Appendix A

Scoping Comment Summary

Bogle Wind Turbine Project EIR – Scoping Comments

Commenter	Date	Summary	Issue Area (EIR Section)
Harold Shipley	10/23/15	■ Expresses support for the project	Not within the scope of the EIR analysis
USDA Natural Resources Conservation Service	10/26/15	■ Provides soils information for the project area	
Federal Emergency Management Agency	11/12/15	■ Requests that the County review the current effective countywide Flood Insurance Rate Maps ■ Summarizes the National Flood Insurance Program floodplain management building requirements, including the requirement that any development shall not increase the base flood elevation level	Hydrology and Water Quality (Section 3.2.7)
Yolo Audubon Society	11/15/15	■ Requests the EIR analyze compliance with the California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development ■ Identified potential alternatives including alternative methods of energy production and alternative locations for the wind turbine ■ Requests the EIR include mitigation strategies to reduce avian and bat collision with the proposed turbine ■ Requests the EIR analyze consistency with large-scale conservation efforts in the Delta region (Yolo Habitat Conservancy's HCP/NCCP), the Central Valley Flood Protection Plan, the Bay Delta Conservation Plan) and impacts to regionally important conservation resources/ sensitive wildlife habitats ■ Expresses concern regarding cumulative impacts to bats, including Mexican free-tailed bats, western red bats, and pallid bats ■ Requests consideration of "moving" the adjacent Swainson's hawk easement if the project is approved in its proposed location	Alternatives (Section 5), Biological Resources (Section 3.4), Cumulative Analysis (Section 3.6)
Tuleyome	11/15/15	■ Incorporates by reference the comments of Yolo Audubon Society	
Central Valley Regional Water Quality Control Board	11/17/15	■ Provides information on the CVRWQCB's regulatory authority, including the Basin Plan and Antidegradation Considerations ■ Summarizes the requirements of permits potentially applicable to the project, including the Construction Storm Water General Permit, Phase I and II Municipal Separate Storm Sewer System (MS4) Permits, Industrial Storm Water General Permit, Clean Water Act Section 404 Permit, Clean Water Act Section 401 – Water Quality Certification, Waste Discharge Requirements – Discharges to Waters of the State, Regulatory Compliance for Commercially Irrigated Agriculture, and Low or Limited Threat General NPDES Permit	Biological Resources (Section 3.4) and Hydrology and Water Quality (Section 3.2.7)

Bogle Wind Turbine Project EIR – Scoping Comments

Commenter	Date	Summary	Issue Area (EIR Section)
Donald Mooney	11/19/15	■ Notes increase in the electrical output of the proposed turbine from that described in the 2013 MND ■ Requests analysis of all issue areas that are identified in Table 1 of the Notice of Preparation ■ Identifies various potential alternatives, including an alternative method of energy production (i.e., solar photovoltaics) and an alternative location for the wind turbine ■ Proposes mitigation strategies to reduce avian and bat collision with the proposed turbine ■ Provides recommendations for describing the biological resources baseline and using mortality data from other turbines in a comparative analysis ■ Expresses concerns regarding aesthetic impacts to neighbors and proposes landscaping mitigation strategies ■ Requests a comprehensive analysis of noise impacts, including low frequency or infra-sound ■ Requests that cumulative impacts be analyzed in the EIR	Project Description (Section 2), Resource Areas with Effects Found Not to be Significant (Section 3.2), Alternatives (Section 5), Biological Resources (Section 3.4), Aesthetics (Section 3.3), Noise (Section 3.5), Cumulative Analysis (Section 3.6)
Tom Uslan	11/21/15	■ Identifies the proposed project areas as habitat for sensitive wildlife ■ Requests the EIR analyze impacts to avian species and bats as well as compliance with the Federal Migratory Bird Species Act, California Endangered Species Act, California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development, and other regulations protective of wildlife ■ Provides information on bats within and near the proposed project area and requests the EIR analyze impacts to bats from barotrauma and direct collision ■ Provides information on bird species and sensitive wildlife habitats within and near the proposed project area ■ Expresses concerns about land use and planning, aesthetics (shadow flicker, night lighting), public safety (blade throw, electric and magnetic fields), noise (infrasound and low-frequency noise) ■ Requests the EIR address alternatives to the proposed project and provide a comparison	Resource Areas with Effects Found Not to be Significant (Section 3.2), Alternatives (Section 5), Biological Resources (Section 3.4), Aesthetics (Section 3.3), Noise (Section 3.5), Cumulative Analysis (Section 3.6)
Roger and Carol Berry	11/22/15	■ Expresses support for the project	Not within the scope of the EIR analysis
Caltrans District 3	11/23/15	■ Provides recommendations to avoid and minimize impacts to the State Highway System ■ Identifies the potential need for submittal of a traffic management plan ■ Provides instructions for submitting an encroachment permit, if necessary	Traffic and Transportation (Section 3.2.13)

Bogle Wind Turbine Project EIR – Scoping Comments

Commenter	Date	Summary	Issue Area (EIR Section)
Matthew Hunter	11/23/15	■ Identifies potential impacts of wind turbine construction including, noise, air quality and climate change, cultural resources, biological resources, environmental justice, hazardous materials and waste management, human health and safety, land use, paleontological resources, soils and geologic resources (including seismicity/geologic hazards), transportation, visual resources, water resources (surface and groundwater) ■ Identifies potential impacts of wind turbine operation including, noise, biological resources, environmental justice, hazardous materials and waste management, human health and safety, visual resources, water resources (groundwater)	Resource Areas with Effects Found Not to be Significant (Section 3.2), Noise (Section 3.5), Biological Resources (Section 3.4), Aesthetics (Section 3.3) Environmental Justice is not within the scope of the EIR analysis
Delta Protection Commission	12/1/15	■ Expresses concerns about impacts to bird and bat species and noise impacts to neighboring properties ■ Lists several policies from the Commission's Land Use and Resource Management Plan for consideration in the EIR, including those pertaining to land use, agriculture, natural resources, and utilities and infrastructure	Resource Areas with Effects Found Not to be Significant (Section 3.2), Noise (Section 3.5), Biological Resources (Section 3.4)
Yolo Habitat Conservancy	12/1/15	■ Provides map showing Swainson's hawk and white-tailed kite nesting sites found in the area surrounding the proposed project and a list of modeled acres of habitat for species covered in the Yolo Natural Community/Habitat Conservation Plan, which is currently being developed ■ Expresses concern about impacts to species covered in the Plan (e.g., tricolored blackbird, western pond turtle, valley elderberry beetle, and giant garter snake)	Biological Resources (Section 3.4)

Appendix B

Visual Simulations

FIGURE 7

MAP OF PHOTO SIMULATION LOCATIONS

FIGURE 8

PHOTO SIMULATION #1 OF TURBINE TAKEN FROM HAMILTION ROAD (0.9 MILES WEST)

PHOTO SIMULATION #2 OF TURBINE TAKEN FROM JEFFERSON BLVD. (1.9 MILE SOUTH)

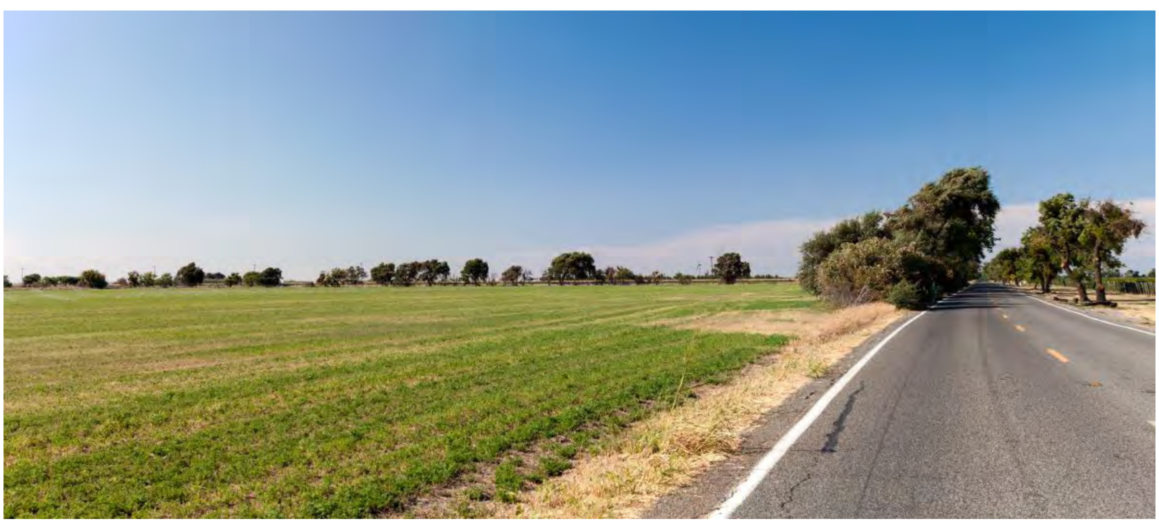

**PHOTO SIMULATION #3 OF TURBINE
TAKEN FROM JEFFERSON BLVD.
(0.6 MILE EAST)**

**PHOTO SIMULATION #4 OF TURBINE
TAKEN FROM SHORTY'S RESTAURANT
JEFFERSON BLVD/CLARKSBURG ROAD
(2.28 MILE NORTH)**

PHOTO SIMULATION #5 OF TURBINE
TAKEN FROM HUNTER RESIDENCE BACK YARD
CENTRAL AVENUE
(0.8 MILE NORTH)

Appendix C

Noise and Vibrations Calculations

Single or Composite Noise Source Calculation

Project Number: 3319, Yolo Co
Project Name: Bogle Wind Turbine
Model Description: Basic Composite Noise Level Calc

Construction Assumptions: FTA, 2006. Transit Noise and Vibration Impact Assessment Guidelines. Table 12-1

Activity	Loudest Equipment	Leq(h) (dBA)	Individ SPL(h)	Refc Dist (ft)	Composite Leq(h) at Refc (dBA)	Composite Leq(h) at __ft 1850 (dBA)
Typical Construction Sources	Composite >>>>>>>>>>>>>>>>>>>			50	90.6	59.2
	Grader	85	3.2E+08			
	Truck	88	6.3E+08			
	Crane, Mobile	83	2.0E+08			
Single Noise Source, hemispherical				1.3	107.0	43.9
	WTG	107	5.0E+10			

Single Noise Source, hemispherical propagation including air absorption (MassDEP, 2012)

	Lw (dBA)	alpha (dBA/m)	Dist (m)	Dist (ft)	Leq(h) at __ft (dBA)
WTG	107	5.0E-03	0.4	1.3	107.0
			100	328	58.5
			200	656	52.0
			403.8	1,325	44.9
		(at R2)	563.9	1,850	41.2
		(at R1, R3)	914.4	3,000	35.2
		(at R4)	1158.1	3,800	32.0

WTG: Product Acoustic Specifications: 107.0 dB, Lw total apparent sound power level for individual turbine

Source: GE Power & Water. 2014. Technical Documentation, Wind Turbine Generator Systems, 2.3-107 - 50 Hz and 60 Hz (Normal Operation)

Hourly Leq to Day-Night Noise Calculation

Project Number: 3319, Yolo Co
Project Name: Bogle Wind Turbine
Model Description: Basic 24-hour Noise Exposure Calc for CNEL or Ldn at Typical Leq
Model Assumptions: FTA, 2006. Transit Noise and Vibration Impact Assessment Guidelines, Section 2.5.5

Hour beginning	Leq(h) (dBA)	Penalty (dBA)	w/o Penalty SPL(h)	Penalized SPL(h)	Raw Leq(24) (dBA)	Penalized Leq(24) (dBA)
0:00	44.9	10	30,732	307,318		
1:00	44.9	10	30,732	307,318		
2:00	44.9	10	30,732	307,318		
3:00	44.9	10	30,732	307,318		
4:00	44.9	10	30,732	307,318		
5:00	44.9	10	30,732	307,318		
6:00	44.9	10	30,732	307,318		
7:00	44.9	0	30,732	30,732		
8:00	44.9	0	30,732	30,732		
9:00	44.9	0	30,732	30,732		
10:00	44.9	0	30,732	30,732		
11:00	44.9	0	30,732	30,732		
12:00	44.9	0	30,732	30,732		
13:00	44.9	0	30,732	30,732		
14:00	44.9	0	30,732	30,732		
15:00	44.9	0	30,732	30,732		
16:00	44.9	0	30,732	30,732		
17:00	44.9	0	30,732	30,732		
18:00	44.9	0	30,732	30,732		
19:00	44.9	5	30,732	97,182		
20:00	44.9	5	30,732	97,182		
21:00	44.9	5	30,732	97,182		
22:00	44.9	10	30,732	307,318		
23:00	44.9	10	30,732	307,318		
			Raw SPL(24)	Total SPL(24)		
			737,562	3,426,187	44.88	51.55

Hourly Leq to Day-Night Noise Calculation

Project Number: 3319, Yolo Co
Project Name: Bogle Wind Turbine
Model Description: Basic 24-hour Noise Exposure Calc for CNEL or Ldn at Typical Leq
Model Assumptions: FTA, 2006. Transit Noise and Vibration Impact Assessment Guidelines, Section 2.5.5

Hour beginning	Leq(h) (dBA)	Penalty (dBA)	w/o Penalty SPL(h)	Penalized SPL(h)		
0:00	41.2	10	13,106	131,059		
1:00	41.2	10	13,106	131,059		
2:00	41.2	10	13,106	131,059		
3:00	41.2	10	13,106	131,059		
4:00	41.2	10	13,106	131,059		
5:00	41.2	10	13,106	131,059		
6:00	41.2	10	13,106	131,059		
7:00	41.2	0	13,106	13,106		
8:00	41.2	0	13,106	13,106		
9:00	41.2	0	13,106	13,106		
10:00	41.2	0	13,106	13,106		
11:00	41.2	0	13,106	13,106		
12:00	41.2	0	13,106	13,106		
13:00	41.2	0	13,106	13,106		
14:00	41.2	0	13,106	13,106		
15:00	41.2	0	13,106	13,106		
16:00	41.2	0	13,106	13,106		
17:00	41.2	0	13,106	13,106		
18:00	41.2	0	13,106	13,106		
19:00	41.2	5	13,106	41,444		
20:00	41.2	5	13,106	41,444		
21:00	41.2	5	13,106	41,444		
22:00	41.2	10	13,106	131,059		
23:00	41.2	10	13,106	131,059	Raw Leq(24) (dBA)	Penalized Leq(24) (dBA)
			Raw SPL(24)	Total SPL(24)		
			314,541	1,461,132	41.17	47.84

Vibration Source Levels for Construction Equipment

Project Number: 3319
Project Name: generic

Model Approach and Cite: FTA, 2006: Table 12-2

Reference Source (at 25 ft):	PPV	0.089	in/sec , routine (large bulldozer, caisson drilling)
Reference Source (at 25 ft):	Lv	87	VdB, routine (large bulldozer, caisson drilling)

Vibration Assessment FTA, 2006: p 12-11	D (ft) =	ppv(eq) =		Building Damage (over 0.5 in/sec)	Lv(D) =		Human Annoyance (over 80 VdB)
(ref)	25	0.089	in/sec	No	87.0	VdB	Yes
At 45 feet	45	0.037	in/sec	No	79.3	VdB	No
At 100 feet	100	0.011	in/sec	No	68.9	VdB	No
At 200 feet	200	0.004	in/sec	No	59.9	VdB	No

Reference Source (at 25 ft):	PPV	0.644	in/sec , worst case (impact pile driver)
Reference Source (at 25 ft):	Lv	104	VdB, worst case (impact pile driver)

Vibration Assessment FTA, 2006: p 12-11	D (ft) =	ppv(eq) =		Building Damage (over 0.5 in/sec)	Lv(D) =		Human Annoyance (over 80 VdB)
(ref)	25	0.644	in/sec	Yes	104.0	VdB	Yes
At 45 feet	45	0.267	in/sec	No	96.3	VdB	Yes
At 100 feet	100	0.081	in/sec	No	85.9	VdB	Yes
At 200 feet	200	0.028	in/sec	No	76.9	VdB	No

Appendix D

Justification for Using Bird and Bat Fatalities per Megawatt

Project Memorandum: Bogle Wind Turbine Project

Date: June 24, 2016
To: Yolo County
From: Dick Anderson
Subject: Justification for using bird and bat fatalities per megawatt

When discussing wind turbine impacts on birds and bats, it is important to use consistent metrics that are easily obtained and minimize confusion. By far the most acceptable metric for wind-turbine caused bird and bat fatalities are comparisons of fatalities per megawatt (MW) (turbine nameplate capacity) per year. There are several other metrics in use but both the California and federal Wind-Wildlife guidelines recommend the use of bird or bat fatalities per MW per year (WTGAC, 2010) (CEC and CDFG, 2007).

