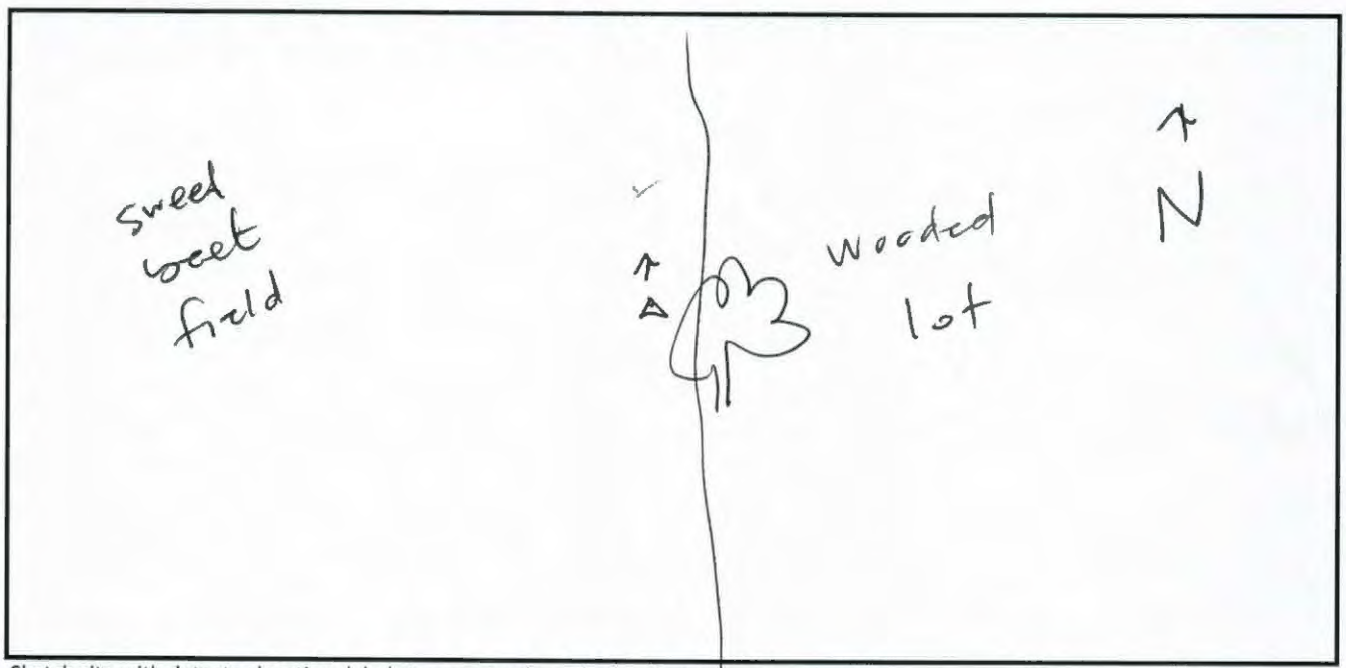
WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 45 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 56 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2036	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*if YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 33

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 45 Location A

SM4 Detector Deployment Data Sheet

Site Name: 45 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/19/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19184 Longitude: -082.76826 UTC: -4

Site Description: edge of sweet seed field and wooded lot where Black Creek enters wooded lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 3 Microphone #: 80 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 5

User Profile/Settings:

WA SM4BAT FS SMM-U2 Firmware: 2.3.1

Samp. Freq: 384kHz HP-Filter: On Input Gain: 0 or (12) db (circle one)

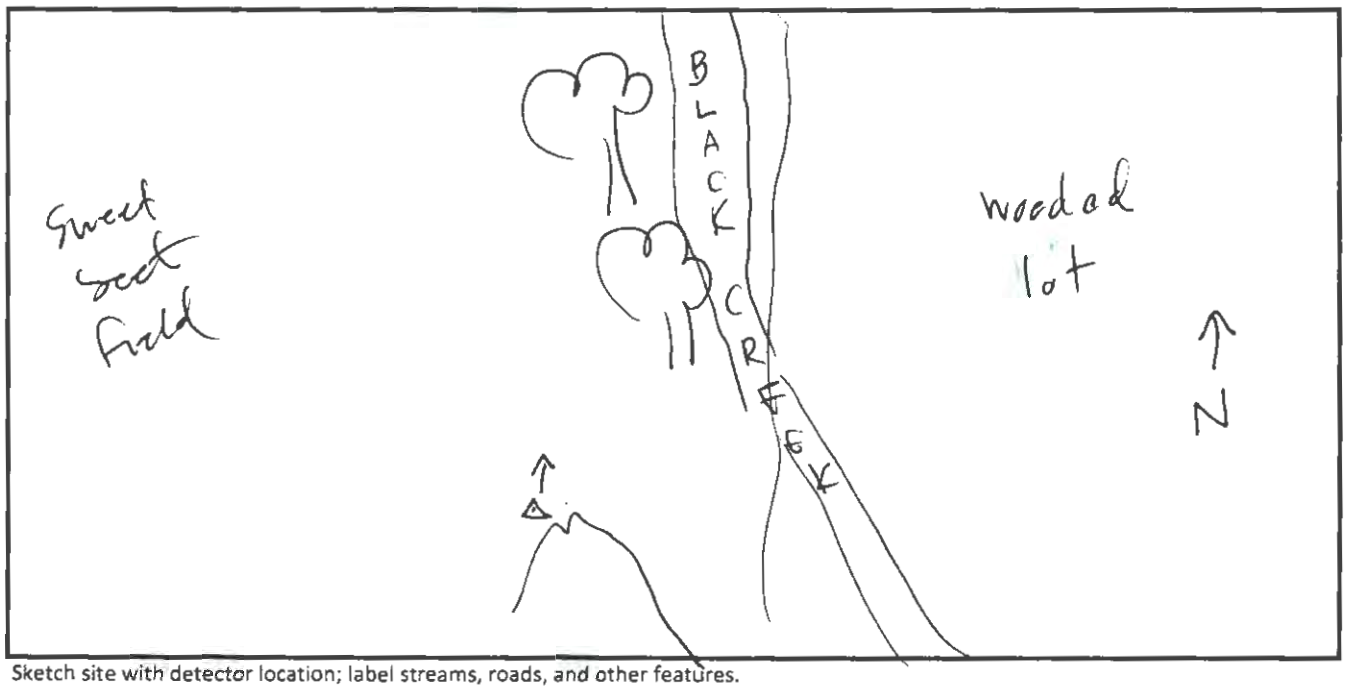
Min. Dur.: 1.5 ms Max Dur.: none Trig Freq: 16kHz

Trig. Level 12db Trig. Window 3 sec Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 45 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 3
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: NO

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2036	2036	2035	2034		
End time	0639	0640	0641	0644		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 136

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 45 Location B

SM4 Detector Deployment Data Sheet

Site Name: 46 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18456 Longitude: -082.79777 UTC: -4

Site Description: ~~edge~~ of ag. field and forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 17 Microphone #: 37 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 276

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

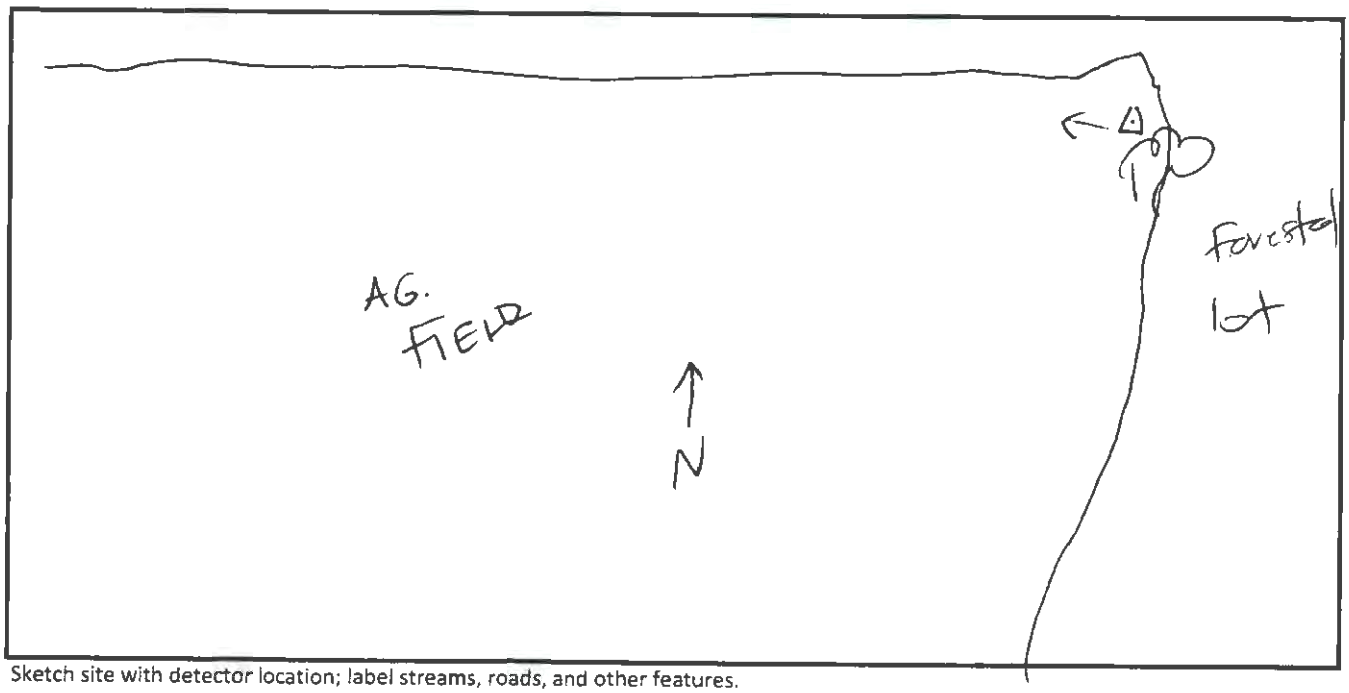
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 5ec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 46 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 17 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2037	2036	2035	2034		
End time	0639	0640	0641	0642		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N				
>9m/h wind speeds?	N	N				
>30 min of precip./fog?	N	N				
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y				

Data download

Card ID: 215

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 46 Location A

SM4 Detector Deployment Data Sheet

Site Name: 46 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.18392 Longitude: -082.79764 UTC: -4

Site Description: edge of ag field and forested lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: Z6 Microphone #: 52 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 5

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

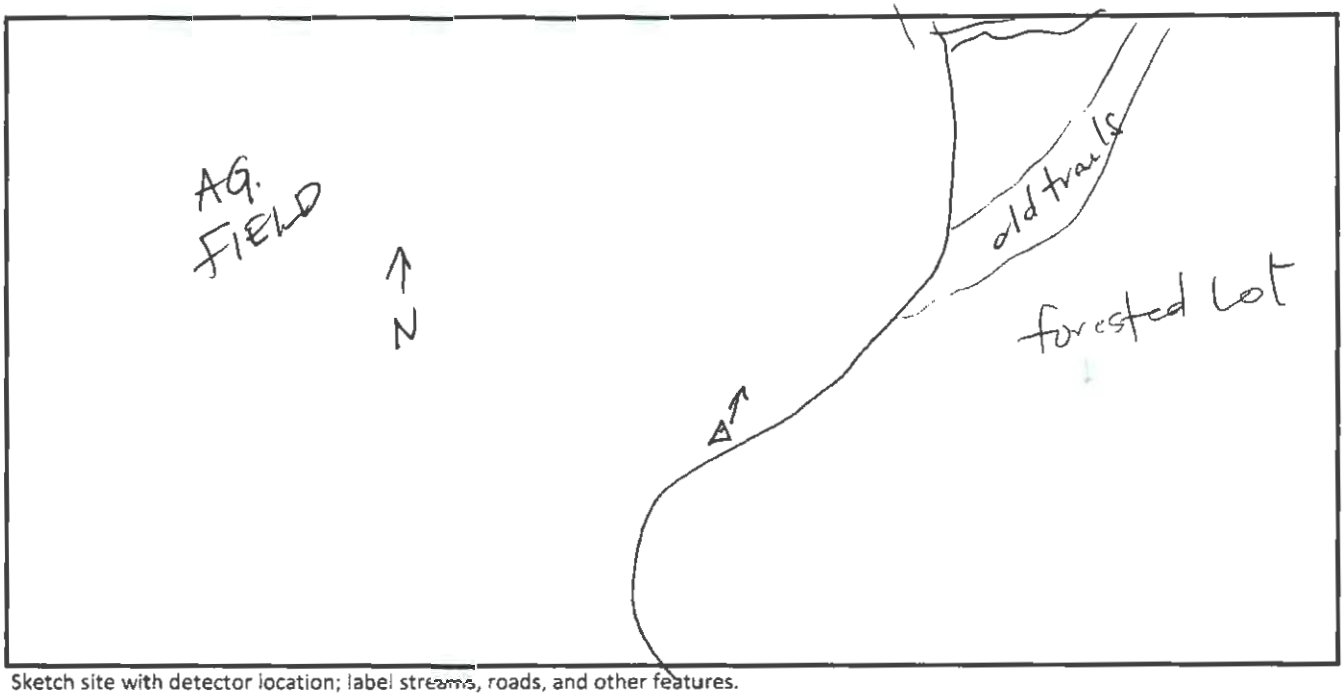
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 46 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 26
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2037	2036	2035	2034		
End time	0639	0640	0641	0642		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 49

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 46 Location B

SM4 Detector Deployment Data Sheet

Site Name: 47 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19191 Longitude: -082.73383 UTC: -4

Site Description: edge of corn field and wooded lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 47 Microphone #: 44 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 182

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12)db
(circle one)

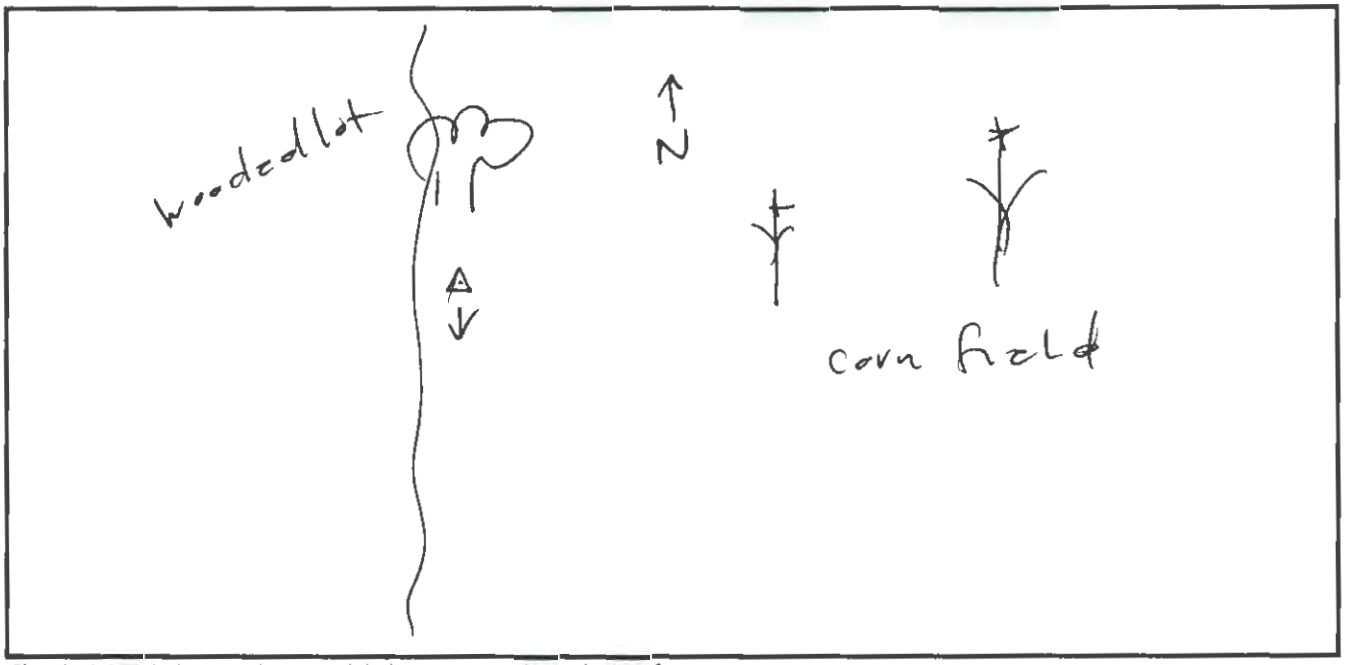
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

revised 06/2021

Detector Pick-up Data Sheet

Site Name: 47 A Project Name: 2021 Riverbird

Biologists: E. Merrill, L. Fitzpatrick Date: 7/21/21

Detector: 47 (circle one) Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2036	2039		
End time	0638	0638	06	0635		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 153 Card ID: _____

Log file Present? Y/TS Log file Present? _____

revised 6/2021

Site 47 Location A

SM4 Detector Deployment Data Sheet

Site Name: 47 B Project Name: 2021 Riverbend

Biologists: E. Merrill, K. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.19414 Longitude: -082.73399 UTC: -4

Site Description: edge of corn field and wooded lot

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 65 Microphone #: 22 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 6

User Profile/Settings:

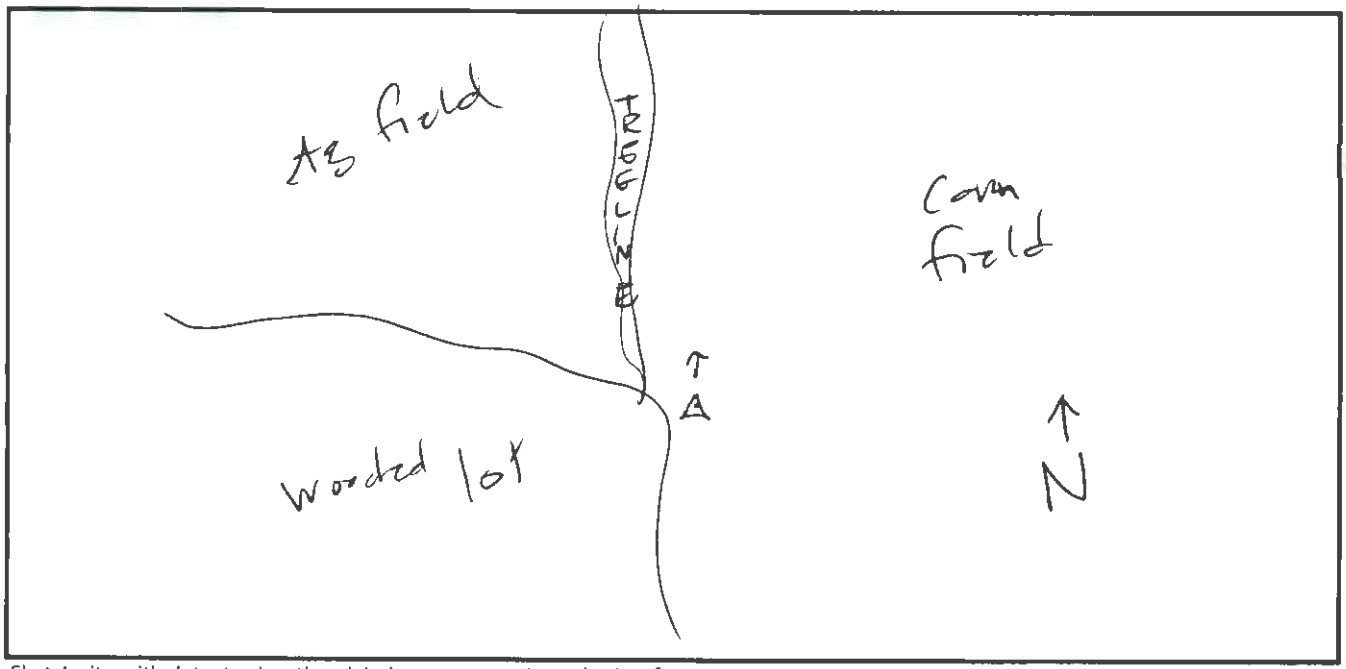
WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq:	384kHz	Min. Dur.:	1.5 ms	Trig. Level	12db
HP-Filter:	On	Max Dur.:	none	Trig. Window	3 sec
Input Gain:	0 or (12) db (circle one)	Trig Freq:	16kHz	Max Length:	5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 47 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/21/21

Detector: 65 (circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2036	2035		
End time	0638	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 154

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 47 Location B

SM4 Detector Deployment Data Sheet

Site Name: 48 A Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.2180 Longitude: -082.71143 UTC: -4

Site Description: edge of wooded lot and corn field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 50 Microphone #: 42 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 88

User Profile/Settings:

WA SM4BAT FS SMM-U2 Samp. Freq: 384kHz Min. Dur.: 1.5 ms Trig. Level 12db

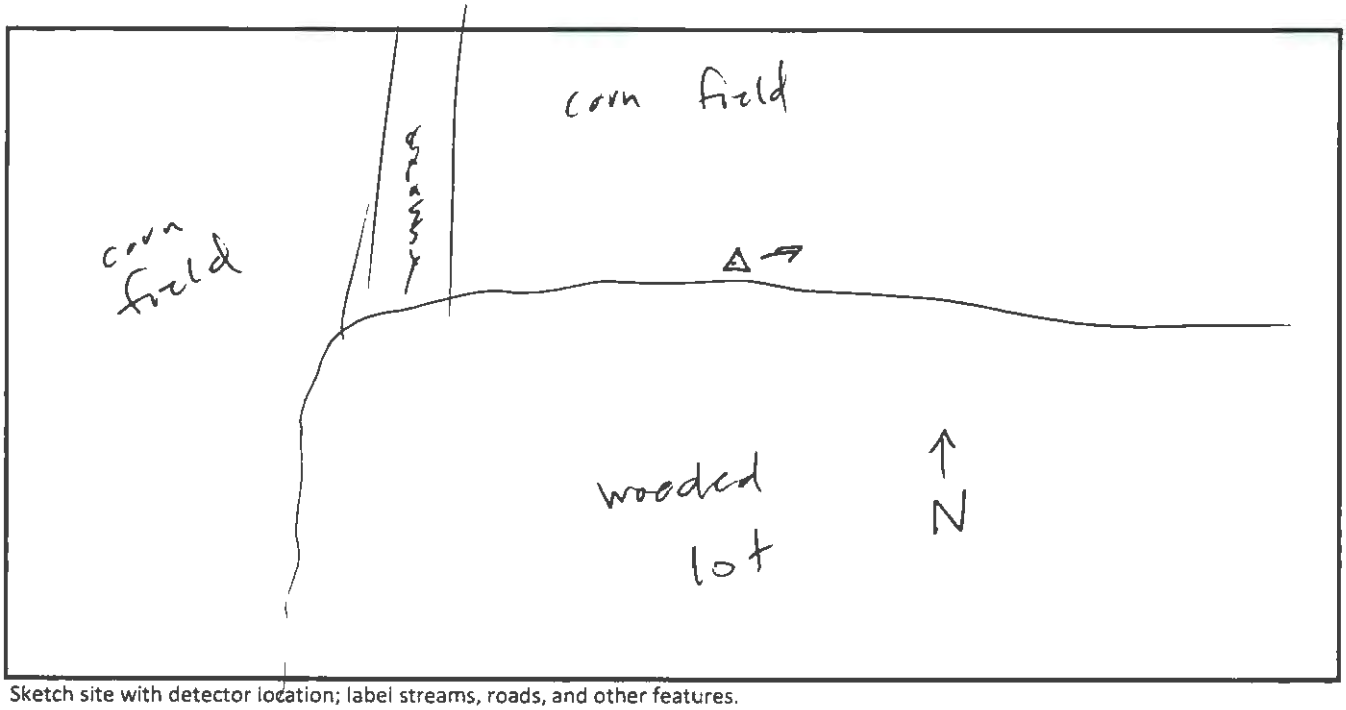
Firmware: 2.3.1 HP-Filter: On Max Dur.: none Trig. Window 3 sec

Input Gain: 0 or (12) db (circle one) Trig Freq: 16kHz Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 48 A

Project Name: 2021 Riverbend

Biologists: E. Mescill, R. Fitzpatrick

Date: 7/21/2021

Detector: 50 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2037	2036	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 156

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 48 Location A

SM4 Detector Deployment Data Sheet

Site Name: 48 B Project Name: 2021 Riverbed

Biologists: E. Merrill, R. Fitzpatrick Date: 7/17/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.21636 Longitude: -082.71203 UTC: -4

Site Description: edge of wooded lot and corn field

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 18 Microphone #: 71 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 267

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

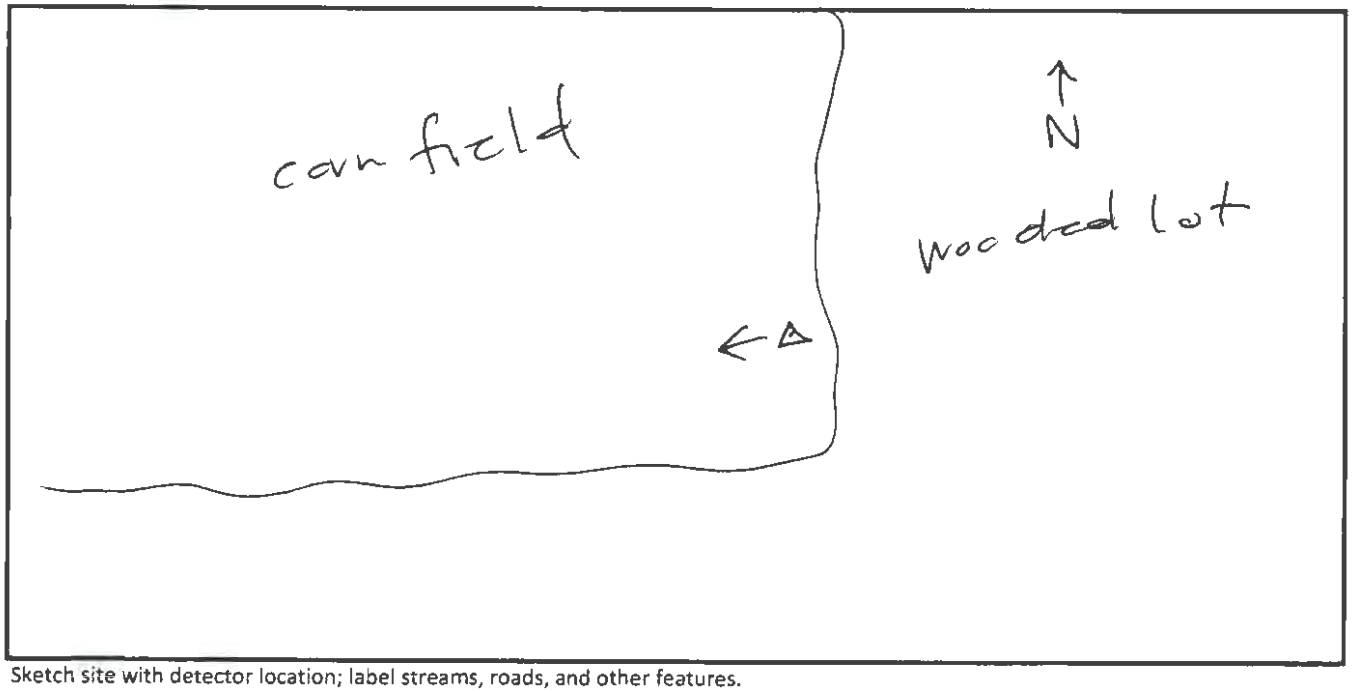
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 48 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 07/21/2021

Detector: 18 (circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/17/21	7/18/21	7/19/21	7/20/21		
Start time	2037	2036	2036	2035		
End time	0637	0638	0639	0640		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 155

Log file Present? Yes

Card ID: _____

Log file Present? _____

revised 6/2021

Site 48 Location B

SM4 Detector Deployment Data Sheet

Site Name: 49 A Project Name: 2021 Riverbend

Biologists: E. Mercill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.21045 Longitude: -082.77933 UTC: -4

Site Description: shooting along treeline adjacent to forested lot.

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 71 Microphone #: 49 Directional PVC present?: no

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 180

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

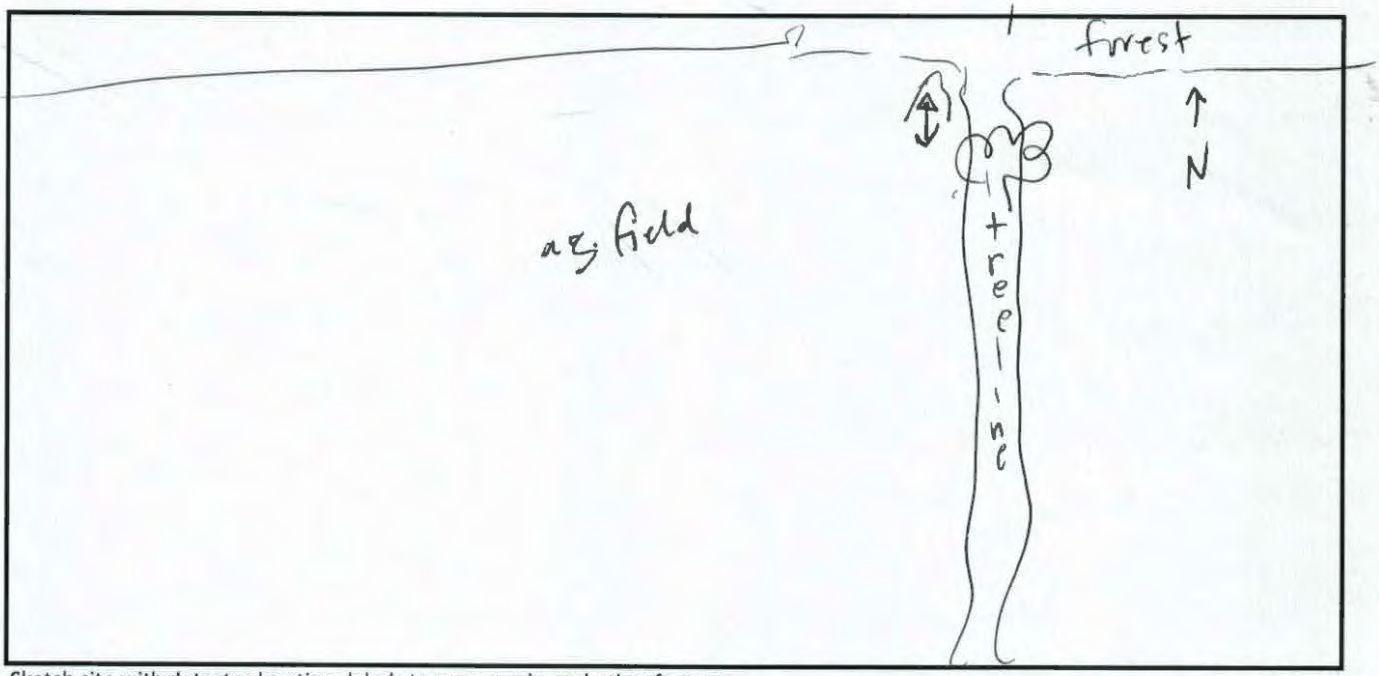
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (X) Site: (X) Mic orientation: (X)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 49 A

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 71
(circle one)

Detector Status: ON:Armed ON:Triggered OFF: Dead

Reason for OFF:

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2037	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y	Y		

Data download

Card ID: 203

Log file Present? Yes

Card ID:

Log file Present?

revised 6/2021

Site 49 Location A

SM4 Detector Deployment Data Sheet

Site Name: 49 B Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick Date: 7/18/21

Location Information:

State: Michigan County: Sanilac Datum/Format: NAD 83/D.D

Latitude: 43.20916 Longitude: -082.77919 UTC: -4

Site Description: edge of treeline and ag field, sheating towards drainage ditch/field edge

Habitat being sampled: Riparian (Field Edge) Open Field Bottomland Forest Upland Forest Pond Other
(circle one)

Deployment Information:

Detector #: 44 Microphone #: 75 Directional PVC present?: NO

Mic Height (m): 3 Mic Inclination: 0 Mic Azimuth: 190

User Profile/Settings:

WA SM4BAT FS SMM-U2
Firmware: 2.3.1

Samp. Freq: 384kHz
HP-Filter: On
Input Gain: 0 or (12) db
(circle one)

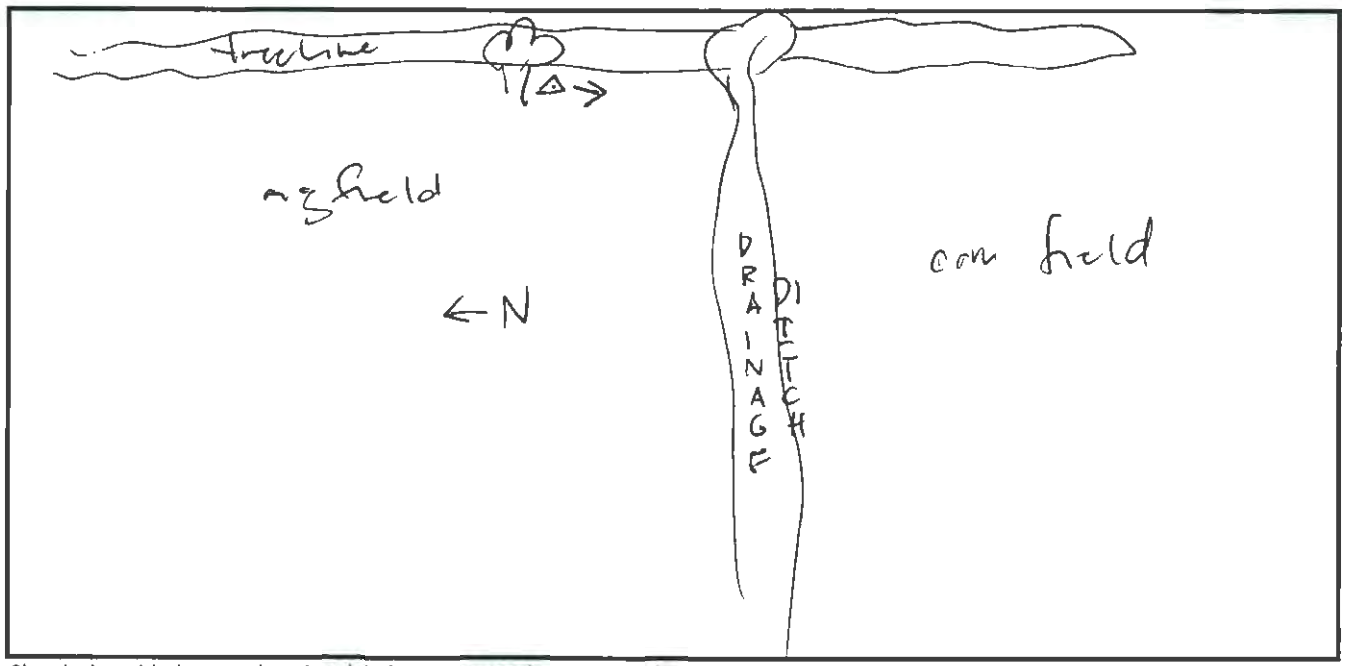
Min. Dur.: 1.5 ms
Max Dur.: none
Trig Freq: 16kHz

Trig. Level 12db
Trig. Window 3 sec
Max Length: 5 Sec

Comments:

Photos:

Detection area: (x) Site: (x) Mic orientation: (x)



Sketch site with detector location; label streams, roads, and other features.

