ecology and environment, inc.

Memorandum

To: Heritage Wind, LLC

From: Justin Zoladz

Date: May 25, 2017

Re: 2016 – 2017 Wintering Grassland Raptor Survey Memorandum

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1 Project Description

Heritage Wind, LLC (Heritage) is developing the Heritage Wind Project (Project) in the town of Barre, Orleans County, New York. The proposed Project would generate up to 200 megawatts (MW) of electricity from approximately 67 wind turbine generators (WTGs) and include access roads, underground electrical collection lines, a substation, permanent meteorological towers, and a temporary construction staging area. The Project Area includes an airport setback area where turbines are unlikely to be installed (Figure 1-1).

In coordination with the New York State Department of Environmental Conservation (NYSDEC), Ecology and Environment, Inc. (E & E) conducted wintering grassland raptor surveys within the Project area from November 16, 2016, to March 27, 2017, to evaluate the spatial and temporal presence of raptors of concern associated with these habitats. The protocol was based on the NYSDEC *Draft Project Applicant Survey Protocol for State-listed Wintering Grassland Raptor Species* (NYSDEC 2014) and was presented to NYSDEC during a meeting in Albany on November 15, 2016, and included in meeting notes distributed on November 18, 2016. The primary focus of the survey was to collect information on the occurrence and distribution of wintering raptor species in the Project Area, with special attention to New York State-listed raptor species, such as the state endangered short-eared owl and the state threatened northern harrier and bald eagle.