As stated in the federal Wind Turbine Guidelines Advisory Committee Recommendations (WTGAC, 2010):

> *The primary objective of fatality searches is to determine the overall estimated fatality rates for birds and bats for the project. These rates serve at the fundamental basis for all comparisons of fatalities, and if studies are designed appropriately they allow researchers to relate fatalities to site characteristics and environmental variables, and to evaluate mitigation measures. Several methods are available for expressing fatality rates. Early studies reported fatality rates per turbine. However, this metric is somewhat misleading as turbine sizes and their risk to birds vary significantly (NRC 2007). Fatalities are frequently reported as nameplate capacity (i.e. MW), a metric that is easily calculated and better for comparing fatality rates among different size turbines. Even with turbines of the same nameplate capacity, the size of the rotor swept area may vary among manufacturers, and turbines at different sites may operate for different lengths of time and during different times of the day and seasons. With these considerations in mind, it is recommended that fatality rates be expressed on a per nameplate MW basis until a better option becomes available.*

The California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC and CDFG, 2007) provides the following recommendation: "Bird Metrics. Record bird fatalities per MW of installed capacity (nameplate capacity) per year and fatalities per rotor-swept square meter per year."

Few researchers use the per rotor swept square meter (RSA) area metric due to difficulty in its calculation. If the RSA metric is use, it should be used in combination with the per MW metric. The analysis in this EIR uses fatality per MW per year when discussing impacts and making comparisons with other wind turbine projects.

References

WTGAC (Wind Turbine Guidelines Advisory Committee). 2010. Consensus Recommendations on Developing Effective Measures to Mitigate Impacts to Wildlife and Their Habitats Related to Land Based Wind Energy Facilities. Prepared by Kearns and West for the US Department of the Interior (USDOI), Washington, D.C. http://www.fws.gov/habitatconservation/windpower/Wind_Turbine_Guidelines_Advisory_Committee_Recommendations_Secretary.pdf

CEC and CDFG (California Energy Commission and California Department of Fish and Game). 2007. California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development. Commission Final Report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC-700-2007-008-CMF

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects. National Academies Press. Washington, D. C., USA. www.nap.edu.

Appendix E

Application for Incidental Take of Endangered Species

Bogle Vineyards

Processing Facility Wind Turbine

APPLICATION FOR INCIDENTAL TAKE OF ENDANGERED SPECIES

Per the California Endangered Species Act

**IN ACCORDANCE WITH CALIFORNIA CODE OF REGULATIONS,
TITLE 14, DIVISION 1, SUBDIVISION 3,
CHAPTER 6, ARTICLE 1, SECTION 783.2**

**Bogle Vineyards, Inc.
49762 Hamilton Road, Clarksburg, CA 95612
Contact: Garrett Lamberti, Facilities Director
(916) 744-1139**

January 3, 2017

Bogle Vineyards, Inc.

Processing Facility Wind Turbine

APPLICATION FOR INCIDENTAL TAKE OF ENDANGERED SPECIES
Per the California Endangered Species Act

The following application for incidental take of endangered species under the California Endangered Species Act is being submitted to:

Scott Wilson
Regional Manager
Calif. Department of Fish and Game
7329 Silverado Trail
Napa, CA 94558

This application follows the outline listed in § 783.2 of the California Code of Regulations (CCR):

(1) Name and Address of Applicant (CCR § 783.2(a)(1))[1]

Applicant:	Bogle Vineyards, Inc.
Principal Contact:	Mr. Garrett Lamberti
Mailing Address:	49762 Hamilton Road, Clarksburg, CA 95612

(2) Species Name and CESA[2] Status (CCR § 783.2(a)(2))

Species: Swainson's Hawk (*Buteo swainsoni*)
Status: Threatened

[1] Unless otherwise noted, all references refer to Title 14 of the California Code of Regulations (CCR).
[2] California Endangered Species Act (CESA) (Cal. Gov Code § 2050, et seq.)

(3) Description of Project (CCR § 783.2(a)(3))

A General Electric (GE) 2.3 MW wind turbine would be constructed at the site of a recently constructed (2011) wine producing facility (Figures 1 and 2) located at 49762 Hamilton Road, west of Clarksburg, Yolo County. The turbine would be located adjacent to the wastewater ponds used by the facility, within a fenced 2,500-square foot graveled area (Figure 3). The turbine would be approximately 80 meters (263 feet) in height (the main tower of the turbine) and 138 meters (452.8 feet high) with the rotor (blade) in the twelve o'clock position (Figure 4). A blinking red beacon light that meets FAA standards would be installed at the top of the tower.

Bogle Vineyards (Bogle) would use the power the turbine generates for its production facility and would send any excess power to back feed the PG&E grid. As a condition of approval for the winery facility, Bogle was required to install energy efficient machinery and alternative energy features. Bogle installed 350 kilowatts of solar panels on the roof of the winery building in 2012.

There would be no above-ground transmission lines. All electrical feeders from the new turbine would be fed underground to a distribution switch located on-site and then connected to an existing PG&E service transformer on the site.

The 60-acre parcel that includes the winery production facility and the proposed wind turbine is subject to a Williamson Act contract. To the west is an adjacent 115-acre parcel of land also owned by the Bogle family. Eighty acres of the 115-acre parcel is subject to a Swainson's hawk conservation easement. It is planted in alfalfa. Immediately to the north of the proposed turbine site are the wastewater treatment ponds used by the winery facility. A third 80-acre parcel of land owned by the Bogle family wraps around the winery facility and is planted in alfalfa and wine grapes.

Specifications. The proposed GE 2.3 MW wind turbine generator (WTG) would consist of a three-bladed, upwind, horizontal axis rotor system on an 80 meter (263 feet) tubular steel tower. With a rotor diameter of 116 meters (380.6 feet), the total height from base to rotor tip in the 12 o'clock position would be 138 meters (452.8 feet). The distance from the ground to the rotor plane would be 22 meters (72 feet), and the total rotor-swept area would be 10,563 square meters (m$^{2)}$ (113,712 square feet (ft$^{2)}$).

In addition to the WTG, the system includes a transformer, switchgear, and metering panel. The turbine and related system components would be installed on within an approximately 74 m^2 (800 ft^2) concrete foundation and enclosed within a 232 m^2 (2,500 ft^2) fenced, graveled area.

All electrical transmission lines will be fed underground to a distribution switch located on the Bogle Vineyards production facility site. No above-ground transmission lines would be installed. There is an existing gravel road to access the turbine site; therefore, no new roads would be constructed.

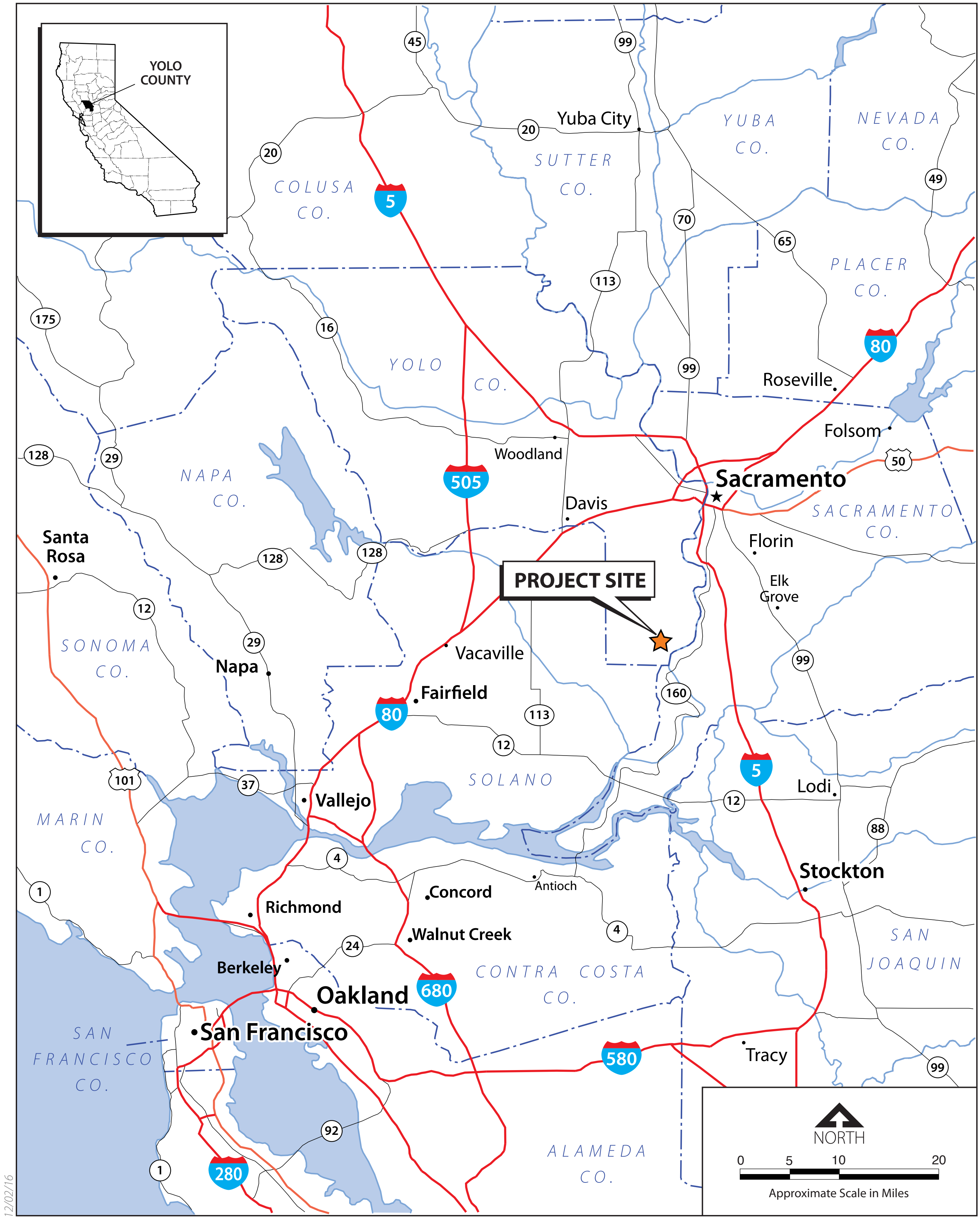

Figure 1
Regional Location of the Bogle Wine Production Facility, Yolo County, California

12/02/16

Figure 2
Facility Map of the Bogle Wine Production Facility

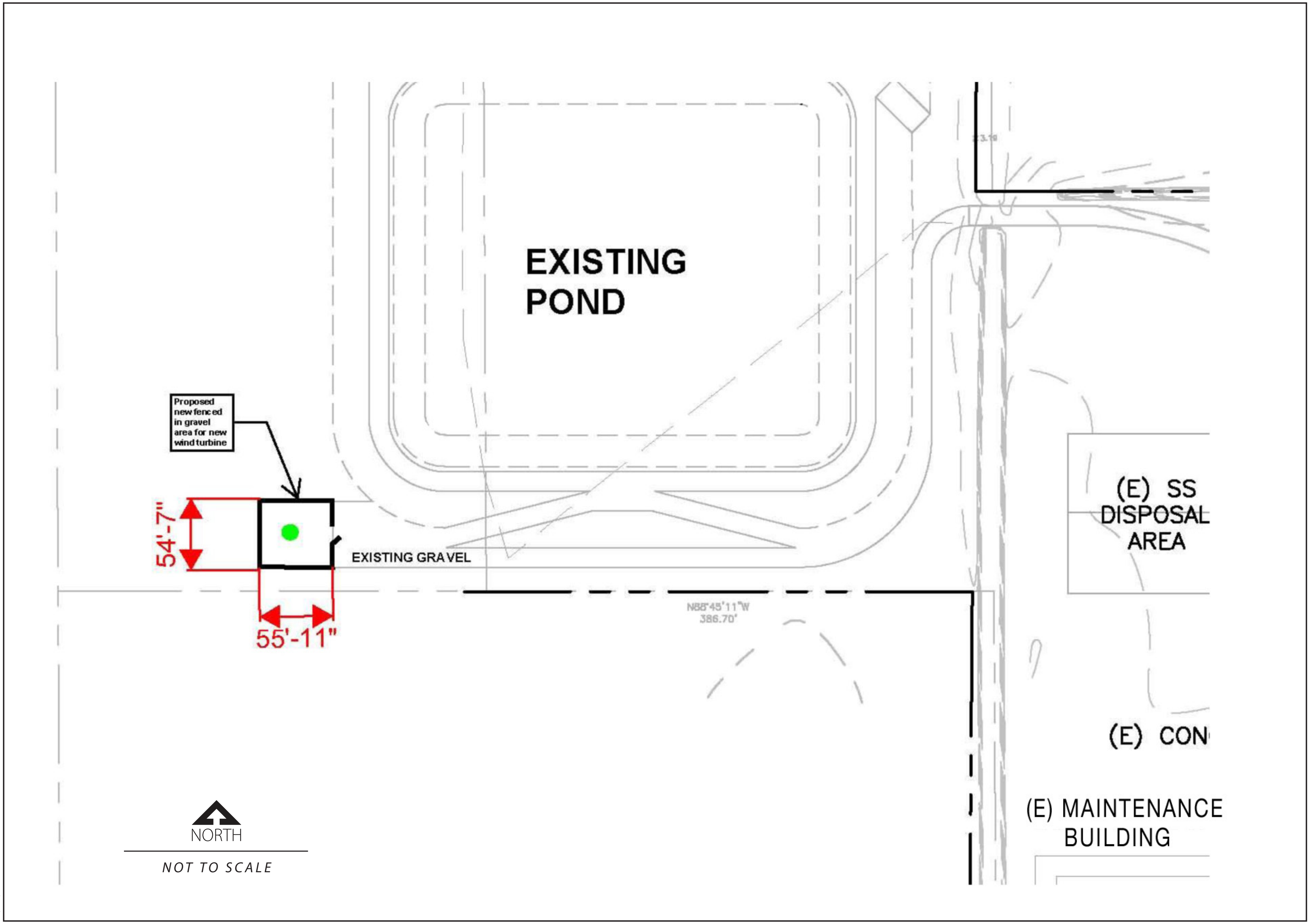

Figure 3
Site Plan

1/03/17

Figure 4
GE 2.3 MW Turbine

The wind turbine has been designed in accordance with Federal Aviation Administration (FAA) requirements to prevent obstructions to navigable airspace. It will be painted bright white, and would include a blinking red light at the top of the nacelle (the nacelle is the structure at the top of the wind turbine tower just behind the wind turbine blades) to mark the height of the tower at night.

