

# Expedition Wind Project

## Site Characterization Study and Biological Survey Wrap-Up

Marion County, KS

March 28, 2019



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## Site Characterization Study

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## 1.0 EXECUTIVE SUMMARY

Expedition Wind, LLC (EXW) is investigating the biological issues associated with the potential development of the Expedition Wind Project (Project or Project Area) located in Marion County, Kansas. EXW intends to use the findings of the investigations for this Site Characterization Study (SCS) and biological survey wrap-up to identify biological resource issues that may require further study or significantly impede or prevent the proposed Project from being permitted or constructed.

The proposed Project Area consists of approximately 46,897 acres (73 square miles) and is located in east central Kansas, approximately 1.9 miles north of the town of Peabody. The proposed Project Area has little topographic relief and is primarily used for agriculture and livestock grazing. Elevation within the site slopes eastward from an elevation of approximately 487 feet above mean sea level (amsl) to 353 feet amsl.

A total of eleven land cover types are recognized and mapped within the Project Area. These include cultivated crops, herbaceous, developed areas, hay/pasture, deciduous forest, woody wetlands, open water, mixed forest, evergreen forest, emergent herbaceous wetlands, and barren land. A total 678 acres, or 0.01 percent of the Project Area, is identified as wetland habitat. Cottonwood River is found in the northeast portion of the Project site, Spring Creek is in the southwest portion, and Caitlin Creek runs through the center of the Project site.

No federally or state listed endangered or threatened plant species are known to occur within the Project area or Marion County, Kansas. Review of the USFWS and KDWPT list of threatened or endangered wildlife species for Marion County, identified ten species as potentially occurring in Marion County, Kansas (KDWPT 2019 and USFWS 2019). Additionally, bald and golden eagles, both protected under the Bald and Golden Eagle Protection Act (BGEPA), have the potential to occur within the Project Area and surrounding region.

A total of 12,192 birds, representing 106 different avian species were recorded during point count surveys conducted from April 27 to October 15, 2018 at 36 points within the Project Area (ACS 2019). No federally- or state-listed avian species were observed during surveys (ACS 2019).

Acoustical bat data was collected and analyzed at two locations in the Project Area between August 1 and November 1, 2018 (ACS 2018). ACS verified bat calls from seven bat species in the Project Area, including big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), evening bat (*Nycticeius humeralis*), tri-colored bat (*Perimyotis subflavus*), and Indiana bat (*Myotis sodalis*) (ACS 2018). The Indiana bat is a federally-listed as endangered species and has not been previously recorded in Marion County (USFWS 2018).



Results from the investigation in this report generally indicate a low probability of significant adverse impact to wildlife. This was based on the fact that few species of concern are likely to occur within the Project Area and there are little to no critical areas of wildlife congregation, staging areas, nesting sites, and other areas of seasonal importance known to occur within the Project Area.



## 2.0 LIST OF ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
ACS	Aeolus Consulting Services
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BCC	Bird of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
CBC	Christmas Bird Count
CRP	Conservation Reserve Program
EXW	Expedition Wind, LLC
ESA	Endangered Species Act
GIS	Geographic Information Systems
IBA	Important Bird Area
IPaC	Information for Planning and Conservation
KDWPT	Kansas Department of Wildlife, Parks and Tourism
KMA	Kansas Mammal Atlas
MRLC	Mult-Resolution Land Characteristics
NLCD	National Land Cover Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
RSA	Rotor Swept Area
SCS	Site Characterization Study
SINC	Species in Need of Conservation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Westwood	Westwood Professional Services



### 3.0 INTRODUCTION

Expedition Wind, LLC (EXW) is investigating the biological issues associated with the potential development of the Expedition Wind Project (Project or proposed Project) located in Marion County, Kansas. It is understood that EXW intends to use the findings of the investigations for this Site Characterization Study (SCS) and biological survey wrap-up to identify potential biological resource issues that could require further study or significantly impede or prevent the proposed Project from being permitted or constructed. The results of this SCS and biological survey wrap-up will be considered as directed biological surveys are developed and will facilitate the siting of wind turbines and operational facilities in a manner that avoids or minimizes impacts to biological resources.

### 4.0 SCOPE OF DATA REVIEW

#### 4.1 Regional Overview

The proposed EXW site lies within the Flint Hills Uplands region of the eastern plains of Kansas (Chapman et al. 2001 and KGS 2018). The Flint Hills region runs north and south through east-central Kansas, and is characterized by rolling hills composed of limestone outcrops and rocky soils. Cottonwood River is found in the northeast portion of the Project site and Spring Creek is in the southwest portion. Caitlin Creek runs through the center of the Project site. The proposed EXW site is primarily used for crop cultivation and livestock grazing. Common crops include wheat, hay, grain sorghum, and grain corn. Potatoes, beans, and sugar beets are also grown in the area. The area contains dispersed residences.

#### 4.2 Project Area

The Project Area consists of approximately 46,897 acres (73 square miles) and is located in east central Kansas, approximately 1.9 miles north of the town of Peabody (Exhibit 1 and 2). The Project Area is located on the following United States Geological Survey (USGS) 7.5-minute series topographic quadrangles: Cottonwood Falls, Hutchinson, Florence, Emporia, Peabody, Peabody NW, Newton, Hillsboro, Marion, and Lincolnville SW. Surface ownership in the Project Area is all private lands.

The Project Area has little topographic relief and is primarily used for agriculture and livestock grazing (Exhibit 3). Elevation within the site slopes eastward from an elevation of approximately 487 feet amsl to 353 feet amsl. Portions of three named waterways are located within the Project Area: Cottonwood River, Caitlin Creek, and Spring Creek.

#### 4.3 Methods

Biological resources within the Project Area were evaluated through a review of National Land Cover Dataset (NLCD); National Wetlands Inventory (NWI); Kansas Natural Resource Planner (NRP) Geographic Information System (GIS) data; U.S. Fish and Wildlife Service (USFWS) Information; Planning, and Conservation System (IPaC) federally listed species; Kansas Natural Heritage Information System (NHIS); Kansas Biological Survey (KBS); U.S. Department of Agriculture (USDA) Conservation Reserve Program (CRP) lands; Kansas Wildlife, Parks & Tourism (KDWPT) data; USFWS Natural Wildlife



Refuges (NWFs); National Audubon Society Important Bird Areas (IBAs); North American Breeding Bird Survey (BBS) data; and other readily available databases, public records, GIS data, and websites.

## 5.0 RESULTS

### 5.1 Land Cover Types

Land cover within the Project Area is mapped and described using data and descriptions from the NLCD created by the Multi-Resolution Land Characteristics Consortium (Homer et al. 2015). The data is based on a 16-class land cover classification scheme that has been applied consistently across the United States at a spatial resolution of 30 meters and is created through a decision-tree classification of circa 2011 Landsat satellite data. Data on wetlands were supplemented with interpretation of aerial photographs and information from USFWS NWI maps (USFWS 2018). In this effort, a total of eleven land cover types are recognized and mapped within the Project Area. These include cultivated crops, herbaceous, developed, hay/pasture, deciduous forest, woody wetlands, open water, mixed forest, evergreen forest, emergent herbaceous wetlands, and barren land (Exhibit 4) (Table 1).

Table 1: Land Cover Types within in the Project Area

Land Cover Types	Area (Acres)	Percent of Total
<i>Cultivated Crops</i>	23,566	50.2
<i>Herbaceous</i>	17,513	37.3
<i>Developed</i>	2,190	4.7
<i>Hay/Pasture</i>	1,690	3.6
<i>Deciduous Forest</i>	1,280	2.7
<i>Woody Wetlands</i>	476	1.0
<i>Open Water</i>	158	0.3
<i>Mixed Forest</i>	19	< 0.1
<i>Evergreen Forest</i>	3	< 0.1
<i>Emergent Herbaceous Wetlands</i>	1	<0.1
<i>Barren Land</i>	1	<0.1
<i>Total</i>	46,897	100.00

### 5.2 Special Management Areas

An evaluation was conducted to document special biological resource management areas within the Project Area and an associated 10-mile buffer. Results of this effort indicated that approximately 5,731 acres, including U.S. Army Corps of Engineers (USACE) land and Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) lands are managed in whole or in part for the conservation and management of biological resources. USACE is the largest land manager, with about 5,700 acres designated as Recreational Area lands. This recreational area includes portions of the Marion Reservoir and Wildlife Area. The long-term goal of USACE is to maintain and strengthen valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat within the recreational land areas. A summary of these special management areas is presented



in Table 4 and the location of these special management areas within the Project Area and an associated 10-mile buffer are shown in Exhibit 10.

Table 4: Special Management Areas for the Conservation and Management of Biological Resources

<b>Special Management Area</b>	<b>Area (acres)</b>	<b>Management Entity</b>
<i>Marion Reservoir and Wildlife Area</i>	<i>5,700</i>	<i>U.S. Army Corps of Engineers</i>
<i>NRCS Conservation Easements</i>	<i>31</i>	<i>NRCS</i>
<i>Total</i>	<i>5,731</i>	<i>--</i>

### 5.3 Wetlands and Riparian Areas

The preliminary analysis of federally designated wetland and riparian resources within the Project Area consisted of a review of the USGS topographic quadrangles in which the Project Area is located, aerial photographs, and NWI spatial data. Formal wetland delineations have not been completed. According to NWI spatial data, a total of 814 wetlands are identified within the Project Area, comprising approximately 678 acres, or 0.01 percent of the Project Area (Table 2 and Exhibit 5). The majority of the wetlands, 285 acres, are classified as riverine, 179 acres are classified as freshwater emergent wetlands, 136 acres are classified as freshwater pond, and 78 acres are classified as freshwater forested/scrub wetland.

Although 814 acres of wetlands are identified within the Project Area, the proposed Project is anticipated to impact few, if any, of these wetland resources, particularly those associated with turbine pad locations and proposed access roads. The proposed Project should be designed to avoid all mapped NWI wetlands to the greatest extent practicable to avoid and minimize impacts.

Table 2: NWI Wetlands within the Project Area

<b>Wetland Type</b>	<b>Number in Project Area</b>	<b>Total Area (Acres)</b>	<b>Percent of Project Area</b>
<i>Riverine</i>	<i>268</i>	<i>285</i>	<i>&lt;0.1</i>
<i>Freshwater Emergent Wetland</i>	<i>282</i>	<i>179</i>	<i>&lt;0.1</i>
<i>Freshwater Pond</i>	<i>185</i>	<i>136</i>	<i>&lt;0.1</i>
<i>Freshwater Forested/Shrub Wetland</i>	<i>79</i>	<i>78</i>	<i>&lt;0.1</i>
<i>TOTAL</i>	<i>814</i>	<i>678</i>	

### 5.4 Federally and State Listed Plant Species

No federally or state listed endangered or threatened plant species are known to occur within the Project Area or Marion County, Kansas.



## 6.0 WILDLIFE

### 6.1 Wildlife Habitats

Wildlife species primarily associated with agricultural, mixed grass, and tallgrass prairie habitats are expected to inhabit the Project Area and surrounding region. The overall landscape of the Project Area is relatively uniform, and wetland areas comprise <1% of the overall Project Area. Cottonwood River, Caitlin Creek, and Spring Creek, and unnamed creeks, washes, and drainages occur within the permitted Project Area and surrounding region.

### 6.2 Federally and State Listed Species

The Project Area was evaluated for the presence of federally and State listed species and their habitat. Federally listed species include those characterized by USFWS under the authority of the ESA of 1973 (16 United States Code [USC] 1531–1544) as threatened or endangered, as well as those proposed for listing (i.e., candidate species). The ESA mandates the protection of federally listed threatened or endangered species, as well as any habitat designated as critical habitat. Additionally, under the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-668d, 54 Stat. 250), USFWS has the authority to review proposed actions with respect to impacts to bald eagle and golden eagles.

KDWPT also maintains a list of threatened and endangered species for the State of Kansas. Laws and regulations pertaining to State listed endangered or threatened animal species are contained in Chapter 32 Wildlife, Parks and Recreation; Article 9- Licenses, Permits, Stamps and Other Issues, Sections 957- 963; Article 10- Enforcement, Sections 1009- 1012 and Section 1033 of the Kansas Statutes Annotated. Laws and regulations related to Kansas nongame listed threatened and endangered species are contained in 115-15-01 of the Kansas Statutes Annotated.

### 6.3 Federally and State Listed Animal Species

Review of the USFWS IPaC and KDWPT list of threatened or endangered species for Marion County, identified three federally listed threatened, endangered, or candidate species and eight state listed threatened or endangered species as occurring in Marion County, Kansas (KDWPT 2019 and USFWS 2019). Listed federal species including one mammal species and two fish species are northern long-eared bat (*Myotis septentrionalis*), Topeka shiner (*Notropis topeka*), and Neosho madtom (*Noturus placidus*). KDWPT listed species for Marion County are Topeka shiner, eastern spotted skunk (*Spilogale putorius*), whooping crane (*Grus Americana*), least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), snowy plover (*Charadrius alexandrinus*), flutedshell mussel (*Lasmigona costata*), and American burying beetle (*Nicrophorus americanus*).