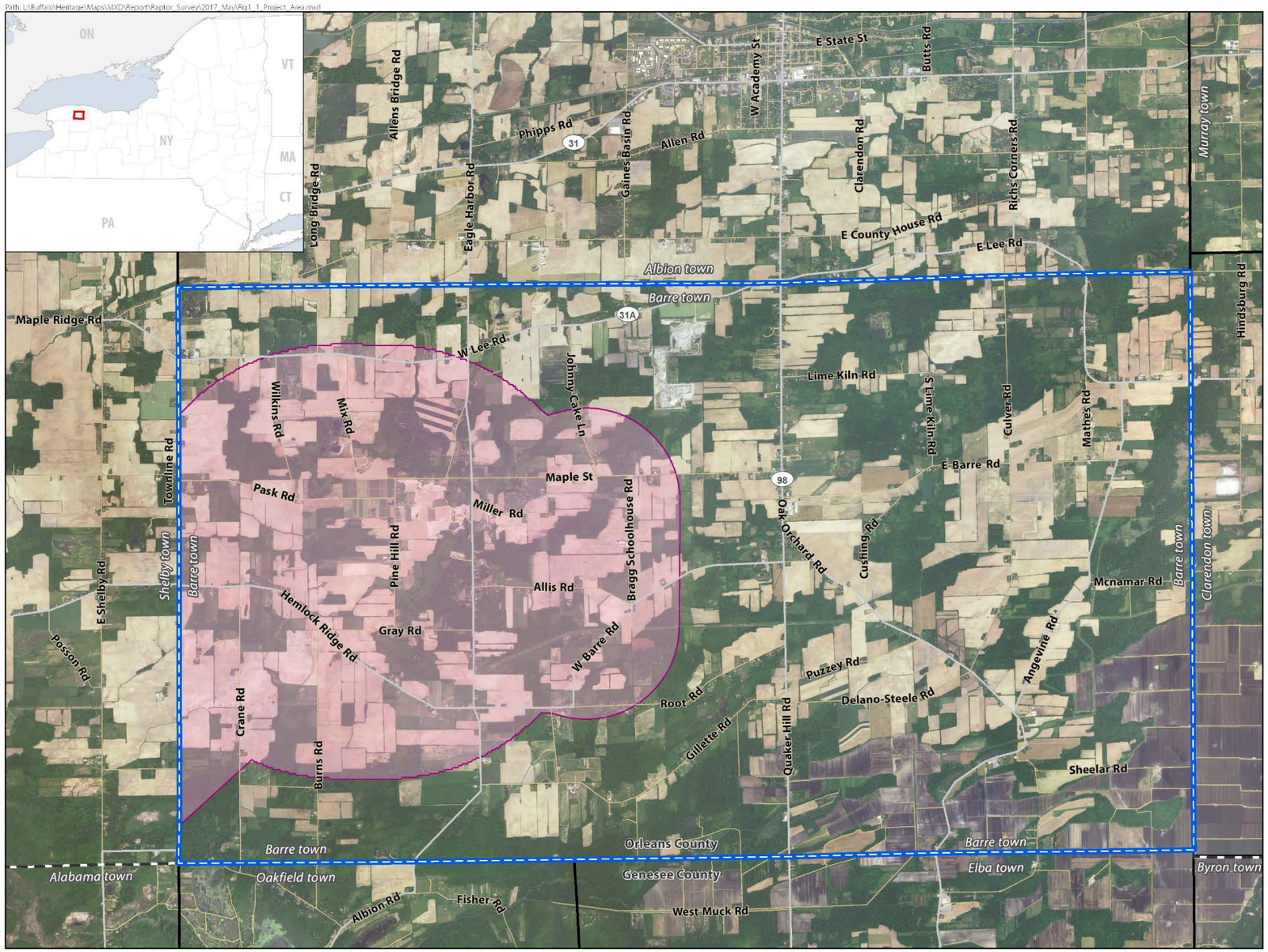

Figure 1-1
Heritage Wind Project Area
Barre, Orleans County, NY

Legend
- Project Area
- County Boundary
- Town Boundary
- Major Road
- Street
- Proposed Airport Setback

N

SCALE
0 1 2 Miles

SOURCE: ESRI 2012, 2016; NAIP 2015; NYS GIS Program Office 2016; Ecology and Environment, Inc. 2017.

2 Methodology

As per NYSDEC guidance (NYSDEC 2014) and recommendations provided on November 15, 2016, both stationary and driving route surveys were completed to assess winter raptor use and distribution in the Project area. Surveys were conducted within suitable habitat for wintering short-eared owl and northern harrier, defined as open country, including grasslands and areas with small pines and/or roosting habitat surrounded by grasslands. Surveys were completed during appropriate weather conditions to ensure detectability of target species and are described in the following paragraphs. Surveys were generally not conducted in precipitation, fog, or moderate to strong winds (i.e., wind greater than 12 mph, or Beaufort Scale 3).

Stationary Surveys

Five areas of optimally suitable habitat were identified by E & E and stationary survey points were located to provide excellent vantage over the habitat in these areas (Figure 2-1). Stationary surveys were conducted at approximately two-week intervals (i.e., twice per month) from late November 2016 through March 2017. The protocol requires continuation into April if any target species are documented in the second half of March, but no target species were detected at the site during that period (NYSDEC 2014).

Stationary surveys were conducted from one hour before sunset to one half-hour after sunset and were extended up to an additional half hour when short-eared owl and/or northern harrier were detected or favorable visibility conditions were present. Each stationary survey consisted of 90 minutes of observation of the area within view (approximately 100 to 1,100 meters from the observer, depending on the point).

Driving Route Surveys

Two driving routes were established throughout the Project Area to allow survey of potentially suitable habitat within the majority of the Project (see Figure 2-1). Driving Route "D" was 25.6 miles long with 19 identified stops. Driving Route "A" was approximately 22.2 miles long with 18 stops. The survey routes and stopping points were selected based on the presence of suitable foraging habitat (e.g., pasture/hayfields) and viewshed availability. Each driving route was surveyed in one day, at approximately two-week intervals (i.e., twice per month). Driving Route D was surveyed from late November 2016 through March 2017 and Driving Route A was surveyed from early February through March 2017. Driving surveys were conducted during the afternoon and usually took place on the same day as the stationary surveys.