Construction. Access to and from the construction site would be provided along an existing gravel road located immediately west of the main entrance road to the processing facility at 49762 Hamilton Road. The equipment would be delivered to a construction staging area adjacent to the turbine location on the Bogle Vineyard's property.

The following equipment would be used to construct the wind turbine: large truss-boom crane, smaller hydraulic crane, excavator (similar to CAT 225), backhoe, forklift, delivery trucks and possibly a portable generator (if power is not available nearby).

Construction of the wind turbine would require minimal clearing and grading. There would be no demolition of any existing structures. Most of the site is within a currently graded roadway and adjacent turn-around area. Any additional clearing and grading would be limited to a small portion of the adjacent cultivated field.

Construction of the wind turbine would occur in two phases. The first phase would include site preparation and foundation construction. This would require an excavation depth of up to approximately 9.1 meters (30 feet) from the surface to construct a concrete foundation approximately 4.6 meters (15 feet) in diameter. The subsurface soil would be prepared for the crane pads, and remaining soil from the foundation excavation would be returned to the center of the foundation pursuant to the foundation design. The installation of electrical equipment, underground conductors, and transformers would also be installed during this time. The first phase of construction would last approximately four weeks followed by at least 30 days of no activity to allow sufficient time for the foundation's concrete to cure.

The second phase of construction would involve the delivery and assembly of the tower, rotor, nacelle and transformer. Each piece would be shipped, then assembled on site with the use of cranes. The energy conditioning unit would be placed on the foundation and bolted down. The tower base section would be set on the foundation bolts and grout laid around the bolts. Over the following days the balance of the turbine would be erected. The upper tower section would be lifted into place and bolted to the base section through the welded interior flange on the ends of the tower sections. Next, the nacelle would be bolted to the top of the upper tower, and finally the blades would be installed. The associated electrical system would be installed to connect the wind turbine generator to the transformer and transmission line. The transmission line would run completely underground. This phase of work would take approximately four weeks.

The turbine components would be delivered to the site over existing gravel roads. During each phase all construction vehicles and equipment would be staged onsite and would not require street closures. Construction activities would employ approximately 35 employees and would generate approximately 90 truckloads (round trip) over the entire two- to three-month construction period.

The two phases of construction described above may be separated by as many as three months due to the variability in delivery schedule of the wind turbine equipment. The ultimate construction schedule would depend on the final delivery schedule for the turbine. However, generally, underground electrical and electrical panel installation takes four workers approximately three weeks, electrical testing takes two workers approximately one week, turbine erection takes ten workers two days and electrical completion requires three workers for approximately three weeks. Completion of all necessary inspections, reports and approvals requires four workers two to three weeks, and commissioning requires five workers for about two days.

Due to time involved in permitting, turbine delivery and electrical component delivery, the project could take from six to 12 months to complete after authorization. Specialized workers are required to construct the foundations, install the electrical facilities and erect the turbine.

Operation. The wind turbine would operate on an automatic basis whenever sufficient wind would present at a maximum 24 hours per day, seven days per week. The maximum rotational speed would be 15.7 rotations per minute (rpm) operating in wind speeds of 40 meters per second (m/s) with a cut-in speed of 3.0 meters per second (m/s). Based on a turbine siting analysis of prevailing winds and wind patterns in the region, the wind in the Clarksburg area typically averages approximately 14 mph. This means the blades would usually be turning at a relatively slow pace of 8.7 rpm at this wind speed. However, on an annual basis, the turbines would not be spinning at all approximately 24 percent of the time due to low wind speeds. The system is expected to have an operational lifespan of at least 20 years and may be operational for more than 30 years.

The operation of the GE 2.3 MW turbine would be controlled by a Supervisory Control and Data Acquisition (SCADA) system located inside the base of the tower. The SCADA system would monitor wind speed and direction and constantly adjustment to the direction of the nacelle and to the blade pitch angle in order to maximize power production and safety. The minimum wind speed at which the wind turbine would produce power would be 6.7 mph. At wind speeds above 71 mph for a duration of 10 minutes, the wind turbine would automatically shut down and cease power production. This is an automatic safety mechanism that prevents damage to the wind turbine that could result from operating at wind speeds that exceed the turbine design specifications.

The turbine would generate power at 690 Volts, which would be transmitted to energy conditioning equipment located inside the base of the turbine tower. The energy conditioning equipment would sense the power quality (i.e., frequency, amplitude and phase) from the grid and modify the wind-generated energy to match these qualities. This synchronized energy would then be transmitted to a step-up transformer located outside of and beside the tower where the voltage would be changed to match that of the voltage at the project site. The high voltage connection of the transformer would be connected to Bogle Vineyard's main bus inside its primary switchgear using conductors buried underground.

Maintenance. The turbine manufacturer would retain a qualified turbine maintenance company to conduct routine maintenance of the wind facility. The typical maintenance schedule would include monthly inspections and occasional preventive maintenance. Maintenance crews would be expected to use traditional petroleum-based lubricants (grease and oil) during their visits.

(4) Project Location (CCR § 783.2(a)(4))

The proposed wind turbine would be installed near the Bogle Vineyards wine production facility located at 49762 Hamilton Road, west of Jefferson Boulevard (State Route 84), approximately 4.5 miles southwest of Clarksburg. The turbine would be constructed near the southwest corner of the facility's water treatment ponds, which are located immediately northeast of the production facility (Figure 1).

Surrounding lands are designated and zoned for agricultural uses (Figure 5). Land to the south includes three to four farm residences, the closest of which is approximately 0.4 miles away. An additional four to five farm residences are north and east of the site, the nearest of which is approximately 0.7 miles away.

(5) Potential for Take (CCR § 783.2(a)(5))

"Take" is defined in the California Endangered Species Act (CESA) as hunting, pursuing, catching, capturing, or killing an individual of a listed species, or to attempt any such act (Cal. Fish & Game Code §86). "Incidental Take" is take that is incidental to otherwise lawful activities.

One CESA-listed species, Swainson's hawk, which is state-listed as "threatened", has been identified as occurring in the vicinity of the proposed Bogle Wind Turbine project site. This section discusses whether and to what extent the proposed wind turbine on the Bogle Vineyard's property could result in the taking of individual Swainson's hawks resulting from the construction and/or operation of the wind turbine.

Status of the Swainson's Hawk in the Vicinity of the Project

Distribution and Abundance

The Swainson's hawk is broadly distributed throughout the western United States, south-central Canada, and northern Mexico (England et al. 1997). There are no reliable range-wide population estimates, but annual migration counts have ranged from 200,000 to over 800,000 individuals (England et al. 1997). The California breeding population (based on estimates of active nests) is currently estimated at nearly 2,072 breeding pairs, 1,948 of these in the Central Valley (Anderson et al. 2007). There is also a substantial non-breeding adult and sub-adult population for which there are no estimates (Estep pers obs.). Within the Central Valley, the four-

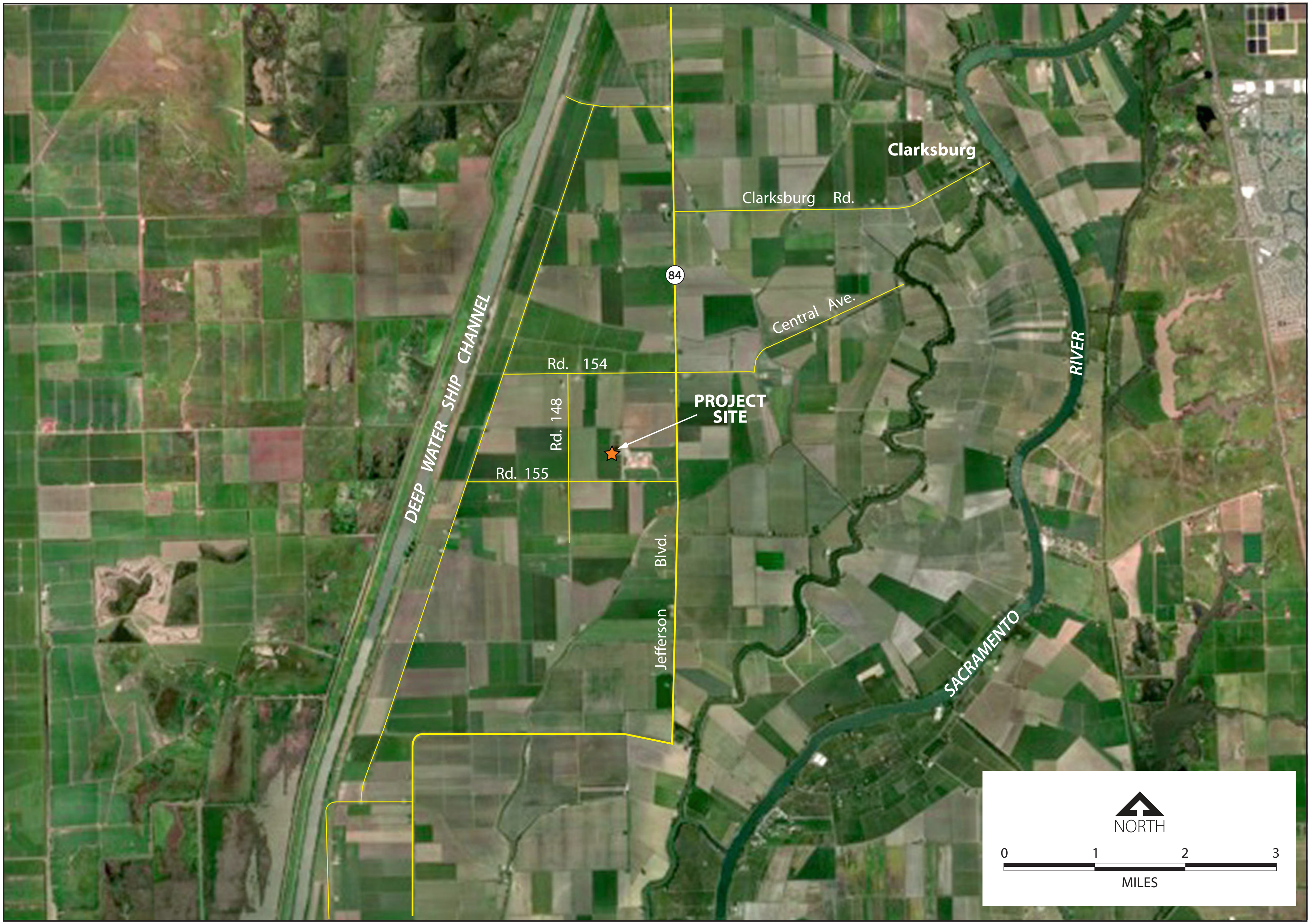

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Figure 5
Surrounding Land Use

county area including Solano, Yolo, Sacramento, and San Joaquin Counties represent an area that supports the highest densities of nesting Swainson's hawks reported anywhere within the species' range with reported nesting densities of 0.39 pairs per square mile in Solano County (LSA 2004), 0.38 pairs per square mile in Yolo County (Estep 2008) and 0.37 pairs per square mile in Sacramento County (Estep 2007). This four-county area includes an estimated 1,257 breeding pairs, or 65 percent of the Central Valley population (Anderson et al. 2007). A breeding census of Yolo County in 2007 detected a total of 292 breeding pairs (Estep 2008), which is generally consistent with the Anderson et al (2007) estimate of 346 breeding pairs for Yolo County. Subsequent, more localized surveys in Yolo County revealed additional previously unreported nesting territories (Estep 2012, Cahill 2014). Anderson et al (2007) estimated a population at 159 pairs for nearby Solano County, which is also generally consistent with the estimate of 120 to 130 breeding pairs used in the Solano County Multi-species Habitat Conservation Plan (LSA Associates 2007).

While the Swainson's hawk has declined in California, resulting in its 1983 listing as a threatened species by the California Fish and Game Commission, the southern Sacramento Valley portion of the statewide population supports a large and robust breeding population.

The local and statewide population of nesting Swainson's hawks also appears to be increasing since the 1980s; however, the increase may be in part a function of survey and estimation techniques. A total of 350 breeding pairs were estimated statewide in 1979 (Bloom 1980). The population estimate was revised upward several times during the 1980s and 1990s before the Anderson et al. (2007) statewide survey resulted in the current estimate of 2,072 breeding pairs. Local survey efforts suggest a continuing population and range expansion of the species into foothill regions of the Sierra Nevada, Coast Range valleys, and southern California deserts such as Antelope Valley. Local populations, including preliminary results of a long-term (30 year) population study in Yolo County (Estep in progress) indicate a gradually increasing population since the mid-1980s.

The project site is located in an area with a dense population of Swainson's hawks. According to census data (Estep 2007, 2008) and the CNDDB (2015), over 80 nesting territories are known to occur within 10 miles of the project site; 17 within five miles; and five within three miles. To provide the most recent, up-to-date information on the local nesting distribution, a nesting survey was conducted during the 2016 breeding season (Appendix A). The survey was conducted as a census of all nesting activity within 5 miles of the project site. A total of 18 active Swainson's hawk nests were recorded with a distribution and abundance very similar to the earlier 2007/08 data. Figure 6 illustrates the location of active nests found during the survey.