Detector Pick-up Data Sheet

Site Name: 49 B

Project Name: 2021 Riverbend

Biologists: E. Merrill, R. Fitzpatrick

Date: 7/22/2021

Detector: 44
(circle one)

Detector Status: (ON:Armed) ON:Triggered OFF: Dead

Reason for OFF: —

Did detector location/orientation change? If so, how?: No

If detector has moved, been tampered with, knocked over, or changed orientation then take photos before picking up.

Weather conditions

*Weather data (source: NOAA) must be checked and entered below prior to pickup.

	Night 1	2	3	4	5	6
Date	7/18/21	7/19/21	7/20/21	7/21/21		
Start time	2037	2036	2035	2034		
End time	0639	0640	0641	0641		
Do any of the following conditions apply to the first 5 hours of sampling? (Y/N)						
Temp. below 10°C(50°F) ?	N	N	N	N		
>9m/h wind speeds?	N	N	N	N		
>30 min of precip./fog?	N	N	N	N		
*If YES to any of the conditions, resample the night.						
Was the night successful?	Y	Y	Y			

Data download

Card ID: 38

Log file Present? YES

Card ID: _____

Log file Present? _____

revised 6/2021

Site 49 Location B

Appendix D: Echolocation Call Review – Janet Tyburec

Janet Debelak Tyburec
Bat Survey Solutions, LLC
Cell/Text: (520) 404-7406
jtyburec@batsurveysolutions.com

7 September 2021

Echolocation Call Review

Myotis septentrionalis and M. sodalis AutoID Classifications

Results of Manual Vetting

An acoustic survey for bats was conducted in June/July 2021 in Michigan using Wildlife Acoustics full-spectrum bat detectors. The results of this survey included five (5) recordings at one site identified with an MLE for probable presence for the federally endangered Indiana myotis (*Myotis sodalis*) by the Wildlife Acoustics bat call classification program Kaleidoscope Pro. This software additionally identified four (4) recordings from two additional sites as probable for occurrence of the federally threatened northern long-eared myotis (*M. septentrionalis*). I have manually reviewed these nine (9) recordings and have determined none of them had any archetypical species characteristics for either of these species, nor for any *Myotis* species in general. ***No mitigation for either the federally endangered Indiana myotis or the federally threatened northern long-eared myotis is warranted from analysis of this acoustic survey.***

My manual review was conducted by viewing and playing the recordings using both the SonoBat and Kaleidoscope software programs. This revealed that eight (8) of the recordings were in fact either commuting, approach- or inspection-phase call sequences from *Lasiurus borealis* (eastern red bat). The one (1) remaining recording was a typical clutter- or edge-habitat echolocation call from *Eptesicus fuscus* (big brown bat). My file-level Manual Identification (ID) results for these nine (9) recordings appear in Table 1, and includes certain AutoID metrics generated by the KaleidoscopePRO (version 5.4.3) classification algorithm. Spectrographs for each recording, accompanied by a short narrative describing the reasons for over-ruling the computer-generated ID, appear in Figures 1-9. My review is based upon thirty years of experience recording bat echolocation, including work with all *Myotis* species in the eastern U.S. Please see the attached vitae for a summary of my qualifications to provide this type of opinion.

Table 1. File-level Results of KaleidoscopePRO AutoID and Manual Vetting

Files with a *Myotis septentrionalis*, northern long-eared myotis, AutoID

FILENAME	AUTO ID	PULSES	MATCH	RATIO	MANUAL ID	COMMENTS
S4U11109_20210630_035558	MYOSEP	5	3	0.6	LASBOR	approach-phase call type
S4U11101_20210630_040230	MYOSEP	4	2	0.5	LASBOR+LASBOR	two bats in file; approach-phase call type; low match ratio
S4U10922_20210717_025858	MYOSEP	4	2	0.5	LASBOR	approach-phase call type; low match ratio
S4U10922_20210718_232623	MYOSEP	5	2	0.4	EPTFUS	typical clutter- or edge-type search phase; diffuse echo; low match ratio

Files with a *Myotis sodalis*, Indiana myotis, AutoID

FILENAME	AUTO ID	PULSES	MATCH	RATIO	MANUAL ID	COMMENTS
S4U11087_20210719_211610	MYOSOD	10	1	0.1	LASBOR	approach-phase call type; very low match ratio
S4U11087_20210719_213045	MYOSOD	11	2	0.182	LASBOR	archetypical search-phase; very low match ratio
S4U11087_20210719_213335	MYOSOD	8	1	0.125	LASBOR	archetypical search-phase; very low match ratio
S4U11087_20210719_213407	MYOSOD	8	3	0.375	LASBOR	archetypical search-phase; very low match ratio
S4U11087_20210719_214509	MYOSOD	11	1	0.091	LASBOR+LowF	two bats in file; approach-phase call type; very low match ratio

NOTES: **AutoID** decisions generated by KaleidoscopePRO (v5.4.3); **Pulses** indicate the number of echolocation call pulses in the recording that contributed to the AutoID decision; **Match** indicates how many of the pulses in the recording that "matched" the AutoID decision; **Ratio** indicates the ratio of pulses matching the AutoID decision (in general, a match ratio greater than or equal to 0.66 and for at least 8 "matching" pulses is considered to be a "confident" AutoID decision; match ratios less than that are equivalent to a "flip of a coin" between other AutoID decisions at the pulse level); **Comments** include reasons for rejecting the AutoID decision

AUTOID'D *MYOTIS SEPTENTRIONALIS*, NORTHERN LONG-EARED MYOTIS (MYOSEP) RECORDINGS

Figure 1. *Lasiurus borealis* (LASBOR, eastern red bat), approach-phase call sequence.

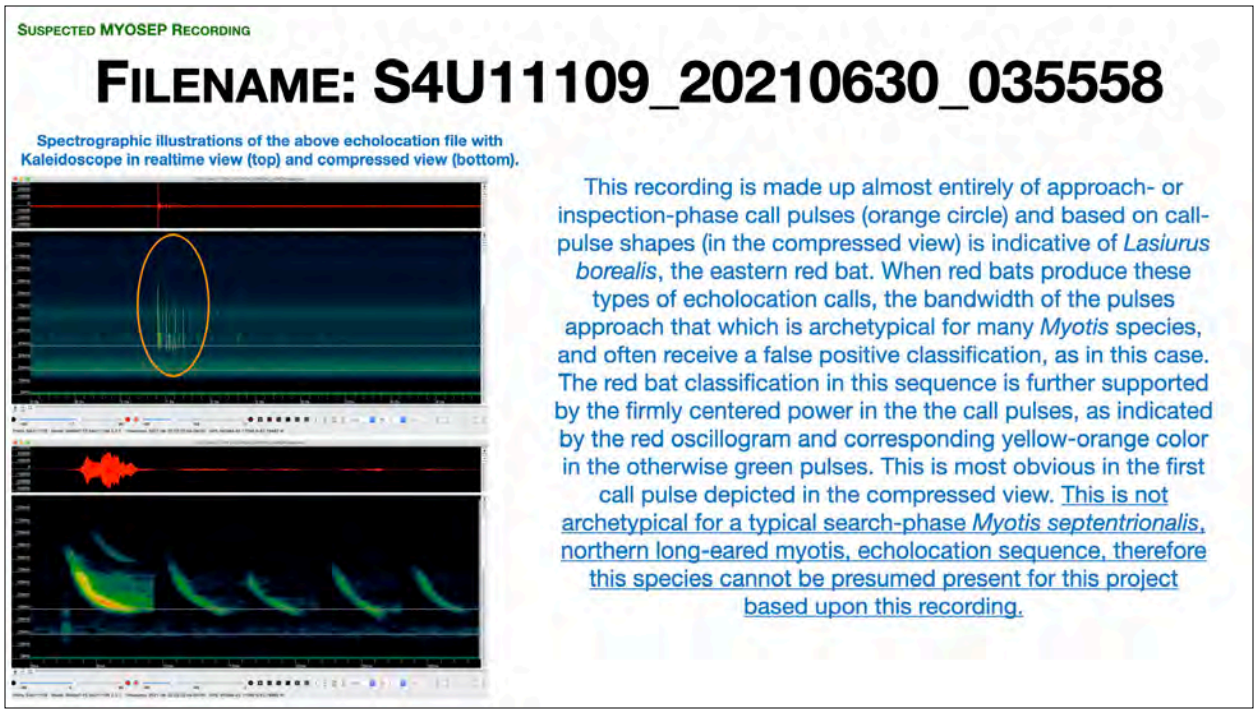


Figure 2. Two *Lasiurus borealis* (LASBOR, eastern red bat), approach-phase call sequences.

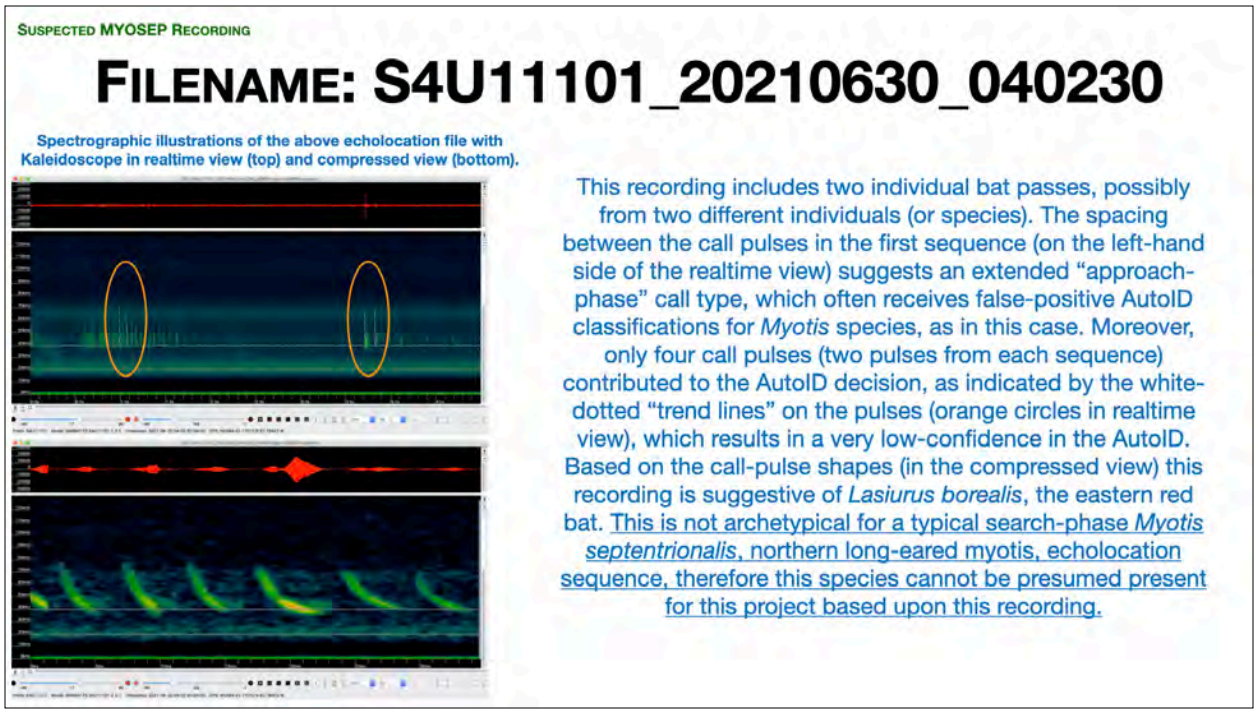


Figure 3. *Lasiurus borealis* (LASBOR, eastern red bat), approach-phase call sequence.

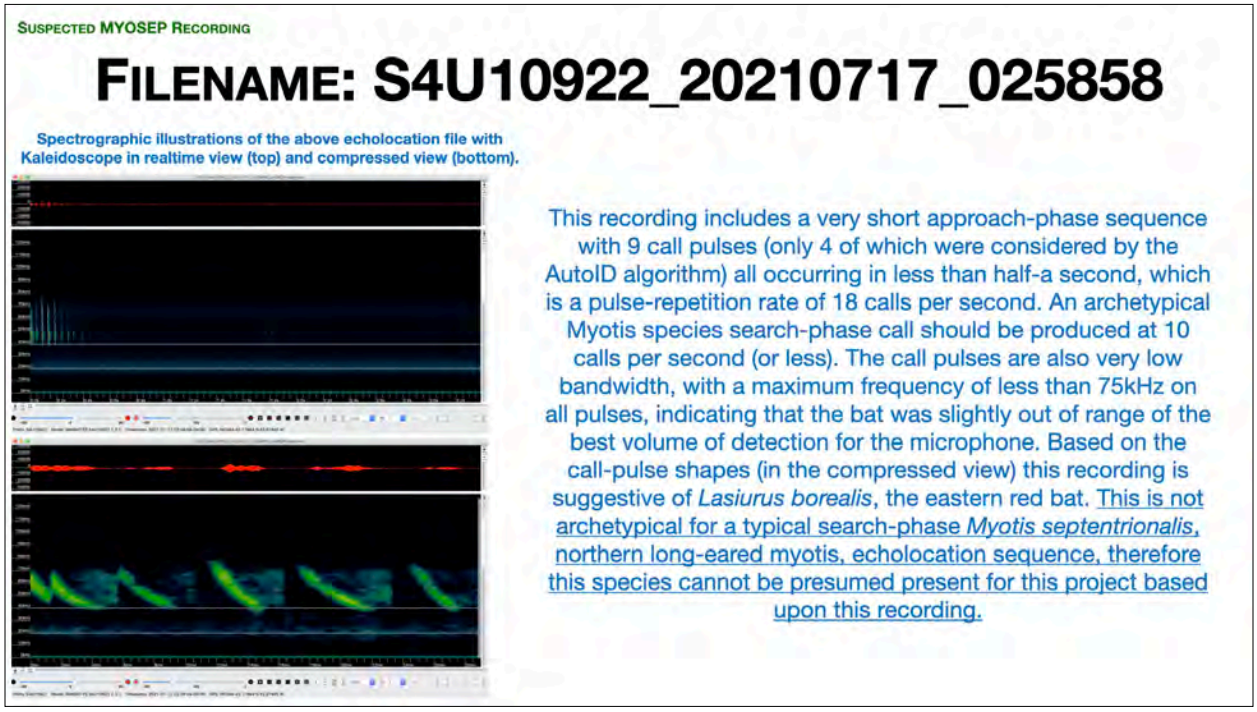
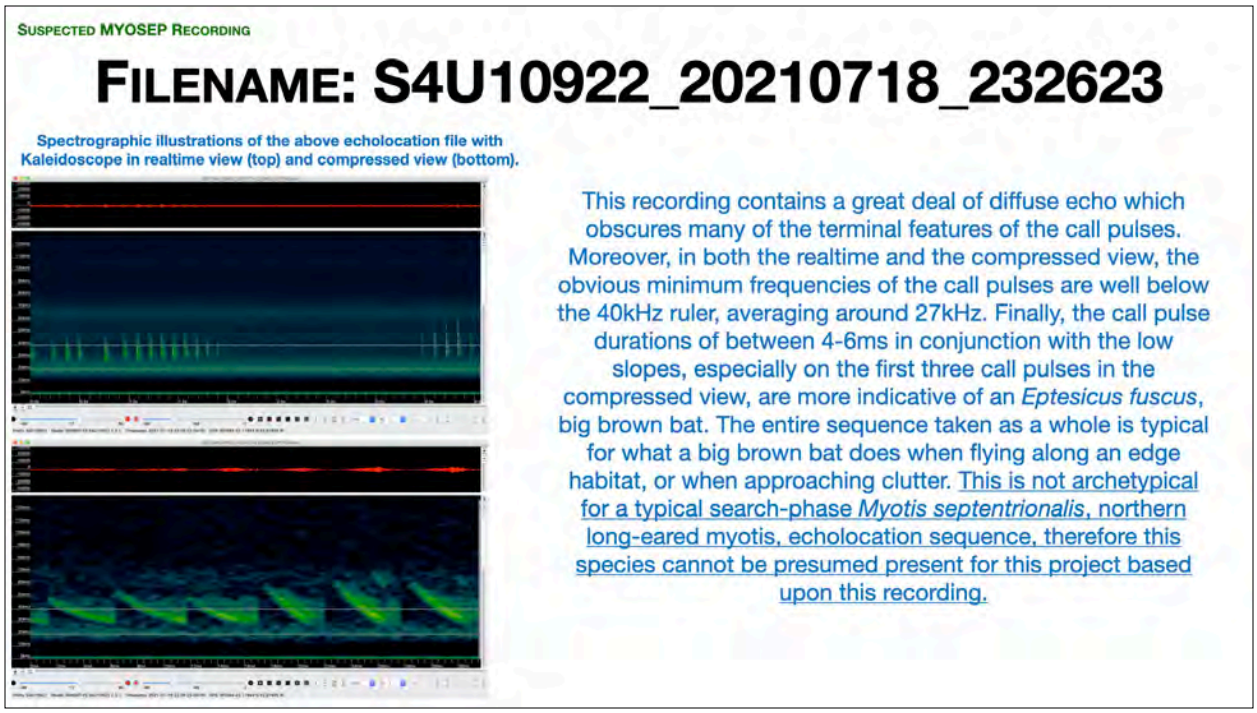


Figure 4. *Eptesicus fuscus* (EPTFUS, big brown bat), archetypical edge/clutter sequence.



AUTOID'D *MYOTIS SODALIS*, INDIANA MYOTIS (MYOSOD) RECORDINGS

Figure 5. *Lasiurus borealis* (LASBOR, eastern red bat), approach-phase call sequence.

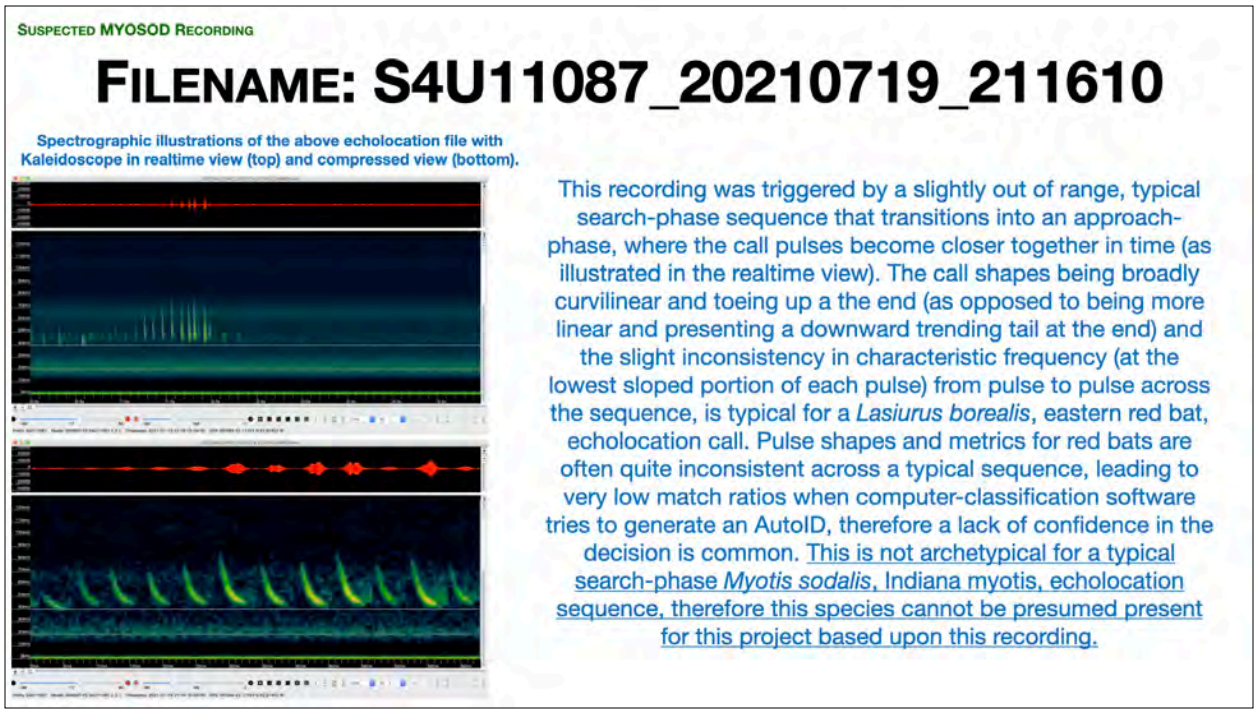


Figure 6. *Lasiurus borealis* (LASBOR, eastern red bat), archetypical search-phase call sequence.

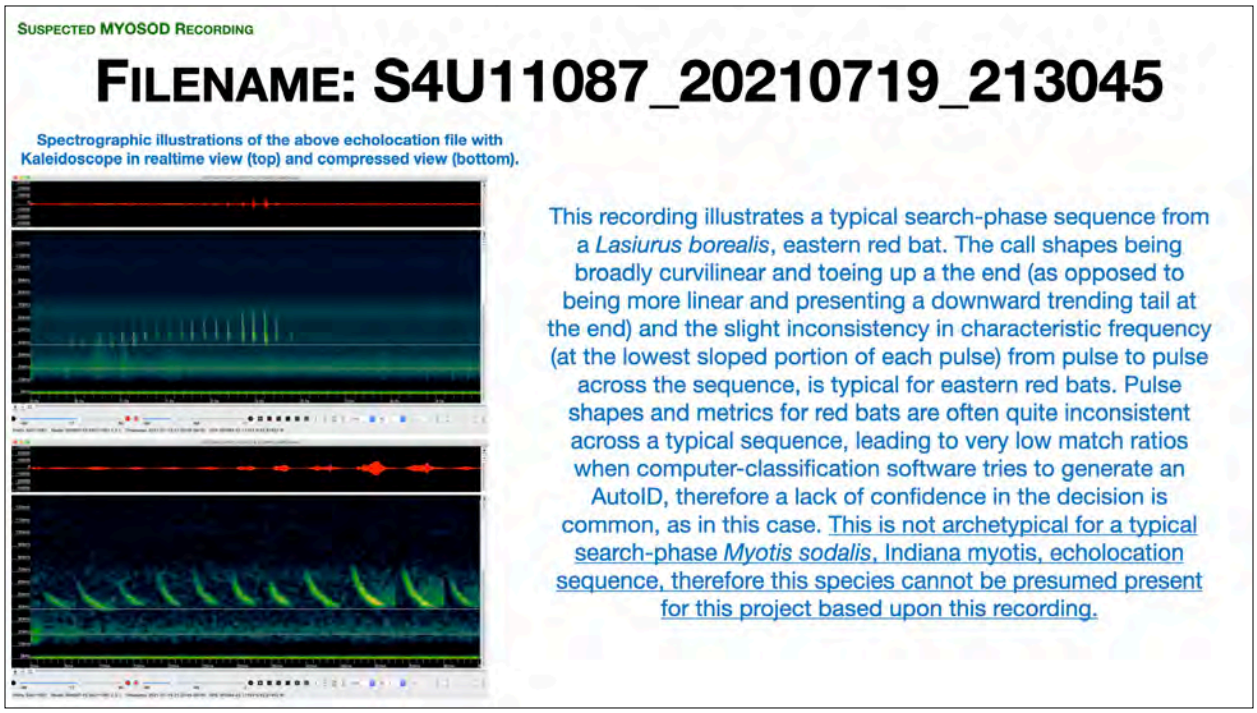


Figure 7. *Lasiurus borealis* (LASBOR, eastern red bat), archetypical search-phase call sequence.

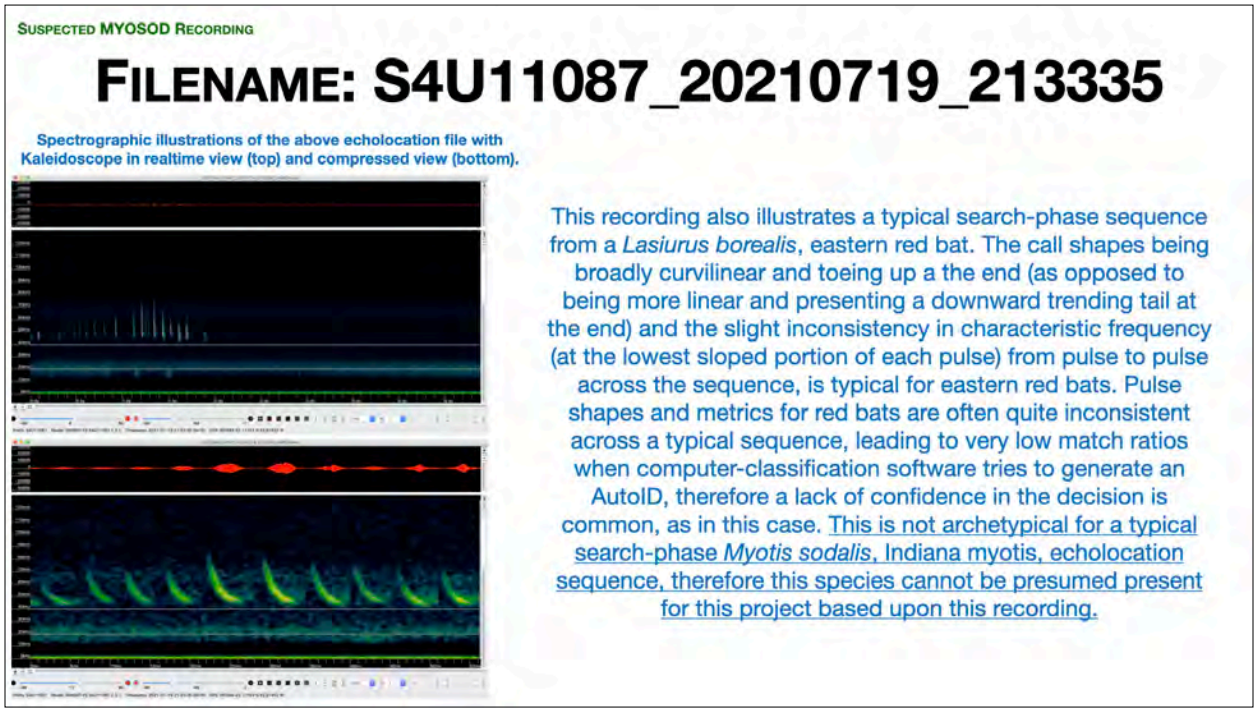


Figure 8. *Lasiurus borealis* (LASBOR, eastern red bat), archetypical search-phase call sequence.

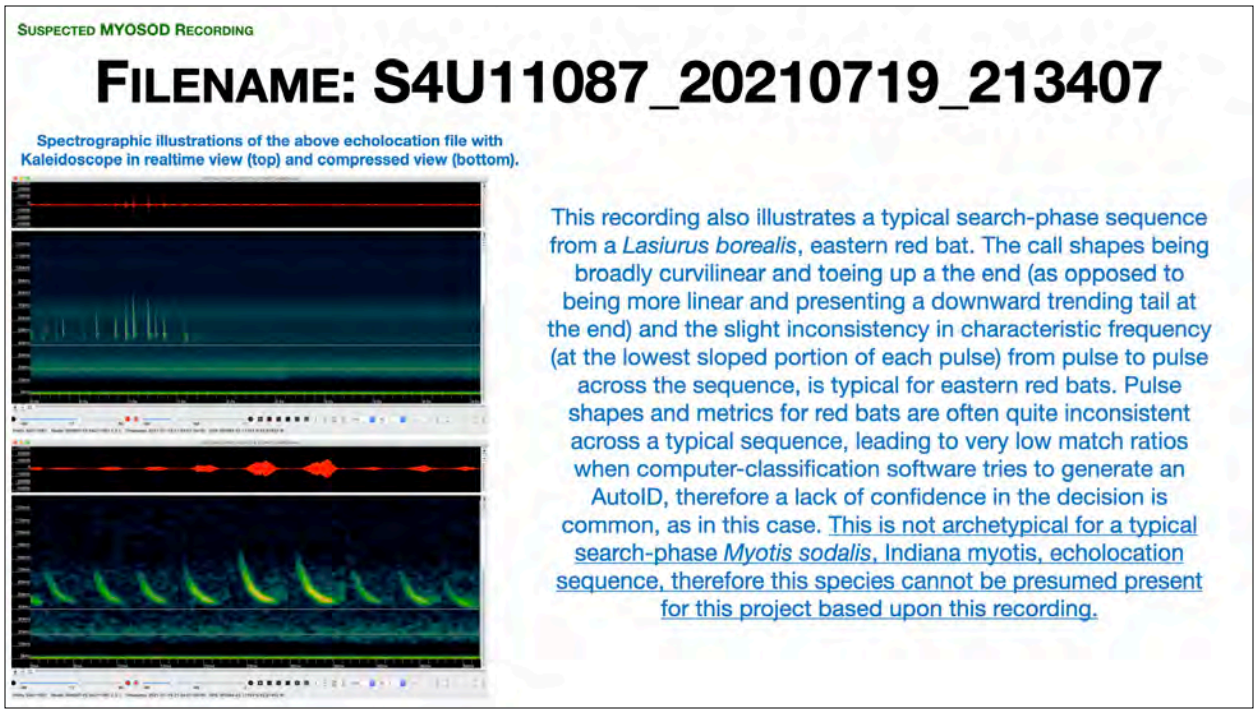
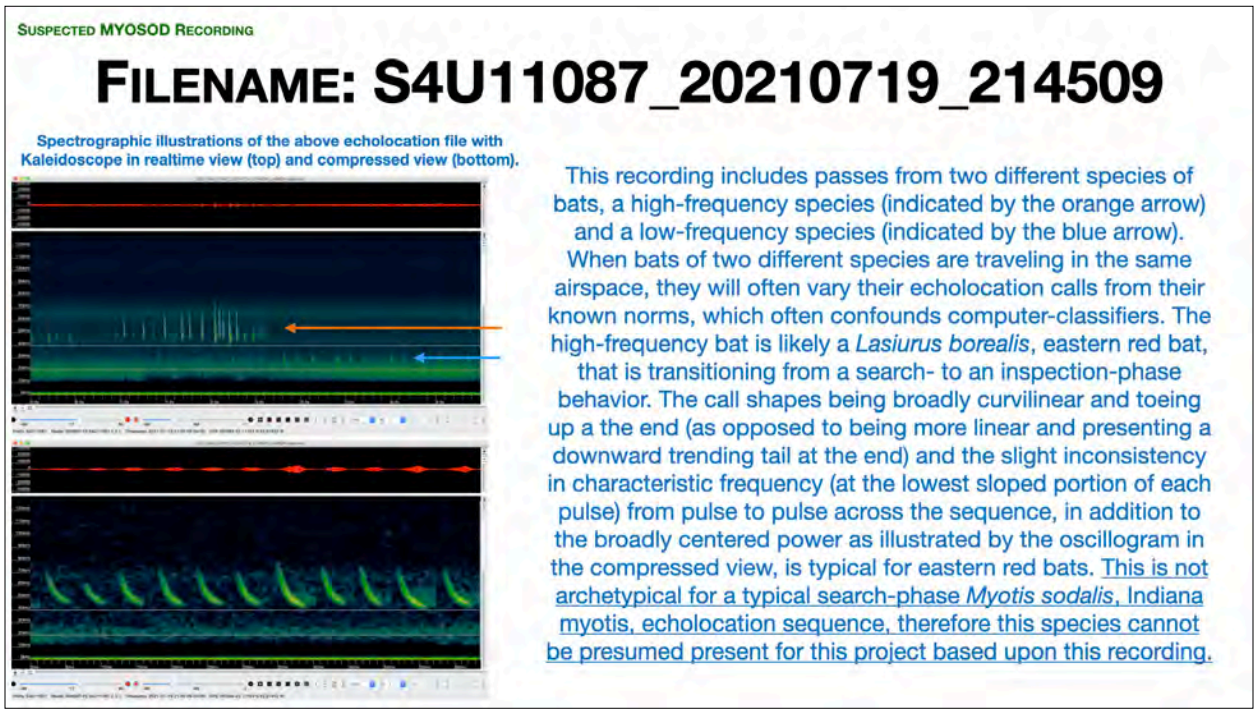


Figure 9. Two bats in file: *Lasiurus borealis* (LASBOR, eastern red bat) and unknown low-frequency bat.