At each stop, a biologist exited the vehicle and scanned the suitable habitat for 3 minutes before recording the data and proceeding to the next stop. All raptors observed by the biologist, at each stop and while in transit between stops, were recorded. Driving surveys were conducted during the afternoon and usually took place on the same day as stationary surveys.

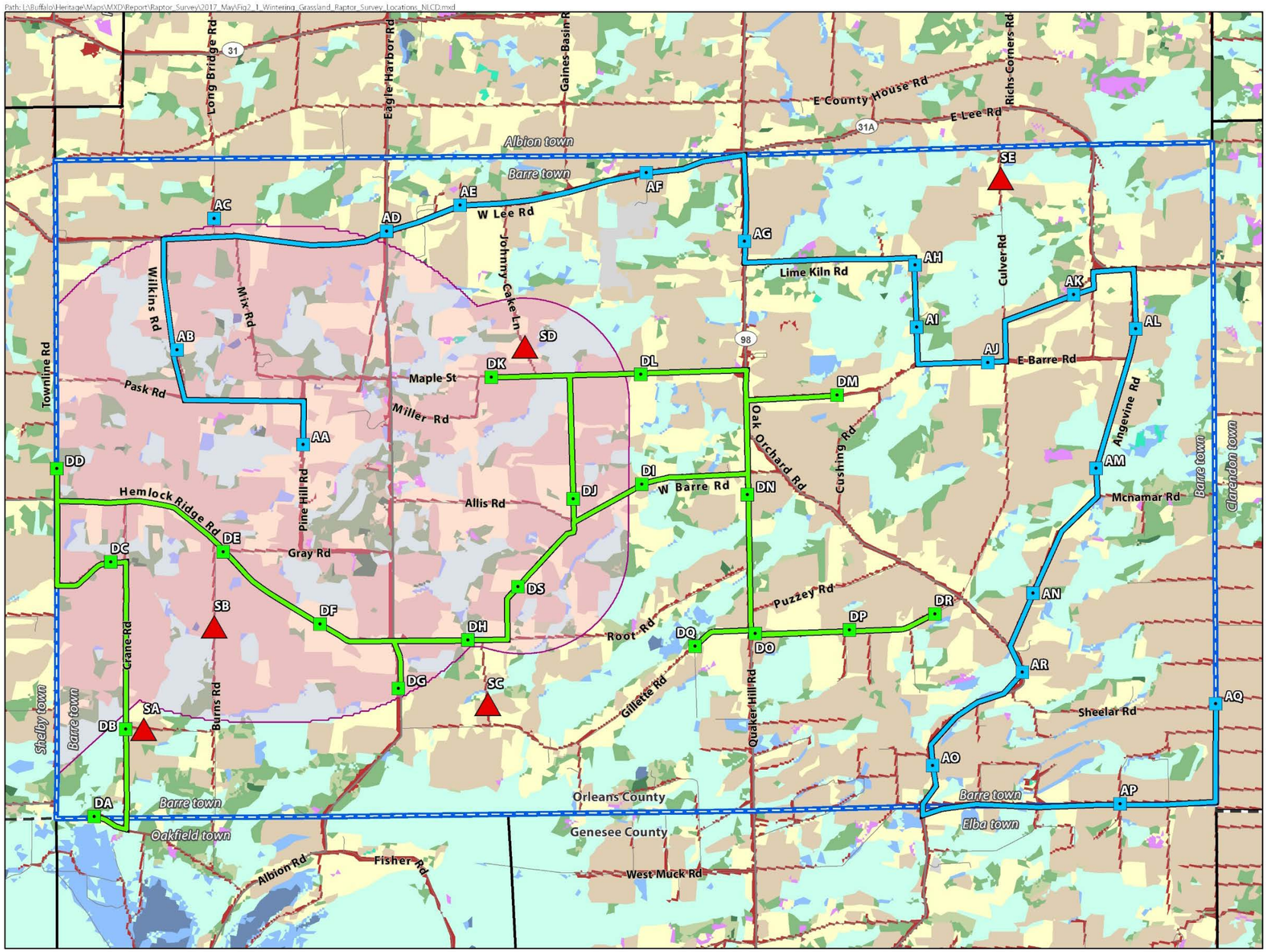

Figure 2-1
Wintering Grassland Raptor Survey Locations and USGS National Land Cover Database (NLCD) 2011
Barre, Orleans County, NY