KDWPT lists thirteen wildlife species as Species in Need of Conservation (SINC) for Marion County, Kansas, including one mammal, seven birds, one reptile, one fish, and three mussel species. SINC species in Marion County include golden eagle (*Aquila chrysaetos*) (also protected under BGEPA), southern bog lemming (*Synaptomys cooperi*), black tern (*Chlidonias niger*), short-eared owl (*Asio flammeus*), Chihuahuan raven (*Corvus cryptoleucus*), ferruginous hawk (*Buteo regalis*), bobolink (*Dolichonyx oryzivorus*), long-billed curlew (*Numenius americanus*), alligator snapping turtle



(*Macrochelys temminckii*), spotted sucker (*Minytrema melanops*), yellow sandshell mussel (*Lampsilis teres*), creeper mussel (*Strophitus undulatus*), and fawnsfoot mussel (*Truncilla donaciformis*) (KDWPT 2019).

Based on a letter from KDWPT, the Project area does not contain Designated Critical Habitat for any state-listed species, but nearby Mud Creek has been designated as Critical Habitat for Topeka shiner (KDWPT 2018). The Project is located in the Flint Hills Ecological Focus Area and Neosho River Ecological Area; and although outside of the Flint Hills Wind Development Moratorium Area, KDWPT is concerned about continued tallgrass prairie habitat and fragmentation of native grasslands. KDWPT has a record of greater prairie-chicken and spotted sucker in the Project area; and whooping crane, creeper mussel, spike mussel, and Wabash Pigtoe mussel, Fawnsfoot mussel, bald eagle, and Henslow's sparrow (*Ammodramus henslowii*) occurrence records in the vicinity of the Project area (KDWPT 2018).

Federally and state listed wildlife species in Marion County, their status, general distribution, and habitat requirements are listed in Table 4.

Table 4: Federally and State Listed Species with the Potential to Occur within Marion County, Kansas

Common Name Scientific Name	Status	Range and General Habitat Requirements	Potential for Occurrence
<b>Mammals</b>			
Northern long-eared bat ( <i>Myotis septentrionalis</i> )	FT	Suitable summer habitat for the northern long-eared bat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed and non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. There is no designated critical habitat for this species in Kansas.	Low: No KDWPT records of sightings within the Project Area. Study Area is within the species range but none were identified during bat acoustic surveys of the area. No designated critical habitat for this species exists within the Study Area or Marion County.
Eastern spotted skunk ( <i>Spilogale putoris</i> )	ST	Prefers habitat on forest edges and upland prairie grasslands, especially where rock outcrops and shrub clumps are present. Woody fencerows, odd areas, and abandoned farm buildings also provide important habitat.	Absent: No KDWPT records of sightings or critical habitat for this species in Marion County.
<b>Birds</b>			
Whooping crane ( <i>Grus americana</i> )	FE/SE	Breeds in the wetlands of Wood Buffalo National Park in northern Canada and spends the winter on the Texas coast at Aransas National Wildlife Refuge near Rockport. Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds at Aransas National Wildlife Refuge between late October and mid-November. Whooping cranes prefer isolated areas away from human activity for feeding and roosting and utilize vegetated wetlands in level to moderately rolling terrain where low, sparse	Low - Moderate: Project Area is inside the 90-95 percent probability zone of its migration corridor. Based on the federal whooping crane sighting data, there were no historical whooping crane observations within the Project Area or Marion County. While limited, stopover habitat for this species



		vegetation permits ease of movement and an open view. Known to migrate through many counties in Kansas, with four counties containing designated critical habitat. Marion county is not typically used by Whooping cranes during migration, although Marion County and many surrounding counties are within the migration corridor.	exists in the region surrounding the Project Area. Operational mitigation measures such as flock migration monitoring may be required.
Least tern ( <i>Sterna antillarum</i> )	FE/SE	Summer residents of Kansas. Nest near saline flats in salt marshes, sand bars in river beds, shores of large impoundments, or other barren areas near water with a dependable food source of small fish and aquatic crustaceans nearby. Nesting birds have been recorded in six central and western counties in Kansas, as well as along the Kansas River, and the Jeffery Energy Center.	Low: Project Area is not within the species breeding range, and no critical habitat for this species exists within the Project Area. May occur as an uncommon migrant.
Piping plover ( <i>Charadrius melodus</i> )	FT/ST	Occurs in bare or very sparsely vegetated shallow wetlands, open beaches, and sandbars adjacent to or within streams and impoundments in areas which are periodically covered with water and then exposed either by tides or wind. Piping plovers are rare migrants through Kansas, but nesting has been recorded on sand bars along the Kansas River. They winter primarily along Gulf Coast beaches from Florida to Mexico, along the Atlantic Coast from North Carolina to Florida, and on Caribbean islands. There is designated piping plover critical habitat along the main stem of the Kansas River contained in nine counties of the state.	Low: Project Area is not within the species breeding range, and no critical habitat for this species exists within the Project Area. May occur as an uncommon migrant.
Snowy plover ( <i>Charadrius alexandrinus</i> )	ST	Occurs in barren to sparsely vegetated sand beaches, dry/open salt flats, river bars, wetlands, along alkaline or saline lakes, reservoirs, and ponds, levees and flats at salt-evaporation ponds, and dredge spoils deposited on a beach or dune habitat.	Low: Project Area is not within the species breeding range, and no critical habitat for this species exists within the Project Area. Potential to occur as an uncommon migrant. No documented sightings in Marion County.
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	BGEPA	Typically nest in forested areas adjacent to large bodies of water. Avoid heavily developed and populated areas when possible. Prefer tall, mature coniferous or deciduous trees that provide a wide view of the surrounding areas. During winter can be seen in dry, open uplands if there is access to open water.	Low for nesting; Moderate for transients: Nesting habitat available in areas surrounding the Project Area. One sighting documented on the nearest BBS route to the Project Area in 2017 (<5 miles from Project Area boundary line) and twenty sightings recorded during the 2016 Marion CBC. No bald eagles were observed in 2018 avian point counts. The Project area was previously adjusted south to avoid nesting habitat to the north.



Golden eagle ( <i>Aquila chrysaetos</i> )	BGEPA/ SINC	Has records of occurring in most counties of Kansas. Occurs regularly over open grasslands in western Kansas but will sporadically winter in eastern Kansas. Prefers isolated nesting sites. Recent nests in Kansas have been built in isolated trees in native grassland or on the steep sides of deeply eroded gullies. Pairs generally occupy a home range of thirty-five square miles.	Low: Project Area is not within the species breeding range. Nesting habitat for this species exists in other parts of the state, and areas surrounding the Project Area may provide wintering habitat. No eagles were observed in 2018 avian point counts. No documented sightings on the BBS routes near the Project Area. May occur as an uncommon non-breeder or migrant.
<b>Fish</b>			
Topeka shiner ( <i>Notropis topeka</i> )	FE	Lives near the headwaters of small prairie streams with high water quality and cool temperatures. These streams generally exhibit intermittent flow during summer, however, pools are maintained by spring or groundwater percolation. Stream substrates are most often clean gravel, however, bedrock and clay hardpan overlain by a thin silt layer are not uncommon. Topeka shiners most often occur in pool and run areas.	Absent: No critical habitat for this species is designated in the Project Area or Marion County.
Neosho madtom ( <i>Noturus placidus</i> )	FT	Found in stream riffles over loosely-packed gravel bottoms. Young madtoms inhabit deeper water with slow moving currents while adults prefer swift shallow currents.	Absent: No critical habitat for this species is designated in the Project Area or Marion County.
<b>Mussels</b>			
Flutedshell mussel ( <i>Lasmigona costata</i> )	ST	Riverine species preferring clear water riffles with moderate current on a medium to small sized gravel substrate. In Kansas, they have historically occurred in the Fall, Elk, Verdigris, Cottonwood, Spring, and Marais des Cynges Rivers.	Absent: No critical habitat for this species is designated in Marion County.
<b>Insects</b>			
American burying beetle ( <i>Nicrophorus americanus</i> )	FE/SE	Frequently found in upland grasslands or near the edge of grassland/forest habitat where sandy/clay loam soils occur and a food source (carrion) is available. They prefer loose soil where carrion can be easily buried. They historically occur in the eastern one-third of the state of Kansas and there are four counties where critical habitat is designated.	Absent: No critical habitat for this species is designated in Marion County.



#### 6.4 Kansas Natural Heritage Inventory

Westwood reviewed site-specific data from the Kansas Natural Heritage Inventory (Kansas NHI 2019). Natural heritage data indicated the Project site is within the range of the greater-prairie chicken (*Tympanuchus cupido*). The greater-prairie chicken is a gamebird species throughout much of the state, and does not have designated critical habitat within the state of the Kansas (KDWPT 2018). KDWPT has records of greater prairie-chicken leks within 5 miles of the Project area to the east. Relative to wind projects, KDWPT has concerns regarding habitat fragmentation and for other anthropogenic impacts to displace greater prairie-chickens (KDWPT 2018). A number of mussel species occur within the Cottonwood River and possibly Caitlin Creek. A review of the Kansas Natural Resource Planner indicated a number of aquatic species of concern have the potential to occur within the waterways located on-site, however, no designated critical habitat for any species is located within the Project area (KNRP 2019).

### 7.0 BIRDS

#### 7.1 Avian Point Counts

Avian point count surveys were conducted by ACS at 36 points within the Project Area from April 27 to October 15, 2018. A total of 12,192 birds, representing 106 species were recorded during these point count surveys, including 84 species of passerine, 10 species of water/shorebirds, and 12 species of raptors (ACS 2019). No federally- or state-listed species were recorded during surveys, however eight BCC were observed including dickcissel (*Spiza americana*), grasshopper sparrow (*Ammodramus savannarum*), upland sandpiper (*Bartramia longicauda*), Bell's vireo (*Vireo bellii*), northern flicker (*Colates auratus*), loggerhead shrike (*Lanius ludovicianus*), field sparrow (*Spizella pusilla*), and Bewick's wren (*Thryomanes bewickii*).

ACS used the Masden model to evaluate avian risk to turbine collisions (ACS 2019). Based on the estimated values, the most at risk avian species are turkey vulture, northern rough-winged swallow (*Stelgidopteryx serripennis*), red-tailed hawk, Canada goose, common grackle (*Quiscalus quiscula*), tree swallow (*Tachycineta bicolor*), and blue jay (*Cyanocitta cristata*). The model predicts that 21 avian species will experience one or more collisions per year and a total of 326 yearly collisions (169 passerine, 50 water/shorebirds, and 107 raptors) was modeled (ACS 2019).

No publicly available reports of avian communities associated with wind projects near the Project Area are available, and data comparisons at species level were not possible. However, ACS estimated fatality averages are high compared to estimates by the American Wind Wildlife Institute in their most recent study (AWWI 2019). AWWI collected and evaluated data from 193 post-construction mortality studies which included 4,340 turbines and accounts for approximately 19% of installed U.S. wind capacity (AWWI 2019). A total of 281 of the more than 600 avian species found in the U.S. have been reported as fatalities at wind farms. Of the 281 species, 108 species (38%) have three or fewer collisions reported in all scheduled searches contained in the database (AWWI 2019). The 15 species with the most recorded fatalities are responsible for 48.8% of all fatality incidents. Median fatality estimates for small birds is 1.2 fatalities per MW/year, large birds is 0.22 fatalities per MW/year, and 0.06 fatalities per MW/year for raptors (AWWI 2019).



Turbine-related bird mortality risk within the Project Area is likely greatest during the migratory seasons, as has been reported at most wind energy facilities (NWCC 2010). Passerines are likely at greatest risk of collision within the Project Area, as this species group represents the majority (75 percent) of mortalities at wind turbines nationwide (Johnson et al. 2007, Strickland and Morrison 2008). Passerines that migrate at night may be at a greater risk than those that migrate during the day, as this group has accounted for over 50 percent of avian fatalities at some sites; however, no individual species have been identified as comprising the majority of fatalities (Erickson et al. 2002).

Resident passerines may experience lower mortality rates during the breeding season as opposed to during migration, as many species tend to fly below the Rotor Swept Area (RSA) of the turbines during breeding activities. However, some breeding passerines, such as the American robin, northern mockingbird, and horned lark, exhibit behaviors that increase their risk of collision with turbines (Arnett et al. 2007). Courtship rituals that frequently take individuals into the RSA, recurrent activity before dawn and past dusk, and long nocturnal migrations are common amongst these species. Birds that take off or land at dusk or dawn, or birds traveling in low cloud or foggy conditions are also likely at the greatest risk of collision (Kerlinger 1995).