WETLAND DELINEATION REPORT

RIVERBEND WIND PROJECT

Prepared for

Algonquin Power, LLC
Ms. Gabriella Kovacs
345 Davis Road
Oakville, ON L6J 2X1

Atwell Project No. 21003645

Submitted by Atwell, LLC

August 31, 2022

EXECUTIVE SUMMARY

Atwell, LLC (Atwell) was contracted by Algonquin Power (Riverbend Wind), LLC to complete a wetland delineation and drainage review for the proposed Riverbend Wind Project (hereafter referred to as the "Environmental Study Area"). Riverbend Wind is proposing a wind energy facility within Sanilac County, located within the Lower Peninsula of Michigan. The Environmental Study Area spans approximately 44,523 acres, while the survey corridor used for field studies (hereafter referred to as the "Project Survey Corridor") is approximately 3,847 acres in size.

Atwell conducted a desktop review of aerial photographs, topographic maps, wetland inventory maps, floodplain maps, and county soil surveys for the Environmental Study Area. The desktop review was followed by on-site wetland delineations conducted on the following dates: December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. Atwell conducted on-site and desktop assessments within the areas targeted for development within the Environmental Study Area. The following summarizes Atwell's findings for the Environmental Study Area, which are intended to be taken in context with the complete report and should not be used as a separate document.

Existing land use within the Environmental Study Area consists of cultivated agricultural fields, farmsteads, pasture, fallow field, and rural residences within a network of agricultural drains and roadside ditches that are prevalent throughout the landscape. Forested areas, wetlands, and watercourses are also prevalent.

Atwell biologists delineated 70 wetlands and 196 watercourses within the Environmental Study Area. A wetland is considered regulated by Michigan Department of Environment, Great Lakes, and Energy (EGLE) if it is five acres in size or larger, and/or if it is connected to or located within 500 feet of a lake, pond, river, or stream. It is Atwell's professional opinion that 57 of the identified wetlands meet the requirements of Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 (NREPA), and should fall under the jurisdiction of EGLE. A Part 303 permit is required for temporary or permanent work within a regulated wetland (e.g. filling, dredging, construction, timber matting, etc.).

The 196 watercourses observed possess a defined bed, banks, and evidence of continued flow or continued occurrence of water. Therefore, these features are anticipated to be regulated by EGLE under Part 301, Inland Lakes and Streams, of the NREPA. A Part 301 permit is required for temporary or permanent work within a regulated watercourse (e.g. filling, dredging, construction, bridges, culverts, etc.).

Additionally, Atwell conducted a desktop delineation for unsurveyed areas within the Project Survey Corridor and identified 27 wetlands and 45 watercourses. Field surveys will need to be conducted to confirm the location, composition, and regulation status.

Part 31, Water Resources Protection, of the NREPA regulates activities within the 100-year floodplain and floodway of a river, stream, or drain, and within the floodplain of any watercourse with an upstream drainage area of two square miles or larger. A Part 31 permit is required for construction within a regulated floodplain or floodway, including, but not limited to, installation of bridges and culverts. Atwell's review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for Sanilac County indicates there are no FEMA mapped 100-year floodplains within the Environmental Study Area. Based upon Atwell's desktop drainage review, state regulated floodplains may be associated with 10 watercourses.

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APPENDICES

ACRONYMS AND ABBREVIATIONS

Atwell	Atwell, LLC
BFEs	Base Flood Elevations
EGLE	Michigan Department of Environment, Great Lakes, and Energy
FAC	facultative
FACU	facultative-upland
FACW	facultative-wetland
FEMA	Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
NRCS	Natural Resources Conservation Service
NREPA	Natural Resources and Environmental Protection Act, 1994 PA 451
NWI	National Wetland Inventory
OBL	obligate
OW	open water
PEM	palustrine emergent wetland
PSS	palustrine scrub-shrub wetland
PFO	palustrine forested wetland
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U. S. Geological Service

1 INTRODUCTION

Atwell, LLC (Atwell) was contracted by Algonquin Power (Riverbend Wind), LLC to complete a wetland delineation and desktop-level review for approximately 44,523 acres of the proposed Riverbend Wind Project (hereafter referred to as the "Environmental Study Area"). Riverbend Wind is proposing a wind energy facility within Sanilac County, located within the Lower Peninsula of Michigan. Refer to **Figure 1 – Site Location Map**.

Riverbend Wind proposes to build a wind energy facility that will involve the construction of various wind turbine locations and associated infrastructure including but not limited to permanent access roads, an underground electric collection line system, substation, temporary laydown yard, a temporary haul route, overhead transmission line, and a crane walk.

Atwell's evaluation of the Environmental Study Area focused on targeted areas for development to identify environmental features such as potentially regulated wetlands, watercourses, bodies of water and floodplains. The Environmental Study Area included areas identified through the desktop review as well as on-site identification.

In general, wetlands in Michigan fall under the jurisdiction of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) by Part 303, Wetlands Protection, of the *Natural Resources and Environmental Protection Act, 1994 PA 451 (NREPA)* as amended, and/or the U.S. Army Corps of Engineers (USACE). Watercourses that meet the requirements of Part 301, Inland Lakes and Streams, of the NREPA, and floodplains that meet the requirements of Part 31, Water Resources Protection, of the NREPA, fall under the jurisdiction of the EGLE. USACE wetland participating authority is often associated with the Great Lakes and their connecting navigable waterways (e.g., Section 10 waters) and is authorized by Section 404 of the *Federal Water Pollution Control Act of 1972 (*i.e. Clean Water Act*)*. Although the EGLE administers Section 404 of the Clean Water Act, the U.S. Environmental Protection Agency (USEPA) maintains oversight of projects that surpass established criteria. When a project requires federal oversight, the EGLE forwards the permit application to federal agencies such as the USEPA, USACE, and the U.S. Fish and Wildlife Service (USFWS). EGLE does not typically issue permits for projects objected by the USEPA unless specific concerns are resolved.

This report summarizes the natural features found within the Environmental Study Area targeted for development of the proposed facility and associated permits or clearance that may be required prior to the commencement of project activities.

2 SITE DESCRIPTION

The Environmental Study Area spans approximately 44,523 acres in Sanilac County, and is approximately 1.5 miles north of Yale, in the Lower Peninsula of Michigan. The land use within the Environmental Study Area consists primarily of cropland, along with some fallow fields, gravel and paved roads, roadside ditches, overhead distribution lines, and railroad tracks. The Environmental Study Area also contains scattered woodlots, wooded hedgerows, wetlands, and watercourses. Existing development within the Environmental Study Area is largely rural. The topography of the region and the Environmental Study Area is relatively flat to gently rolling, with elevations ranging between approximately 736 feet and 910 feet above sea level. Refer to **Figures 1 and 2**.

Specifically, the Environmental Study Area is located in:

SANILAC COUNTY

Speaker Township:	**Fremont Township:**
Township 09 North, 14 East	Township 09 North, 15 East
Sections 1, 2, 4, 5, 7-10, 12-15, 18, 19, 23-26	Sections 1, 2, 6, 7, 9-31, 33-36

3 METHODS

Atwell completed a preliminary desktop review of existing background information for the Environmental Study Area. An extensive review of current and historical background documentation included aerial photographs, U. S. Geological Service (USGS) topographic maps, National Wetland Inventory (NWI) maps, county soil surveys, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs). This approach is effective for evaluating broader-scale wetland and watercourse systems and identifying potential natural resource constraints prior to on-site assessments to help with project design and reducing and eliminating impacts. The results of this desktop review were used to focus field efforts on regulated or protected natural resources that are likely to occur within the Environmental Study Area. Refer to **Figures 1-7**.

On-site surveys, including wetland delineations and watercourse documentations were then conducted to locate, verify, or ascertain the probability that protected natural resources were located within the Environmental Study Area. Atwell's knowledge of landscape characteristics, plant identification skills, and desktop review allowed for valid and effective wetland delineations.

3.1 AERIAL PHOTOGRAPH REVIEW

Atwell utilized available Google Earth aerial imagery dated 1985 through 2019 to guide field efforts and outline land cover characteristics within the Environmental Study Area.

3.2 USGS TOPOGRAPHIC REVIEW

The USGS 7.5-minute series Topographic Quadrangles for Brown City, Yale, and Roseburg were reviewed for overall topography, natural features, and additional characteristics of the Environmental Study Area. Refer to **Figure 1 - Site Location Map**.

3.3 WETLAND INVENTORY MAP REVIEW

A review of the NWI maps for Sanilac County was conducted to determine the likely presence, location, size, and type of wetlands that may be located within the Environmental Study Area. The USFWS produces NWI maps through aerial photographic interpretation. Refer to **Figure 2 – Water Resources Map.**

3.4 COUNTY SOIL SURVEY MAP

The U. S. Department of Agriculture Natural Resources Conservation Service (NRCS) soil data for Sanilac County was reviewed to obtain an overall sense of the soil types likely to be observed within the Environmental Study Area. Refer to **Figure 3 - County Soil Survey Maps**.

3.5 FLOODPLAIN MAP REVIEW

FEMA FIRMs are maps that show floodplain areas along rivers and their tributaries. The maps record the following data: 100-year floodplains (1% chance of annual flooding) and 500-year floodplains (0.2% annual chance of flooding), the base flood elevation, and the risk to premium areas developed across a floodplain. A review of the FEMA FIRMs for Sanilac County was conducted to determine the existence, location, and zone of any 100-year floodplain that may be located within the Environmental Study Area. Atwell also performed a preliminary desktop drainage review to determine if state regulated floodplains are present within the Project Area. Refer to **Figure 4 – FEMA Floodplain Map** and **Figure 5 – Drainage Review Map**.

3.6 ON-SITE LANDSCAPE ASSESSMENT

An on-site assessment of the Environmental Study Area was conducted to ascertain and verify landscape and land use characteristics. Atwell staff inspected the Environmental Study Area, noting primary and overall land use types, topography, and land cover types. These were compared with topographic map and aerial photographic reviews. Potential environmental challenges or regulatory requirements were noted, if encountered.

3.7 ON-SITE WETLAND ASSESSMENT

Wetlands were identified and delineated utilizing methods prescribed by the USACE 1987 Wetland Delineation Manual and the Regional Supplement to the USACE Wetland Delineation Manual: Northcentral and Northeast Region (USACE 1987; USACE 2012). The delineation of any wetland depends on three basic, interrelated parameters. These parameters are: (1) the presence of hydrophytic vegetation (plants adapted to living in saturated soils), (2) hydric soils (distinctive soil types that develop under saturated conditions), and (3) wetland hydrology (the presence of water at or near the surface for a specific period of time). Wetland boundaries were recorded with a sub-meter GPS unit, which provides a spatial error of less than one meter.

3.8 ON-SITE WATERCOURSE ASSESSMENT

EGLE regulated watercourses were identified and recorded based upon stream morphological characteristics, including (1) the presence of a defined bed, (2) the presence of defined banks, and (3) evidence of continued flow or continued occurrence of water.

3.9 DESKTOP WETLAND AND WATERCOURSE ASSESSMENT

Atwell completed a desktop assessment of additional areas nearby for potential future inclusion in the Environmental Study Area. Google earth aerial interpretation, results of on-site wetland determinations, as well as Sanilac County soil data, NWI, and NHD maps were utilized to

determine whether wetlands and watercourses may be present. Refer to **Figure 7 – Wetland Location Map**.

4 RESULTS, FINDINGS, AND DISCUSSION

Atwell conducted on-site assessments of the Project Survey Corridor on the following dates: December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. Representative photographs depicting conditions at the time of the site visits are provided in the Photographic Log in **Appendix A**.

4.1 OVERALL LANDSCAPE AND TOPOGRAPHY

The USGS 7.5-minute series Topographic Quadrangles for Brown City, Yale, and Roseburg, Michigan indicate that elevations within the Environmental Study Area range between approximately 736 feet and 910 feet above mean sea level. The topography of the Environmental Study Area is relatively flat to gently rolling. Land use within the Environmental Study Area consists primarily of cropland and a network of associated agricultural drains and roadside ditches. Existing development within the Environmental Study Area is largely rural residential. There are isolated patches of woodlots in the Environmental Study Area, along with a network of linear wetlands and watercourses. The Environmental Study Area includes numerous gravel and paved roadways that are spread relatively evenly across the entire Environmental Study Area, which allows for easy vehicle access. Railroad tracks are present in the Environmental Study Area as well as existing overhead transmission distribution lines. Nearby towns located outside of the Environmental Study Area include Yale to the south, Croswell to the northeast, and Brown City to the west. Refer to **Figure 1 - Site Location Map**.

The NRCS soil data for Sanilac County indicate that a number of different major soil series are present within the Environmental Study Area. The soils documented as hydric by the NRCS are depicted on the soil survey maps for Sanilac County. Hydric soils are conducive to the growth of hydrophytic (i.e., wetland) vegetation as a result of their tendency to be wet for extended periods of time (NRCS 2014). The presence of poorly drained and hydric soils suggest wetlands may be present within the Environmental Study Area. The composition of soils within the Environmental Study Area indicates that, historically, wetlands may have been abundant in the region. As a result of agricultural development, natural wetlands have become less prevalent over time. Refer to **Figure 3 - County Soil Survey Map**.

The on-site assessment revealed that the overall topography within the Environmental Study Area is largely an agricultural landscape with scattered rural residences, woodlots, wooded hedgerows, scrub/shrub areas, fallow herbaceous areas, wetlands, watercourses. Descriptions of each general land cover type within and adjacent to the Environmental Study Area are described below.

4.2 AGRICULTURAL FIELDS/RURAL RESIDENCES

The Environmental Study Area consists primarily of agricultural land. During the on-site assessments agricultural lands consisted of planted and recently harvested fields including, but not limited to, corn (*Zea mays*), soybeans (*Glycine max*), wheat (*Triticum aestivum*), sugar beets (*Beta vulgaris*), and fescue (*Festuca spp*.). Agricultural drains, upland ditches, and hedgerows commonly border and separate individual fields. In addition, rural residences, farmsteads, and associated lawn areas are spread throughout the Environmental Study Area and are often located near roads on agricultural properties or on smaller lots adjacent to agricultural lands.

4.3 OTHER UPLANDS

The upland areas within the Environmental Study Area are a mix of agricultural, fallow, and forested land. Upland areas also include actively maintained utility corridors, hedgerows, ditches, swales, and stream and field margins. Some of the more common herbaceous species in the upland areas such include Kentucky blue grass (*Poa pratensis*), yellow foxtail (*Setaria pumila*), penny-cress (*Thlaspi arvense*), garlic mustard (*Alliaria petiolata*), hairy bittercress (*Cardamine hirsuta*), spring draba (*Draba verna*), and black mustard (*Brassica nigra*). Common upland shrubs and brambles include autumn olive (*Elaeagnus umbellata*), common buckthorn (*Rhamnus cathartica*), gray dogwood *(Cornus racemosa),* and honeysuckle (*Lonicera spp.*). Common upland trees observed include white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*), scotch pine (*Pinus sylvestris*), white pine (*Pinus strobus*), red maple (*Acer rubrum*), red pine (*Pinus resinosa*), and bur oak (*Quercus macrocarpa*).

4.4 WETLANDS, WATERCOURSES, AND FLOODPLAINS

A total of 70 wetlands and 196 watercourses were documented within the Project Survey Corridor. Of the 70 wetlands, 17 are considered entirely emergent, seven are considered emergent with scrub-shrub components, four are considered emergent with forested components, seven are considered entirely scrub-shrub, two are considered scrub-shrub with forested components, 25 are considered entirely forested, two are considered emergent with scrub-shrub and forested components, and six are considered open water. Of the documented wetlands, 57 features appear to meet the requirements of Part 303, Wetlands Protection, of the NREPA, 1994 PA 451, as amended, and are therefore anticipated to fall under the jurisdiction of EGLE. A wetland is considered regulated by EGLE under Part 303, Wetlands Protection, of the NREPA, as amended, if it is five acres in size or larger, and/or if it is connected to, or located within, 500 ft of a lake, pond, river, or stream. The State definition of a lake, pond, river, and stream is found in Parts 301 and 303 of PA 631 of Public Acts of 2018, amending NREPA, 1994 PA 451.

All 196 watercourses identified possess a defined bed, bank, and evidence of continued flow and/or continued occurrence of water and therefore meet the requirements of Part 301, Inland Lakes and Streams, of the NREPA, as amended. Refer to **Table 1 – Wetland, Watercourse, and Waterbody Summary Table**, **Figure 7 - Wetland Location Map,** and the Wetland Determination Forms in **Appendix B**.

4.4.1 EMERGENT WETLANDS

Palustrine emergent (PEM) wetlands were a common wetland type within the Project Survey Corridor due to the agricultural landscape, network of roads and ditches, and maintained conditions of the existing transmission corridor. Of the 70 wetlands, 17 were classified as entirely emergent (Wetlands BB5, C3, DD1, DD2, DD5, EE2, F3, F4, II3, T1-T3, T5, T8, & W1-W3), and an additional 13 wetlands contain emergent components (Wetlands BB2-BB4, F1, F2, F5, H1, L1, M1, P1, P3, T4 & T6). PEM wetlands were observed in various places such as active farm fields, pasture, fallow areas, and riparian areas. Common vegetation observed within the wetlands includes reed canary grass (*Phalaris arundinacea*; FACW), Indian hemp (*Apocynum cannabnum*; FAC), crested sedge (*Carex cristatella*; FACW), giant goldenrod (*Solidago gigantea*; FACW), dark green bulrush (*Scirpus atrovirens*; OBL), willowherb (*Epilobium ciliatum*; FACW), lakebank sedge (*Carex lacustris*; OBL), Canada bluejoint grass (*Calamagrostis canadensis*; OBL), and sensitive fern (*Onoclea sensibilis*; FACW). Common wetland hydrologic indicators observed within the emergent wetlands include surface water, surface saturation, high water table, sparsely vegetated concave surface, drainage patterns, algal mat, saturation visible on aerial imagery, stunted plants, geomorphic position, and FAC-Neutral test. Common hydric soil indicators observed include depleted below dark surface, depleted matrix, and redox dark surface.

For wetland specific vegetation and indicators, refer to the Wetland Determination Forms in **Appendix B**.

4.4.2 SCRUB-SHRUB WETLANDS

Of the 70 wetlands delineated, seven wetlands were classified as entirely Palustrine scrub-shrub (PSS) (Wetlands DD3, DD7, EE1, HH2, HH4, P2 & T7), and an additional 11 wetlands contain scrub-shrub components (Wetlands B2, BB2-BB4, F1 F5, II2, M1, P1, T4 & T6). Scrub-shrub wetlands tend to have species compositions very similar to emergent wetlands, except with a higher density of shrubs and woody vegetation. Common vegetation observed within the wetlands includes sandbar willow (*Salix interior*; FACW), grey dogwood (FAC), buttonbush (*Cephalanthus occidentalis*; OBL), common buckthorn (FAC), and green ash saplings (*Fraxinus pennsylvanica*; FACW). Common wetland hydrologic indicators observed within the wetlands include surface water, surface saturation, water-stained leaves, geomorphic position, FAC-Neutral test, high

water table, and crayfish burrows. Common hydric soil indicators observed include depleted matrix, redox dark surface, and loamy mucky mineral.

For wetland specific vegetation and indicators, refer to the Wetland Determination Forms in **Appendix B**.

4.4.3 FORESTED WETLANDS

Of the 70 wetlands delineated, 25 wetlands were classified as entirely Palustrine forested (PFO) (Wetlands A1, A2, B1, C1, C2, C4, CC1, DD4, FF1, FF2, GG1, HH1, HH3, II4, J1-J3, K1, M2, N1, R1, R2, S1, U1 & Y1), and an additional eight wetlands contain forested components (Wetlands B2, BB4, F1, F2, H1, II2, L1 & P3). Palustrine forested wetlands tended to have species compositions very similar to the delineated PEM and PSS wetlands, except with a higher density of trees. The most commonly encountered woody species in PFO wetlands included green ash, cottonwood (*Populus deltoides;* FAC), box elder maple (*Acer negundo*; FAC), red maple (*Acer rubrum*; FAC), silver maple (*Acer saccharinum*; FACW), quaking aspen (*Populus tremuloides*; FACU), swamp white oak (*Quercus bicolor*; FACW), and pin oak (*Quercus palustris*; FACW). Common wetland hydrologic indicators observed within the wetlands include surface saturation, drainage patterns, water-stained leaves, geomorphic position, and FAC-Neutral test. Common hydric soil indicators observed include depleted matrix, redox dark surface, and redox depressions.

For wetland specific vegetation and indicators, refer to the Wetland Determination Forms in **Appendix B**.

4.4.4 OPEN WATER WETLANDS

Of the 70 delineated wetlands, six were classified as open water (OW) (Wetlands BB1, DD6, DD8, DD9, FF3 & II2). OW wetlands observed within the Project Survey Corridor had minimal vegetation and surface water totaling less than one acre. These wetlands often also had PEM and PSS fringe. Emergent vegetation that was observed included sensitive fern, broadleaf cattail (*Typha latifolia*; OBL), and reed canary grass. Scrub-shrub vegetation that was observed included sandbar willow, grey dogwood, musclewood (*Carpinus caroliniana*; FAC). Common wetland hydrologic indicators observed within the wetlands include surface water, surface saturation, high water table, geomorphic position, inundation visible on aerial imagery, FAC-Neutral test, water-stained leaves, moss trim lines, stunted or stressed plants, and sparsely vegetated concave surface. Common hydric soil indicators observed include depleted matrix, sandy mucky mineral, loamy mucky mineral, histosol, and 2 cm muck.

4.4.5 DESKTOP DELINEATED WETLANDS AND WATERCOURSES

At this time, field work has not been conducted within some portions of the Environmental Survey Area. These areas have been desktop delineated and will be revisited at a later date prior to EGLE submission. Within these additional areas, Atwell identified 27 wetlands and 45 watercourses. Field surveys will need to be conducted to confirm the location, composition, and regulation status.

4.4.6 WATERCOURSES, LAKES, AND PONDS

Watercourses were identified based upon stream morphological characteristics such as presence of a defined bed, banks, and evidence of continued flow or continued occurrence of water. The Project Survey Corridor contains 196 watercourses including crossings of the following named watercourses: Turner Drain, McIntyre & Willing Drain, William Doan Drain, Sheridan Drain, Lawson Drain, Downey Drain, Seymore Creek, Conroy & Ferriby Drain, Willey Drain, Lavell Drain, Black Creek Drain, Rector Drain, Sloat Drain, Potts Drain, Lord Drain, Cline and Kerr Drain, Cork Drain, Solan Drain, Macklem Drain, East Branch Speaker & Maple Drain, Rattray Drain, Wilson Drain, Spring Creek, Hunt Drain, Jackson Creek, Putney Drain, Sanilac and St. Clair Drain, Cole Drain, and 75 unnamed watercourses. The majority of these watercourses are roadside ditches and/or drains created or altered to expedite drainage for agriculture, and generally separate and border agricultural fields. Most of the features were intermittent in nature, 68 were considered perennial with constantly flowing water, and 15 were considered ephemeral. All 196 watercourses are likely regulated under Part 301, Inland Lakes and Streams, of the NREPA, as amended because they display a definitive bed and bank with a regular occurrence of flow. No lakes or ponds were observed within the Project Survey Corridor. Refer to the **Table 1 -Wetland and Watercourse Summary Table** and **Figure 7 - Wetland Location Map** for approximate watercourse locations.

4.4.7 FLOODPLAINS

FEMA FIRMs for Sanilac County were reviewed to determine if portions of the Project Survey Corridor lie within mapped floodplains, floodways, or other flood prone areas. According to FEMA FIRM Panels #26151C0567B, #26151C0557B, #26151C0575B, #26151C0559B, #26151C0560B, #26151C0525B, #26151C0550B, #26151C0425B, and #26151C0570B, FEMA mapped 100-year floodplains were not mapped within the Project Survey Corridor.

A preliminary desktop drainage review was conducted to determine if watercourses with an upstream drainage area of greater than two square miles were present within the Environmental Study area; indicating the presence of a potentially state regulated floodplain. Based on Atwell's preliminary desktop drainage review, there are 10 watercourses with upstream drainage areas larger than two square miles within the Project Survey Corridor: Macklem Drain, East Branch

Speaker and Maple Valley Drain, Downey Drain, Sanilac and Saint Clair Drain, Potts Drain, Bradley Creek, Seymore Drain, Perry Drain, Willey Drain, and Black Creek.

Part 31, Water Resources Protection, of NREPA regulates activities within the 100-year floodplain and floodway of rivers, streams, drains, and watercourses that have upstream drainage areas of two square miles or larger. Temporary crossings of regulated floodplains are generally exempt from permitting if the floodplain will be restored to existing elevations; however, temporary watercourse crossings within a 100-year floodplain or floodway may require a permit from EGLE. Based upon the desktop and on-site assessments, Atwell anticipates that potential 100-year floodplains meeting the requirements of Part 31 of NREPA appear to be present within the Project Survey Corridor. Refer to **Figure 4 – FEMA Floodplain Map** and **Figure 5 – Drainage Review Map** for the locations of these features.

5 CONCLUSIONS

The Environmental Study Area is situated in an agricultural landscape dominated by cultivated fields, rural residences and farmsteads, and an associated network of agricultural drains and roadside ditches. Woodlots, hedgerows, pasture, wetlands, and fallow areas are also interspersed throughout the Environmental Study Area. Riverbend has carefully selected the proposed locations of turbines, associated access roads, and additional project infrastructure to avoid natural features to the greatest extent practicable. Atwell biologists delineated 70 wetlands and 196 watercourses within the Project Survey Corridor. It is Atwell's professional opinion that 57 of the field-identified wetlands meet the requirements of Part 303, Wetlands Protection, of the NREPA, and should fall under the jurisdiction of EGLE. A Part 303 permit is required for temporary or permanent work within a regulated wetland (e.g. filling, dredging, construction, timber matting, etc.).

The 196 watercourses observed all possess a defined bed, banks, and evidence of continued flow or continued occurrence of water. Therefore, these features are anticipated to be regulated by EGLE under Part 301, Inland Lakes and Streams, of the NREPA. A Part 301 permit is required for temporary or permanent work within a regulated watercourse (e.g. filling, dredging, construction, bridges, culverts, etc.).

Additionally, Atwell conducted a desktop delineation for unsurveyed areas within the Environmental Survey Area and identified 27 wetlands and 45 watercourses. Field surveys will need to be conducted to confirm the location, composition, and regulation status.

Part 31, Water Resources Protection, of the NREPA regulates activities within the 100-year floodplain and floodway of a river, stream, or drain, and within the floodplain of any watercourse with an upstream drainage area of two square miles or larger. A Part 31 permit from EGLE is required for construction within a regulated floodplain or floodway, including, but not limited to, installation of bridges and culverts. Atwell's review of the FEMA FIRMs for Sanilac County indicates there are no FEMA mapped 100-year floodplains within the Environmental Study Area. However, based upon Atwell's desktop drainage review, state regulated floodplains are likely present within the Environmental Study Area.

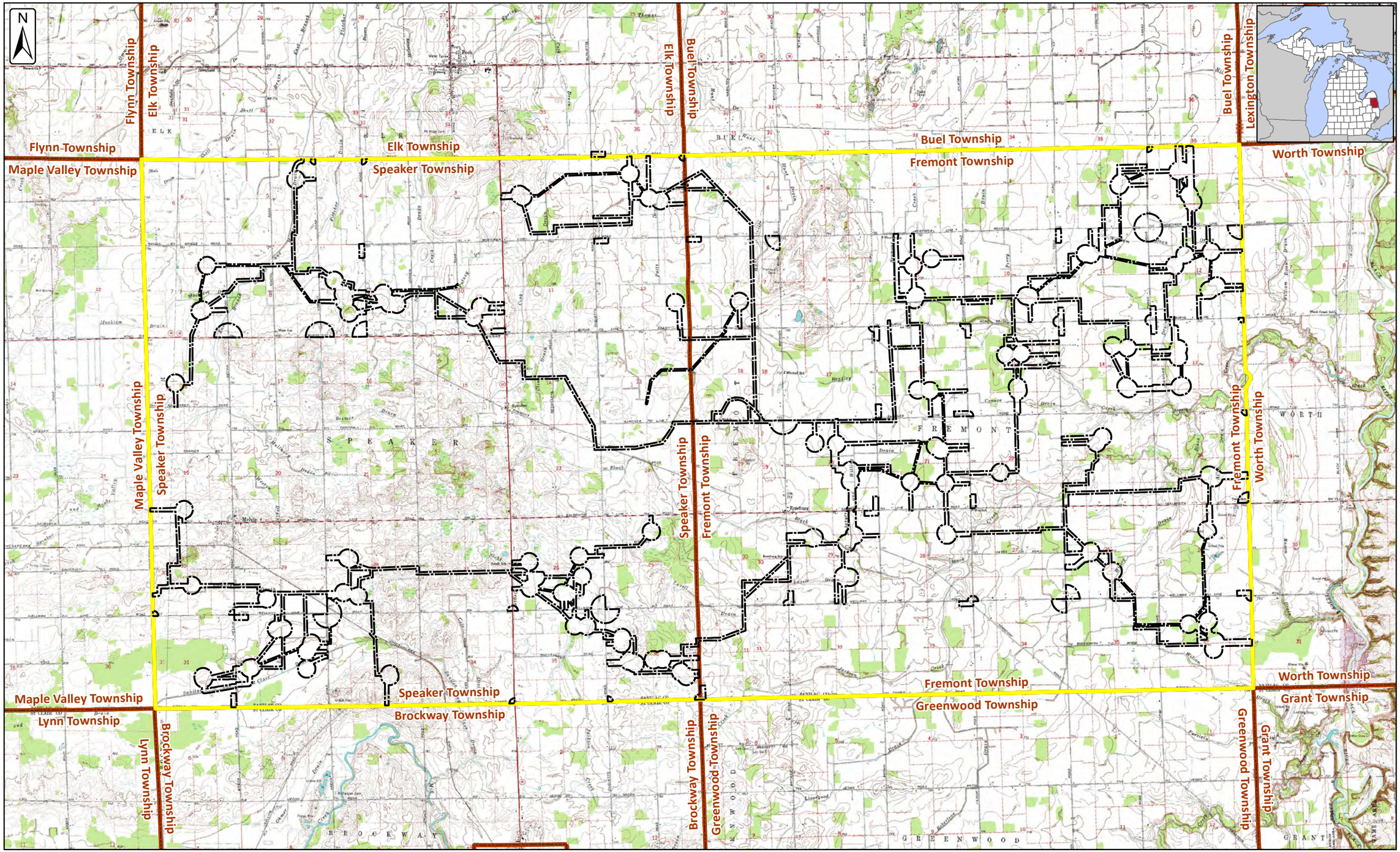
6 REFERENCES

NRCS [Natural Resources Conservation Service]. 2014. National Hydric Soils List. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2_053959.

USACE [U.S. Army Corps of Engineers]. 1987. Corps of Engineers Wetlands Delineation Manual. USACE, Environmental Laboratory Report No.: Technical Report Y-87-1 (online edition). http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf.

USACE [U.S. Army Corps of Engineers]. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0). Vicksburg (MS): U.S. Army Engineer Research and Development Center Report No.: ERDC/ EL TR-12-1. https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7640.