The nearest reported nest site is approximately 0.8 miles southeast of the project site, one was 1 mile from the site, three were from 1 to 2 miles, six were from 2 to 3

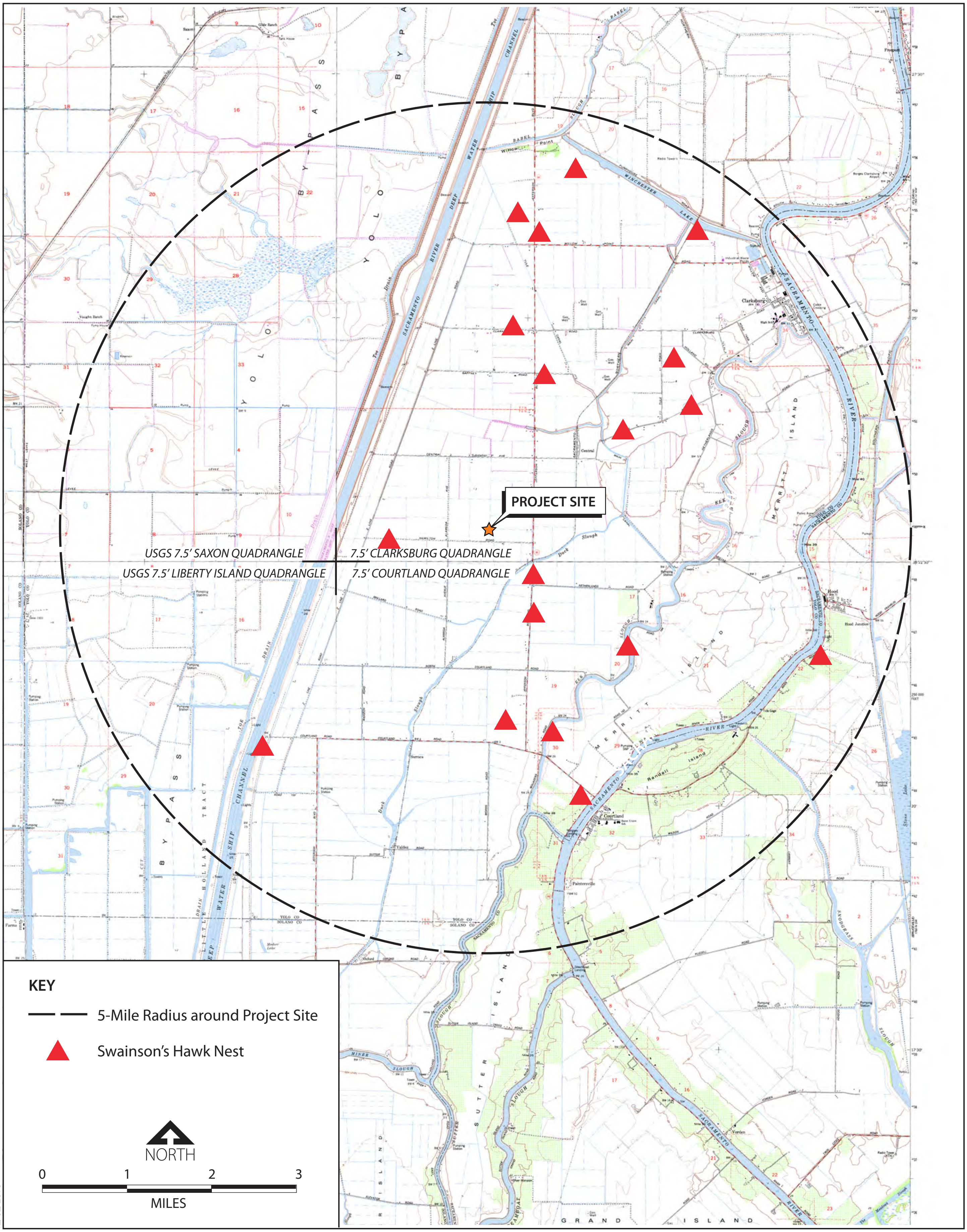

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Figure 6
Swainson's Hawk Nest Locations within 5 Miles of the Project Site

miles, four were from 3. to 4 miles, and three were from 4 to 5 miles (Figure 6). However, while many nesting territories are known to be in the surrounding area, there are relatively few in the immediate vicinity of the project site due to a relatively sparse distribution of potential nesting habitat. The nearest suitable nesting tree is approximately 0.3 miles southeast of the project site.

Habitat Availability

In the Central Valley, Swainson's hawks are largely dependent on agricultural lands for foraging and nest trees that occur within the agricultural landscape including those along roadsides or field borders, riparian corridors, small remnant groves, or in remnant isolated trees. The project site is within an active agricultural landscape consisting of perennial, semi-perennial, and annually or seasonally rotated crops. Located in the southeastern panhandle of Yolo County between the Sacramento River and the Sacramento River Deep Water Ship Channel, the area is flat, open, and sparsely populated. Wine grapes dominate much of the agricultural landscape in the area, particularly east of Jefferson Boulevard. Other dominant crops in the area include alfalfa, wheat, safflower, and corn. Alfalfa fields currently border the project site on the west, southwest, and northwest.

Nesting habitat in the vicinity of the project site consists primarily of native and non-native trees around farmhouses and along field borders or roadsides. The nearest suitable nest trees are approximately 0.3 miles to the southeast at a rural residence, approximately 0.4 miles east along an irrigation ditch, and approximately 0.7 miles northwest at a rural residence.

Within a 10-mile radius of the site, the majority of the land is active agricultural land, indicating availability of potential suitable nesting and foraging habitat in the project area. While some of this land is in fruit and nut orchard production, there appears to be plentiful alfalfa, pasture, wheat, and row crops that Swainson's hawks prefer. Nesting Swainson's hawks are distributed relatively evenly throughout this agricultural landscape where tree rows, roadside trees, small groves, and single isolated trees are available as nest sites (LSA 2007, Estep 2007, 2008). Dependent on agricultural lands as foraging habitat, the matrix of alfalfa fields, irrigated pastures, and the annually rotated irrigated cropland, particularly fields planted with wheat and tomatoes, are used by foraging Swainson's hawks as rodent prey become accessible during the growing and harvesting seasons (Estep 2009). Alfalfa fields are particularly suitable for Swainson's hawk foraging and receive high levels of foraging use by Swainson's hawks due to regular mowing, which reduces cover and increases prey accessibility, and periodic flood irrigation, which exposes prey. The agricultural matrix in Yolo, Sacramento, and Solano counties are highly suitable for foraging Swainson's hawks and in part explain the high nesting densities found there.

The alfalfa fields adjacent to the project site represent the highest value Swainson's hawk foraging habitat and other row and grain crops and irrigated pastures in the area represent moderately suitable foraging habitat. Vineyards and orchards do not represent suitable foraging habitat. Immediately adjacent to the turbine site, alfalfa fields occur to the south and west. The water treatment ponds bordering the northern edge and the production facility to the east do not represent habitat for Swainson's hawk.

Potential Impacts/Take

Potential impacts of the project that may result in take of the Swainson's hawk include the following:

- Disturbance effects during turbine construction; and
- Collision with operating turbine rotors.

Disturbance Effects During Turbine Construction

Swainson's hawks occur in the Central Valley during the breeding season, which extends from approximately mid-March through mid-September. With the exception of occasional winter occurrences, the species does not occur in the Central Valley during the non-breeding season, which extends from approximately mid-September to mid-March. While highly habituated to varying levels of human activity, nesting Swainson's hawks in the Central Valley are sometimes sensitive to noise and other disturbances near the nest. Potential indirect impacts include noise and vibration, fugitive dust, and increased human activity. Noise and vibration may cause physiological and/or behavioral disruptions to nesting birds that could interfere with foraging and breeding, including temporary or permanent nest abandonment. Because disturbances that may affect nesting behavior are unpredictable, a no-disturbance buffer is often established around the nest to ensure construction or other related disturbances do not affect nesting activity and result in take. When disturbances occur during the non-breeding season, there is no potential for take and therefore, no avoidance measures are implemented.

If construction were to occur during the non-nesting season (approximately mid-September to mid-March) no take would occur. However, if the project were constructed during the nesting season (approximately mid-March through mid-September), the project would still not be expected to result in any of the effects noted above because:

- the nearest potential nesting habitat is approximately 0.3 miles from the project site. This and other nearby potential nesting habitat (0.4 and 0.7 miles away) is along roadsides and farm residences; thus, any nesting hawks would be acclimated to relatively high levels of disturbance (e.g., harvesting activities, crop dusting, etc.).
- the nearest active Swainson's hawk nest is approximately one mile from the project site, a distance too far to be subject to construction disturbances.

Collision with Operating Turbine Rotors

Birds and bats occasionally collide with operating wind turbines. The mechanisms of this phenomenon have been extensively researched over the last 20 years and research continues to identify causes of collision mortality and to develop strategies to reduce collision mortality (Erickson et al. 2001). In general, wind turbine-related mortality is responsible for only a small proportion of overall collision-related mortality in the United States relative to other sources (e.g., buildings, power lines, communication towers, vehicles on roads). However, wind resource areas are sometimes associated with conditions that also attract large concentrations of resident or migratory birds, particularly raptors. Wind patterns, topography, and land use/prey availability influence migratory patterns and use of the landscape by many raptor species. Wind turbines sited in areas of high raptor use can lead to high incidences of collision mortality (Smallwood and Thelander 2004). Collision mortality of some species, particularly those that are state or federally listed, can have a greater affect on local or regional populations.

Turbine siting, the number and proximity of turbines, and structural and operational features of the turbine all influence the extent of potential collision mortality. Generally, single turbines, particularly new generation turbines, are not expected to result in the same rate of collision mortality compared with larger wind generation facilities where birds and bats must negotiate through a dense turbine field.

However, even with individual turbines, siting and the structural and operational features of the turbine also influence the extent of potential collision mortality. Potential collision mortality can be reduced by avoiding siting of the turbine near habitats such as wetlands that attract large numbers of birds, or topographic conditions that concentrate migrating birds. When sited in flat, open agricultural land, collision potential is generally expected to be substantially lower. In these areas, birds and bats tend to be more dispersed on the landscape, and the opportunity for birds to fly through the rotor swept area is correspondingly less.

Operational factors such as reduced rotational speed (rpms) and tip speed of the turbine rotor blades also contributes to minimizing collision potential. New generation turbines with lower rotational speeds, and particularly those (like the proposed turbine) that are expected to operate at rotational speeds substantially lower than the turbine specifications due to lower local wind speeds, will further reduce collision potential.

Nesting Swainson's hawks occur in the vicinity of the project and regularly fly at the altitude of the rotor swept area. Because most wind generation facilities occur outside the range of the Swainson's hawk, there is limited mortality data that can be used to assess the susceptibility of the species to turbine collision. However, there are reports of Swainson's hawk collision mortality from the Solano Wind Resource Area (SWRA), a large wind farm with over 700 turbines in the Montezuma Hills of Solano County. Recent data from the SWRA indicates that as many as three Swainson's hawks have collided with wind turbines there (ICF 2012).

However, more relevant information is available from two other single wind turbine projects in the region: the CEMEX turbine in Yolo County; and the Superior Farms turbine near Dixon in Solano County. Both turbines are similar to the proposed Bogle turbine as both occur in similar agricultural landscapes, and both occur within large concentrations of nesting Swainson's hawks and other nesting raptors. The Cemex turbine is located in a similar cultivated landscape to the proposed Bogle turbine. Land use is primarily row crops and alfalfa and at least 21 Swainson's hawk nesting territories occur within 5 miles of the turbine. The Superior Farms turbine is also in a cultivated landscape of primarily row, grain, and hay crops, and at least 17 Swainson's hawk nesting territories occur within 5 miles of the turbine. The CEMEX turbine was monitored for one full year. A total of four bats and one warbler species were recorded as turbine-related fatalities. The Superior Farms turbine was monitored continuously for two full years. A total of nine bats, all Mexican free-tailed bats, and seven birds including, one black-necked stilt, one avocet, two rock pigeons, and two mallards, and one Canada goose were reported as turbine-related fatalities. No Swainson's hawk or other raptor species fatality was reported at either facility.

Based on these relatively limited data from similar turbines, Swainson's hawks do not appear to be particularly susceptible to collision with individual turbines within an open, flat agricultural landscape. However, because of the proximity of suitable habitat immediately next to the turbine site, and the potential for concentrating Swainson's hawk use during flood irrigation and mowing activities, multiple Swainson's hawks are expected to occasionally forage close to the turbine footprint and at the height of the rotor swept area, thereby increasing the potential for collision. Bogle has minimized the potential for this interaction due to the proximity of the alfalfa field by curtailing turbine operation during periods of expected higher use (e.g., mowing and flood irrigating) of the adjacent alfalfa fields by foraging Swainsons's hawks (See Below).

To further assess the potential collision risk to Swainson's hawks, Bogle conducted a pre-construction monitoring study to document use of the area in the immediate vicinity of the turbine. Monitoring was conducted using standard point count protocols from July 12 to September 2, 2016. Four stationary observation points were situated within four delineated survey blocks to achieve coverage of all areas within the 2,000–foot radius survey area. Complete methods and results are presented in Appendx B. A total of 99 occurrences were documented during 16-four-hour survey periods. Only two were within the rotor radius distance of the proposed turbine. The nearest occurrence was 186 feet from the turbine and the average distance was 1,025 feet from the turbine. However, 51% of the occurrences were of birds flying at the altitude of the rotor-swept area. Only nine of the 99 occurrences were within a more generally defined risk zone of 500 feet from the turbine and within the altitude of the rotor-swept area. Extrapolating the data over an entire breeding season and factoring in shut-downs during irrigation and mowing events, 144 occurrences within this risk zone were possible. In other words, approximately every 1.25 days, one Swainson's hawk will occur within 500 feet of the turbine at the rotor-swept altitude of the turbine.

Like most preconstruction avian monitoring programs, the results provide little evidence of collision potential. The extent to which collision potential is related to the abundance and locations of Swainson's hawk occurrences is entirely unclear. Monitoring provides information on general use and movement patterns that can contribute to mortality potential, but it does not address incidental movements that may be more associated with actual collision events. What appears to be reasonably clear is that the distribution and abundance of nesting and foraging Swainson's hawks in the vicinity of the turbine site is similar to most of lowland Yolo and Solano Counties. The location, in and of itself, does not appear to contribute to elevated levels of use compared with surrounding areas.

Thus, while there is potential for Swainson's hawk collision-related injury or mortality, this potential is considered low because of the following factors:

- the project would consist of only a single turbine;
- the turbine would be located within an open, flat agricultural landscape that does not support features that would concentrate use by Swainson's hawks;
- the operational features of the proposed turbine would reduce collision potential (e.g., slow rotational speed);
- the turbine operation would be curtailed during periods of expected higher potential foraging use; and
- no Swainson's hawk or other raptor injury or mortality has been reported at similar single turbines in Yolo and Solano counties.

An analysis of the extent to which individual Swainson's hawks could actually come in contact with the turbine rotors is discussed further below.

Estimated Extent of Take

The estimate of the extent of potential take of individual Swainson's hawks from operation of the Bogle wind turbine considers the following factors: (1) the location of the project site with regard to known/active Swainson's hawk nests in the region; (2) topography, habitat, and wind patterns that would concentrate Swainson's hawk activity, (3) the extent of suitable foraging habitat in the immediate vicinity of the project site; (4) wind patterns that would affect the operation of the turbine during the six months (mid-March to mid-September) that Swainson's hawks are in the region; (5) foraging and other behavior and movement patterns of Swainson's hawks associated with collision susceptibility, and (6) Swainson's fatalities reported at similar wind turbines in the region. A brief summary of the existing information regarding each of these criteria is discussed below:

1. As discussed above, at least 97 active Swainson's hawk nesting territories have been recently documented within 10 miles of the project site, indicating a dense and robust local breeding population, and an agricultural landscape that supports abundant and highly suitable nesting and foraging habitat. As noted

above, this breeding population is part of a larger regional population that supports the highest concentration of nesting Swainson's hawks reported anywhere within the range of the species.