Legend

- Project Area
- County Boundary
- Town Boundary
- Major Road
- Street
- Proposed Airport Setback
- Driving Route A Stop
- Driving Route D Stop
- Stationary Point - Optimal Habitat
- Driving Route A Path
- Driving Route D Path

Land Cover

- Developed
- Woody Wetlands
- Herbaceous
- Mixed Forest
- Deciduous Forest
- Evergreen Forest
- Barren Land
- Cultivated Crops
- Hay/Pasture
- Shrub/Scrub
- Emergent Herbaceous Wetlands
- Open Water

N

SCALE
0 0.5 1 Miles

SOURCE: ESRI 2012, 2016; NYS GIS Program Office 2016; USGS NLCD 2011; Ecology and Environment, Inc. 2017.

3 Results

Stationary Surveys

A total of 45 point surveys were conducted from November 16, 2016, through March 27, 2017, during which 105 sightings of nine raptor species were recorded (Table 3-1). The greatest total raptor-sighting rate occurred in February 2017 with a mean of 3.2 sightings per stationary survey.

The most commonly observed species during stationary surveys was the red-tailed hawk (59 sightings, comprising 56.2% of all raptor observations). The next most commonly observed species were short-eared owl (14 sightings, 13.3% of all sightings), and auditory detection of great horned owls (9 detections, 8.6% of all detections). The most raptor observations occurred at point SB (31 sightings) within the largest area of grassland habitat in the Project area. Thirteen of 14 short-eared owl observations and one of one northern harrier were identified at points within the airport setback area, suggesting low risk to these state-listed species.

Table 3-1 Total Sightings during Stationary Surveys

Species	Outside Airport Setback Zone			Within Airport Setback Zone		Total
	SA	SC	SE	SB	SD	
Red-tailed hawk	19	6	7	8	19	**59**
Short-eared owl	1	0	0	13	0	**14**
Great horned owl	2	1	3	3	0	**9**
Bald eagle	3	0	0	3	0	**6**
American kestrel	1	2	0	1	1	**5**
Cooper's hawk	0	2	0	0	3	**5**
Sharp-shinned hawk	0	1	0	2	2	**5**
Northern harrier	0	0	0	1	0	**1**
Turkey vulture	0	0	0	0	1	**1**
Total	**26**	**12**	**10**	**31**	**26**	**105**

Short-eared owl. Fourteen short-eared owl sightings were made during the stationary surveys. All of the short-eared owl sightings occurred in the southwestern portion of the Project area, at points SB and SA with 13 of 14 occurring within the airport setback area (Figure 3-1). Short-eared owl sightings occurred on six survey dates ranging from December 16, 2016, to March 5, 2017. No additional short-eared owl sightings were made after that date. The most active months for short-eared owl were January and February 2017 (five sightings each), followed by March 2017 (three sightings) and December 2016 (one sighting). The most active survey dates were January 14 and February 11, 2017, with four sightings on each date. It is important to note that each sighting may have been repeat observations of the same individual(s).