FIGURES



Source: USGS TOPOGRAPHIC QUADRANGLES
BROWN CITY, YALE, ROSEBURG (1961)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- TOWNSHIP BOUNDARY

ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

SITE LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 1,250 2,500 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

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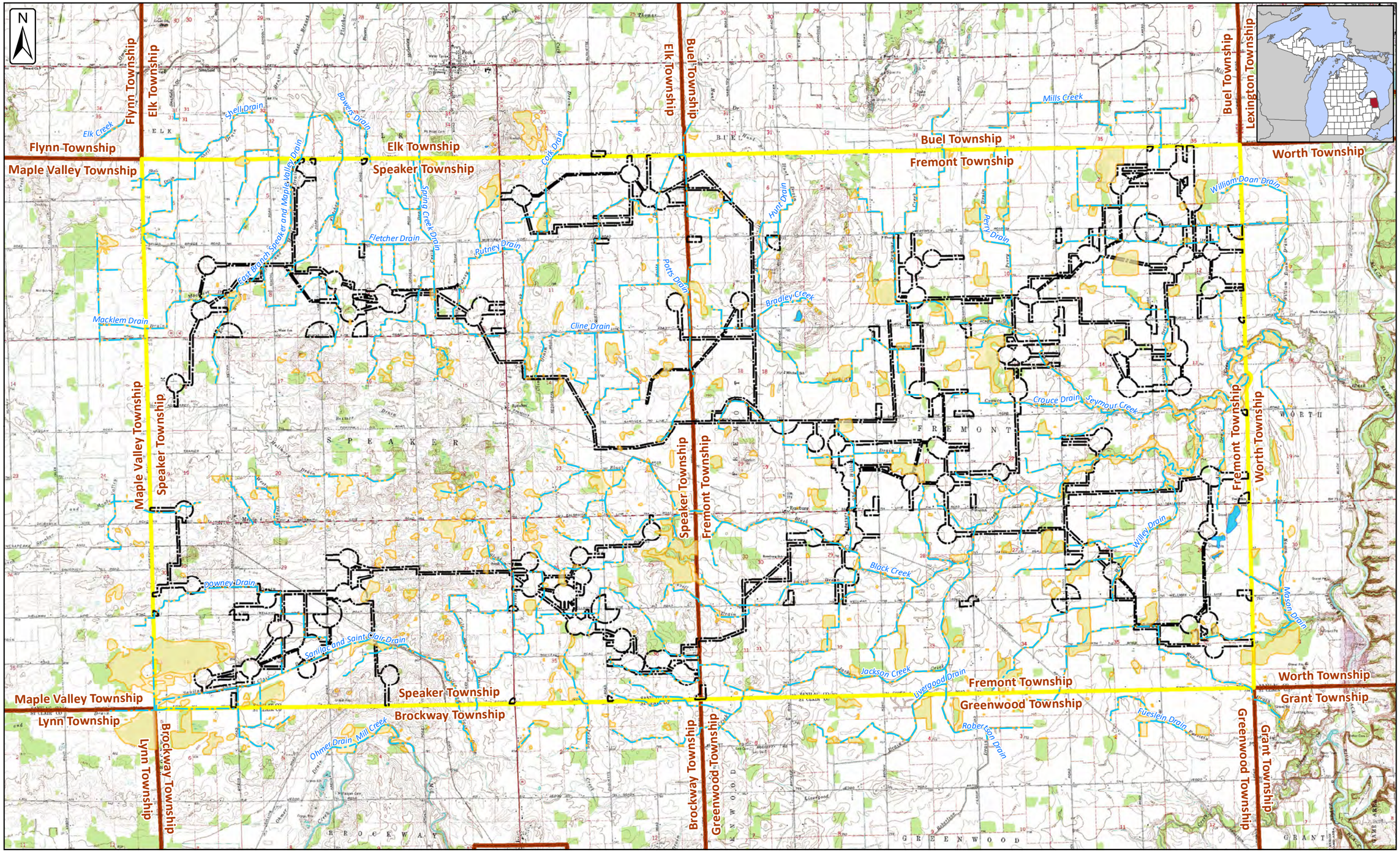

Source: USGS TOPOGRAPHIC QUADRANGLES
BROWN CITY, YALE, ROSEBURG (1961)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- TOWNSHIP BOUNDARY
- WATERCOURSE (NHD)
- WATERBODY (NHD)
- WETLAND (NWI)

ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

DESKTOP WATER RESOURCES MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 1,250 2,500 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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Sanilac County Soil Survey (NRCS)

Symbol	Soil Name	Acres	Percent
*AbA0	Alluvial land, poorly drained loams, 0 to 2 percent slopes	15.21	0.40%
*CcA0	Carlisle muck, 0 to 2 percent slopes	2.56	0.07%
*CdA0	Carlisle and Linwood mucks, 0 to 2 percent slopes	1.13	0.03%
CgA1	Covert loamy sand, 0 to 2 percent slopes, slightly eroded	1.01	0.03%
CvabA	Conover loam, 0 to 3 percent slopes	1,221.17	31.74%
CvacB	Conover-Williamstown loams, 0 to 6 percent slopes	24.60	0.64%
IbA0	Iosco and Winegars sandy loams, 0 to 2 percent slopes	16.01	0.42%
IcA0	Iosco sandy loam and Covert loamy sand, 0 to 2 percent slopes	26.38	0.69%
*JaA0	Jeddo silty clay loam, 0 to 2 percent slopes	88.26	2.29%
*Jd	Jeddo silt loam	0.82	0.02%
*LdA0	Linwood muck, 0 to 2 percent slopes	11.06	0.29%
*LeA0	Linwood and Timakwa mucks, 0 to 2 percent slopes	9.28	0.24%
MaB1	McBride fine sandy loam, 2 to 6 percent slopes, slightly eroded	1.95	0.05%
MbA1	McBride sandy loam and Montcalm loamy sand, 0 to 3 percent slopes, slightly eroded	23.81	0.62%
MbB1	McBride sandy loam and Montcalm loamy sand, 3 to 8 percent slopes, slightly eroded	19.24	0.50%
MbC1	McBride sandy loam and Montcalm loamy sand, 8 to 15 percent slopes, slightly eroded	0.80	0.02%
MeA1	Mancelona loamy sand, 0 to 3 percent slopes, slightly eroded	22.14	0.58%
MeB1	Mancelona loamy sand, 3 to 8 percent slopes, slightly eroded	0.07	0.00%
MeB2	Mancelona loamy sand, 3 to 8 percent slopes, moderately eroded	4.97	0.13%
MeC1	Mancelona loamy sand, 8 to 15 percent slopes, slightly eroded	0.18	0.00%
MfA1	Marlette loam, 0 to 2 percent slopes, slightly eroded	68.14	1.77%
MfB1	Marlette loam, 2 to 6 percent slopes, slightly eroded	39.86	1.04%
MfB3	Marlette loam, 2 to 6 percent slopes, severely eroded	5.27	0.14%
MfC1	Marlette loam, 6 to 12 percent slopes, slightly eroded	8.36	0.22%
MfC2	Marlette loam, 6 to 12 percent slopes, moderately eroded	3.79	0.10%
MfC3	Marlette loam, 6 to 12 percent slopes, severely eroded	4.04	0.10%
MgA1	Marlette silt loam and loam, 0 to 2 percent slopes, slightly eroded	166.82	4.34%
MgB1	Marlette silt loam and loam, 2 to 6 percent slopes, slightly eroded	26.99	0.70%
MgB2	Marlette silt loam and loam, 2 to 6 percent slopes, moderately eroded	1.64	0.04%
MgC1	Marlette silt loam and loam, 6 to 12 percent slopes, slightly eroded	0.42	0.01%
MhA1	Melita and Arenac loamy sands, 0 to 2 percent slopes, slightly eroded	6.10	0.16%
MnB1	Montcalm loamy sand, 2 to 6 percent slopes, slightly eroded	1.46	0.04%
*PcA0	Parkhill loam, 0 to 1 percent slopes	1,069.93	27.81%
*PdA0	Parkhill loam and clay loam, 0 to 2 percent slopes	700.65	18.21%
*PeA0	Parkhill loam and mucky loam, 0 to 2 percent slopes	129.70	3.37%
ReB1	Grattan sand, 2 to 7 percent slopes, slightly eroded	6.78	0.18%
SbA0	Saverine and Iosco fine sandy loams, 0 to 2 percent slopes	32.27	0.84%
SbB1	Saverine and Iosco fine sandy loams, 2 to 7 percent slopes, slightly eroded	2.93	0.08%
SbB2	Saverine and Iosco fine sandy loams, 2 to 7 percent slopes, moderately eroded	4.05	0.11%
*TbA0	Tappan mucky loam, 0 to 2 percent slopes	48.70	1.27%
*TgA0	Tonkey and Bach fine sandy loams, 0 to 2 percent slopes	13.22	0.34%
W	Water	0.00	0.00%
*WaA0	Wallkill loam, 0 to 2 percent slopes	7.62	0.20%
*WcA0	Washtenaw loam and silt loam, 0 to 2 percent slopes	7.25	0.19%
*WdA0	Washtenaw sandy loam and loam, 0 to 2 percent slopes	0.29	0.01%
Totals for Area of Interest		**3,847**	**100%**

* Indicates hydric or partially hydric soils

Flynn Township
Maple Valley Township
Elk Township
Speaker Township
Buel Township
Fremont Township
Lexington Township
Worth Township
Maple Valley Township
Speaker Township
Fremont Township
Worth Township
Maple Valley Township
Lynn Township
Speaker Township
Brockway Township
Fremont Township
Greenwood Township
Worth Township
Grant Township

Source: USGS TOPOGRAPHIC QUADRANGLES
BROWN CITY, YALE, ROSEBURG (1961)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- TOWNSHIP BOUNDARY

ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

COUNTY SOIL SURVEY MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 1,250 2,500 Feet

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P.M. JEFF WILLIAMS

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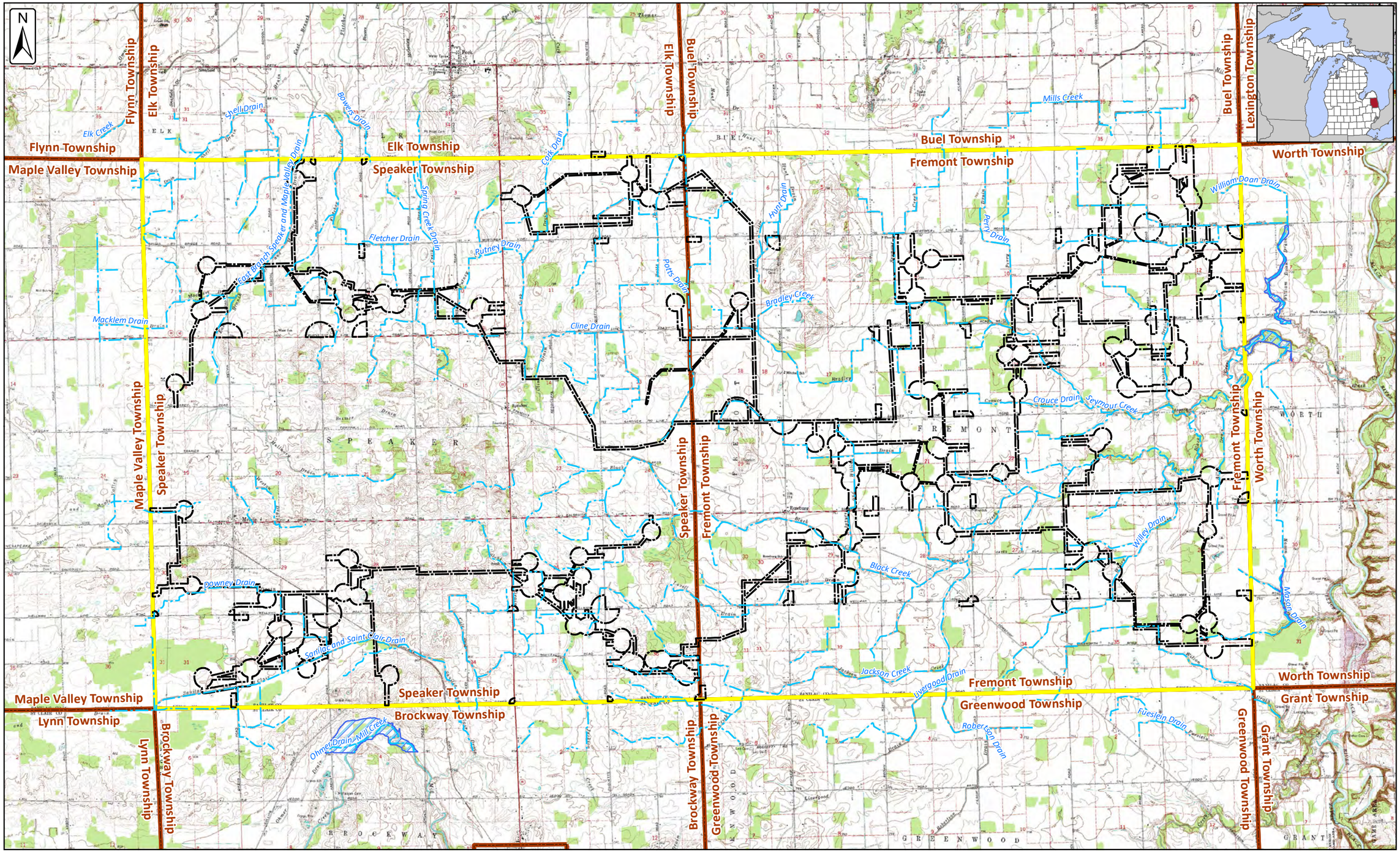

Source: USGS TOPOGRAPHIC QUADRANGLES
BROWN CITY, YALE, ROSEBURG (1961)
FEMA FIRM: 26151C0567B, 26151C0557B, 26151C0575B, 26151C0559B, 26151C0560B, 26151C0525B, 26151C0550B, 26151C0425B, 26151C0570B

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- TOWNSHIP BOUNDARY
- WATERCOURSE (NHD)
- Zone A: subject to inundation by the one-percent-annual chance flood event

ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

FEMA FLOOD ZONE MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 1,250 2,500 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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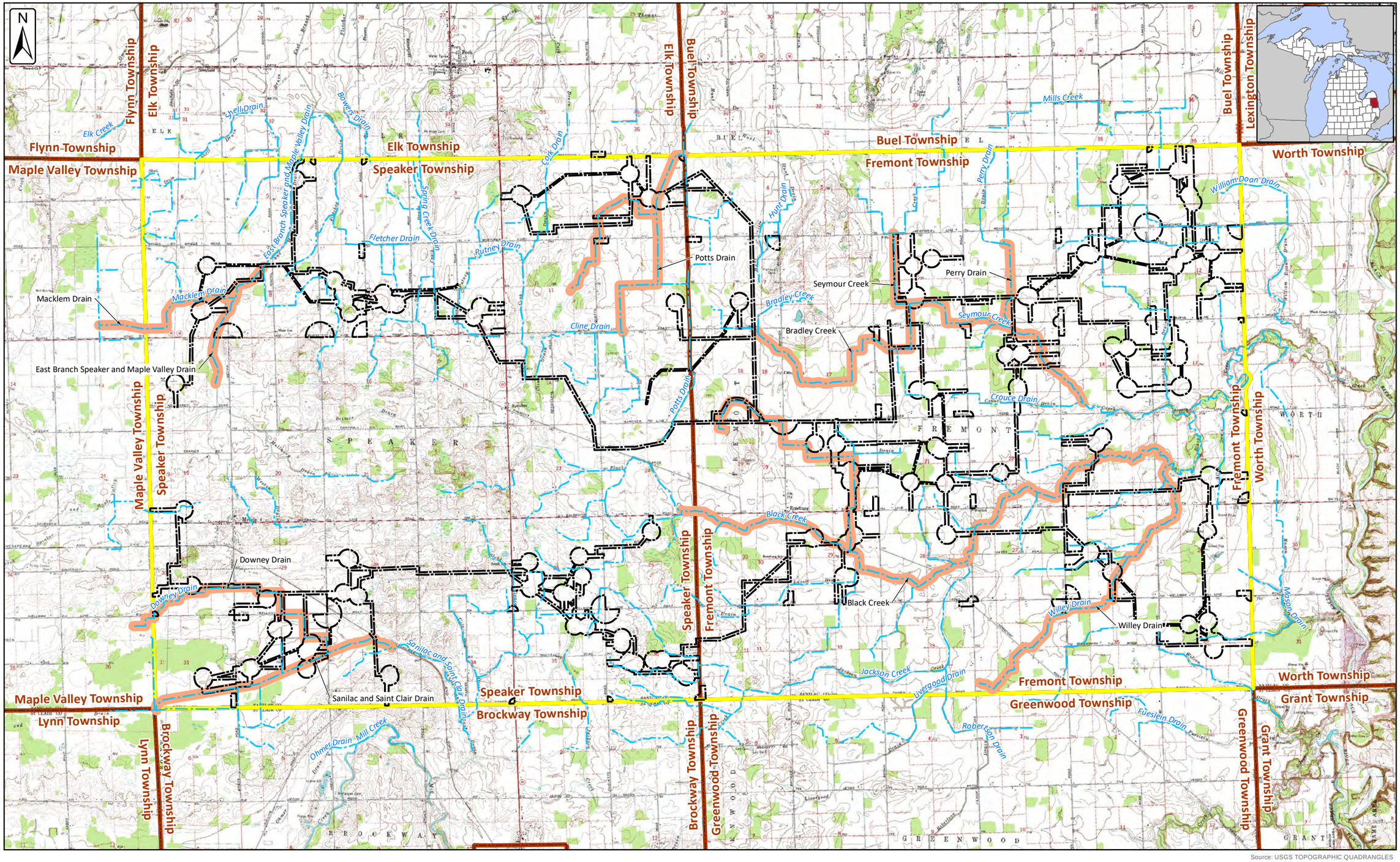

Source: USGS TOPOGRAPHIC QUADRANGLES BROWN CITY, YALE, ROSEBURG (1961)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- TOWNSHIP BOUNDARY
- WATERCOURSE (NHD)
- WATERSHED WITH UPSTREAM DRAINAGE AREA GREATER THAN 2 SQUARE MILES

ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

DRAINAGE REVIEW MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 1,250 2,500 Feet

DR.	C.J. CH. C.C.
P.M.	JEFF WILLIAMS
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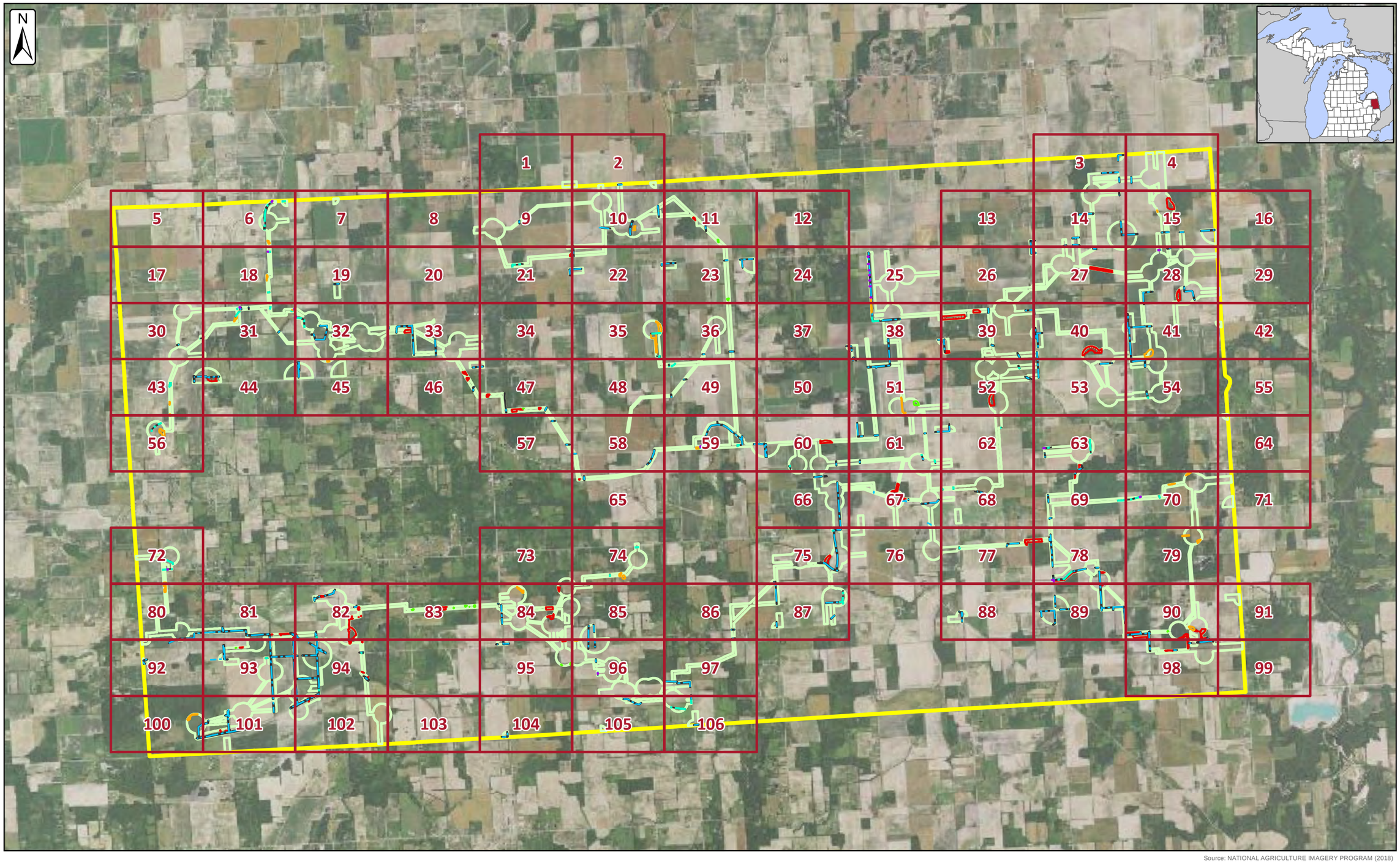

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

LEGEND

- MAP INDEX
- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

Note: This illustration is an approximate depiction of the wetlands and watercourses that appear to be located on the subject property as delineated by Atwell on December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. The EGLE has the final authority on the extent of regulated wetlands, lakes, and streams in the state of Michigan.

ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND DELINEATION MAP INDEX

DATE: 8/31/2022

REVISIONS

SCALE: 0 1,250 2,500 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: INDEX MAP

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

Note: This illustration is an approximate depiction of the wetlands and watercourses that appear to be located on the subject property as delineated by Atwell on December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. The EGLE has the final authority on the extent of regulated wetlands, lakes, and streams in the state of Michigan.

ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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FILE CODE: --

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

Note: This illustration is an approximate depiction of the wetlands and watercourses that appear to be located on the subject property as delineated by Atwell on December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. The EGLE has the final authority on the extent of regulated wetlands, lakes, and streams in the state of Michigan.

ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 2 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

Note: This illustration is an approximate depiction of the wetlands and watercourses that appear to be located on the subject property as delineated by Atwell on December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. The EGLE has the final authority on the extent of regulated wetlands, lakes, and streams in the state of Michigan.

ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 3 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 4 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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- DESKTOP DELINEATED WATERCOURSE
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- DESKTOP DELINEATED WETLAND

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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 5 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 6 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 7 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 8 OF 106

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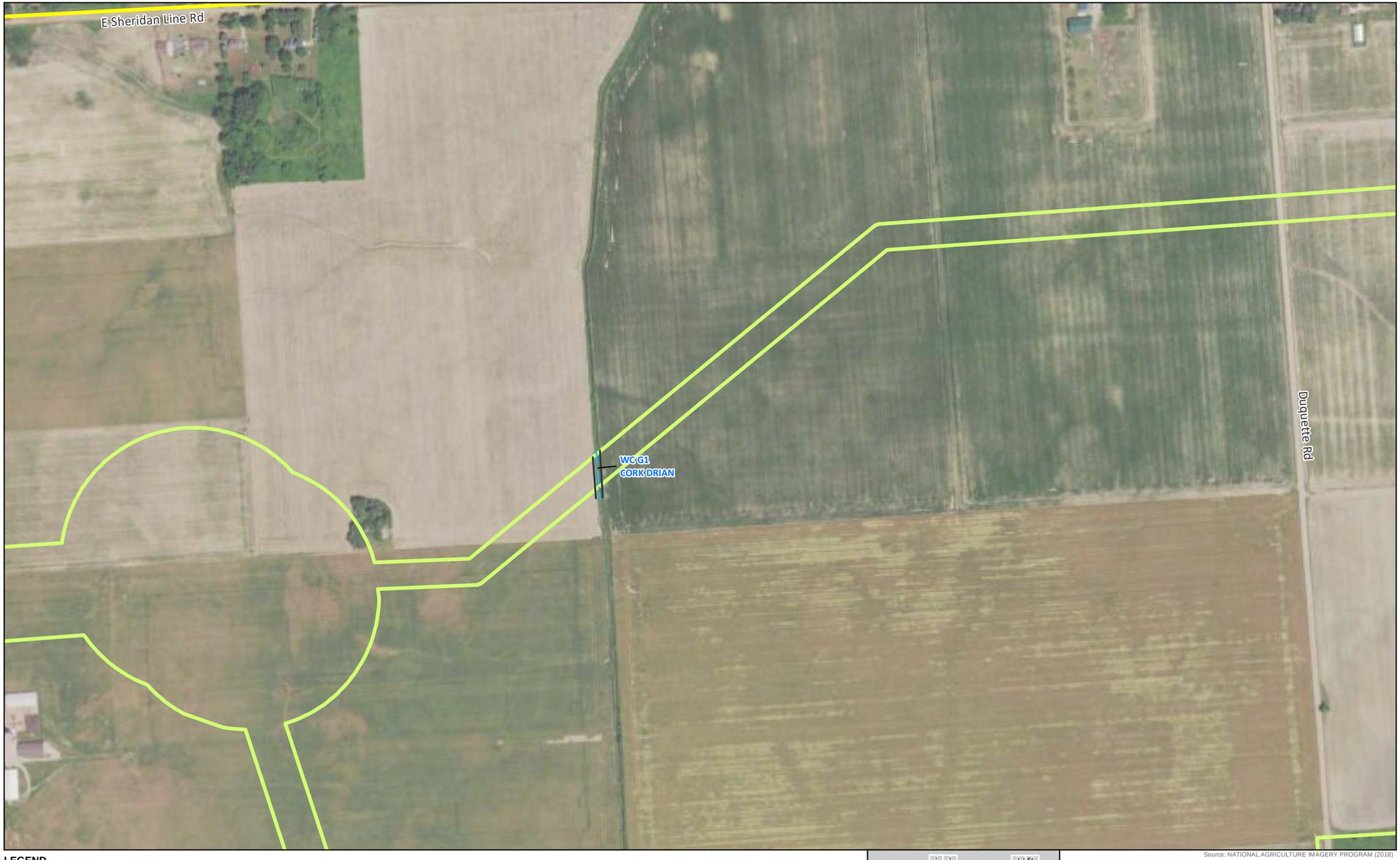

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 9 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 10 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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- DESKTOP DELINEATED WATERCOURSE
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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 11 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

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JOB: 21003645

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SHEET NO: 12 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

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JOB: 21003645

FILE CODE: --

SHEET NO: 14 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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SHEET NO:	15 OF 106		

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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JOB:	21003645		
FILE CODE:	--		
SHEET NO:	16 OF 106		

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 17 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

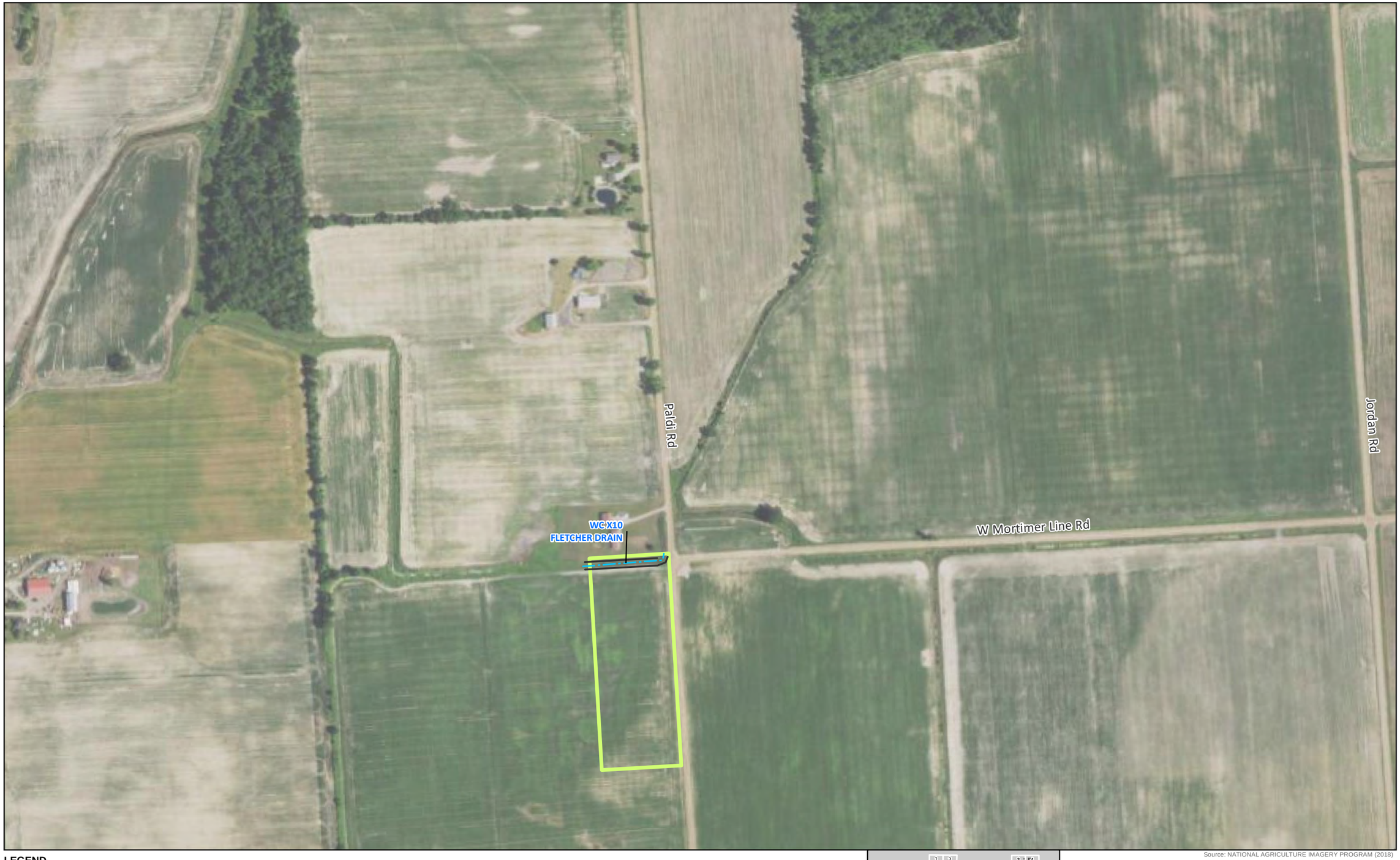
BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 18 OF 106



LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 19 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

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JOB: 21003645

FILE CODE: --

SHEET NO: 20 OF 106

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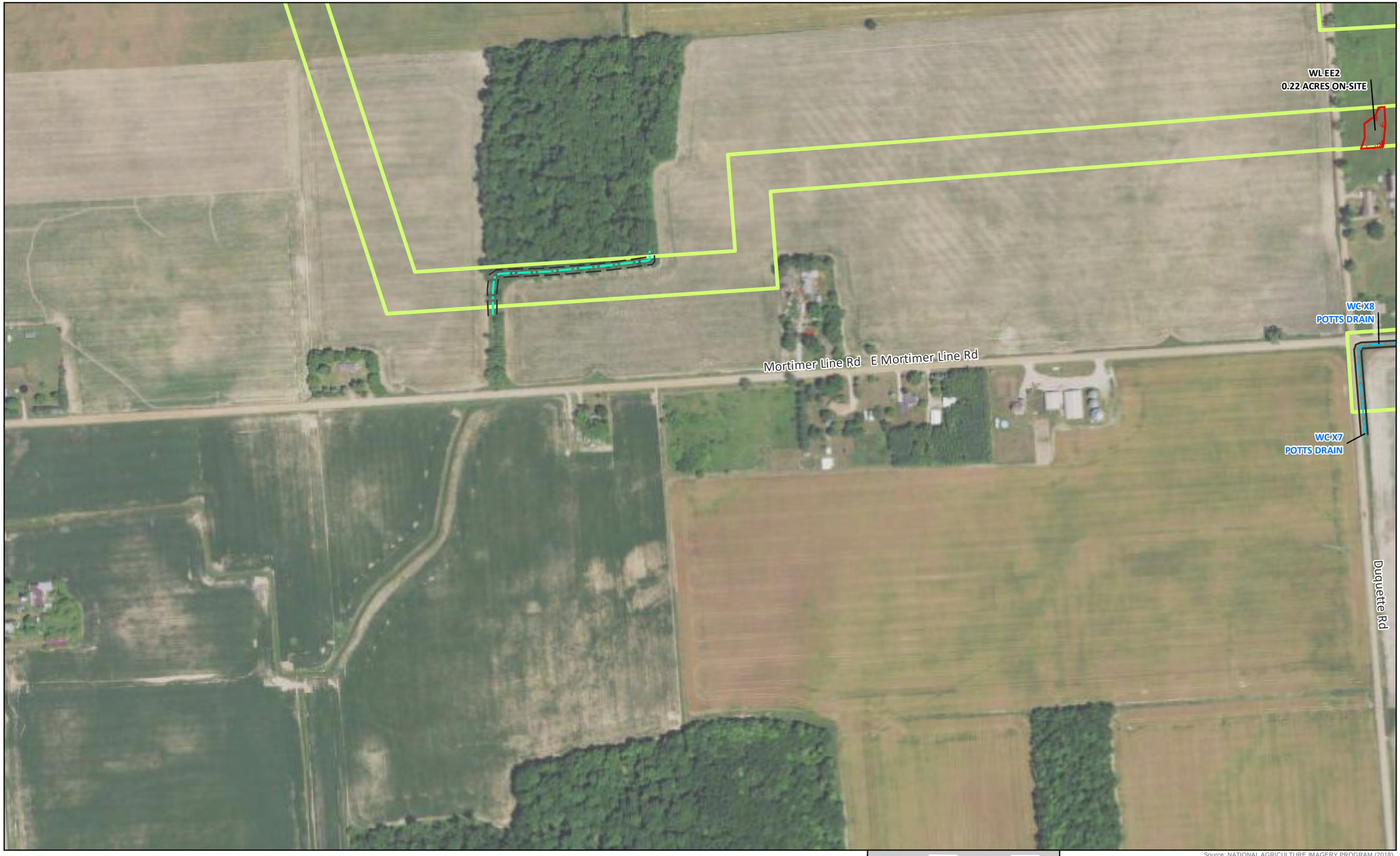