2. The project site and surrounding region consists of flat, uniform, agricultural land that supports a diverse matrix of crop types and foraging habitat suitability. Data from the Yolo County Natural Heritage Program (Yolo County HCP/NCCP)(http://www.yoloconservationplan.org/), the Solano County Multi-species Habitat Conservation Plan (http://www.scwa2.com/conservation_habitat_finaladmindraft.aspx) and the South Sacramento County Habitat Conservation Plan (http://www.per.saccounty.net/PlansandProjectsIn-Progress/Pages/SSHCPPlan.aspx) indicate a broad distribution of high and moderate value foraging cover types and corresponding Swainson's hawk nesting distribution throughout the lowlands of Yolo, and nearby Solano, and Sacramento Counties. This extensive agricultural region does not support particular land use, topographic or wind patterns that would concentrate Swainson's hawk activity. While multiple birds may be periodically attracted to nearby alfalfa fields (see below), the project site and surrounding area does not support landscape, topographic, or environmental conditions that would otherwise concentrate Swainson's hawk use. While alfalfa fields generally receive more frequent use compared with other crop types and due to mowing and irrigation events may periodically attract birds from more distant nesting locations (Estep 1989, Babcock 1995), the majority of use of the adjacent alfalfa fields is expected to be used by nearby nesting pairs and incidental movement of birds flying through the area.

3. Suitable Swainson's hawk foraging habitat occurs extensively in the region and in the immediate vicinity of the project site. As previously noted, the majority of the land within a 10-mile radius of the site is agricultural. Alfalfa fields, a preferred crop type within which Swainson's hawks are known to forage, occur immediately to the west and south of the site. Additional alfalfa and other row crop and low vegetation fields occur as part of the typical agricultural matrix throughout the region. However, vineyard, an unsuitable crop type for foraging Swainson's hawks, is a dominant agricultural type near the project site between the Deep Water Ship Channel and the Sacramento River. As a result, nesting density in this part of Yolo County is less than found elsewhere in the interior of the county. This may also reduce the overall foraging use in the immediate vicinity of the project compared with other agricultural lands in the surrounding region that are not similarly dominated by unsuitable crop types.

4. Wind data collected to investigate the feasibility of a wind turbine in this location indicates that the prevailing winds primarily blow from the west/southwest to the east/northeast at a heading of approximately 210 degrees. The average wind speeds range from approximately five mph to 20 mph, with the strongest winds ("delta breezes") primarily occurring in the early to late evenings during summer months from approximately May to the end of August. On an annual basis, the turbine would not be spinning at all

approximately 24 percent of the time due to low wind speeds. The large GE 2.3 MW wind turbine proposed for this location is designed to have a lower rotational speed than smaller models. The maximum rotational speed for the turbine is 15.7 revolutions per minute (rpm) operating in wind speeds of 40 m/s. As previously discussed, the wind speed in the Clarksburg area typically averages close to 14 miles per hour. At this speed the blades will be turning at a relatively slow pace of 8.7 rpm. The minimum wind speed at which the wind turbine would produce power is 6.7 mph. At blade-tip velocities above 18.6 rpm (which would occur at wind speeds reaching 71 mph), the wind turbine automatically shuts down and ceases power production. This is an automatic safety mechanism that prevents damage to the wind turbine that could result from operating at wind speeds that exceed the turbine design specifications.

5. Susceptibility to collision with operating turbines is based in part on the proportion of time Swainson's hawks occur within the rotor-swept area. The rotor swept area of the proposed turbine extends from 22 meters (72 feet) to 138 meters (452.8 feet) above the ground encompassing a rotor-swept area of 10,563 m^2 (113,712 ft^2). This 116-meter (380-foot) vertical zone represents the elevation risk zone to Swainson's hawks in flight. Several behaviors may place Swainson's hawks within the risk zone with varying relative frequency, including foraging, territorial interactions, courtship displays, and mid-day soaring. The Swainson's hawk hunts almost exclusively from the wing, and rarely from a perch (with the exception of hunting while on the ground). Typical foraging behavior is a low altitude soaring flight from between approximately 30 and 61 meters (100 and 300 feet) above the ground. Prey is captured by stooping toward the ground. So most foraging behavior occurs between elevations of zero and approximately 61 meters (0-300 feet) (Estep 1989). Most territorial interactions occur at higher elevations and most often involve Swainson's hawks chasing and stooping on other raptors that enter the breeding territory. Because the objective is to flush invading birds out, these aggressive interactions usually remain at relatively high elevations, usually greater than 152 meters (500 feet), to prevent the invading bird from getting close to the nest site. Courtship displays, which occur primarily during the early part of the nesting season also typically occur at fairly high elevations, usually higher than 152 meters (500 feet) above ground. However, it is possible that these behaviors could occasionally occur at lower elevations and within the risk zone. Both adults participate in these displays that involve rapid flight, stooping, dipping and diving, and talon locking. Mid-day soaring usually occurs daily during the summer months. Adult Swainson's hawks will gradually circle and gain elevation within a thermal up to elevations exceeding 305 meters (1,000 feet). Of these behaviors, Swainson's hawks occur within the risk zone at the greatest relative frequency during foraging. As noted above, Swainson's hawks are expected to forage near the turbine footprint due to the high value alfalfa foraging habitat immediately to the west and south. Hawks moving into these adjacent fields to hunt could pass through the rotor plane risk zone and be subject to possible collision injury or mortality. However, curtailment of operation during mowing and flood irrigation

events is expected to reduce this potential (See below). As described above and documented in Appendix B, preconstruction monitoring of Swainson's hawks from July to September 2016 revealed that no birds occurred within the rotor distance of the proposed turbine site. However, 42% of the occurrences were within the rotor plane altitude. Thus, monitoring confirmed that Swainson's hawks do spend a substantial proportion of time at the altitude of the rotor plane. But contact with the rotor plane in a broad, flat and otherwise unobstructed agricultural landscape is expected to be a less frequent occurrence.

6. No Swainson's hawk or other raptor collision-related injuries or fatalities have been reported from the two similar individual turbines in the region - the CEMEX turbine in Yolo County and the Superior Farms turbine in Solano County. Both of these projects occur in similar agricultural settings surrounded by large concentrations of nesting Swainson's hawks. Alfalfa and other high and moderate value crop types occur immediately adjacent or very near both of these turbines. The lack of reported collisions suggests that Swainson's hawk and other raptors are able to see and avoid the turning rotors. In a dense array of turbines within a larger wind energy facility, raptors must negotiate through a maze of turbines, increasing their susceptibility particularly if the wind farm represents a portion of their primary foraging habitat. In these instances, raptor mortality can be more common and have a substantially greater effect. An individual turbine within a large agricultural landscape represents a small fraction of the foraging airspace for raptors. Foraging raptors may be able to better sense the presence of the turbine compared with a dense turbine array and avoid flying through the rotor plane. The causes and avoidance mechanisms are largely unknown, but the existing data suggests that the potential for turbine-related mortality of raptors is low at individual turbines in a broad, flat agricultural landscape.

Based on the nest and foraging habitat information, and the monitoring results discussed above, it is assumed that on any given day during the nesting season (approximately mid-March through mid-September) several Swainson's hawks could be foraging in the active agricultural fields surrounding the Bogle Vineyard property, primarily in the fields to the west and south. The most likely scenario that would result in a blade striking a flying Swainson's hawk would be in which an individual bird is circling the adjacent field while foraging and inadvertently entering the relatively small rotor plane (approximately 2.6 acres) at a time when the blades are turning.

It is assumed that the faster the turbine blades spin, the higher the risk of injury or mortality to birds that inadvertently fly through the rotor swept zone of the turbine. As noted above, the average strongest winds and, thus, times when the turbine blades would be spinning at the highest speeds, appear to occur in this region during the summer months between 6 p.m. and midnight when the region's "delta breezes" are often prevalent. While most of these increased winds occur during the evening hours, adequate daylight still exists after 6 p.m. during the peak summer months such that there could be overlap of time periods when turbine speeds could increase during these winds and when Swainson's hawks could still be moving about within individual nest territories. Even then, given that an individual Swainson's hawk would need to be moving through a relatively small airspace of a single turbine at a time when the turbine blades (particularly the blade tips that move the fastest) are spinning fast enough either to not be recognized by an individual hawk as a danger or that otherwise could cause injury or mortality, the potential for an individual hawk to be struck by a spinning blade from this proposed turbine is considered low.

Based on the relatively high density of known active nests, the prevalence of suitable foraging habitat within a 10-mile radius of the project site, and the agreement to maintain alfalfa production on fields immediately adjacent to the site that are under an existing conservation easement agreement, it is assumed that a number of Swainson's hawks could be moving about in the immediate vicinity of the proposed turbine location on any given day during the time of year (mid-March through mid-September) that this species occurs in the Sacramento Valley. However, given that (a) the project would entail the construction of just one individual turbine that represents a total rotor swept zone within which blade/bird collisions occur much less than that of multiple turbine operations; (b) that the particular design of the proposed turbine is considered less of a danger to raptors due to relative lack of perching opportunities (older, lattice-style turbines offered perching opportunities to raptors) and slower rotational speeds than that of older turbine models that are known to present more of a collision threat to raptors; (c) that the time of day that the turbine blades would be spinning at high rpms, on average, would generally be during evening hours after 6 p.m. on a given day when delta breezes are most active but when there is a smaller overlap of time when the blades are spinning and individual hawks are still flying about; (d) that because the average wind speeds in the area are approximately 13 mph which would result in relatively low (5-6) turbine blade rpms that would present less of a threat to Swainson's hawks than faster-spinning blades at higher average wind speeds; (e) that due to the migratory nature of this species, the potential for Swainson's hawk collisions with a turbine blade would only occur generally during the roughly six months (mid-March through mid-September) of a given year that Swainson's hawks are present in the Sacramento Valley; (f) that Swainson's hawk flight movement and keen eyesight allows it to see and maneuver around objects and under most conditions successfully avoid the rotor plane, and (g) that there are no reported incidences of Swainson's hawk or other raptor injury or mortality at other similar single wind turbines in Yolo and Solano counties, the potential for an individual Swainson's hawk to collide with an actively spinning turbine blade is considered low.

There are limited data available from other projects that could be used to estimate a fatality rate for the proposed project. The only reported incidences of Swainson's hawks colliding with operating wind turbines are from the nearby Montezuma Hills Wind Resource Area in Solano County. Three Swainson's hawk fatalities have been reported; however, a fatality rate for Swainson's hawks is not available.

Fatality rates for other species or species groups in the Montezuma Hills (at similarly rated turbines) range from 0.07 to 0.15 per MW per year for red-tailed hawk and 0.15 to 0.22 per MW per year for all large birds (Kerlinger et al. 2006, 2009, 2010). While fatality rate is likely to be higher within a dense turbine field in a high wind area compared with a single turbine in a low wind area, these fatality rates suggest that a Swainson's hawk fatality rate at the proposed turbine will likely not exceed 0.22 per MW per year, which translates to approximately one fatality every five years.

However, given the close proximity of the turbine to high value foraging habitat and the requirement to maintain high value foraging habitat at this location in subsequent years, as well as the totality of all of the considerations described above, a conservative estimate of one individual Swainson's hawk every three years is estimated to be potentially taken as a result of an individual moving through the rotor swept zone and colliding with spinning turbine blades.

(6/7) Analysis of the Impacts of the Proposed Taking on the Species and Whether Issuance of Permit Jeopardize the Continued Existence of a Species? (CCR § 783.2(a)(6 and 7))

For the reasons discussed in detail below, the single Bogle Vineyard wind turbine will not jeopardize the continued existence of the Swainson's hawk. While a small number of individuals could be taken over the operating life of the turbine (estimated loss of one Swainson's hawk individual per every three years), no nesting or foraging habitat will be temporarily or permanently lost and the project's effects on the Swainson's hawk's overall ability to survive and reproduce in the wild are not considered, after the application of minimization and mitigation strategies (see *Section 8* below), substantial enough to cause jeopardy. What follows is an analysis of the impacts of the taking (of an estimated one individual per every three years) on the species and how the issuance of the Incidental Take Permit would affect the continued existence of the species. The conclusion of no jeopardy considers the species' ability to survive and reproduce range-wide, and any adverse impacts on those abilities in light of known population trends, known threats to the species, and reasonably foreseeable impacts on the species from other related projects and activities.

Ability to Survive and Reproduce

There are at least 97 breeding pairs of Swainson's hawks within 10 miles of the project site and at least 1,257 breeding pairs within the four-county area surrounding the project site. Portions of this population have been monitored for 30 years, including the area immediately northwest of the project site in Yolo County (Estep in progress). The subpopulation within the 215 square-mile Estep study area has gradually increased since the late 1980s as have other portions of the Central Valley range. A county-wide census of Swainson's hawks in Yolo County in 2007 indicate that Yolo County supports approximately 300 breeding pairs and is the most abundant breeding buteo in the lowlands of Yolo County, three times more abundant than the red-tailed hawk. Similar breeding densities are reported from Solano County (LSA 2007) and Sacramento County (Estep 2007), where the species is also common. The Natomas Basin, in northern Sacramento County, also reports a stable if not gradually increasing nesting population during 14 years of monitoring (ICF 2013). The overall population trend in the Central Valley appears to be stable if not increasing along with an apparent range expansion into the Sierra foothills, inner coastal valleys, and Southern California deserts, where reports of breeding records have increased in the last five to 10 years. So the local and regional population is robust and the statewide population appears to be increasing and expanding.

The loss of one individual every three years represents 0.3 percent of the estimated number of breeding birds in Yolo County, 0.02 percent of the estimated number of breeding birds in the surrounding four-county area; 0.01 percent of the estimated number of breeding birds in the Central Valley and statewide; and 0.0001 percent of the estimated number of birds range-wide.

Therefore, while over time the project may affect individual nesting pairs, the estimated level of take (1 individual every 3 years) from the proposed project is not expected to have any measureable affect on the local or regional Swainson's hawk population and will not affect the ability of the species to survive, reproduce, or continue to expand.

Adverse Impacts of Taking On Ability to Survive and Reproduce in Light of:

Known Population Trends

Swainson's hawk historically was abundant in California and had a wide breeding range (Grinnell and Miller 1944; Bloom 1980; Garrett and Dunn 1981). However, Bloom (1980) estimated that there were approximately 350 nesting pairs remaining in the state and determined this to be a 90 percent population reduction of historic Swainson's hawk numbers. The Swainson's hawk was subsequently listed as state-threatened in 1983. Later inventories estimated populations of 500 breeding pairs in 1988, and 1,000 breeding pairs in 1994 (CDFG 2007). The CDFG initiated an inventory of Swainson's hawk breeding pairs in California in 2005 and 2006 (CDFG 2007). Based on a randomized sampling, the CDFG estimated a breeding population of 1,912 pairs (95 percent confidence interval of 1,471 to 2,353 pairs) in 2005 and 2,251 breeding pairs (95 percent confidence interval of 1,811 to 2,690 pairs) in 2006. The combined estimate for 2005-2006 is 2,081 pairs (95 percent confidence interval of 1,770 to 2,393 pairs). Approximately 94 percent of the breeding pairs now occur in the Central Valley. Although it is difficult to compare inventory data directly due to different methods, the apparent trend based on these statewide estimates is an increasing population (statewide) of Swainson's hawk since the 1980 Bloom report. Note, however, that early and more recent estimation methods are not comparable, which influences the validity of potential trends. In addition, as noted above, long-term monitoring of Swainson's hawks in the Central Valley since the 1980s also indicates a stable if not increasing population trend, particularly in the Sacramento Valley, and a more recent range expansion.

While overall nesting density is much lower, populations in portions of the San Joaquin Valley also appear to be more robust than previously thought (Estep and Dinsdale 2013). Therefore, the removal of one individual from this population every three years is not expected to influence the stability, population trend, or range expansion of the local, regional, or statewide populations.

While the proposed project would also contribute to a cumulative effect from other wind energy or other related types of projects that could result in mortality, there are very few similar projects within the range of the species and very few records of Swainson's hawk mortality resulting from collision with operating wind turbines. There have been no reported incidences from the two similar local single turbines in Yolo and Solano counties. Consequently, the contribution to a cumulative take of the Swainson's hawk and its affect on the breeding population is considered negligible.

Threats

It has been hypothesized that the historic decline in Swainson's hawk resulted in part from loss of nesting habitat (Garrett and Dunn 1981). High levels of dichlorodiphenyltrichloroethane (DDT) contamination may also have contributed to, or caused, the extirpation of breeding populations of Swainson's hawk in southern California (Risebrough et al. 1989). Habitat loss as a result of land conversion from small farms to large agribusiness operations where nesting trees are removed may also be a contributing factor to the historic decline of the species. Disturbance of nesting sites by human activities and loss of prey due to the use of rodenticides also may play a role.

With regard to the proposed turbine project, any individual Swainson's hawks that stoop on a prey item (generally a rodent, but can include insects, small reptiles, and amphibians) in the immediate vicinity of the turbine or any individuals that move across the site, could inadvertently strike a rotating blade resulting in injury or mortality of individual hawks. Measures are provided in Section 8 to minimize the potential by use of the adjacent fields by multiple hawks, thereby reducing the potential for collision events.

Based on recent statewide population surveys, Swainson's hawks populations in the state appear to be stabilized or increasing. Further, no loss of Swainson's hawk foraging or nesting habitat would occur as a result of the proposed project. Finally, applicable mitigation measures presented in *Section 8* would reduce the potential use of adjacent fields. While the loss of one Swainson's hawk every three years as a result of operation of the turbine may still occur, losses of the Swainson's hawk would not rise to a level that would jeopardize the continued existence of the species. Therefore, issuance of the Incidental Take Permit would not jeopardize the continued existence of the Swainson's hawk.

(8) Measures to Avoid, Minimize, and Mitigate Impacts (CCR § 783.2(a)(8))

Bogle Vineyards shall implement the following measures to minimize, avoid and mitigate potential impacts to Swainson's hawks.

Measure BIO-1

If any aspect of project construction would occur during the Swainson's hawk nesting season (mid-April through mid-September), a pre-construction survey for active Swainson's hawk nests within 0.50 mile of the turbine location shall be conducted by a qualified biologist. If active nests are found during the pre-construction survey during the nesting season of these species, the Permittee shall maintain a no-disturbance buffer zone around active nests during the breeding season or until it is determined by the Permittee's qualified biologist that the young have fledged and are no longer dependent upon the nest for survival. The no-disturbance buffer zone from active Swainson's hawk nests shall be from 0.25 mile to 0.5 mile, or as otherwise determined by the qualified biologist considering such factors as type and extent of the construction activity, line-of-sight from the activity to the nest, and time of year within the nesting season.

Measure BIO-2

To reduce the risk of collision of Swainson's hawks and other raptors with the turbine, the applicant shall discontinue operation of the turbine during periods when alfalfa is being cut (harvested) or flood irrigated in the adjacent fields owned by the applicant, which are activities that attract foraging raptors. During the first year of turbine operation, turbine shutdown shall occur when crops are being harvested or irrigated on the adjacent 115-acre parcel, which includes the 80-acre conservation easement. Raptors may use the fields for some time after alfalfa is harvested or irrigated until prey numbers are reduced. The turbine shall begin operation after harvest or flood irrigation after a biological monitor has surveyed the adjacent fields and has determined that no groups of Swainson's hawks or kettles of raptors are using the fields.

Measure BIO-3

*In order to mitigate the loss of aerial habitat, the Permittee shall purchase mitigation credits from a CDFG approved conservation bank located in Yolo County (or other location as approved by CDFG) or acquire and preserve Swainson's hawk habitat at a CDFG approved location. The acquisition and/or preservation of foraging habitat shall be calculated from the total rotor swept area representing aerial habitat within the completed Project. The rotor swept area is the product of the blade radius squared multiplied by 3.14 (or 190 * 190 * 3.14 = 113,712 square feet or 2.6 acres), Preservation lands shall consist of any combination of non-native grassland, grazing land, mixed grain or cropland (excluding orchard or vineyard land or other agricultural uses not typically used by Swainson's hawks), or open oak woodland. The off-site habitat mitigation area shall be preserved in perpetuity by an established conservation bank or through a conservation easement held by a certified third party approved to hold conservation easement by the CDFG.*

If the off-site habitat mitigation area will be preserved in perpetuity by an established conservation bank, the Permittee shall submit evidence in the form *of a sales agreement or receipt to Yolo County of the purchase of all required credits prior to operation of the wind turbine. It is assumed the approved conservation bank will have documentation equivalent to a nest habitat enhancement plan to provide CDFG. If the mitigation occurs at another CDFG approved location, the Permittee shall prepare a nest habitat enhancement plan to address the enhancement of nest habitat associated with the acquired/preserved foraging habitat, as well as a conservation easement and endowment to ensure conservation in perpetuity.*

Measure BIO-4

The applicant shall implement a post-construction monitoring program to determine overall avian and bat mortality associated with operation of the turbine. For the first year of operations the monitoring will consist of weekly bat and bird carcass surveys and bird use surveys of the turbine area, ponds and the adjacent conservation easement parcel. For years two and three, surveys will be conducted weekly from February 1 to October 1, and twice monthly for the rest of the year.

After the first year of turbine operation, and based on carcass survey results and bird use surveys, the applicant will adopt, with the approval of the DFW and the County, a comprehensive post-construction avian and bat mortality mitigation, monitoring and reporting plan consistent with the California Energy Commission and California Department of Fish and Game Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC, 2007), including biweekly reporting of bird and bat mortalities to DFW and the County.

The search area to be monitored will have a width equal to the maximum rotor tip height, which is approximately 452 feet, so the search area will extend out 452 feet from the turbine on all sides. The search area will be walked by foot in either linear or concentric circle transects around the turbine. A standard transect of 20 feet in width (10 feet on either side of a centerline) will be walked but with adjustment to the transect width made as appropriate for vegetation and topographic conditions on the site. The field surveyor working with direction of the biologist will record and collect all carcasses located in the search area. Information to be collected should include the species of bird/bat, the condition of the carcass, and location of the bird or bat relative to the turbine.

Any injured birds or bats shall be taken to a nearby rehabilitation center. Any unidentified carcass shall be collected and submitted for identification to an appropriate facility or person. No "unidentified raptor" counts shall be included in reports. Monitoring schedules may be adapted to avoid periods immediately following turbine shutdowns. Survey protocol will include carcass surveys, searcher efficiency trials and scavenger trials.

On a monthly basis, the biologist will prepare a brief memo that will be submitted to Yolo County Planning and Public Works Department, the applicant, and the California Department of Fish and Wildlife noting the *methods and results of the monitoring site visit. At the end of each annual cycle, a more detailed monitoring report will be prepared and submitted that describes the methods, results, and conclusions of the monitoring effort.*

Measure BIO-5

The Permittee shall assign a qualified biologist, or other person, as the point of contact with the county. The qualified biologist shall conduct environmental training sessions with construction personnel within 30 days of the start of construction. The training session shall include information about the locations and extent of any Swainson's hawks, methods of avoidance, permit conditions, and possible fines for violations of permit conditions and state or federal environmental laws.

(9) Monitoring Plan (CCR § 783.2(a)(9))

Pursuant to Measure BIO-4 above, Bogle Vineyards shall prepare and implement a post-construction avian mortality monitoring program. The focus of the monitoring program will be to determine whether estimated annual mortality rates of Swainson's hawks were accurate, and to compare overall mortality rates to other regional operations. The monitoring program will require that a search be conducted within a 452-foot radius of the turbine tower for bird and bat injuries and fatalities on a weekly basis year round during year one and weekly from February through October and twice monthly for the remainder of the year for years two and three. The monitoring shall be conducted by a qualified avian biologist or the Permittee shall designate an appropriate individual(s) who shall be trained onsite by a qualified avian biologist to conduct the monitoring searches. If individuals trained by the qualified avian biologist locate any avian carcasses or injured birds during the monitoring period, the qualified avian biologist shall be contacted immediately to identify, document, and remove the species. The qualified avian biologist shall prepare a monthly report on avian injury or mortality and submit the report to the CDFW, with a copy to the County.

The plan shall also ensure compliance with the avoidance, minimization, and mitigation measures listed in this application document, and the effectiveness of these measures, to ensure that all requirements of the CESA 2081 permit and all other regulatory requirements pertaining to biological resource impact mitigation are implemented. The final plan shall ultimately be reviewed by the CDFW for concurrence.

The table below identifies applicable mitigation measures, an implementation schedule, and the party responsible for measure implementation responsibility or oversight. This table includes a status, date and initials data entry column for the individual certifying or tracking completion of the measure, to simplify subsequent reporting tasks.

Mitigation Measure No.	Mitigation Measure Summarized Description	Implementation Schedule	Responsible Oversight Party	Status/ Date/ Initials
BIO-1	Pre-construction Surveys of construction during Swainson's Hawk nesting season and appropriate setbacks	Pre-Construction	Permittee/Qualified Biologist	
BIO-2	Curtailment of operation during mowing and irrigating of adjacent fields	Post-Construction	Permittee	
BIO-3	Purchase mitigation credits from a CDFW approved conservation bank located in Yolo County, OR acquire Swainson's hawk habitat via a conservation easement and endowment at a CDFW approved location, and prepare a nest habitat enhancement plan.	Pre-Construction	Permittee	
BIO-4	Prepare and implement a post-construction avian mortality monitoring program, which shall include specific monitoring areas, carcass surveys, the preparation of monthly memoranda identifying monitoring methods and results, and an annual monitoring report	Post-Construction	Permittee & Designated Biologist	
BIO-5	Permittee shall assign a qualified biologist as the point of contact with the County and conduct environmental training.	Pre-Construction	Permittee & Designated Biologist	

(10) Habitat Management Land Acquisition and Funding Assurances and Security Assurances (CCR § 783.2(a)(10))

Bogle Vineyards shall provide financial assurances to guarantee an adequate level of funding is available to implement all minimization, mitigation and compensation measures identified in the CESA Section 2081 Permit, including the post-construction avian mortality monitoring program. These funds shall be used solely for implementation of the minimization, mitigation and compensation measures associated with this Project.

As detailed above in mitigation measure BIO-3, the off-site habitat mitigation area shall be preserved in perpetuity by an established conservation bank, or at another location approved by CDFW. If mitigated at a conservation bank, the Permittee shall submit evidence in the form of a sales agreement or receipt to Yolo County of the purchase of all required credits prior to operation of the wind turbine. The approved conservation bank shall have documentation equivalent to a nest habitat enhancement plan approved by CDFW. If the mitigation occurs at another CDFW approved location, the Permittee shall prepare a nest habitat enhancement plan to address the enhancement of nest habitat associated with the acquired/preserved foraging habitat.

(11) Certification (CCR § 783.2(a)(11))

A signed certification certifying that the information submitted in this application is complete and accurate to the best of the Permittee's knowledge and belief is provided at the end of this application document.

(12) Compliance with California Environmental Quality Act (14CCR § 783.3(b))

Section 783.3 of Title 14 of the California Code of Regulations lays out CEQA-compliance requirements where CDFW is the responsible agency for purposes of issuing an Incidental Take Permit.

Section 783.3(b) requires submittal of information by the Project applicant showing compliance with CEQA requirements. The submission of compliance information does not need to be concurrent with the submission of the Incidental Take Permit application: "[t]he analysis and information required by this section shall be provided to the Department [CDFW] as soon as reasonably practicable following the submission of a permit application." (14 CCR § 783.3(b)).

Pursuant to § 783.3(b), an applicant must submit the following information in addition to that information required by 14 CCR § 783.2. First, the applicant must provide information to CDFW regarding whether the Project may result in significant adverse environmental effects in addition to those impacts of taking analyzed in the Incidental Take Permit. Second, if additional significant adverse environmental effects are found to exist, the applicant must state whether feasible alternatives or mitigation measures would avoid or lessen those significant adverse effects. Third, the applicant must analyze all potentially significant adverse environmental effects resulting from the Project and include a discussion of the feasible alternatives and mitigation measures that will be used to avoid or substantially lessen those significant adverse environmental effects with documentation to support that analysis. Fourth, if the analysis identifies significant adverse environmental effects for which feasible mitigation measures are not available, the applicant must also include a statement describing specific environmental, economic, legal, social, technological, or other benefits which might justify the significant environmental effects created by the Project.

A Draft IS/MND was prepared by Yolo County with all of the information required by 14 CCR § 783.3(b) (Yolo County Planning and Public Works Department, 2013). Supporting technical studies, including biological surveys, have been prepared and included in the IS/MND regarding various environmental issues, including the species proposed to be covered by the Incidental Take Permit which could result from the Bogle Vineyards Wind Turbine project. Although the County found the project would have less than significant impacts with mitigation, an environmental impact report

(EIR) is currently being prepared (2016/17) to provide additional analysis of potential impacts and to address public comments on the IS/MND.

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I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.

BOGLE VINEYARDS, INC.

By: ___________________________ ____________________
Name: ________________________ Date
Its: ___________________________

Appendix A

Nesting Swainson's Hawks in the Vicinity of the Proposed Bogle Vineyards Wind Turbine

Introduction

Bogle Vineyards has submitted an application to Yolo County for a Major Use Permit to allow construction and operation of a single wind turbine generator (WTG) to power their recently constructed wine production facility near Clarksburg, Yolo County. The project is expected to improve Bogle Vineyard's overall energy efficiency by supplementing its existing electricity delivered through the grid by Pacific Gas and Electric Company (PG&E) with an onsite, emission-free renewable energy source. A draft environmental impact report that addresses potential construction and operational impacts of the project was recently released by Yolo County pursuant to the California Environmental Quality Act (CEQA).

Because of the potential for collision-related mortality of the state-threatened Swainson's hawk (*Buteo swainsoni*) from operation of the turbine, Bogle is also consulting with the California Department of Fish and Wildlife (CDFW) to receive take authorization pursuant to Fish and Game Code 2081. An ITP application was prepared and submitted to CDFW on November 20, 2014. To describe the distribution and abundance of nesting Swainson's hawks in the vicinity of the project site, the application relied on data from surveys conducted in 2007. In their review of the application, CDFW had several recommendations including conducting a survey for nesting Swainson's hawks to update the 2007 nesting survey. To accommodate this recommendation, this report documents the results of nesting surveys conducted in 2016, results of which will be incorporated into a revised ITP application.

The proposed WTG consists of a three-bladed rotor system on an 80 meter (263 feet) tubular steel tower. With a rotor diameter of 116 meters (380.6 feet), the total height from base to rotor tip in the 12 o'clock position is 138 meters (452.8 feet), the distance from the ground to the rotor plane is 22 meters (72 feet), and the total rotor-swept area is 10,563 m^2 (113,712 ft^2). A blinking red beacon light that meets FAA standards would be installed on the top of the turbine nacelle.

In addition to the WTG, the system includes a transformer, switchgear, and metering panel. The turbine and related system components would be installed within an approximately 74 m^2 (800 ft^2) concrete foundation and enclosed within a 232 m^2 (2,500 ft^2) fenced, graveled area.

All electrical transmission lines will be fed underground to a distribution switch located on the Bogle Vineyards production facility site. No above-ground transmission lines would be installed. There is an existing gravel road to access the turbine site and therefore no new roads would be constructed.

Project Location

The proposed WTG would be installed near the Bogle Vineyards wine production facility located at 49762 Hamilton Road, west of Jefferson Boulevard (State Route 84), approximately 4.5 miles southwest of Clarksburg. The turbine would be constructed near the southwest corner of the facilities' water treatment ponds, which are located immediately northeast of the production facility (Figure 1).

Methods

The survey area includes all lands within 5 miles of the turbine and was delineated by extending a 5-mile radius line from the proposed turbine location (Figure 2). Surveys were conducted between July 16 to 20, 2016 by systematically driving all available roads within the survey area. Where roads were not available to drive or where there were no roads to access potential nest trees, the survey was conducted on foot unless access to private property was not granted. In general, access in the study area was very good. All potential nest trees were searched for nests and adult Swainson's hawks using binoculars and/or a spotting scope. Activity and nest sites were noted and mapped on field maps and a hand-held GPS unit was used to record coordinates of each nest.

Activity data were recorded based on the following definitions:

- *Occupied Nesting Territory:* a nesting area in which a pair of raptors display activity indicating territory establishment. Territories were considered occupied when the following activities and behaviors were observed: regular presence and activity of adults, courtship displays, circling low above the nest tree or nesting stand, defensive behavior, prey exchanges and prey delivery to the nest). The nesting territory location was plotted based on the location of the nest, or if the nest was not located based on the primary area of observed activity within potential nesting habitat.

- A*ctive Nest:* the nest within the occupied nesting territory for which egg laying was confirmed through direct observation of incubating adults or young were observed in or near the nest. .

- *Occupied Nesting Territory with Unconfirmed Nesting Status:* occupied nesting territories for which reproductive outcome was not confirmed. This includes occupied nesting territories where access was not sufficient to determine nesting activity or where repeat visits were inconclusive in determining the success or failure of the nest.

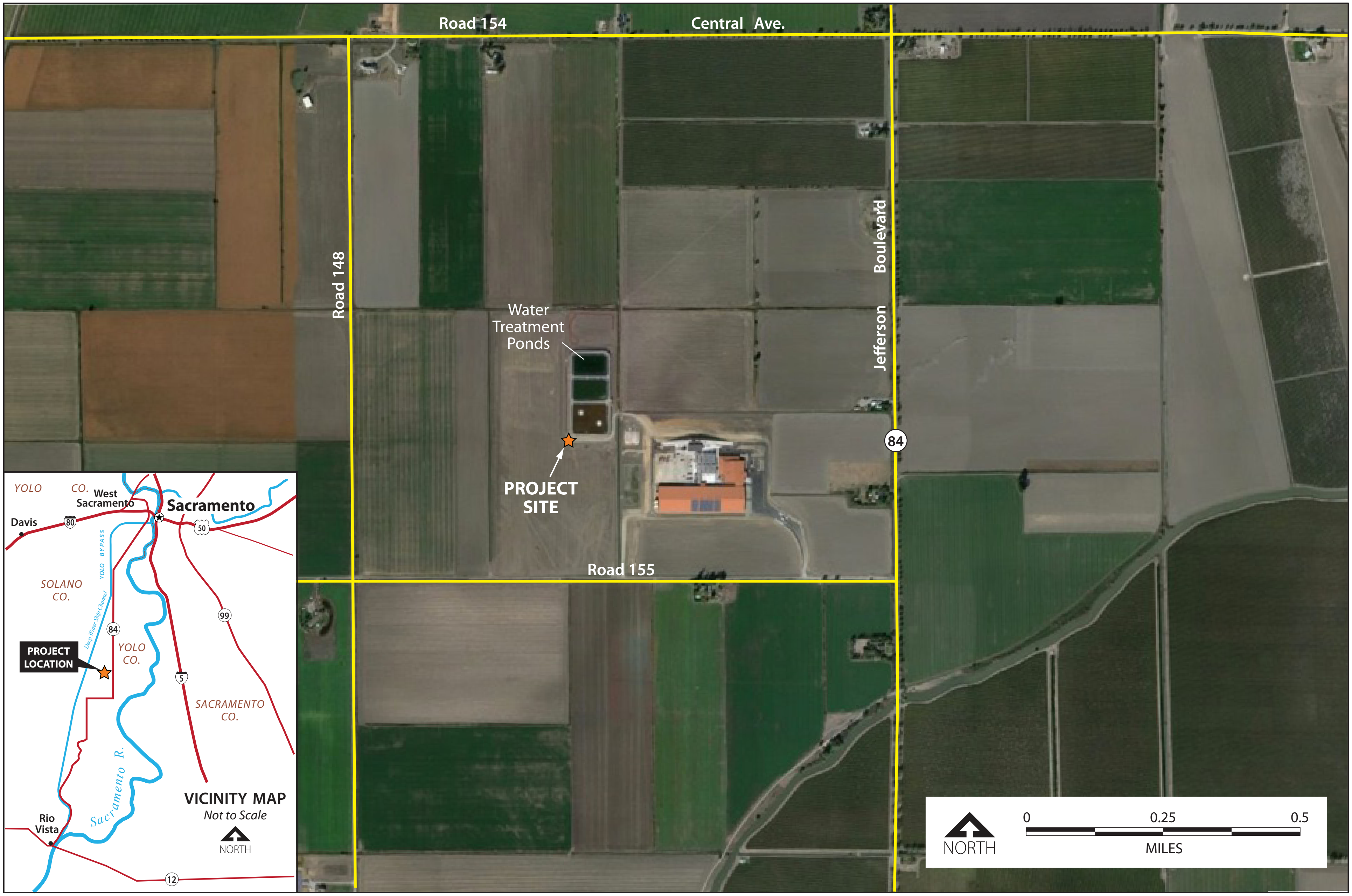

Figure 1
Proposed Wind Turbine Project Site at the Bogle Wine Production Facility, Yolo Couty, California

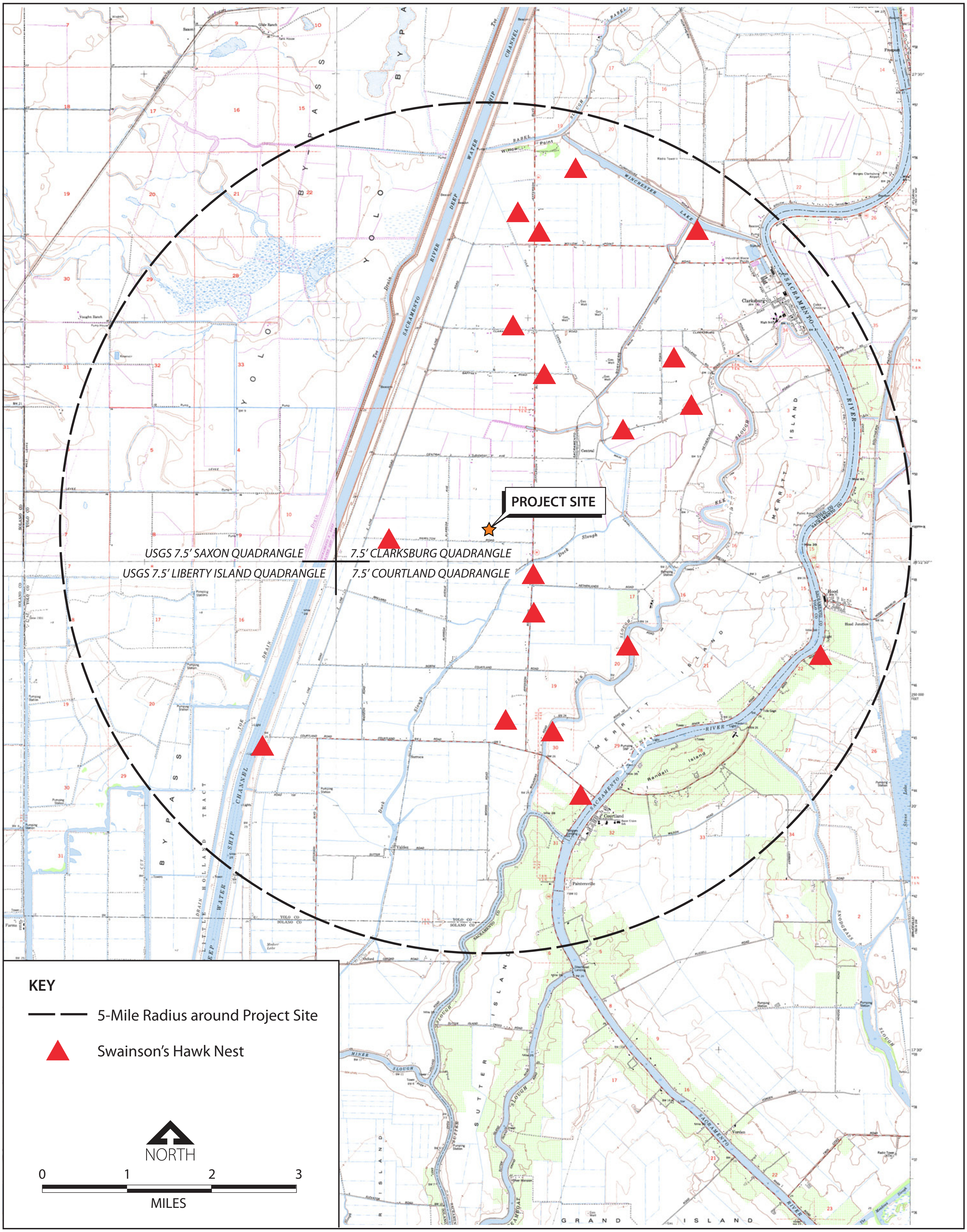

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Figure 2
Swainson's Hawk Nest Locations within 5 Miles of the Project Site

- *Successful Nest*: an active nest that produced fledged young.
- *Unsuccessful Nesting Attempt*: an active nest that failed to produce fledged young and occupied nesting territories that did not nest.

Each occupied nesting territory was characterized with regard to overall habitat conditions and availability and land use patterns. Each active nest site was characterized with regard to nesting habitat type and condition, tree species, and estimated tree and nest height.

Results

Description of Nesting and Foraging Habitat

The survey area is within an active agricultural landscape consisting of perennial, semi-perennial, and annually or seasonally rotated crops. Centered in the southeastern panhandle of Yolo County between the Sacramento River and the Sacramento River Deep Water Ship Channel (DWSC), the area is flat, open, and sparsely populated. Wine grapes dominate much of the agricultural landscape in the area, particularly east of Jefferson Boulevard. Other dominant crops in the area include alfalfa, wheat, safflower, and corn. Alfalfa fields currently border the project site on the west, southwest, and northwest. The survey area also extends into the Yolo Bypass, west side of the DWSC, an area dominated by irrigated pasture, seasonal wetlands, and field crops; and east of the Sacramento River, where orchards and vineyards are the dominant land use.

Nesting habitat is relatively abundant in the survey area, consisting primarily of riparian woodland and native and nonnative trees and tree rows along roadsides and field borders and around farmhouses and farmyards. Riparian habitat occurs mainly along the Sacramento River, DWSC, and Elk Slough. Tree row habitat occurs along many of the roadways between the DWSC and the Sacramento River. Nesting habitat is very sparse west of the DWSC, limited to several isolated trees.

Distribution and Abundance of Active Nests

A total of 18 active Swainson's hawk nests were located within the survey area (Figure 2). Table 1 indicates the nest site locations, status, and nesting habitat type of each active nest site. With the exception of one nest that was along the east side of the Sacramento River, all active nests were between the Sacramento River and the DWSC. Distributed fairly evenly within this area, nine nests were north of the proposed turbine site and nine were south of the site. The nearest nest was approximately 0.8 miles from the site, one was 1 mile from the site, three were from 1 to 2 miles, six were from 2 to 3 miles, four were from 3 to 4 miles, and three were from 4 to 5 miles from the site (Figure 2).

Eleven of the 18 nests (61.1%) were along tree rows, either along road sides or along field borders. Four (22.2%) were in riparian habitat, two (11.1%) were in isolated trees, and one (5.6%) was in an oak grove. Twelve nests were in valley oak trees (66.6%), two each were in cottonwood (11.1%) and willow trees (11.1%), and one each in walnut (5.6%) and eucalyptus (5.6%) trees. All 18 pairs successfully reproduced with a total of 25 fledged young, representing 1.39 young per occupied nesting territory.

These results are generally consistent with 2007 data when a total of 17 active nests were located within the same area. Eight of the 18 nests located in 2016 were at the same location as 2007, two were near locations reported in 2007, and eight were at new locations but in the general vicinity of previously reported sites.

Table 1. Swainson's hawk nesting data within the Bogle Turbine survey area.

Site #	Location	GPS coordinates	Status	# Yg	Nesting Habitat	Nest Tree
SH1	Jefferson Blvd, 0.14 mi N of Willow Point Rd	38.431219 N 121.582264 W	S	1	Roadside tree row	Valley oak
SH2	Jefferson Blvd, 0.1 mi N of Netherlands Rd	38.372995 N 121.583341 W	S	1	Roadside tree row	Valley oak
SH3	Jefferson Blvd, 0.3 mi S of Netherlands Rd	38.364737 N 121.583807 W	S	2	Roadside tree row	Valley oak
SH4	Deep Water Ship Channel at Courtland Rd	38.344114 N 121.642494 W	S	1	Riparian	Cottonwood
SH5	Hamilton Rd, 0.5 mi E of Z Line	38.378798 N 121.612647 W	S	1	Isolated road side tree	Willow
SH6	No. Courtland Rd, 500 ft W of Jefferson Blvd	38.356377 N 121.586117 W	S	2	Roadside tree row	Valley oak
SH7	Elk Slough, 0.2 mi N of Courtland Rd.	38.345011 N 121.580155 W	S	1	Riparian	Valley oak
SH8	Elk Slough, 0.7 mi S of CR 146	38.360120 N 121.562467	S	1	Riparian	Valley oak
SH9	Central Rd. 0.6 mi W of Tule Rd	38.396716 N 121.565293	S	2	Roadside tree row	Valley oak
SH10	Central Rd, 0.2 mi W of Netherlands Rd.	38.401600 N 121.548278 W	S	1	Roadside tree row	Valley oak
SH11	500 ft E of Tule Rd, 0.4 mi S of Clarksburg Rd.	38.409088 N 121.553314 W	S	1	Tree row	Valley oak
SH12	Winchester Lake, 0.6 mi W of River Rd.	38.431420 N 121.543946 W	S	1	Riparian	Willow
SH13	Gaffney Rd, 0.1 mi E of Jefferson	38.407138 N 121.579770 W	S	2	Roadside tree row	Walnut
SH14	0.1 mi W of Winchester Lk, 0.2 mi S of Babel Sl.	38.446491 N 121.577398 W	S	2	Oak grove	Valley oak
SH15	0.5 mi N of Willow Point Rd, 0.2 mi W of Jefferson	38.435162 N 121.586055 W	S	2	Tree row	Cottonwood
SH16	E side Sacramento River 0.9 mi S of Hood	38.355177 N 121.527527 W	S	1	Tree row	Eucalyptus
SH17	0 15 mi W of Sacramento Ri, 0.1 mi S Courtland Rd	38.334979 N 121.575315 W	S	1	Isolated tree	Valley oak
SH18	Clarksburg Rd, 0.25 mi W of Jefferson Blvd.	38.414546 N 121.588562 W	S	2	Roadside tree row	Valley oak

Appendix B

Preconstruction Monitoring of Swainson's Hawk Activity in the Vicinity of the Proposed Bogle Vineyard Wind Turbine

Introduction and Site Description

Swainson's hawk monitoring was conducted at proposed Bogle Vineyard wind turbine in Clarksburg, Yolo County between July 12 and September 2, 2016. The monitoring was conducted as part of the risk assessment to Swainson's hawks by assessing the extent to which Swainson's hawks occur in the vicinity of the proposed turbine and that may be at risk from potential turbine-related collision mortality. The proposed wind turbine is located on the west side of the Bogle processing facility and next to the facilities' water retention ponds. The site is otherwise surrounded by agricultural land and is immediately adjacent to an alfalfa field. Other crops in the immediate vicinity include other alfalfa fields, vineyards, safflower, and wheat.

Methods

Survey Area: The survey area extended 2,000 feet from the turbine base, or approximately 288 acres surrounding the turbine site. .

Observation Points: Four stationary observation points were situated within four delineated survey blocks to achieve coverage of all areas within the survey area.

Timing: A total of 16 four-hour surveys were conducted during either morning or afternoon hours between 0840 and 2000 hours from July 12 through September 2, 2016. Surveys were conducted for one hour at each of the four observation points per survey.

Recorded Data: Recorded data included name of observer, date, weather, begin and end time of observation, species, number of birds present, behavior, crop type, crop status, and bird altitude. Occurrence locations were mapped on a field map and GPS coordinates were recorded for each. Location points were generated using a hand held Garmin GPS unit. Distance to the bird was estimated and recorded in feet. A compass bearing was taken from the location of the GPS waypoint to the location of the bird. The data were recorded from the point the bird(s) was first observed. Subsequent occurrence locations of the same bird were recorded only if the bird changed behavior or location within the survey block for more than 30 seconds.

Results

Number and Timing of Occurrences

As Table 1 suggests, observations of Swainson's hawks increases in August and September as both adults and juveniles become increasingly active following fledging. Due to the number of Swainson's hawk nests in the vicinity of the project site (See Appendix A or Figure 1), and the high value foraging habitat within the survey area, it is not unexpected that the number of reported occurrences would be relatively high. However, this also suggests that an undetermined, but likely relatively high proportion of the occurrences are of the same locally nesting birds using these same fields throughout the season.

Table 1. Number and Timing of Occurrences

	July	August	September	Total
# observation periods	5	8	2	15
# occurrences	13	69	17	99
Occurrences per period	2.6	8.6	8.5	
Average occurrences per period				6.2
Average occurrences per hour				1.5

Table 2 indicates that most of the recorded occurrences are of single individuals. Only one foraging group (22 individuals) was recorded during the monitoring period.

Table 2. Number of individual Swainson's hawks per reported occurrence.

# Individuals	# Occurrences	Percent of total
1	78	78.8
2	17	17.2
3	3	3.0
22	1	1.0
Total	99	100

Location of Occurrences

Table 3 indicates that none of the recorded Swainson's hawk occurrences was within 142 feet of the turbine base, which represents the radius of the rotor plane. Over 70% of the occurrences were beyond 500 feet from the turbine base with an average distance of 1,075 feet. This is probably due in part to the location of the proposed turbine, which is on the edge of an alfalfa field, rather than in the interior.

Table 3. Distance from Swainson's hawk occurrence locations to the turbine.

Distance from occurrence location to turbine base	# of Occurrences	Percent of Total
0 to 190 feet	2	2.0
190 to 500 feet	18	18.2
500 to 1,000 feet	22	22.2
>1,000 feet	57	57.6
Average Distance from occurrence location to turbine base		1,075 feet

Flight Altitude

The rotor plane of the turbine extends from 72 feet to 452 feet in altitude. Table 4 indicates that 51.5 percent of the occurrences were at flight altitudes that were within the rotor plane.

Table 4. Flight altitude of Swainson's hawk occurrences

Flight Altitude	# Occurrences	Percent of Total
1 to 72 feet	39	39.4
72 to 452 feet	51	51.5
452 to 1,000	9	9.1

Behavior

Swainson's hawk activity was recorded in five behavior categories (Table 5). With the exception of Flying Through, all behaviors can be associated with the land use and possible foraging behavior. However, about 26% of the fly-through occurrences were within the altitude of the rotor plane, and 57% were below the rotor plane, and therefore occurring at 'at risk' altitudes. Overall, 8% of the occurrences were high altitude (>500 feet) fly-through or soaring birds. The remaining 92% of the occurrences are more closely associated with the land use (e.g., foraging behavior) or potentially within the rotor plane altitude.

Table 5. Behavior associated with Swainson's hawk occurrences.

Behavior	# Occurrences	Percent of Total
Circling/soaring	50	50.5
Flying through	23	23.2
On the Ground	12	12.1
Kiting	8	8.1
Perched	6	6.1
Total	99	100

Land Use/Crop Association

Table 6 indicates the approximate proportion of land use types within the 2,000-foot radius monitoring area. Alfalfa makes up the majority of the acreage within the monitoring area, including immediately adjacent to the turbine site. Although there remains sufficient hay and row crop agriculture in the surrounding area to support several Swainson's hawk nests, vineyards continue to expand in the area between the Sacramento River and the Deep Water Ship Channel. Over time, it is likely that the proportion of vineyard acreage will increase and further reduce the overall suitability of this area for Swainson's hawks.

Table 6. Land Use/Crop Type proportions within the monitoring area.

Land Use/Crop Type	Approximate Acres	Percent of Total
Alfalfa	173	60
Vineyard	43	15
Other (ponds and hardscape)	29	10
Safflower	14	5
Wheat	14	5
Ruderal	12	4
Wetland	3	1
Total	288	100

Table 7 indicates the crop associations with Swainson's hawk occurrences. Not surprisingly, eighty percent are associated with alfalfa, which is considered the highly value crop type for foraging Swainson's hawks. Associations with other land uses/crop types are likely incidental as birds circle over a broader area and are not directly associated with the land cover type for foraging or other uses.

Table 7. Land Use/Crop associations of Swainson's hawk occurrences.

Crop Type	# Occurrences	Percent of Total
Alfalfa	80	80.8
Safflower	7	7.1
Ruderal	4	4.0
Other (ponds, hardscape)	4	4.0
Vineyard	2	2.0
Wetland	2	2.0
Total	99	100

Use of alfalfa fields by Swainson's hawks and other birds is typically associated with management activities, mainly irrigation and mowing. Table 8 indicates that 75% of all occurrences in alfalfa fields and 60% of all occurrences were associated with these activities. This is consistent with other studies of Swainson's hawk agricultural habitat use. Most use occurs when field are being mowed or immediately following mowing when the vegetation is reduced and prey are exposed, or during irrigation when rodent prey are forced to the surface and exposed.

Table 8. Alfalfa management associated with Swainson's hawk occurrences

Management Activity	# Occurrences	Percent of Alfalfa occurrences	Percent of all occurrences
Irrigation	34	42.5	34.3
Mowing/recently mowed	26	32.5	26.3
Total	60	75.0	60.6

Assessing Risk Using the Monitoring Data

In general, research on wind turbine-related collision mortality reveals that collision events among raptors are rare and incidental. It has proven to be extremely difficult to make reliable correlations between bird abundance, behavior, or habitat use with collision events (i.e. flying into the rotor plane and colliding with the rotor of an operating wind turbine). Nearly all studies to date have been at large wind energy facilities with multiple turbines. Although there is now abundant data available on fatality rates, the causes of collision mortality remains largely speculative. Further complicating the issue with regard to the proposed Bogle turbine is the possible effect of a single turbine. With large wind energy facilities, it is possible to visualize, and then to speculate on the risk of a bird negotiating through a maze of operating turbines. At single turbines, the risk becomes significantly more difficult to visualize.

Monitoring data can inform us about the extent of use of a certain area and the proximity of occurrences to the turbine location. We can calculate the proportion of birds that are observed within the 'risk zone' and assess the land use to estimate use levels of different land cover types. But whether any of this information is useful in estimating the potential collision risk is entirely unknown and any conclusions should be regarded with a high degree of uncertainty.

In most cases, collision events, particularly involving raptors, appear to be incidental. In other words, there doesn't appear to be a reasonable explanation about how or why the incident occurred. On the other hand, there are situations that may pose greater risk and that could lead to a greater likelihood of collision. These are related to the siting of turbines, topographical conditions, and habitat conditions. For example, some bird species may be more susceptible to collision at turbines that are located on a steep slope or within a draw compared with those that are located in flat, open country. Turbines that are sited in or near certain habitat conditions, such as wetlands, that attract and concentrate large groups of birds, may also pose a greater risk simply due to the greater opportunity for incidental collisions.

The proposed Bogle turbine is located in flat, open agricultural land. There are no clear topographic or land use issues that are unique to the site or that would necessarily increase the likelihood for Swainson's hawk collisions. There are, however, 18 reported nest sites within 5 miles of the site, and others in the surrounding area that are within foraging distance of the site. The adjacent agricultural land use consists mostly of alfalfa fields, the highest value crop type associated with Swainson's hawk foraging. As a result, Swainson's hawks do forage in the fields adjacent to the proposed turbine site, which poses some level of collision mortality risk.

Extrapolating the monitoring data across the breeding season, we can at least generally evaluate risk in terms of the proportion of observations that might be expected to occur within the risk zone of the turbine. First, the risk zone should be defined. If it is defined narrowly as the rotor swept area of the turbine, then because monitoring detected only two occurrences within 190 feet of the turbine base (the length of the rotors), then we could conclude that very few occurrences were at risk of collision.

But there appears to be no reason why birds would not be closer than the190-foot rotor radius, so to accommodate bird movements to some extent beyond the static results of the monitoring data, expanding our definition of the risk zone is appropriate. So as an alternative, we can expand the risk zone to 500 feet to include occurrences that were near, but not within the rotor distance. So, by example, if we assume all else is equal, within a 10-hour day, there will be 15 Swainson's hawk occurrences within 2,000 feet of the turbine per day (Table 1). Note that this does not represent individual birds, but instead a large proportion of these are more likely to be the same birds from nearby active nests. Over an approximately 154-day breeding season, this equates to 2,310 occurrences within 2,000 feet of the turbine per year. Only 20% of these were within 500 feet of the turbine (Table 3), reducing our total to 462 occurrences. Approximately 51% of these were within the altitude of the rotor-swept area (72 feet to 452 feet) (Table 4), further reducing our total to 236 occurrences per year. Finally, 61% of all occurrences were in alfalfa fields being irrigated or mowed (Table 8). By applying the mitigation measure that would shut down the turbine during mowing and irrigation events, this further reduces our total to 144 'at risk' occurrences per year. In other words, approximately every 1.25 days, one Swainson's hawk will occur within 500 feet of the turbine at the rotor-swept altitude of the turbine.

The remaining issue is what proportion of these would not be able to see and successfully negotiate around or through the operating turbine. With the exceptional eyesight of raptors and the maneuverability of Swainson's hawks in flight, and in the absence of other turbines or other obstacles, the number is likely very low.

But as noted, the very superficial nature of this type of risk assessment, which doesn't account for incidental behaviors, does not lend itself to any sort of accurate estimate of potential mortality. More importantly is the overall level of use, the landscape and conditions around the turbine site, and information from other similar turbines.

There are nesting Swainson's hawks in the vicinity of the proposed turbine. So there is some risk of collision. However, the distribution of nesting Swainson's hawks in the area is similar to most of lowland Yolo and Solano Counties and similar to other single turbines in the area. Avian and bat mortality monitoring has been conducted at four single turbines in Yolo and Solano County. Two of these, the CEMEX turbine northwest of Woodland in Yolo County and the Superior Farms turbine, just south of Dixon in Solano County were monitored for one and two years, respectively. The Cemex turbine is located in a similar cultivated landscape to the proposed Bogle turbine. Land use is primarily row crops and alfalfa and at least 21 Swainson's hawk nesting territories occur within 5 miles of the turbine. The Superior Farms turbine is also in a cultivated landscape of primarily row, grain, and hay crops, and at least 17 Swainson's hawk nesting territories occur within 5 miles of the turbine. No Swainson's hawk mortality or other raptor mortality was documented at either site. Also, no mortality was documented at the AB-1 and AB-2 turbines at the Anheuser-Bush facility in Solano County, although these are in an area with fewer Swainson's hawk nests.

As noted above, there are no topographic features in the vicinity of the turbine site that would attract, concentrate, or otherwise put at risk Swainson's hawks, other raptors, or other birds. The site consists entirely of flat farmland. Foraging conditions adjacent to the site are considered high value due to the extent of alfalfa. This condition does attract use by Swainson's hawks, but use of alfalfa fields increases substantially during irrigation and mowing events. Applying the mitigation measure that would shut-down the turbine during these periods would decrease the frequency and use of these nearby fields.

So, based on the results of mortality monitoring at other single turbines, the conditions of the site, and the mitigation to reduce bird use, and along with the relatively few 'at risk' occurrences reported during the preconstruction monitoring, collision-related mortality of Swainson's hawks at the proposed turbine is expected to be low.