## 7.2 U.S. Fish and Wildlife Service Birds of Conservation Concern

The formal Birds of Conservation Concern (BCC) list was developed by the USFWS as a result of a 1988 amendment to the Fish and Wildlife Conservation Act. This Act mandated that USFWS “identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973.” The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions and to consult on these species in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds.

The Project Area is located within Bird Conservation Region (BCR) 19 Central Mixed Grass Prairie and BCR 22 Eastern Tallgrass Prairie (USFWS 2014). The USFWS lists 27 species as BCC within the Central Mixed Grass Prairie and 39 species as BCC within the Tallgrass Prairie BCR. Seventeen of these species have been recorded on one or more of the BBS routes or CBC routes near the Project Area (Appendix A).

USFWS IPaC lists nine BCC with occurrence in Marion County including bald eagle (*Haliaeetus leucocephalus*), Harris’s sparrow (*Zonotrichia querula*), Hudsonian godwit (*Limosa haemastica*), lesser yellowlegs (*Tringa flavipes*), prothonotary warbler (*Protonotaria citrea*), red-headed woodpecker (*Melanerpes erythrocephalus*), semipalmated sandpiper (*Calidris pusilla*), Sprague’s pipit (*Anthus spragueii*), and willet (*Tringa semipalmata*) (USFWS 2019).



### 7.3 Important Bird Areas

An Important Bird Area (IBA) is an area recognized as being globally important habitat for the conservation of bird populations. In the United States, the program is administered by the National Audubon Society (Audubon 2019). The National Audubon Society lists IBAs as sites providing essential habitat for one or more species of birds. The nearest IBA is the 18,463 acre globally recognized Flint Hills Region (Exhibit 7). Flint Hills spans across 22 counties in Kansas, including portions of Marion County and the Project Area. This IBA contains habitat for the greater prairie chicken (*Tympanuchus cupido*), Henslow's sparrow (*Ammodramus henslowii*), grasshopper sparrow (*Ammodramus savannarum*), dickcissel (*Spiza americana*), eastern meadowlark (*Strunella magna*), and upland sandpiper (*Bartramia longicauda*). The Flint Hills also serve as a staging area for raptors and comprises North America's only north-south tallgrass prairie corridor. Migrant species using this corridor include American golden-plover (*Pluvialis dominica*), buff-breasted sandpiper (*Tryngites subruficollis*), Sprague's pipit (*Anthus spragueii*), vesper sparrow (*Pooecetes gramineus*), savannah sparrow (*Passerculus sandwichensis*), and Smith's longspur (*Calcarius pictus*) (Audubon 2019).

### 7.4 Breeding Bird Survey Routes

The Breeding Bird Survey (BBS) is a cooperative effort between the Patuxent Wildlife Research Center (USGS) and Canadian Wildlife Service to monitor the status and trends of North American bird populations (USGS-PWRC 2018). BBS are conducted during the peak of the breeding season. Each route is 24.5 miles long and has 50 stops located at half-mile intervals along the route. A three-minute point count is conducted at each stop, during which the observer records all birds heard or seen within a quarter mile of the stop.

There are two active BBS routes located in Marion County, Kansas (Exhibit 8). Goessel and Lincolnville are located approximately 8 and 20 miles from the center of the Project Area, respectively, with portions of the routes running even closer to the Project Area. Based on the species richness reported for each of the BBS routes, 97 bird species have been identified in the surrounding region (Appendix A) (USGS-PWRC 2017). There were no federally –listed species documented on the BBS routes (Audubon 2017).

### 7.5 Christmas Bird Counts

The National Audubon Society began collecting Christmas Bird Count (CBC) data in the year 1900 as a means to guide conservation for birds. The count occurs between December 14 to January 5 every year and volunteers record all birds seen and heard within a 15-mile diameter circle (Lebaron 2017).

The Marion and Halstead-Newton CBC routes are the closest CBC surveys to the Project Area, located approximately 9 and 24 miles from the center of the Project Area (to the center of the survey routes), respectively (Exhibit 8). Portions of the northern section of the Project Area fall within the 15-mile diameter circle surveyed by Marion CBC. The Marion CBC was surveyed in the year 2016 and results indicate that 88 species were observed (Appendix A). The Halstead-Newton CBC is typically surveyed every year and data was available for the ten year period between 2008 and 2017 and results indicate



that 113 species have been observed from this survey route. No federally-listed species were documented during these CBC surveys (Audubon 2017).

## 8.0 BATS

Forty-seven bat species are known to occur in North America, fifteen of which have the potential to occur in Kansas (BCI 2019). Of these fifteen bat species, the Project area is within range of ten bat species (BCI 2019). Seven bat species have been previously identified in Marion County including big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), evening bat (*Nycticeius humeralis*), tri-colored bat (*Perimyotis subflavus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (KDWPT 2019).

Acoustical bat data was collected and analyzed by Aeolus Consulting Services (ACS) at two locations in the Project Area between August 1 and November 1, 2018 (ACS 2018). ACS verified bat calls from seven bat species in the Project Area, including big brown bat, silver-haired bat, eastern red bat, hoary bat, evening bat, tri-colored bat, and Indiana bat (*Myotis sodalis*) (ACS 2018). The Indiana bat is a federally-listed as endangered species and has not been previously recorded in Marion County (USFWS 2018). ACS reported 11 bat calls suggestive of Indiana bat, of which five were definitive (ACS 2018). ACS reported the following species-verified call proportions: eastern red bat, 43 percent; tri-colored bat, 17 percent; evening bat, 16 percent; big brown bat, 12 percent; silver-haired bat, 7 percent; hoary bat, 3 percent; and Indiana bat, 3 percent (ACS 2018).

The big brown bat, tri-colored bat, and Brazilian free-tailed bat are cave bats that typically hibernate in caves during the winter and roost in trees, shrubs, caves, or buildings during the summer. No winter roosts for any of these bat species are known to occur within the Project Area, however, mines and karst formations are known to occur within or near the Project Area and surrounding region (Exhibit 6). The silver-haired bat, hoary bat, and eastern red bat are migratory tree bats and commonly roost in trees and shrubs throughout the year. They have been well documented as being at risk from operating wind turbines during the late summer and fall migratory period (Arnett et al. 2008; Johnson 2005; Kunz et al. 2007b). The evening bat is a true forest bat that inhabits deciduous woodlands and is known to roost in hollow trees and buildings. It is currently unknown whether evening bats migrate south or overwinter in Kansas (KMA 2018).

A review of the literature by Ellison (2012) for a synthesis of bats and wind-energy issues noted the following general patterns and findings common to all of the review papers:

- Bat-fatality rates at wind turbines are variable across sites and regions of North America. Estimates of bat fatalities were highest at wind-energy facilities located on forested ridges in the eastern United States and the prairies of eastern Canada and were lowest in the Rocky Mountain and Pacific Northwest regions.



- Bat-fatality rates range from just below one bat per installed megawatt per year (bats/megawatt [MW]/year) to 70 bats/MW/year.
- Three species of migratory tree bats comprise the majority of fatalities (i.e., hoary, eastern red, and silver-haired bats), and hoary bats comprise about half of all documented fatalities in North America.
- Silver-haired bat fatalities were more common in Canada, Iowa, and the Pacific Northwest compared to the eastern United States, where the eastern red bats were the most common species in eastern forested sites.
- Fatalities were skewed toward males for the four most commonly killed species at most facilities.
- Most fatalities occur during a period of time that coincides with autumn migration, although few studies spanned the entire season when bats were active.
- Bats collide with spinning turbine blades and do not strike stationary blades or towers.
- Larger, taller turbines killed more bats per turbine when compared to smaller turbines. Highest bat-fatality rates occurred at turbines with towers of 65 meters or taller.
- The majority of bats appeared to be killed on low wind-speed nights when power production was proportionally low, but turbine blades were still moving, often at or close to fully operational speed.
- There appeared to be no difference in bat-fatality rates between turbines equipped with Federal Aviation Administration (FAA) lights and those that were unlit.
- Factors influencing fatality rates remain unclear, and it is not yet known how to identify and avoid high-risk sites for bats and wind energy.
- Population sizes of migratory tree bats are unknown because of their cryptic habits and limitations in how their numbers can be estimated. No method of assessing how quickly the current rates of bat mortality at turbines could cause population declines has been established.
- Studies in Canada and the United States have independently shown that curtailment or preventing turbine blades from turning during relatively low wind speeds in late-summer and autumn, can reduce bat fatalities by as much as 40 to 90 percent.

## 9.0 DISCUSSION

The *USFWS Land-Based Wind Energy Guidelines* (USFWS 2012) provide voluntary guidance for assessing potential impacts to wildlife and their habitats from wind energy development. These guidelines are founded upon a “tiered approach” for assessing potential impacts to wildlife and their habitats. The tiered approach is an iterative decision-making process for collecting information in increasing detail; quantifying the possible risks of proposed wind energy projects to wildlife and habitats; and evaluating those risks to make siting, construction, and operation decisions. Subsequent tiers refine and build upon issues raised and efforts undertaken in previous tiers.

The tiers are outlined briefly as:

- Tier 1 – Preliminary evaluation or screening of sites (landscape -level screening of possible project sites)



- Tier 2 – Site characterization (broad characterization of one or more potential project sites)
- Tier 3 – Field studies to document site wildlife conditions and predict project impacts (site-specific assessments at the proposed project site)
- Tier 4 – Post-construction fatality studies (to evaluate direct fatality impacts)
- Tier 5 – Other post-construction studies (to evaluate direct and indirect effects of adverse habitat impacts and assess how they may be addressed)

It should be noted that adherence to the *USFWS Land-Based Wind Energy Guidelines* is voluntary and does not relieve any individual, company, or agency of the responsibility to comply with laws and regulations. If a violation occurs: however, USFWS can consider a developer's documented efforts to communicate with USFWS and adherence to the guidelines.

This SCS and biological survey wrap-up serves as the Tier 2 stage in the site selection process and has been informed by Tier 3 site specific field studies and surveys conducted by ACS. Results from this report generally indicate a low probability of significant adverse impact to wildlife. This was based on the fact that few species of concern are likely to occur within the Project Area and there are little to no critical areas of wildlife congregation, staging areas, nesting sites, and other areas of seasonal importance known to occur within the Project Area or nearby. Although the Project Area falls within the 90 - 95% probability zone of the whooping crane corridor (Exhibit 9), the lack of sightings within the Project Area and Marion County suggests a low likelihood of use by whooping cranes.

While the outcome of Tier 1 through 3 studies generally determine the need for Tier 4 studies, fatality studies are generally considered and required for most wind energy projects. EXW intends to conduct Tier 4 post-construction monitoring studies to determine avian and bat mortality rates resulting from operation of the Project. The monitoring study would use standardized area searches of all turbines at the Project site in accordance with agency recommended guidelines. Specific information regarding the methods and metrics used, duration, and timing of the monitoring study would be contained in a Bird and Bat Conservation Strategy (BBCS), which would be developed for the Project in accordance with the USFWS *Interim Guidelines for the development of a Project Avian and Bat Protection Plan for Wind Energy Facilities* (USFWS 2009).