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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GIS FILE:	--		
JOB:	21003645		
FILE CODE:	--		
SHEET NO:	21 OF 106		

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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JOB: 21003645

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SHEET NO: 22 OF 106

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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

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JOB: 21003645

FILE CODE: --

SHEET NO: 23 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
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- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

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JOB: 21003645

FILE CODE: --

SHEET NO: 24 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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JOB:	21003645		
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SHEET NO:	25 OF 106		

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 26 OF 106

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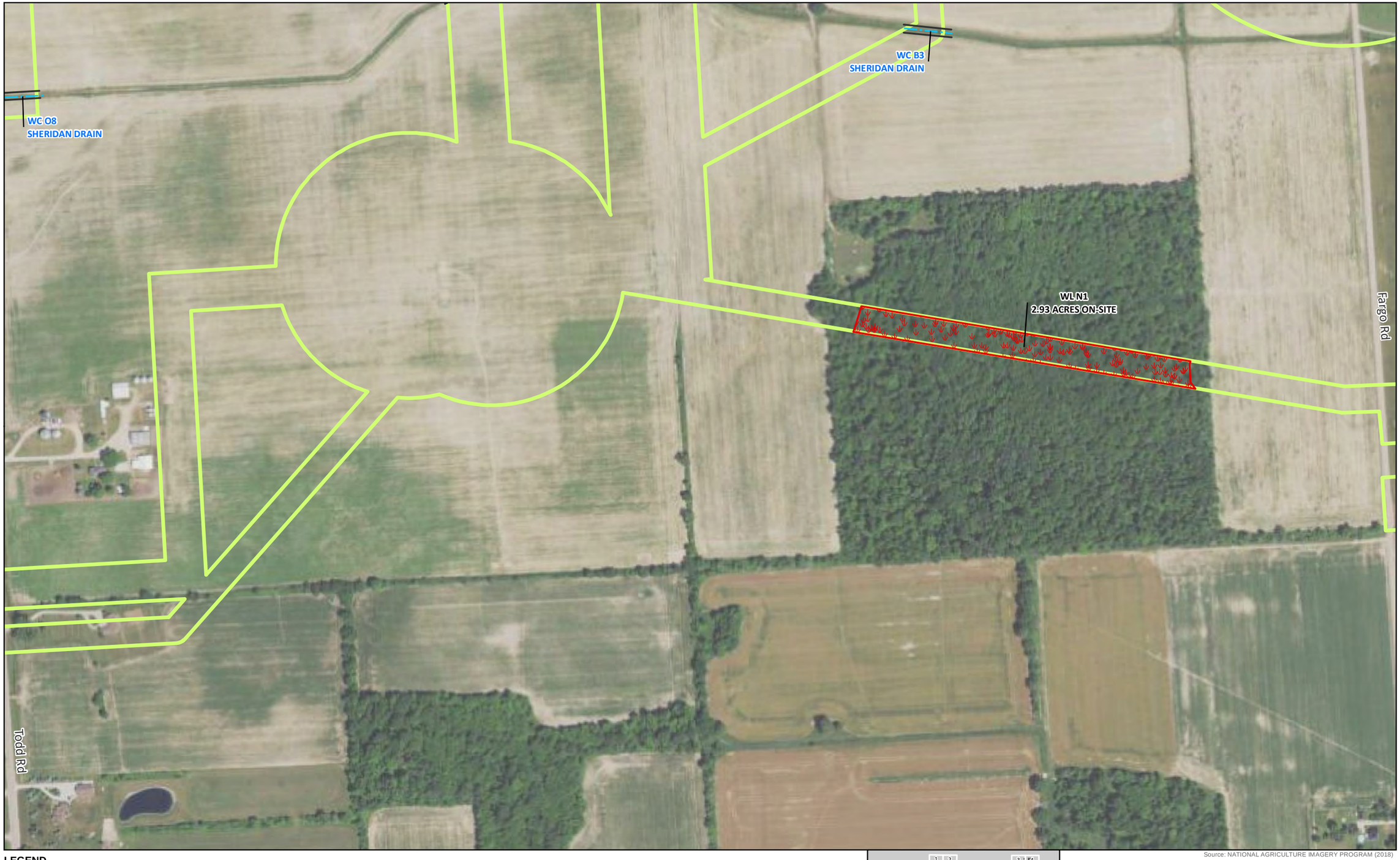

LEGEND

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- WATERCOURSE (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 27 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 28 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 29 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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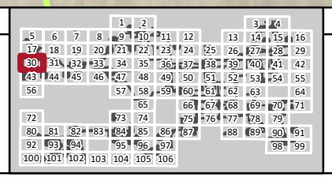
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N



Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 30 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 31 OF 106

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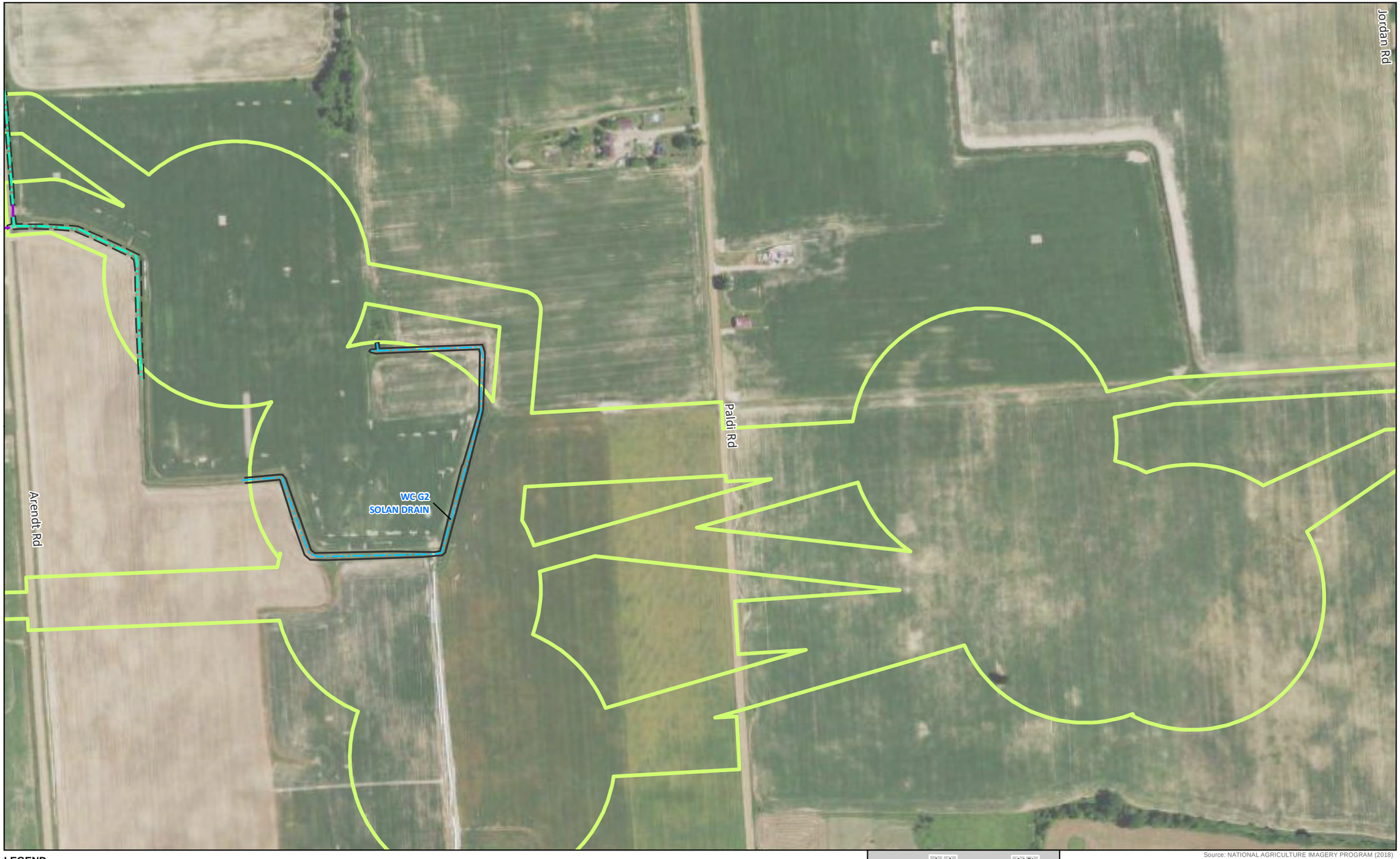

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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GIS FILE:	--		
JOB:	21003645		
FILE CODE:	--		
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LEGEND

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.
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GIS FILE:	--
JOB:	21003645
FILE CODE:	--
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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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FILE CODE: --

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
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JOB:	21003645		
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

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SANILAC COUNTY, MICHIGAN

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LEGEND

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DR. C.J. CH. C.C.

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SHEET NO: 40 OF 106

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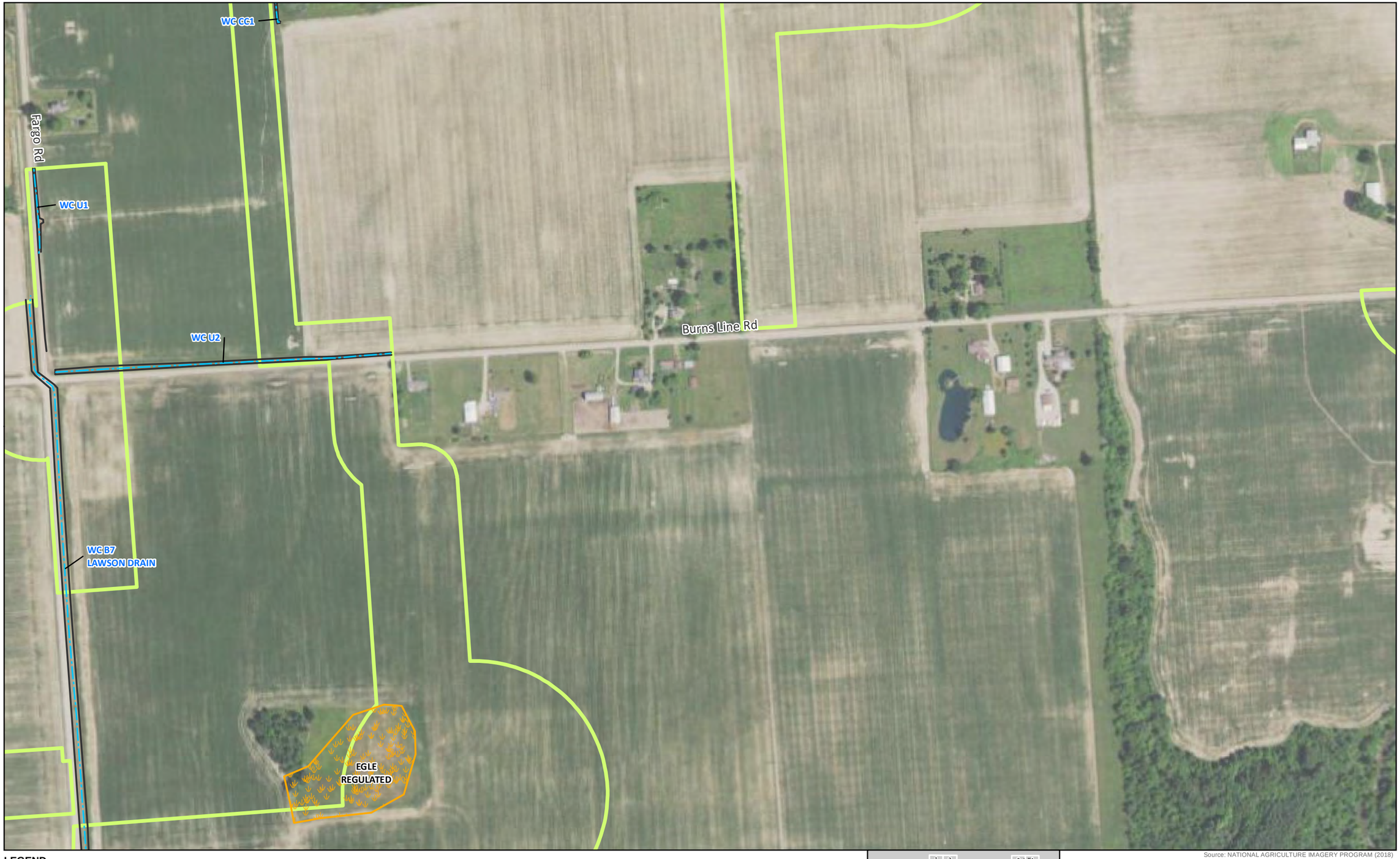

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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

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DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

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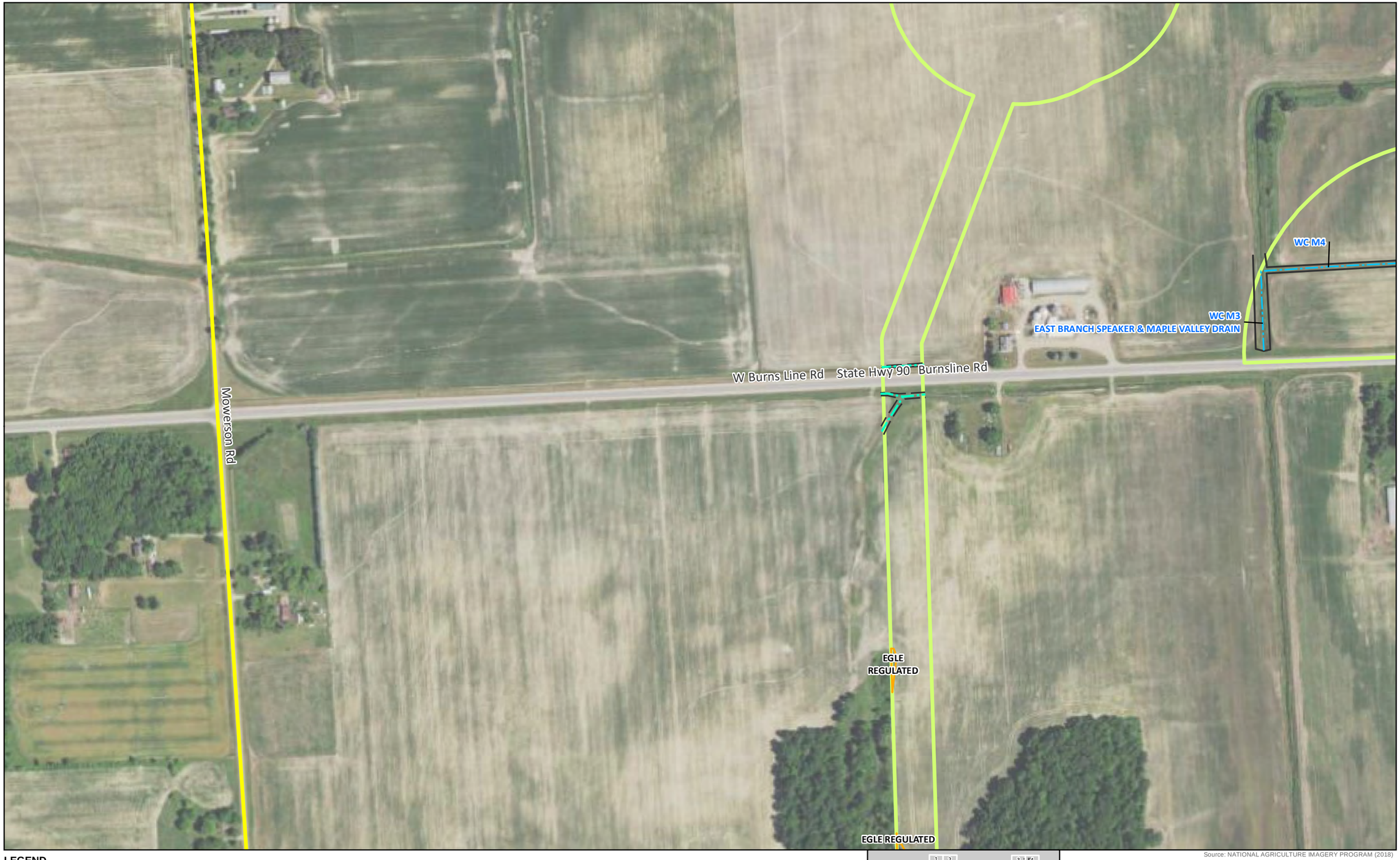
SHEET NO: 42 OF 106



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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

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LEGEND

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 45 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 46 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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LEGEND

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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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GIS FILE: --

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FILE CODE: --

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LEGEND

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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FILE CODE: --

SHEET NO: 49 OF 106

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LEGEND

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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JOB: 21003645

FILE CODE: --

SHEET NO: 50 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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SHEET NO: 53 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ATWELL

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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JOB: 21003645

FILE CODE: --

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

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JOB: 21003645

FILE CODE: --

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LEGEND

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

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JOB: 21003645

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 57 OF 106

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

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DR. C.J. CH. C.C.

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LEGEND

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
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LEGEND

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- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

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ATWELL

TOWN/RANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 60 OF 106

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Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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P.M. JEFF WILLIAMS

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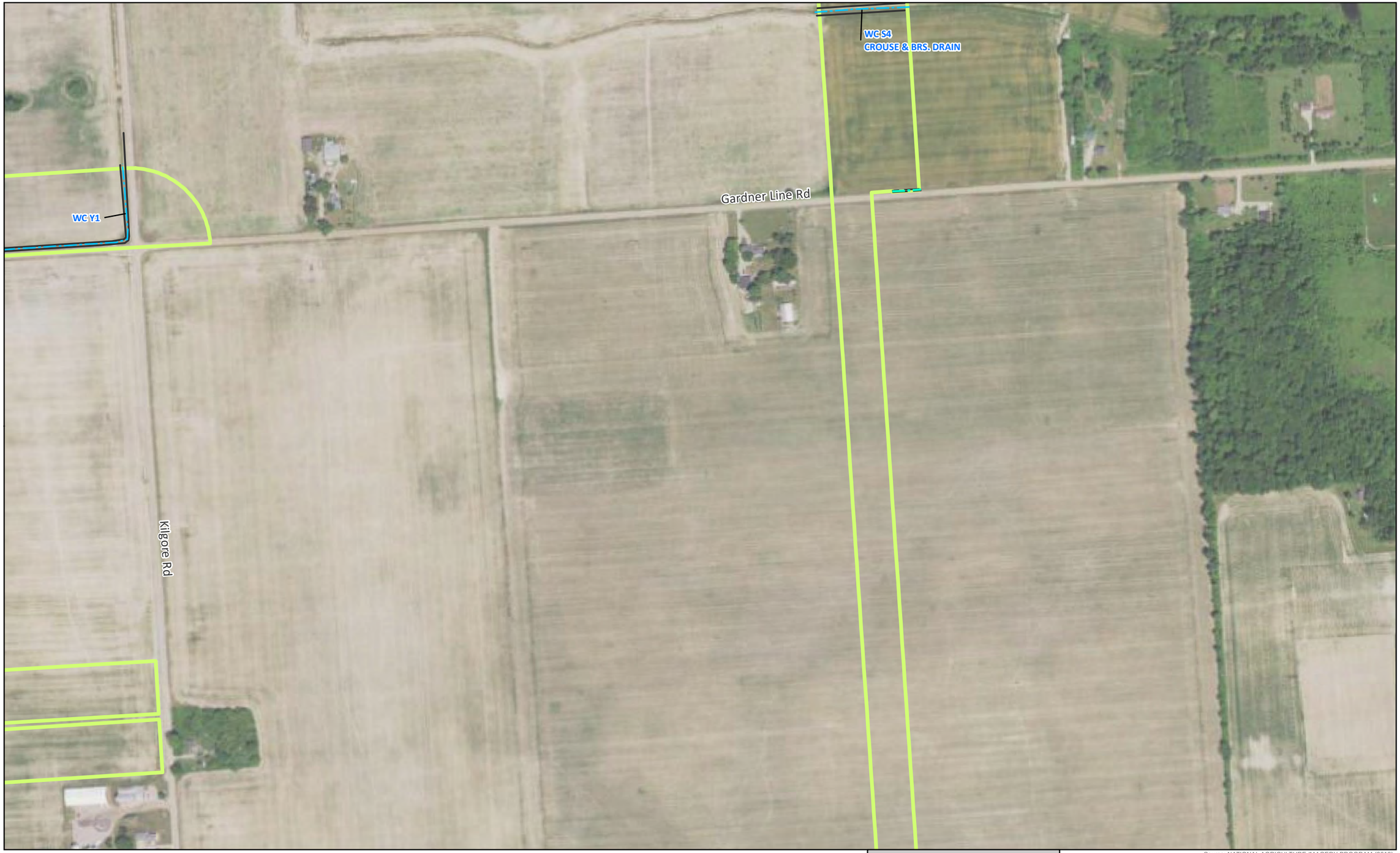

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The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.

ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

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SCALE: 0 200 Feet

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SANILAC COUNTY, MICHIGAN

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N

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106

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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

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SANILAC COUNTY, MICHIGAN

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SANILAC COUNTY, MICHIGAN

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

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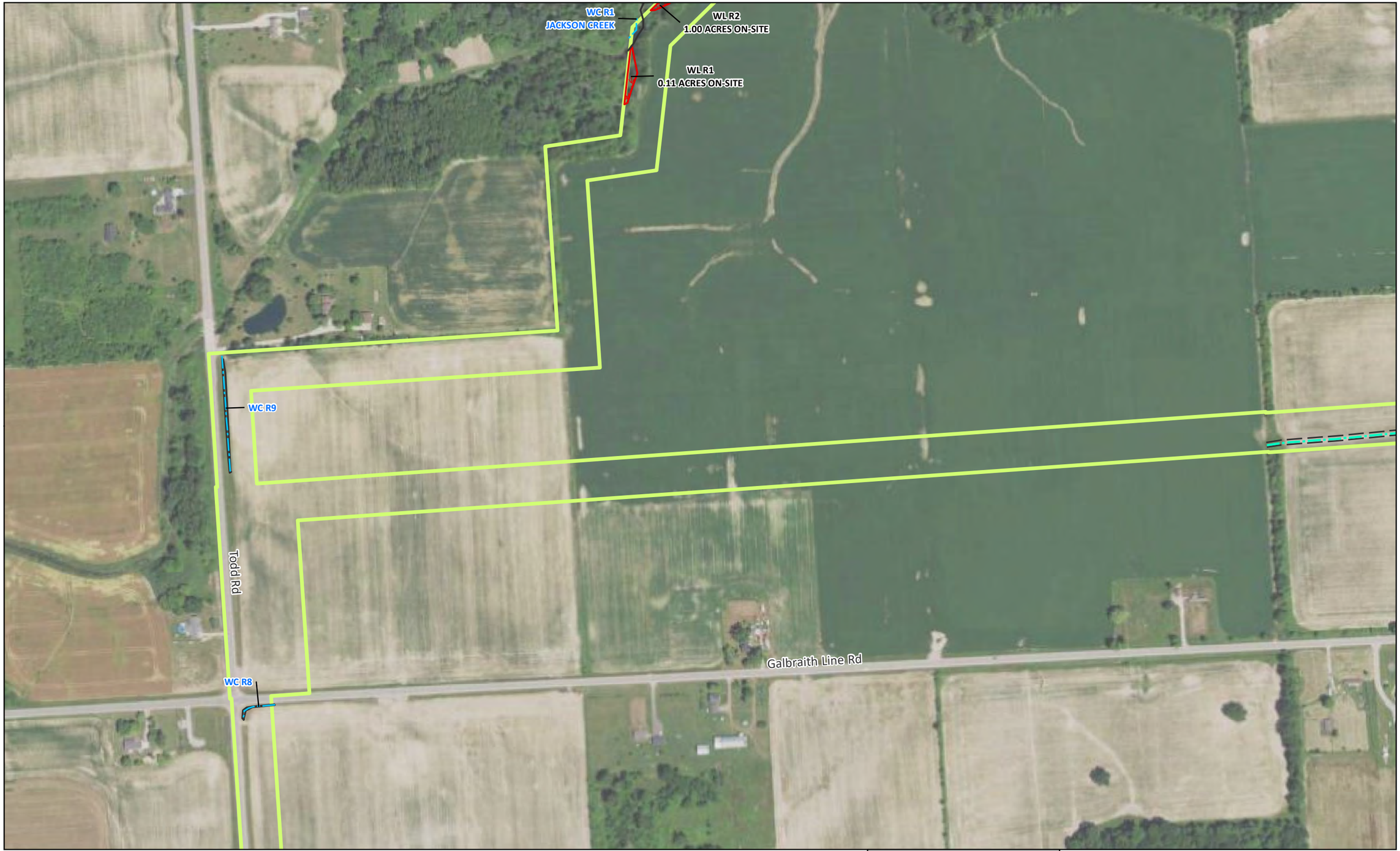

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

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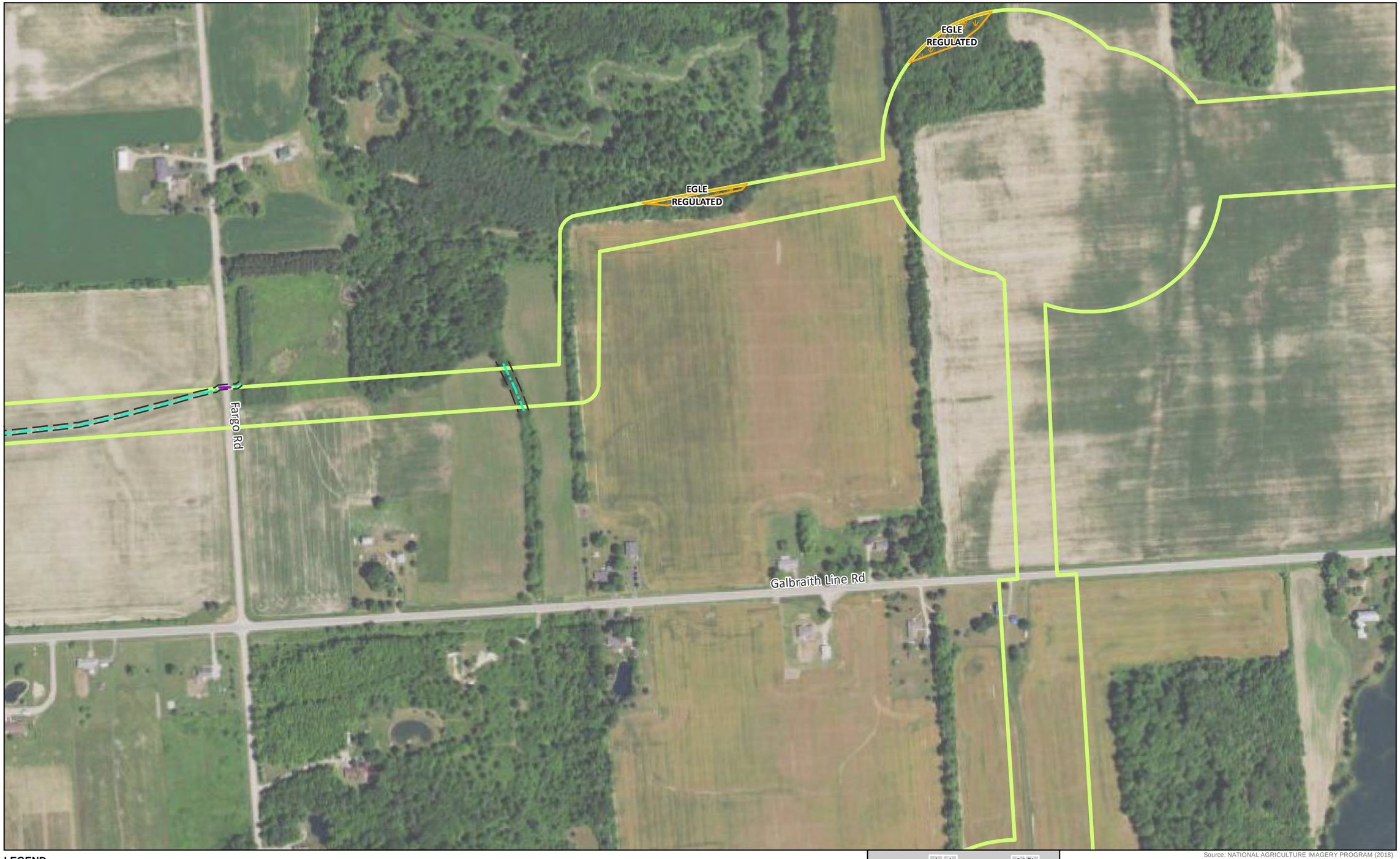

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SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

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SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

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- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 74 OF 106

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
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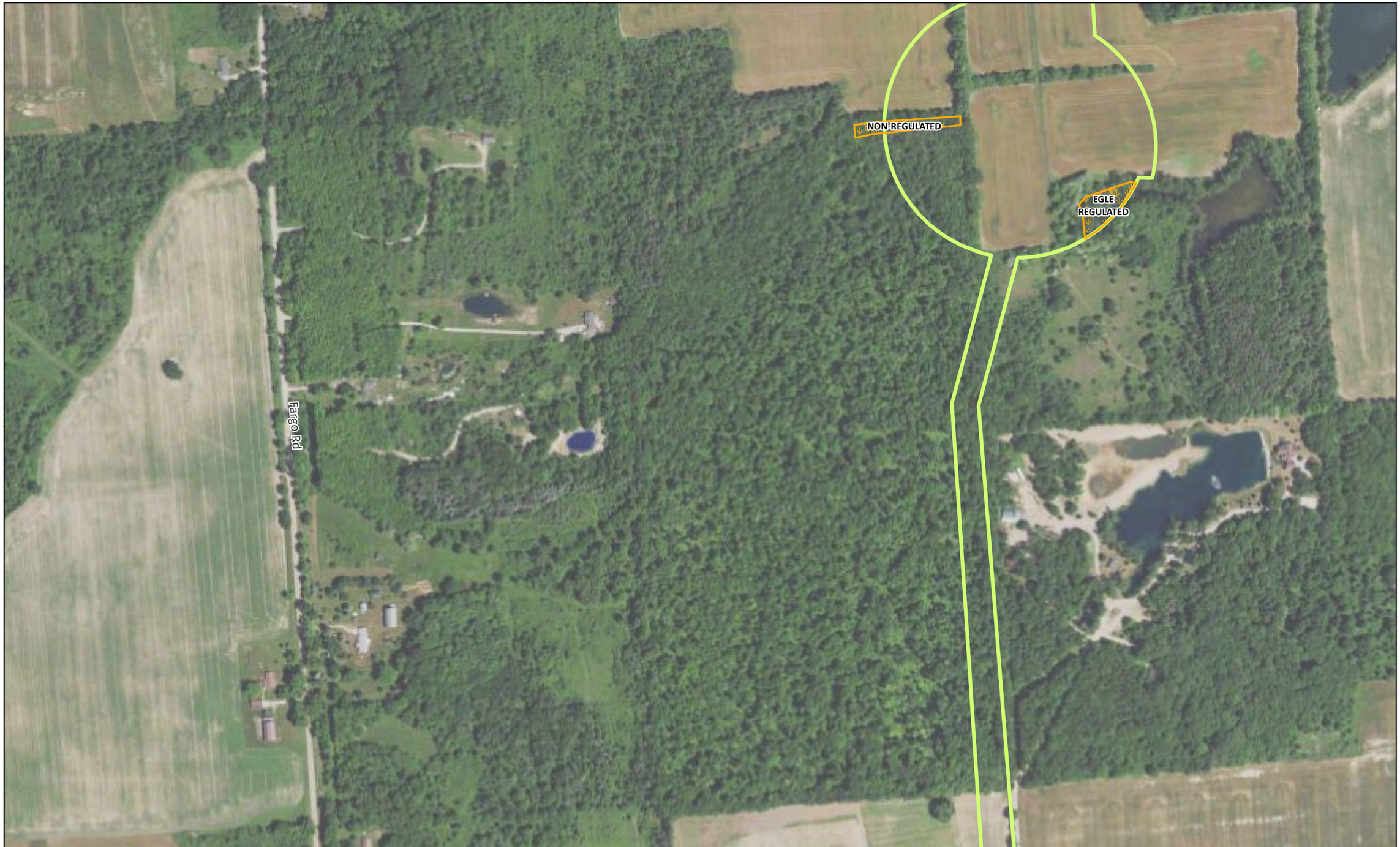