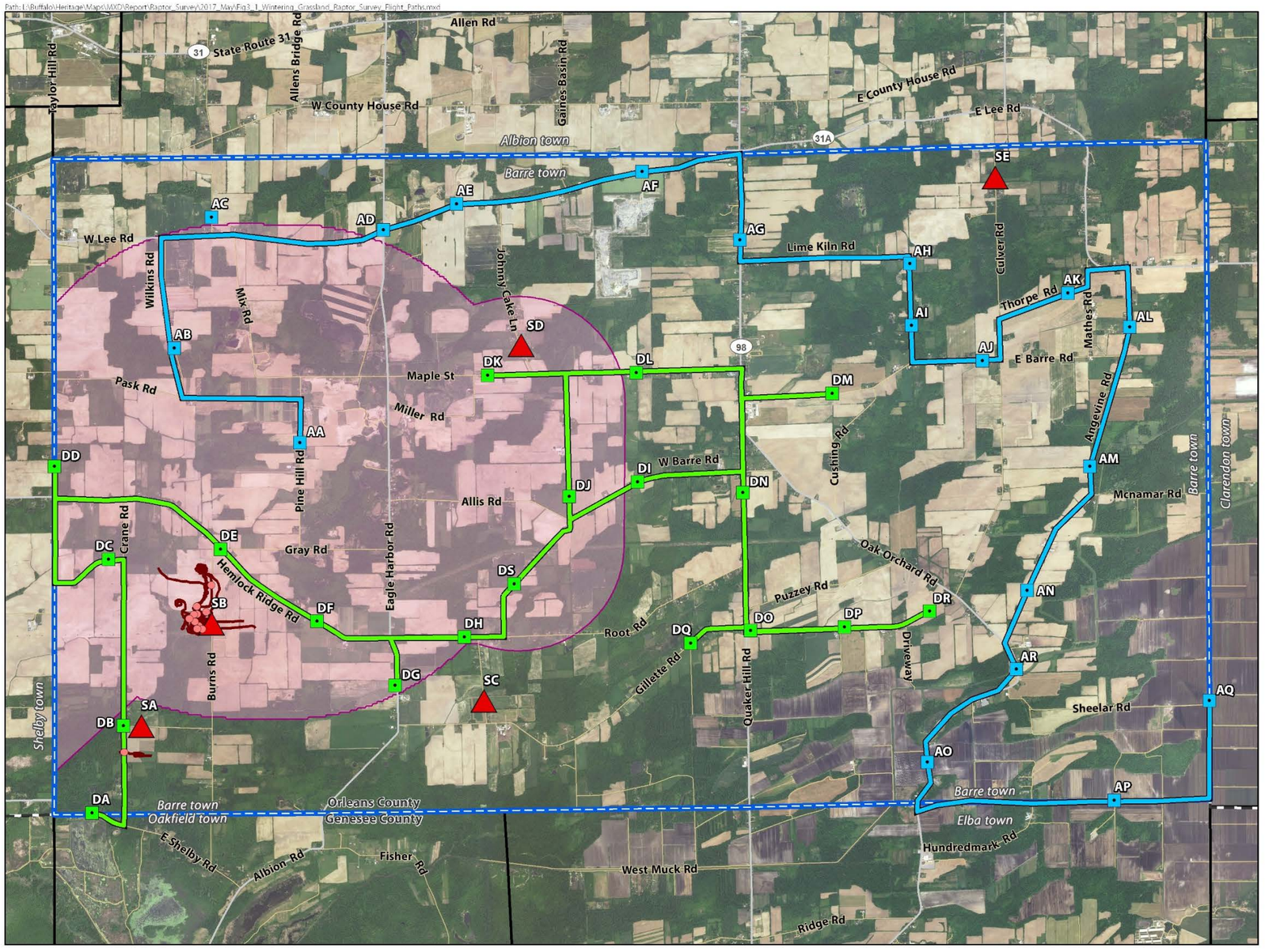

Figure 3-1
Wintering Grassland Raptor Survey
Short-Eared Owl Flight Paths
Barre, Orleans County, NY

Legend
- Project Area
- County Boundary
- Town Boundary
- Major Road
- Street
- Proposed Airport Setback
- Driving Route A Stop
- Driving Route D Stop
- Stationary Point
- Driving Route A Path
- Driving Route D Path
- Short-Eared Owl Pearched Locations
- Short-Eared Owl Flight Paths

N

SCALE
0 0.5 1 Miles

SOURCE: ESRI 2012, 2016; NAIP 2015; NYS GIS Program Office 2016; Ecology and Environment, Inc. 2017.