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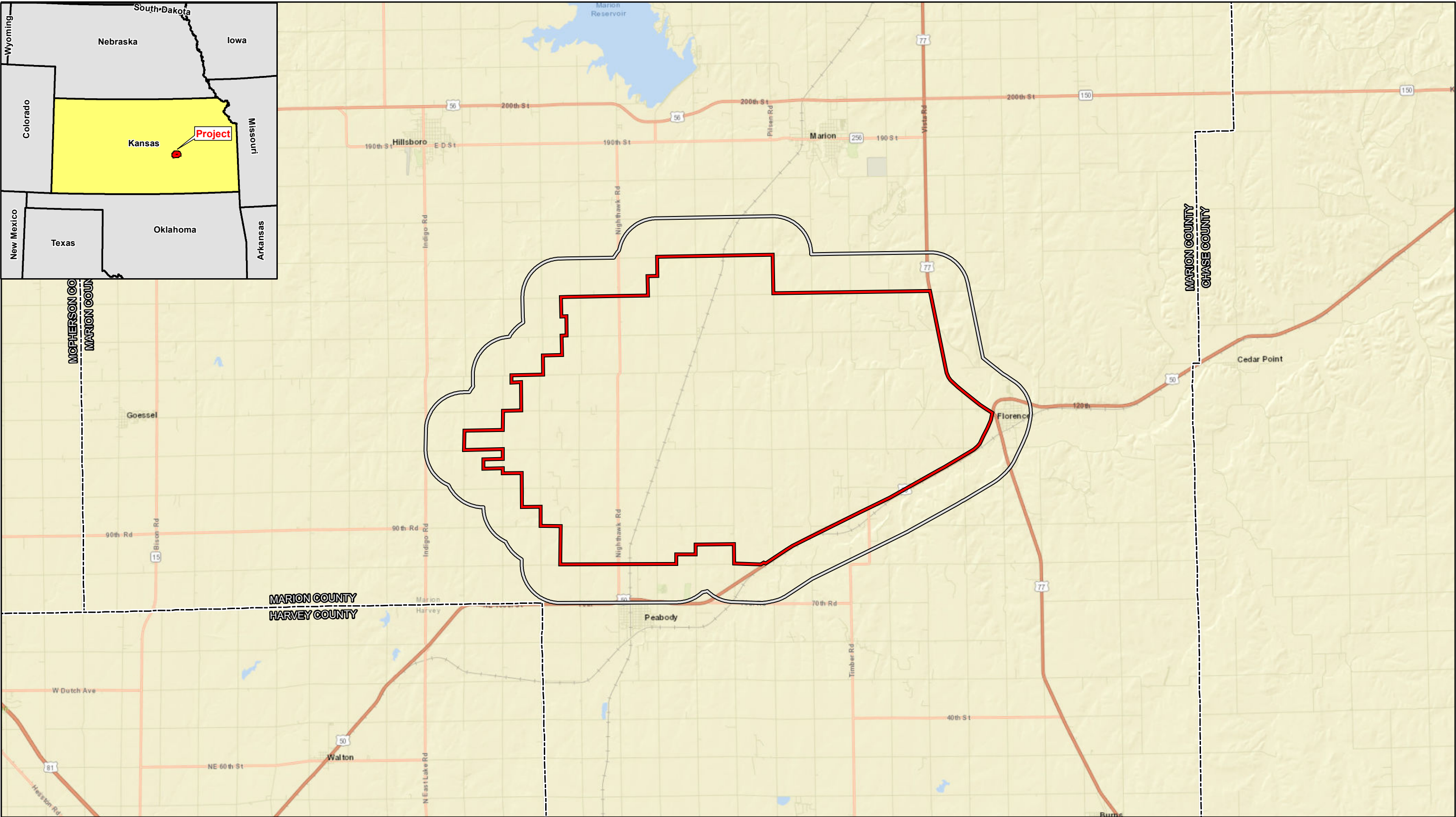
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# **Exhibit 1**

## **Study Area Vacinity Map**





Data Source(s): Westwood (2019); ESRI WMS World Streets Basemap (Accessed 2019); U.S. Census Bureau (2017).

**Legend**

- Project Boundary
- 1-Mile Buffer
- State Boundary
- County Boundary



**Expedition Wind Project**

Marion County, Kansas

Project Area Vicinity Map



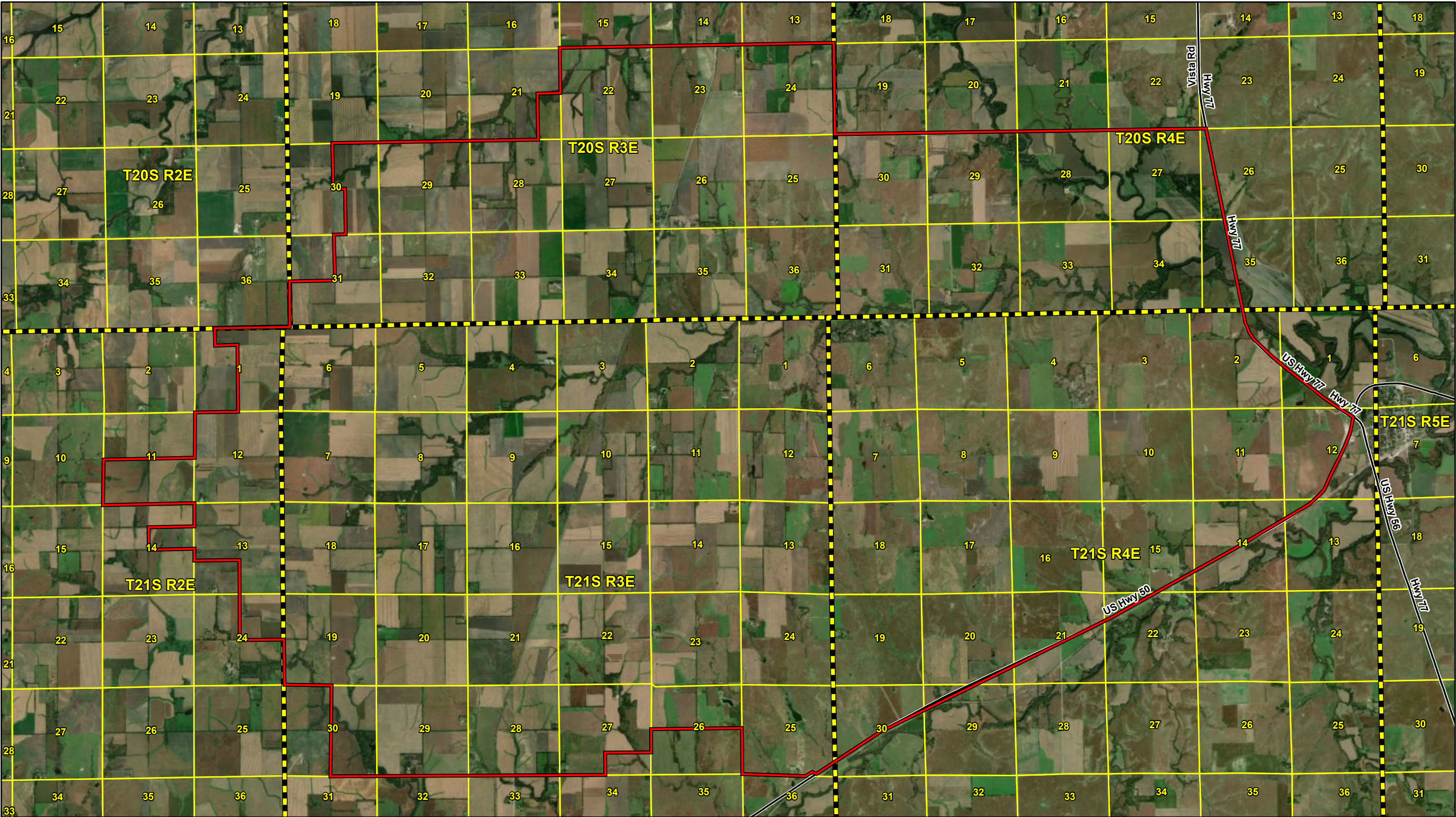
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# **Exhibit 2**



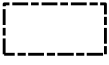


## **Project Area Site Map**





Data Source(s): Westwood (2019); ESRI WMS World Imagery Basemap (Accessed 2019); U.S. Census Bureau (2017).

**Legend**

	Project Boundary		PLS Township Boundary
	County Boundary		PLS Section Boundary
	Major Road		

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**Expedition Wind Project**  
Marion County, Kansas  
Project Area Site Map  
EXHIBIT 2

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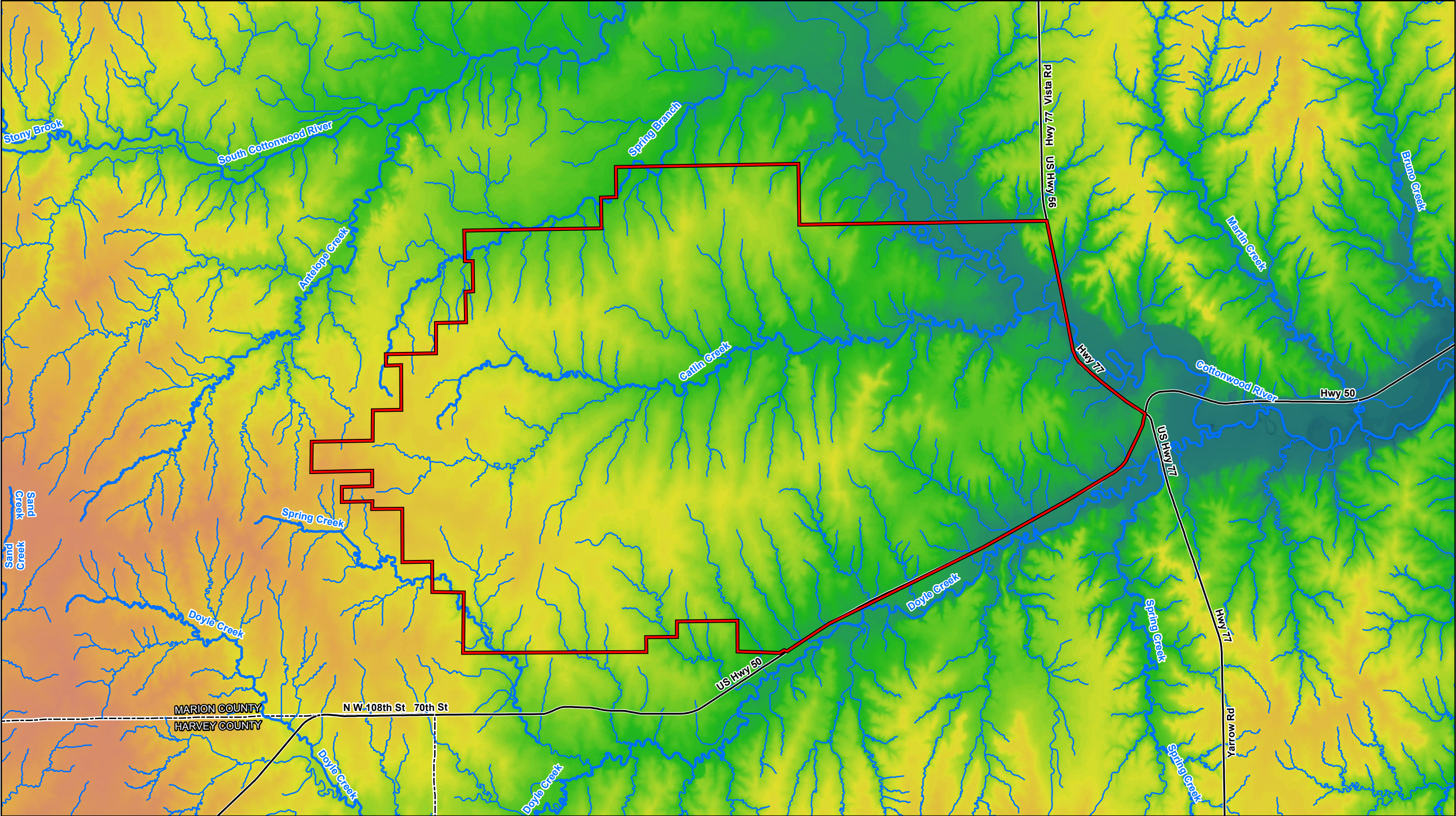


# **Exhibit 3**

## **Topography & Major Drainage Features Map**



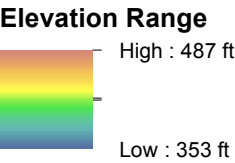
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Data Source(s): Westwood (2019);

**Legend**

- Project Boundary
- County Boundary
- Major Drainage Feature
- Minor Drainage Feature
- Major Road



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**Expedition Wind Project**

Marion County, Kansas

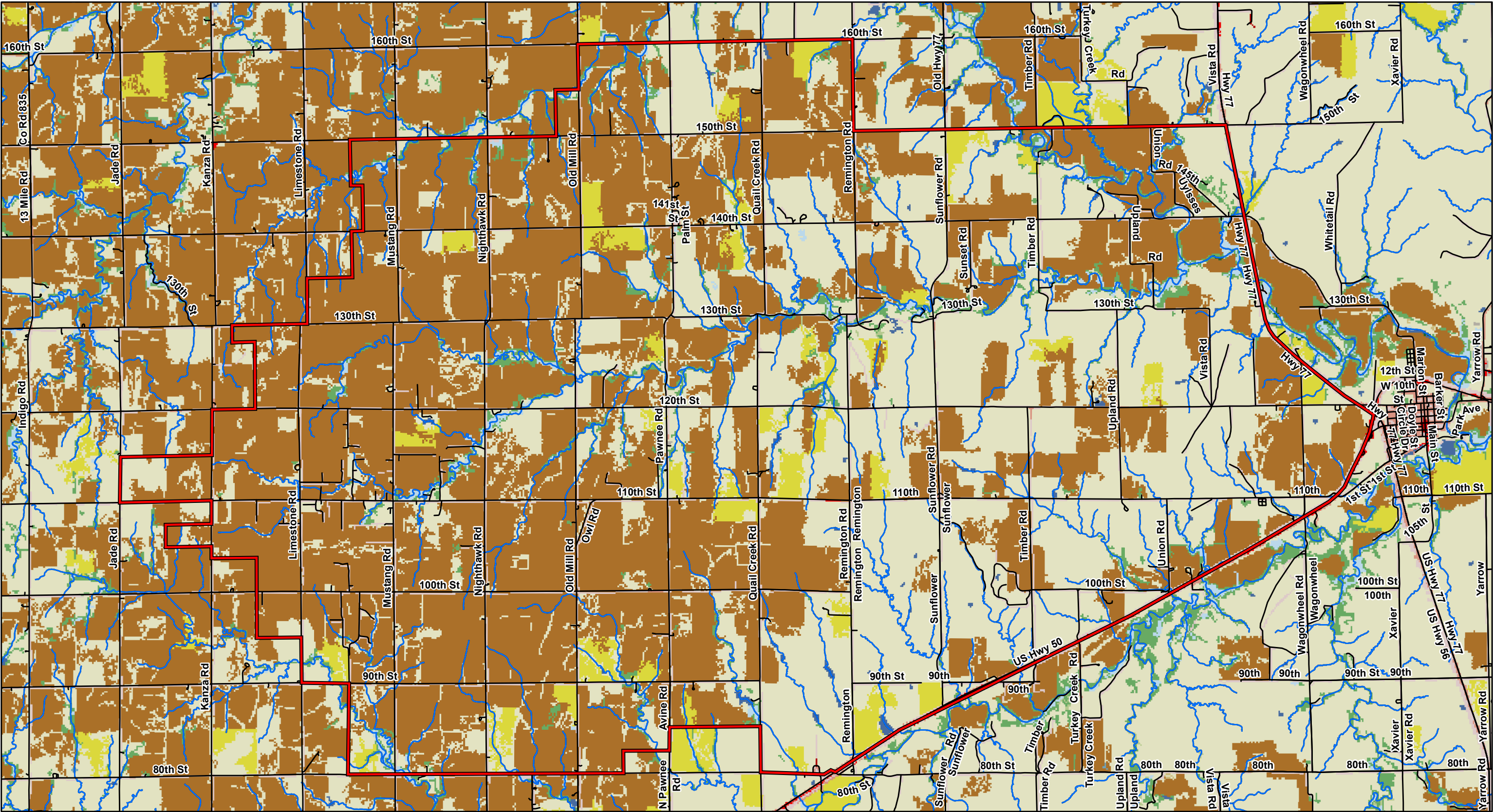
Topography & Major  
Drainage Features




















# **Exhibit 4**

## **Land Cover**





Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Geological Survey (2011).

Legend			
	Project Boundary		Developed, Open Space (4.4%)
	Ephemeral Drainage		Developed, Low Intensity (0.2%)
	Road		Developed, Medium Intensity (0.1%)
			Developed, High Intensity (<0.1%)
			Barren Land (<0.1%)
			Deciduous Forest (2.7%)
			Evergreen Forest (<0.1%)
			Mixed Forest (<0.1%)
			Herbaceous (37.3%)
			Hay/Pasture (3.6%)
			Cultivated Crops (50.2%)
			Woody Wetlands (1.0%)
			Emergent Herbaceous Wetlands (<0.1%)
			Open Water (0.3%)

# Expedition Wind Project

Marion County, Kansas

## Land Cover Map

EXHIBIT 4

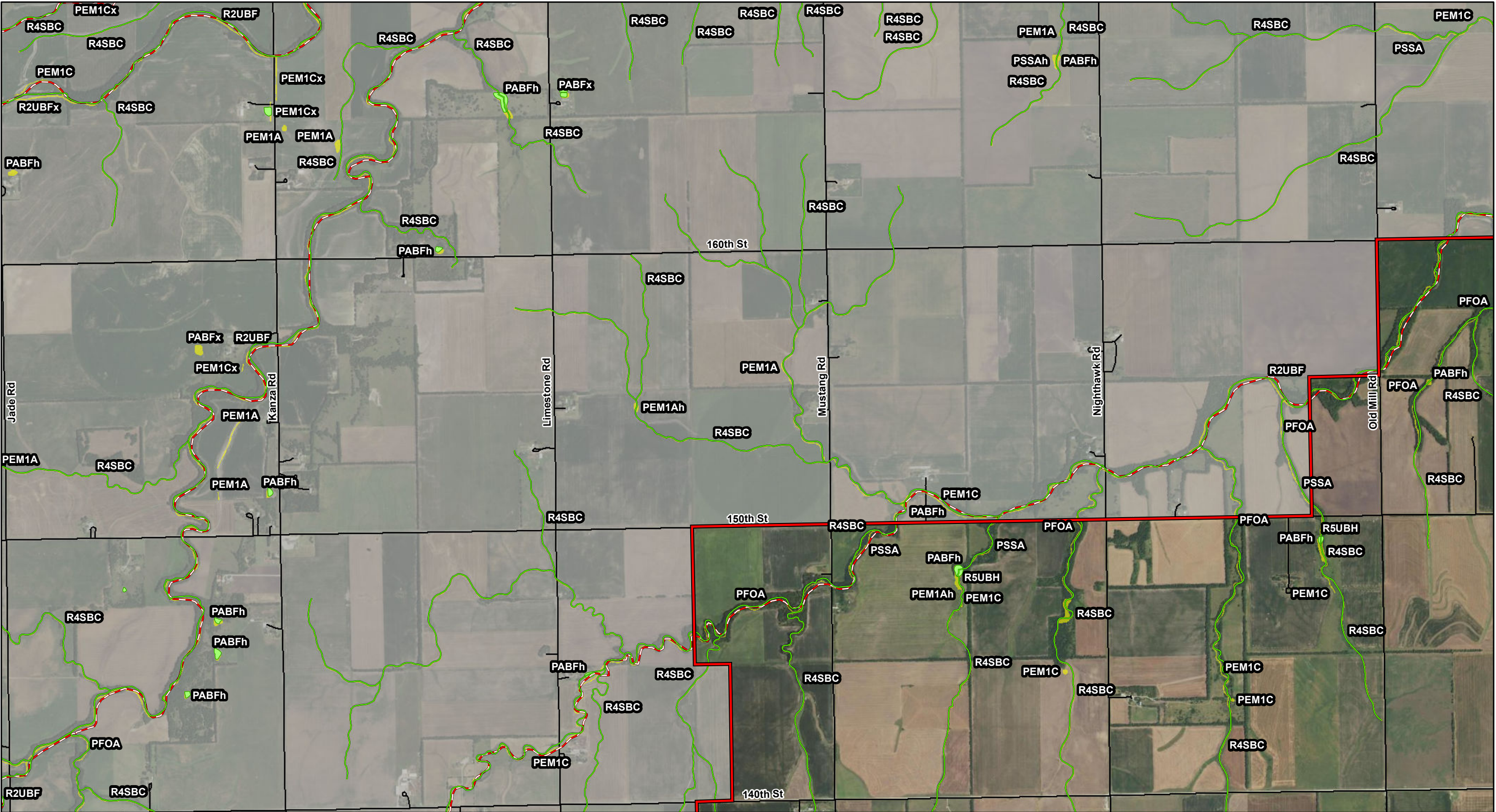




# **Exhibit 5**

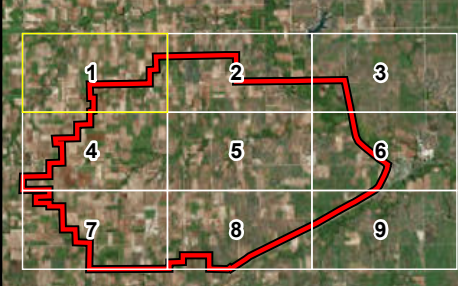
## **Surface Water Wetlands**















Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Fish and Wildlife Service (2013); Ducks Unlimited (2013); FEMA (2016).

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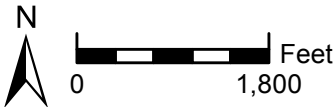
**Legend**

- |   |  |   |
|---|--|---|
|  Project Boundary     |  NHD Flowline       |  100-Year Floodplain |
|  Road                 |  NHD Waterbody      |  500-Year Floodplain |
|  Out of Project Scope |  Impaired Stream    |   |
|  NWI Wetlands         |  Impaired Waterbody |   |

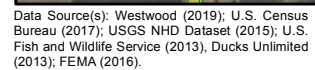
# Expedition Wind Project

Marion County, Kansas

## Surface Water & Wetlands







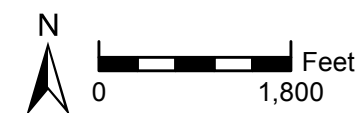
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 NWI Wetlands Impaired Waterbody

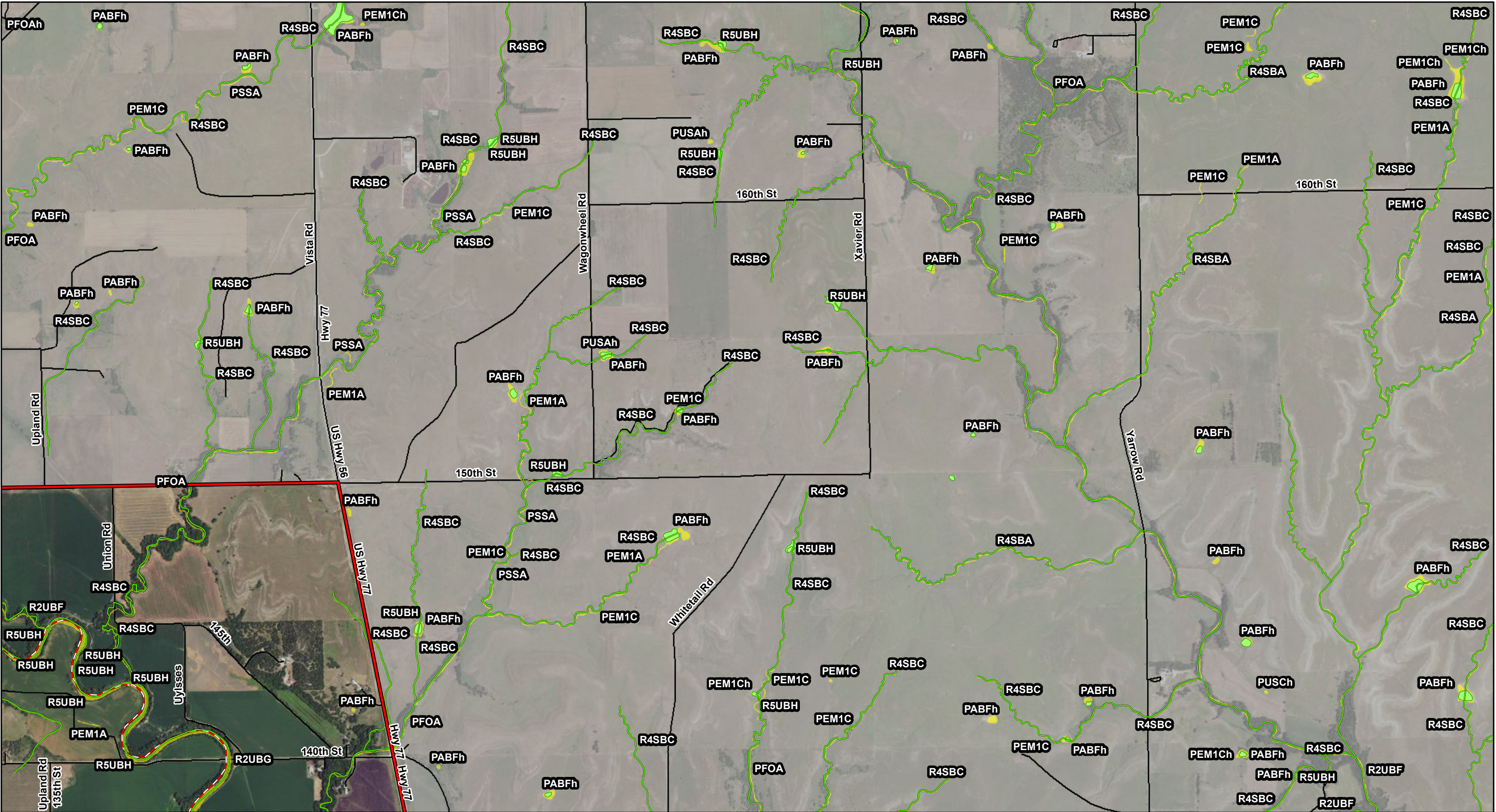
500-Year Floodplain

## Marion County, Kansas

## Surface Water & Wetlands

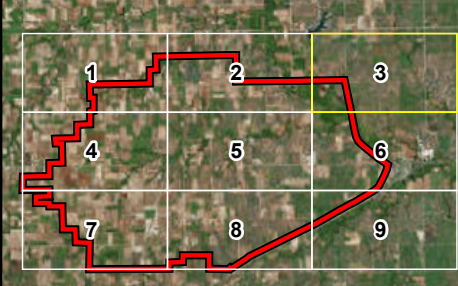
















Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Fish and Wildlife Service (2013); Ducks Unlimited (2013); FEMA (2016).

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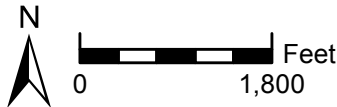
**Legend**

- |   |  |   |
|---|--|---|
|  Project Boundary     |  NHD Flowline       |  100-Year Floodplain |
|  Road                 |  NHD Waterbody      |  500-Year Floodplain |
|  Out of Project Scope |  Impaired Stream    |   |
|  NWI Wetlands         |  Impaired Waterbody |   |

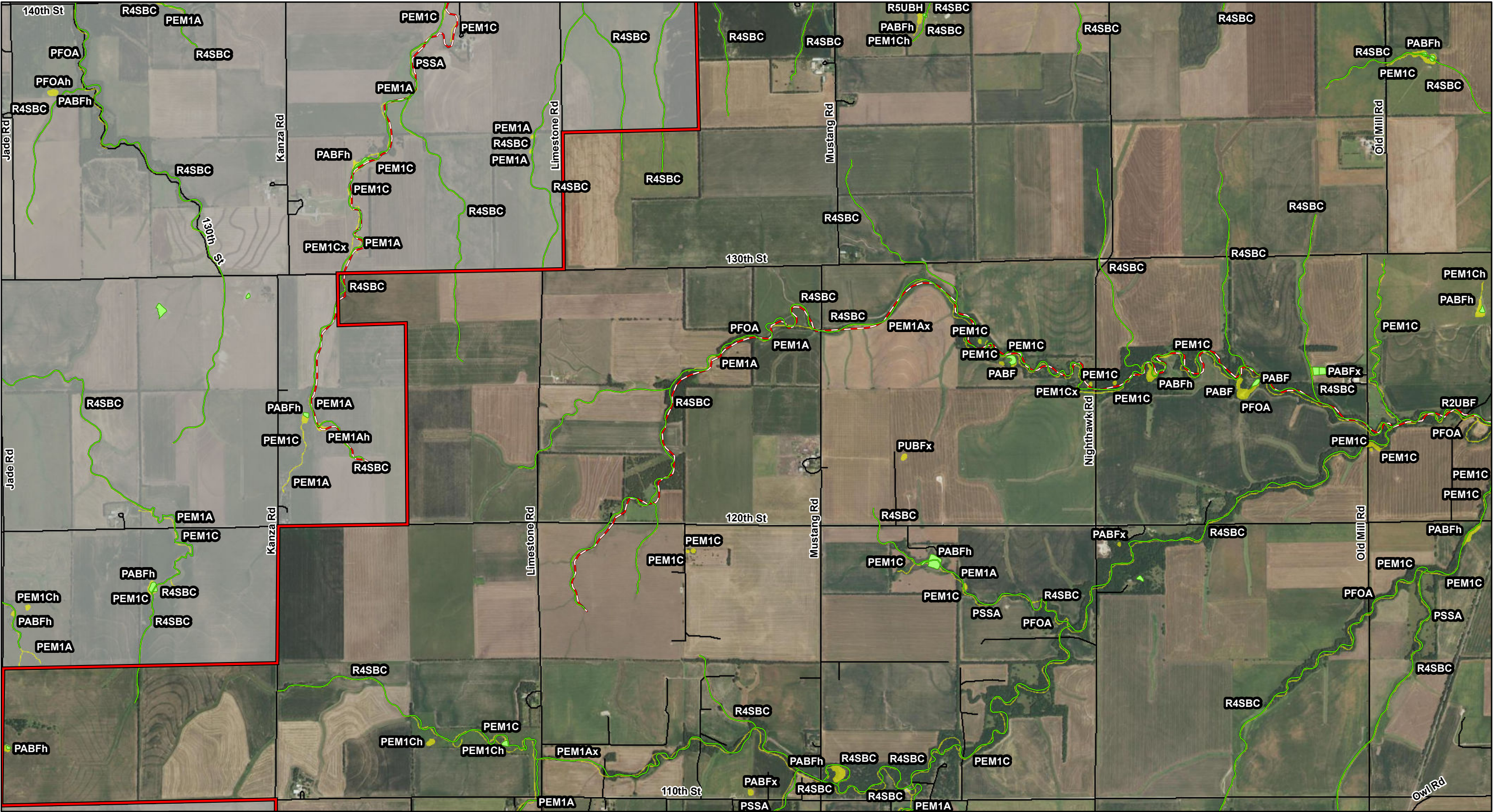
# Expedition Wind Project

Marion County, Kansas

## Surface Water & Wetlands

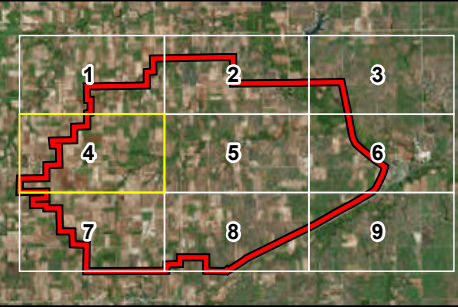






Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Fish and Wildlife Service (2013); Ducks Unlimited (2013); FEMA (2016).

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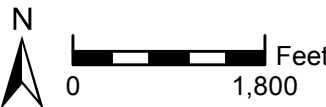
**Legend**

Project Boundary	NHD Flowline	100-Year Floodplain
Road	NHD Waterbody	500-Year Floodplain
Out of Project Scope	Impaired Stream	
NWI Wetlands	Impaired Waterbody	

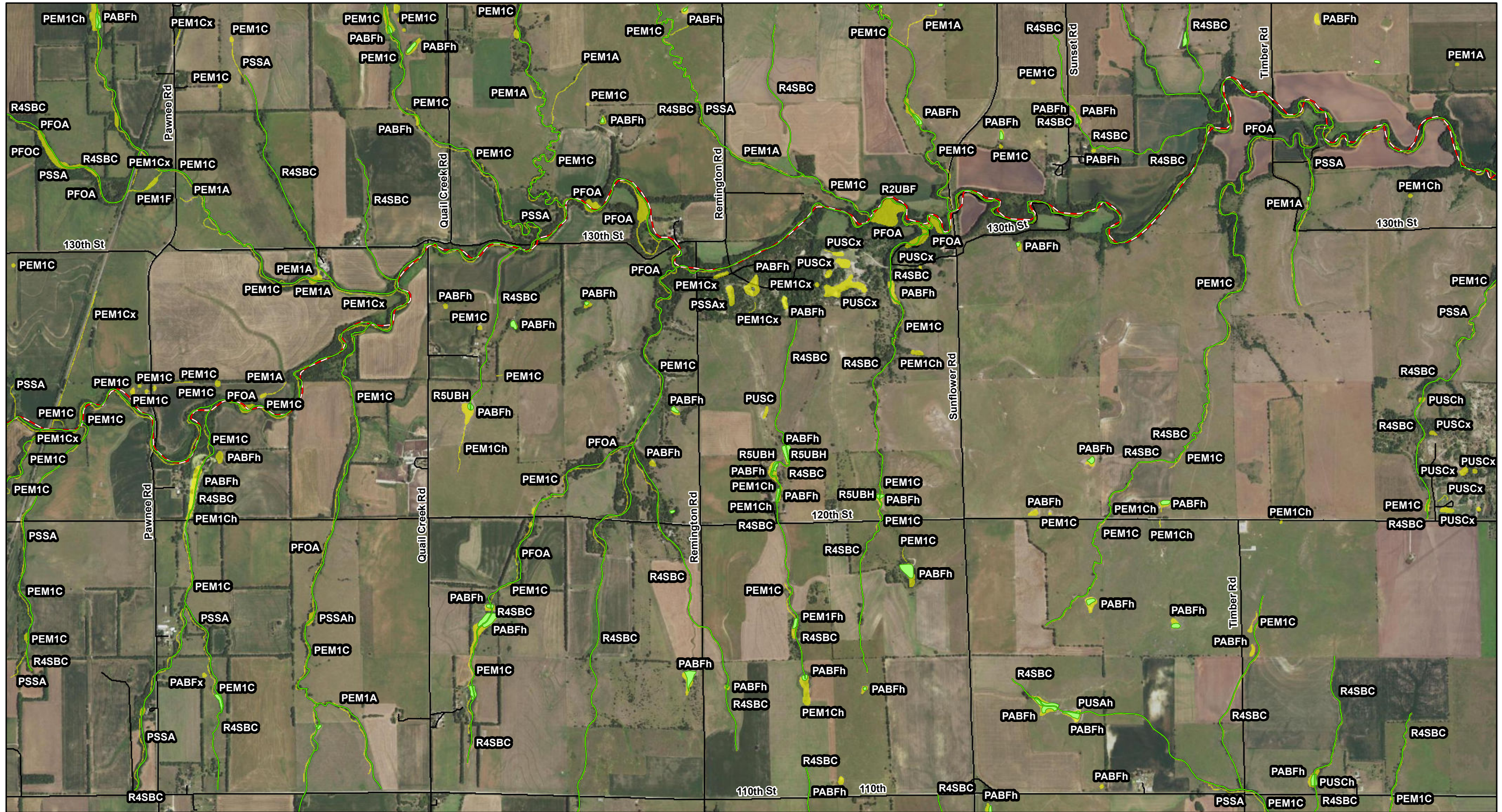
# Expedition Wind Project

Marion County, Kansas

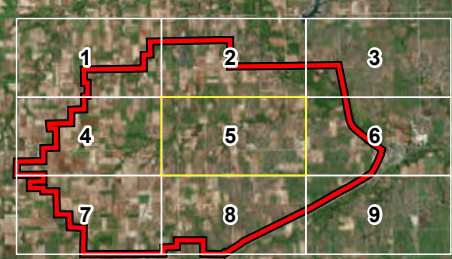
## Surface Water & Wetlands







Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Fish and Wildlife Service (2013); Ducks Unlimited (2013); FEMA (2016).



#### Legend

- |  |                      |  |                    |  |                     |
|--|----------------------|--|--------------------|--|---------------------|
|  | Project Boundary     |  | NHD Flowline       |  | 100-Year Floodplain |
|  | Road                 |  | NHD Waterbody      |  | 500-Year Floodplain |
|  | Out of Project Scope |  | Impaired Stream    |  |                     |
|  | NWI Wetlands         |  | Impaired Waterbody |  |                     |

## Expedition Wind Project

Marion County, Kansas

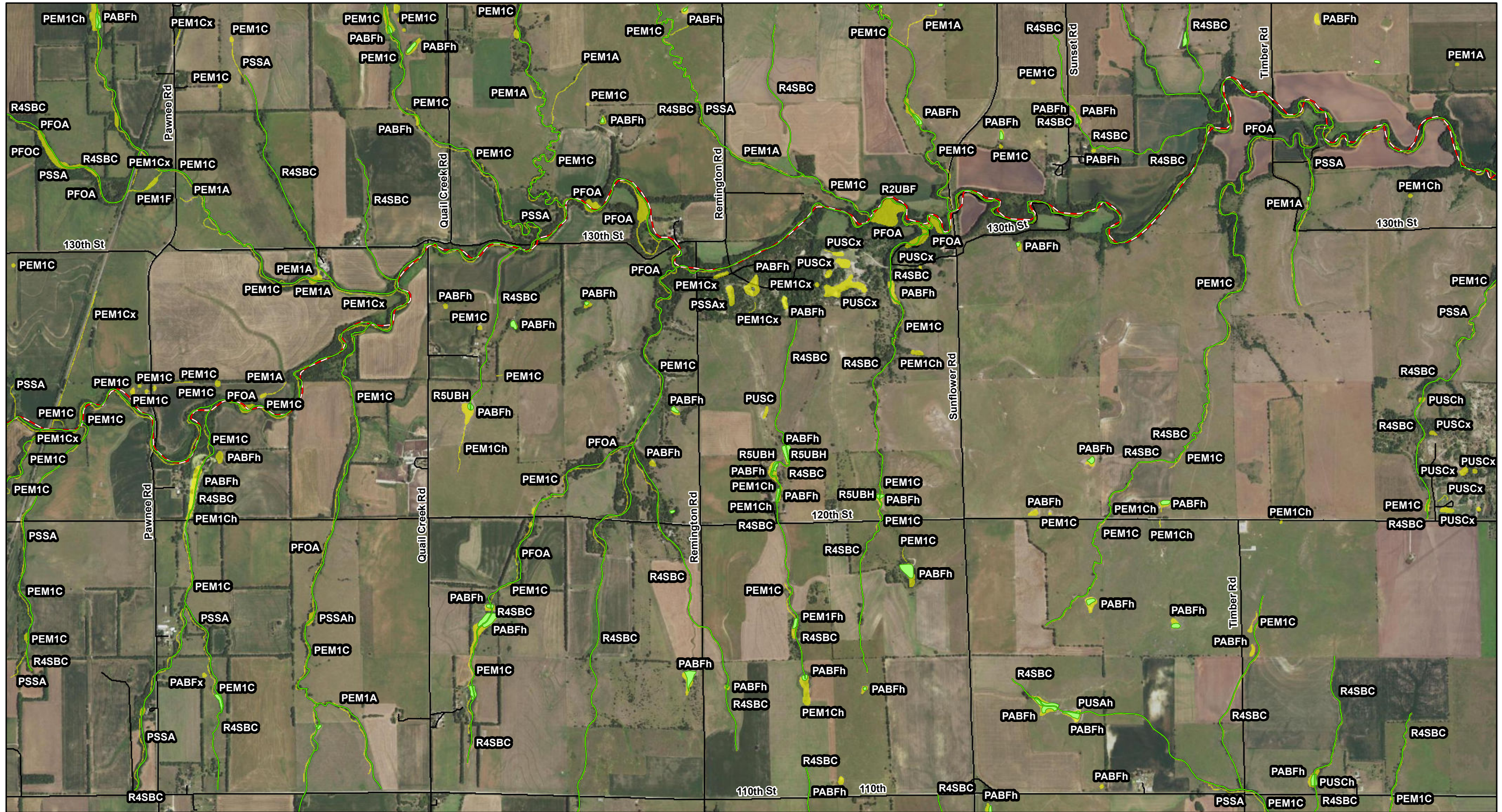
### Surface Water & Wetlands



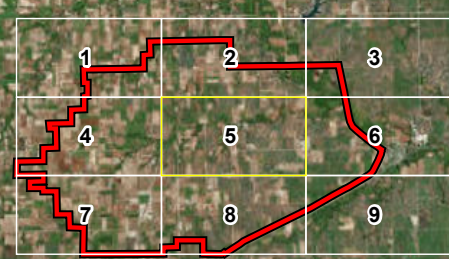
**Westwood**

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Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Fish and Wildlife Service (2013); Ducks Unlimited (2013); FEMA (2016).



#### Legend

- |                      |                    |                     |
|----------------------|--------------------|---------------------|
| Project Boundary     | NHD Flowline       | 100-Year Floodplain |
| Road                 | NHD Waterbody      | 500-Year Floodplain |
| Out of Project Scope | Impaired Stream    |                     |
| NWI Wetlands         | Impaired Waterbody |                     |

## Expedition Wind Project

Marion County, Kansas

### Surface Water & Wetlands



**Westwood**

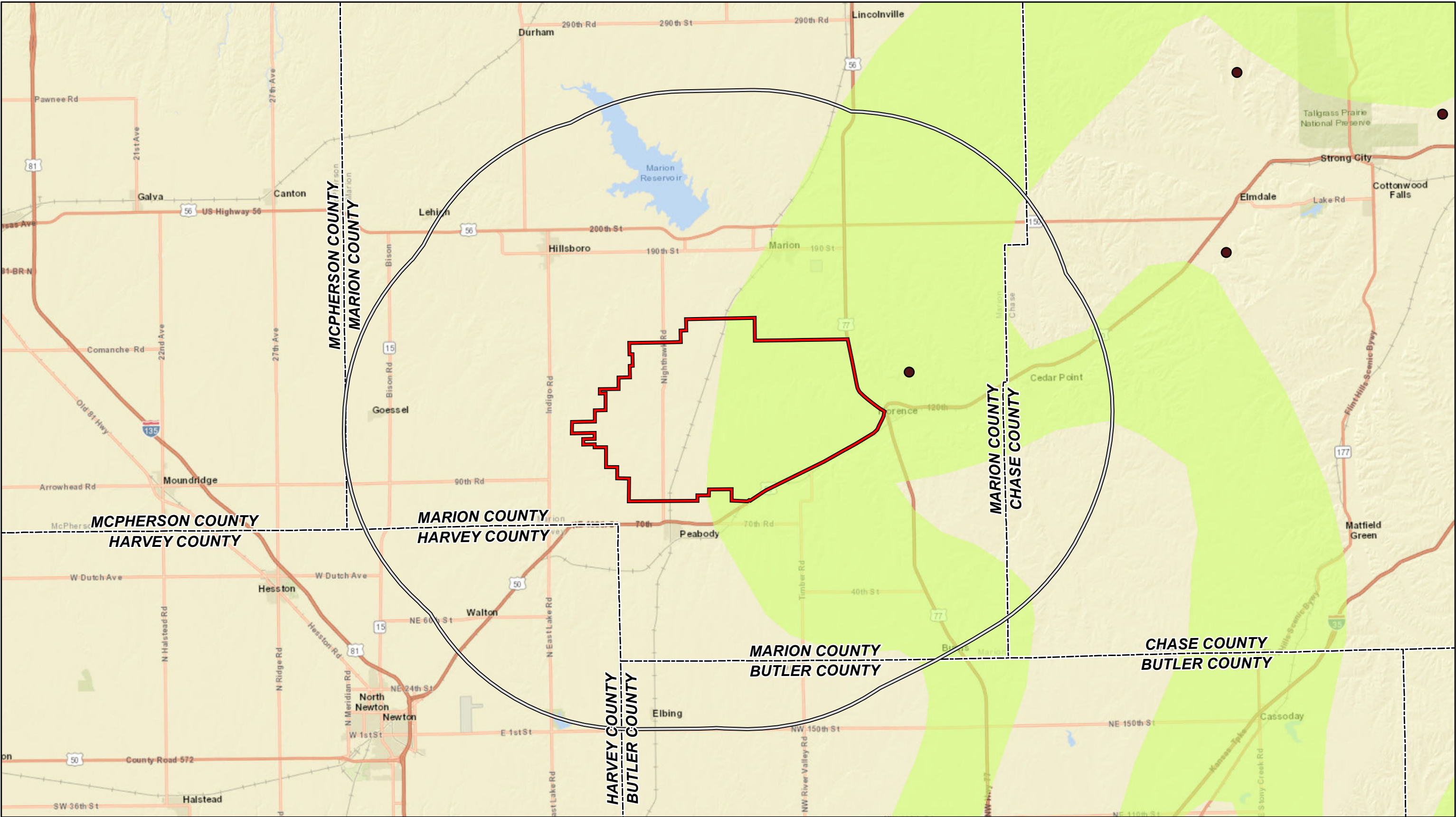
Toll Free (888) 937-5150 westwoodps.com  
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# **Exhibit 6**

**Geology**







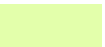


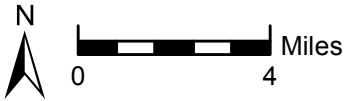
Data Source(s): Westwood (2019); ESRI WMS Streets Basemap (Accessed 2019); U.S. Census Bureau (2017); Ventyx Velocity Suite, Ventyx Energy LLC. (2017); USGS Karst in the United States (2014).

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**Legend**

-  Project Boundary
-  10-Mile Buffer
-  County Boundary
-  Mines
-  Karst Region



**Expedition Wind Project**

Marion County, Kansas

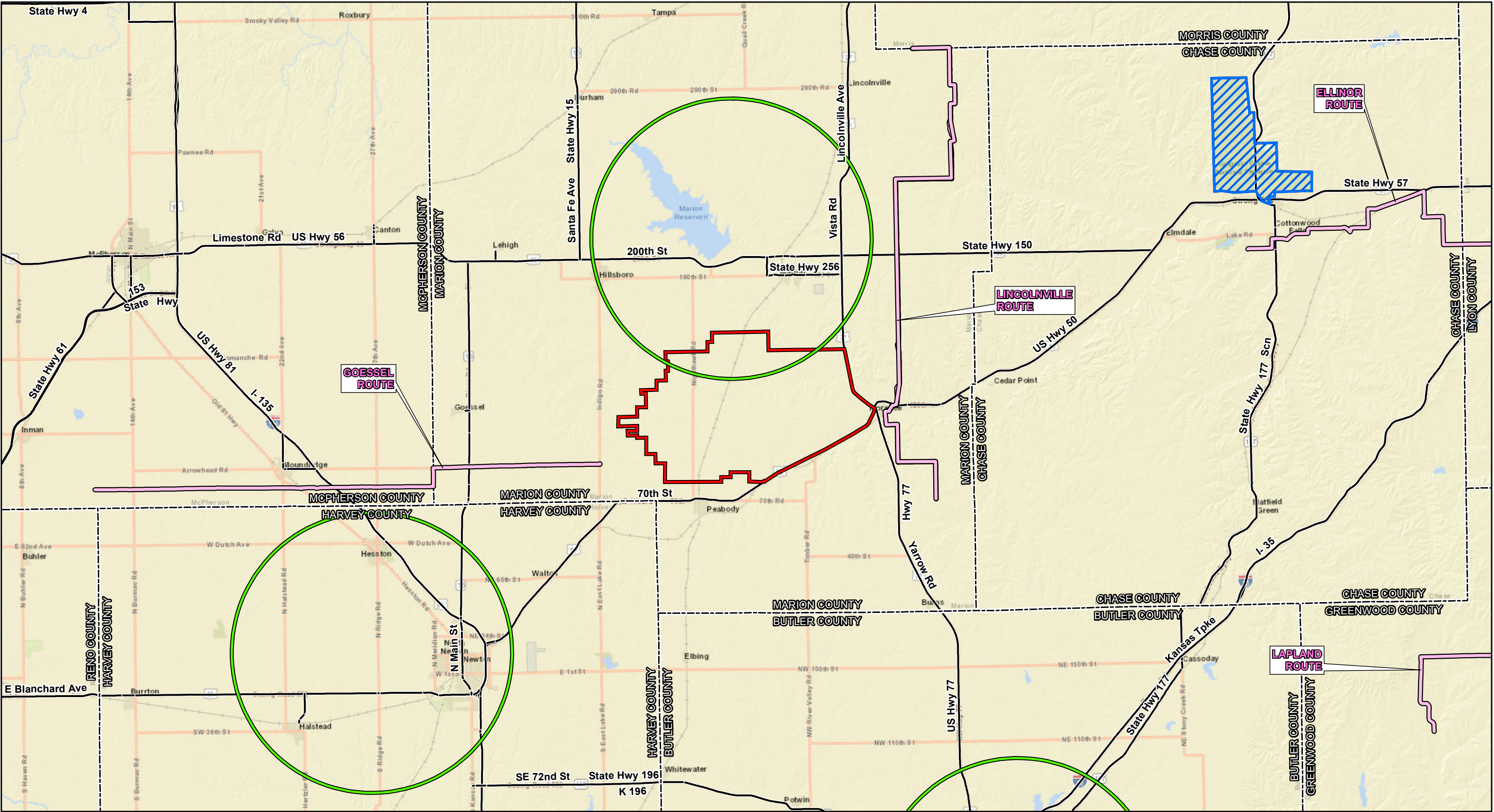
Caves, Mines, and Areas of  
Potential Karst Geology



# **Exhibit 7**






## **Important Bird Areas**





Data Source(s): Westwood (2019); U.S. Census Bureau (2017); USGS NHD Dataset (2015); U.S. Geological Survey (2011); American Bird Conservancy (2015); National Audubon Society (2016).

**Legend**

- |   |                  |   |   |   |                      |
|---|------------------|---|---|---|----------------------|
|  | Project Boundary |  | Major Road                                      |  | Important Bird Area  |
|  | County Boundary  |  | North American Breeding Bird Survey Route (BBS) |  | Christmas Bird Count |
|  | State Boundary   |   |   |   |                      |

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# Expedition Wind Project

Marion County, Kansas

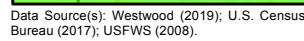
Important Bird Areas &  
Breeding Bird Survey (BBS) Routes



# **Exhibit 8**

**Whooping Crane**





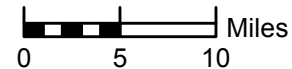
---

Major Road

100

130 miles (85% of sightings)

80 miles (75% of sightings)



## Marion County, Kansas

## Whooping Crane Migration Corridor And Sightings

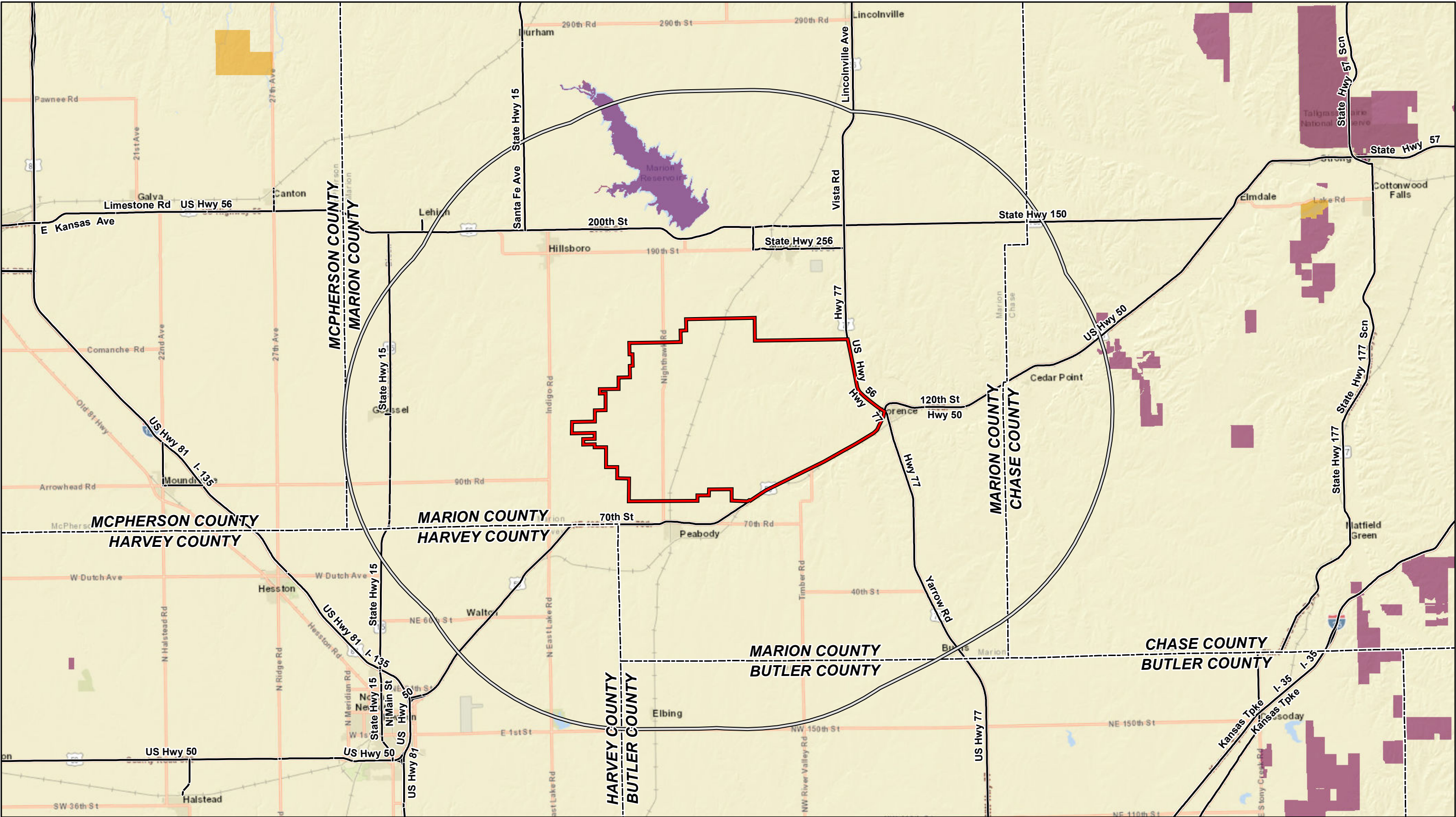
EXHIBIT 8



# **Exhibit 9**


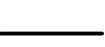




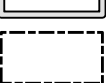


## **Special Management Areas**

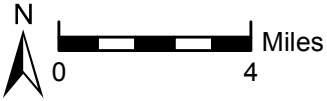




Data Source(s): Westwood (2019); ESRI WMS Streets Basemap (Accessed 2019); Conservation Biology Institute PAS-US (2016); U.S. Census Bureau (2017).

**Legend**

- |  |  |   |
|--|--|---|
|  Project Boundary |  Major Road   |  American Indian Land  |
|  10-Mile Buffer   |  Federal Land |  Local Government Land |
|  County Boundary  |  State Land   |  Other Protected Land  |



**Expedition Wind Project**

Marion County, Kansas

Special Management Areas



# **Appendix A**

## **Species List**



Species	Breeding Bird Survey (BBS) Routes		Christmas Bird Count (CBC) Routes		Point Count Surveys
	Goessel	Lincolnville	Marion*	Halstead-Newton	EXW Project Area
Alder Flycatcher					X
American Coot			X	X	
American Crow	X	X	X	X	X
American Goldfinch	X	X	X	X	X
American Kestrel	X	X	X	X	X
American Robin	X	X	X	X	X
American Tree Sparrow			X	X	
American White Pelican			X		X
American Wigeon			X	X	
Bald Eagle <sup>1</sup>	X		X	X	
Baltimore Oriole	X	X			X
Barn Swallow	X	X			X
Barred Owl	X	X	X	X	X
Bell's Vireo <sup>1</sup>	X	X			X
Belted Kingfisher			X	X	X
Bewick's Wren <sup>1</sup>					X
Black-capped Chickadee	X	X	X	X	X
Black-crowned Night Heron <sup>1</sup>				X	
Blue Grosbeak		X			X
Blue Jay	X	X	X	X	X
Blue-gray Gnatcatcher		X			X
Blue-winged Teal					X
Bobolink <sup>2</sup>					X
Bonaparte's Gull			X		
Brewer's Blackbird			X	X	
Broad-winged Hawk					X
Brown Creeper			X	X	
Brown Thrasher	X	X		X	X
Brown-headed Cowbird	X	X	X	X	X
Bufflehead				X	
Cackling Goose			X	X	
Canada Goose	X	X	X	X	X
Canvasback			X	X	
Carolina Wren	X	X	X	X	X
Cassin's Sparrow <sup>1</sup>		X			



Species	Breeding Bird Survey (BBS) Routes		Christmas Bird Count (CBC) Routes		Point Count Surveys
	Goessel	Lincolnville	Marion*	Halstead-Newton	EXW Project Area
Cattle Egret	X				
Cedar Waxwing		X	X	X	X
Chimney Swift	X	X			X
Chipping Sparrow		X			X
Clay-colored Sparrow					X
Cliff Swallow	X	X			X
Common Goldeneye			X	X	
Common Grackle	X	X		X	X
Common Merganser			X	X	
Common Nighthawk	X	X			X
Common Yellowthroat	X	X			X
Cooper's Hawk		X	X	X	X
Dark-eyed Junco			X	X	X
Dickcissel <sup>1</sup>	X	X			X
Double-crested Cormorant				X	X
Downy Woodpecker	X	X	X	X	X
Eastern Bluebird	X	X	X	X	X
Eastern Kingbird	X	X			X
Eastern Meadowlark	X	X	X	X	X
Eastern Phoebe	X	X			X
Eastern Screech Owl				X	
Eastern Towhee		X			
Eastern Wood-Pewee	X	X			X
Eurasian Collared-Dove	X	X	X	X	X
European Starling	X	X	X	X	X
Evening Grosbeak				X	
Field Sparrow <sup>1</sup>	X	X	X	X	X
Fox Sparrow			X	X	
Franklin's Gull					X
Gadwall			X	X	
Golden-crowned Kinglet			X	X	
Grasshopper Sparrow <sup>1</sup>	X	X			X
Gray Catbird	X	X			X
Great Blue Heron	X	X	X	X	X
Great Egret					X
Great Crested Flycatcher	X	X			X



Species	Breeding Bird Survey (BBS) Routes		Christmas Bird Count (CBC) Routes		Point Count Surveys
	Goessel	Lincolnville	Marion*	Halstead-Newton	EXW Project Area
Great Horned Owl	X	X	X	X	X
Great-tailed Grackle		X			
Greater Prairie-Chicken		X			X
Greater White-fronted Goose			X	X	
Greater Yellowlegs					X
Green Heron		X			
Green-winged Teal				X	
Hairy Woodpecker	X	X	X	X	X
Harris's Sparrow <sup>1</sup>			X	X	X
Hermit Thrush				X	
Herring Gull			X	X	
Hooded Merganser			X	X	
Horned Lark	X	X	X	X	X
House Finch	X	X	X	X	X
House Sparrow	X	X	X	X	X
House Wren	X	X			X
Indigo Bunting	X	X			X
Killdeer	X	X		X	X
Lapland Longspur			X	X	
Lark Sparrow	X	X		X	X
Lesser Scaup			X	X	
Lincoln's Sparrow			X	X	
Loggerhead Shrike <sup>1</sup>	X	X	X	X	X
Long-billed Curlew <sup>1,2</sup>					X
Louisiana Waterthrush		X			X
Mallard	X		X	X	
Merlin			X	X	
Mississippi Kite <sup>1</sup>					X
Mountain Bluebird				X	
Mourning Dove	X	X	X	X	X
Northern Bobwhite	X	X	X	X	X
Northern Cardinal	X	X	X	X	X
Northern Flicker <sup>1</sup>	X	X	X	X	X
Northern Goshawk				X	
Northern Harrier		X	X	X	X



Species	Breeding Bird Survey (BBS) Routes		Christmas Bird Count (CBC) Routes		Point Count Surveys
	Goessel	Lincolnville	Marion*	Halstead-Newton	EXW Project Area
Northern Mockingbird	X	X	X	X	X
Northern Parula		X			
Northern Pintail			X	X	
Northern Rough-winged Swallow		X			X
Northern Shoveler			X	X	X
Orchard Oriole	X	X			X
Osprey					X
Painted Bunting		X			X
Pileated Woodpecker		X		X	
Pied-billed Grebe <sup>1</sup>			X	X	
Pine Siskin				X	
Prairie Falcon			X	X	
Purple Finch				X	
Purple Martin	X	X			
Red-bellied Woodpecker	X	X	X	X	X
Red-breasted Nuthatch			X	X	
Red-eyed Vireo	X	X			X
Red-headed Woodpecker <sup>1</sup>	X	X		X	X
Red-shouldered Hawk				X	X
Red-tailed Hawk	X	X	X	X	X
Red-tailed Hawk (Harlan's)			X	X	
Red-winged Blackbird	X	X	X	X	X
Redhead			X	X	
Ring-billed Gull	X		X	X	X
Ring-necked Duck			X	X	
Ring-necked Pheasant	X	X		X	X
Rock Pigeon	X	X	X	X	X
Rose-breasted Grosbeak	X	X			
Ross's Goose			X	X	
Rough-legged Hawk			X	X	
Ruby-crowned Kinglet			X	X	X
Ruby-throated Hummingbird		X			
Ruddy Duck				X	
Rusty Blackbird <sup>1</sup>				X	
Savannah Sparrow			X	X	X



Species	Breeding Bird Survey (BBS) Routes		Christmas Bird Count (CBC) Routes		Point Count Surveys
	Goessel	Lincolnvillle	Marion*	Halstead-Newton	EXW Project Area
Scissor-tailed flycatcher <sup>1</sup>	X	X			X
Sedge Wren		X			
Sharp-shinned Hawk			X	X	
Snow Goose			X	X	
Song Sparrow				X	
Spotted Sandpiper	X		X		
Spotted Towhee			X	X	
Sprague's Pipit <sup>1</sup>				X	
Summer Tanager		X			X
Swainson's Hawk <sup>1</sup>	X	X			X
Swamp Sparrow				X	
Townsend's Solitaire				X	
Tree Swallow					X
Trumpeter Swan			X		
Tufted Titmouse	X	X	X	X	X
Turkey Vulture	X	X			X
Upland Sandpiper <sup>1</sup>				X	X
Vesper Sparrow	X	X			X
Warbling Vireo	X	X			X
Western Kingbird	X	X			X
Western Meadowlark	X	X	X	X	X
White-breasted Nuthatch	X	X	X	X	X
White-crowned Sparrow			X	X	
White-throated Sparrow				X	
White-winged Dove	X		X	X	
Wild Turkey	X	X	X	X	X
Willow Flycatcher		X			
Wilson's Snipe				X	
Winter Wren			X	X	
Wood Duck	X	X		X	X
Yellow Warbler	X				X
Yellow-bellied Sapsucker			X	X	
Yellow-billed Cuckoo	X	X			X
Yellow-headed Blackbird					X
Yellow-rumped Warbler			X	X	X



Species	Breeding Bird Survey (BBS) Routes		Christmas Bird Count (CBC) Routes		Point Count Surveys
	Goessel	Lincolnville	Marion*	Halstead-Newton	EXW Project Area
<b>TOTAL</b>	<b>77</b>	<b>90</b>	<b>88</b>	<b>113</b>	<b>106</b>

\*Marion CBC route only surveyed in 2016 <sup>1</sup>USFWS Bird of Conservation Concern <sup>2</sup>Kansas Species in Need of Conservation