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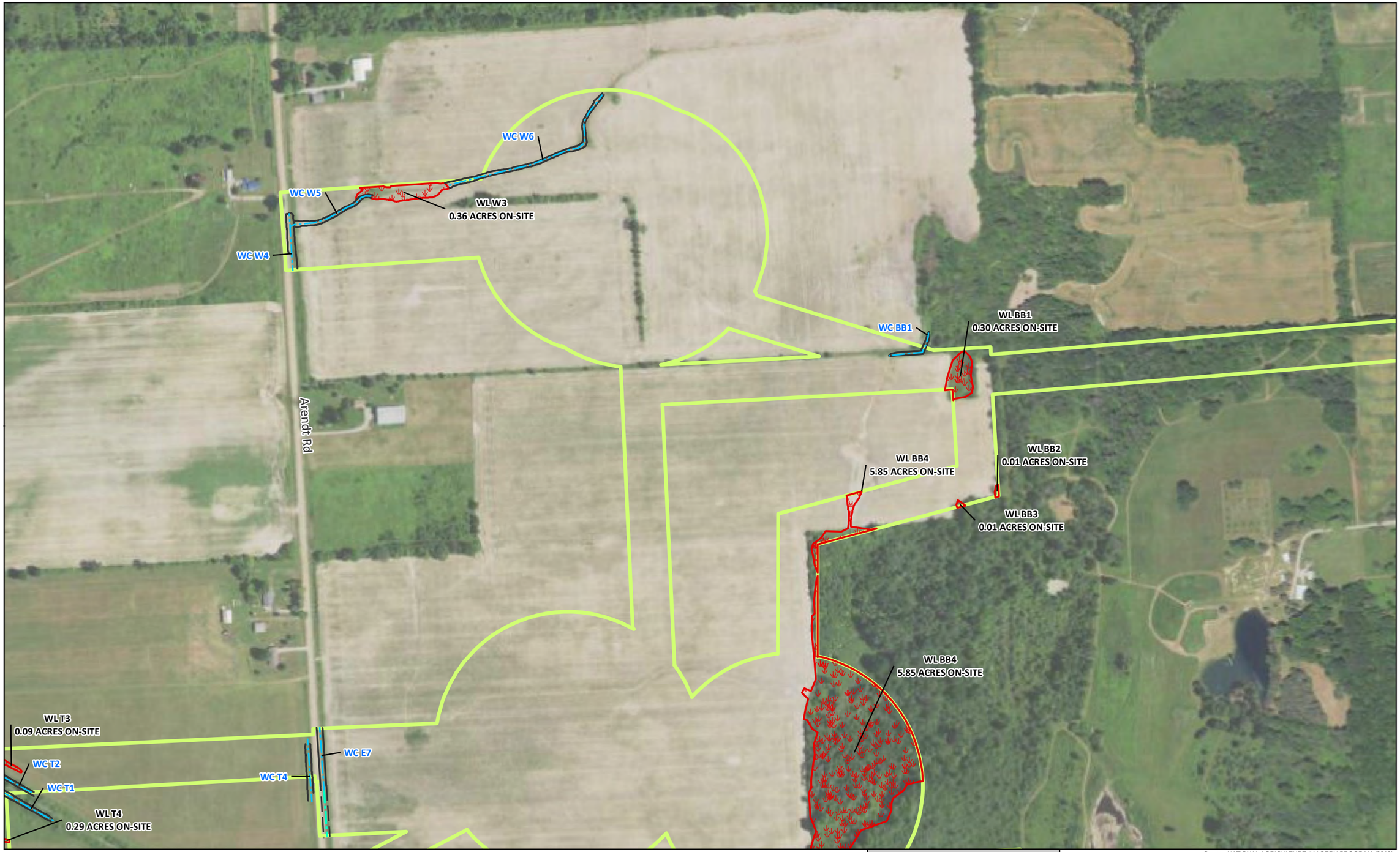

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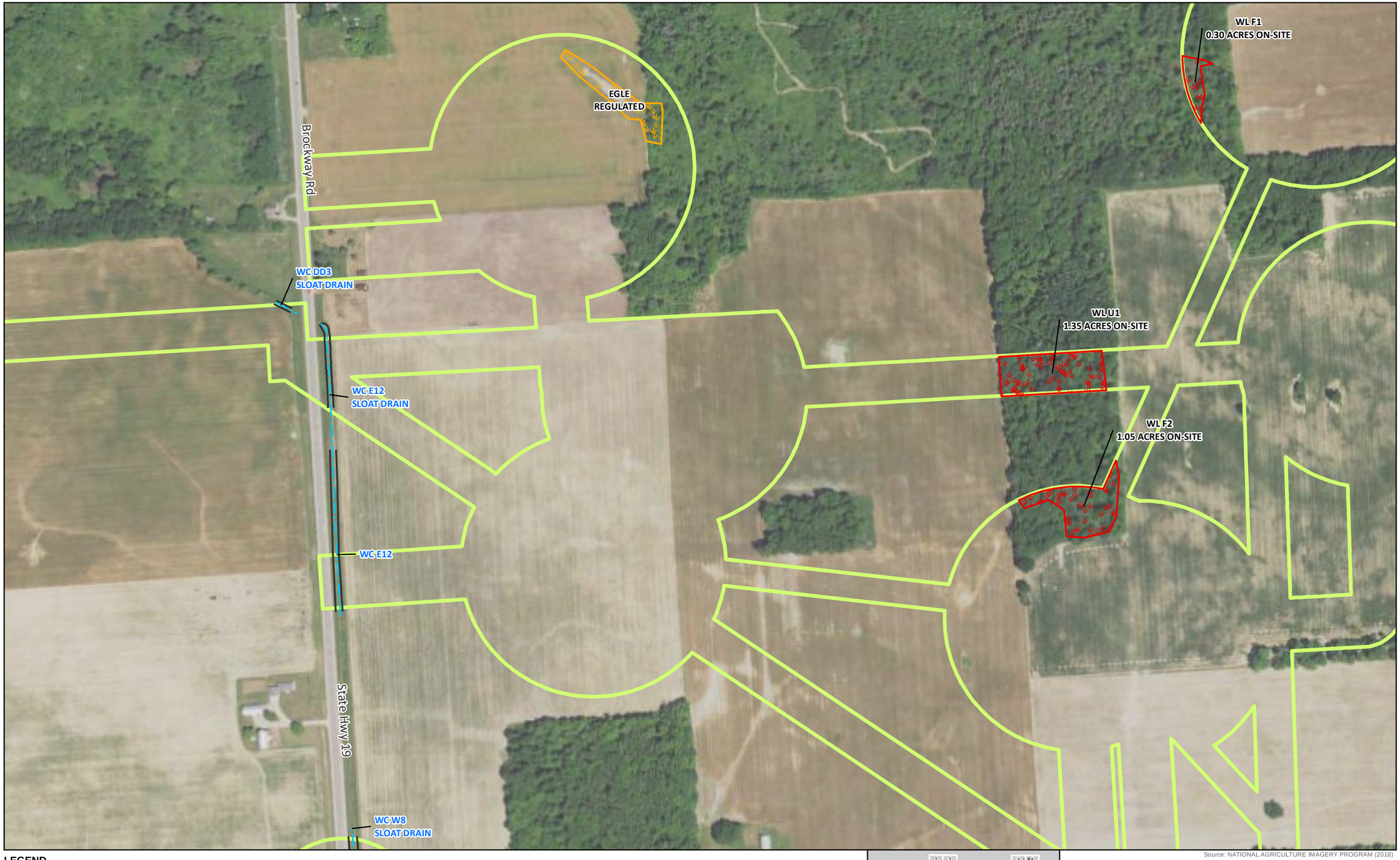

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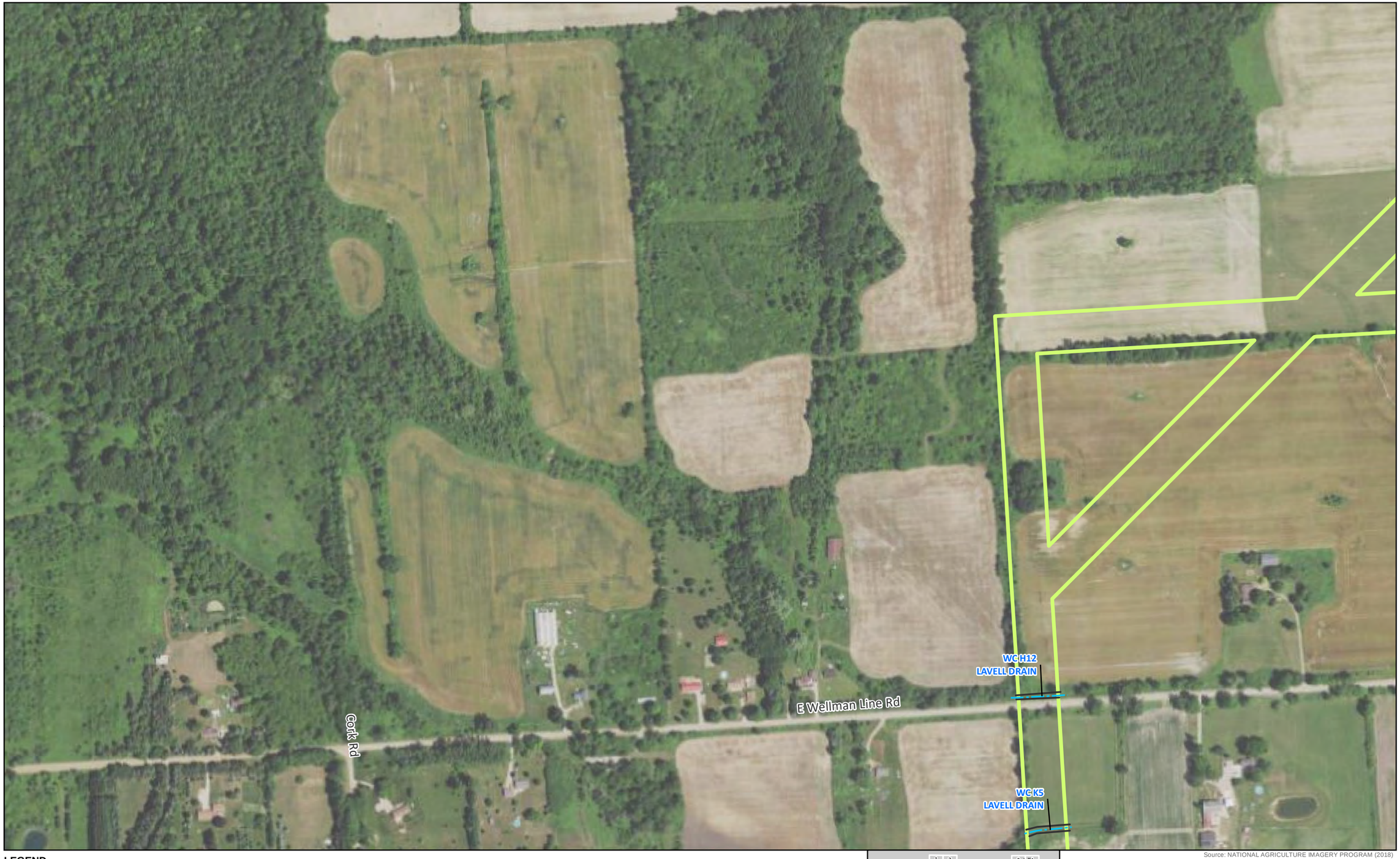

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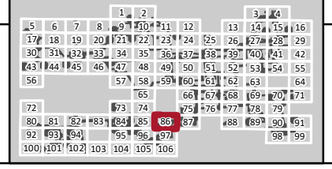

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SCALE: 0 200 Feet

DR.	C.J.	CH.	C.C.
P.M.	JEFF WILLIAMS		
BOOK:	--		
GIS FILE:	--		
JOB:	21003645		
FILE CODE:	--		
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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
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- DESKTOP DELINEATED WATERCOURSE
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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

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SCALE: 0 200 Feet

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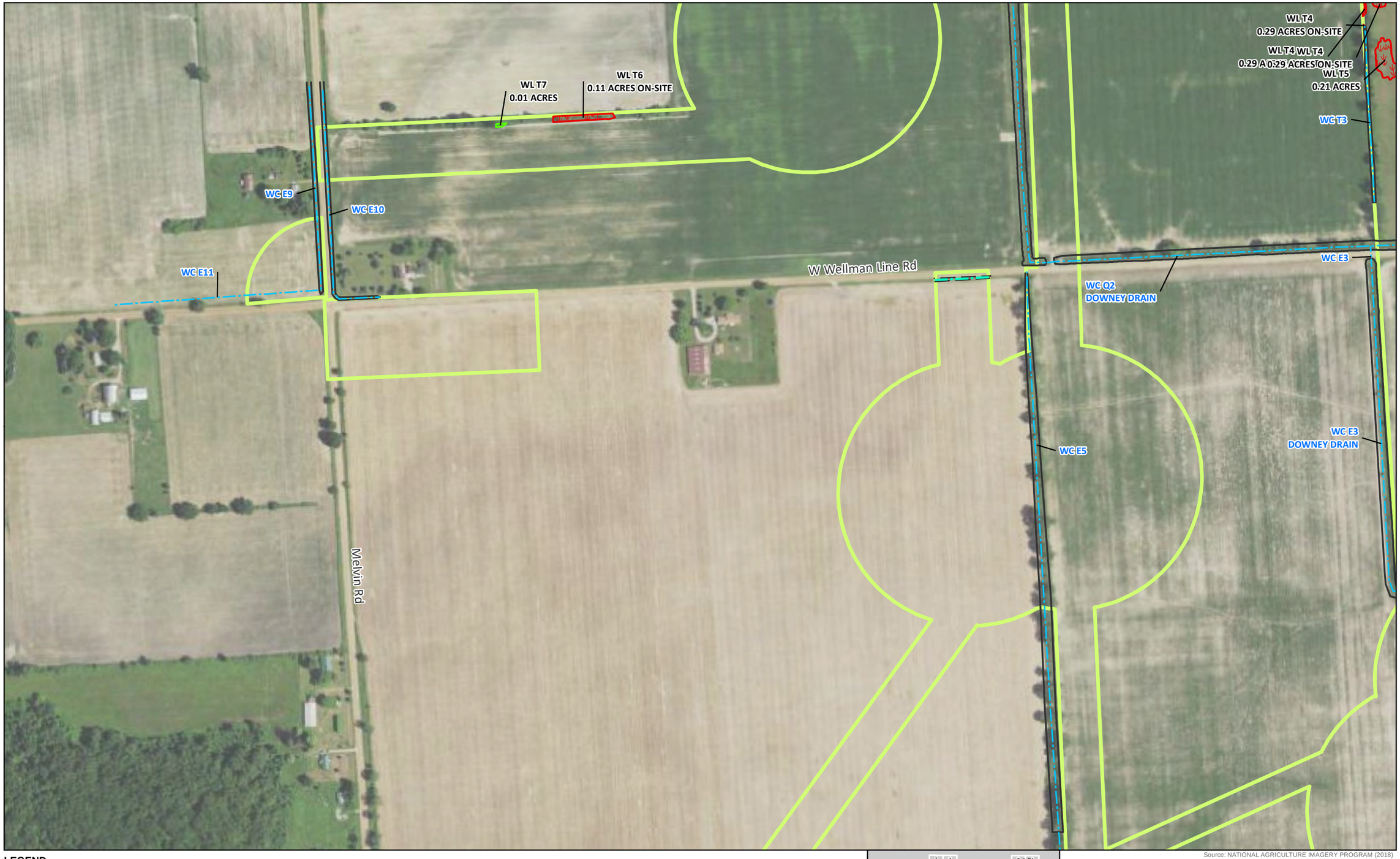

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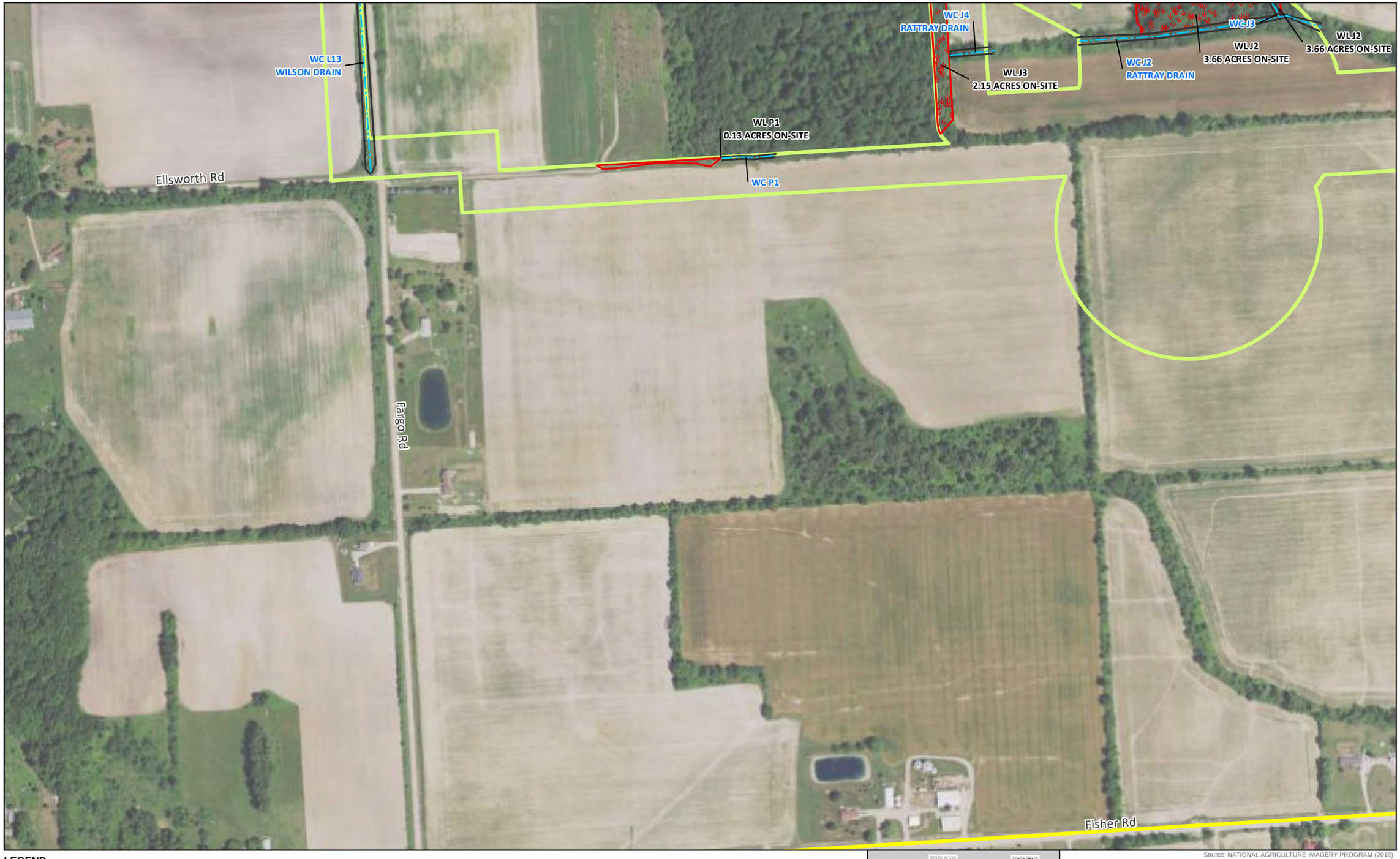

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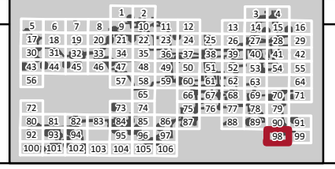

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LEGEND

- PROJECT SURVEY CORRIDOR (~3,847 ACRES)
- ENVIRONMENTAL STUDY AREA (~44,523 ACRES)
- WATERCOURSE (FIELD IDENTIFIED)
- APPROXIMATE TOP OF BANK (FIELD IDENTIFIED)
- NON-REGULATED WETLAND (FIELD IDENTIFIED)
- EGLE REGULATED WETLAND (FIELD IDENTIFIED)
- DESKTOP DELINEATED CULVERT
- DESKTOP DELINEATED WATERCOURSE
- DESKTOP DELINEATED APPROXIMATE TOP OF BANK
- DESKTOP DELINEATED WETLAND

N

Source: NATIONAL AGRICULTURE IMAGERY PROGRAM (2018)

Note: This illustration is an approximate depiction of the wetlands and watercourses that appear to be located on the subject property as delineated by Atwell on December 6-9 and 13-17, 2021 and January 3-7, April 4-8 and 11-14, 2022. The EGLE has the final authority on the extent of regulated wetlands, lakes, and streams in the state of Michigan.

ATWELL

TOWNRANGE (SECTIONS): 9N13E (12-13), 9N14E (1-18, 22-36), 9N15E (1-2, 5-36), 9N16E (6-7, 30-31), 10N14E (35-36)

ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

WETLAND LOCATION MAP

DATE: 8/31/2022

REVISIONS

SCALE: 0 200 Feet

DR. C.J. CH. C.C.

P.M. JEFF WILLIAMS

BOOK: --

GIS FILE: --

JOB: 21003645

FILE CODE: --

SHEET NO: 102 OF 106

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

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ELK, FREMONT, MAPLE VALLEY, SPEAKER AND WORTH TOWNSHIP

SANILAC COUNTY, MICHIGAN

CLIENT: ALGONQUIN POWER (RIVERBEND WIND), LLC

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SANILAC COUNTY, MICHIGAN

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TABLES

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
Atwell Project No. 21003645						
Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Wetland A1	4.3	EGLE Regulated	Forested	09N	15E	1
Wetland A2	2.00	EGLE Regulated	Forested	09N	15E	12
Wetland B1	5.86	EGLE Regulated	Forested	09N	15E	14
Wetland B2	1.27	Non-Regulated	Forested/Scrub-Shrub	09N	15E	14
Wetland BB1	0.30	EGLE Regulated	Open Water/Emergent/Scrub-Shrub	09N	14E	28
Wetland BB2	0.01	EGLE Regulated	Emergent/Scrub-Shrub	09N	14E	28
Wetland BB3	0.01	EGLE Regulated	Emergent/Scrub-Shrub	09N	14E	28
Wetland BB4	5.85	EGLE Regulated	Emergent/Scrub-Shrub/Forested	09N	14E	28
Wetland BB5	0.04	EGLE Regulated	Emergent	09N	14E	28
Wetland C1	1.64	EGLE Regulated	Forested	09N	15E	26
Wetland C2	0.64	EGLE Regulated	Forested	09N	15E	26
Wetland C3	0.02	EGLE Regulated	Emergent	09N	15E	26
Wetland C4	0.18	EGLE Regulated	Forested	09N	15E	26
Wetland CC1	0.47	EGLE Regulated	Forested	09N	15E	15
Wetland DD1	0.11	Non-Regulated	Emergent	09N	14E	27
Wetland DD2	0.07	EGLE Regulated	Emergent	09N	14E	27
Wetland DD3	0.51	EGLE Regulated	Scrub-Shrub	09N	14E	27
Wetland DD4	0.02	Non-Regulated	Forested	09N	14E	27
Wetland DD5	0.09	Non-Regulated	Emergent	09N	14E	27
Wetland DD6	0.01	Non-Regulated	Open Water	09N	14E	27
Wetland DD7	0.18	Non-Regulated	Scrub-Shrub	09N	14E	27
Wetland DD8	0.16	Non-Regulated	Open Water	09N	15E	6
Wetland DD9	0.19	Non-Regulated	Open Water	09N	15E	7
Wetland EE1	0.25	EGLE Regulated	Scrub-Shrub	09N	15E	6
Wetland EE2	0.22	EGLE Regulated	Emergent	09N	14E	1
Wetland F1	0.30	EGLE Regulated	Emergent/Scrub-Shrub/Forested	09N	14E	26
Wetland F2	1.05	EGLE Regulated	Emergent/Forested	09N	14E	26
Wetland F3	0.03	EGLE Regulated	Emergent	09N	15E	35
Wetland F4	0.04	Non-Regulated	Emergent	09N	14E	35
Wetland F5	0.17	Non-Regulated	Emergent/Scrub-Shrub	09N	14E	35
Wetland FF1	1.71	EGLE Regulated	Forested	09N	15E	20
Wetland FF2	0.05	EGLE Regulated	Forested	09N	14E	25
Wetland FF3	0.20	EGLE Regulated	Open Water	09N	14E	23
Wetland GG1	1.21	EGLE Regulated	Forested	09N	14E	14
Wetland H1	1.80	EGLE Regulated	Emergent/Forested	09N	15E	29
Wetland HH1	0.03	EGLE Regulated	Forested	09N	14E	33
Wetland HH2	0.02	EGLE Regulated	Scrub-Shrub	09N	14E	33
Wetland HH3	0.44	EGLE Regulated	Forested	09N	14E	15
Wetland HH4	0.15	EGLE Regulated	Scrub-Shrub	09N	14E	15
Wetland II1	0.01	Non-Regulated	Open Water	09N	14E	14
Wetland II2	1.23	EGLE Regulated	Scrub-Shrub/Forested	09N	14E	14
Wetland II3	0.46	EGLE Regulated	Emergent	09N	14E	14
Wetland II4	5.88	EGLE Regulated	Forested	09N	14E	14
Wetland J1	0.06	Non-Regulated	Forested	09N	15E	36

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
Atwell Project No. 21003645						
Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Wetland J2	3.66	EGLE Regulated	Forested	09N	15E	36
Wetland J3	2.15	EGLE Regulated	Forested	09N	15E	36
Wetland K1	1.59	EGLE Regulated	Forested	09N	15E	21
Wetland L1	1.83	EGLE Regulated	Emergent/Forested	09N	15E	35
Wetland M1	2.39	EGLE Regulated	Emergent/Scrub-Shrub	09N	14E	8
Wetland M2	1.52	EGLE Regulated	Forested	09N	14E	10
Wetland N1	2.93	EGLE Regulated	Forested	09N	14E	11
Wetland P1	0.13	EGLE Regulated	Emergent/Scrub-Shrub	09N	15E	36
Wetland P2	0.16	EGLE Regulated	Scrub-Shrub	09N	15E	36
Wetland P3	3.03	EGLE Regulated	Forested/Emergent	09N	15E	35
Wetland R1	0.11	EGLE Regulated	Forested	09N	15E	23
Wetland R2	1.00	EGLE Regulated	Forested	09N	15E	23
Wetland S1	3.52	EGLE Regulated	Forested	09N	15E	15
Wetland T1	0.03	EGLE Regulated	Emergent	09N	14E	29
Wetland T2	0.29	EGLE Regulated	Emergent	09N	14E	29
Wetland T3	0.09	EGLE Regulated	Emergent	09N	14E	29
Wetland T4	0.29	EGLE Regulated	Emergent/Scrub-Shrub	09N	14E	29
Wetland T5	0.21	EGLE Regulated	Emergent	09N	14E	29
Wetland T6	0.11	EGLE Regulated	Scrub-Shrub/Emergent	09N	14E	29
Wetland T7	0.01	Non-Regulated	Scrub-Shrub	09N	14E	29
Wetland T8	0.03	EGLE Regulated	Emergent	09N	14E	31
Wetland U1	1.35	EGLE Regulated	Forested	09N	14R	26
Wetland W1	0.03	EGLE Regulated	Emergent	09N	14E	31
Wetland W2	0.02	EGLE Regulated	Emergent	09N	14E	32
Wetland W3	0.36	EGLE Regulated	Emergent	09N	14E	28
Wetland Y1	3.63	EGLE Regulated	Forested	09N	15E	27
Watercourse A1 (Turner Drain)	--	EGLE Regulated	Intermittent			
Watercourse A2	--	EGLE Regulated	Perennial			
Watercourse A3	--	EGLE Regulated	Intermittent			
Watercourse A4	--	EGLE Regulated	Intermittent			
Watercourse A5	--	EGLE Regulated	Intermittent			
Watercourse AA1	--	EGLE Regulated	Intermittent			
Watercourse AA2 (McIntyre & Willing Drain)	--	EGLE Regulated	Perennial			
Watercourse AA3	--	EGLE Regulated	Perennial			
Watercourse AA4	--	EGLE Regulated	Intermittent			
Watercourse B1	--	EGLE Regulated	Intermittent			
Watercourse B2 (William Doan Drain)	--	EGLE Regulated	Intermittent			
Watercourse B3 (Sheridan Drain)	--	EGLE Regulated	Intermittent			
Watercourse B4 (Sheridan Drain)	--	EGLE Regulated	Intermittent			
Watercourse B5	--	EGLE Regulated	Perennial			
Watercourse B6 (Lawson Drain)	--	EGLE Regulated	Perennial			
Watercourse B7 (Lawson Drain)	--	EGLE Regulated	Perennial			
Watercourse B8	--	EGLE Regulated	Intermittent			
Watercourse BB1	--	EGLE Regulated	Intermittent			

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
Atwell Project No. 21003645						
Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Watercourse BB2	--	EGLE Regulated	Intermittent			
Watercourse BB3 (Downey Drain)	--	EGLE Regulated	Intermittent			
Watercourse BB4 (Downey Drain)	--	EGLE Regulated	Intermittent			
Watercourse BB5 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse BB6	--	EGLE Regulated	Intermittent			
Watercourse C1 (Conroy & Ferriby Drain)	--	EGLE Regulated	Perennial			
Watercourse C2	--	EGLE Regulated	Intermittent			
Watercourse C3 (Willey Drain)	--	EGLE Regulated	Perennial			
Watercourse C4	--	EGLE Regulated	Intermittent			
Watercourse C5 (Lavell Drain)	--	EGLE Regulated	Intermittent			
Watercourse C6 (Black Creek Drain)	--	EGLE Regulated	Perennial			
Watercourse CC1	--	EGLE Regulated	Perennial			
Watercourse CC2 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse D1 (McIntyre & Willing Drain)	--	EGLE Regulated	Perennial			
Watercourse D2 (Rector Drain)	--	EGLE Regulated	Perennial			
Watercourse DD1	--	EGLE Regulated	Ephemeral			
Watercourse DD3 (Sloat Drain)	--	EGLE Regulated	Intermittent			
Watercourse DD4	--	EGLE Regulated	Intermittent			
Watercourse E1	--	EGLE Regulated	Perennial			
Watercourse E2 (Downey Drain)	--	EGLE Regulated	Perennial			
Watercourse E3 (Downey Drain)	--	EGLE Regulated	Perennial			
Watercourse E4	--	EGLE Regulated	Perennial			
Watercourse E5	--	EGLE Regulated	Intermittent			
Watercourse E6	--	EGLE Regulated	Perennial			
Watercourse E7	--	EGLE Regulated	Intermittent			
Watercourse E8	--	EGLE Regulated	Intermittent			
Watercourse E9	--	EGLE Regulated	Intermittent			
Watercourse E10	--	EGLE Regulated	Intermittent			
Watercourse E12 (Sloat Drain)	--	EGLE Regulated	Perennial			
Watercourse EE1	--	EGLE Regulated	Intermittent			
Watercourse EE2 (Potts Drain)	--	EGLE Regulated	Intermittent			
Watercourse EE3	--	EGLE Regulated	Intermittent			
Watercourse EE4 (Potts Drain)	--	EGLE Regulated	Perennial			
Watercourse EE5	--	EGLE Regulated	Intermittent			
Watercourse EE6 (McIntyre & Willing Drain)	--	EGLE Regulated	Perennial			
Watercourse EE7	--	EGLE Regulated	Intermittent			
Watercourse F1 (Potts Drain)	--	EGLE Regulated	Perennial			
Watercourse F2 (Potts Drain)	--	EGLE Regulated	Perennial			
Watercourse FF1	--	EGLE Regulated	Intermittent			
Watercourse FF2	--	EGLE Regulated	Intermittent			
Watercourse FF3 (Lord Drain)	--	EGLE Regulated	Perennial			
Watercourse FF4 (Cline and Kerr Drain)	--	EGLE Regulated	Perennial			
Watercourse FF5	--	EGLE Regulated	Intermittent			
Watercourse FF6	--	EGLE Regulated	Intermittent			

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
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Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Watercourse FF7	--	EGLE Regulated	Intermittent			
Watercourse FF8	--	EGLE Regulated	Intermittent			
Watercourse G1 (Cork Drain)	--	EGLE Regulated	Perennial			
Watercourse G2 (Solan Drain)	--	EGLE Regulated	Perennial			
Watercourse G3 (Macklem Drain)	--	EGLE Regulated	Perennial			
Watercourse G6 (Turner Drain)	--	EGLE Regulated	Perennial			
Watercourse GG1 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse GG2	--	EGLE Regulated	Intermittent			
Watercourse H1	--	EGLE Regulated	Intermittent			
Watercourse H3 (East Branch Speaker & Maple Valley Drain)	--	EGLE Regulated	Perennial			
Watercourse H4	--	EGLE Regulated	Perennial			
Watercourse H6 (Solan Drain)	--	EGLE Regulated	Perennial			
Watercourse H8	--	EGLE Regulated	Intermittent			
Watercourse H12 (Lavell Drain)	--	EGLE Regulated	Perennial			
Watercourse H13	--	EGLE Regulated	Intermittent			
Watercourse H16 (Black Creek Drain)	--	EGLE Regulated	Perennial			
Watercourse HH1	--	EGLE Regulated	Perennial			
Watercourse HH2	--	EGLE Regulated	Intermittent			
Watercourse I1 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse I3 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse II1 (Cork Drain)	--	EGLE Regulated	Perennial			
Watercourse J1	--	EGLE Regulated	Ephemeral			
Watercourse J2 (Rattray Drain)	--	EGLE Regulated	Intermittent			
Watercourse J3	--	EGLE Regulated	Intermittent			
Watercourse J4 (Rattray Drain)	--	EGLE Regulated	Intermittent			
Watercourse K1	--	EGLE Regulated	Ephemeral			
Watercourse K2	--	EGLE Regulated	Ephemeral			
Watercourse K3	--	EGLE Regulated	Perennial			
Watercourse K4	--	EGLE Regulated	Ephemeral			
Watercourse K5 (Lavell Drain)	--	EGLE Regulated	Perennial			
Watercourse K6	--	EGLE Regulated	Ephemeral			
Watercourse K7	--	EGLE Regulated	Intermittent			
Watercourse K8	--	EGLE Regulated	Intermittent			
Watercourse K9	--	EGLE Regulated	Ephemeral			
Watercourse K10	--	EGLE Regulated	Intermittent			
Watercourse L1	--	EGLE Regulated	Ephemeral			
Watercourse L2	--	EGLE Regulated	Ephemeral			
Watercourse L3	--	EGLE Regulated	Ephemeral			
Watercourse L4	--	EGLE Regulated	Intermittent			
Watercourse L5	--	EGLE Regulated	Intermittent			
Watercourse L6 (Willey Drain)	--	EGLE Regulated	Perennial			
Watercourse L7	--	EGLE Regulated	Ephemeral			
Watercourse L8	--	EGLE Regulated	Intermittent			
Watercourse L9	--	EGLE Regulated	Intermittent			