Northern harrier. One northern harrier sighting was made during the stationary surveys. Similar to short-eared owl sightings, the northern harrier was observed at point SB (Figure 3-2), which is within the airport setback area. The northern harrier sighting was a female/immature type recorded on December 28, 2016.

Bald eagle. Six bald eagle sightings occurred during the stationary surveys. Bald eagle sightings first occurred on November 28, 2016, and the last one occurred on March 5, 2017. All sightings consisted of a single bald eagle on three days at point SB and one day at point SA, except one sighting at point SA when two adults were observed. Similar to short-eared owl sightings, all of the bald eagle sightings occurred at points SB and SA, located in the southwest portion of the Project Area. Of the six sightings, three of them occurred within the airport setback area and three were outside the setback area. All bald eagles sighted during the stationary surveys were adults.

Driving Route Surveys

Eight raptor species were recorded during the driving route surveys, totaling 151 raptor sightings (Table 3-2). The highest raptor-sighting rate occurred during March (mean of 0.85 sightings/visit), followed by February (0.66), January (0.59), and November (0.47) and December (0.24). The survey locations with the highest raptor-sighting rates were survey points AB (2.00 sightings per visit) and DB (1.33 sightings per visit). The average raptor-sighting rate across all 37 survey locations was 0.67 sightings per visit. Red-tailed hawk (100 sightings) comprised approximately 66% of all sightings, followed by turkey vulture (25 sightings), approximately 16% of all sightings.

Thirty six percent of the total raptor sightings occurred within the airport setback area. The majority of the raptors observed within the airport setback area were red-tailed hawk (30 sightings), followed by turkey vulture (16 sightings). The greatest sighting rate occurred in March with sighting rate of 0.77 raptors per survey, followed by February with 0.71 raptors per survey. The lowest sighting rates occurred in November and December, both with 0.30 raptors per survey. The overall mean detection rate within the area proposed for turbine installation was 0.58 raptors per survey, compared to 0.69 within the airport setback area.

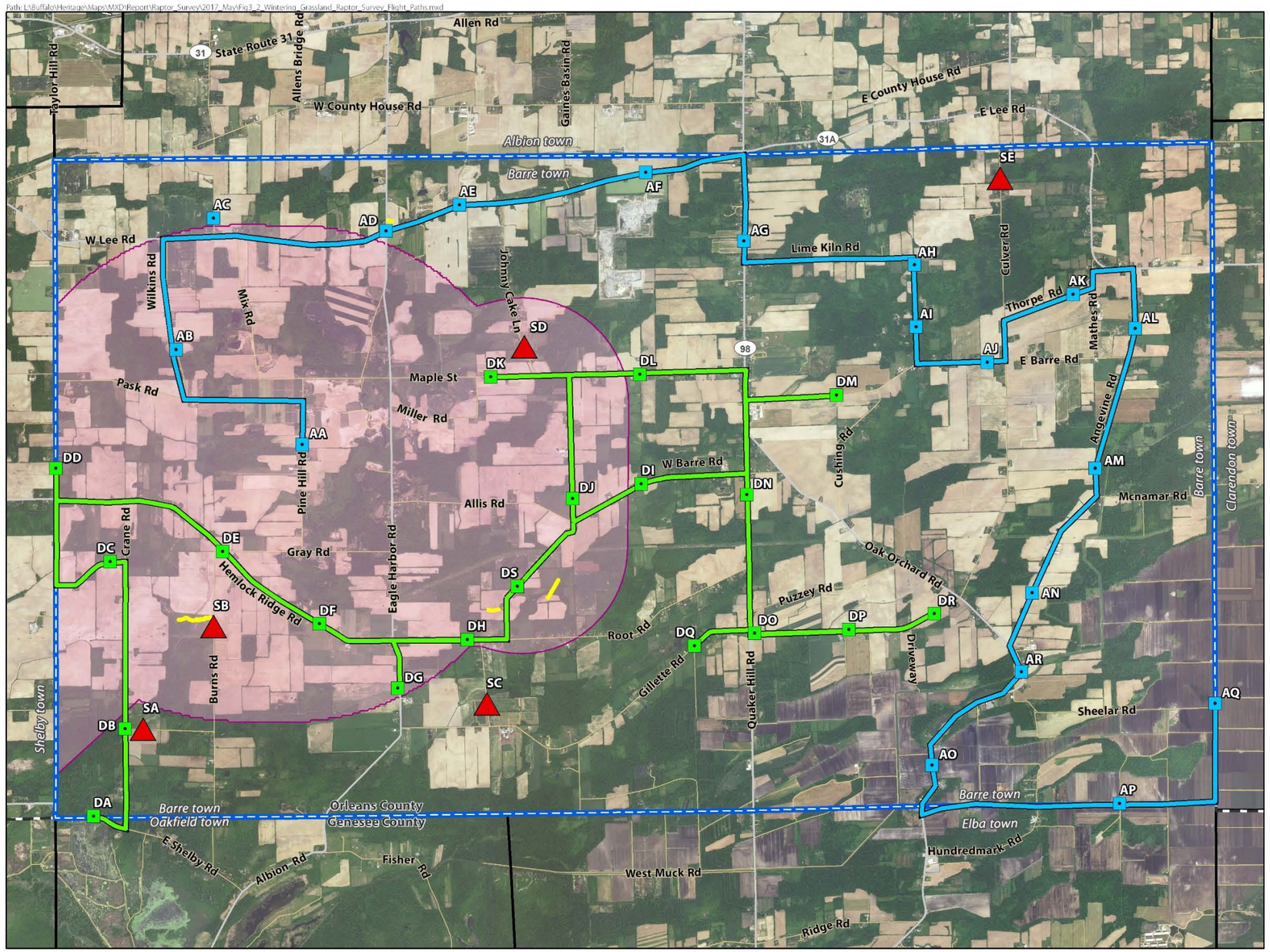

Figure 3-2
Wintering Grassland Raptor Survey
Northern Harrier Flight Paths
Barre, Orleans County, NY

Legend

- Project Area
- County Boundary
- Town Boundary
- Major Road
- Street
- Proposed Airport Setback
- Driving Route A Stop
- Driving Route D Stop
- Stationary Point
- Driving Route A Path
- Driving Route D Path
- Northern Harrier Flight Paths

N

SCALE
0 0.5 1 Miles

SOURCE: ESRI 2012, 2016; NAIP 2015; NYS GIS Program Office 2016; Ecology and Environment, Inc. 2017.

ecology and environment, inc.

Table 3-2 Total Raptor Sightings during Driving Route Surveys

Species	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	Total
Red-tailed hawk	2	8	3	4	3	4	3	5	2	1	2	3	1	2	3	3	4	1	2	8	6	1	2	4	1	0	1	3	2	7	4	0	1	1	0	2	1	**100**
Turkey vulture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	6	1	3	0	3	4	1	0	1	0	0	2	1	0	0	**25**
American kestrel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	2	1	0	0	2	0	0	1	0	0	1	**10**
Bald eagle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**7**
Cooper's hawk	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**3**
Northern harrier	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**2**
Sharp-shinned hawk	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**2**
Peregrine falcon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Unidentified raptor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Total	**2**	**8**	**4**	**5**	**3**	**4**	**3**	**5**	**2**	**1**	**3**	**3**	**1**	**2**	**3**	**4**	**4**	**1**	**6**	**12**	**8**	**2**	**9**	**7**	**4**	**0**	**6**	**8**	**3**	**7**	**8**	**0**	**1**	**5**	**1**	**3**	**3**	**151**
Number of Visits	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**7**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**241**
Sighting Rate (No. per Visit)	**0.50**	**2.00**	**1.00**	**1.25**	**0.75**	**1.00**	**0.75**	**1.25**	**0.50**	**0.25**	**0.75**	**0.75**	**0.25**	**0.50**	**0.75**	**1.00**	**1.00**	**0.25**	**0.67**	**1.33**	**0.89**	**0.22**	**1.00**	**0.78**	**0.44**	**0.00**	**0.67**	**0.89**	**0.43**	**0.78**	**0.89**	**0.00**	**0.11**	**0.56**	**0.11**	**0.33**	**0.33**	**0.66**

Note: Shaded cells represent those individual stops on the driving routes within the airport setback area.

Throughout the driving route survey period, there were no short-eared owl sightings and two northern harrier sightings. One of these harrier sightings was along the original driving route at point DS (within the airport exclusion zone) and the other was along the additional route at point AD (Figure 3-2). A total of seven bald eagle sightings occurred during the driving route surveys, with five sightings occurring in the southwestern portion of the Project area (points DA and DB, within the airport exclusion zone). One bald eagle sighting each was also recorded near points DR and AP.

4 Discussion

Survey results indicate that short-eared owl were present in specific fields in the southwestern portion of the Project during the winter survey period. Sightings of short-eared owl peaked slightly in January and February 2017. One to two short-eared owl individuals were observed on consecutive surveys at survey point SB from January 14 to March 5, 2017. Owls were typically first detected approximately ten minutes after sunset, although on one occasion were first observed 20 minutes before sunset. On four occasions, owls were first detected when they took off from the tall grass shortly after sunset; this behavior could be indicative of owls roosting on the ground in the grassy field by point SB. During the majority of observation time, owls made foraging flights low over grassland/hayfield habitat in consistent locations (Figure 3-2). This primary foraging area and potential roosting area is within the airport setback area, where no WTGs are expected to be sited. It is possible that the same individuals were observed on multiple dates. Short-eared owls were not detected in other portions of the Project area or anywhere after March 5, 2017. It is important to reiterate that 13 of the total 14 short-eared owl sightings occurred within the airport setback area, where siting of WTGs is not anticipated to occur. Overall, only one single short-eared owl sighting was recorded within the area proposed for turbines, and even that is located over 1 mile from the nearest potential turbine location based on information provided by Heritage.

Northern harrier were rare throughout the survey period; a total of three were observed, two of which were identified within the airport setback area. One of these sightings was during a stationary survey in December 2016 in the same area of grassland/hayfield used by short-eared owls (Figure 3-2). Two separate sightings of one northern harrier (seen flying across agricultural habitat) were during driving surveys in February and March 2017. (Figure 3-2).

The remainder of the raptor sightings throughout the wintering raptor surveys represented a species diversity that would be expected in this area during the winter months. No unexpected raptor sightings or large concentrations of raptors were recorded throughout the surveys.

These surveys confirmed presence of both short-eared owl and northern harrier within the study area; however, presence in winter 2016-2017 was localized for short-eared owl, mostly limited to one area with suitable foraging habitat for the species. The vast majority of sightings of these species occurred within the airport setback area, indicating very low risk of collision for these species, should the Project be constructed. Within the Project Area where WTG siting is

anticipated, only a single short-eared owl and a single northern harrier were identified throughout the entire survey period. These data suggest that the habitats within the portion of the Project area where WTGs are anticipated to be sited are largely unoccupied and/or not suitable for short-eared owl and northern harrier.

5 References

New York State Department of Environmental Conservation (NYSDEC 2014). DRAFT Project Applicant Survey Protocol for State listed Wintering Grassland Raptor Species. December 22, 2014. (work in progress)

_____. 2016. *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects*. Prepared by New York State Department of Environmental Conservation, Division of Fish and Wildlife.