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
Atwell Project No. 21003645						
Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Watercourse L10	--	EGLE Regulated	Intermittent			
Watercourse L11	--	EGLE Regulated	Perennial			
Watercourse L12	--	EGLE Regulated	Perennial			
Watercourse L13 (Wilson Drain)	--	EGLE Regulated	Intermittent			
Watercourse M1	--	EGLE Regulated	Intermittent			
Watercourse M2	--	EGLE Regulated	Intermittent			
Watercourse M3 (East Branch Speaker & Maple Valley Drain)	--	EGLE Regulated	Perennial			
Watercourse M4	--	EGLE Regulated	Intermittent			
Watercourse M5	--	EGLE Regulated	Intermittent			
Watercourse M6	--	EGLE Regulated	Intermittent			
Watercourse M7 (Spring Creek)	--	EGLE Regulated	Perennial			
Watercourse M8 (Spring Creek)	--	EGLE Regulated	Perennial			
Watercourse M9 (Hunt Drain)	--	EGLE Regulated	Intermittent			
Watercourse M10 (Hunt Drain)	--	EGLE Regulated	Ephemeral			
Watercourse N1 (Lord Drain)	--	EGLE Regulated	Intermittent			
Watercourse N2	--	EGLE Regulated	Intermittent			
Watercourse N3	--	EGLE Regulated	Intermittent			
Watercourse O1	--	EGLE Regulated	Intermittent			
Watercourse O2	--	EGLE Regulated	Intermittent			
Watercourse O3	--	EGLE Regulated	Perennial			
Watercourse O4	--	EGLE Regulated	Intermittent			
Watercourse O5	--	EGLE Regulated	Intermittent			
Watercourse O6 (Sheridan Drain)	--	EGLE Regulated	Perennial			
Watercourse O7	--	EGLE Regulated	Intermittent			
Watercourse O8 (Sheridan Drain)	--	EGLE Regulated	Intermittent			
Watercourse P1	--	EGLE Regulated	Ephemeral			
Watercourse Q1 (Downey Drain)	--	EGLE Regulated	Intermittent			
Watercourse Q2 (Downey Drain)	--	EGLE Regulated	Perennial			
Watercourse R1 (Jackson Creek)	--	EGLE Regulated	Intermittent			
Watercourse R2	--	EGLE Regulated	Perennial			
Watercourse R3 (Willey Drain)	--	EGLE Regulated	Intermittent			
Watercourse R4	--	EGLE Regulated	Intermittent			
Watercourse R5	--	EGLE Regulated	Intermittent			
Watercourse R6 (Conroy & Ferriby Drain)	--	EGLE Regulated	Perennial			
Watercourse R7	--	EGLE Regulated	Intermittent			
Watercourse R8	--	EGLE Regulated	Intermittent			
Watercourse R9	--	EGLE Regulated	Intermittent			
Watercourse R10 (Jackson Creek)	--	EGLE Regulated	Perennial			
Watercourse R11	--	EGLE Regulated	Intermittent			
Watercourse S1 (Putney Drain)	--	EGLE Regulated	Perennial			
Watercourse S2 (Seymore Drain)	--	EGLE Regulated	Perennial			
Watercourse S3	--	EGLE Regulated	Intermittent			
Watercourse S4 (Crouse Drain)	--	EGLE Regulated	Perennial			
Watercourse S5	--	EGLE Regulated	Intermittent			

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
Atwell Project No. 21003645						
Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Watercourse S6 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse S7 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse S8 (Seymore Creek)	--	EGLE Regulated	Perennial			
Watercourse T1	--	EGLE Regulated	Intermittent			
Watercourse T2	--	EGLE Regulated	Intermittent			
Watercourse T3	--	EGLE Regulated	Intermittent			
Watercourse T4	--	EGLE Regulated	Intermittent			
Watercourse T5 (Sanilac and St. Clair Drain)	--	EGLE Regulated	Perennial			
Watercourse T6	--	EGLE Regulated	Intermittent			
Watercourse T7	--	EGLE Regulated	Intermittent			
Watercourse U1	--	EGLE Regulated	Intermittent			
Watercourse U2	--	EGLE Regulated	Intermittent			
Watercourse U3	--	EGLE Regulated	Intermittent			
Watercourse U4	--	EGLE Regulated	Intermittent			
Watercourse U5	--	EGLE Regulated	Intermittent			
Watercourse V1 (Jackson Creek)	--	EGLE Regulated	Perennial			
Watercourse W1	--	EGLE Regulated	Intermittent			
Watercourse W2 (Sanilac and St.Clair Drain)	--	EGLE Regulated	Perennial			
Watercourse W3	--	EGLE Regulated	Ephemeral			
Watercourse W4	--	EGLE Regulated	Intermittent			
Watercourse W5	--	EGLE Regulated	Intermittent			
Watercourse W6	--	EGLE Regulated	Intermittent			
Watercourse W7	--	EGLE Regulated	Intermittent			
Watercourse W8 (Sloat Drain)	--	EGLE Regulated	Intermittent			
Watercourse W9 (Cole Drain)	--	EGLE Regulated	Intermittent			
Watercourse X1 (Seymore Creek)	--	EGLE Regulated	Intermittent			
Watercourse X2	--	EGLE Regulated	Perennial			
Watercourse X3	--	EGLE Regulated	Intermittent			
Watercourse X4	--	EGLE Regulated	Intermittent			
Watercourse X5	--	EGLE Regulated	Intermittent			
Watercourse X6	--	EGLE Regulated	Intermittent			
Watercourse X7 (Potts Drain)	--	EGLE Regulated	Perennial			
Watercourse X8 (Potts Drain)	--	EGLE Regulated	Intermittent			
Watercourse X9	--	EGLE Regulated	Intermittent			
Watercourse X10 (Fletcher Drain)	--	EGLE Regulated	Intermittent			
Watercourse X11	--	EGLE Regulated	Intermittent			
Watercourse Y1	--	EGLE Regulated	Intermittent			
Watercourse Y2 (Seymore Drain)	--	EGLE Regulated	Perennial			
Watercourse Y3	--	EGLE Regulated	Intermittent			
Watercourse Y4	--	EGLE Regulated	Intermittent			
Watercourse Y5	--	EGLE Regulated	Intermittent			
Watercourse Y6	--	EGLE Regulated	Perennial			
Watercourse Y7	--	EGLE Regulated	Intermittent			
Watercourse Y8	--	EGLE Regulated	Intermittent			

Riverbend Wind Project						
Wetland and Watercourse Summary Table						
Atwell Project No. 21003645						
Feature	**Acres (On-Site)**	**Regulatory Status**	**Type**	**Township**	**Range**	**Section**
Watercourse Y9	--	EGLE Regulated	Ephemeral			
Watercourse Z1	--	EGLE Regulated	Intermittent			
Desktop Delineated Features						
27 Wetlands						
45 Watercourses						
Total	**69.71**	--	--			

APPENDICES

APPENDIX A

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Riverbend Wind Energy Project

Sanilac County, MI

Photo 1. A northeast-facing view of a typical agricultural field within the Environmental Survey Area.

Photo 2. A north-facing view of a typical upland woodlot within the Environmental Survey Area.

Photo 3. A west-facing view of a typical upland pasture area within the Environmental Survey Area.

Photo 4. A south-facing view of a residential building with maintained lawn within the Environmental Survey Area.

Photo 5. An east-facing view of Wetland DD5, a typical palustrine emergent (PEM) wetland in the Environmental Survey Area.

Photo 6. A north-facing view of Wetland DD3, a palustrine scrub-shrub (PSS) wetland found within the Environmental Survey Area.

Photo 7. A south-facing view of Wetland II4, a palustrine forested (PFO) wetland found within the Environmental Survey Area.

Photo 8. A west-facing view of Wetland P3, a PEM/PFO wetland found within the Environmental Survey Area.

Photo 9. A north-facing view of Wetland T4, a PEM/PSS wetland found within the Environmental Survey Area.

Photo 10. An east-facing view of Wetland II2, a PSS/PFO wetland found within the Environmental Survey Area.

Photo 11. An east-facing view of Wetland BB4, a PEM/PSS/PFO wetland found within the Environmental Survey Area.

Photo 12. A north-facing view of Wetland FF3, an open water (OW) wetland found within the Environmental Survey Area.

Photo 13. A west-facing view of Wetland BB1, a PEM/PSS/OW wetland found within the Environmental Survey Area.

Photo 14. A southwest-facing view of Watercourse R10, Jackson Creek, a typical perennial watercourse found within the Environmental Survey Area.

Photo 15. A south-facing view of Watercourse T6, another typical perennial watercourse found within the Environmental Survey Area.

Photo 16. An east-facing view of Watercourse B8, a typical intermittent watercourse found within the Environmental Survey Area.

Photo 17. A west-facing view of Watercourse E5, another typical intermittent watercourse found within the Environmental Survey Area.

Photo 18. A north-facing view of Watercourse W3, a typical ephemeral watercourse found within the Environmental Survey Area.

APPENDIX B

WETLAND DATA FORMS

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL A1

Investigator(s): David Nigro, Carl LaRiccia, Chris Kunkle Section, Township, Range: sec 01 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.240799 Long: -82.657782 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PFO wetland mosaic

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL A1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	70	Y	FAC
2. *Acer saccharinum*	10	N	FACW
3. *Populus tremuloides*	5	N	FAC
4. *Betula papyrifera*	2	N	FACU
5.			
6.			
7.			
	87	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	10	Y	FAC
2. *Rubus hispidoides*	3	Y	FACW
3.			
4.			
5.			
6.			
7.			
	13	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Symphyotrichum lanceolatum*	15	Y	FACW
2. *Geum canadense*	10	Y	FAC
3. *Onoclea sensibilis*	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	33.00	x 2 =	66.00
FAC species	95.00	x 3 =	285.00
FACU species	2.00	x 4 =	8.00
UPL species	0.00	x 5 =	0.00
Column Totals:	130.00 (A)		359.00 (B)

Prevalence Index = B/A = 2.76

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL A1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					SL	
8-12	10YR 3/1	95	10YR 4/6	5	C	M	SL	Prominent redox.
12-18	10YR 8/3	80	10YR 4/6	20	C	M	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL A2

Investigator(s): David Nigro, Carl LaRiccia, Chris Kunkle Section, Township, Range: sec 12 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.226803 Long: -82.655701 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 6

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL A2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	35	Y	FAC
2. *Populus tremuloides*	30	Y	FAC
3.			
4.			
5.			
6.			
7.			
	65	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	5	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	25	Y	FACW
2. *Solidago gigantea*	10	Y	FACW
3. *Rumex crispus*	3	N	FAC
4. *Symphyotrichum lanceolatum*	2	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	37.00	x 2 =	74.00
FAC species	73.00	x 3 =	219.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	110.00 (A)		293.00 (B)

Prevalence Index = B/A = 2.66

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL A2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					SL	
6-12	10YR 2/1	85	10YR 5/6	15	C	M	SL	Prominent redox.
12-18	10YR 2/2	70	10YR 4/4	30	C	M	SL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-07

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL B1

Investigator(s): David Nigro, Carl LaRiccia Section, Township, Range: sec 14 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.217443 Long: -82.673147 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL B1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus bicolor*	20	Y	FACW
2. *Acer rubrum*	20	Y	FAC
3. *Acer saccharinum*	10	N	FACW
4. *Ailanthus altissima*	5	N	UPL
5.			
6.			
7.			
	55	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	15	Y	FAC
2. *Rubus pubescens*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	20	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Typha angustifolia*	10	Y	OBL
2. *Solidago gigantea*	10	Y	FACW
3. *Carex sp.*	10	Y	
4. *Phalaris arundinacea*	5	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20.00	x 1 =	20.00
FACW species	50.00	x 2 =	100.00
FAC species	35.00	x 3 =	105.00
FACU species	0.00	x 4 =	0.00
UPL species	5.00	x 5 =	25.00
Column Totals:	110.00 (A)		250.00 (B)

Prevalence Index = B/A = 2.27

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: WL B1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					SL	
3-12	10YR 3/1	85	10YR 5/6	15	C	M	SL	Prominent redox.
12-18	10YR 5/1	80	10YR 5/4	20	C	M	SL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-07

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL B2

Investigator(s): David Nigro, Carl LaRicca Section, Township, Range: sec 16 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.210040 Long: -82.712609 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL B2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	35	Y	FAC
2. *Quercus bicolor*	5	N	FACW
3. *Populus tremuloides*	5	N	FAC
4.			
5.			
6.			
7.			
	45	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus alba*	15	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex vulpinoidea*	10	Y	OBL
2. *Symphyotrichum lanceolatum*	10	Y	FACW
3. *Solidago gigantea*	5	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis sp.*	10	Y	
2.			
3.			
4.			
	10	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	35.00	x 2 =	70.00
FAC species	40.00	x 3 =	120.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	85.00 (A)		200.00 (B)

Prevalence Index = B/A = 2.35

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL B2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100					SL	
2-9	10YR 3/2	90	10YR 5/6	10	C	M	SCL	Prominent redox.
9-16	10YR 5/1	65	10YR 5/6	35	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland BB1

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 28 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.179655 Long: -82.831870 Datum: WGS84

Soil Map Unit Name: McBride sandy loam and Montcalm loamy sand, 0 to 3 percent slopes, slightly eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

Open water depression with mixed PEM/PSS fringe

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 24	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present?** Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Likely groundwater fed

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland BB1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Saix spp.*	20	Y	FACW
2. *Cornus racemosa*	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
	30 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha latifolia*	30	Y	OBL
2. *Juncus effusus*	10	Y	OBL
3. *Onoclea sensibilis*	5	N	FACW
4. *Scirpus cyperinus*	5	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	45.00	x 1 =	45.00
FACW species	25.00	x 2 =	50.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	80.00 (A)		125.00 (B)

Prevalence Index = B/A = 1.56

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season, open water approx 30% of wetland

SOIL

Sampling Point: Wetland BB1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/1	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ✓ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland BB2

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 28 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.178489 Long: -82.831509 Datum: WGS84

Soil Map Unit Name: McBride sandy loam and Montcalm loamy sand, 0 to 3 percent slopes, slightly eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PSS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland BB2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	5	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	20	Y	FAC
2. *Alnus incana*	10	Y	FACW
3. *Ilex verticillata*	5	N	FACW
4.			
5.			
6.			
7.			
	35 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Symphyotrichum lateriflorum*	20	Y	FAC
3. *Bluejoint*	20	Y	OBL
4. *Juncus effusus*	10	N	OBL
5. *Onoclea sensibilis*	5	N	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35.00	x 1 =	35.00
FACW species	50.00	x 2 =	100.00
FAC species	40.00	x 3 =	120.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	125.00 (A)		255.00 (B)

Prevalence Index = B/A = 2.04

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season, open water approx 30% of wetland

SOIL

Sampling Point: Wetland BB2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100						
3-18	10YR 4/2	80	10YR 5/6	20				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland BB3

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 28 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.178402 Long: -82.832065 Datum: WGS84

Soil Map Unit Name: McBride sandy loam and Montcalm loamy sand, 0 to 3 percent slopes, slightly eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PSS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland BB3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	5	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	20	Y	FAC
2. *Alnus incana*	10	Y	FACW
3. *Ilex verticillata*	5	N	FACW
4.			
5.			
6.			
7.			
	35 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Symphyotrichum lateriflorum*	20	Y	FAC
3. *Bluejoint*	20	Y	OBL
4. *Juncus effusus*	10	N	OBL
5. *Onoclea sensibilis*	5	N	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35.00	x 1 =	35.00
FACW species	50.00	x 2 =	100.00
FAC species	40.00	x 3 =	120.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	125.00 (A)		255.00 (B)

Prevalence Index = B/A = 2.04

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season, open water approx 30% of wetland

SOIL

Sampling Point: Wetland BB3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100						
3-18	10YR 4/2	80	10YR 5/6	20				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland BB4

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 28 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.178179 Long: -82.833607 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PSS/PFO

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 6
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Inundated from recent rain

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland BB4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	20	Y	OBL
2. *Silver maple*	10	Y	FACW
3. *Acer negundo*	5	N	FAC
4.			
5.			
6.			
7.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	30	Y	FAC
2. *Alnus incana*	10	Y	FACW
3. *Cephalanthus occidentalis*	5	N	OBL
4.			
5.			
6.			
7.			
	45	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Carex lacustris*	20	Y	OBL
3. *Juncus effusus*	10	N	OBL
4. *Symphyotrichum lateriflorum*	5	N	FAC
5. *Onoclea sensibilis*	5	N	FACW
6. *Bluejoint*	5	N	OBL
7.			
8.			
9.			
10.			
11.			
12.			
	75	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60.00	x 1 =	60.00
FACW species	55.00	x 2 =	110.00
FAC species	40.00	x 3 =	120.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	155.00 (A)		290.00 (B)

Prevalence Index = B/A = 1.87

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season, open water approx 30% of wetland

SOIL

Sampling Point: Wetland BB4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100						
3-18	10YR 4/2	80	10YR 5/6	20				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland BB5

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 28 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.174561 Long: -82.831375 Datum: WGS84

Soil Map Unit Name: Marlette loam, 2 to 6 percent slopes, slightly eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 6
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Inundated from recent rain

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland BB5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Ranunculus sceleratus*	2	N	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	2 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2.00	x 1 =	2.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	2.00 (A)		2.00 (B)

Prevalence Index = B/A = 1.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

_✓_ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_✓_ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _✓_ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season, open water approx 30% of wetland

SOIL

Sampling Point: Wetland BB5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100						
3-18	10YR 4/2	80	10YR 5/6	20				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL C1

Investigator(s): David Nigro, Carl LaRiccia Section, Township, Range: sec 26 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.183288 Long: -82.678982 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL C1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	20	Y	FAC
2. *Quercus palustris*	15	Y	FACW
3. *Populus grandidentata*	10	Y	FACU
4. *Quercus muehlenbergii*	5	N	FACU
5.			
6.			
7.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	25	Y	FAC
2. *Rubus pubescens*	5	N	FACW
3.			
4.			
5.			
6.			
7.			
	30	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Solidago gigantea*	5	Y	FACW
2. *Symphyotrichum lanceolatum*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis sp.*	5	Y	
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.43 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	30.00	x 2 =	60.00
FAC species	45.00	x 3 =	135.00
FACU species	15.00	x 4 =	60.00
UPL species	0.00	x 5 =	0.00
Column Totals:	90.00 (A)		255.00 (B)

Prevalence Index = B/A = 2.83

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL C1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	100					SCL	
6-10	10YR 3/1	98	10YR 5/4	2	C	M	SCL	Distinct redox.
10-18	10YR 6/2	60	10YR 5/6	20	C	M	SCL	Prominent redox.
			10YR 3/1	20	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL C2

Investigator(s): David Nigro, Carl LaRiccia Section, Township, Range: sec 26 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.185960 Long: -82.678783 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL C2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus palustris*	25	Y	FACW
2. *Acer saccharinum*	10	Y	FACW
3. *Acer rubrum*	10	Y	FAC
4. *Ulmus americana*	5	N	FACW
5.			
6.			
7.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	10	Y	FAC
2. *Rubus pubescens*	10	Y	FACW
3.			
4.			
5.			
6.			
7.			
	20	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Elymus virginicus*	10	Y	FACW
2. *Symphyotrichum lanceolatum*	10	Y	FACW
3. *Phalaris arundinacea*	5	N	FACW
4. *Solidago gigantea*	5	N	FACW
5. *Erigeron canadensis*	5	N	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis sp*	10	Y	
2.			
3.			
4.			
	10	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	80.00	x 2 =	160.00
FAC species	20.00	x 3 =	60.00
FACU species	5.00	x 4 =	20.00
UPL species	0.00	x 5 =	0.00
Column Totals:	105.00 (A)		240.00 (B)

Prevalence Index = B/A = 2.29

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL C2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					SCL	
6-10	10YR 3/2	95	10YR 4/6	5	C	M	SCL	Prominent redox.
10-18	10YR 5/2	70	10YR 5/6	30	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-08

Applicant/Owner: Libert Power State: Michigan Sampling Point: WL C3

Investigator(s): David Nigro, Carl LaRiccia Section, Township, Range: sec 26 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.181155 Long: -82.673319 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL C3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Agrostis stolonifera*	20	Y	FACW
2. *Panicum capillare*	15	Y	FAC
3. *Rumex crispus*	10	N	FAC
4. *Beta vulgaris*	10	N	UPL
5. *Setaria pumila*	5	N	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	20.00	x 2 =	40.00
FAC species	30.00	x 3 =	90.00
FACU species	0.00	x 4 =	0.00
UPL species	10.00	x 5 =	50.00
Column Totals:	60.00 (A)		180.00 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL C3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/1	100					SCL	
2-8	10YR 3/1	90	10YR 5/6	10	C	M	SCL	Prominent redox.
8-16	10YR 4/2	80	10YR 5/6	20	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL C4

Investigator(s): David Nigro Section, Township, Range: sec 26 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.183292 Long: -82.673429 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL C4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	45	Y	FAC
2. *Quercus macrocarpa*	10	N	FACU
3. *Acer saccharinum*	5	N	FACW
4.			
5.			
6.			
7.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	10	Y	FAC
2. *Rubus pubescens*	10	Y	FACW
3.			
4.			
5.			
6.			
7.			
	20	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Solidago gigantea*	15	Y	FACW
2. *Symphyotrichum lanceolatum*	10	Y	FACW
3. *Poa palustris*	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	45.00	x 2 =	90.00
FAC species	55.00	x 3 =	165.00
FACU species	10.00	x 4 =	40.00
UPL species	0.00	x 5 =	0.00
Column Totals:	110.00 (A)		295.00 (B)

Prevalence Index = B/A = 2.68

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL C4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100					SCL	
6-12	10YR 2/2	95	10YR 4/6	5	C	M	SCL	Prominent redox.
12-18	10YR 6/1	80	10YR 5/6	20	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-08

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL CC1

Investigator(s): David Nigro, Carl LaRiccia Section, Township, Range: sec 15 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.218371 Long: -82.706000 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ✓ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL CC1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	15	Y	FACW
2. *Quercus alba*	5	Y	FACU
3. *Carya ovata*	5	Y	FACU
4.			
5.			
6.			
7.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Ulmus americana*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex grayi*	10	Y	FACW
2. *Onoclea sensibilis*	5	Y	FACW
3. *Juncus effusus*	2	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	17	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2.00	x 1 =	2.00
FACW species	35.00	x 2 =	70.00
FAC species	0.00	x 3 =	0.00
FACU species	10.00	x 4 =	40.00
UPL species	0.00	x 5 =	0.00
Column Totals:	47.00 (A)		112.00 (B)

Prevalence Index = B/A = 2.38

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: WL CC1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100					SCL	
3-9	10YR 3/2	80	10YR 4/6	20	C	M	SCL	Prominent redox.
9-18	10YR 3/2	75	10YR 6/2	25	D	M	CL	
9-18	10YR 3/2	50	10YR 4/6	25	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL DD1

Investigator(s): David Nigro, Kaitlyn Yantz Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.180248 Long: -82.821422 Datum: WGS84

Soil Map Unit Name: Marlette loam, 2 to 6 percent slopes, slightly eroded NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM depression in fallow field

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3	
Water Table Present?	Yes _____	No ✓	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL DD1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	55	Y	FACW
2. *Scirpus atrovirens*	30	Y	OBL
3. *Epilobium ciliatum*	3	N	FACW
4. *Solidago gigantea*	2	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30.00	x 1 =	30.00
FACW species	60.00	x 2 =	120.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	90.00 (A)		150.00 (B)

Prevalence Index = B/A = 1.67

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 6/2	85	10YR 5/4	15	C	M	SCL	Distinct redox.
6-18	10YR 6/2	65	10YR 5/4	35	C	PL	SCL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL DD2

Investigator(s): David Nigro, Kaitlyn Yantz Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.179301 Long: -82.816863 Datum: WGS84

Soil Map Unit Name: Marlette loam, 2 to 6 percent slopes, slightly eroded NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM drainage

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL DD2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	40	Y	FACW
2. *Scirpus atrovirens*	35	Y	OBL
3. *Carex lacustris*	20	Y	OBL
4. *Spartina pectinata*	5	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55.00	x 1 =	55.00
FACW species	45.00	x 2 =	90.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		145.00 (B)

Prevalence Index = B/A = 1.45

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	85	10YR 5/4	15	C	M	SCL	Distinct redox.
12-18	10YR 3/2	60	10YR 5/4	15	C	PL	SCL	Distinct redox.
			10YR 2/2	25	C	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD3

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.174318 Long: -82.808707 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: No

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PSS wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL DD3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	15	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	40	Y	FAC
2. *Salix discolor*	5	N	FACU
3.			
4.			
5.			
6.			
7.			
	45	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	25	Y	FACW
2. *Carex lacustris*	15	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	10	Y	FAC
2. *Celastrus scandens*	5	N	FACU
3.			
4.			
	15	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15.00	x 1 =	15.00
FACW species	30.00	x 2 =	60.00
FAC species	65.00	x 3 =	195.00
FACU species	5.00	x 4 =	20.00
UPL species	0.00	x 5 =	0.00
Column Totals:	115.00 (A)		290.00 (B)

Prevalence Index = B/A = 2.52

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 5/1	100					SCL	
2-16	10YR 3/2	80	10YR 4/6	20	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: St. Clair County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD4

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 12 T008N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.133110 Long: -82.767257 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: No

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PFO wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL DD4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	15	Y	FAC
2. *Fraxinus pennsylvanica*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Carex lacustris*	15	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	10	Y	FAC
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15.00	x 1 =	15.00
FACW species	35.00	x 2 =	70.00
FAC species	25.00	x 3 =	75.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	75.00 (A)		160.00 (B)

Prevalence Index = B/A = 2.13

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	70	5YR 5/4	30	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD5

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.179766 Long: -82.809126 Datum: WGS84

Soil Map Unit Name: Marlette loam, 2 to 6 percent slopes, slightly eroded NWI classification: No

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
Large PEM wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ✓ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 24
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL DD5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	10	Y	FAC
2. *Fraxinus pennsylvanica*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	40	Y	FACW
2. *Carex lacustris*	20	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20.00	x 1 =	20.00
FACW species	45.00	x 2 =	90.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	75.00 (A)		140.00 (B)

Prevalence Index = B/A = 1.87

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	70	5YR 5/4	30	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD6

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.179602 Long: -82.808142 Datum: WGS84

Soil Map Unit Name: Marlette loam, 2 to 6 percent slopes, slightly eroded NWI classification: No

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
Small OW wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ✓ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 12
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL DD6

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	5	Y	FACW
2. *Ulmus americana*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Carpinus caroliniana*	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	10.00	x 2 =	20.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	20.00 (A)		50.00 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	70	5YR 5/4	30	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD7

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.179706 Long: -82.807423 Datum: WGS84

Soil Map Unit Name: Marlette loam, 2 to 6 percent slopes, slightly eroded NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PSS wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 12	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL DD7

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	10	Y	FAC
2. *Fraxinus pennsylvanica*	5	Y	FACW
3. *Ulmus americana*	5	Y	FACW
4.			
5.			
6.			
7.			
	20	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cephalanthus occidentalis*	70	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	70	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70.00	x 1 =	70.00
FACW species	40.00	x 2 =	80.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	120.00 (A)		180.00 (B)

Prevalence Index = B/A = 1.5

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: WL DD7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	80	5YR 5/4	20	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD8

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 06 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.235817 Long: -82.753780 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: Pond

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

Man made open water wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 48
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL DD8

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	30.00	x 2 =	60.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	30.00 (A)		60.00 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	80	5YR 5/4	20	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL DD9

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 07 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.227008 Long: -82.752049 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
OW wetland within field with few trees along edge

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 4
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL DD9

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	10	Y	OBL
2. *Ulmus americana*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	35.00	x 2 =	70.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	45.00 (A)		80.00 (B)

Prevalence Index = B/A = 1.78

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL DD9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	80	5YR 5/4	20	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL EE1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 06 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.239777 Long: -82.759138 Datum: WGS84

Soil Map Unit Name: Marlette silt loam and loam, 0 to 2 percent slopes, slightly eroded NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PSS depression

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 12
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL EE1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cephalanthus occidentalis*	90	Y	OBL
2. *Salix discolor*	5	N	FACW
3. *Cornus racemosa*	5	N	FAC
4.			
5.			
6.			
7.			
	100 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	10	Y	FACW
2. *Onoclea sensibilis*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	5	Y	FAC
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90.00	x 1 =	90.00
FACW species	20.00	x 2 =	40.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	120.00 (A)		160.00 (B)

Prevalence Index = B/A = 1.33

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL EE1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/2	90	5YR 5/4	10	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL EE2

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 01 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.234178 Long: -82.785415 Datum: WGS84

Soil Map Unit Name: Parkhill loam and mucky loam, 0 to 2 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
PEM depression drains into adjacent watercourse

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL EE2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Calamagrostis canadensis*	92	Y	OBL
2. *Phalaris arundinacea*	5	N	FACW
3. *Symphyotrichum lanceolatum*	2	N	FACW
4. *Carex annectens*	1	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	92.00	x 1 =	92.00
FACW species	8.00	x 2 =	16.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		108.00 (B)

Prevalence Index = B/A = 1.08

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: WL EE2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	100					MUCK	
8-16	10YR 5/2	85	10YR 6/4	15	C	M	CL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-14

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL F1

Investigator(s): K. Yantz, C. LaRiccia-Atwell, LLC Section, Township, Range: sec 26 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.182167 Long: -82.789396 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PSS/PFO depression.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL F1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	10	Y	FACW
2. *Ulmus americana*	10	Y	FACW
3. *Quercus rubra*	5	Y	FACU
4.			
5.			
6.			
7.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus incana*	20	Y	FACW
2. *Cornus racemosa*	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
	30	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	60	Y	FACW
2. *Solidago gigantea*	10	N	FACW
3. *Carex lupulina*	5	N	OBL
4. *Carex gynandra*	5	N	OBL
5. *Onoclea sensibilis*	5	N	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	115.00	x 2 =	230.00
FAC species	10.00	x 3 =	30.00
FACU species	5.00	x 4 =	20.00
UPL species	0.00	x 5 =	0.00
Column Totals:	140.00 (A)		290.00 (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					MUCK	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-14

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL F2

Investigator(s): K. Yantz, C. LaRiccia-Atwell, LLC Section, Township, Range: sec 27 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.184673 Long: -82.805314 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PFO. Forested woodlot surrounded by agricultural fields.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 6

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL F2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	20	Y	FACW
2. *Acer rubrum*	10	Y	FAC
3. *Acer saccharinum*	10	Y	FACW
4. *Populus deltoides*	5	N	FAC
5. *Quercus rubra*	5	N	FACU
6.			
7.			
	50	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	

Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	20	Y	FACW
2. *Carex lacustris*	10	Y	OBL
3. *Rubus pubescens*	10	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	60.00	x 2 =	120.00
FAC species	15.00	x 3 =	45.00
FACU species	5.00	x 4 =	20.00
UPL species	0.00	x 5 =	0.00
Column Totals:	90.00 (A)		195.00 (B)

Prevalence Index = B/A = 2.17

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/2	95	10YR 4/6	5	C	M	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-14

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL F3

Investigator(s): K. Yantz, C. LaRiccia-Atwell, LLC Section, Township, Range: sec 35 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.174014 Long: -82.788478 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM. Roadside ditch.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 6

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL F3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix interior*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	60	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	65.00	x 2 =	130.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	65.00 (A)		130.00 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/2	95	10YR 4/6	5	C	M	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-14

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL F4

Investigator(s): K. Yantz, C. LaRiccia-Atwell, LLC Section, Township, Range: sec 26 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.176616 Long: -82.783964 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM RCG basin.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL F4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	15	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Physocarpus opulifolius*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	50	Y	FACW
2. *Urtica dioica*	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15.00	x 1 =	15.00
FACW species	55.00	x 2 =	110.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	80.00 (A)		155.00 (B)

Prevalence Index = B/A = 1.94

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					MUCK	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-14

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL F5

Investigator(s): K. Yantz, C. LaRiccia-Atwell, LLC Section, Township, Range: sec 22 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.195788 Long: -82.809692 Datum: WGS84

Soil Map Unit Name: Marlette loam, 12 to 18 percent slopes, severely eroded NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PSS. Surrounded by forested vegetation, inundated area in the center.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ✓ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 6	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL F5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cephalanthus occidentalis*	30	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	30 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30.00	x 1 =	30.00
FACW species	35.00	x 2 =	70.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	65.00 (A)		100.00 (B)

Prevalence Index = B/A = 1.54

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					MUCK	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL FF1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 20 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.204287 Long: -82.732121 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PFO mosaic wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL FF1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	25	Y	FACW
2. *Quercus rubra*	20	Y	FACU
3. *Ulmus americana*	20	Y	FACW
4. *Quercus bicolor*	15	N	FACW
5. *Acer rubrum*	5	N	FAC
6. *Carya ovata*	3	N	FACU
7.			
	88	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex lacustris*	5	Y	OBL
2. *Phalaris arundinacea*	5	Y	FACW
3. *Elymus virginicus*	5	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	70.00	x 2 =	140.00
FAC species	5.00	x 3 =	15.00
FACU species	23.00	x 4 =	92.00
UPL species	0.00	x 5 =	0.00
Column Totals:	103.00 (A)		252.00 (B)

Prevalence Index = B/A = 2.45

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL FF1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100					MUCK	
2-6	10YR 5/2	85	10YR 6/4	15	C	M	SCL	Distinct redox.
6-16	10YR 6/2	60	10YR 6/4	40	C	M	SC	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL FF2

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 23 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.199256 Long: -82.784424 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
Small PFO wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL FF2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	100 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Juncus effusus*	15	Y	OBL
2. *Phalaris arundinacea*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15.00	x 1 =	15.00
FACW species	105.00	x 2 =	210.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	120.00 (A)		225.00 (B)

Prevalence Index = B/A = 1.88

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL FF2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	95	10YR 5/4	5	C	M	SCL	Distinct redox.
4-10	10YR 2/2	85	10YR 5/6	15	C	M	SCL	Prominent redox.
10-16	10YR 6/2	80	10YR 6/4	20	C	M	SCL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL FF3

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 14 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.210204 Long: -82.792746 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: Pond

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
Open water wetland within yard

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 120	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL FF3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	0.00 (A)		0.00 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

No vegetation present due to inundation; assume hydric.

SOIL

Sampling Point: WL FF3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1						MUCK	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL GG1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 10 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.224366 Long: -82.699461 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: Pond

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PFO mosaic within woodlot

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ✓ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2	
Water Table Present?	Yes ✓	No _____	Depth (inches): 2	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL GG1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	35	Y	FACW
2. *Betula papyrifera*	10	Y	FACU
3. *Fraxinus pennsylvanica*	10	Y	FACW
4. *Tilia americana*	10	Y	FACU
5. *Populus deltoides*	5	N	FAC
6. *Quercus bicolor*	5	N	FACW
7.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Juncus effusus*	15	Y	OBL
2. *Onoclea sensibilis*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15.00	x 1 =	15.00
FACW species	55.00	x 2 =	110.00
FAC species	5.00	x 3 =	15.00
FACU species	20.00	x 4 =	80.00
UPL species	0.00	x 5 =	0.00
Column Totals:	95.00 (A)		220.00 (B)

Prevalence Index = B/A = 2.32

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL GG1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1						MUCK	
6-12	10YR 2/1	85	10YR 6/4	15	C	M	L	Prominent redox.
12-18	10YR 2/1	80	10YR 6/4	15	C	M	L	Prominent redox.
		5	10YR 5/2	5	D	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2021-12-16

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL H1

Investigator(s): K. Yantz, C. LaRiccia-Atwell, LLC Section, Township, Range: sec 29 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.186548 Long: -82.732086 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: Freshwater PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM/PFO woodlot surrounded by agricultural fields

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL H1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	30	Y	FACW
2. *Acer saccharinum*	25	Y	FACW
3. *Quercus palustris*	5	N	FACW
4.			
5.			
6.			
7.			
	60	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	

Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	40	Y	FACW
2. *Solidago gigantea*	15	Y	FACW
3. *Carex lacustris*	10	N	OBL
4. *Elymus virginicus*	10	N	FACW
5. *Cornus racemosa*	5	N	FAC
6. *Onoclea sensibilis*	5	N	FACW
7. *Rubus pubescens*	5	N	FACW
8.			
9.			
10.			
11.			
12.			
	90	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	135.00	x 2 =	270.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	150.00 (A)		295.00 (B)

Prevalence Index = B/A = 1.97

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL H1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					SICL	
16-20	10YR 6/2	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ✓ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL HH1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 33 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.168925 Long: -82.830259 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓** **No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
PFO drainage within woodlot

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1
Water Table Present?	Yes ✓	No _____	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes ✓** **No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL HH1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	40	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	40 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Rhamnus cathartica*	5	Y	FAC
2. *Fraxinus pennsylvanica*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	45.00	x 2 =	90.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	50.00 (A)		105.00 (B)

Prevalence Index = B/A = 2.1

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL HH1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	100					MUCK	
8-16	10YR 2/1	80	10YR 6/4	15	C	M	SCL	Prominent redox.
			10YR 5/2	5	D	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL HH2

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 33 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.169838 Long: -82.831414 Datum: WGS84

Soil Map Unit Name: McBride sandy loam and Montcalm loamy sand, 3 to 8 percent slopes, slightly eroded NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
PSS drainage

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 6	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL HH2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	30	Y	FAC
2. *Fraxinus pennsylvanica*	10	Y	FACW
3. *Rhamnus cathartica*	5	N	FAC
4.			
5.			
6.			
7.			
	45 = Total Cover		
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	10.00	x 2 =	20.00
FAC species	35.00	x 3 =	105.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	45.00 (A)		125.00 (B)

Prevalence Index = B/A = 2.78

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL HH2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	80	10YR 5/6	15	C	M	SCL	Prominent redox.
0-16			10YR 5/2	5	D	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL HH3

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 15 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.216185 Long: -82.808740 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PFO depression

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL HH3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus bicolor*	30	Y	FACW
2. *Ulmus americana*	25	Y	FACW
3. *Salix nigra*	10	N	OBL
4.			
5.			
6.			
7.			
	65	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	55.00	x 2 =	110.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	65.00 (A)		120.00 (B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL HH3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100					SCL	
6-16	10YR 3/2	90	10YR 6/4	10	C	M	SCL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-11

Applicant/Owner: Liberty State: Michigan Sampling Point: WL HH4

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 15 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.215170 Long: -82.807562 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PSS depression

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ✓ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 2	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL HH4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Rhamnus cathartica*	50	Y	FAC
2. *Cornus racemosa*	40	Y	FAC
3.			
4.			
5.			
6.			
7.			
	90 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Carex lacustris*	5	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	5.00	x 2 =	10.00
FAC species	90.00	x 3 =	270.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		285.00 (B)

Prevalence Index = B/A = 2.85

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: WL HH4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					SCL	
6-16	10YR 3/2	80	10YR 6/6	20	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-16

Applicant/Owner: Liberty State: Michigan Sampling Point: WL II1

Investigator(s): J. Brown - Atwell LLC Section, Township, Range: sec 14 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.210415 Long: -82.795993 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: Pubgx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

Open water wetland in residential backyard.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 36	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present?** Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

10 ft deep open water

VEGETATION – Use scientific names of plants. Sampling Point: wlii1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
= Total Cover			
Herb Stratum (Plot size: 5)			
1. *Festuca rubra*	5	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
5 = Total Cover			
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
= Total Cover			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	5.00	x 4 =	20.00
UPL species	0.00	x 5 =	0.00
Column Totals:	5.00 (A)		20.00 (B)

Prevalence Index = B/A = 4.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Maintained lawn around feature.

SOIL

Sampling Point: wlii1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-16

Applicant/Owner: Liberty State: Michigan Sampling Point: WL II2

Investigator(s): J. Brown - Atwell LLC Section, Township, Range: sec 14 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.210384 Long: -82.797272 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PSS/PFO

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 10
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The PFO section of the complex had areas of standing of water. 1 ft at the deepest spot. The PSS section was adjacent to a maintained lawn and ag field.

VEGETATION – Use scientific names of plants. Sampling Point: wlii2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Y	FAC
2. *Acer saccharinum*	20	Y	FACW
3.			
4.			
5.			
6.			
7.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus incana*	50	Y	FACW
2. *Acer rubrum*	10	N	FAC
3. *Ribes americanum*	3	N	FACW
4. *Cornus racemosa*	2	N	FAC
5.			
6.			
7.			
	65	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex sp*	15	Y	FACU
2. *Moss*	15	Y	
3. *Toxicodendron radicans*	5	N	FAC
4. *Symphyotrichum lanceolatum*	5	N	FACW
5. *Onoclea sensibilis*	5	N	FACW
6. *Vitis riparia*	2	N	FAC
7.			
8.			
9.			
10.			
11.			
12.			
	47	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	83.00	x 2 =	166.00
FAC species	59.00	x 3 =	177.00
FACU species	15.00	x 4 =	60.00
UPL species	0.00	x 5 =	0.00
Column Totals:	157.00 (A)		403.00 (B)

Prevalence Index = B/A = 2.57

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

The PSS is a dense stand of alder adjacent to a maintained lawn. The PFO is a red maple swamp.

SOIL Sampling Point: wlii2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3						CL	
8-18	10YR 5/1	94	10YR 5/6	6	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-16

Applicant/Owner: Liberty State: Michigan Sampling Point: WL II3

Investigator(s): J. Brown - Atwell LLC Section, Township, Range: sec 14 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.212663 Long: -82.803352 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
This PEM is mowed once or twice a season.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: wlii3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phragmites australis*	90	Y	FACW
2. *Phalaris arundinacea*	18	N	FACW
3. *Moss*	5		
4. *Symphyotrichum lanceolatum*	5	N	FACW
5. *Carex sp*	2	N	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	120 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0.00	x 1 = 0.00
FACW species 113.00	x 2 = 226.00
FAC species 0.00	x 3 = 0.00
FACU species 2.00	x 4 = 8.00
UPL species 0.00	x 5 = 0.00
Column Totals: 115.00 (A)	234.00 (B)

Prevalence Index = B/A = 2.03

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

The feature is mostly Phragmites and Phalaris. There is one planted willow in the depression.

SOIL Sampling Point: wlii3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 5/2						CL	
2-18	10YR 5/1	94	10YR 5/6	6	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-16

Applicant/Owner: Liberty State: Michigan Sampling Point: WL II4

Investigator(s): J. Brown - Atwell LLC Section, Township, Range: sec 10 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.223086 Long: -82.706170 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PFO

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Some standing water.

VEGETATION – Use scientific names of plants. Sampling Point: wlii4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus bicolor*	60	Y	FACW
2. *Acer rubrum*	40	Y	FAC
3. *Ulmus americana*	5	N	FACW
4. *Acer saccharinum*	5	N	FACW
5.			
6.			
7.			
	110	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Acer rubrum*	10	Y	FAC
2. *Ribes americanum*	3	Y	FACW
3. *Cornus racemosa*	2	N	FAC
4.			
5.			
6.			
7.			
	15	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	10	Y	FACW
2. *Onoclea sensibilis*	10	Y	FACW
3. *Carex sp*	8	Y	FACU
4. *Toxicodendron radicans*	5	N	FAC
5. *Moss*	5		
6. *Symphyotrichum lanceolatum*	5	N	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	43	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.71 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	98.00	x 2 =	196.00
FAC species	57.00	x 3 =	171.00
FACU species	8.00	x 4 =	32.00
UPL species	0.00	x 5 =	0.00
Column Totals:	163.00 (A)		399.00 (B)

Prevalence Index = B/A = 2.45

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: wlii4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3						CL	
8-18	10YR 5/1	94	10YR 5/6	6	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-01-03

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL J1

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 36 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.173748 Long: -82.659595 Datum: WGS84

Soil Map Unit Name: Tonkey and Bach fine sandy loams, 0 to 2 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
PFO depression in woodlot

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 2

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants. Sampling Point: WL J1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Y	FAC
2. *Ulmus americana*	10	N	FACW
3.			
4.			
5.			
6.			
7.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	10.00	x 2 =	20.00
FAC species	50.00	x 3 =	150.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	60.00 (A)		170.00 (B)

Prevalence Index = B/A = 2.83

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL J1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	100					SL	
6-16	10YR 3/1	80	10YR 5/6	20	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-01-03

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL J2

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 36 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.172529 Long: -82.650968 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PFO depression in woodlot, connects to WC J2 and WC J3

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 2

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants. Sampling Point: WL J2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	60	Y	FAC
2. *Ulmus americana*	20	Y	FACW
3. *Carpinus caroliniana*	5	N	FAC
4. *Carya ovata*	2	N	FACU
5.			
6.			
7.			
	87	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	15	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex sp.*	12	Y	FACW
2. *Elymus virginicus*	10	Y	FACW
3. *Onoclea sensibilis*	5	N	FACW
4. *Juncus effusus*	3	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	3	Y	FAC
2. *Toxicodendron radicans*	2	Y	FAC
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	3.00	x 1 =	3.00
FACW species	47.00	x 2 =	94.00
FAC species	85.00	x 3 =	255.00
FACU species	2.00	x 4 =	8.00
UPL species	0.00	x 5 =	0.00
Column Totals:	137.00 (A)		360.00 (B)

Prevalence Index = B/A = 2.63

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL J2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	100					SL	
6-16	10YR 3/1	80	10YR 5/6	20	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-01-03

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL J3

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 36 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.171146 Long: -82.655464 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation ✔, Soil _____, or Hydrology ✔ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** **Yes ✔ No _____**
Hydric Soil Present?	Yes ✔	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PFO depression in woodlot, connects to WC J4

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants. Sampling Point: WL J3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Y	FAC
2. *Ulmus americana*	20	Y	FACW
3. *Carpinus caroliniana*	5	N	FAC
4. *Populus tremuloides*	5	N	FAC
5. *Carya ovata*	2	N	FACU
6.			
7.			
	82	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	18	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	18	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Elymus virginicus*	5	Y	FACW
2. *Onoclea sensibilis*	5	Y	FACW
3. *Carex sp.*	5	Y	FACW
4. *Juncus effusus*	3	N	OBL
5. *Rubus allegheniensis*	3	N	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	21	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	5	Y	FAC
2. *Toxicodendron radicans*	2	Y	FAC
3.			
4.			
	7	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	3.00	x 1 =	3.00
FACW species	35.00	x 2 =	70.00
FAC species	85.00	x 3 =	255.00
FACU species	5.00	x 4 =	20.00
UPL species	0.00	x 5 =	0.00
Column Totals:	128.00 (A)		348.00 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL J3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	75	10YR 5/6	25	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2022-01-04

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL K1

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 21 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.195254 Long: -82.714948 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation ✔, Soil _____, or Hydrology ✔ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** **Yes ✔ No _____**
Hydric Soil Present?	Yes ✔	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PFO depression in woodlot, connects to several ephemeral watercourses

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 2

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants.

Sampling Point: WL K1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Y	FAC
2. *Ulmus americana*	20	Y	FACW
3. *Carya ovata*	2	N	FACU
4.			
5.			
6.			
7.			
	72	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	18	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	18	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex intumescens*	10	Y	FACW
2. *Elymus virginicus*	5	Y	FACW
3. *Onoclea sensibilis*	5	Y	FACW
4. *Carex sp.*	5	Y	FACW
5. *Phalaris arundinacea*	5	Y	FACW
6. *Rubus pubescens*	3	N	FACW
7. *Geum rivale*	2	N	OBL
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	5	Y	FAC
2. *Toxicodendron radicans*	2	Y	FAC
3.			
4.			
	7	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2.00	x 1 =	2.00
FACW species	53.00	x 2 =	106.00
FAC species	75.00	x 3 =	225.00
FACU species	2.00	x 4 =	8.00
UPL species	0.00	x 5 =	0.00
Column Totals:	132.00 (A)		341.00 (B)

Prevalence Index = B/A = 2.58

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL K1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	75	10YR 5/6	25	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac Sampling Date: 2022-01-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL L1

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 21 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.173442 Long: -82.667060 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO1C/SS1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation ✔, Soil _____, or Hydrology ✔ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** **Yes ✔ No _____**
Hydric Soil Present?	Yes ✔	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM/PFO depression

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ✔ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 2

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants.

Sampling Point: WL L1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Y	FAC
2. *Fraxinus pennsylvanica*	15	Y	FACW
3. *Ulmus americana*	10	N	FACW
4.			
5.			
6.			
7.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	3	N	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	3	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Solidago gigantea*	10	Y	FACW
2. *Phalaris arundinacea*	5	Y	FACW
3. *Rubus pubescens*	5	Y	FACW
4. *Geum rivale*	2	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	22	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2.00	x 1 =	2.00
FACW species	45.00	x 2 =	90.00
FAC species	53.00	x 3 =	159.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		251.00 (B)

Prevalence Index = B/A = 2.51

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL L1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1	80	10YR 6/8	20	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-01-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL M1

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 08 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.216271 Long: -82.862401 Datum: WGS84

Soil Map Unit Name: Marlette loam, 0 to 2 percent slopes, slightly eroded NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation ✔, Soil _____, or Hydrology ✔ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM/PSS depression including small drainage canal

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✔ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✔	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants. Sampling Point: WL M1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	5	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix interior*	30	Y	FACW
2. *Cornus racemosa*	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
	40 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Solidago gigantea*	20	Y	FACW
3. *Symphyotrichum sp.*	15	Y	FAC
4. *Juncus tenuis*	10	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	3	N	FAC
2.			
3.			
4.			
	3 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	80.00	x 2 =	160.00
FAC species	43.00	x 3 =	129.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	123.00 (A)		289.00 (B)

Prevalence Index = B/A = 2.35

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL M1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	80	10YR 5/6	20	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-01-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL M2

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 10 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.223381 Long: -82.820005 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: PFO1C/SS1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation ✔, Soil _____, or Hydrology ✔ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** **Yes ✔ No _____**
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
PFO depression connecting to WC M7

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants.

Sampling Point: WL M2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	70	Y	FAC
2. *Carpinus caroliniana*	2	N	FAC
3.			
4.			
5.			
6.			
7.			
	72	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus amomum*	15	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Solidago gigantea*	20	Y	FACW
3. *Symphyotrichum sp.*	5	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	3	N	FAC
2.			
3.			
4.			
	3	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	65.00	x 2 =	130.00
FAC species	80.00	x 3 =	240.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	145.00 (A)		370.00 (B)

Prevalence Index = B/A = 2.55

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL M2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/2	85	10YR 5/6	15	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-01-07

Applicant/Owner: Liberty Power State: Michigan Sampling Point: WL N1

Investigator(s): C. LaRiccia, C. Scholten Section, Township, Range: sec 11 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.229886 Long: -82.670275 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation ✔, Soil _____, or Hydrology ✔ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** **Yes ✔ No _____**
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
PFO depression in woodlot

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Snow covered

VEGETATION – Use scientific names of plants.

Sampling Point: WL N1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	70	Y	FAC
2. *Ulmus americana*	20	Y	FACW
3. *Carpinus caroliniana*	1	N	FAC
4.			
5.			
6.			
7.			
	91 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	40	Y	FACW
2. *Phalaris arundinacea*	10	N	FACW
3. *Carex sp.*	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	3	N	FAC
2.			
3.			
4.			
	3 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	75.00	x 2 =	150.00
FAC species	74.00	x 3 =	222.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	149.00 (A)		372.00 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Snow covered, difficult to assess

SOIL

Sampling Point: WL N1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	80	10YR 5/6	20	C	M/PL	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-04

Applicant/Owner: Liberty State: Michigan Sampling Point: WL P1

Investigator(s): J. Brown, K. Yantz, Atwell, LLC Section, Township, Range: sec 36 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.170729 Long: -82.659279 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM/PSS wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Some standing water from recent rain events

VEGETATION – Use scientific names of plants.

Sampling Point: WL P1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Spiraea alba*	40	Y	FACW
2. *Cornus racemosa*	15	Y	FAC
3. *Cornus alba*	5	N	FACW
4.			
5.			
6.			
7.			
	60 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	85	Y	FACW
2. *Juncus effusus*	5	N	OBL
3. *Solidago gigantea*	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	135.00	x 2 =	270.00
FAC species	15.00	x 3 =	45.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	155.00 (A)		320.00 (B)

Prevalence Index = B/A = 2.06

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL P1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 5/2	90	10YR 4/6	10	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-04

Applicant/Owner: Liberty State: Michigan Sampling Point: WL P2

Investigator(s): J. Brown, K. Yantz, Atwell, LLC Section, Township, Range: sec 36 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.173616 Long: -82.653311 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PSS wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Some standing water from recent rain events

VEGETATION – Use scientific names of plants. Sampling Point: WL P2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix interior*	90	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	90 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	20	Y	FACW
2. *Phragmites australis*	10	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	120.00	x 2 =	240.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	120.00 (A)		240.00 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL P2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 5/2	90	10YR 4/6	10	C	M	C	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-04

Applicant/Owner: Liberty State: Michigan Sampling Point: WL P3

Investigator(s): J. Brown, K. Yantz, Atwell, LLC Section, Township, Range: sec 35 T009N R015E

Landform (hillslope, terrace, etc.): Other Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.173155 Long: -82.664576 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

Vegetation recently plowed and highly disturbed. PFO/PEM 80% 20%

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ✓ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL P3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	30	Y	FAC
2. *Fraxinus pennsylvanica*	20	Y	FACW
3. *Ulmus americana*	20	Y	FACW
4. *Acer saccharinum*	10	N	FACW
5.			
6.			
7.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Populus balsamifera*	5	Y	FACW
2. *Salix interior*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	10	Y	FACW
2. *Apocynum cannabinum*	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	70.00	x 2 =	140.00
FAC species	40.00	x 3 =	120.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	110.00 (A)		260.00 (B)

Prevalence Index = B/A = 2.36

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL P3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/2	100			C	M	CL	
6-18	10YR 5/2	97	10YR 4/6	3	C	M	C	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

Recently plowed, significantly disturbed

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-04

Applicant/Owner: Liberty State: Michigan Sampling Point: WL R1

Investigator(s): J. Brown, K. Yantz, Atwell, LLC Section, Township, Range: sec 35 T009N R015E

Landform (hillslope, terrace, etc.): Other Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.198169 Long: -82.678622 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PFO floodplain wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL R1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	20	Y	FACW
2. *Acer saccharinum*	10	Y	FACW
3. *Ulmus americana*	5	N	FACW
4.			
5.			
6.			
7.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex lacustris*	20	Y	OBL
2. *Phalaris arundinacea*	20	Y	FACW
3. *Rosa multiflora*	15	Y	FACU
4. *Angelica atropurpurea*	5	N	OBL
5. *Urtica dioica*	5	N	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25.00	x 1 =	25.00
FACW species	55.00	x 2 =	110.00
FAC species	15.00	x 3 =	45.00
FACU species	15.00	x 4 =	60.00
UPL species	0.00	x 5 =	0.00
Column Totals:	110.00 (A)		240.00 (B)

Prevalence Index = B/A = 2.18

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL R1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100			C	M	CL	
8-18	10YR 4/2	97	10YR 4/6	3	C	M	C	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-04

Applicant/Owner: Liberty State: Michigan Sampling Point: WL R2

Investigator(s): J. Brown, K. Yantz, Atwell, LLC Section, Township, Range: sec 35 T009N R015E

Landform (hillslope, terrace, etc.): Other Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.198895 Long: -82.678354 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

Naturally problematic due to out of growing season. PFO floodplain wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL R2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	20	Y	FAC
2. *Ulmus americana*	15	Y	FACW
3. *Acer saccharinum*	10	N	FACW
4. *Fraxinus pennsylvanica*	5	N	FACW
5. *Salix nigra*	5	N	OBL
6.			
7.			
	55	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Rosa multiflora*	15	Y	FACU
2. *Aster sp.*	5	Y	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	30.00	x 2 =	60.00
FAC species	20.00	x 3 =	60.00
FACU species	15.00	x 4 =	60.00
UPL species	0.00	x 5 =	0.00
Column Totals:	70.00 (A)		185.00 (B)

Prevalence Index = B/A = 2.64

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL R2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100			C	M	CL	
8-18	10YR 4/2	97	10YR 4/6	3	C	M	C	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty State: Michigan Sampling Point: WL S1

Investigator(s): David Nigro Section, Township, Range: sec 15 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.209747 Long: -82.695863 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PFO

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL S1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus alba*	10	Y	FACU
2. *Acer saccharinum*	10	Y	FACW
3. *Populus deltoides*	10	Y	FAC
4. *Quercus rubra*	5	N	FACU
5. *Carpinus caroliniana*	5	N	FAC
6.			
7.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus alba*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Elymus curvatus*	20	Y	FAC
2. *Carex grayi*	10	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	5	Y	FAC
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.71 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	25.00	x 2 =	50.00
FAC species	40.00	x 3 =	120.00
FACU species	15.00	x 4 =	60.00
UPL species	0.00	x 5 =	0.00
Column Totals:	80.00 (A)		230.00 (B)

Prevalence Index = B/A = 2.88

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: WL S1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100						
2-8	10YR 3/2	85	10YR 5/6	15	C	M	SCL	Prominent redox.
8-12	10YR 3/2	50	10YR 5/6	30	C	M	SCL	Prominent redox.
			10YR 6/2	20	D	M		
12-20	10YR 6/2	60	10YR 5/6	40	C	M	COSL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T1

Investigator(s): Eric Rademacher , Ernest Schenk Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.175894 Long: -82.850748 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Ponding from recent rain

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	1	N	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	1 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix sp.*	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Apocynum cannabinum*	30	Y	FAC
2. *Symphyotrichum lateriflorum*	20	Y	FAC
3. *Epilobium ciliatum*	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	10.00	x 2 =	20.00
FAC species	51.00	x 3 =	153.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	61.00 (A)		173.00 (B)

Prevalence Index = B/A = 2.84

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T2

Investigator(s): Eric Rademacher , Ernest Schenk Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.175993 Long: -82.846851 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Ponding from recent rain, farmed portion is sparsely vegetated

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	5	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix interior*	15	Y	FACW
2. *Cornus amomum*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Carex lacustris*	20	Y	OBL
2. *Symphyotrichum lateriflorum*	10	Y	FAC
3. *Apocynum cannabinum*	10	Y	FAC
4. *Phalaris arundinacea*	10	Y	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20.00	x 1 =	20.00
FACW species	30.00	x 2 =	60.00
FAC species	25.00	x 3 =	75.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	75.00 (A)		155.00 (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T3

Investigator(s): Eric Rademacher , Ernest Schenk Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.176000 Long: -82.845886 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Ponding from recent rain, farmed portion is sparsely vegetated

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Carex lacustris*	5	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	5.00 (A)		5.00 (B)

Prevalence Index = B/A = 1.0

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T4

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.175095 Long: -82.846045 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓** **No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

PEM/PSS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Ponding from recent rain, farmed portion is sparsely vegetated

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	10	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Fraxinus pennsylvanica*	75	Y	FACW
2. *Cornus amomum*	10	N	FACW
3.			
4.			
5.			
6.			
7.			
	85	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Calamagrostis canadensis*	20	Y	OBL
2. *Symphyotrichum lateriflorum*	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20.00	x 1 =	20.00
FACW species	95.00	x 2 =	190.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	125.00 (A)		240.00 (B)

Prevalence Index = B/A = 1.92

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T5

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.174590 Long: -82.845915 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Ponding from recent rain, sparsely vegetated

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Barbarea vulgaris*	5	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	5.00 (A)		15.00 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T6

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.173936 Long: -82.857417 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PSS/PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T6

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	50	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	50 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Carex lacustris*	20	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20.00	x 1 =	20.00
FACW species	0.00	x 2 =	0.00
FAC species	50.00	x 3 =	150.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	70.00 (A)		170.00 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T7

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 29 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.173917 Long: -82.858441 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)
PSS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3	
Water Table Present?	Yes _____	No ✓	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Ponding from recent rain

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T7

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus racemosa*	50	Y	FAC
2. *Rhamnus cathartica*	20	Y	FAC
3.			
4.			
5.			
6.			
7.			
	70 = Total Cover		
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	70.00	x 3 =	210.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	70.00 (A)		210.00 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-05

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland T8

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 31 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.161003 Long: -82.861947 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Ponding from recent rain

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland T8

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Elymus repens*	30	Y	FACU
2. *Symphyotrichum lateriflorum*	20	Y	FAC
3. *Phalaris arundinacea*	20	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	20.00	x 2 =	40.00
FAC species	20.00	x 3 =	60.00
FACU species	30.00	x 4 =	120.00
UPL species	0.00	x 5 =	0.00
Column Totals:	70.00 (A)		220.00 (B)

Prevalence Index = B/A = 3.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland T8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 2/2	100					MMI	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ✓ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-06

Applicant/Owner: Liberty State: Michigan Sampling Point: WL U1

Investigator(s): David Nigro Section, Township, Range: sec 26 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.179163 Long: -82.791751 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PFO

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____	
Water Table Present?	Yes ✓	No _____	Depth (inches): 3	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL U1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	10	Y	FACW
2. *Populus deltoides*	10	Y	FAC
3. *Fagus grandifolia*	5	N	FACU
4. *Quercus alba*	5	N	FACU
5.			
6.			
7.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex grayi*	15	Y	FACW
2. *Poa palustris*	10	Y	FACW
3. *Agrostis stolonifera*	2	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	27	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	37.00	x 2 =	74.00
FAC species	10.00	x 3 =	30.00
FACU species	10.00	x 4 =	40.00
UPL species	0.00	x 5 =	0.00
Column Totals:	57.00 (A)		144.00 (B)

Prevalence Index = B/A = 2.53

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL U1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100					SCL	
3-8	10YR 3/2	95	10YR 5/6	5	C	M	SCL	Distinct redox.
8-18	10YR 5/6	50	10YR 6/2	30	D	M	CL	Mixed Matrix
			10YR 3/3	20	C	M	CL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland W1

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 31 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.161001 Long: -82.860705 Datum: WGS84

Soil Map Unit Name: Parkhill loam and clay loam, 0 to 2 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Ponding from recent rain

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland W1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Elymus repens*	30	Y	FACU
2. *Phalaris arundinacea*	20	Y	FACW
3. *Symphyotrichum lateriflorum*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0.00	x 1 = 0.00
FACW species 20.00	x 2 = 40.00
FAC species 10.00	x 3 = 30.00
FACU species 30.00	x 4 = 120.00
UPL species 0.00	x 5 = 0.00
Column Totals: 60.00 (A)	190.00 (B)

Prevalence Index = B/A = 3.17

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season; we assume vegetation to be hydric during growing season.

SOIL

Sampling Point: Wetland W1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100					L	
3-18	10YR 4/3	50	10YR 4/6	50	C	M	L	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland W2

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 32 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.165533 Long: -82.843035 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland W2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Elymus repens*	30	Y	FACU
2. *Phalaris arundinacea*	20	Y	FACW
3. *Symphyotrichum lateriflorum*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	20.00	x 2 =	40.00
FAC species	10.00	x 3 =	30.00
FACU species	30.00	x 4 =	120.00
UPL species	0.00	x 5 =	0.00
Column Totals:	60.00 (A)		190.00 (B)

Prevalence Index = B/A = 3.17

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season; assume vegetation to be hydric during growing season.

SOIL

Sampling Point: Wetland W2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100					L	
3-18	10YR 4/3	50	10YR 4/6	50	C	M	L	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend Wind City/County: Sanilac County Sampling Date: 2022-04-06

Applicant/Owner: Liberty Power State: Michigan Sampling Point: Wetland W3

Investigator(s): Ernest Schenk , Eric Rademacher Section, Township, Range: sec 28 T009N R014E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR L, MLRA 98 Lat: 43.181736 Long: -82.840329 Datum: WGS84

Soil Map Unit Name: Parkhill loam, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

PEM

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 3
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Water drains through wetland

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland W3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus amomum*	5	N	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Ranunculus sceleratus*	30	Y	OBL
2. *Barbarea vulgaris*	20	Y	FAC
3. *Phalaris arundinacea*	10	N	FACW
4. *Juncus effusus*	10	N	OBL
5. *Symphyotrichum lateriflorum*	5	N	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40.00	x 1 =	40.00
FACW species	15.00	x 2 =	30
FAC species	25.00	x 3 =	75.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	80.00 (A)		145 (B)

Prevalence Index = B/A = 1.81

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

Out of growing season

SOIL

Sampling Point: Wetland W3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100					L	
3-18	10YR 4/3	50	10YR 4/6	50	C	M	L	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Riverbend City/County: Sanilac County Sampling Date: 2022-04-04

Applicant/Owner: Liberty State: Michigan Sampling Point: WL Y1

Investigator(s): J. Brown, K. Yantz, Atwell, LLC Section, Township, Range: sec 27 T009N R015E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 43.188319 Long: -82.686196 Datum: WGS84

Soil Map Unit Name: Conover loam, 0 to 3 percent slopes NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓** **No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

Naturally problematic due to out of growing season. PFO wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 1	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WL Y1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	80	Y	FACW
2. *Quercus bicolor*	5	N	FACW
3.			
4.			
5.			
6.			
7.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix discolor*	5	Y	FACW
2. *Cornus racemosa*	5	Y	FAC
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	80	Y	FACW
2. *Juncus effusus*	5	N	OBL
3. *Solidago gigantea*	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	175.00	x 2 =	350.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	185.00 (A)		370.00 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

✓ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL Y1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 5/2	80	10YR 4/6	20	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: