Sand Hill Wind, LLC
Sand Hill Repowering Project

Supporting Documentation—Reports

Report BIO-1

Focused Spring Botanical Survey for the Sand Hill Project

2013

Focused Spring Botanical Survey for the Sand Hill Project – A New Dimensions Energy Project

Alphabiota
ENVIRONMENTAL CONSULTING, LLC

Focused Spring Botanical Survey
Altamont Pass Wind Resources Area
County of Alameda, California

May 17, 2013

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Project Number: 13-1073

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May 17, 2013

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APPENDICES

1.0 Introduction

Alphabiota Environmental Consulting, LLC (AEC) understands that New Dimension Energy Company (NDEC, Project Applicant) is proposing the repower of wind energy facility within the Alameda County portion of the Altamont Pass Wind Resource Area (APWRA).

1.1 Project Description

The botanical survey reported here supplements an initial botanical survey performed by ICF International (ICF) in September 2012 and reported in their Biological Resources Technical Report (BRTR) released in February 2013 (ICF 2013). The following excerpts from the BRTR provide background on the project.

> '*The initial repower would use a new type of wind turbine known as a MEWT. The MEWTs are approximately 70 feet in diameter, with a hub height of 120 feet and a total maximum turbine height of 190 feet'.*
>
> *'The MEWTs installed for the initial repower would be interspersed throughout the existing facilities, covering approximately 1,058 acres and comprising seven parcels in three nearby but separated areas currently occupied by existing turbines and their supporting facilities. The initial repower would decommission and remove 70-80 of the existing turbines and replace them with 40 MEWTs, with the remaining existing turbines staying in place for at least 1 year as controls for the avian study. Because the MEWTs will be installed within an existing wind project footprint, no new access roads will be needed, though minor improvements or modifications to existing roads may be necessary. The initial repower includes construction of new pads for the MEWTs, some minor connections to the existing power collection system, and temporary laydown areas. The initial repower would connect to the power grid using existing infrastructure; no new substation, interconnection lines, or operations and maintenance (O&M) facilities would be needed'.*

1.2 Project Location

The Project is located in a designated wind resource area within the rural northeast portion of Alameda County commonly known as the Altamont Pass. Specific location information for this facility can be found in the BRTR (ICF 2013). The proposed Project would encompass three major areas of multiple parcels within the APWRA comprising

approximately 1,058 acres of previously developed lands currently designated for wind generation use. The following parcel numbers are associated with the Project: 99B - (7500-3-1, 7600-1-1; 7375-1-7; 6325-1-3; 6325-1-4; 7750-6; 7875-1-2; 7875-1-3).

Owner	Parcel Number	Area (acres)
Ralph 1	099B-6325-001-03	222.4
Ralph 2	099B-7375-001-07	80.0 (1)
Johnston	099B-6325-001-04	67.9
Pombo	099B-7750-006-00	99.4
Arnuado	099B-7600-001-01	104.9
Castello	099B-7500-003-01	112.9
Griffith 1	099B-7875-001-02	115.1
Griffith 2	099B-7875-001-03	92.8

Note: (1) not the complete parcel

1.3 Survey Purpose

The Project Applicant has requested a spring botanical survey to compliment the previous 2012 survey performed by ICF on September 21, 2012. AEC was contracted through Tetra Tech, Inc. to provide a spring field survey for target special status plant species identified in the BRTR and to prepare a limited report providing location data on special status plant species observed during the spring survey. Surveys were requested by the Project Applicant for one survey period consisting of approximately 3-4 days to search for target special status plant species identified in the ICF BRTR.

The survey encompassed 100% of the project area and reports on all plant species observed or identified for this project location. Supporting documentation not included in this report may be found in the BRTR or reporting supported by Tetra Tech, Inc.

2.0 Methodology

2.1 Survey Background Review

The target special status plant species identified in the BRTR (and included here as Appendix A) were adapted for use on the target plant species list for the current 2013 spring surveys. In addition to the BRTR AEC reviewed readily available botanical data from the California Native Plant Society (CNPS) and the California Natural Diversity Data Base (CNDDB) in order to review location data, plant phenology, and special status designations data for site specific plant resources.

2.2 Site Survey

The site was surveyed by 2 to 4 botanists/biologists over a three-day period using meandering pedestrian transects. Surveyors walked the site to search for spring flowering target special status plant species identified in the BRTR. Transects were spaced to allow for full visual coverage of the site while walking transects. Areas that exhibited appropriate conditions to support plants from the target list were given additional focus and attention. Readily identifiable botanical species encountered during the survey were identified to the species level whenever possible otherwise they were identified to the genus level (Appendix B). Habitat types identified in the BRTR were reconfirmed during field surveys.

3.0 Site Survey

3.1 Background Review

Of the 25 special-status species identified on the target list the CNDDB data identified five of these special status plant species to have been documented and or reported to occur within the immediate vicinity of the site. CNDDB occurrence data was retrieved from the April 2013 CNDDB commercial license and projected in ArcMap 9.3 for research and review purposes.

San Joaquin Spearscale (*Atriplex joaquinana*) has been documented to occur within the Project bounds of parcel 99B-7500-003-01. A small population of approximately 200 plants was observed during a 1989 survey in a low lying seep at the base of a hill in the northern portions of the parcel parallel and south of Mountain House Road.

The remaining plant records indicated historical data locations from 1888, 1932, 1933, 1986, 1996 and 2003. The plants associated with these occurrence data include Diamond Petaled California Poppy (*Eschscholzia rhombipetala*) 1888, Caper-fruited Tropidocarpum (*Tropidocarpum capparideum*) 1933, Round-leaved Filaree (*California macrophyllum*) 1932, and Big Tarweed (*Blepharizonia plumosa*) 1996 and 2003. None of these records included site locations within the Project bounds. However, the CNDDB data projected potential occurrence reach polygons for Diamond Petaled California Poppy, Caper-fruited Tropidocarpum, and Round-leaved Filaree that projected over the Project bounds indicating a potential for these species to occur at the site. The Big Tarweed occurrence area did not contain any overlapping occurrence data but was within 0.64 miles south of the nearest Project bounds.

A review of weather data collected for the Months of January through May 2013 indicate that precipitation amounts for the area are approximately 7.78 inches below the normally reported and expected precipitation amount for this area. The precipitation total for the region for this year (January through May 15, 2013), as reported by Weather Underground (Weather Underground, Inc., 2013), is 2.07 inches. The total expected or normal is reported to be approximately 9.85 inches of precipitation for these same months.

3.2 Site Survey

A focused botanical survey (a botanical survey focusing on detecting target or special status plant species while providing 100% visual coverage of the area being surveyed) were conducted on May 2nd , 3rd , and 4th of 2013. During May 2nd and 3rd Botanists Yancey Bissonnette and Cecile Shohet conducted focused botanical surveys of parcels 99B-7500-003-01, 99B-7600-001-01, 99B-7875-001-02, 99B-7875-001-03, and 99B-6325-001-04 respectively. On May 4th Botanists Yancey Bissonnette, Cecile Shohet, Chris Bronny, and Biologist Morgan Edel conducted focused surveys of parcels

99B7375-001-07, 99B-6325-001-03, and 99B-7750-006-00. Weather conditions on May 2nd and 3rd consisted of clear skies, with temperatures ranging in the high 60's Fahrenheit in the mornings to the low to mid 90's Fahrenheit in the afternoons. Winds were generally low range velocities in the morning ranging from 1.9 mph to 2.5 mph and increasing throughout the day to approximately 8.0 + mph in the afternoons. On May 4th the temperature ranged from 72-78 degree Fahrenheit with wind velocities ranging from 5.0 mph to 10.0 mph.

The vegetation encountered consisted of mostly dry grasses and forbs. Most annual plants encountered during the survey had already bloomed, set fruit, and were experiencing seed dispersal. Visually the landscape consisted of dry, brown annual grasses dominated by *Avena spp.*, *Bromus spp.* and *Hordeum spp.*, and forbs. Soils were very dry throughout most of the site and were showing signs of cracking or upper level crusting and dust. However, some stock ponds, detention basins, perennial seeps, and some of the drainage features of the site and surrounding areas were still exhibiting water, water flow and or green vegetation along their margins. Otherwise most of the Project's habitat was in a state of desiccation.

Figure 1 : View of parcel 99B-7600-1-1 looking north. View represents the overall vegetation conditions encountered during the survey.

Figure 2 : View of parcel 99B-6325-1-4 looking south-southwest.

The site topography and habitat structure have been characterized in the BRTR and therefore are not repeated here. After completing the botanical survey and having observed the Project site the survey botanists identified in this report support the assessment and characterization provided in the BRTR.

Only one of the special status plant species identified on the target list was observed during the site survey. On May 2nd a small remnant population of Heartscale (*Atriplex cordulata var. cordulata*) was located along the southwest boundary of parcel 99B-7600-001-01. A population of approximately 25-50 individuals was observed along the outer margins of an alkaline grassland vernal pool/depression/swale. The observed plants were believed to be those from the previous year's growth. They were exhibiting extreme desiccation and appeared to have persisted through the winter. Fruits (which are necessary for identification of this species) were still present on some of the plants and they were complete enough to allow identification.

Figure 3 : Alkali Grassland Vernal Pool/Depression/Swale where Atriplex cordulata var. cordulata was observed. View looking south just east of Mountain House Road at the southern end of parcel 99B-7600-1-1.

None of the other target special status plant species identified in the BRTR was observed during the survey, which is not surprising, given the unusually low rainfall amounts both in this season and the previous season.

4.0 Summary

4.1 Assessment

Based on observations made during this survey and readily available data, it is our assessment that the site currently supports a population of a special status species identified as Heartscale (*Atriplex cordulata var. cordulata*) with a California Rare Plant Rank (CRPR) of 1B.2.

Documented habitat and observations for San Joaquin Spearscale (*Atriplex joaquinana,* CRPR 1B.2) exist within the northern bounds of parcel 99B-7500-003-01. This is a

documented CNDDB occurrence and based on the observed conditions encountered during this year's survey AEC believes that the specific site locale is still likely to support the population. The plant was not detected during this survey although the conditions of the soil, hydrology, and topography appear to be unchanged, current conditions would not allow definitive evaluation of the current status of this plant population at this locale.

Precipitation totals for the region and the State have been well-below average for the last two years. Based on the observations made during this survey, AEC believes that some plant species may be experiencing temporal and seasonal "confusion." Late summer annuals, such as Vinegar Weed (*Trichostema lanceolatum*), Dove Weed (*Croton sp.*) and some of the Tarweeds (*Dienandra sp., Holocarpha sp.*) were observed in vegetative condition and were beginning to show floral growth in some of the locales on the Project site as well as throughout the State. These are plants that are usually seen growing in the mid to late summer season after most other annual plants have cycled through their growth and reproductive phases.

4.2 Conclusions

AEC believes that the current precipitation and climate conditions of the survey are insufficient to thoroughly assess the presence or absence of the special status species listed and targeted for this survey.

4.3 Limitations

The site survey is conducted with consideration for current existing environmental laws, regulations, and policies for the time that the survey was conducted. The results provided represent observations of the site at a particular point in time. The habitat(s), topography, resources, and conditions on-site can exhibit seasonal and permanent changes after the survey has been completed. The survey report can only represent the site as it was observed during the survey period. Therefore, these survey results should be considered in the context of the current drought conditions at the site and thus the results for these parcels may not be fully representative of the population diversity of the special status species on the target list.

5.0 References

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Table 2. Special-Status Plant Species Identified as Potentially Occurring or Known to Occur at the Sand Hill Wind Project Area

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area
Large-flowered fiddleneck *Amsinckia grandiflora*	E/E/1B.1	Historically known from Mount Diablo foothills in Contra Costa, Alameda, and San Joaquin Counties; currently known from three natural occurrences	Cismontane woodland, valley and foothill grassland slopes; 275–550 m	Apr–May	Low
Bent-flowered fiddleneck *Amsinckia lunaris*	–/–/1B.1	Inner North Coast Ranges, San Francisco Bay Area, west-central Great Valley	Coastal bluff scrub, valley and foothill grasslands, cismontane woodlands, from 10–1,645 feet above msl	Mar–Jun	Moderate
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, east San Francisco Bay Area	Grassy flats and vernal pool margins, on alkali soils, 0–200 above msl	Mar–Jun	High
Heartscale *Atriplex cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills	Alkali grassland, alkali meadow, alkali scrub, 0–660 feet above msl	May–Oct	High
Brittlescale *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley	Alkali grassland, alkali meadow, alkali scrub, chenopod scrub, playas, valley and foothill grasslands on alkaline or clay soils, 0–660 feet above msl	May–Oct	High
San Joaquin spearscale *Atriplex joaquiniana*	–/–/1B.2	West edge of Central Valley from Glenn County to Tulare County	Alkali meadow, alkali grassland, saltbush scrub; 0–2,740 feet above msl	April–Sept	High
Lesser saltscale *Atriplex minuscula*	–/–/1B.1	Sacramento and San Joaquin Valley, Butte County and from Merced County to Kern County	Alkali sink and sandy alkaline soils in grasslands, chenopod scrub, between 65–325 feet above msl	May–Oct	High
Big-scale balsamroot *Balsamorhiza macrolepis*	–/–/1B.2	Scattered occurrences in the Coast Ranges and Sierra Nevada foothills	Rocky annual grassland and fields, foothill woodland hillsides, sometimes serpentinite, 0–4,600 feet above msl	Mar–Jun	Moderate
Big tarplant *Blepharizonia plumosa*	–/–/1B.1	San Francisco Bay area, with occurrences in Alameda, Contra Costa, San Joaquin*, Stanislaus, and Solano Counties	Valley and foothill grassland; 30–505 m	Jul–Oct	High

[1]Floristic provinces as defined in Baldwin et al. 2012.

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area
Round-leaved filaree *California macrophylla*	–/–/1B.1	Scattered occurrences in the Great Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges	Cismontane woodland, valley and foothill grassland on clay soils; 15–1,200 m	Mar–May	High
Lemmon's jewel-flower *Caulanthus lemmonii*	–/–/1B.2	Southeast San Francisco Bay Area, south through the South Coast Ranges and adjacent San Joaquin Valley to Ventura County	Dry, exposed slopes in grasslands and pinyon–juniper woodland; 80–1,220 m	Mar–May	Low
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	–/–/1B.2	East San Francisco Bay Area, Salinas Valley, Los Osos Valley	Annual grassland, on lower slopes, flats, and swales, sometimes on alkaline or saline soils, 0–700 feet above msl	Jun–Nov	Moderate
Hispid bird's-beak *Chloropyron molle* ssp. *hispidum*	–/–/1B.1	Central Valley: Alameda, Kern, Merced, Placer, and Solano Counties	Meadow, grassland, playa, on alkaline soils; 0–500 feet above msl	Jun–Sept	Moderate
Palmate bird's-beak *Chloropyron palmatus*	E/E/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa County to Fresno County	Alkaline grassland, alkali meadow, chenopod scrub; 16–509 feet above msl	May–Oct	Low
Livermore tarplant *Deinandra bacigalupii*	–/–/1B.2	Endemic to Alameda County (Livermore Valley)	Alkaline meadows; 490–610 feet above msl	June–Oct	Moderate
Recurved larkspur *Delphinium recurvatum*	–/–/1B.2	San Joaquin Valley and central valley of the South Coast Ranges, Contra Costa County to Kern County	Subalkaline soils in annual grassland, saltbush scrub, cismontane woodland, and vernal pools; 10–2,592 feet above msl	Mar–May	High
Diamond-petaled California poppy *Eschscholzia rhombipetala*	–/–/1B.1	Interior foothills of South Coast Ranges from Alameda County to Stanislaus Counties, Carrizo Plain in San Luis Obispo County	On alkaline clay soils in grassland, chenopod scrub, where grass cover is sparse enough to allow growth of low annuals; below 975 m	Mar–Apr	Moderate

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area
Contra Costa goldfields *Lasthenia conjugens*	E/–/1B.1	Scattered occurrences in Coast Range valleys and southwest edge of Sacramento Valley, Alameda, Contra Costa, Mendocino, Monterey, Napa, Santa Barbara*, Santa Clara*, and Solano Counites.	Alkaline or saline vernal pools and swales; 0–700 feet above msl	Mar–Jun	Low
Showy golden madia *Madia radiata*	–/–/B.1	Scattered populations in the interior foothills of the South Coast Ranges: Contra Costa*, Fresno, Kings*, Kern, Monterey*, Santa Barbara*, San Benito, Santa Clara, San Joaquin*, San Luis Obispo, and Stanislaus Counties	Oak woodland, valley and foothill grassland, slopes; 25–900 m	Mar–May	Moderate
Mt. Diabo cottonweed *Micropus amphibolus*	–/–/3.2	Coast Ranges from Lake County to Santa Barbara County	Mixed evergreen forest, oak woodland, chaparral, grasslands; 150–2,715 feet above msl	March–May	Low
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Central Valley, South Coast: Alameda, Butte, Contra Costa, Colusa, Kern, Riverside, San Bernardino, San Diego, Solano, and Stanislaus Counties	Alkaline vernal pools and marshes; 66-2,100 feet above msl	Mar–Jun	Low
Shining navarretia *Navarretia nigelliformis* ssp*. radians*	–/–/1B.2	Interior foothills of South Coast Ranges from Merced County to San Luis Obispo County	Mesic areas with heavy clay soils, in swales and clay flats; in oak woodland, grassland; 76–1000 m	Apr–Jul	Low
Hairless popcorn flower *Plagiobothyrs glaber*	–/–/1A	Coastal valleys from Marin County to San Benito Counties	Alkaline meadows, coastal salt marsh; 49–591 feet above msl	Apr–May	Low
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Sacramento Valley, central western California	Salt marsh, mesic alkaline areas in grasslands, vernal pools; 0–984 feet above msl	Apr–Jun	Low
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	–/–/1B.1	Historically known from the northwest San Joaquin Valley and adjacent Coast Range foothills; currently known from Fresno, Monterey, and San Luis Obispo Counties	Grasslands on alkaline hills; below 455 m	Mar–Apr	Low

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area

[a] Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.

– = no listing.

State

E = listed as endangered under the California Endangered Species Act.

– = no listing.

California Rare Plant Rank[2]

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

3 = List 3 species: uncertain taxonomic status

4 = List 4 species: limited distribution and on a watch list.

0.1 = seriously endangered in California.

0.2 = fairly endangered in California.

* = presumed extirpated from that county.

msl = mean sea level

m = meters

[2] In March, 2010, DFG changed the name of "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or CRPR). This was done to reduce confusion over the fact that CNPS and DFG jointly manage the Rare Plant Status Review groups (300+ botanical experts from government, academia, NGOs, and the private sector) and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment.

Appendix B : Observed Flora : Sand Hill Project : Spring 2013 Botanical Survey

Family	Scientific Name	Common Name	Federal/State CA Rare Plant Rank (CRPR)	Wetland Indicator Designation	Plant Communities and Habitat	Bloom	Native, Non-Native, and/or Invasive
Agavaceae	*Chlorogalum pomeridianum var. pomeridianum*	Wavyleaf Soap Plant, Common Soaproot			Grasslands, chaparral, open woodlands: 0-4921 ft.		
Apiaceae	*Conium maculatum*	Poison-Hemlock		FACW	Weedy species characteristic of disturbed places, wetland-riparian: 0-5,000 ft.	April-September	Non-Native Invasive
Apiaceae	*Eryngium sp.*						Native
Apiaceae	*Foeniculum vulgare*	Sweet Fennel, Biscuit Root			Weedy species characteristic of disturbed places: 0-1148 ft.	March-September	Non-Native Invasive
Apocynaceae	*Asclepias fascicularis*	Mexican Or Narrow-Leaf Milkweed		FAC	Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Foothill Woodland, Chaparral, Valley Grassland, wetland-riparian: 0-7,000 ft.	June-September	Native
Asteraceae	*Achillea millefolium*	Common Yarrow		FACU	Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Subalpine Forest, Alpine Fell-fields, Meadow: 0-13,000 ft.	April-August	Native
Asteraceae	*Ancistrocarphus filagineus*	False Neststraw, Woolly Fishhooks			Coastal Sage Scrub, Chaparral, Foothill Woodland, stonrg affinity to serpentine soil: 0-5,500 ft.	March-May	Native
Asteraceae	*Carduus pycnocephalus*	Italian Thistle			Weedy species characteristic of disturbed places: 0-3280 ft.	February-July	Non-Native Invasive
Asteraceae	*Centaurea melitensis*	Maltese Star Thistle, Napa Star Thistle, Tocalote			Agricultural weed, weed, species characteristic of disturbed places: 0-7218 ft.	April-August	Non-Native Invasive
Asteraceae	*Centromadia pungens*	Pungent False Tarplant		FAC	Equally likely to occur in wetlands or non wetlands: 0-1640 ft.	April-September	Native
Asteraceae	*Cirsium cymosum*	Peregrine Thistle			Mixed Evergreen Forest, Chaparral, Foothill Woodland, Yellow Pine Forest, affinity for serpentine soil, slopes: 0-5,000 ft.	June-July	Native
Asteraceae	*Cirsium vulgare*	Bull Thistle		FACU	Weedy species characteristic of disturbed places, wetland-riparian: 0-7,500 ft.	June-Spetember	Non-Native Invasive
Asteraceae	*Cotula coronopifolia*	Common Brassbuttons		OBL	Saline and freshwater marshes, mud flats, wetland-riparian: 0-984 ft.	March-October	Non-Native
Asteraceae	*Deinandra sp.*						Native
Asteraceae	*Grindelia sp.*						Native
Asteraceae	*Heterotheca sessiliflora*	Golden Aster, False Goldenaster			Yellow Pine, Red Fir, Mixed Evergreen Forest; Sagebrush, Coastal Sage, Northern Coastal Scrub; Chaparral, Foothill, Joshua Tree Woodland; Valley Grassland: 0-8,850 ft.	March-December	Native
Asteraceae	*Holocarpha heermannii*	Heermann'S Tarweed			Valley Grassland, Foothill Woodland: 0-4,000 ft.	March-November	Native
Asteraceae	*Holocarpha virgata*	Pitgland Tarweed, Yellowflower Tarweed, Narrow Tarplant			Valley Grassland, Foothill Woodland: 0-2,625 ft.	March-November	Native
Asteraceae	*Microseris sp.*						Native
Asteraceae	*Silybum marianum*	Blessed Milkthistle, Milk Thistle			Invasive weed, roadsides, pastures, species characteristic of disturbed places: 0-1,640 ft.	April-July	Non-Native Invasive
Asteraceae	*Sonchus oleraceus*	Common Sowthistle			Abundant weed, species characteristic of disturbed places: 0-4,900 ft.	January-December	Non-Native
Asteraceae	*Hypochaeris glabra*	Smooth Cat'S Ear			Weedy species characteristic of disturbed places: 0-3,900 ft.	March-June	Non-Native Invasive
Asteraceae	*Iva axillaris*	Povertyweed, Deer Root		FAC	Coastal Salt Marsh, Alkali Sink, wetland-riparian: 0-6,700 ft.	April-October	Native
Asteraceae	*Lactuca serriola*	Prickly Lettuce		FACU	Weedy species characteristic of disturbed places, wetland-riparian: 0-6,500 ft.	May-September	Non-Native
Boraginaceae	*Amsinckia menziesii*	Menzie'S Fiddleneck, Common Fiddleneck		UPL	Valley Grassland: 0-5577 ft.	March-May	Native
Boraginaceae	*Plagiobothrys sp.*						Native
Brassicaceae	*Brassica nigra*	Black Mustard			Weedy species characteristic of disturbed places: 0-4921 ft.	April-July	Non-Native Invasive

Appendix B : Observed Flora : Sand Hill Project : Spring 2013 Botanical Survey

Family	Scientific Name	Common Name	Federal/State CA Rare Plant Rank (CRPR)	Wetland Indicator Designation	Plant Communities and Habitat	Bloom	Native, Non-Native, and/or Invasive
Brassicaceae	*Hirschfeldia incana*	Mediterranean Hoary Mustard, Summer Mustard, Wild Mustard		UPL	Weedy species characteristic of disturbed places : 0-5,249 ft.	January-December	Non-Native Invasive
Brassicaceae	*Lepidium latifolium*	Broad-Leaf Pepperwort, Pepper Leave, Pepper Grass		FAC	Weedy species characteristic of disturbed places, wetland-riparian: 0-6,200 ft.	May-July	Non-Native Invasive
Brassicaceae	*Lepidium sp.*						
Brassicaceae	*Sisymbrium altissimum*	Tall Hedge-Mustard, Tumble Mustard		FACU	Weedy species characteristic of disturbed places, occasionally found in wetlands: 0-8,200 ft.	May-July	Non-Native
Brassicaceae	*Sisymbrium irio*	London Rocket			Weedy species characteristic of disturbed places, fields, pastures: 0--2,600 ft.	January-April	Non-Native Invasive
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's-Purse		FACU	Weedy species characteristic of disturbed places, wetland-riparian: 0-7,000 ft.	January-December	Non-Native
Caryophyllaceae	*Herniaria hirsuta*	Hairy Rupturewort			Native to Eurasia	June-July	Not Native
Chenopodiaceae	*Atriplex cordulata var. cordulata*	Heartscale	1B.2	FAC	Chenopod scrub, meadows and seeps, Valley and foothill grassland (VFGrs)(sandy)/saline or alkaline: 0-1837 ft.	April-October	Native
Chenopodiaceae	*Atriplex fruticulosa*	Ball Saltbush, Valley Saltbush		FACW	Valley Grassland, wetland-riparian: 0-2000 ft.	June-Spetember	Native
Chenopodiaceae	*Chenopodium californicum*	California Goosefoot, Pigweed, Soaproot			Yellow Pine Forest, Foothill Woodland, Chaparral, Valley Grassland, slopes: 0-5,000 ft.	March-June	Native
Chenopodiaceae	*Chenopodium sp.*					March-June	Native
Chenopodiaceae	*Suaeda nigra*	Shrubby Seepweed, Bush Seepweed		OBL	Coastal Salt Marsh, Coastal Sage Scrub, Sagebrush, Creosote Bush Scrub; Alkali Sink, interior and desert saline habitats, wetland-riparian: 0-5,250 ft.	May	Native
Convolvulaceae	*Convolvulus arvensis*	Bindweed, Orchard Morning-Glory			Weedy species characteristic of disturbed places: 0-4200ft.	April-September	Non-Native Invasive
Convolvulaceae	*Cressa truxillensis*	Spreading Alkali-Weed		FACW	Saline, alkaline substrates, yellow Pine Forest, Foothill Woodland, Chaparral, Valley Grassland, wetland-riparian: 0-4,000 ft.	May-June	Native
Crassulaceae	*Crassula connata*	Sand Pygmyweed		FAC	Yellow Pine Forest, Foothill Woodland, Chaparral, Valley Grassland, wetland-riparian: 0-2500 ft.	February-March	Native
Cucurbitaceae	*Marah fabacea*	California Man-Root			Coastal Strand, Mixed Evergreen Forest, Foothill Woodland, Chaparral, Streamsides, washes, shrubby open areas: 0-5,200 ft.	March-April	Native
Cyperaceae	*Bolboschoenus maritimus ssp. paludosus*	Saltmarsh Bulrush			Brackish to saline coastal, inland marshes, shores: 0-9514 ft.	August-September	Native
Euphorbiaceae	*Croton setigerus*	Dove Weed, Turkey Mullein			Coastal Sage Scrub, Foothill Woodland, Valley Grassland, Northern Oak Woodland, Southern Oak Woodland: 0-6,000 ft.	May-October	Native
Fabaceae	*Acmispon wrangelianus*	Chilean Trefoil			Abundant. Coastal bluffs, chaparral, disturbed areas: 0-4,900 ft.	March-April	Native
Fabaceae	*Astragalus sp.*	Alkali Milkvetch					Native
Fabaceae	*Lupinus microcarpus var. microcarpus*	Chick Lupine, Valley Lupine			Sagebrush Scrub, Creosote Bush Scrub, Foothill Woodland, Valley Grassland, very toxic: 0-5,000 ft.	May-June	Native
Fabaceae	*Melilotus indicus*	Indian Sweet-Clover, Annual Yellow Sweetclover, Sourclover		FACU	Open, disturbed areas: 0-4921 ft.	April-October	Non-Native
Fabaceae	*Trifolium hirtum*	Rose Clover			Weedy roadside species characteristic of disturbed places: 0-6,750 ft.	February-March	Non-Native Invasive
Fabaceae	*Medicago polymorpha*	Toothed Medick, California Burclover, Bur Medic		FACU	Common, chaparral, oak woodland, streambanks, roadsides, disturbed areas: 0-4,900 ft.	February-June	Non-Native Invasive
Frankeniaceae	*Frankenia salina*	Alkali Sea-Heath		FACW	Coastal Strand, Coastal Salt Marsh, wetland-riparian Salt marshes, alkali flats: 0-2,400 ft.	March-October	Native
Geraniaceae	*Erodium botrys*	Long-Beak Stork'S-Bill		FACU	Usually occurs in non wetlands, but occasionally found in wetlands: 0-3,200 ft.	February-March	Non-Native
Geraniaceae	*Erodium cicutarium*	Coastal Heron'S Bill, Red Stemmed Filaree			Open, disturbed sites, grassland, scrub: 0-6,000 ft.	Jebruary-June	Non-Native

Appendix B : Observed Flora : Sand Hill Project : Spring 2013 Botanical Survey

Family	Scientific Name	Common Name	Federal/State CA Rare Plant Rank (CRPR)	Wetland Indicator Designation	Plant Communities and Habitat	Bloom	Native, Non-Native, and/or Invasive
Juncaceae	*Juncus balticus*	Baltic Rush, Wire Rush			Yellow Pine, Red Fir, Lodgepole, Subalpine Forest; Foothill Woodland, Chaparral, Valley Grassland, Alpine Fell-fields, wetland-riparian: 0-11,000 ft.	May-June	Native
Juncaceae	*Juncus bufonius*	Toad Rush		FACW	Wetland-riparian: 0-10,000 ft.	March-May	Native
Juncaceae	*Juncus mexicanus*	Mexican Rush		FACW	Yellow Pine, Red Fir, Lodgepole, Subalpine Forest; Foothill Woodland, Chaparral, Valley Grassland, Alpine Fell-fields, wetland-riparian: 0-11,000 ft.	March-May	Native
Lamiaceae	*Marrubium vulgare*	White Horehound		FACU	Weed, disturbed sites, generally overgrazed pastures, wetlands: 0-1,900 ft.	March-April	Non-Native Invasive
Lamiaceae	*Trichostema lanceolatum*	Vinegar-Weed		FACU	Coastal Sage Scrub, Chaparral, Northern Oak Woodland, Southern Oak Woodland, Foothill Woodland : 0-3,500 ft.	August-October	Native
Malvaceae	*Malva parviflora*	Cheeseweed, Little Mallow			Agricultural weed, species characteristic of disturbed places: 0-4,900 ft.	March-October	Non-Native
Malvaceae	*Malvella leprosa*	Alkali-Mallow		FACU	Wetland-riparian areas, valleys, generally saline, agricultural weed: 0-4,900 ft.	April-October	Native weed
Papaveraceae	*Eschscholzia californica*	California Poppy			Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Foothill Woodland, Chaparral, Valley Grassland: 0-6,500 ft.	April-July	Native
Plantaginaceae	*Collinsia sp.*	Blue Eyed Mary				March-june	Native
Poaceae	*Bromus hordeaceus*	Soft. Brome, Soft. Chess		FACU	Weedy species characteristic of disturbed places: 0-3280 ft.	April-May	Non-Native Invasive
Poaceae	*Cynodon dactylon*	Bermuda Grass		FACU	Weed, species characteristic of disturbed places, occasionally foud in wetlands: 0-2952 ft.	April-May	Non-Native Invasive
Poaceae	*Distichlis spicata*	Coastal Salt Grass		FAC	Coastal Salt Marsh, Creosote Bush Scrub, Alkali Sink, Valley Grassland, wetland-riparian	July-August	Native
Poaceae	*Elymus triticoides*	Beardless Wild Rye			Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Subalpine Forest, Foothill Woodland, Chaparral, Valley Grassland, wetland-riparian: 0-7,500 ft.	June-July	Native
Poaceae	*Festuca myuros*	Rattail Sixweeks Grass			Generally open places, sandy soils, desert: 0-6,500 ft.	February-May	Non-Native Invasive
Poaceae	*Hordeum vulgare*	Common Barley			Agricultural plant, monoculture, widely adaptable in temperate and tropical areas: 0-10,000 ft.	March-May	Non-Native
Poaceae	*Hordeum marinum ssp. gussoneanum*	Mediterranean Barley			Weedy species characteristic of disturbed places, wetland-riparian: 0-4921 ft.	March-May	Non-Native Invasive
Poaceae	*Hordeum murinum ssp. glaucum*	Blue Foxtail, Smooth Barley			Weedy species characteristic of disturbed places: 0-3280 ft.	April-May	Non-Native Invasive
Poaceae	*Koeleria gerardii*	Annual June Grass, Bristly Koeleria			Open, disturbed sites: 0 -1,148 ft.	April-July	Non-Native
Poaceae	*Melica californica*	California Melicgrass, California Melic			Open or rocky hillsides, Foothill Woodland, Mixed Evergreen Forest, Yellow Pine Forest: 0-4,000 ft.	June-August	Native
Poaceae	*Polypogon monspeliensis*	Annual Beard Grass, Rabbitfoot Grass			Weedy species characteristic of disturbed places, wetland-riparian, moist places, common along streams: 0-6,800 ft.	May-June	Non-Native
Poaceae	*Stipa lepida*	Foothill Needle Grass			Chaparral, Coastal Sage Scrub, Coastal Prairie, grassland, savanna, dry slopes: 0-4,000 ft.	March-May	Native
Poaceae	*Stipa pulchra*	Purple Needle Grass			Coastal Sage Scrub, Foothill Woodland, Oak woodland, chaparral, grassland, slopes: 0-5,000 ft.	March-May	Native
Poaceae	*Avena barbata*	Slender Wild Oat			Weedy species characteristic of disturbed places: 131-3937 ft.	March-june	Non-Native Invasive
Poaceae	*Avena fatua*	Common Wild Oat			Weedy species characteristic of disturbed places: 82-4002 ft.	April-May	Non-Native Invasive
Poaceae	*Bromus diandrus*	Ripgut, Bromegrass			Weedy species characteristic of disturbed places: 0-6500 ft.	April-June	Non-Native Invasive

Appendix B : Observed Flora : Sand Hill Project : Spring 2013 Botanical Survey

Family	Scientific Name	Common Name	Federal/State CA Rare Plant Rank (CRPR)	Wetland Indicator Designation	Plant Communities and Habitat	Bloom	Native, Non-Native, and/or Invasive
Polemoniaceae	*Leptosiphon sp.*						Native
Polemoniaceae	*Lolium multiflorum (Festuca perennis)*	Italian Rye Grass			Urban and agricultural weed, dry to moist disturbed sites, abandoned fields: 0-3,200 ft.	May-September	Non-Native Invasive
Polemoniaceae	*Microsteris gracilis*	Annual-Phlox, Slender Phlox		FACU	Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Subalpine Forest, Foothill Woodland, Chaparral, Valley Grassland, ocassionally wetlands: 0-10,000 ft.	February-June	Native
Polygonaceae	*Polygonum aviculare ssp. aviculare*	Prostrate Knotweed		FAC	Disturbed places, roadsides, cultivated fields: 0-6561 ft.	June-December	Non-Native
Polygonaceae	*Rumex crispus*	Curly Dock, Curly Leaved Dock, Rhubarb		FAC	Weedy species characteristic of disturbed places, wetland-riparian: 0-8,200 ft.	January-December	Non-Native Invasive
Polygonaceae	*Rumex pulcher*	Fiddle Dock		FAC	Weed species characteristic of disturbed places, meadows, moist or dry habitats, wetland-riparian: 0-4,900 ft.	May-September	Non-Native
Pteridaceae	*Pentagramma triangularis*	Gold Back Fern, Silver Back Fern			Coastal Sage Scrub, Creosote Bush Scrub, Yellow Pine Forest, Foothill Woodland, Chaparral, Valley Grassland, Pinyon-Juniper Woodland: 0-7,545 ft.	NA	Native
Ranunculaceae	*Ranunculus californicus*	California Buttercup		FACU	Northern Coastal Scrub, Foothill Woodland, Northern Oak Woodland, Mixed Evergreen Forest, Valley Grassland, Yellow Pine Forest, Red Fir Forest, wetland-riparian, minor toxicity: 0-7,500 ft.	February-May	Native
Themidaceae	*Brodiaea elegans ssp. elegans*	Elegent Cluster Lily		FACU	Usually occurs in non wetlands, but occasionally found in wetlands: 0-8000 ft.	March-August	Native
Themidaceae	*Brodiaea terristris ssp. terrestris*	Ground or Dwarf Brodiaea			Coastal prairie, foothill woodland; < 1476 ft.	April-June	Native
Themidaceae	*Triteleia laxa*	Ithuriel'S Spear, Common Triteleia			Common, Open Mixed Evergreen Forest, Conifer or Foothill Woodland, Grassland, Chaparral on clay soil: 0-4,600 ft.	April-July	Native
Typhaceae	*Typha angustifolia*	Narrow-Leaf Cat-Tail		OBL	Nutrient-rich freshwater to brackish marshes, wet disturbed places, wetland-riparian: 0-6,560 ft.	May-June	Non-Native

*** Status explanations:**

Federal

E = listed as endangered under the federal Endangered Species Act.

– = no listing.

State

E = listed as endangered under the California Endangered Species Act.

– = no listing.

California Rare Plant Rank2

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

3 = List 3 species: uncertain taxonomic status

4 = List 4 species: limited distribution and on a watch list.

0.1 = seriously endangered in California.

0.2 = fairly endangered in California.

* = presumed extirpated from that county.

NI = No Information

Wetland Indicator Code Key for Indicator Categories		
Indicator Code	**Wetland Type**	**Comment**
OBL	Obligate Wetland	Occurs almost always (estimated probability 99%) under natural conditions in wetlands.
FACW	Facultative Wetland	Usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
FAC	Facultative	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
FACU	Facultative Upland	Usually occurs in non-wetlands (estimated probability 67%-99%), but occasionally found on wetlands (estimated probability 1%-33%).
UPL	Obligate Upland	Occurs in wetlands in another region, but occurs almost always (estimated probability 99%) under natural conditions in non-wetlands in the regions specified. If a species does not occur in wetlands in any region, it is not on the National List.

Report BIO-2

Biological Resources Technical Report for the Sand Hill Wind Project

BIOLOGICAL RESOURCES TECHNICAL REPORT FOR THE SAND HILL WIND PROJECT

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February 2013

ICF International. 2013. *Biological Resources Technical Report for the Sand Hill Project*. February. (ICF 00456.12.) Sacramento, CA. Prepared for FloDesign Wind Turbine Corporation, Waltham, MA.

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Acronyms and Abbreviations

APWRA	Altamont Pass Wind Resource Area (APWRA
BO	biological opinion
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CZ	conservation zone
CRLF	California red-legged frog
CTS	California tiger salamander
CWA	Clean Water Act
EACCS	East Alameda County Conservation Strategy
EIR	environmental impact report
EPA	Environmental Protection Agency
ESA	federal Endangered Species Act
FloDesign	FloDesign Wind Turbine Corporation
GIS	geographic information systems
HCP	habitat conservation plan
ICF	ICF International
Kw	kilowatts
MBTA	Migratory Bird Treaty Act
MEWT	mixer-ejector wind turbine
MW	megawatts
NCCP	natural communities conservation plan

O&M	operations and maintenance
PIER	Public Interest Energy Research
PPA	power purchase agreement
Ropanos	*Rapanos v. U.S. and in Carabell v. U.S.*
SWANCC	*Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*
TNW	traditional navigable waters
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WDR	waste discharge requirements

Chapter 1
Introduction

This report presents the methods and results of biological resource surveys conducted by ICF International (ICF) for the proposed Sand Hill wind project, located in the Altamont Pass Wind Resource Area (APWRA) of Alameda County, California (Figure 1). This biological resources study was initiated by FloDesign Wind Turbine Corporation (FloDesign), the project proponent, to identify biological resources affecting the siting of the proposed project components, to provide baseline studies useful for preparation of the environmental impact report (EIR) that will be prepared by Alameda County, and to support other permitting, as necessary.

Potential effects on nesting avian species that may result from construction activities are discussed in this report. It is our understanding that operational effects (i.e., potential wind turbine collisions and/or mortality) are being addressed separately by FloDesign through a dedicated avian study; therefore, those potential effects are not discussed in this report.

Summary of Results

Based on surveys and assessments conducted to date, ICF has reached the following conclusions regarding the presence of sensitive biological resources in the project area.

- The project area supports potential aquatic and upland habitat for California tiger salamander (*Ambystoma californiense*) (CTS), listed as threatened under the federal Endangered Species Act (ESA) and as endangered under the California Endangered Species Act (CESA), and California red-legged frog (*Rana draytonii*) (CRLF), listed as threatened under ESA. Recommendations to avoid, minimize, and mitigate potential impacts are included.
- The project area supports potential dispersal habitat for San Joaquin kit fox (*Vulpes macrotis mutica*), listed as endangered under ESA and as threatened under CESA; however, the potential for this species to occur is low. Recommendations to avoid, minimize, and mitigate potential impacts are included.
- The project area supports potential habitat for western burrowing owl (*Athene cunicularia hypugea*), a California species of special concern. Recommended measures to avoid, minimize, and mitigate potential impacts are included.
- The project area supports potential habitat for western pond turtle (*Actinemys marmorata*), a California species of special concern. Recommendations for other species outlined in this report will also benefit western pond turtle if the species is present, and no additional measures are recommended.
- The project area supports potential habitat for San Joaquin whipsnake (*Masticophis flagellum ruddocki*), a California species of special concern. Recommendations for other species outlined in this report will also benefit San Joaquin whipsnake if the species is present, and no additional measures are recommended.
- The project area supports potential habitat for coast horned lizard (*Phrynosoma blainvillii*), a California species of special concern. Recommendations for other species outlined in this report

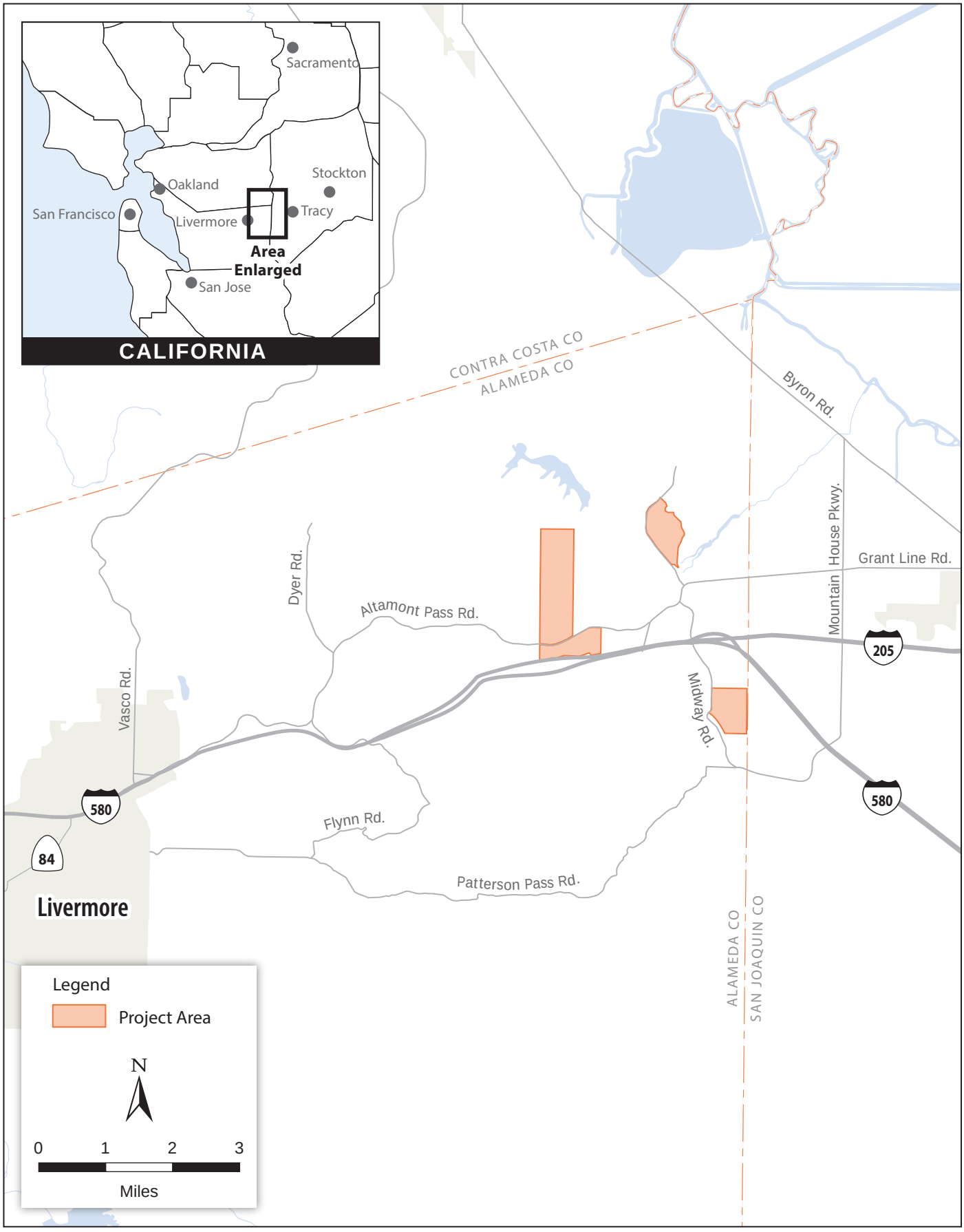

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Figure 1
Project Location

will also benefit coast horned lizard if the species is present, and no additional measures are recommended.

- The project area supports potential habitat for several nesting raptor and special-status bird species (e.g., loggerhead shrike [*Lanius ludovicianus*]) known to be present in or adjacent to the project area. Recommended measures are included to avoid potential impacts on nesting raptors and other special-status birds during construction.
- The project area supports potential habitat for American badger (*Taxidea taxus*), a California species of special concern. Recommendations for other species outlined in this report will also benefit American badger if the species is present, and no additional measures are recommended.
- The project area supports habitat for plants considered special-status species under the California Environmental Quality Act (CEQA). No special-status species were observed during a fall floristic survey. A spring floristic survey is still needed, however, and is planned by the applicant.
- The project area supports wetlands, including alkali wetlands, considered sensitive natural communities as defined by the California Department of Fish and Wildlife (CDFW). The proposed project has been designed to avoid effects on sensitive natural communities, and measures are included to avoid potential impacts during construction.
- The project area supports potential waters of the United States (including wetlands) that could be subject to U.S. Army Corps of Engineers (USACE) jurisdiction pursuant to Section 404 of the Clean Water Act (CWA). The proposed project has been designed to avoid effects on potential waters of the United States, and measures are included to avoid potential impacts during construction.
- The project area supports streams which may be subject to CDFW jurisdiction under Section 1602 of the California Fish and Game Code (Streambed Alteration).

Project Overview

Project Background

In April 2012, FloDesign acquired existing wind farm installations (existing turbines) owned by SeaWest Power Resources, LLC on multiple parcels in the northwest corner of Alameda County in the APWRA. FloDesign intends to implement a repowering program (proposed project) that will include the removal of the existing turbines and replace them with a new technology turbine known as a *mixer-ejector wind turbine* (MEWT). FloDesign seeks to accomplish the repowering in two or more phases through 2016.

The first phase of the proposed project (referred to as the *initial repower*) would involve the removal of approximately 70–80 existing turbines and the installation of approximately 40 MEWTs as a test case to assess the functionality of the new MEWT design and determine the extent to which it reduces impacts on birds and bats compared to fatality associated with the existing turbines. The assessment would consist of an avian validation study funded by a Public Interest Energy Research (PIER) grant from the California Energy Commission (avian study), currently in progress. FloDesign

would use the test results of the avian study and MEWT performance data to inform its approach to repowering the remainder of the existing turbines in future phases.

Project Description

The proposed project consists of (1) the initial repower of up to 4 megawatts (MW) and the subsequent avian study, and (2) subsequent repowers of up to 30 MW. The proposed project is located on sites within the APWRA, an area designated by the State of California and recognized by Alameda County as a Wind Resource Area because it maintains winds at a level that supports economically viable wind energy projects.

The initial repower would use a new type of wind turbine known as a MEWT. The MEWTs are approximately 70 feet in diameter, with a hub height of 120 feet and a total maximum turbine height of 190 feet . The MEWTs contemplated for the initial repower would have a nameplate generating capacity of 100 kilowatts (kW) per turbine.

The MEWTs installed for the initial repower would be interspersed throughout the existing facilities, covering approximately 1,058 acres and comprising seven parcels in three nearby but separated areas (referred to as *Areas 1*, *2*, and *3* in this report) currently occupied by existing turbines and their supporting facilities. The initial repower would decommission and remove 70-80 of the existing turbines and replace them with 40 MEWTs, with the remaining existing turbines staying in place for at least 1 year as controls for the avian study.

Because the MEWTs will be installed within an existing wind project footprint, no new access roads will be needed, though minor improvements or modifications to existing roads may be necessary. The initial repower includes construction of new pads for the MEWTs, some minor connections to the existing power collection system, and temporary laydown areas. The initial repower would connect to the power grid using existing infrastructure; no new substation, interconnection lines, or operations and maintenance (O&M) facilities would be needed.

The power produced by the initial repower would be sold under a power purchase agreement (PPA) between the producer and a consumer that sets the price of the power. A PPA also provides assurances necessary to secure financing for constructing a project and establishes a targeted completion date. The electricity would be transmitted to the consumer power market in northern California through utilities, municipalities, and cooperatives in furtherance of the goals of the 33% California Renewable Energy Portfolio standard.

Setting

The proposed project is in the APWRA, a large collection of wind energy facilities owned by multiple operators that provide electrical power to the California electrical grid. The APWRA is one of the oldest and largest wind generation development areas in the country. Permits have been granted for 5,400 wind turbines with a rated capacity of approximately 580 MW, distributed over 50,000 acres (150 square kilometers) of rolling grassland hills and valleys. The total number of operating turbines has varied through time from a maximum of approximately 5,400 units in 1998 to approximately 4,200 today. The APWRA is in a rural part of Alameda County, and land uses are mostly limited to grazing and wind energy generation.

Biological Study Area

The area proposed for the proposed project comprises three separate but nearby areas on multiple parcels totaling approximately 1,058 acres (Figure 2). Initially, FloDesign would replace approximately70-80 of the existing wind turbines with MEWTs and has provided ICF with preliminary engineering drawings showing proposed turbine locations, meteorological towers, work areas, collection lines, and areas where access roads would be improved. Detailed plans for subsequent phases of the overall repowering project have not yet been prepared. Consequently, field surveys for this study focused on areas that would be disturbed during the initial repower phase. However, this report also provides an assessment of the habitat suitability for all species within the overall project area.

Regulatory and Management Considerations

This section provides an overview of the major laws and regulations that influence the management of biological resources in the project region. While some of these regulations may not apply to the proposed project if the resources in question are avoided as part of the project, they are discussed here for context in determining which biological resources are considered *sensitive* for the purposes of this report and to discuss the effects the proposed project may have on them.

Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over species listed as threatened or endangered under ESA Section 9. ESA protects listed species from harm, or *take*, which is broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." For any project involving a federal agency in which a listed species could be affected, the federal agency must consult with USFWS in accordance with Section 7 of ESA. USFWS issues a biological opinion (BO) and, if the project does not jeopardize the continued existence of the listed species, issues an incidental take permit. When no federal context is present, proponents of a project affecting a listed species must consult with USFWS and apply for an incidental take permit under ESA Section 10. Section 10 requires an applicant to submit a habitat conservation plan (HCP) that specifies project impacts and mitigation measures.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union (which was dissolved in 1991); the act authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It protects migratory birds, their occupied nests, and their eggs (16 USC 703; 50 Code of Federal Regulations [CFR] 21, 10). Most actions that result in the taking of or the permanent or temporary possession of a protected avian species constitute violations of the MBTA. The MBTA also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum (MBPM-2), dated April 15, 2003, clarifies that destruction of most unoccupied bird nests is permissible under the MBTA; exceptions include nests of federally listed threatened or endangered migratory birds, bald eagle, and golden eagle. USFWS is responsible for overseeing compliance with the MBTA.

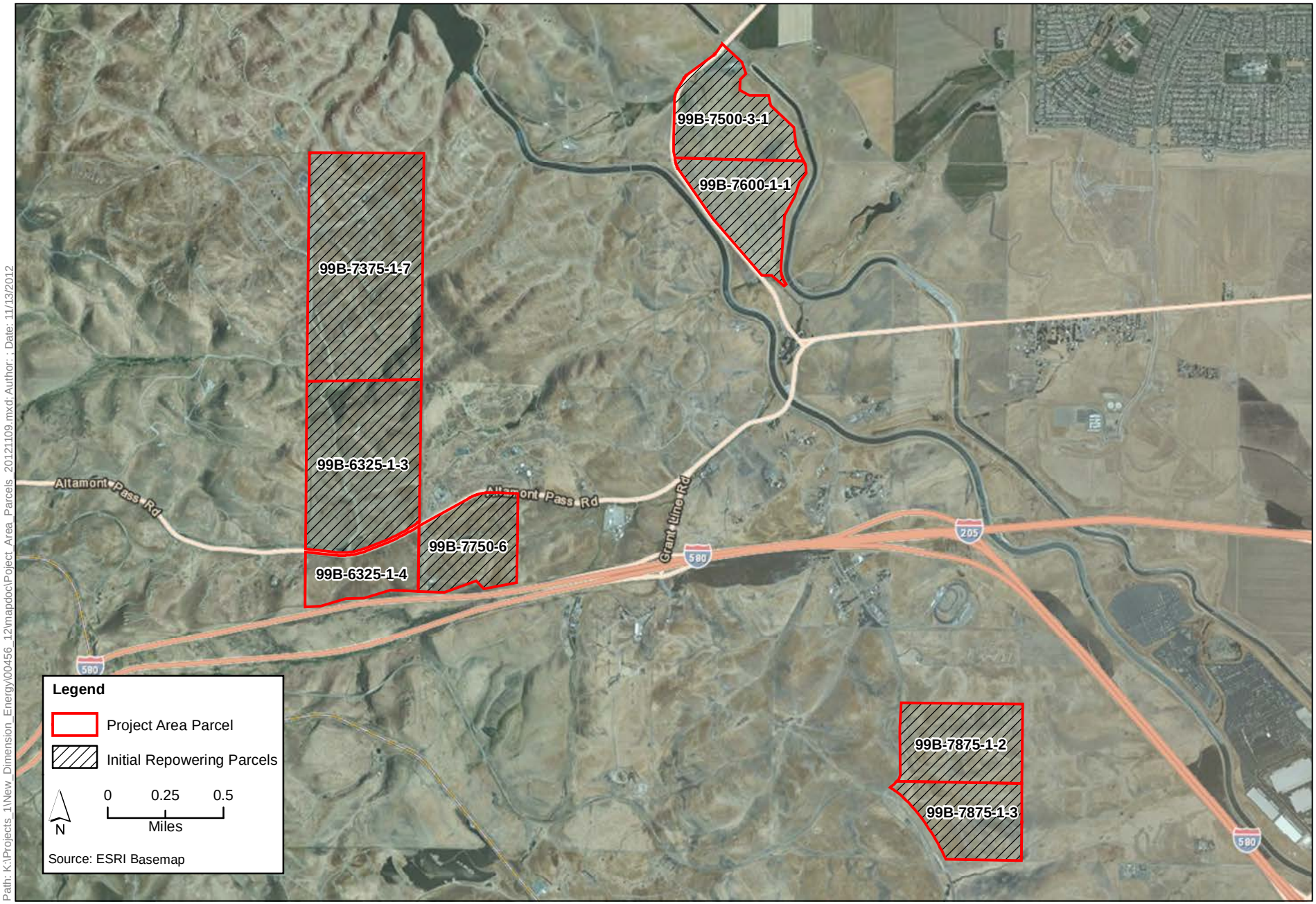

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Figure 2
Project Area Parcels

California Endangered Species Act

CESA prohibits the take of endangered and threatened species; however, habitat destruction is not included in the state's definition of *take*. Section 2090 of CESA requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. CDFW administers CESA and authorizes take through Section 2081 agreements.

California Fish and Game Code

Fully Protected Species

The California Fish and Game Code provides protection from take for a variety of species that are referred to as *fully protected species*. Section 5050 lists fully protected amphibians and reptiles, Section 3515 lists fully protected fish, Section 3511 lists fully protected birds, and Section 4700 lists fully protected mammals. The California Fish and Game Code defines *take* as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Except for take related to scientific research or authorized pursuant to an approved natural community conservation plan (NCCP), all take of fully protected species is prohibited.

Sections 3503 and 3503.5

Section 3503 of the California Fish and Game Code prohibits the destruction of bird nests. Section 3503.5 prohibits the killing of raptor species and the destruction of raptor nests.

Section 1600: Streambed Alteration Agreements

In addition to regulating listed and special-status species, CDFW regulates activities that would interfere with the natural flow—or substantially alter the channel, bed, or bank—of a lake, river, or stream. These activities are regulated under California Fish and Game Code Sections 1600–1616 and require a streambed alteration agreement. Requirements to protect the integrity of biological resources and water quality are often conditions of streambed alteration agreements. CDFW may require avoidance or minimization of vegetation removal, use of standard erosion control measures, limitations on the use of heavy equipment, limitations on work periods to avoid impacts on fish and wildlife, and restoration of degraded sites or compensation for permanent habitat losses, among other conditions.

California Environmental Quality Act

CEQA is the regulatory framework by which California public agencies identify and mitigate significant environmental impacts. A project usually will have a significant environmental impact (in the context of biological resources) if it substantially affects a rare or endangered species or the habitat of that species; substantially interferes with the movement of resident or migratory fish or wildlife; or substantially diminishes habitat for fish, wildlife, or plants. The State CEQA Guidelines define *rare, threatened, or endangered species* as those listed under ESA and CESA as well as any other species that meet the criteria of the resource agencies or local agencies—for example, the CDFW-designated *species of special concern* and plant species identified by the California Native Plant Society (CNPS) as being of conservation interest. Special-status species and sensitive habitats occurring in the study area are described in Chapter 4, *Results*; the effects of the proposed project on

these species and habitats are important in determining whether the project has significant environmental impacts under CEQA.

Section 404 of the Clean Water Act

USACE and the U.S. Environmental Protection Agency (EPA) regulate the discharge of dredged or fill material into waters of the United States under Section 404 of the Clean Water Act (CWA). Project proponents must obtain a permit from USACE for all discharges of fill material into waters of the United States, including wetlands, before proceeding with a proposed action. Biological communities in the study area that could qualify as waters of the United States are described in Chapter 4, *Results*.

A federal ruling (January 9, 2001, *Solid Waste Agency of Northern Cook County* v. *United States Army Corps of Engineers,* 121 S.CT. 675 [2001] [the SWANCC ruling]) affects whether wetlands are considered jurisdictional under Section 404 of the CWA. The SWANCC ruling was limited to wetlands that are "nonnavigable, isolated [and] intrastate." Under this ruling, wetlands identified as waters of the United States solely as a result of their use by migratory birds (which was considered interstate commerce) are no longer under USACE jurisdiction. However, SWANCC did not overrule *United States* v. *Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985), which upheld the regulation of navigable waters, interstate waters, their tributaries, and wetlands adjacent to each.

In 2006, the Supreme Court again addressed the jurisdictional scope of Section 404 of the CWA, specifically the term "waters of the U.S.," in *Rapanos* v. *U.S.* and in *Carabell* v. *U.S.* (the Rapanos ruling). The Rapanos ruling provides two new analytical standards for determining whether water bodies that are not traditional navigable waters (TNWs), including wetlands adjacent to those non-TNWs, are subject to CWA jurisdiction: (1) if the water body is relatively permanent, or if the water body is a wetland that directly abuts a relatively permanent water body, or (2) if a water body, in combination with all wetlands adjacent to that water body, has a significant nexus with TNWs. As a result of the Rapanos ruling, EPA and USACE developed guidance requiring the application of the two standards described above, as well as a greater level of documentation to support an agency jurisdictional determination for a particular water body. As described in the *Jurisdictional Determination Form Instructional Guidebook* (U.S. Army Corps of Engineers and U.S. Environmental Protection Agency 2007), a "significant nexus" evaluation must determine if the water body, itself or in combination with the functions performed by any wetlands adjacent to the water body, would have more than a substantial or speculative effect on the chemical, physical, and/or biological integrity of TNWs.

Regional Water Quality Control Board

The State Regional Water Quality Control Board 's mission is "to preserve, enhance, and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations." Within the state, there are nine regional water quality control boards that make decisions within their regions. Water Code Section 13260 requires "any person discharging waste, or proposing to discharge waste, within any region that could affect the *waters of the state* to file a report of discharge (an application for waste discharge requirements [WDRs])." Under the Porter-Cologne Water Quality Control Act definition, the term *waters of the state* is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." (Water Code §12050[e].)

If the project would require the disturbance of a water of the State, and USACE determines that the water is not subject to regulation under Section 404 of the CWA, a water quality certification under Section 401 of the CWA is not required. However, the Regional Water Control Quality Board may still require WDRs if fill material is placed into waters of the state.

East Alameda County Conservation Strategy

Several local, state, and federal agencies have recently prepared the East Alameda County Conservation Strategy (EACCS), a plan intended to provide a framework to protect, enhance, and restore the natural resources in eastern Alameda County while improving and streamlining the environmental permitting process for impacts resulting from infrastructure and development projects. The EACCS is intended to focus on impacts on biological resources, such as endangered and other special-status species, as well as sensitive habitat types (e.g., wetlands, riparian corridors, and rare upland communities). Participation in the EACCS is voluntary for project applicants.

Although the EACCS is not a formal HCP or NCCP, and formal take authorization under ESA and CESA cannot be granted through the EACCS, the plan provides a framework of comprehensive conservation goals and objectives, as well as recommendations for consistent and standardized mitigation requirements. The EACCS study area encompasses 271,485 acres, or approximately 52% of Alameda County, including the cities of Dublin, Livermore, and Pleasanton. The western boundary of the EACCS study area runs along the Alameda Creek watershed; the northern, southern, and eastern boundaries follow the Alameda County boundary with adjacent counties. The Sand Hill project area is within the boundaries of the EACCS study area.

A final draft of the EACCS was completed in October 2010 and released to the public in March 2011. On May 31, 2012, USFWS issued the *Programmatic Biological Opinion for U.S. Army Corps of Engineers Permitted Projects Utilizing the East Alameda County Conservation Strategy that May Affect Federally Listed Species in East Alameda County, California*, hereinafter referred to as the Programmatic BO. Wind energy projects, including installation, operation, and maintenance, are identified as covered infrastructure projects within the Programmatic BO. However, avian and bat effects associated with these types of projects are not covered under the Programmatic BO. Individual projects may be appended to the Programmatic BO if they are consistent with the EACCS, occur within the EACCS study area, and are a covered activity. The Programmatic BO does not provide incidental take authorization; therefore, individual projects appended to the Programmatic BO will be granted individual take coverage as part of the project's Section 7 consultation process. Because the EACCS is designed to be an adaptive management process, the Programmatic BO may be amended in the future or a new BO may be written if there are substantive changes to the EACCS.

For projects where USACE is not the federal lead agency for Section 7 consultation, consistency with the Programmatic BO can afford other federal agencies the opportunity to streamline their individual ESA consultations by utilizing preapproved mitigation standards and focusing mitigation in conservation priority areas.

EACCS development included input and review by CDFW to address impacts on state-listed species. Consistency with the EACCS can also aid in streamlining CESA permit compliance for project impacts on state-listed species.

Terminology

This section defines the key terms relating to biological resources used throughout this report.

- ***Special-status species*** are plants and animals that are legally protected under ESA, CESA, or other such regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. For the purposes of this report, special-status species are those species that meet any of the following requirements.
    - Species listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants], 50 CFR 17.11 [listed animals], and various notices in the Federal Register [proposed species].
    - Species that are candidates for possible future listing as threatened or endangered under ESA (75 FR 69222 [November 10, 2010]).
    - Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
    - Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
    - Plants listed as rare under the California Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.).
    - Plants considered by the CNPS to be "rare, threatened, or endangered in California" (Lists 1B and 2 in California Department of Fish and Game 2012).
    - Plants listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution (Lists 3 and 4 in California Department of Fish and Game 2012), which may be included as special-status species on the basis of local significance or recent biological information.
    - Animal species of special concern to CDFW (California Department of Fish and Game 2012).
    - Animals fully protected in California (California Fish and Game Code, Section 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles]).
- ***Habitat*** is the place or type of site where a plant or animal naturally or normally lives and/or grows. Habitats can be further classified for some species depending on specific ecology or life history factors. For example, a species such as Swainson's hawk has both a nesting habitat requirement and a foraging habitat requirement.
- ***Sensitive natural communities*** are communities that are especially diverse; regionally uncommon; or of special concern to local, state, or federal agencies. Elimination or substantial degradation of these communities would constitute a significant impact under CEQA. For the purposes of this report, sensitive natural communities may include areas that provide habitat for special-status species.
- ***Waters of the United States*** are defined in the CFR as:

    > (1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands,

sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters…; (4) all impoundments of waters otherwise defined as waters of the United States under the definition; (5) tributaries of waters identified in paragraphs (a)(1)–(4) of this section; (6) the territorial seas; and (7) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(1)–(6) of this section (33 CFR Section 328.3).

- ***Wetlands*** are defined for regulatory purposes in the CFR as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3). To be considered subject to federal jurisdiction, a wetland must normally exhibit positive indicators for three distinct features: hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; U.S. Army Corps of Engineers 2008).

Chapter 2
Methods

This biological resources study entailed a prefield investigation and reconnaissance and focused field surveys to identify and describe the biological resources in the proposed project area.

Prefield Investigation

ICF biologists conducted an investigation to review existing information and to prepare lists of special-status plant and wildlife species known to occur or with potential to occur in the project region. The information listed below was reviewed to develop these lists.

- A records search of CDFW's California Natural Diversity Database (CNDDB) (2012) for the Midway 7.5-minute U.S. Geological Survey quadrangle map and surrounding quadrangles.
- CNPS's online *Inventory of Rare and Endangered Plants of California* (2012) (CNPS Inventory).
- USFWS lists of endangered and threatened species for the Midway USGS 7.5-minute quadrangle (Appendix A).

In addition to a review of the information sources listed above, three other nearby repowering projects have recently been permitted: Vasco Winds, Buena Vista, and Tres Vaqueros. The EIRs for these projects were also reviewed as part of the prefield investigation.

All these information sources were used to develop lists of special-status wildlife and plant species that could occur in the project area (Tables 1 and 2, respectively).

Field Surveys

ICF biologists conducted field surveys to map and describe the biological resources present or potentially present in the project area. Each of these surveys is described below.

Biological Communities

Field surveys to identify and map the general vegetation types (i.e., biological communities) present in the project area were conducted on August 7 and 8, 2012 (Appendix B). The Natural Communities Program of the CNDDB maintains records of occurrences of natural communities considered to be rare or sensitive by CDFW. The records search described above revealed that eight sensitive natural communities have been recorded in the region surrounding the project area Alkali Meadow, Alkali Seep, Cismontane Alkali Marsh, Great Valley Valley Oak Riparian Forest, Northern Claypan Vernal Pool, Sycamore Alluvial Woodland, Valley Needlegrass Grassland, and Valley Sink Scrub. The biologists mapped occurrences of these rare communities during the field surveys. Biologists visually inspected habitats in the field, mapped them on aerial photographs, and digitized them into a geographic information system (GIS) database. They also took representative photographs of vegetation communities.

Special-Status Wildlife

ICF wildlife biologists conducted a habitat assessment survey in August and September 2012 for special-status wildlife species and their habitats in the project area. Table 1 identifies 15 special-status wildlife species as having the potential to occur in the project area. Based on the review of existing information and known CNDDB records in the surrounding region, ICF wildlife biologists determined that CTS and CRLF both have a high potential to occur. Several other species were determined to have a high potential to occur, including three special-status bird species: tricolored blackbird (*Agelaius tricolor*), western burrowing owl, and loggerhead shrike. As discussed earlier in this report, avian species are being assessed separately by another consultant and, therefore, no specific surveys for these three species were conducted by ICF. The remaining species were either not expected to occur or had a low to moderate potential to occur. The six remaining species with a low to moderate potential to occur were western spadefoot (*Spea hammondii*), western pond turtle, San Joaquin whipsnake, coast horned lizard, American badger, and San Joaquin kit fox.

The six species with a low to moderate potential to occur are difficult to detect because of their habitat preferences and ecology, making quantification of individuals extremely difficult. Making a habitat-based assessment is a better estimate of the potential for project impacts; therefore, ICF wildlife biologists walked the site to characterize the habitats and assess the likelihood for these species to occur. Western spadefoot and western pond turtle occur in pond habitats that are not within potential impact areas, and thus specific surveys for these species were not necessary. San Joaquin whipsnake and coast horned lizard are difficult to directly observe without intensive and potentially destructive survey techniques (digging burrows, etc.) and, therefore, were also assessed on the basis of potential habitat. American badger and San Joaquin kit fox are already known to occur in the region, or may move into the project area in the future prior to construction, rendering any current surveys useless. As recommended in this report, an assumption of presence and a preconstruction survey strategy is most effect for cases like these in which the species is known to be present in the region but may move into or out of a particular project area.

In addition to the habitat-based assessment, a formal site assessment was conducted for CTS and CRLF in accordance with USFWS's and CDFW's (2003) *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (Interim Guidance) and *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (U.S. Fish and Wildlife Service 2005). The site assessment report is included in this report as Appendix C.

Special-Status Plants

ICF botanists conducted late-season botanical surveys on August 7 and 8 and September 21, 2012, focused on the areas planned for the initial repower (Appendix D). The surveys were conducted by walking the areas proposed for project components for over a period of approximately 3 days. The surveys generally followed CDFW's *2009 Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. During the surveys, all plants were identified to the taxonomic level necessary to determine if they were special-status plants or were species with unusual or significant range extensions. The surveyors (John Holson and Seth Kirby) possess more than the minimum surveyor qualifications recommended in the CDFW survey protocols, including experience conducting floristic field surveys; knowledge of plant taxonomy and plant community ecology; familiarity with the plants of the area, including rare, threatened, and

Table 1. Special-Status Wildlife Species Identified as Potentially Occurring or Known to Occur at the Sand Hill Wind Project Area

Common and Scientific Names	Status Federal/ State/Other	Geographic Distribution	Habitat Requirements	Potential for Species Occurrence in the Project Area
Invertebrates				
Longhorn fairy shrimp *Branchinecta longiantenna*	E/–/–	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools	**Not expected to occur.** Rock outcrop pools are not present in the project area
Vernal pool fairy shrimp *Branchinecta lynchi*	T/–/–	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	**Not expected to occur.** Vernal pools are not present in the project area
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/–/–	Streamside habitats below 3,000 feet msl throughout the Central Valley and adjacent foothills	Riparian and oak savanna habitats with elderberry shrubs; elderberry is the host plant	**Not expected to occur.** Elderberry host plants not observed in the project area
Amphibians				
California tiger salamander *Ambystoma californiense*	T/T/–	Central Valley, including Sierra Nevada foothills to approximately 1,000 feet msl, and coastal region from Butte to northeastern San Luis Obispo Counties	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy	**High.** Numerous CNDDB records in the area and potential aquatic and upland habitat is present
California red-legged frog *Rana draytonii*	T/SSC/–	Along the coast and coastal mountain ranges of California from Marin to San Diego Counties and in the Sierra Nevada from Tehama to Fresno Counties	Permanent and semi-permanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation. May aestivate in rodent burrows or cracks during dry periods	**Present.** Observed in the project area during surveys. A portion of the project area is within USFWS Critical Habitat
Western spadefoot *Spea hammondii*	–/SSC/–	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California	Seasonal wetlands such as vernal pools and stock ponds in annual grasslands and oak woodlands	**Moderate.** Suitable aquatic and upland habitat is present
Reptiles				
Silver legless lizard *Anniella pulchra pulchra*	–/SSC/–	Along the Coast, Transverse, and Peninsular Ranges from Contra Costa County to San Diego County, with spotty occurrences in the San Joaquin Valley	Habitats with loose soil for burrowing or thick duff or leaf litter; often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas	**Not expected to occur.** No CNDDB occurrences within 3 miles and habitat is not optimal
Western pond turtle *Emys marmorata*	–/SSC/–	From Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley and on western slope of Sierra Nevada	Woodlands, grasslands, and open forests; aquatic habitats, such as ponds, marshes, or streams, with rocky or muddy bottoms and vegetation for cover and food	**Low.** Potential aquatic habitat occurs in the project area but there are few nearby CNDDB occurrences

Table 1. Continued

Common and Scientific Names	Status Federal/ State/Other	Geographic Distribution	Habitat Requirements	Potential for Species Occurrence in the Project Area
San Joaquin whipsnake *Masticophis flagellum ruddocki*	–/SSC/–	From Colusa county in the Sacramento Valley southward to the grapevine in the San Joaquin Valley and westward into the inner Coast Ranges. An isolated population occurs at Sutter Buttes. Known range of elevation from 20 to 900 meters	Occurs in open, dry, vegetative associations with little or no tree cover. Occurs in valley grassland and saltbush scrub associations. Often occurs in association with mammal burrows	**Moderate.** Suitable habitat is present and there is a CNDDB record nearby
Alameda whipsnake *Masticophis lateralis euryxanthus*	T/T/–	Restricted to Alameda and Contra Costa Counties; fragmented into 5 disjunct populations throughout its range	Valleys, foothills, and low mountains associated with northern coastal scrub or chaparral habitat; requires rock outcrops for cover and foraging	**Not expected to occur.** Nearest scrub or chaparral habitat is more than 1 mile from the project area
Coast horned lizard *Phrynosoma blainvillii*	–/SSC/–	Sacramento Valley, including foothills, south to southern California; Coast Ranges south of Sonoma County; below 4,000 feet msl in northern California	Grasslands, shrub lands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging	**Low.** Habitat quality is poor and very few CNDDB records in the region
Birds[1]				
Tricolored blackbird *Agelaius tricolor*	–/SSC/–	Permanent resident in Central Valley from Butte to Kern Counties; breeds at scattered coastal locations from Marin to San Diego Counties and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony	**High.** Known to nest with the APWRA
Burrowing owl *Athene cunicularia*	–/SSC/–	Lowlands throughout California, including Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows	**High.** Known to nest within the APWRA
Loggerhead shrike *Lanius ludovicianus*	–/SSC/–	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	**High.** Known to nest within the APWRA
Mammals[2]				
American badger *Taxidea taxus*	–/SSC/–	Occurs statewide except for the northwestern corner in Del Norte County and parts of Humboldt and Siskiyou Counties	Requires sufficient food, friable soils, and relatively open uncultivated ground; preferred habitat includes grasslands, savannas, and mountain meadows near timberline	**Moderate.** Suitable habitat is present

Table 1. Continued

Common and Scientific Names	Status Federal/ State/Other	Geographic Distribution	Habitat Requirements	Potential for Species Occurrence in the Project Area
San Joaquin kit fox *Vulpes macrotis mutica*	E/T/–	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, and oak, savanna	**Low.** Species has not been detected in the region for many years, although the project area is still within the range, there is a CNDDB record nearby, and suitable habitat is present

[1] Only includes species with a potential to nest on the project site. Numerous other special-status bird species may occur (i.e., use the area for foraging) in the project area but are not addressed in this report.
[2] Excluding bat species.

Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
– = no listing.

State

E = listed as endangered under the California Endangered Species Act.
T = listed as threatened under the California Endangered Species Act.
SSC = Species of Special Concern

FP = Fully protected under the California Fish and Game Code.

msl = meal sea level

endangered species; familiarity with the appropriate state and federal statutes related to plants and plant collecting; and experience with analyzing impacts of development on native plant species and communities.

Surveys for spring-blooming special-status plants have not been conducted as of the preparation of this report.

Waters of the United States

Concurrent with the surveys described above, ICF biologists also conducted a reconnaissance-level wetland survey to document potentially jurisdictional features in accordance with the *Corps of Engineers Wetlands Delineation Manual* (1987 Manual) (Environmental Laboratory 1987) and, where applicable, the *Interim Regional Supplement to the Corps of Engineers Manual: Arid West Region* (2008 Supplement) (U.S. Army Corps of Engineers 2008). Other waters of the United States were mapped in accordance with the guidelines in USACE Regulatory Guidance Letter No. 05-05, dated December 7, 2005.

These surveys differed from a formal delineation in that hydric soils were not examined, and the presence and boundaries of each wetland feature were determined on the basis of the presence or inference of positive indicators of hydrophytic vegetation and wetland hydrology. Information on vegetation and hydrology was collected in and adjacent to the features. A resource-grade global positioning system (GPS) unit, typically accurate to less than 1 horizontal meter, was used to record the location of representative wetland boundaries and other pertinent features.

Chapter 3
Results

Biological Communities

Biological communities are defined by the dominant characteristics in the landscape discernible through aerial imagery and generally classified as vegetation communities, water bodies, or human land uses. They are the most widely used units in analyzing habitat diversity, natural communities, and ecosystem function. The biological communities and general land cover types that occur in the Sand Hills project area are described below and depicted in Figure 3. Representative photographs of selected biological communities are provided in Appendix E.

Nonnative Annual Grassland

Nonnative annual grassland is the most common biological community in the project area. It is an herbaceous community dominated by naturalized annual grasses with intermixed perennial and annual forbs. Annual grassland in the study area commonly exhibits low levels of diversity and is dominated by ripgut brome (*Bromus diandrus*), soft chess brome (*Bromus hordeaceous*), yellow star-thistle (*Centaurea solstitialis*), Italian ryegrass (*Lolium multiflorum*), and wild oat (*Avena fatua*). Annual grasslands are common both regionally and statewide and are not considered sensitive natural communities by CDFW, although they can support special-status species. Representative photographs of annual grasslands are provided in Appendix E.

Alkali Grassland

This habitat type is relatively common in the project area, occurring in low-lying areas and valleys. Portions of this habitat type are intermittently flooded and saturated by alkaline water and are dominated almost entirely by saltgrass (*Distichlis spicata*) with Baltic rush (*Juncus balticus*) and alkali heath (*Frankenia salina*). In addition, nonnative annual grasses, such as sea barley (*Hordeum marinum*) and soft chess brome, are also common associates. Grasses are typically short in stature, growing less than 1 meter high. Alkali grassland is considered a sensitive natural community by CDFW and is listed in the EACCS as a conservation priority. In addition to its status as a sensitive natural community, it also provides potential habitat for special-status plants, and portions would likely qualify as waters of the United States (wetlands) under Section 404 of the CWA. Representative photographs of alkali grassland are provided in Appendix E.

Stock Ponds

Several stock ponds were mapped in the project area. In the Altamont Pass area, stock ponds are small permanent or seasonal bodies of water that have been constructed for the purposes of retaining runoff water for livestock use. The surface area of these features varies widely depending on the time of year. Within the project area, these features are located in low-lying drainages and valley bottoms, and the vegetation surrounding them is typically dominated by the alkali grassland species described above. The locations of the stock ponds mapped in the project area are shown in Figure 3. Representative photographs are included in Appendix E.

Path: K:\Projects_1\New_Dimension_Energy\00456_12\mapdoc\Biological_Communities_20121120.mxd Author: Date: 2/19/2013

Mountain House Creek

Patterson Run

Grant Line Rd

Alameda Creek Rd

Mountain House Pkwy

Legend

- Project Area
- Alkali Grassland
- Annual Grassland
- Ephemeral Drainage
- Pond

N

0 0.25 0.5

Miles

Figure 1
Biological Communities

Open water land cover types include natural and human-made aquatic habitats, such as flood control basins, sloughs, canals, and ponds (including stock ponds), that support submerged or floating vegetation. In the project area, two large stock ponds were observed at the southern entrance to the Ralph and Pombo sites (Figure 3). Both were devoid of vegetation at the time and had features (i.e., salt crust) that identified them as being alkaline.

Streams and Drainages

Streams and drainages, though uncommon in the project area, occur in low-lying areas and valley bottoms. Two named streams flow through the project area: Mountain House Creek and Patterson Run (Figure 3). Streams and drainages within the project area are ephemeral.

Special-Status Species

Numerous occurrences of special-status plants and wildlife are known from the region surrounding the project area (Figures 4a and 4b). A summary and brief description of the wildlife and plant species known or with a potential to occur in the project area are provided below.

Wildlife

Based on a review of the CNDDB (2012), the USFWS species list (U.S. Fish and Wildlife Service 2012), and the EACCS (ICF Jones & Stokes 2010), as well as other environmental documents prepared for recent repowering projects near the project area, 15 special-status wildlife species were identified as having the potential to occur in the project area (Table 1). As discussed earlier in this report, avian and bat species that may nest and breed within the project area (e.g., burrowing owl, tricolored blackbird) are addressed in this report and are listed in Table 1. Numerous other special-status birds may occur in the project area during migration and while foraging (e.g., ferruginous hawk, golden eagle), but these species are not addressed in this report because they are not known to nest in the area and thus would only be potentially subject to operational effects.

Of the potentially occurring species, five have not been observed and are not expected to occur in the project area because they are limited to habitats that are not present in the project area, and there are no nearby occurrences listed in the CNDDB. The five species include longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool fairy shrimp(*Branchinecta lynchi*), Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), silver legless lizard (*Anniella pulchra pulchra*), and Alameda whipsnake (*Masticophis lateralis euryxanthus*). The rationale detailing why each of these species does not occur in the study area is provided in Table 1.

The remaining 10 species have a potential to occur; this determination is based on the presence of suitable habitat observed during field surveys, the location of the project area within the species' known range, and/or the presence of nearby occurrences in the CNDDB. Each of these 10 species is discussed briefly below.

California Tiger Salamander

CTS is listed as threatened under ESA and endangered under CESA. CTSs are terrestrial and spend most of their time underground in small burrows, emerging for only brief periods to breed in aquatic habitats. Thus, upland habitats with suitable burrows near aquatic habitats are an essential

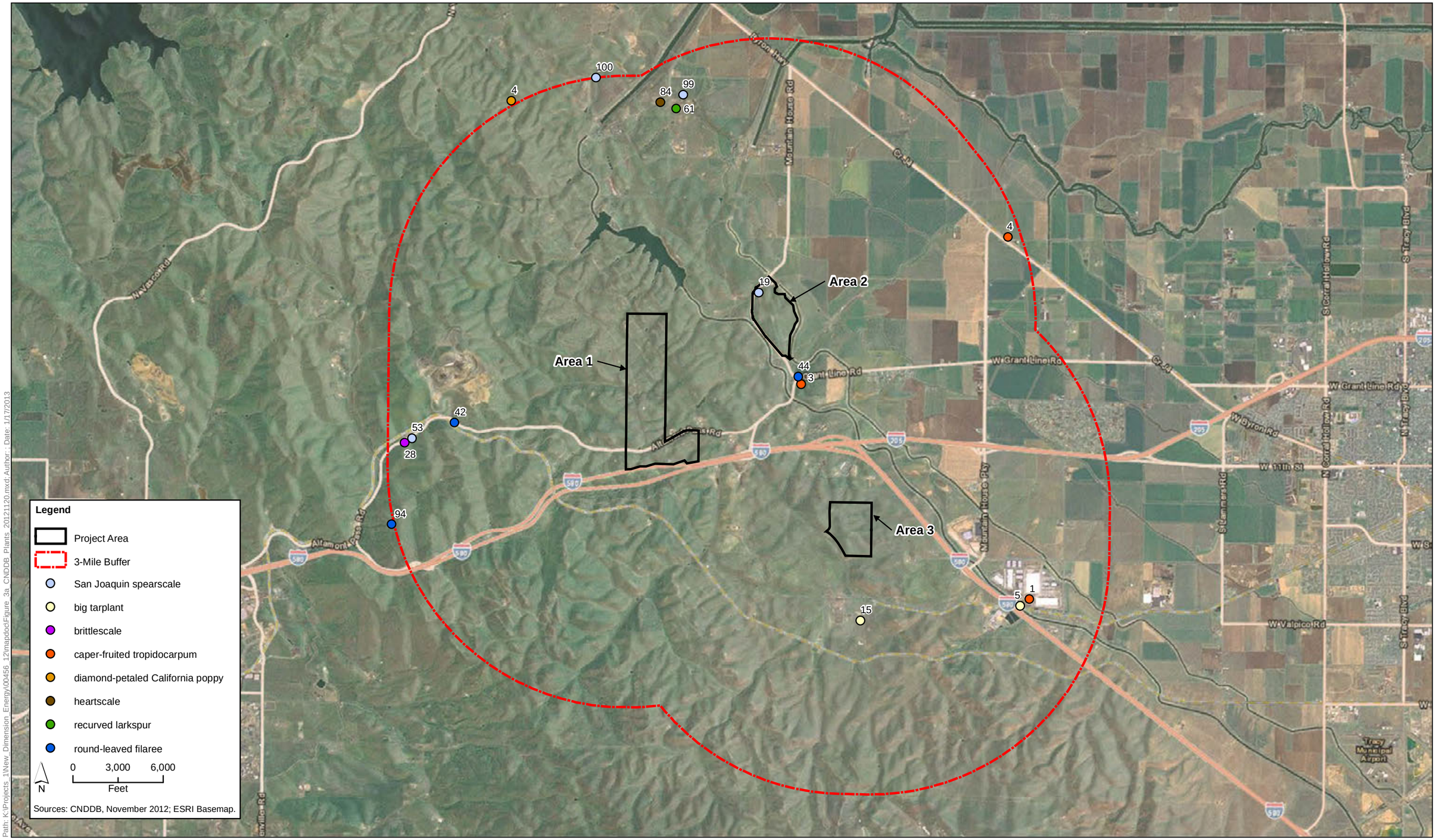

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Figure 4a
California Natural Diversity Database - Plants

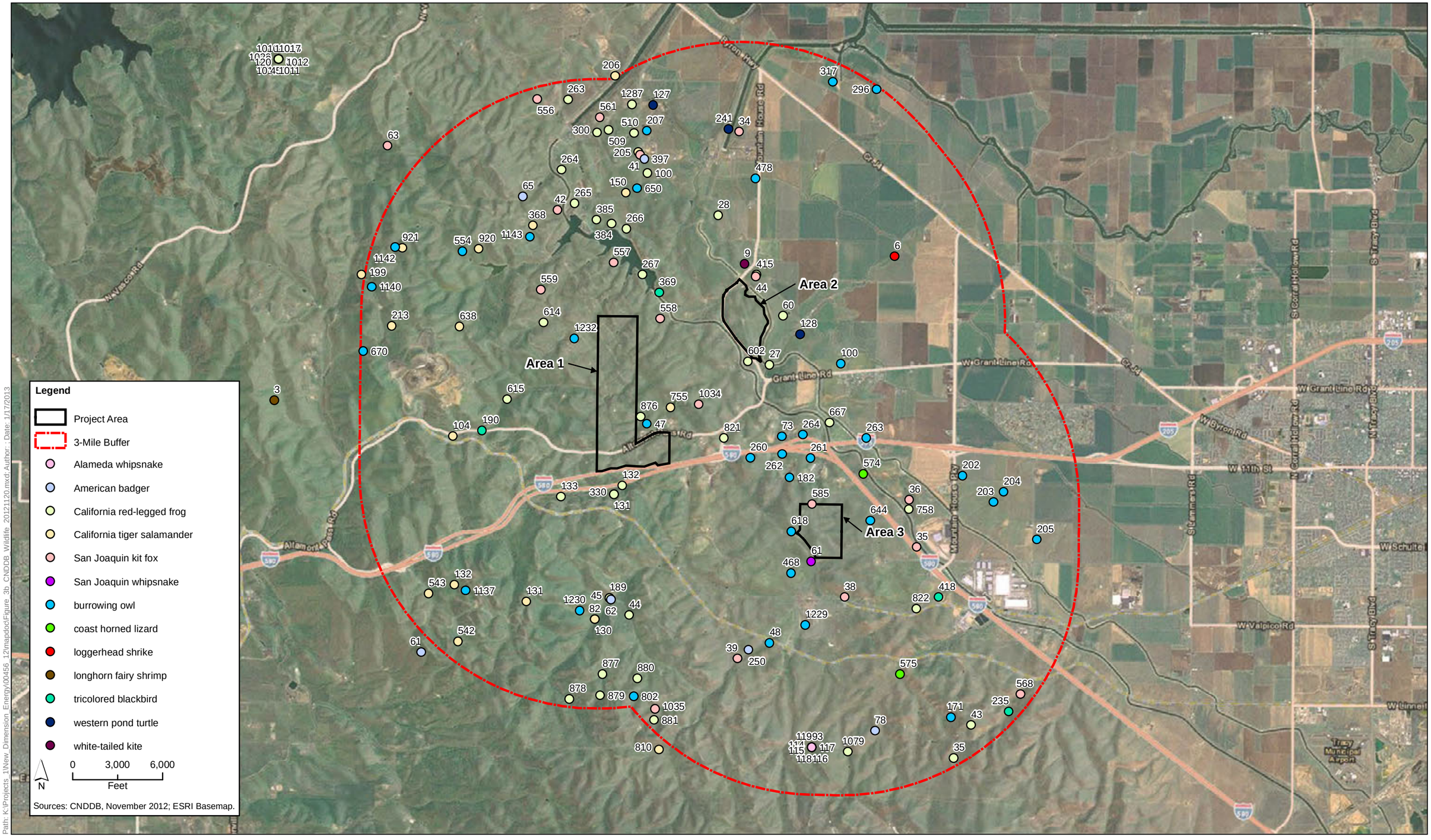

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Figure 4b
California Natural Diversity Database - Wildlife

component influencing the presence or absence of CTS within a particular area. CTS breeding and aestivation habitat includes vernal pools, seasonal and perennial ponds, and surrounding upland areas in grassland and oak savannah plant communities from sea level to about 3,600 feet (69 FR 149, August 4, 2004). The historical range of CTS extends from Butte County in the north to Santa Barbara County in the south (Stebbins 1985). Populations of CTS have declined in much of its former range in the Central Valley because of the conversion of valley and foothill grassland habitats to agricultural and urban uses (Stebbins 1985).

ICF completed a formal site assessment for CTS in August and September 2012 (Appendix C). The results of the site assessment indicate that potential aquatic habitat on the project area is limited to several ponds in Area 1, and suitable upland habitats are present.

California Red-Legged Frog

CRLF is listed as threatened under ESA and is a California species of special concern. CRLFs use a variety of habitats, including various aquatic systems, as well as riparian and upland habitats. CRLFs inhabit marshes, streams, lakes, ponds, and other, usually permanent, sources of water that have dense riparian vegetation (Stebbins 2003). The highest densities of frogs are found in habitats with deepwater pools (at least 2.5 feet deep) surrounded by dense stands of overhanging willows (*Salix* sp.) and a fringe of tules (*Scirpus* sp.) or cattails (*Typha* sp.). Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation. Although CRLFs can inhabit either ephemeral or permanent streams or ponds, populations probably cannot be maintained in ephemeral streams in which all surface water disappears (Jennings and Hayes 1994; U.S. Fish and Wildlife Service 2002).

ICF completed a formal site assessment for CRLF in August and September 2012 (Appendix C). CRLF individuals were observed in a pond in the project area during the site assessment. Additionally, the project area is within critical habitat as designated by the USFWS.

Western Pond Turtle

Western pond turtle is a California species of special concern. Western pond turtles inhabit aquatic habitats such as ponds, marshes, or streams with rocky or muddy bottoms and vegetative cover. They occasionally leave the water to bask, and females leave the water from May through July to lay eggs. These turtles can often be found sunning on emergent logs or rocks near the water's edge but quickly retreat to the water when disturbed (Stebbins 1954).

Because there are no known occurrences of western pond turtles in or near the project area and only marginal habitat is present, the potential for this species to occur within the project area is considered to be low.

San Joaquin Whipsnake

San Joaquin whipsnake is a California species of special concern. They inhabit open, dry areas with little or no tree cover and often occur in association with small mammal burrows. There is one recorded CNDDB occurrence adjacent to the project area (Area 3), and the species has a moderate potential for occurrence overall.

Coast Horned Lizard

Coast horned lizard is a California species of special concern. It occurs in grasslands, shrublands, woodlands, and open forests with loose sandy soils. The CNDDB lists two occurrences within 3 miles of the project area. Loose sandy soils are not common in the project area and, overall, the potential for this species to occur is considered low.

Tricolored Blackbird

Tricolored blackbird is a California species of special concern. It nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or in upland sites with blackberries, nettles, thistles, or grainfields. Suitable nesting habitat for this species is poor within the project area with a general lack of emergent marsh vegetation. The overall potential for this species to nest in the project area is considered low.

Western Burrowing Owl

Western burrowing owl is a state species of special concern. Western burrowing owls are found throughout much of California in annual and perennial grassland, desert, and arid scrubland (California Department of Fish and Game 1995). They can also be found in vacant lots in residential areas, along railroad ballast, along dirt roads, and on canal levees. The critical requirement for western burrowing owl habitat is the presence of burrows. These owls use burrows excavated by ground squirrels and badgers, as well as artificial burrows and other structures such as concrete culverts, debris piles, and openings under roads (California Department of Fish and Game 1995). The species' breeding season extends from March through August, peaking in April and May (Zeiner et al. 1990).

There are numerous documented occurrences of western burrowing owls in the project region, including several adjacent to the project area. Burrowing owl was observed at one location in the project area during field surveys. Overall, the potential for burrowing owl to occur in the project area during construction is considered to be high.

Loggerhead Shrike

Loggerhead shrike is a California species of special concern. It is a widespread breeding species in North America, occurring from the southern Canadian provinces south across most of the United States and into Mexico. In California, loggerhead shrikes occur in open habitats with scattered shrubs, trees, posts, fences, utility lines, and other perches. Habitats include valley foothill forests, pinyon-juniper, desert riparian, and Joshua tree. Loggerhead shrikes are adaptable to urban environments as long as preferred habitat characteristics and abundant prey supplies are present (Yosef 1996). Loggerhead shrike has been observed within the project area, potential habitat is present, and it is considered to have a high potential to occur.

American Badger

American badger is a California species of special concern. The species is found throughout the state except in the north coast region. Badgers are most abundant in drier areas with friable soils. Other fossorial animals often use burrows made by badgers. Badgers are carnivorous and prey on fossorial rodents, especially ground squirrels and pocket gophers, as well as reptiles, insects, earthworms, eggs, and carrion (Zeiner et al. 1990). The CNDDB lists several nearby occurrences of American

badger, and suitable habitat is present in the project area. Overall, American badger is considered to have a high potential to occur in the project area.

San Joaquin Kit Fox

San Joaquin kit fox is federally listed as endangered and state listed as threatened. It inhabits semiarid communities and open canopied woodlands of the San Joaquin Valley and adjacent foothill grasslands (U.S. Fish and Wildlife Service 1997). San Joaquin kit foxes have not been detected in the vicinity of the project area in many years; however, there is a historic occurrence adjacent to the project area of a San Joaquin kit fox observed in 1986. This record is a nonspecific point in the CNDDB, indicating that the exact location is unknown. Regardless of this old occurrence or its exact location, the area is still considered to be within the species' range, and suitable habitat is present. However, given the lack of recent sightings, the overall potential for this species to occur is very low.

Non-Special-Status Migratory Birds and Raptors

Migratory birds and raptors have the potential to nest in the project area vicinity and to forage in the project area. The breeding season for migratory birds and raptors generally extends from early February through early August, although nesting periods vary by species. Forested nesting habitat for these species typically includes riparian and woodland areas, although nonnative trees and electrical towers are also used. There are no suitable trees in the project area; however, there are existing turbine towers and other poles, which may provide nesting habitat for migratory birds and raptors.

Plants

Based on a review of the CNDDB and CNPS Inventory, 25 special-status plant species were identified as having the potential to occur in the project area (Table 2). ICF botanists conducted a pedestrian survey in August and September 2012 within the areas planned for disturbance as part of the initial repowering and did not document any summer-blooming special-status plant species (Appendix D).

Surveys for spring-blooming species have not been conducted as of the preparation of this report and will be necessary to determine the presence or absence of special-status plants in the project area. Several species, such as round-leaved filaree (*California macrophylla*), big tarplant (*Blepharizonia plumose*), and San Joaquin spearscale (*Atriplex joaquiniana*), have been recorded nearby, and the project area has a high potential to support one or more of these species. Additionally, numerous other special-status plants, as outlined in Table 2, may occur within the project area, although they have not been recorded nearby.

Waters of the United States

Potential waters of the United States were identified and mapped on the basis of the presence of observable indicators such as wetland vegetation, wetland hydrology, a defined channel, or a defined bed and bank. This report reflects a conservative assessment of whether a particular area would be considered a water of the United States. Although recent regulatory guidance from USACE may affect whether some wetlands in the project area are jurisdictional, all wetlands and waters generally appear to have a hydrological connection to other waters of the United States and, thus,

Table 2. Special-Status Plant Species Identified as Potentially Occurring or Known to Occur at the Sand Hill Wind Project Area

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area
Large-flowered fiddleneck *Amsinckia grandiflora*	E/E/1B.1	Historically known from Mount Diablo foothills in Contra Costa, Alameda, and San Joaquin Counties; currently known from three natural occurrences	Cismontane woodland, valley and foothill grassland slopes; 275–550 m	Apr–May	Low
Bent-flowered fiddleneck *Amsinckia lunaris*	–/–/1B.1	Inner North Coast Ranges, San Francisco Bay Area, west-central Great Valley	Coastal bluff scrub, valley and foothill grasslands, cismontane woodlands, from 10–1,645 feet above msl	Mar–Jun	Moderate
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, east San Francisco Bay Area	Grassy flats and vernal pool margins, on alkali soils, 0–200 above msl	Mar–Jun	High
Heartscale *Atriplex cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills	Alkali grassland, alkali meadow, alkali scrub, 0–660 feet above msl	May–Oct	High
Brittlescale *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley	Alkali grassland, alkali meadow, alkali scrub, chenopod scrub, playas, valley and foothill grasslands on alkaline or clay soils, 0–660 feet above msl	May–Oct	High
San Joaquin spearscale *Atriplex joaquiniana*	–/–/1B.2	West edge of Central Valley from Glenn County to Tulare County	Alkali meadow, alkali grassland, saltbush scrub; 0–2,740 feet above msl	April–Sept	High
Lesser saltscale *Atriplex minuscula*	–/–/1B.1	Sacramento and San Joaquin Valley, Butte County and from Merced County to Kern County	Alkali sink and sandy alkaline soils in grasslands, chenopod scrub, between 65–325 feet above msl	May–Oct	High
Big-scale balsamroot *Balsamorhiza macrolepis*	–/–/1B.2	Scattered occurrences in the Coast Ranges and Sierra Nevada foothills	Rocky annual grassland and fields, foothill woodland hillsides, sometimes serpentinite, 0–4,600 feet above msl	Mar–Jun	Moderate
Big tarplant *Blepharizonia plumosa*	–/–/1B.1	San Francisco Bay area, with occurrences in Alameda, Contra Costa, San Joaquin*, Stanislaus, and Solano Counties	Valley and foothill grassland; 30–505 m	Jul–Oct	High

[1]Floristic provinces as defined in Baldwin et al. 2012.

Table 2. Continued

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area
Round-leaved filaree *California macrophylla*	–/–/1B.1	Scattered occurrences in the Great Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges	Cismontane woodland, valley and foothill grassland on clay soils; 15–1,200 m	Mar–May	High
Lemmon's jewel-flower *Caulanthus lemmonii*	–/–/1B.2	Southeast San Francisco Bay Area, south through the South Coast Ranges and adjacent San Joaquin Valley to Ventura County	Dry, exposed slopes in grasslands and pinyon–juniper woodland; 80–1,220 m	Mar–May	Low
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	–/–/1B.2	East San Francisco Bay Area, Salinas Valley, Los Osos Valley	Annual grassland, on lower slopes, flats, and swales, sometimes on alkaline or saline soils, 0–700 feet above msl	Jun–Nov	Moderate
Hispid bird's-beak *Chloropyron molle* ssp. *hispidum*	–/–/1B.1	Central Valley: Alameda, Kern, Merced, Placer, and Solano Counties	Meadow, grassland, playa, on alkaline soils; 0–500 feet above msl	Jun–Sept	Moderate
Palmate bird's-beak *Chloropyron palmatus*	E/E/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa County to Fresno County	Alkaline grassland, alkali meadow, chenopod scrub; 16–509 feet above msl	May–Oct	Low
Livermore tarplant *Deinandra bacigalupii*	–/–/1B.2	Endemic to Alameda County (Livermore Valley)	Alkaline meadows; 490–610 feet above msl	June–Oct	Moderate
Recurved larkspur *Delphinium recurvatum*	–/–/1B.2	San Joaquin Valley and central valley of the South Coast Ranges, Contra Costa County to Kern County	Subalkaline soils in annual grassland, saltbush scrub, cismontane woodland, and vernal pools; 10–2,592 feet above msl	Mar–May	High
Diamond-petaled California poppy *Eschscholzia rhombipetala*	–/–/1B.1	Interior foothills of South Coast Ranges from Alameda County to Stanislaus Counties, Carrizo Plain in San Luis Obispo County	On alkaline clay soils in grassland, chenopod scrub, where grass cover is sparse enough to allow growth of low annuals; below 975 m	Mar–Apr	Moderate

Table 2. Continued

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area
Contra Costa goldfields *Lasthenia conjugens*	E/–/1B.1	Scattered occurrences in Coast Range valleys and southwest edge of Sacramento Valley, Alameda, Contra Costa, Mendocino, Monterey, Napa, Santa Barbara*, Santa Clara*, and Solano Counites.	Alkaline or saline vernal pools and swales; 0–700 feet above msl	Mar–Jun	Low
Showy golden madia *Madia radiata*	–/–/B.1	Scattered populations in the interior foothills of the South Coast Ranges: Contra Costa*, Fresno, Kings*, Kern, Monterey*, Santa Barbara*, San Benito, Santa Clara, San Joaquin*, San Luis Obispo, and Stanislaus Counties	Oak woodland, valley and foothill grassland, slopes; 25–900 m	Mar–May	Moderate
Mt. Diabo cottonweed *Micropus amphibolus*	–/–/3.2	Coast Ranges from Lake County to Santa Barbara County	Mixed evergreen forest, oak woodland, chaparral, grasslands; 150–2,715 feet above msl	March–May	Low
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Central Valley, South Coast: Alameda, Butte, Contra Costa, Colusa, Kern, Riverside, San Bernardino, San Diego, Solano, and Stanislaus Counties	Alkaline vernal pools and marshes; 66-2,100 feet above msl	Mar–Jun	Low
Shining navarretia *Navarretia nigelliformis* ssp. *radians*	–/–/1B.2	Interior foothills of South Coast Ranges from Merced County to San Luis Obispo County	Mesic areas with heavy clay soils, in swales and clay flats; in oak woodland, grassland; 76–1000 m	Apr–Jul	Low
Hairless popcorn flower *Plagiobothyrs glaber*	–/–/1A	Coastal valleys from Marin County to San Benito Counties	Alkaline meadows, coastal salt marsh; 49–591 feet above msl	Apr–May	Low
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Sacramento Valley, central western California	Salt marsh, mesic alkaline areas in grasslands, vernal pools; 0–984 feet above msl	Apr–Jun	Low
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	–/–/1B.1	Historically known from the northwest San Joaquin Valley and adjacent Coast Range foothills; currently known from Fresno, Monterey, and San Luis Obispo Counties	Grasslands on alkaline hills; below 455 m	Mar–Apr	Low

Table 2. Continued

Common and Scientific Name	Legal Status[a] Federal/State/ Rare Plant Rank	Geographic Distribution/Floristic Province[1]	Habitat Requirements	Reported Blooming Period	Potential to Occur in the Project Area

[a] Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.

– = no listing.

State

E = listed as endangered under the California Endangered Species Act.

– = no listing.

California Rare Plant Rank[2]

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

3 = List 3 species: uncertain taxonomic status

4 = List 4 species: limited distribution and on a watch list.

0.1 = seriously endangered in California.

0.2 = fairly endangered in California.

* = presumed extirpated from that county.

msl = mean sea level

m = meters

[2] In March, 2010, DFG changed the name of "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or CRPR). This was done to reduce confusion over the fact that CNPS and DFG jointly manage the Rare Plant Status Review groups (300+ botanical experts from government, academia, NGOs, and the private sector) and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment.

are assumed to be jurisdictional for the purposes of this assessment. A final determination on the jurisdiction of features within the project area would be made by USACE.

Biological communities that could potentially qualify as waters of the United States (including wetlands) are present in the project area. These communities are listed below.

- Alkali grasslands (inclusions within alkali grassland would qualify as wetlands)
- Stock ponds
- Streams and drainages

Each of these communities is described above in Chapter 3, *Results* (Biological Communities). The location and extent of areas considered potential waters of the United States are depicted on Figure 3. As discussed above, a formal wetland delineation was not conducted as part of this study and is not necessary to determine the areas potentially subject to USACE jurisdiction. A conservative approach to mapping wetland features was used to ensure that all features that could be considered waters of the United States were mapped.

Chapter 4
Effects Analysis

This section assesses the potential direct and indirect effects on biological resources that could result from construction of the Sand Hill wind project. A final determination on the potential effects of the proposed project will be made by Alameda County, the lead agency under CEQA.

Impacts of the Proposed Project

Biological Communities

The proposed project would primarily affect annual grassland areas surrounding the currently existing wind turbines. Several areas of alkali grassland and other seasonal wetlands occur within the project area and may be affected by project activities. In general, these areas are located in topographically low areas, whereas the turbines are located in topographically higher areas. Consequently, potential impacts, if they were to occur, would likely be associated with road improvements, collection line installation, and other infrastructure required to operate the proposed project. This impact would be evaluated during the CEQA process and, if found to be significant, would require mitigation, depending on the type and quantity of the habitats affected.

Special-Status Species

As discussed in Chapter 3, *Results*, 10 special-status wildlife species are known to occur or have a potential to occur in the project area. Potential impacts on these species are discussed below.

Impacts on habitat for California tiger salamander and California red-legged frog

The results of the CTS and CRLF site assessment indicate that the project area provides suitable aquatic and upland habitats for CTS. Although not observed directly during this study, CTS is likely to occur in aquatic habitats in or near the project area. The Interim Guidance from USFWS and CDFW (October 2003) indicates that CTSs are known to travel up to 1.24 miles from aquatic breeding habitat and, thus, could conceivably occur anywhere within the project area. CRLF was observed in a pond in the project area during this study and is consequently assumed to be present in other ponds. No formal guidance exists regarding upland buffer recommendations for either species; however, both species are known to travel large distances from aquatic breeding habitat into surrounding uplands.

According to the initial repowering site plans provided to ICF, all project components are located outside suitable aquatic habitat identified in the project area (i.e., the stock ponds); consequently, the initial repowering as designed would not affect aquatic habitat for CTS or CRLF. The proposed project would, however affect suitable upland habitats that may be occupied by CTS or CRLF.

Impacts on San Joaquin kit fox

Although the likelihood of occurrence is very low because the species has not been detected in the vicinity of the project area in many years, San Joaquin kit fox could be present in the project area at

the time of construction and individuals could be injured or killed during construction of the proposed project.

Impacts on western pond turtle

According to the initial repowering site plans provided to ICF, all project components are located outside potential aquatic habitat identified in the project area (i.e., the stock ponds); consequently, the initial project as designed would not affect aquatic habitat for western pond turtle. Although the likelihood of occurrence is low, western pond turtle could occur in the project area at the time of construction and individuals could be injured or killed during construction of the proposed project.

Impacts on San Joaquin whipsnake and coast horned lizard

The likelihood San Joaquin whipsnake and coast horned lizard could occur in the project area at the time of construction is moderate and low, respectively; individuals could be injured or killed during construction of the proposed project.

Impacts on American badger

American badger is known to occur in the Altamont Pass area and individuals could be injured or killed during construction of the proposed project.

Impacts on western burrowing owl

Western burrowing owl is commonly observed in the Altamont Pass area and was observed in the project area during surveys for this study. Burrowing owls could occur in the project area at the time the proposed project begins construction; consequently, construction activities could injure or kill nesting birds.

Impacts on nesting raptors and special-status birds

The proposed project has the potential to affect nesting birds during construction. Several species are known to occur in the area and could be affected through nest removal or disturbance during the nesting season. There are no suitable trees in the project area; however, there are existing turbine towers and other poles which may provide nesting habitat for migratory birds and raptors.

Impacts on special-status plants

The proposed project has the potential to affect spring-blooming special-status plants. A pedestrian survey in August and September 2012 did not document any summer-blooming special-status plant species. Surveys for spring-blooming species have not been conducted as of the preparation of this report and will be necessary to fully determine the presence or absence of special-status plants in the project area. Several species, such as round-leaved filaree, big tarplant, and San Joaquin spearscale, have been recorded nearby, and the project area has a high potential to support one or more of these species.

Jurisdictional Waters

Preliminary drawings indicate that some road improvements would be completed as part of the proposed project. Depending on final engineering and the extent of these improvements, some improvements to existing wetland and/or stream crossings may be necessary. While these improvements are likely to be minor, they would potentially require permits from USACE under Section 404 of the CWA and/or a streambed alteration agreement from CDFW.

Wildlife Nursery Sites or Migratory Corridors

No wildlife nursery sites or non-avian migration corridors have been identified in the project area. Accordingly, there would be no impacts as a result of the proposed project.

Local Policies or Ordinances

The proposed project would not conflict with any local policies or ordinances protecting biological resources. For example, there are no native trees present in the project area, so the proposed project would not conflict with a tree preservation policy or ordinance.

Habitat Conservation Plans

The proposed project would not conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state plan because the proposed project does not occur in an area covered by any of these types of plans. As discussed in this report, the EACCS planning area includes the APWRA within Alameda County. This plan is not a formal HCP, and although Alameda County is a participant in the plan, participation in the strategy by project applicants is voluntary.

Chapter 5
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Appendix A

U.S. Fish and Wildlife Service Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

November 20, 2012

Document Number: 121120111351

Brad Schafer
ICF International
630 K Street, Suite 400
Sacramento, CA 95814

Subject: Species List for Sand Hills Wind Project

Dear: Interested party

We are sending this official species list in response to your November 20, 2012 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be February 18, 2013.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found here.

Endangered Species Division

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 121120111351

Database Last Updated: September 18, 2011

Quad Lists

Listed Species

Invertebrates

Branchinecta longiantenna
longhorn fairy shrimp (E)

Branchinecta lynchi
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Lepidurus packardi
vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus
Critical habitat, delta smelt (X)
delta smelt (T)

Oncorhynchus mykiss
Central Valley steelhead (T) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Masticophis lateralis euryxanthus
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

Thamnophis gigas
giant garter snake (T)

Mammals

Vulpes macrotis mutica
San Joaquin kit fox (E)

Plants

Amsinckia grandiflora
Critical habitat, large-flowered fiddleneck (X)

large-flowered fiddleneck (E)

Quads Containing Listed, Proposed or Candidate Species:

MIDWAY (445A)

County Lists

Alameda County

Listed Species

Invertebrates

Branchinecta conservatio
Conservancy fairy shrimp (E)

Branchinecta longiantenna
Critical habitat, longhorn fairy shrimp (X)
longhorn fairy shrimp (E)

Branchinecta lynchi
Critical habitat, vernal pool fairy shrimp (X)
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Euphydryas editha bayensis
bay checkerspot butterfly (T)

Icaricia icarioides missionensis
mission blue butterfly (E)

Lepidurus packardi
Critical habitat, vernal pool tadpole shrimp (X)
vernal pool tadpole shrimp (E)

Speyeria callippe callippe
callippe silverspot butterfly (E)

Fish

Acipenser medirostris
green sturgeon (T) (NMFS)

Eucyclogobius newberryi
tidewater goby (E)

Hypomesus transpacificus
Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus kisutch
coho salmon - central CA coast (E) (NMFS)

Oncorhynchus mykiss
Central California Coastal steelhead (T) (NMFS)
Central Valley steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)
Critical habitat, CA tiger salamander, central population (X)

Rana draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Masticophis lateralis euryxanthus
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

Thamnophis gigas
giant garter snake (T)

Thamnophis sirtalis tetrataenia
San Francisco garter snake (E)

Birds

Charadrius alexandrinus nivosus
western snowy plover (T)

Pelecanus occidentalis californicus
California brown pelican (E)

Rallus longirostris obsoletus
California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Mammals

Reithrodontomys raviventris
salt marsh harvest mouse (E)

Vulpes macrotis mutica
San Joaquin kit fox (E)

Plants

Amsinckia grandiflora
Critical habitat, large-flowered fiddleneck (X)
large-flowered fiddleneck (E)

Arctostaphylos pallida
pallid manzanita (=Alameda or Oakland Hills manzanita) (T)

Chorizanthe robusta var. robusta
robust spineflower (E)

Clarkia franciscana
Presidio clarkia (E)

Cordylanthus palmatus
palmate-bracted bird's-beak (E)

Holocarpha macradenia
Critical habitat, Santa Cruz tarplant (X)
Santa Cruz tarplant (T)

Lasthenia conjugens
Contra Costa goldfields (E)
Critical habitat, Contra Costa goldfields (X)

Layia carnosa
beach layia (E)

Suaeda californica
California sea blite (E)

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland

habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be February 18, 2013.

Appendix B

Biological Community Mapping Memorandum

September 28, 2012

Mr. Peter Pawlowski
FloDesign Wind Turbine Corporation
221 Crescent St. Ste. 103A
Waltham, MA 02453

Subject: Biological Community Mapping for the Sand Hill Wind Farm Project

Dear Mr. Pawlowski:

This memorandum documents the results of biological community (i.e., habitat) mapping conducted at the Sand Hill Wind Project Site, located in Alameda County, California. Two ICF International botanists, John Holson and Seth Kirby, conducted late-season botanical surveys for the Griffith, Ralph and Pombo, and Arnaudo project sites in Alameda County, California and concurrently mapped and described biological communities within the project area. These surveys were conducted at FloDesign Wind Turbine Corporation's (FloDesign's) request to support the Biological Resources Technical Report (BRTR), currently in preparation by ICF.

FloDesign intends to implement a repowering program that will include the removal of the existing turbines and replacing them with a new technology turbine known as a *mixer-ejector wind turbine* (MEWT). FloDesign seeks to accomplish the repowering in two or more phases through 2016. The first phase of the project (referred to as the *initial repower*) would involve the removal of approximately 70-80 existing turbines and the installation of approximately 40 MEWTs as a test case to assess the functionality of the new MEWT design and determine the extent to which it reduces impacts on birds and bats compared to fatality associated with the existing turbines. The study area is composed of three aforementioned sites, and contains primarily non-native annual grassland, alkali grassland, and open water habitats. The biological community mapping included all areas within the project area. This memo summarizes the methods and results of our surveys.

Methods

Mr. Holson and Mr. Kirby conducted surveys on August 7 and 8 and September 21, 2012. The surveys were conducted by walking and driving portions of the study area over a period of approximately 4–6 hours each day. All areas within the project area were examined on foot, by vehicle, or using binoculars. The botanists also took photographs of representative habitats within the project area. The location and extent of biological communities, and notes on biological communities, were recorded on aerial photographs and were later digitized into a Geographic Information System (GIS) format, for use in preparation of the BRTR and associated species assessments. Biological community types mapped in the project area were classified to be consistent with those used in the East Alameda County Conservation Strategy (EACCS).

Results

The biological communities (land cover types) that occur in the Sand Hills project area are described below and are depicted on Figure 1.

Nonnative Annual Grassland

Nonnative annual grassland is the most common biological community in the project area. It is an herbaceous community dominated by naturalized annual grasses with intermixed perennial and annual forbs. Annual grassland in the study area commonly exhibits low levels of diversity and is dominated by ripgut brome (*Bromus diandrus*), soft chess brome (*Bromus hordeaceous*), yellow star-thistle (*Centaurea solstitialis*), Italian ryegrass (*Lolium multiflorum*), and wild oat (*Avena fatua*). Annual grasslands are common both regionally and statewide and are not considered sensitive natural communities by the California Department of Fish and Game (DFG), although they can support special-status species.

Alkali Grassland

This habitat type is relatively common in the project area, occurring in low-lying areas and valleys. Portions of this habitat type are intermittently flooded and saturated by alkaline water and are dominated almost entirely by saltgrass (*Distichlis spicata*) with Baltic rush (*Juncus balticus*) and alkali heath (*Frankenia salina*). In addition, nonnative annual grasses, such as sea barley (*Hordeum marinum*) and soft chess brome, are also common associates. Grasses are typically short in stature, growing less than 1 meter high. Alkali grassland is considered a sensitive natural community by and is listed in the EACCS as a conservation priority. In addition to its status as a sensitive natural community, it also provides potential habitat for special-status plants, and portions would likely qualify as waters of the United States (wetlands) under Section 404 of the CWA.

Stock Ponds

Several stock ponds were mapped in the project area. In the Altamont Pass area, stock ponds are small permanent or seasonal bodies of water that have been constructed for the purposes of retaining runoff water for livestock use. The surface area of these features varies widely depending on the time of year. Within the project area, these features are located in low-lying drainages and valley bottoms, and the vegetation surrounding them is typically dominated by the alkali grassland species described above.

Open water land cover types include natural and human-made aquatic habitats, such as flood control basins, sloughs, canals, and ponds (including stock ponds), that support submerged or floating vegetation. In the project area, two large stock ponds were observed at the southern entrance to the Ralph and Pombo sites.

Streams and Drainages

Streams and drainages, though uncommon in the project area, occur in low-lying areas and valley bottoms. Two named streams flow through the project area: Mountain House Creek and Patterson Run. Streams and drainages within the project area are ephemeral.

Conclusions and Recommendations

The project site is primarily a non-native annual grassland community, however several wetland and other habitat types considered sensitive by DFG are located in the project area. We recommend avoiding these features to the extent feasible. Figure(s) showing the location and extent of the biological communities described above will be included in the BRTR.

If you have any questions regarding the results of this survey, please contact us at (916) 737-3000.

Sincerely,

John Holson
Botanist

Path: K:\Projects_1\New_Dimension_Energy\00456_12\mapdoc\Biological_Communities_20121120.mxd Author: Date: 2/19/2013

Mountain House Creek

Patterson Run

Grant Line Rd

Alameda Creek Rd

Mountain House Pkwy

Legend

- Project Area
- Alkali Grassland
- Annual Grassland
- Ephemeral Drainage
- Pond

N

0 0.25 0.5

Miles

Figure 1
Biological Communities

Appendix C

California Red-legged Frog and California Tiger Salamander Site Assessment

California Red-legged Frog and California Tiger Salamander Habitat Site Assessment for the Sand Hill Wind Project, Alameda County

Prepared for:

FloDesign Wind Turbine Corporation
221 Crescent St, Ste. 103A
Waltham, MA 02453
Contact: Peter Pawlowski
240.351.5000

Prepared by:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Will Kohn
858.444.3905

December 2012

ICF International. 2012. California Tiger Salamander and California Red-legged Frog Habitat Site Assessment for the Sand Hill Wind Project, Alameda County. December. (ICF 00456.12.) Sacramento, CA. Prepared for FloDesign Wind Turbine Corporation, Waltham, MA.

Contents

Tables and Figures

Acronyms and Abbreviations

APWRA	Altamont Pass Wind Resources Area
Avian Study	avian validation study funded by a PIER grant from the California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CRLF	California red-legged frog
CTS	California tiger salamander
DFG	California Department of Fish and Game
EIRs	environmental impact reports
ESA	federal Endangered Species Act
FloDesign	FloDesign Wind Turbine Corporation
FR	Federal Register
kW	kilowatts
MEWT	mixer-ejector wind turbine
MW	megawatts
O&M	operations and maintenance
PPA	a power purchase agreement
USFWS	U.S. Fish and Wildlife Service

California Red-legged Frog Habitat and California Tiger Salamander Site Assessment for the Sand Hill Wind Project, Alameda County

Introduction

In April2012, FloDesign Wind Turbine Corporation (FloDesign) acquired existing wind farm installations (Existing Turbines) owned by SeaWest Power Resources, LLC on multiple parcels of land located in the northwest corner of Alameda County in the Altamont Pass Wind Resources Area (APWRA) (Figure 1). FloDesign intends to implement a repowering program (Project) that will include the removal of the Existing Turbines and replace them with a new technology turbine known as mixer-ejector wind turbine (MEWT). FloDesign seeks to accomplish the repowering in two or more phases through 2016.

The first phase of the Project (referred to as the "Initial Repower" by FloDesign) would involve the removal of 70-80 Existing Turbines and the installation of 40 MEWTs as a test case to assess the functionality of the new MEWT design and determine the extent to which it reduces impacts on birds and bats compared to the Existing Turbines. The assessment would consist of an avian validation study funded by a PIER grant from the California Energy Commission (Avian Study), which is currently in progress. FloDesign would use the test results of the Avian Study and MEWT performance data to inform its approach to repowering the remainder of the Existing Turbines in future phases. The precise development specifications of future phases are not known at this time.

This document presents the methods and results of a site assessment that was conducted at FloDesign's request to determine the presence of both aquatic and upland habitat suitable to support California red-legged frog (*Rana aurora*) (CRLF) and California tiger salamander (*Ambystoma californiense*) (CTS) within the proposed project area and its vicinity. Because the Project would be constructed within the range of CRLF (listed as threatened under the federal Endangered Species Act [ESA]) and CTS (listed as threatened under both ESA and the California Endangered Species Act [CESA]), compliance with ESA and CESA is necessary. Accordingly, a determination of presence or likelihood of presence of listed species is required.

This CRLF and CTS habitat assessment is intended to supplement a larger biological resources assessment currently in preparation by ICF for the proposed project. This report will be submitted to the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (DFG) by FloDesign, for their review and recommendations regarding CRLF and CTS.

Project Description

The Project consists of (i) the Initial Repower of up to 4 megawatts (MW) and the Avian Study; and (ii) subsequent repowers of up to 32 MW. The Project is located on sites within the APWRA, an area designated by the State of California and recognized by Alameda County as a Wind Resource Area because it maintains winds at a level that supports economically viable wind energy projects.

The Initial Repower would use a new type of wind turbine known as a MEWT. The MEWTs are approximately 65.6 feet (20 meters) in diameter, would have a hub height of 118.8 feet (36.2 meters) and have a total turbine height of 190 feet (57.9 meters). The MEWTs contemplated for the Initial Repower would have a nameplate generating capacity of 100 kilowatts (kW) per turbine.

The MEWTs installed for the Initial Repower would be interspersed throughout the existing facilities, covering approximately 1,058 acres and comprising seven parcels in three nearby but separated areas (referred to as "Areas 1, 2, and 3" in this report) currently occupied by Existing Turbines and their supporting facilities. The Initial Repower would decommission and remove 70-80 of the Existing Turbines and replace them with 40 MEWTs, with the remaining Existing Turbines remaining in place for at least one year as controls for the Avian Study.

Because the MEWTs will be installed within an existing wind project footprint, no new access roads will be needed, though minor improvements or modifications to existing roads may be necessary. The Initial Repower includes construction of new pads for the MEWTs, some minor connections to the existing power collection system, and temporary lay-down areas. The Initial Repower would connect to the power grid using existing infrastructure; no new substation or interconnection lines, or operations and maintenance (O&M) facilities will be needed.

The power produced by the Initial Repower would be sold via a power purchase agreement (PPA) between the producer and a consumer that sets the price of the power. A PPA also provides assurances necessary to secure financing for constructing a project and establishes a targeted completion date. The electricity would be transmitted to the consumer power market in Northern California through utilities, municipalities, and cooperatives in furtherance of the goals of the 33% California Renewable Energy Portfolio standard.

California Red-Legged Frog Species Description

Legal Status

USFWS designated the CRLF as threatened on June 24, 1996 (*61* Federal Register [FR] *25813*). Critical habitat for CRLF was first designated on April 13, 2006 (71 FR 19244). Revised critical habitat for CRLF was designated on March 17, 2010 (75 FR:12815). The entire project site is located within the CRLF Critical Habitat Unit ALA-2. In 2002, USFWS issued the *Recovery Plan for the California Red-legged Frog*. The objective of the recovery plan is to reduce threats to CRLF and improve the population status sufficiently to warrant delisting.

Distribution

The historical range of CRLF extended along the coast from the vicinity of Point Reyes National Seashore in Marin County, California, and inland from the vicinity of Redding, California, southward to northwestern Baja California, Mexico. Its current range consists of isolated locations in the Sierra Nevada, throughout the northern Coast Ranges, and in the northern Transverse Ranges. It is relatively common in the San Francisco Bay Area and along the central coast and is still present in Baja California. CRLF has been found at elevations from sea level to about 5,000 feet, although nearly all sightings have been reported below 3,500 feet (U.S. Fish and Wildlife Service 2002).

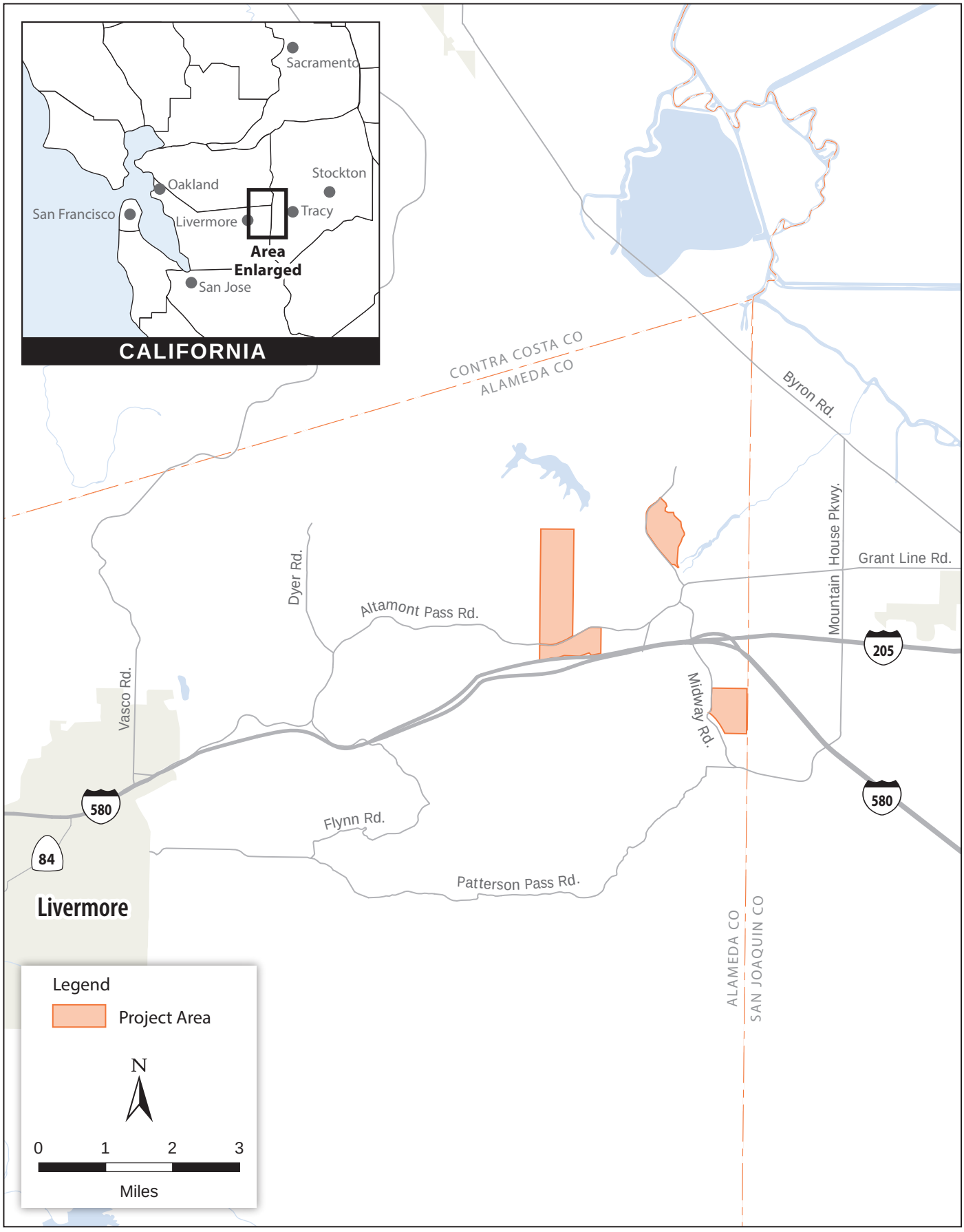

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Figure 1
Project Location

Habitat Requirements

CRLFs use a variety of habitats, including various aquatic systems as well as riparian and upland habitats. CRLFs inhabit marshes, streams, lakes, ponds, and other usually permanent sources of water that have dense riparian vegetation (Stebbins 2003). The highest densities of frogs are found in habitats with deepwater pools (at least 2.5 feet deep) surrounded by dense stands of overhanging willows (*Salix* sp.) and a fringe of tules (*Scirpus* sp.) or cattails (*Typha* sp.). Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation. Although CRLFs can inhabit either ephemeral or permanent streams or ponds, populations probably cannot be maintained in ephemeral streams in which all surface water disappears (Jennings and Hayes 1994; U.S. Fish and Wildlife Service 2002).

As adults, CRLFs are highly aquatic when active but depend less on permanent water bodies than other frog species, such as bullfrogs (*Rana catesbiana*). Adults may take refuge during dry periods in rodent burrows or leaf litter in riparian habitats. Although CRLFs typically remain near streams or ponds, marked and radio-tagged frogs have been observed moving more than 2 miles through upland habitat. These movements are typically made during wet weather and at night (U.S. Fish and Wildlife Service 2002).

CRLFs typically breed from late November to late April. Female frogs typically lay between 2,000 and 6,000 eggs around aquatic vegetation, which hatch in 6–14 days (Jennings and Hayes 1994). Larvae require 11–20 weeks to metamorphose into adult frogs (U.S. Fish and Wildlife Service 2002). However, in some locations, larvae have been observed to take more than a year to complete metamorphosis (Fellers et al. 2001). Of the various life stages, larvae have the highest mortality rates; less than 1% of the eggs laid reach metamorphosis. Sexual maturity is normally reached at 3–4 years, and life expectancy is 8–10 years (U.S. Fish and Wildlife Service 2002).

The diet of CRLFs is highly variable. Larval CRLFs probably eat algae (Jennings and Hayes 1994; U.S. Fish and Wildlife Service 2002). Vertebrates, such as Pacific treefrogs (*Pseudacris regilla*) and California deer mice (*Peromyscus californicus*), represented more than half of the food source for the adult frogs. Invertebrates also make up a large proportion of the diet of adult frogs. Juvenile frogs are active diurnally and nocturnally, whereas adult frogs are largely nocturnal. Feeding activity most commonly occurs along the shoreline and on the surface of the water (U.S. Fish and Wildlife Service 2002).

Reasons for Decline

The decline of CRLF is attributable to a variety of factors. Large-scale commercial harvesting of CRLFs led to severe depletions of populations at the turn of the century. Subsequently, exotic aquatic predators such as bullfrogs, crayfish (*Procambarus clarki*), and various species of fish became established and contributed to the continued decline of the species (U.S. Fish and Wildlife Service 2002). Habitat alterations, such as conversion of natural lands to agricultural and commercial uses, destruction and degradation of riparian forests, reservoir construction, and unmanaged land use practices (e.g., unmanaged livestock grazing and unregulated off-highway vehicle use) are unfavorable to CRLF and threaten some of the remaining populations (Jennings and Hayes 1994; U.S. Fish and Wildlife Service 2002).

California Tiger Salamander Species Description

Legal Status

The central California population of CTS is federally listed as threatened (69 FR 47212–47248; August 4, 2004). Distinct population segments in Santa Barbara and Sonoma Counties are federally listed as endangered (70 FR 49380-49458, August 23, 2005). California tiger salamander is also listed as threatened under CESA.

Critical habitat was finalized for the central population of CTS on August 23, 2005 (70 FR 49380-49458, August 23, 2005). USFWS divided the current range of the central California population into four regions: Central Valley, Southern San Joaquin Valley, East Bay, and Central Coast. These regions reflect the genetic structure of the subspecies. The project area does not occur within any designatedcritical habitat for CTS.

Distribution

CTS is endemic to the San Joaquin–Sacramento River valleys, bordering foothills, and coastal valleys of central California (Barry and Shaffer 1994). The species' range is from Sonoma County and the Colusa-Yolo County line south to Santa Barbara County in the Coast Ranges and from southern Sacramento County south to Tulare County in the Central Valley (Jennings and Hayes 1994). CTS occur at elevations from sea level to approximately 3,900 feet in the Coast Ranges and to approximately 1,600 feet in the Sierra Nevada foothills (Jennings and Hayes 1994).

Habitat Requirements

CTS is a lowland species restricted to annual grasslands and foothill oak savanna regions where its breeding habitat occurs. Breeding habitat consists of temporary ponds or pools, some permanent waters, and, rarely, slower portions of streams. Permanent aquatic sites are unlikely to be used for breeding unless they lack predators. CTS requires dry-season refuge sites in the vicinity of breeding sites. California ground squirrel burrows are important dry-season refuge sites for adults and juveniles. Other types of small mammal burrows, logs, and shrink-swell cracks also are utilized for dry-season refuge (Jennings and Hayes 1994).

Adult CTS move from subterranean burrow sites to breeding pools during November–February after warm late fall and winter rains. Eggs are laid in January–February, at the height of the rainy season. About 9–12 weeks are needed to complete development through metamorphosis. During winter, CTS take refuge in damp places near the surface of the ground during the day and emerge at night to forage. During dry weather, they take refuge in ground squirrel burrows, crevices in the soil, or other burrows. They are known to travel large distances from breeding ponds into upland habitats. One study found that 20–25% of individuals captured at one pond were recaptured at ponds approximately 1,900 and 2,200 feet away (Trenham et al. 2001). Trenham and Schaffer (2005) found that juveniles in Solano County used upland habitats farther from breeding ponds than did adults (2,297 feet maximum for juveniles contrasted with 813 feet maximum for adults). In addition to traveling long distances during migration to or from ponds, California tiger salamanders might reside in burrows that are a far distance from ponds. Dry-season refuge sites within approximately 1.24 miles of suitable breeding habitat are likely a necessary requirement because this species is absent from sites with seemingly suitable breeding habitat where surrounding upland habitats are

lacking in small mammal burrows (U.S. Fish and Wildlife Service and California Department of Fish and Game 2003).

Reasons for Decline

CTS has been eliminated from much of its former range because of agriculture and urban development. Other factors affecting CTS populations include the introduction of nonnative predators such as fish, bullfrogs, and crayfish; loss of dry-season refuge habitat as a result of to land use changes; and poisoning of ground squirrels (Jennings and Hayes 1994).

Survey Methods

Information regarding potential habitat within the proposed project area, and documented CRLF and CTS locality information, are important in determining the likelihood that the species could occur within the project area. Conducting a site assessment is the first step in reaching such a determination, according to *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frogs* (U.S. Fish and Wildlife Service 2005) and *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (U.S. Fish and Wildlife Service and California Department of Fish and Game 2003) (Interim Guidance).

Prior to the site assessment, ICF wildlife biologist Will Kohn conducted a search of the California Natural Diversity Database (CNDDB) (California Department of Fish and Game 2012) for CRLF and CTS occurrences within 3 miles of the project area (Figure 2). Mr. Kohn also reviewed aerial photographs of the project area and surrounding areas to identify potentially suitable aquatic habitat within the project area and within 1.24 miles of the project area.

Mr. Kohn conducted the site assessment on August 15, 2012 per the requirements of the 2003 and 2005 guidelines. The site assessment included the project area and accessible areas within a 1.24-mile radius of the project area (Figure 3). The site assessment was conducted by assessing potential aquatic habitat and surrounding upland habitats based on habitat requirements described by USFWS for both CRLF and CTS. Representative photographs were taken of accessible habitats within 1.24 miles of the project area, and aerial photographs were analyzed for aquatic habitat that could not be accessed (%ØÈÉÂÊÔ A). Descriptions of potential aquatic breeding and dispersal habitat were recorded for each aquatic feature that was directly assessed, describing of the aquatic and upland habitat and vegetation. This information is presented in Table 1. Barriers to movement of CRLF and CTS into the project area were also noted.

The project area occurs within the historic range of both CRLF and CTS. Based on the location of the project area, a CNDDB records search, and a review of the aerial photographs, it was determined that potentially suitable aquatic habitat occurs within 1.24 miles of the project area and that the project area provides suitable upland habitat for the species.

Results

The proposed project is located within the current and historical range of CRLF and CTS (Jennings and Hayes 1994; U.S. Fish and Wildlife Service 2002; California Department of Fish and Game 2012). The three project components occur within USFWS-designated critical habitat for CRLF.

Documented and Known Occurrences

The CNDDB (2012) listed 45 CRLF occurrences and 16 CTS occurrences within 3 miles of the project area (Figure 2). Individual CNDDB occurrence numbers are shown for reference on Figure 2. Several of these known occurrences, such as CRLF occurrence numbers 876, 602, 27, etc., and CTS occurrence number 755 are immediately adjacent to the project area. Overall, there are numerous occurrences of both species in the surrounding areas.

Mr. Kohn observed CRLF during the habitat assessment in Pond 16 within Area 1 of the Project Area(Figure 3). This pond is described below.

Pond 16

The ponded area is approximately 60 feet long, 30 feet wide, and 48 inches deep. The banks of the pool are surrounded by cattails (*Typha* sp.). Uplands consist of annual grassland with numerous ground squirrel burrows. Several adult and metamorph CRLF were observed in Pond 16 during the habitat assessment. This pond also provides potential breeding habitat for CTS, but no CTS were observed.

Potential Breeding Habitat

Within the Project Area

Potential breeding habitat within the proposed project area consists of Ponds 15, 18, and 19 within Area 1. These ponds are described below.

Pond 15

Pond 15 is at the north end of Area 1 (Figure 3). It is approximately 130 feet long and 90 feet wide. The west end of the pond flows through six 4-foot-wide culverts. The depth of the pond could not be determined, but it appeared to be relatively deep. There was no aquatic vegetation in the pond. The surrounding area consists of annual grassland, barns, and corrals. Several mammal burrows and rock piles were observed nearby. Fish were observed in the pond. The species and number of fish that inhabit the pond is unknown and it unknown if they would preclude CRLF or CTS from successfully breeding in the pond. Therefore, this pond potentially supports suitable breeding habitat for CRLF and CTS, but neither species was observed.

Pond 18

Pond 18 is within Drainage 17 in the southern portion of Area 1 (Figure 3). The pond is approximately 120 feet long and 70 feet wide. The pond is surrounded by annual grassland and contains no aquatic vegetation. The depth of the pond could not be determined, but it appeared to be relatively deep. There are mammal burrows and rock piles in the vicinity of the pond. This pond potentially supports suitable breeding habitat for CRLF and CTS, but neither species was observed.

Pond 19

Pond 19 is adjacent to and within the same drainage as Pond 18 in the southern portion of Area 1(Figure 3). The pond is approximately 80 feet long and 40 feet wide. The pond is surrounded by annual grassland and contains no aquatic vegetation. The depth of the pond could not be

Table 1. Summary of CRLF and CTS Habitat Assessment Survey Results

Pool ID	Date	Surveyors	Ponded Area (feet)	Current Depth (inches)	Aquatic vegetation	Upland vegetation	Presence of Burrows	Notes
Known Breeding Habitat within the Project Boundary								
16	8/15/12	Will Kohn	60 x 30	48	Cattails	Annual grassland	Ground squirrel burrows	Several adult and metamorph CRLF observed in pond. Also potential breeding habitat for CTS.
Potential Breeding Habitat within the Project Boundary								
15	8/15/12	Will Kohn	130 x 90	24	None	Annual grassland, barn and corrals	Mammal burrows and rock piles	Potential breeding habitat for CRLF and CTS. Fish observed in pond.
18	8/15/12	Will Kohn	120 x 70	26	None	Annual grassland	Mammal burrows and rock piles	Potential breeding habitat for CRLF and CTS.
19	8/15/12	Will Kohn	80 x 40	24	None	Annual grassland	Mammal burrows and rock piles	Potential breeding habitat for CRLF and CTS.
Potential Dispersal Habitat within Project Boundary								
Drainage 17	8/15/12	Will Kohn		Dry	Cattails in potion	Annual grassland, roadway	Mammal burrows and rock piles	Parallels the north side of Altamont Pass Road to Pond 18. One CRLF CNDDB record from drainage.
Drainage 23	8/15/12	Will Kohn		Water present	Cattail and bulrush	Annual grassland	Mammal burrows and rock piles	Flows east through rural residence and under Mountain House Road. Some ponded areas in drainage. One CRLF CNDDB record from drainage.
Potential Breeding Habitat within 1.24 miles of the Project Area Not Surveyed								
1-4, 6-15, 20-22, and 24-31	Not Surveyed		Most are smaller stock ponds, some are larger ponds.					Could not access ponds because of private property. Based on aerial photo analysis. CRLF and CTS CNDDB records at some ponds
Dispersal Habitat within 1.24 Miles of Project Area								
Drainage 5	8/15/12	Will Kohn		Water present	Choked with cattails	Annual grassland, rural residence	Mammal burrows	Flows from rural residence west of Mountain House Road., under road and east under Delta-Mendota Canal. Two CRLF CNDDB occurrences in drainage.

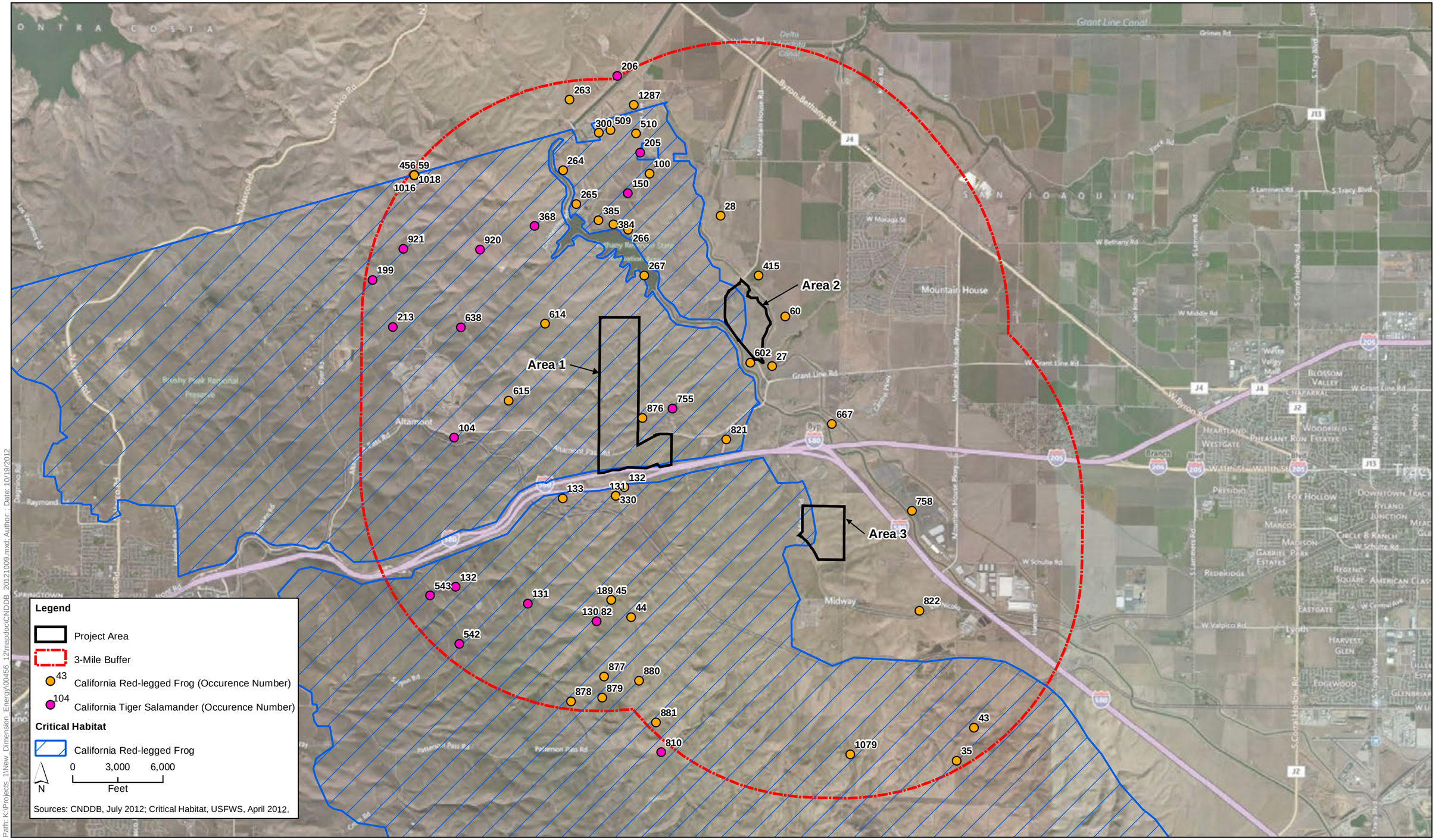

Figure 2
California Natural Diversity Database and Critical Habitat near the Project Area

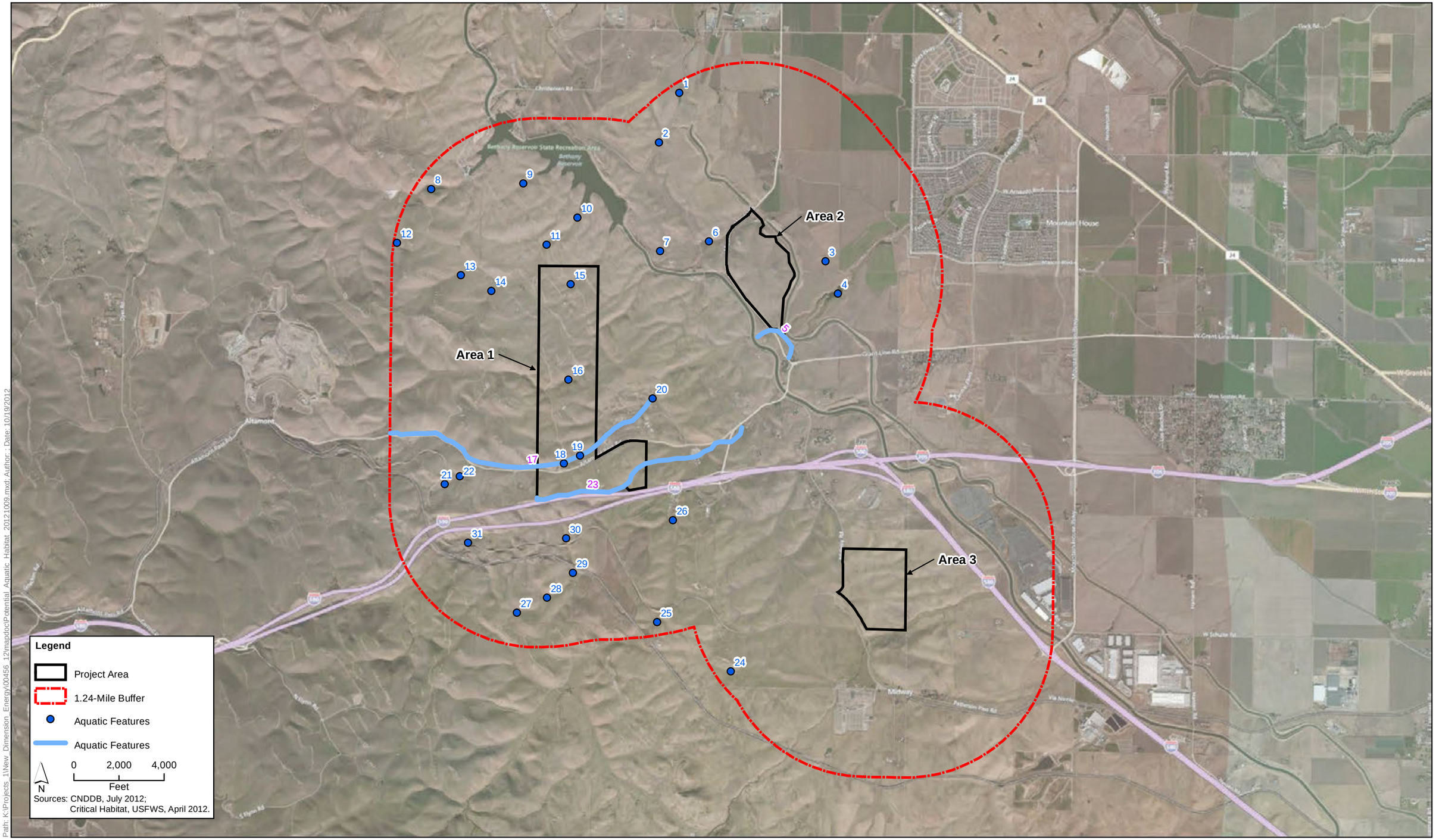

Figure 3
Potential Aquatic Habitat within 1.24 Miles of the Project Area

determined, but it appeared to be relatively deep. There are mammal burrows and rock piles in the vicinity of the pond. This pond potentially supports suitable breeding habitat for CRLF and CTS, but neither species was observed.

Within 1.24 miles of the Project Area

Pools 1–4, 6–15, 20–22, and 24–31

Several ponds in the project vicinity have potential to support breeding habitat for CRLF and CTS, but they could not be surveyed because they occur on private property and access was not possible. These ponds were assessed using aerial photo imagery. Most of these ponds are smaller stock ponds though some are quite large.

Potential Dispersal Habitat

Within the Project Area

Two unnamed drainages, 17 and 23, are located within the project area. The results of the assessment of these features are described below.

Drainage 17

Drainage 17 parallels the north side of Altamont Pass Road and empties into Ponds 18, 19, and 20. It flows generally west to east through the southern portion of Area 1(Figure 3). Portions of the drainage support cattails and saltgrass (*Distichlis spicata*) The upland consists of annual grassland with mammal burrows, rock piles, and rural residential development.

Drainage 23

Drainage 23 flows west to east through the southeast corner of Area 1 south of Altamont Pass Road through a rural residential parcel and under Mountain House Road (Figure 3). Some ponded areas in the drainage support cattails and bulrush (*Scirpus* sp.) Vegetation along the drainage consists of annual grassland. One CRLF has been historically documented in the drainage near Mountain House Road (California Department of Fish and Game 2012).

Within 1.24 miles of the Project Area

Drainage 5

Drainage 5 flows just to the south of Area 2 (Figure 3). The drainage flows from a rural residence west of Mountain House Road, under the road, and then east under the Delta-Mendota Canal. This drainage supports cattails and is surrounded by annual grassland and rural residential development. The CNDDDB lists records of CRLFs in Drainage 5 (California Department of Fish and Game 2012).

Barriers to Movement

Several barriers to overland movement of CRLF and CTS between potential breeding ponds and potential the project area occur. These include I-580 just to the south of Area 1; Altamont Pass Road,

which runs through the southern portion of Area 1; Mountain House Road, which runs along the western boundary of Area 2; North Midway Road, which runs along the western boundary of Area 3; the California Aqueduct just west of Area 2; and the Delta-Mendota Canal just east of Area 2.

Conclusions

The proposed project is located within the current and historical range of CRLF and CTS (Jennings and Hayes 1994; U.S. Fish and Wildlife Service 2002; California Department of Fish and Game 2012). The three project areas occur within USFWS-designated critical habitat for CRLF.

Area 1

There was a confirmed CLRF observation in Pond 16 in Area 1 during this site assessment. No CTS were observed in Area 1 during the site assessment. There are several CRLF and CTS CNDDB records that occur within 3 miles of Area 1 (California Department of Fish and Game 2012). There are three potential CRLF and CTS breeding ponds in Area 1 (15, 18, and 19) and two drainages (17 and 23) flow through the southern portion of Area 1. Additionally, there are numerous potential breeding ponds within 1.24 miles of Area 1. There are no barriers to overland movement between those ponds to the north and west of Area 1, though I-580 is a significant barrier to overland movement between Area 1 and the ponds to the south. Upland habitat in Area 1 consists mostly annual grasslands, existing wind turbines and associated structures, and areas of rural residential development. Burrows, necessary for CRLF and CTS aestivation, were observed throughout the area.

Area 2

No CRLF or CTS were observed in Area 2 during the site assessment. There are several CRLF and five CTS CNDDB records that occur within 3 miles of Area 2 (California Department of Fish and Game 2012). There are no potential CRLF and CTS breeding ponds in Area 2. Several ponds occur within 1.24 miles of Area 2. Four potential breeding ponds (1, 2, 6, and 7) occur to the north and west of the Area 2 and two ponds occur to the east (3 and 4). Mountain House Road is a barrier to overland movement between Ponds 1, 2, 6, and 7 and Area 2, and the Delta-Mendota Canal is a barrier to movement between Pond 3 and 4 and Area 2. Drainage 5 with known CRLF occurrences flows along the southern edge of Area 2. Upland habitat in Area 1 consists mostly annual grasslands and existing wind turbines and associated structures. Burrows, necessary for CRLF and CTS aestivation, were observed throughout the area.

Area 3

No CRLF or CTS were observed in Area 3 during the site assessment. There are several CRLF and no CTS CNDDB records that occur within 3 miles of Area 3 (California Department of Fish and Game 2012). There are no potential CRLF and CTS breeding ponds in Area 3. There is one potential breeding pond (24) approximately 1.2 miles southwest of the Area 3. North Midway Road is a barrier to overland movement between Pond 24 and Area 3. Upland habitat in the Area 3 consists mostly annual grasslands and existing wind turbines and associated structures. Burrows, necessary for CRLF and CTS aestivation, were observed throughout the area.

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Representative Photographs

Photo 1. Drainage 5 (8-15-12).

Photo 2. Drainage 5 at CRLF occurrence 602 (8-15-12).

Photo 3. Drainage 17 in Project Area near CRLF occurrence 876 (8-15-12).

Photo 4. Drainage 23 at CRLF occurrence 821 (8-15-12).

Photo 5. Drainage 23 in Project Area (8-15-12).

Photo 6. Drainage 23 in project Area2 (8-15-12).

Photo 7. Pond 15 (8-15-12).

Photo 8. Pond 16 (8-15-12).

Photo 9. CRLF in Pond 16 (8-15-12).

Photo 10. CRLF-2 in Pond 16 (8-15-12).

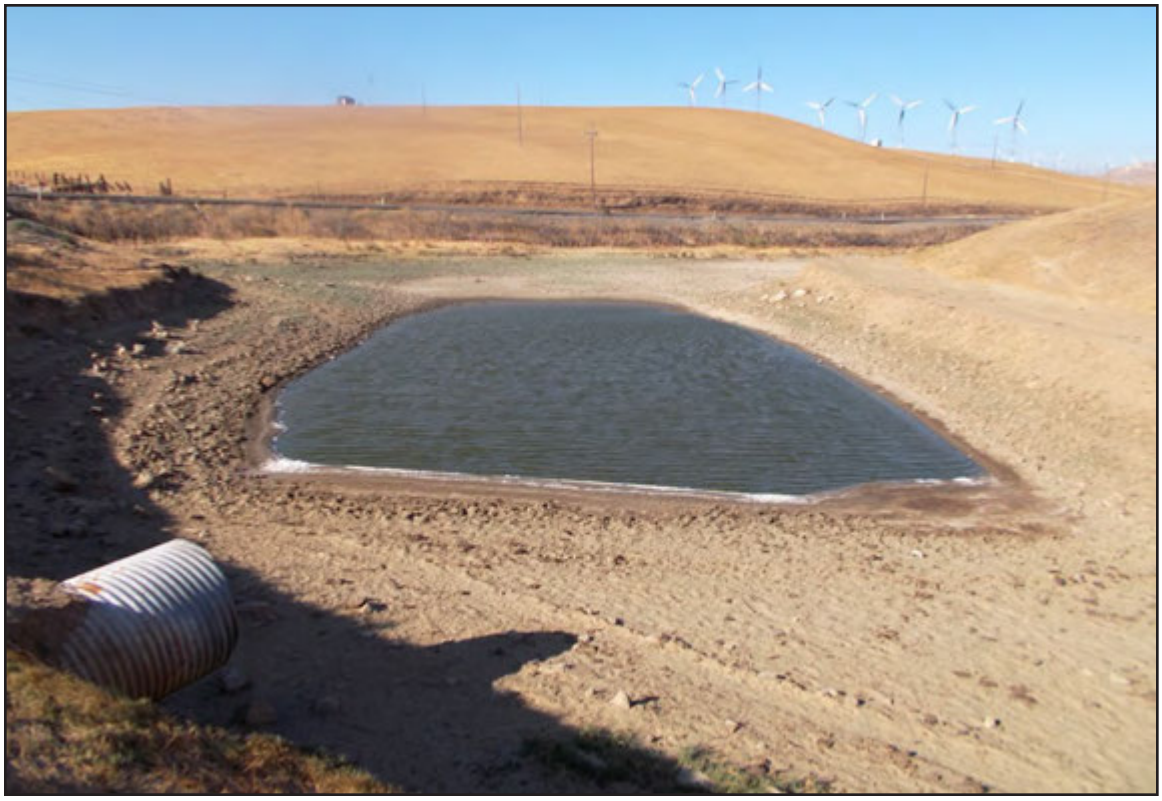

Photo 11. Pond 18 (8-15-12).

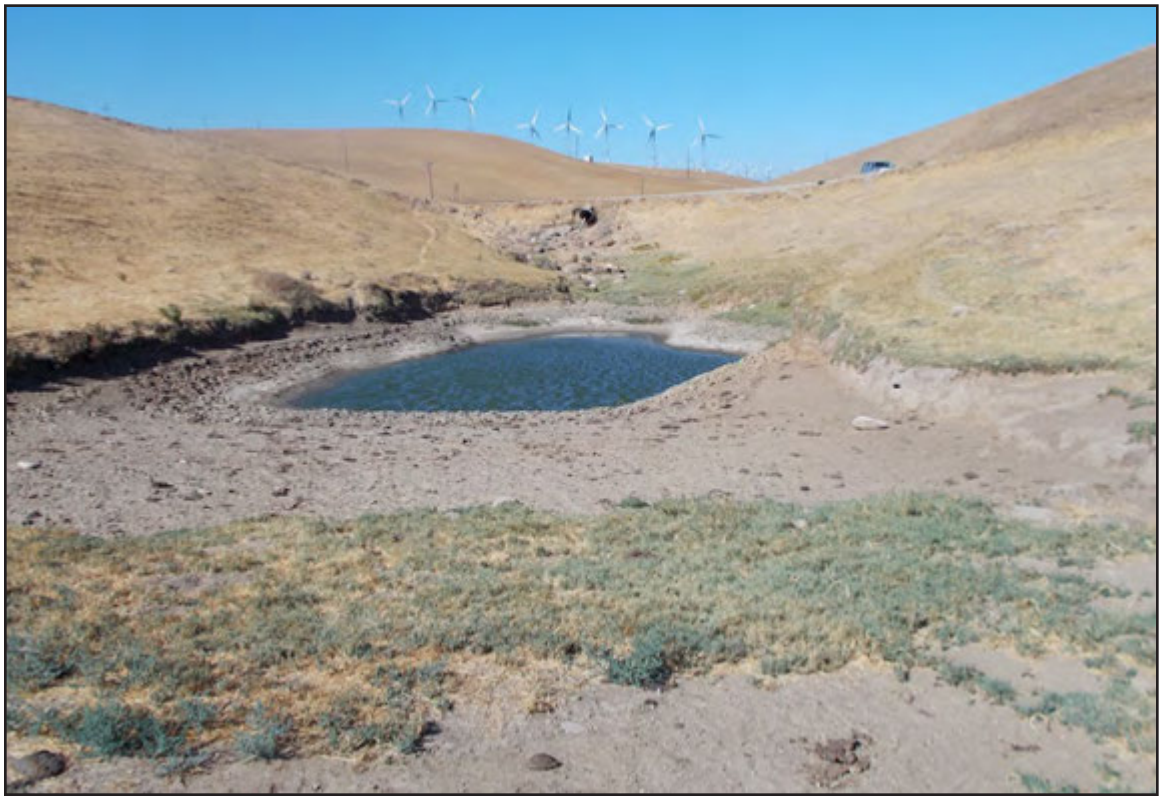

Photo 12. Pond 19 (8-15-12).

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Appendix D

Special-Status Plant Survey Memorandum

September 28, 2012

Mr. Peter Pawlowski
FloDesign Wind Turbine Corporation
221 Crescent St. Ste. 103A
Waltham, MA 02453

Subject: Botanical Surveys for the Sand Hill Wind Farm Project

Dear Mr. Pawlowski:

This memorandum documents the results of botanical surveys conducted at the Sand Hill Wind Project Site, located in Alameda County, California. Two ICF International botanists, John Holson and Seth Kirby, conducted late-season botanical surveys for the Griffith, Ralph and Pombo, and Arnaudo project sites in Alameda County, California. These surveys were conducted at FloDesign Wind Turbine Corporation's (FloDesign's) request to determine the presence or absence of late-season special-status plants within potentially disturbed areas.

FloDesign intends to implement a repowering program that will include the removal of the existing turbines and replacing them with a new technology turbine known as a *mixer-ejector wind turbine* (MEWT). FloDesign seeks to accomplish the repowering in two or more phases through 2016. The first phase of the project (referred to as the *initial repower*) would involve the removal of approximately 70-80 existing turbines and the installation of approximately 40 MEWTs as a test case to assess the functionality of the new MEWT design and determine the extent to which it reduces impacts on birds and bats compared to fatality associated with the existing turbines. The botanical surveys were focused on the first phase of the proposed project.

The study area is composed of three aforementioned sites, and contains non-native annual grassland, alkali grassland, and open water habitats. Twenty-five special-status plants were identified as potentially occurring in the project area based on proximity to nearby occurrences and habitats present onsite. The botanical surveys described in this memo were conducted to coincide with the blooming periods of 9 of the 25 species, with the remaining 16 species blooming in the spring. This memo summarizes the results of surveys conducted for the special-status plant species with potential to occur in the project area.

Methods

Prefield Investigation

The prefield investigation consisted of record searches of the 2012 California Natural Diversity Database (CNDDB) and California Native Plant Society's (CNPS's) 2012 online Inventory of Rare & Endangered Plants for the Midway, Byron Hot Springs, Clifton Court Forebay, Tracy, Lone Tree Creek, Union Island, Altamont, Mendenhall, Cedar Mountain 7.5-minute U.S. Geological Survey quadrangles. The results of these searches were used to compile a list of special-status plants with the potential to occur in the study area.

Botanical Surveys

Mr. Holson and Mr. Kirby conducted late-season botanical surveys on August 7 and 8 and September 21, 2012. The surveys were conducted by walking the entire study area over a period of approximately 4–6 hours each day. The surveys were conducted by walking the proposed disturbance areas (access roads, electrical system components, proposed turbine areas, meterological towers, etc.) and recording all species encountered. The botanists also took representative photographs within the study area.

The surveys followed the California Department of Fish and Game's (DFG's) *2009 Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. Mr. Holson and Mr. Kirby possess more than the minimum surveyor qualifications recommended in the DFG survey protocols, including experience conducting floristic field surveys; knowledge of plant taxonomy and plant community ecology; familiarity with the plants of the area, including rare, threatened, and endangered species; familiarity with the appropriate state and federal statutes related to plants and plant collecting; and experience with analyzing impacts of development on native plant species and communities. Mr. Holson has a bachelor's degree in biology (ecology emphasis) and Mr. Kirby has a master's degree in conservation biology. During the surveys, all plants were identified to the taxonomic level necessary to determine if they were special-status plants or were species with unusual or significant range extensions.

Results

Prefield Investigation

The CNDDB and CNPS record searches identified 44 sensitive plants with the potential to occur in the region (see Attachment A). Of those 44 species, 25 had potential habitat that was known to occur in non-native annual grassland, and alkali grassland habitats within the study area (Table 1).

Table 1. Special-Status Plants Species with Potential to Occur on the Project Sites

Common Name	Scientific Name	Blooming Period
Large-flowered fiddleneck	*Amsinckia grandiflora*	April-May
Bent-flowered fiddleneck	*Amsinckia lunaris*	March-June
Alkali milk vetch	*Astragalus tener* var. *tener*	March–June
Heartscale	*Atriplex cordulata*	May–October
Brittlescale	*Atriplex depressa*	May–October
San Joaquin spearscale	*Atriplex joaquiniana*	April–September
Lesser saltscale	*Atriplex minuscula*	May–October
Big-scale balsamroot	*Balsamorhiza macrolepis*	March-June
Big tarplant	*Blepharizonia plumosa*	July-October
Round-leaved filaree	*California macrophylla*	March–May
Lemmon's jewelflower	*Caulanthus lemmonii*	March–May
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	June-November
Hispid bird's-beak	*Chloropyron molle* ssp. *hispidum*	June–September
Palmate bird's-beak	*Chloropyron palmatus*	May-October
Livermore tarplant	*Deinandra bacigalupii*	June-October
Recurved larkspur	*Delphinium recurvatum*	March–June
Diamond-petaled California poppy	*Eschscholzia rhombipetala*	March-April
Contra Costa goldfields	*Lasthenia conjugens*	March-June

Common Name	Scientific Name	Blooming Period
Showy golden madia	*Madia radiata*	March-May
Mt. Diablo cottonweed	*Micropus amphibolus*	March-May
Little mousetail	*Myosurus minimus* ssp. *apus*	March–June
Shining navarretia	*Navarretia nigelliformis* ssp. *radians*	April–July
Hairless popcorn flower	*Plagiobothyrs glaber*	April-May
Saline clover	*Trifolium hydrophilum*	April-June
Caper-fruited tropidocarpum	*Tropidocarpum capparideum*	March-April

Botanical Surveys

A list of plants observed during the botanical surveys is provided in Attachment B. The timing of the surveys coincided with the reported blooming periods of 9 of the 25 sensitive species identified as having the potential to occur in the study area. No special-status plants were observed in the study area during the survey.

Conclusions and Recommendations

Late-season botanical surveys did not detect the presence of special-status plants in the project area. Several other spring- blooming plants are known to occur in the surrounding region and potential habitat is present. FloDesign has indicated that they intend to conduct additional surveys in the spring of 2013. We concur with conducting the survey at this time as there are several species, including round-leaved filaree and San Joaquin spearscale, which have a high potential to occur in the study area, based on nearby occurrences.

If you have any questions regarding the results of our botanical survey, please contact us at (916) 737-3000.

Sincerely,

John Holson
Botanist

Attachments

Attachment A. CNPS Search Results

Attachment B. List of Plant Species Observed

CNPS Inventory of Rare and Endangered Plants

v7-12dec 12-15-12

Status: search results - Wed, Jan. 2, 2013, 13:51 b

{QUADS_123} =~ m/445A|463C|463D|444B|444C|462C|445B|445C|445D/ Search

Tip: Having trouble with a multi-word search? Try a single word, e.g. `ginger` or `cobra`.[all tips and help.][search history]

Your Quad Selection: Midway (445A) 3712165, Byron Hot Springs (463C) 3712176, Clifton Court Forebay (463D) 3712175, Tracy (444B) 3712164, Lone Tree Creek (444C) 3712154, Union Island (462C) 3712174, Altamont (445B) 3712166, Mendenhall Springs (445C) 3712156, Cedar Mountain (445D) 3712155

Hits 1 to 44 of 44

Requests that specify topo quads will return only Lists 1-3.

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
	☐	1	Allium sharsmithiae	Sharsmith's onion	Alliaceae	List 1B.3
	☐	1	Amsinckia grandiflora	large-flowered fiddleneck	Boraginaceae	List 1B.1
	☐	1	Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	List 1B.2
	☐	1	Astragalus tener var. tener	alkali milk-vetch	Fabaceae	List 1B.2
	☐	1	Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	List 1B.2
	☐	1	Atriplex depressa	brittlescale	Chenopodiaceae	List 1B.2
	☐	1	Atriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	List 1B.2
	☐	1	Atriplex minuscula	lesser saltscale	Chenopodiaceae	List 1B.1
	☐	1	Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	List 1B.2
	☐	1	Blepharizonia plumosa	big tarplant	Asteraceae	List 1B.1
	☐	1	California macrophylla	round-leaved filaree	Geraniaceae	List 1B.1
	☐	1	Calochortus pulchellus	Mt. Diablo fairy-lantern	Liliaceae	List 1B.2
	☐	1	Campanula exigua	chaparral harebell	Campanulaceae	List 1B.2
	☐	1	Caulanthus lemmonii	Lemmon's jewelflower	Brassicaceae	List 1B.2

	☐	1	**Centromadia parryi ssp. congdonii**	Congdon's tarplant	Asteraceae	List 1B.1
	☐	1	**Chloropyron molle ssp. hispidum**	hispid bird's-beak	Orobanchaceae	List 1B.1
	☐	1	**Chloropyron palmatum**	palmate-bracted bird's-beak	Orobanchaceae	List 1B.1
	☐	1	**Cirsium fontinale var. campylon**	Mt. Hamilton fountain thistle	Asteraceae	List 1B.2
	☐	1	**Deinandra bacigalupii**	Livermore tarplant	Asteraceae	List 1B.2
	☐	1	**Delphinium californicum ssp. interius**	Hospital Canyon larkspur	Ranunculaceae	List 1B.2
	☐	1	**Delphinium recurvatum**	recurved larkspur	Ranunculaceae	List 1B.2
	☐	1	**Eschscholzia rhombipetala**	diamond-petaled California poppy	Papaveraceae	List 1B.1
	☐	1	**Fritillaria falcata**	talus fritillary	Liliaceae	List 1B.2
	☐	1	**Helianthella castanea**	Diablo helianthella	Asteraceae	List 1B.2
	☐	1	**Hesperolinon breweri**	Brewer's western flax	Linaceae	List 1B.2
	☐	1	**Hesperolinon serpentinum**	Napa western flax	Linaceae	List 1B.1
	☐	1	**Hesperolinon tehamense**	Tehama County western flax	Linaceae	List 1B.3
	☐	1	**Hibiscus lasiocarpos var. occidentalis**	woolly rose-mallow	Malvaceae	List 1B.2
	☐	1	**Hoita strobilina**	Loma Prieta hoita	Fabaceae	List 1B.1
	☐	1	**Lasthenia conjugens**	Contra Costa goldfields	Asteraceae	List 1B.1
	☐	1	**Legenere limosa**	legenere	Campanulaceae	List 1B.1
	☐	1	**Leptosyne hamiltonii**	Mt. Hamilton coreopsis	Asteraceae	List 1B.2
	☐	1	**Lilaeopsis masonii**	Mason's lilaeopsis	Apiaceae	List 1B.1
	☐	1	**Limosella australis**	Delta mudwort	Scrophulariaceae	List 2.1
	☐	1	**Madia radiata**	showy golden madia	Asteraceae	List 1B.1
	☐	1	**Malacothamnus hallii**	Hall's bush-mallow	Malvaceae	List 1B.2
	☐	1	**Micropus amphibolus**	Mt. Diablo cottonweed	Asteraceae	List 3.2
	☐	1	**Myosurus minimus ssp. apus**	little mousetail	Ranunculaceae	List 3.1
	☐	1	**Navarretia nigelliformis ssp. radians**	shining navarretia	Polemoniaceae	List 1B.2
	☐	1	**Plagiobothrys glaber**	hairless popcorn-flower	Boraginaceae	List 1A
	☐	1	**Senecio aphanactis**	chaparral ragwort	Asteraceae	List 2.2

	☐	1	**Symphyotrichum lentum**	Suisun Marsh aster	Asteraceae	List 1B.2
	☐	1	**Trifolium hydrophilum**	saline clover	Fabaceae	List 1B.2
	☐	1	**Tropidocarpum capparideum**	caper-fruited tropidocarpum	Brassicaceae	List 1B.1

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

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Attachment B. Plants Species Observed in the Sand Hills Project Area, Alameda County, California

Scientific Name	Common Name
Amsinckia menziesii var. intermedia	Common fiddleneck
Asclepias fascicularis	Narrow-leaf milkweed
Atriplex triangularis	Spearscale
Avena barbata *	slender wild oat
Avena fatua *	wild oat
Brassica nigra *	Black mustard
Bromus diandrus *	ripgut brome
Bromus hordeaceus *	soft chess
Bromus madritensis ssp. rubens *	red brome
Carex sp.	nutsedge
Centaurea solstitialis *	Yellow star-thistle
Chenopodium album	White goosefoot
Cirsium vulgare *	Bull thistle
Convolvulus arvensis *	Field bindweed
Cressa truxillensis	Alkali weed
Cynodon dactylon *	Bermuda grass
Distichlis spicata	Saltgrass
Epilobium ciliatum ssp. ciliatum	Hairy willowherb
Eremocarpus setigerus	Turkey mullein
Erodium botrys *	Big heronbill
Erodium cicutarium *	Redstem filaree
Grindelia camporum	Great Valley gumplant
Heliotropium curassavicum	Heliotrope
Hemizonia parryi ssp. rudis	Common tarweed
Hirschfeldia incana *	Mediterranean hoary mustard
Hordeum marinum ssp. gussoneanum *	Mediterranean barley
Hordeum murinum ssp. leporinum *	wall barley
Juncus balticus	Baltic rush
Juncus sp.	Rush species
Lactuca serriola *	Prickly lettuce
Lolium multiflorum *	Italian ryegrass
Lotus corniculatus *	Birdfoot trefoil
Malva neglecta *	Common mallow
Melilotus sp. *	Sweetclover
Picris echioides *	Bristly ox tongue
Polypogon monspeliensis *	rabbitsfoot grass
Rumex crispus *	Curly dock
Rumex pulcher *	Fiddle dock
Salsola tragus *	Russian thistle, tumbleweed
Sonchus oleraceus *	Common sowthistle

Notes:

This list was compiled from ICF International survey in the study area (August, September, 2012).

[a] Nomenclature follows *The Jepson Manual, 2nd Edition* (Baldwin et al, 2012); An asterisk (*) after the scientific name indicates introduced species.

Appendix E

Representative Site Photographs

Photo 1: View to the Southwest of Non-native Annual Grassland Habitat

Photo 2: View to the North of Non-native Annual Grassland Habitat

Photo 3: View to the Northeast of Ephemeral Stream and Alkali Grassland Habitat

Photo 4: View to the Northeast of Open Water Habitat (Ow-4)

Report BIO-3

Avian Baseline in the Altamont Pass Wind Resource Area

AVIAN BASELINE IN THE ALTAMONT PASS WIND RESOURCE AREA

Prepared by

Tetra Tech, Inc.

Prepared for

Sand Hill Wind, LLC

July 2013

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[1]For simplicity in displaying locations of fatalities, species were grouped into two sets of figures. Group 1 consists of American kestrel, brown pelican, golden eagle, loggerhead shrike, northern harrier and tricolored blackbird fatalities. Group 2 consists of burrowing owl and red-tailed hawk fatalities.

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OVERVIEW

The Altamont Pass Wind Resource Area (APWRA) is home to a number of wind energy facilities owned by several companies that provide electrical power to California. Operational since the early 1980s, at its peak the APWRA contained over 7,000 early technology wind turbines. Multiple studies have evaluated the potential bird mortality risks within the APWRA and documented high rates of avian fatalities related to wind turbines (Howell and DiDonato 1991; Orloff and Flannery 1992, 1996; Hunt 2002; Smallwood and Thelander 2004, 2005, 2008; APAMT 2008, WEST 2008; Smallwood and Karas 2009, Smallwood et al. 2009a; ICF International 2013a). Because of concerns over this elevated risk to avian species, when the conditional use permits allowing wind energy generation facilities in Alameda County came up for renewal, several lawsuits were filed to prevent permit renewal approval. Ultimately, these lawsuits were concluded when a settlement agreement was reached in 2007 that allowed conditional use permits to be extended if certain mitigation measures were adopted. One of these measures was the phased replacement of old turbines with new wind turbine technology, also referred to as repowering. The logic for this was that new technology turbines that have been developed are more efficient, producing more megawatt (MW)-hours per rated capacity, and often have higher rated capacities than the older generation models. Therefore, repowering can enable fewer turbines to supply the same amount of power, theoretically resulting in fewer avian fatalities per MW-hours produced (Smallwood and Karas 2009, ICF International 2013a). Additionally, structural modifications (e.g., tubular towers rather than lattice towers that provide perch and nesting sites) and features of new wind turbine designs are thought to pose less risk of collision to birds (see below). Three repowering projects have been completed to date within the APWRA: Diablo Winds, Buena Vista, and Vasco Winds (ICF International 2013a). This report focuses on a proposed repower of the Sand Hill Wind Facility within the APWRA.

The New Dimension Energy Company (NDEC) is proposing to use innovative turbine technology from FloDesign Wind Turbine Corp. (FloDesign) for a repower project at the Sand Hill Wind Facility (Figure 1). The FloDesign turbine, also called a shrouded wind turbine (Shrouded Turbine; Figure 2) is a 100 kW turbine which will replace existing turbines ranging in capacity from 40 kW (Enertech, n = 133) to 65 kW (Micon, n = 218; Windmatic, n = 22) to 100 kW (Polenko, n = 12). Phase 1 of the repower project involves replacing 70-80 of the existing Sand Hill Facility turbines with 40 Shrouded Turbines, thus reducing the numbers of turbines posing a collision risk to birds. Additionally, the design of the Shrouded Turbine is thought to pose a lower risk of avian fatalities compared to conventional open-bladed turbines for two reasons:

1) The unmoving shroud surrounding the turbine blades provides a physical and visual barrier that is expected to prevent birds from entering the rotor plane when they approach parallel to the rotor plane;
2) The shroud is more visible to flying birds than moving blades and reduces the likelihood of collision when birds approach perpendicular to the rotor plane (Smallwood 2013).

FloDesign is collaborating on an experimental study at the Sand Hill Facility to evaluate the effectiveness of the Shrouded Turbine to reduce avian fatalities. This study is primarily funded by a California Energy Commission (CEC) Public Interest Energy Research (PIER) Grant. The study uses a before-after-control-impact (BACI) design to evaluate the effects of the Shrouded Turbine design on avian turbine-collisions.

The results of the first complete year of the study ("before" phase) were available for, and are summarized in this report.

The primary objective of this report is to provide a baseline of avian conditions prior to repowering with Shrouded Turbines. This objective will be met by:

1) Providing descriptions for special status species detected as fatalities at the Sand Hill Facility, including occurrence and mortality data as well as population trends, if known;
2) Describing the current conditions of avian risk at the Sand Hill Facility based on previously collected data and data from the first year of the BACI study performed in 2013 by S. Smallwood (Smallwood 2013).

METHODS

A variety of sources were drawn from to provide relevant context to special status species known to occur at the Sand Hill Facility and their respective risk. Detailed discussion is limited to special status species detected as fatalities within the Sand Hill Facility using the rationale that they are of the greatest concern within the Sand Hill Facility.

As mentioned earlier, a large number of avian mortality studies have been performed within portions of or across the entire APWRA. Because the Sand Hill Facility is similar in topography, habitat, and turbine conditions to much of the rest of the APWRA (ICF International 2012), studies conducted within the APWRA are used to provide information about avian risk in general (Tables 1 and 2), and risk to special status species specifically, when available.

Avian information specific to the Sand Hill Facility is available from APWRA-wide monitoring performed by ICF International. Given the large study area, data were organized by base-layer of operating group boundaries or BLOBs (see Figure 1-2 in ICF International 2012). Turbines within the Sand Hill Facility are located in BLOBs 9, 16, 17, 18, 22; however, the Sand Hill Facility turbines within BLOB 18 were not monitored (See Figures 2-1 and 2-2 in ICF International 2012). ICF International (2012) reports by BLOB adjusted fatalities per MW per year for four focal species: American kestrel, burrowing owl, golden eagle, and red-tailed hawk. The range of mortality rates from 2005 – 2010 for the four focal species in BLOBs 9, 16, 17, and 22 are used in this report to indicate Sand Hill Facility-specific mortality rates for these species (Table 2). Avian use surveys were also performed by ICF International, with use rates reported by BLOB for the four focal species (ICF International 2013a). Additionally, raw numbers of fatalities detected at Sand Hill Facility turbines are available from ICF International's mortality monitoring conducted from 2000 - 2012 (SRC APWRA 2013). Fatalities of special status species are presented on maps of the Sand Hill Facility (Figures 3 A-C and 4 A-C).

Additional Sand Hill Facility-specific information is provided from a biological resources technical report (ICF International 2013b). This report summarizes the results of biological resource surveys performed at the Sand Hill Facility in 2013, and includes occurrence information on burrowing owl, loggerhead shrike, and tricolored blackbird (ICF International 2013b).

Lastly, the results of the first year of the BACI avian mortality study performed by Smallwood at the Sand Hill Facility (Smallwood 2013) are presented. This study involved mortality monitoring at clusters

of high-risk turbines within the Sand Hill facility that are planned to be replaced with Shrouded Turbines. Adjusted mortality rates are presented, but are not to be considered representative of the Sand Hill Facility as a whole because monitoring was specific to high-risk turbines. Additionally, locations of detections of live burrowing owls during the study were provided by Smallwood and are presented here (Figure 4A).

EXISTING DATA

Special Status Bird Species at the Sand Hill Facility

Bird species are known to be impacted by wind facilities in the APWRA (e.g., Hunt 2002, Smallwood and Karas 2009), including species with special status such as federal or state listed species, state fully protected species, state species of concern, and bird species of local concern. Special status species known to occur as fatalities in the APWRA are presented for context, but detailed discussion is limited to special status bird species known to occur as fatalities at the Sand Hill Facility, including information on local or regional abundance and population trends where data are available. These data can inform a risk assessment of the potential impacts that repowering the Sand Hill Facility will have on various bird species; however, such an assessment is beyond the scope of this report.

Federal or State Threatened and Endangered Bird Species

Federal threatened or endangered bird species (USFWS 2013) have not been detected as fatalities within APWRA (Table 1). The state threatened or endangered bird species detected as fatalities in the APWRA are the greater sandhill crane (*Grus canadensis tabida*) and Swainson's hawk (*Buteo swainsoni*). Records of fatalities for these two species are limited to one documented fatality each, during mortality monitoring conducted within the APWRA from 2000 – 2012 (SRC APWRA 2013). Neither of these species has been detected as fatalities at the Sand Hill Facility (Table 1).

State Fully Protected Bird Species

Golden Eagle (*Aquila chrysaetos*)
Golden eagles in the western U.S. are most commonly found near open spaces that provide foraging habitat such as grasslands or shrub-steppe (Kochert et al. 2002). Breeding golden eagles in central California nest primarily in large trees and cliff habitat located within open grasslands and oak savanna, or occasionally in oak woodland and open shrublands (Hunt et al. 1995, 1999). Both suitable foraging and nesting habitat for golden eagles occurs within the APWRA as documented in multiple studies (Orloff and Flannery 1992, Hunt 2002, Smallwood and Thelander 2005). Golden eagles breed within the APWRA, with approximately 18 regularly occupied territories occurring within the APWRA and outward to a distance 6.2 miles (10 kilometers; Hunt 2002). Migrant golden eagles are also known to occur within the APWRA during the non-breeding season (Kochert et al. 2002, CDFG 2004). The Sand Hill Facility includes suitable golden eagle foraging habitat, but there are no documented nests (Orloff and Flannery 1992, CDFW 2013a).

There are numerous documented occurrences of golden eagles in the APWRA from a variety of studies. Mean use rates at point count locations within the Sand Hill Facility (see Figure 2-3 in ICF International 2013a) ranged between 0.00 to 1.34 observations/minute/km^3 during use surveys in the APWRA from

2005 to 2010 (ICF International 2013a). Average golden eagle use rates were highest in the Ralph and Griffith parcels (ICF International 2013a; Figure 1).

Population Trends and Local Impacts. Results from breeding bird surveys (BBS) performed nationwide by Partners in Flight (Rich et al. 2004) and aerial transect surveys performed in the western U.S. (Nielson et al. 2012) indicate that golden eagle populations across the western U.S. are stable as of 2012 (Nielson et al. 2012, Green 2013). Strong trends do not exist for golden eagle populations in California, but survey data are limited (Sauer et al. 2012, CDFW 2013b). Studies specific to APWRA indicate no change in the territory occupancy over time but suggest that the local population is being sustained by golden eagles immigrating from other areas to replace those killed in collisions with turbines (Hunt and Hunt 2006). Adjusted annual mortality estimates for golden eagles presented in other studies of the APWRA range from 0.070 to 0.211 fatalities/MW/year (Table 2).

Within the Sand Hill Facility a total of nine golden eagles have been detected as fatalities during mortality monitoring from 2000 – 2012; none were incidental detections (SRC APWRA 2013). Eight of these were identified as likely turbine strikes, and one was likely caused by electrocution. Seven golden eagle fatalities occurred in the northernmost portion of the Ralph-Pombo parcels (Figure 3A), compared to one each in the Castello-Arnaudo and Griffith parcels (Figures 3B and 3C, respectively). Six of the nine documented fatalities occurred at Micon 65-kW turbines, and the remaining three fatalities were detected at Enertech 40-kW turbines. However, raw mortality numbers do not indicate actual levels of mortality due to inherent biases in mortality monitoring, such as detection bias, turbine sampling scheme, search interval, and scavenger densities. Adjusted mortality estimates for the Sand Hill Facility range from 0.00 to 0.50 fatalities/MW/year based on monitoring conducted from 2005 to 2010 (ICF International 2012). The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected no fatalities of golden eagles (Table 1), and thus, did not calculate an adjusted mortality estimate for high-risk turbines (Smallwood 2013; Table 2).

Collision risk factors for the golden eagle are thought to be largely related to the interaction between flight patterns and turbine locations. Specifically, golden eagles tend to favor the windward aspect of hills and ridges where they fly over slopes that face strong, prevailing winds (Smallwood and Neher 2011). While hunting, golden eagles generally follow topographical contours, creating risk of collision with turbines sited within saddles, notches, and benched slopes (Smallwood 2010). The greatest turbine attribute associated with increased collision risk is whether the turbine blades of a particular model pass within 26 feet (8 meters) of the ground (Hunt 2002, Smallwood and Thelander 2004). Other variables that appear to increase collision risk includes wide spacing of turbines, and turbines located at the edge of a turbine string or cluster (Smallwood and Thelander 2004). Furthermore, unlike with other avian species, larger-sized turbine models appear to have increased collision risk to golden eagles (Smallwood 2010). Operational status of a turbine may also be linked to collision risk as golden eagles engage in interactions with other birds more often when turbines are operational, possibly reducing their awareness of their surroundings (Smallwood et al. 2009a). Higher densities of fossorial animal species near turbines have also been related to increased golden eagle collision risk as they serve as a source of prey (Smallwood and Thelander 2004).

Brown Pelican (*Pelecanus occidentalis*)

Within northern California, the brown pelican is a migrant and part-year resident. Brown pelicans typically migrate north by early May, and return to their southern wintering and breeding grounds in early winter (Zeiner et al. 1988). The northernmost brown pelican breeding areas in California are found on the Channel Islands, south of Santa Barbara (Zeiner et al. 1988). They are typically found in warm coastal marine and estuarine waters where they forage for fish and sometimes are seen on inland freshwater lakes (Shields 2002). Brown pelicans typically nest on small estuarine or offshore islands that provide protection from disturbance and predation (Shields 2002).

The APWRA does not contain suitable foraging or nesting habitat for brown pelicans, although some individuals appear to migrate through the area based on recorded fatalities (see below). The California Natural Diversity Database (CNDDB) does not list any occurrences of brown pelicans in the APWRA (CDFW 2013a).

Population Trends and Local Impacts. After nearly 40 years on the federal and state endangered species lists, brown pelican populations have recovered, and the species was removed from both lists in 2009 (USFWS 2009). Approximately 70,680 breeding pairs are reported in California and the Pacific coast of northern Mexico (USFWS 2009 and references therein), with thousands of migrants moving up and down the Pacific coast annually.

Two brown pelican fatalities have been documented in the APWRA (Table 1). One fatality was recorded during mortality monitoring conducted APWRA-wide between 1989 and 2007 (Smallwood and Karas 2009). The second brown pelican fatality was documented at the Sand Hill Facility in 2009 during mortality monitoring, and occurred at a Micon 65-kW turbine within the Castello parcel (Figure 3B) (SRC APWRA 2013). Adjusted mortality estimates for the Sand Hill Facility are unavailable for brown pelican. The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected no fatalities of brown pelicans (Table 1), and thus, did not calculate an adjusted mortality estimate at high-risk turbines (Smallwood 2013; Table 2). No publicly available research has identified turbine collision risk factors for brown pelicans.

State Bird Species of Special Concern

Tricolored Blackbird (*Agelaius tricolor*)

Tricolored blackbirds are a colonial species that nest in dense vegetation extensive enough to support colonies of 50 pairs or more (CDFG 2008). When nesting, tricolored blackbird prefer freshwater emergent wetlands with tall, dense cattails or bulrushes for nesting, but will also breed in thickets of willow, blackberry, wild rose, or tall herbs (CDFG 2008). During the nonbreeding season, flocks are highly mobile and forage in grasslands, croplands, and wetlands (CDFG 2008).

The tricolored blackbird is largely indigenous to California, with more than 99 percent of the population residing in the State and 90 percent of the breeding population residing specifically in the Central Valley (Shuford and Gardali 2008). The CNDDB lists one occurrence of tricolored blackbirds in the Alameda County portion of the APWRA, approximately 1.5 miles (2.4 kilometers) west of the Ralph parcels (CDFW 2013a).

Suitable nesting habitat for tricolored blackbird is largely absent within the Sand Hill Facility. For this reason the potential for the species to nest at the facility is considered to be low (ICF International

2013b); nevertheless, tricolored blackbirds have occurred as fatalities at the Sand Hill Facility (see below).

Population Trends and Local Impacts. Tricolored blackbird populations have declined significantly in the past century. The National Audubon Society (2010) reports a population decrease of over 50 percent between 1950 and 1985, and a further 56 percent decline from 1994 to 2000, with declines most apparent in the Central Valley.

Mortality studies throughout the APWRA provide adjusted mortality estimates ranging from 0.000 to 0.030 deaths/MW/year (Table 2). Within the Sand Hill Facility, two tricolored blackbirds have been detected as fatalities during mortality monitoring from 2000 – 2012 (SRC APWRA 2013). These fatalities occurred at two different Micon 65-kW turbines. One fatality occurred in the Ralph parcel (Figure 3A), and one occurred in the Castello-Arnaudo parcels (Figure 3B). Adjusted mortality estimates for the Sand Hill Facility are unavailable for tricolored blackbird. The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected one tricolored blackbird fatality, resulting in an adjusted mortality estimate of 0.240 deaths/MW/year at high-risk turbines (Smallwood 2013; Table 2).

No publicly available research has identified turbine collision risk factors for tricolored blackbird.

Burrowing Owl (*Athene cunicularia*)

Burrowing owls are relatively small, semicolonial owls, and are year-round residents of open dry grasslands and desert areas throughout much of California, including the APWRA (CDFG 1999). Migrants from other parts of western North America may augment resident populations in winter (Shuford and Gardali 2008). Resident burrowing owls occupy burrows for breeding and both residents and migrants use burrows for roosting (CDFG 1999). Although capable of digging burrows, they typically use burrows excavated by ground squirrels and other small fossorial mammals, or may use artificial structures for burrows (e.g., drainage culverts, discarded pipe; CDFG 1999). Burrowing owls are active throughout the day and night, being most active during dawn and dusk (CDFG 1999, Shuford and Gardali 2008).

There are numerous documented occurrences of burrowing owls in the APWRA from a variety of studies. Mean use rates at point count locations within the Sand Hill Facility (see Figure 2-3 in ICF International 2013a) ranged between 0.00 and 3.21 observations/minute/km^3 during use surveys in the APWRA from 2005 to 2010 (ICF International 2013a). Most detections of burrowing owls occurred within the Ralph parcels (ICF International 2013a). However, ICF International (2013a) notes that "the avian use survey methodology was not designed to assess use by cryptic and crepuscular species like burrowing owl." At the Sand Hill Facility a single live burrowing owl was observed during 2012 field surveys (ICF International 2013b). Additionally, there were 10 detections of live burrowing owls during the BACI avian mortality study conducted in 2012 – 2013 by Smallwood (2013; Figure 4A).

Population Trends and Local Impacts. BBS data from 1966 to 2011 show a decrease in the burrowing owl population in California and throughout North America (Sauer et al. 2012). Population surveys in California from 1986 through 1991 found a declining trend in the number of breeding groups and breeding pairs (Bates 2006). Comprehensive surveys from 1991 through 1993 found that California's population is estimated at 9,266 breeding pairs (not including the Great Basin, desert areas, or the

Channel Islands), with 24 percent in the Central Valley and 2 percent in the Bay Area (DeSante et al. 2007). Breeding in Central California has been reduced to only three isolated populations: the Central Valley, southern San Francisco Bay between Alameda and Redwood City, and near the Livermore area (DeSante et al. 2007).

Burrowing owl fatalities have been detected in the APWRA, with estimated adjusted mortality rates ranging from 0.700 to 3.025 deaths/MW/year (Table 2). Burrowing owl fatalities detected within 3 feet (1 meter) of an active burrow were considered the result of predation and were excluded from analysis; however, in most cases fatalities caused from turbines cannot be distinguished from those caused by predation (ICF International 2013a). Predation has been identified as the likely cause of death for several detected burrowing owl fatalities at the APWRA, and a peak in August in numbers of fatalities detected roughly corresponds to the timing of fledgling dispersal, when juveniles are most subject to predation. Furthermore, a peak in fatalities in January also appears to be related to increased predation as it is strongly correlated to immigration of red-tailed hawks into the area during the winter (ICF International 2013a). These seasonal patterns in mortality rates may partially explain the lack of relationship between the average number of fatality detections each year and average monthly bird use (ICF International 2013a).

Burrowing owl fatalities have been documented within the Sand Hill Facility specifically (Table 1). A total of 94 burrowing owls have been detected as fatalities within the Sand Hill Facility during mortality monitoring from 2000 – 2012 (SRC APWRA 2013). These fatalities occurred at 76 different turbines; 52 at Enertech 45-kW turbines, 30 at Micon 65-kW turbines, three at Polenko 100-kW turbines, and nine at Windmatic 65-kW turbines. Most of these fatalities were detected within the Ralph-Johnston-Pombo parcel (n = 66 of 94; Figures 4A-C). Adjusted mortality estimates have been calculated for the Sand Hill Facility, and range from 0.00 to 10.40 fatalities/MW/year based on monitoring conducted from 2005 to 2010 (ICF International 2012). The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected 17 burrowing owl fatalities. The estimated adjusted mortality rate was 3.126 deaths/MW/year at high-risk turbines (Smallwood 2013; Table 2).

Collision risk factors for burrowing owls are largely behavioral as individuals exhibit a number of flight behaviors that may increase the likelihood of turbine strikes. They tend to hunt on the ground during the daytime, and to hunt from a perch or from a hover at night (Poulin et al. 2011). Hover-hunting generally occurs at about 32 feet (10 meters) above ground (Poulin et al. 2011), a height which verges on the rotor zone of existing turbines within the Sand Hill Facility (35 to 108 feet, or 11 to 33 meters above ground). Mating display flights which reach heights of up to 98 feet (30 meters) may also enter the rotor zone of existing turbines. Both hunting and display flights generally occur near the burrow, which may explain the correlation of higher fatalities being detected at turbines with burrows within 184 feet (55 meters; Smallwood et al. 2009b).

Northern Harrier (*Circus cyaneus*)

Northern harriers are year-round residents within California and occur in greater numbers during migration and winter than during the breeding season (Shuford and Gardali 2008). Northern harriers breed and forage in a variety of open habitats including meadows, grasslands, open rangelands, ungrazed pastures, desert sinks, freshwater and saltwater emergent wetlands, and some croplands (Shuford and Gardali 2008). Nests are constructed on the ground amid tall, dense shrubby vegetation or amid grasses,

reeds, cattails, or similar vegetation commonly associated with wetland or riparian environments (Smith et al. 2011). Northern harriers typically hunt on the wing, flying low to the ground (less than 16 feet or 5 meters) and relying on both sight and sound to prey on small and medium-sized mammals, birds, reptiles, and frogs (Shuford and Gardali 2008, Smith et al. 2011).

The APWRA provides both nesting and foraging habitat for northern harriers, and individuals are commonly observed foraging over croplands, wetlands, or grasslands (Howell and DiDonato 1991, Smallwood and Thelander 2008, ICF International 2013a). Although suitable nesting habitat for northern harriers occurs within the APWRA, it is limited within the Sand Hill Facility. Nesting habitat may occur sporadically in seasonal or intermittent drainages or around existing ponds within or near the Sand Hill Facility. Foraging habitat for northern harriers is likely present within the Sand Hill Facility.

Population Trends and Local Impacts. BBS data suggest that breeding populations of northern harrier in North America have fluctuated between 1966 and 1996, with some areas experiencing population growth while populations in other areas declined (Smith et al. 2011, Sauer et al. 2012). The California wintering population was estimated at 13,200 birds in the late-1980s; the breeding population would be lower (Johnsgard 1990). Results from the Christmas Bird Count show a declining winter population in California from 1990 to 2011 (National Audubon Society 2010).

Northern harrier fatalities have been detected in the APWRA, with estimated adjusted mortality rates ranging from 0.001 to 0.015 deaths/MW/year (Table 2). Within the Sand Hill Facility, one northern harrier has been detected as a fatality during mortality monitoring from 2000 – 2012 (SRC APWRA 2013; Table 1). This fatality occurred at a Micon 65-kW turbine in the Castello-Arnaudo parcel (Figure 3B). Adjusted mortality estimates for the Sand Hill Facility are unavailable for northern harrier. The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected no northern harrier fatalities, and thus, did not calculate an adjusted mortality estimate at high-risk turbines (Smallwood 2013; Table 2).

No publicly available research has identified collision risk factors for northern harrier.

Loggerhead Shrike (*Lanius ludovicianus*)

Loggerhead shrikes are year-round residents of California that occur in the Central Valley and southern coast within shrub habitats, riparian woodlands, and grazed lands (Shuford and Gardali 2008). Local resident populations are augmented in winter by migrants from the north (Shuford and Gardali 2008). The species shows a preference for nesting and hunting perches in thorny shrubs, as it typically impales its prey on sharp twigs, thorns, or barbed wire (Shuford and Gardali 2008).

Loggerhead shrikes are known to nest in the APWRA (ICF International 2013b). Within the Sand Hill Facility, potential habitat is present and live loggerhead shrikes have been observed (ICF International 2013b).

Population Trends and Local Impacts. BBS data indicate that California populations have been declining since the surveys began in 1968 (Sauer et al. 2012). The California Audubon Society lists the loggerhead shrike as one of California's Common Birds in Decline, noting a 72 percent decline since 1967 (California Audubon Society 2010). While overall abundance remains relatively high in the Central

Valley and in the San Francisco Bay regions, significant population declines have been observed in both regions since 1966 (Sauer et al. 2012).

Loggerhead shrike fatalities have been detected in the APWRA, with estimated adjusted mortality rates ranging from 0.019 to 0.438 deaths/MW/year (Table 2). Within the Sand Hill Facility, a total of 11 loggerhead shrikes have been detected as fatalities during mortality monitoring from 2000 – 2012 (SRC APWRA 2013). These fatalities occurred at 11 different turbines; six fatalities occurred at Enertech 45-kW turbines, four at Micon 65-kW turbines, and one at a Polenko 100-kW turbine. Seven fatalities occurred in the Ralph-Johnston-Pombo parcel (Figure 3A); three occurred in the Castello-Arnaudo parcel (Figure 3B); and one occurred in the Griffith parcel (Figure 3C). Adjusted mortality estimates for the Sand Hill Facility are unavailable for loggerhead shrike. The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected no loggerhead shrike fatalities, and thus, did not calculate an adjusted mortality estimate at high-risk turbines (Smallwood 2013; Table 2).

No publicly available research has identified collision risk factors for loggerhead shrike.

Bird Species of Local Concern

There are four species identified as birds of local concern in the APWRA as a result of the 2007 settlement agreement: American kestrel, burrowing owl, golden eagle, and red-tailed hawk. These four species are disproportionately impacted by wind farms and are the focus of continuing mitigation and research efforts in the APWRA. Descriptions for burrowing owl and golden eagle are provided in the preceding sections.

American Kestrel (*Falco sparverius*)

American kestrels are common residents throughout California, inhabiting a variety of open habitats including grasslands, shrublands, early successional forests, and forest openings (Zeiner et al. 1988). Migrants from more northern latitudes overwinter in California (Zeiner et al. 1988). American kestrels typically hunt from a perched or hovering position; preferred prey items include small mammals, birds, reptiles, and amphibians as well as insects and worms (Zeiner et al. 1988). Breeding individuals nest in cavities found within trees, snags, rocky outcrops, embankments, and buildings (Zeiner et al. 1988).

There are numerous documented occurrences of American kestrel in the APWRA, and use appears to peak in late fall (Smallwood et al. 2009a). Mean use rates at point count locations within the Sand Hill Facility (see Figure 2-3 in ICF International 2013a) ranged between 0.00 to 3.87 observations/minute/km^3 during use surveys in the APWRA from 2005 to 2010 (ICF International 2013a). Average American kestrel use rates were highest in the Griffith and Castello-Arnaudo parcels (ICF International 2013a; Figure 1).

Population Trends and Local Impacts. The American kestrel population in North America appears to be relatively stable, although the population has increased in some areas and declined in others. Populations have declined in the western U.S. and California since the 1960s, with marked declines in California since 1980 (National Audubon Society 2010, Sauer et al. 2012).

American kestrel fatalities have been detected in the APWRA, with estimated adjusted mortality rates ranging from 0.490 to 0.646 deaths/MW/year (Table 2). Within the Sand Hill Facility, a total of 35

American kestrels have been detected as fatalities during mortality monitoring from 2000 – 2012 (SRC APWRA 2013). Fatalities occurred at 31 different turbines; six at Enertech 45-kW turbines, 25 at Micon 65-kW turbines, one at a Polenko 100-kW turbine, and three at Windmatic 65-kW turbines. Thirteen of the 35 fatalities occurred in the Ralph-Johnston-Pombo parcel (Figure 3A); 18 occurred in the Castello-Arnaudo parcel (Figure 3B); and 4 occurred in the Griffith parcel (Figure 3C). Adjusted mortality estimates have been calculated for the Sand Hill Facility, and range from 0.00 to 1.90 fatalities/MW/year based on monitoring conducted from 2005 to 2010 (ICF International 2012). The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected three American kestrel fatalities, resulting in an adjusted mortality estimate of 0.562 deaths/MW/year at high-risk turbines (Smallwood 2013; Table 2).

The seasonal distribution of fatalities appears to correspond with seasonal use patterns; peaks in mean fatalities detected occur in months with highest use (ICF International 2013a). For example, use by kestrels is highest in winter, and peaks in fatality detections occur in January and March (ICF International 2013a). Similarly, use is increased in July and August, corresponding with the timing of juvenile dispersal, and there is a corresponding peak in fatality detections in August (ICF International 2013a).

American kestrels exhibit a number of behaviors that contribute to a relatively high mortality rate. Kestrels observed during use surveys conducted from March 1998 to April 2000 spent a disproportionally greater amount of flight time within the rotor zone or within 164 feet (50 meters) of the rotor zone (Smallwood et al. 2009a). Additionally, Smallwood et al. (2009a) observed a substantial increase in the time American kestrels spent foraging (i.e., hovering, kiting, and diving) while within the rotor zone of operating turbines compared to non-operational turbines. Kestrels have also been observed perching on both operating and non-operational wind turbines, increasing their exposure to collision risk (Smallwood et al. 2009a). American kestrel mortality rates appear to be highest on ridgelines, ridge crests, and ridge saddles (Smallwood 2010).

Red-tailed Hawk (*Buteo jamaicensis*)

Red-tailed hawks are common as residents and migrants throughout California (Zeiner et al. 1988). They are habitat generalists and, as such, can be found in a wide range of habitats and elevations, favoring open areas interspersed with trees or other structures for perching (Zeiner et al. 1988). Red-tailed hawks prey upon a wide variety of small- to medium-sized mammals, birds, reptiles, amphibians, arthropods, and fresh carrion (Preston and Beane 2009). They are primarily perch-and-pounce raptors, although they may take prey on the wing as well as from the ground (Preston and Beane 2009).

Red-tailed hawks are year-round residents in the APWRA and are one of the most frequently-observed species, with a marked population increase in winter due to the presence of migrating and wintering individuals, (ICF International 2013a). Mean use rates at point count locations within the Sand Hill Facility (see Figure 2-3 in ICF International 2013a) ranged between 0.15 to 7.88 observations/minute/km^3 during APWRA-wide use surveys from 2005 to 2010 (ICF International 2013a). Most red-tailed hawk detections occurred within the Castello-Arnaudo parcels (ICF International 2013a; Figure 1).

Population Trends and Local Impacts. Red-tailed hawk populations have remained stable or increased throughout most of the western United States since the 1980s, increasing by 1.5 percent in California between 1983 and 2005 and by 2.1 percent between 2001 and 2011 (Sauer et al. 2012). The population of

red-tailed hawks in California was estimated at 160,000 individuals (Rich et al. 2004). The Central Valley population has significantly increased since 1968 (National Audubon Society 2010, Sauer et al. 2012).

Red-tailed hawk fatalities have been detected in the APWRA, with estimated adjusted mortality rates ranging from 0.324 to 0.782 deaths/MW/year (Table 2). Within the Sand Hill Facility specifically, a total of 92 red-tailed hawks have been detected as fatalities during mortality monitoring from 2000 – 2012 (SRC APWRA 2013). These fatalities occurred at 77 different turbines; 37 at Enertech 45-kW turbines, 48 at Micon 65-kW turbines, three at Polenko 100-kW turbines, and four at Windmatic 65-kW turbines. Fifty-eight of the 92 fatalities occurred in the Ralph-Johnston-Pombo parcel (Figure 4A); 25 occurred in the Castello-Arnaudo parcel (Figure 4B); and 9 occurred in the Griffith parcel (Figure 4C). Adjusted mortality estimates have been calculated for the Sand Hill Facility, and range from 0.00 to 1.90 fatalities/MW/year based on monitoring conducted from 2005 to 2010 (ICF International 2012). The BACI avian mortality study conducted by Smallwood at Sand Hill Facility high-risk turbines in 2012 – 2013 detected one red-tailed hawk fatality, resulting in an adjusted mortality estimate of 0.190 deaths/MW/year at high-risk turbines (Smallwood 2013; Table 2).

The average number of red-tailed hawk fatalities detected each month varies seasonally (Smallwood et al. 2009a). The lowest numbers of fatalities are detected during the winter period, the season with the highest use (ICF International 2013a). Outside of the winter period, the average number of red-tailed hawk fatalities appears to increase through the fall, roughly corresponding to the time of natal dispersal and migration (ICF International 2013a).

A number of factors contribute to relatively high mortality rates of red-tailed hawk in the APWRA. Red-tailed hawks typically hunt from perches, and have frequently been observed perching on both non-operational and operational turbine towers and even on idle turbine blades (Howell and DiDonato 1991, Orloff and Flannery 1992, Smallwood and Thelander 2005, ICF International 2013a). In a study of bird behavior from 1998 – 2001, the red-tailed hawk was the species most often performing what are assumed to be more dangerous behaviors, including flight in close proximity to turbines (within 164 feet, or 50 meters) and even flights through the rotor zone of spinning turbines (Orloff and Flannery 1992, Smallwood and Thelander 2005). Furthermore, they spend disproportionally more time in close proximity to turbines, and spend a large proportion of that time foraging (Smallwood and Thelander 2005, Smallwood et al. 2009a). Red-tailed hawk mortality rates appear to be highest on notches, plateaus, and hill peaks (Smallwood 2010).

Other Common Bird Species

A number of common, non-special status species have been detected as fatalities at the Sand Hill Facility. These species are summarized in Table 1 and annual mortality estimates for these species from a number of studies in the APWRA are provided in Table 2. Mortality estimates from the BACI avian mortality study conducted at Sand Hill in 2012 – 2013 (Smallwood 2013) are also provided in Table 2 for comparison, although the data was collected only at high-risk turbines, and thus, is expected to produce relatively higher mortality estimates.

Table 1. Documented Avian Fatalities in the APWRA

Common Name[1]	Scientific Name	Status[2]	Found as Fatality at Sand Hill
American avocet	*Recurvirostra americana*	-	X
American coot	*Fulica americana*	-	-
American crow	*Corvus brachyrhynchos*	-	X
American kestrel	*Falco sparverius*	SLC	X
American pipit	*Anthus rubescens*	-	X
American robin	*Turdus migratorius*	-	-
Ash-throated flycatcher	*Myiarchus cinerascens*	-	X
Band-tailed pigeon	*Columba fasciata*	-	-
Barn owl	*Tyto alba*	-	X
Barn swallow	*Hirundo rustica*	-	X
Black-crowned night heron	*Nycticorax nycticorax*	-	-
Black-necked stilt	*Himantopus mexicanus*	-	X
Bonaparte's gull	*Chroicocephalus philadelphia*	-	-
Brewer's blackbird	*Euphagus cyanocephalus*	-	X
Brown pelican	*Pelicanus occidentalis*	CFP	X
Brown-headed cowbird	*Molothrus ater*	-	X
Burrowing owl	*Athene cunicularia*	CSC	X
California gull	*Larus californicus*	-	X
Cattle egret	*Bubulcus ibis*	-	-
Cliff swallow	*Hirundo pyrrhonota*	-	X
Cockatiel	*Leptolophus hollandicus*	-	X
Common goldeneye	*Bucephala clangula*	-	-
Common poorwill	*Phalaenoptilus nuttallii*	-	X
Common raven	*Corvus corax*	-	X
Cooper's hawk	*Accipiter cooperii*	-	-
Dark-eyed junco	*Junco hyemalis*	-	-
Double-crested cormorant	*Phalacrocorax auritus*	-	-
European starling	*Sturnus vulgaris*	-	X
Ferruginous hawk	*Buteo regalis*	-	X
Fox sparrow	*Passerella iliaca*	-	-
Golden eagle	*Aquila chrysaetos*	BGEPA, CFP	X
Golden-crowned sparrow	*Zonotrichia atricapilla*	-	X
Great blue heron	*Ardea herodius*	-	X
Great egret	*Ardea alba*	-	X
Great horned owl	*Bubo virginianus*	-	X
Hammond's flycatcher	*Empidonax hammondii*	-	-
Helmeted guineafowl	*Numida meleagris*	-	X
Herring gull	*Larus argentatus*	-	X
Horned lark	*Eremophila alpestris actia*	-	X
House finch	*Carpodacus mexicanus*	-	X
House sparrow	*Passer domesticus*	-	X
House wren	*Troglodytes aedon*	-	-
Killdeer	*Charadrius vociferus*	-	X

Table 1. Documented Avian Fatalities in the APWRA (cont.)

Common Name[1]	Scientific Name	Status[2]	Found as Fatality at Sand Hill
Lesser goldfinch	*Spinus psaltria*	-	X
Lesser yellowlegs	*Tringa flavipes*	-	-
Lincoln sparrow	*Melospiza lincolnii*	-	-
Loggerhead shrike	*Lanius ludovicianus*	CSC	X
Long-billed curlew	*Numenius americanus*	-	-
Long-eared owl	*Asio otus wilsonianus*	CSC	-
Mallard	*Anas platyrhynchos*	-	X
Mew gull	*Larus canus*	-	-
Mountain bluebird	*Sialia currucoides*	-	X
Mourning dove	*Zenaida macroura*	-	X
Northern flicker	*Colaptes auratus*	-	X
Northern harrier	*Circus cyaeneus*	CSC	X
Northern mockingbird	*Mimus polyglottos*	-	X
Northern shrike	*Lanius excubitor*	-	-
Orange-crowned warbler	*Vermivora celata*	-	-
Pacific-slope flycatcher	*Empidonax difficilis*	-	X
Peregrine falcon	*Falco peregrinus*	CFP	-
Pied-billed grebe	*Podilymbus podiceps*	-	-
Prairie falcon	*Falco mexicanus*	-	-
Red-shouldered hawk	*Buteo lineatus*	-	-
Red-tailed hawk	*Buteo jamaicensis*	SLC	X
Red-winged blackbird	*Agelaius phoeniceus*	-	X
Ring-billed gull	*Larus delawarensis*	-	-
Ring-necked duck	*Aythya collaris*	-	-
Rock pigeon	*Columba livia*	-	X
Rock wren	*Salpinctes obsoletus*	-	-
Rough-legged hawk	*Buteo lagopus*	-	-
Sandhill crane[3]	*Grus canadensis*	CT/CSC[3]	-
Savannah sparrow	*Passerculus sandwichensis*	-	X
Say's phoebe	*Sayornis saya*	-	X
Scrub jay	*Aphelocoma californica*	-	-
Spotted sandpiper	*Actitis macularius*	-	X
Spotted towhee	*Pipilo maculatus*	-	-
Swainson's hawk	*Buteo swainsoni*	CT	-
Swainson's thrush	*Catharus ustulatus*	-	-
Thayer's gull	*Larus thayeri*	-	-
Townsend's warbler	*Dendroica townsendi*	-	-
Tree swallow	*Tachycineta bicolor*	-	X
Tricolored blackbird	*Agelaius tricolor*	CSC	X
Turkey vulture	*Cathartes aura*	-	X
Vaux's swift	*Chaetura vauxi*	CSC	-
Violet-green swallow	*Tachycineta thalassina*	-	X

Table 1. Documented Avian Fatalities in the APWRA (cont.)

Common Name[1]	Scientific Name	Status[2]	Found as Fatality at Sand Hill
Warbling vireo	*Vireo gilvus*	-	-
Western bluebird	*Sialia mexicana*	-	-
Western gull	*Larus occidentalis*	-	-
Western kingbird	*Tyrannus verticalis*	-	-
Western meadowlark	*Sturnella neglecta*	-	X
Western tanager	*Piranga ludoviciana*	-	-
White-tailed kite	*Elanus leucurus*	CFP	-
White-throated swift	*Aeronautes saxatalis*	-	X
Wild turkey	*Melleagris gallopavo*	-	-
Wilson's warbler	*Cardellina pusilla*	-	X
Yellow warbler	*Dendroica petechia*	CSC	-
Yellow-rumped warbler	*Dendroica coronata*	-	X

[1]Species documented as fatalities in APWRA have been reported in one or more of the following studies: Howell and DiDonato 1991, Orloff and Flannery 1992, Orloff and Flannery 1996, Howell 1997, Hunt 2002, Smallwood and Thelander 2004, Smallwood and Thelander 2005, Smallwood and Thelander 2008, APAMT 2008, West 2008, Smallwood and Karas 2009, ICF International 2012

[2]Species Status:
BGEPA = Bald and Golden Eagle Protection Act
CE = California Endangered
CT = California Threatened
CFP = California Fully Protected
CSC = California Species of Concern
SLC = Species of Local Concern

[3]The greater sandhill crane is listed as California Threatened and California Fully Protected. The wintering population of lesser sandhill crane is listed as a California Species of Concern.

Table 2. Adjusted Avian Mortality Rates at the APWRA

Study Area	Entire APWRA					Sand Hill Facility	
Data Source	Smallwood and Thelander (2008)	APAMT (2008)	Smallwood and Karas (2009)	Smallwood and Karas (2009)	ICF International (2013a)	ICF International (2012)	Smallwood (2013)[1] High-risk Turbines
Years Data Collected	1998–2003	1998–2003	1998–2000	2005–2007	2005–2011	2005-2010	2012–2013
Species or Group	Adjusted Rate of Fatalities (Deaths/MW/Year)						
American kestrel	0.599	0.646	0.496	0.532	0.490	0.00-1.90	0.562
Barn owl	0.052		0.077	0.268	0.250		0.274
Burrowing owl	0.759	0.827	1.442	3.025	0.700	0.00-10.40	3.126
Ferruginous hawk	0.028				0.010		0.179
Golden eagle	0.115	0.211	0.070	0.091	0.090	0.00-0.50	
Great horned owl	0.016		0.043	0.048	0.070		0.108
Northern harrier	0.001		0.006	0.015	0.010		
Peregrine falcon					0.000		
Prairie falcon	0.002		0.003	0.006	0.020		
Red-shouldered hawk					0.000		
Red-tailed hawk	0.324	0.537	0.437	0.782	0.500	0.00-1.90	0.190
Swainson's hawk					0.000		
Turkey vulture	0.004		0.009	0.003	0.020		
White-tailed kite					0.010		
ALL RAPTORS	**1.943**	**2.459**	**2.583**	**4.786**	**1.780**		**4.441**
American avocet	0.007		0.059	0.000	0.000		
American coot					0.010		
American crow	0.017		0.068	0.049	0.010		
American pipit					0.010		
Ash-throated flycatcher							0.311
Barn swallow					0.010		
Black-crowned night heron	0.001						
Black-necked stilt			0.000	0.130	0.000		
Bonaparte's gull					0.000		
Brewer's blackbird	0.153		0.246	0.226	0.050		

Table 2. Adjusted Avian Mortality Rates at the APWRA (cont.)

Study Area	Entire APWRA					Sand Hill Facility	
Data Source	Smallwood and Thelander (2008)	APAMT (2008)	Smallwood and Karas (2009)	Smallwood and Karas (2009)	ICF International (2013a)	ICF International (2012)	Smallwood (2013)[1] High-risk Turbines
Years Data Collected	1998–2003	1998–2003	1998–2000	2005–2007	2005–2011	2005-2010	2012–2013
Species or Group	Adjusted Rate of Fatalities (Deaths/MW/Year)						
Brown pelican					0.000		
Brown-headed cowbird	0.065		0.058	0.000	0.000		
California gull	0.010		0.028	0.035	0.030		0.126
Cattle egret	0.003						
Cliff swallow	0.013		0.063	0.046	0.020		
Cockatiel	0.001		0.000	0.068			
Common goldeneye					0.000		
Common poorwill					0.000		0.257
Common raven	0.027		0.088	0.145	0.110		0.300
Dark-eyed junco					0.000		
Double-crested cormorant	0.002		0.017	0.000			
European starling	0.469		1.704	3.235	1.950		8.559
Golden-crowned sparrow					0.010		
Great blue heron			0.000	0.004	0.000		
Great egret			0.000	0.156	0.000		
Hammond's flycatcher					0.010		
Herring gull							0.118
Horned lark	0.041		0.455	0.456	0.200		0.553
House finch	0.045		0.693	0.000	0.010		0.866
House sparrow	0.021				0.000		
House wren					0.010		
Killdeer			0.000	0.012	0.020		0.322
Lesser goldfinch					0.010		0.445
Lesser yellowlegs	0.001						
Lincoln's sparrow					0.000		

Table 2. Adjusted Avian Mortality Rates at the APWRA (cont.)

Study Area	Entire APWRA					Sand Hill Facility	
Data Source	Smallwood and Thelander (2008)	APAMT (2008)	Smallwood and Karas (2009)	Smallwood and Karas (2009)	ICF International (2013a)	ICF International (2012)	Smallwood (2013)[1] High-risk Turbines
Years Data Collected	1998–2003	1998–2003	1998–2000	2005–2007	2005–2011	2005-2010	2012–2013
Species or Group	Adjusted Rate of Fatalities (Deaths/MW/Year)						
Loggerhead shrike	0.019		0.066	0.438	0.120		
Mallard	0.052		0.187	0.137	0.060		
Mountain bluebird	0.052		0.000	0.081	0.020		
Mourning dove	0.208		2.538	1.054	0.230		2.868
Northern flicker	0.066		0.247	0.087	0.040		
Northern mockingbird	0.004		0.082	0.000	0.020		
Orange-crowned warbler					0.000		
Pacific-slope flycatcher	0.003		0.058	0.000			
Pied-billed grebe					0.000		
Red-winged blackbird	0.035		0.505	0.330	0.090		0.391
Ring-billed gull	0.010		0.029	0.000	0.000		
Ring-necked duck	0.005						
Rock dove	0.325		1.339	3.520	2.300		16.609
Rock wren					0.010		
Sandhill crane					0.000		
Savannah sparrow	0.015		0.073	0.000	0.010		
Say's phoebe					0.010		
Spotted sandpiper							0.266
Spotted towhee					0.000		
Swainson's thrush					0.010		
Townsend's warbler					0.000		
Tree swallow			0.000	0.013			
Tricolored blackbird	0.002		0.030	0.000	0.010		0.240
Violet-green swallow	0.001				0.000		
Warbling vireo					0.000		

Table 2. Adjusted Avian Mortality Rates at the APWRA (cont.)

Study Area	Entire APWRA					Sand Hill Facility	
Data Source	Smallwood and Thelander (2008)	APAMT (2008)	Smallwood and Karas (2009)	Smallwood and Karas (2009)	ICF International (2013a)	ICF International (2012)	Smallwood (2013)[1] Sand Hill High-risk Turbines
Years Data Collected	1998–2003	1998–2003	1998–2000	2005–2007	2005–2011	2005-2010	2012–2013
Species or Group	Adjusted Rate of Fatalities (Deaths/MW/Year)						
Western meadowlark	0.716		1.964	3.817	1.710		2.342
Western kingbird	0.001		0.021	0.000			
Western scrub-jay					0.000		
Western tanager					0.020		
White-throated swift			0.000	0.027	0.010		0.297
Wild turkey	0.002		0.013	0.000	0.000		
Wilson's warbler					0.010		
Yellow warbler	0.002						
ALL BIRDS	**4.672**		**14.220**	**21.627**	**9.360**		**47.634**

1. Rates provided from Smallwood 2013 are those from searches at high-risk turbines at the Sand Hill Facility corrected with the integrated carcass detection trial performed at the Sand Hill Facility.

BACI Avian Mortality Study at High-risk Turbines at the Sand Hill Facility

Mortality rates specific to high-risk turbines at the Sand Hill Facility are available from the preliminary results of the first year of the BACI study being conducted by Smallwood (2013). The Smallwood study was performed in order to investigate the impacts of repowering with Shrouded Turbines at the Sand Hill Facility. Search turbines were chosen by selecting 60 clusters of high-risk turbines within the 385 turbine Sand Hill Facility; turbines were defined as high-risk that had relatively high numbers of fatalities detected during previously performed mortality monitoring (i.e., monitoring performed by ICF International). Mortality monitoring began April 1, 2012 and this report makes use of data through March 31, 2013. Each 164-foot (50-meter) radius search plot was covered by transects spaced 20 feet (6 meters) apart and had a mean search interval of 4.8 days. Raw numbers of fatalities were adjusted for detection bias (e.g., carcass persistence, searcher efficiency) using integrated carcass detection trials that included scaling detection based on the body mass of carcasses. Additionally, raw numbers of fatalities were adjusted based on the proportion of fatalities that occurred within 164 feet (50 meters) of the turbine to account for the spatial carcass distribution sampled.

A total of 406 unique fatalities were detected during the first year of the study, with 253 of the fatalities attributed to turbine collision. Fatalities attributed to turbine collision were comprised of 97 fatalities of endemic species of which 25 were raptors, and 156 fatalities of non-native species (rock pigeon and European starling, n = 120 and n = 36, respectively).

Adjusted annual mortality rates for the high-risk turbines searched were estimated for individual species and groups (see Smallwood 2013 for detailed methods; Table 2). Species-specific mortality rates ranged from 0.108 fatalities/MW/year to 16.609 fatalities/MW/year at high-risk turbines (Table 2). The burrowing owl and mourning dove had the highest estimated annual mortality rates (3.126 fatalities/MW/year, and 2.868 fatalities/MW/year, respectively) among native species. It is important to note that these rates are not to be considered representative of the Sand Hill Facility as a whole, but reflect the annual rate of fatalities at high-risk turbines.

Smallwood also compared the results of his mortality monitoring against monitoring conducted concurrently by ICF International at the same high-risk turbines of the Sand Hill Facility. No Sand Hill Facility-specific detection bias corrections were available for the ICF International data; therefore, Smallwood used national averages for carcass persistence and searcher efficiency correction factors from trials conducted in annual grassland environments similar to the conditions in the APWRA. These correction factors were applied to both the Smallwood monitoring data and ICF International's data to allow comparison and to lessen the chance of deriving anomalous adjustment values from one monitoring study (Smallwood 2013). Different search intervals were used in the analysis for the two data sources because monitoring performed by ICF International used a longer search interval (39 – 42 days) than the Smallwood monitoring. The ICF International dataset had fewer species detected, particularly small-bodied species, and the mortality estimates were lower than those produced by Smallwood's data using the national adjustments (Smallwood 2013; Table 3). Additionally, the mortality estimates from Smallwood's data were generally higher when adjusted using national averages from separate trials for searcher detection and carcass persistence than when they were adjusted with the integrated carcass detection trial conducted at the Sand Hill Facility (Smallwood 2013; Table 3).

Table 3. Mortality Rates Estimated From Smallwood Monitoring and From ICF International Monitoring at High-risk Turbines at the Sand Hill Facility

Species	Adjusted with Integrated Bias Trial Results from Sand Hill Facility (Deaths/MW/Year)	Adjusted with National Bias Averages (Deaths/MW/Year)	
	Smallwood Mean	Smallwood Mean	ICF Mean
American kestrel	0.562	0.869	
Barn owl	0.274	0.399	0.396
Burrowing owl	3.126	5.104	2.790
Ferruginous hawk	0.179	0.325	
Great horned owl	0.108	0.200	
Red-tailed hawk	0.190	0.325	
ALL RAPTORS	**4.441**	**7.221**	**3.186**
Ash-throated flycatcher	0.311	0.290	
California gull	0.126	0.200	
Common poorwill	0.257	0.290	
Common raven	0.300	0.519	
European starling	8.559	11.586	9.775
Herring gull	0.118	0.200	
Horned lark	0.553	0.579	
House finch	0.866	0.752	1.044
Killdeer	0.322	0.471	
Lesser goldfinch	0.445	0.290	
Mourning dove	2.868	4.536	
Red-winged blackbird	0.391	0.471	
Rock pigeon	16.609	21.631	11.243
Spotted sandpiper	0.266	0.290	
Tricolored blackbird	0.240	0.290	
Western meadowlark	2.342	3.439	1.082
White-throated swift	0.297	0.290	
Yellow-rumped warbler	1.043	0.579	
ALL BIRDS	**47.634**	**61.962**	**27.754**

Mortality rates at high-risk turbines of the Sand Hill Facility do not appear to be declining over time based on a comparison of rates from the Smallwood study to adjusted rates calculated from long-term mortality monitoring data (ICF International 2012, Smallwood 2013). Additionally, for some species such as the burrowing owl and western meadowlark, mortality rates demonstrate a cyclical nature. This may be related to species-specific inter-annual cycles of abundance, assuming that species abundance is related to collision risk.

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FIGURES

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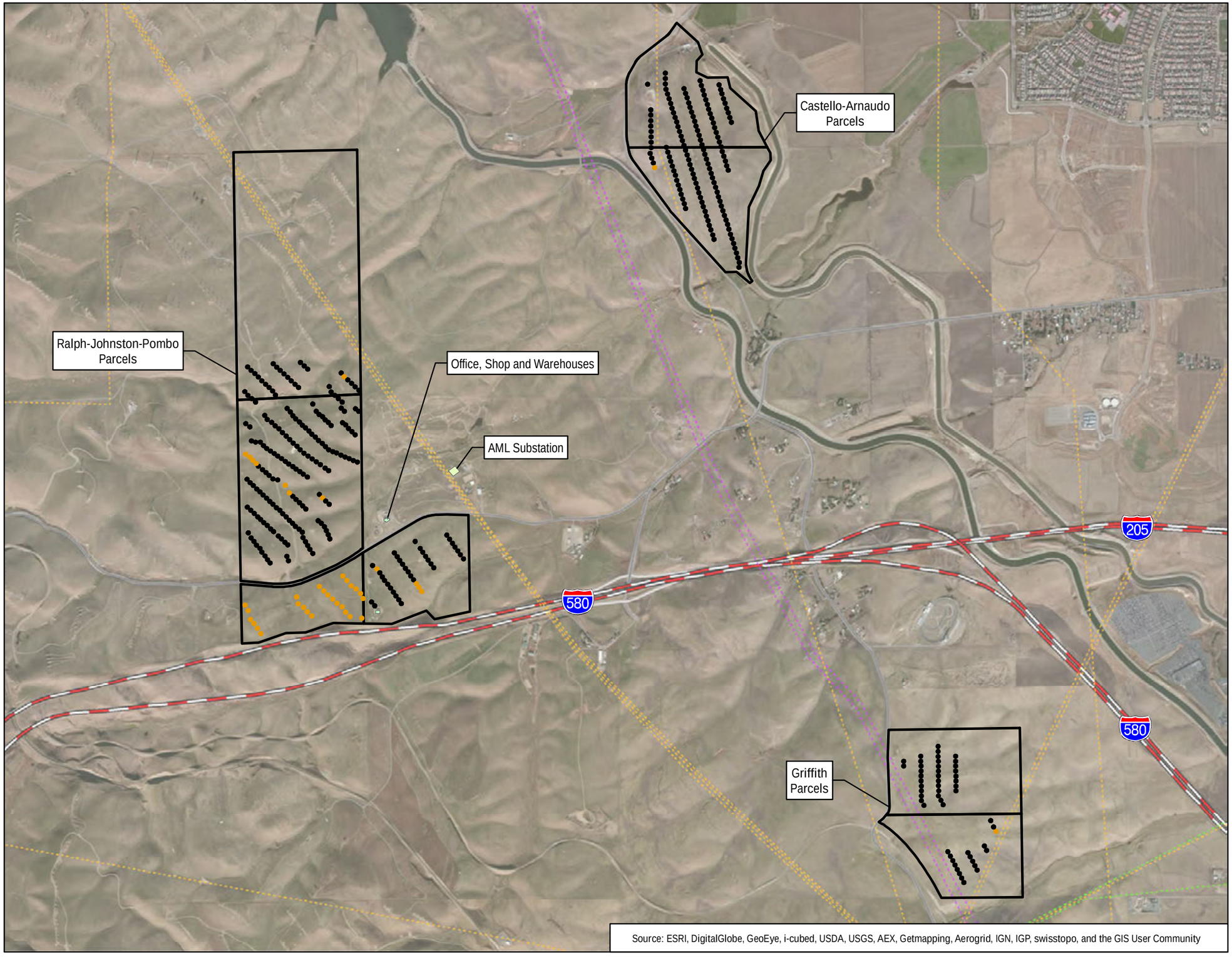

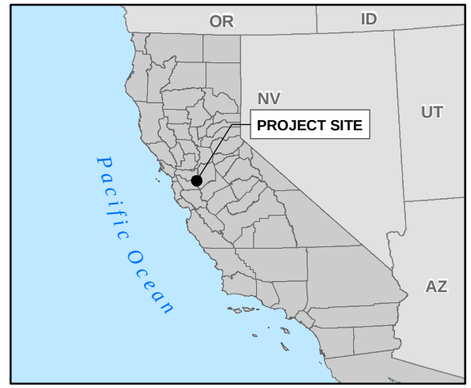

Legend

- Project Parcels
- Existing Wind Turbines
- Removed Wind Turbines
- AES Buildings
- Interconnect Substations

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Transportation Features

- Interstate Highway
- State Highway
- County Highway
- Freeway ramp
- Local Roads

Source: ESRI, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

FLODESIGN WIND TURBINES

FIGURE 1
LOCATION AND VICINITY MAP

0 1,000 2,000 4,000
Feet

TETRA TECH

Figure 2. FloDesign Shrouded Turbine Prototype

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Ralph 2

Ralph 1

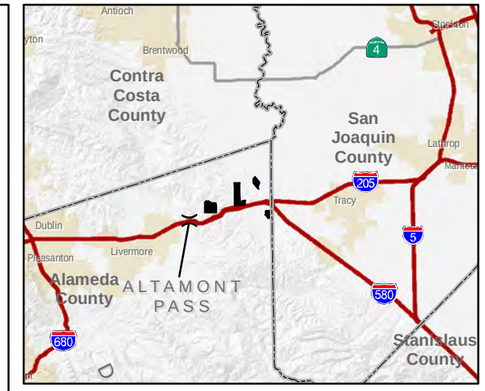
Johnston

Pombo

Altamont Pass Road

AML Substation

Office, Shop and Warehouses



Legend

- Phase 1 Parcels
- Other Parcels
- Existing Turbine
- Removed Turbine
- Proposed Turbines

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Avian Fatalities

- American Kestrel
- Golden Eagle
- Loggerhead Shrike
- Tricolored Blackbird

0 105 210 420
Meters
0 350 700 1,400
Feet

Fatality data derived from mortality monitoring performed by ICF International from 2000-2012. Data retrieved on May 24, 2013 from the Science Review Committee: Altamont Pass Wind Resource Area website.

FLODESIGN WIND TURBINES

FIGURE 3A
AVIAN FATALITIES
GROUP 1

FloDesign Wind Turbine
there's change in the wind

TETRA TECH

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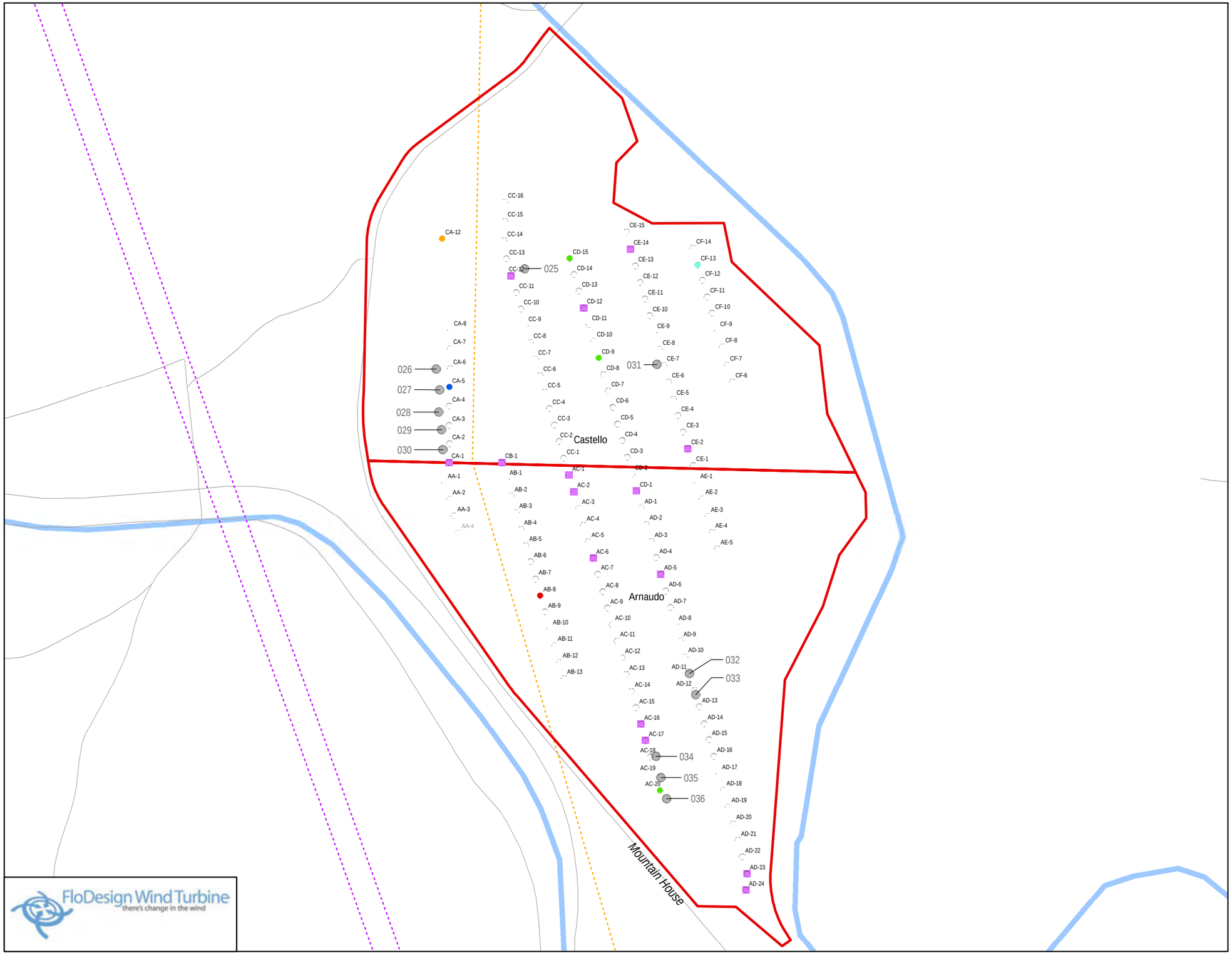

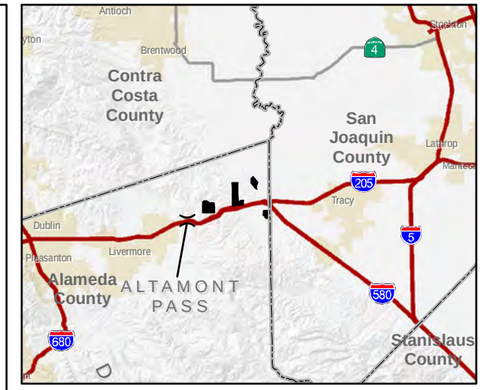

Legend

- Phase 1 Parcels
- Other Parcels
- Existing Turbine
- Removed Turbine
- Proposed Turbines

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Avian Fatalities

- American Kestrel
- Brown Pelican
- Golden Eagle
- Loggerhead Shrike
- Northern Harrier
- Tricolored Blackbird

0 85 170 340
Meters

0 285 570 1,140
Feet

Fatality data derived from mortality monitoring performed by ICF International from 2000-2012. Data retrieved on May 24, 2013 from the Science Review Committee: Altamont Pass Wind Resource Area website.

FLODESIGN WIND TURBINES

FIGURE 3B
AVIAN FATALITIES
GROUP 1

FloDesign Wind Turbine
there's change in the wind

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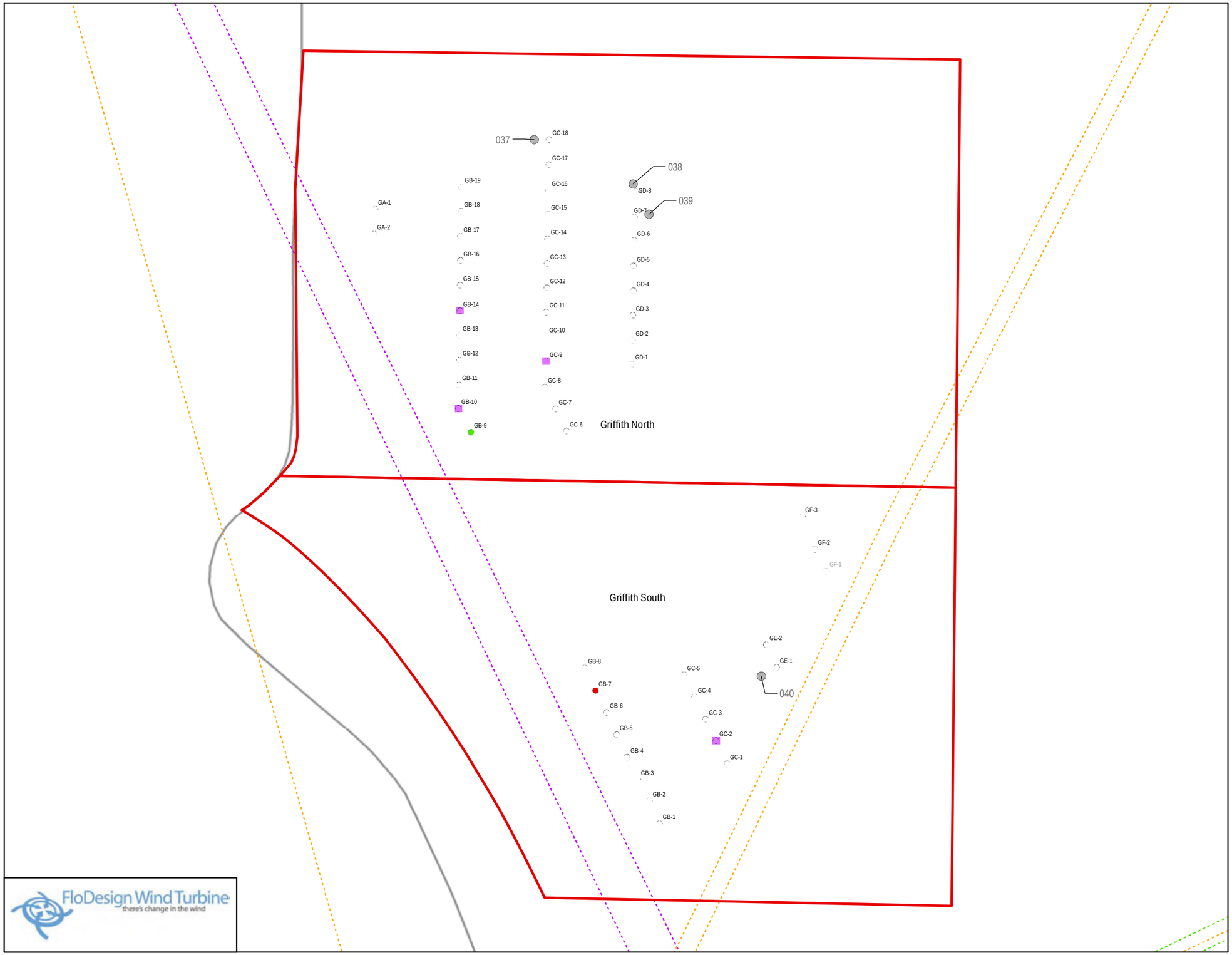

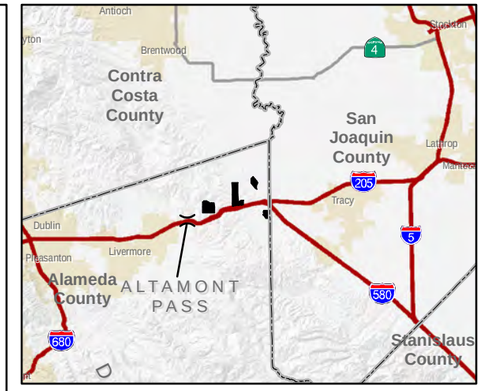

Legend

- Phase 1 Parcels
- Other Parcels
- Existing Turbine
- Removed Turbine
- Proposed Turbines

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Avian Fatalities

- American Kestrel
- Golden Eagle
- Loggerhead Shrike

0 60 120 240
Meters

0 200 400 800
Feet

Fatality data derived from mortality monitoring performed by ICF International from 2000-2012. Data retrieved on May 24, 2013 from the Science Review Committee: Altamont Pass Wind Resource Area website.

FLODESIGN WIND TURBINES

FIGURE 3C
AVIAN FATALITIES
GROUP 1

FloDesign Wind Turbine
there's change in the wind

TETRA TECH

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Ralph 2

Ralph 1

Johnston

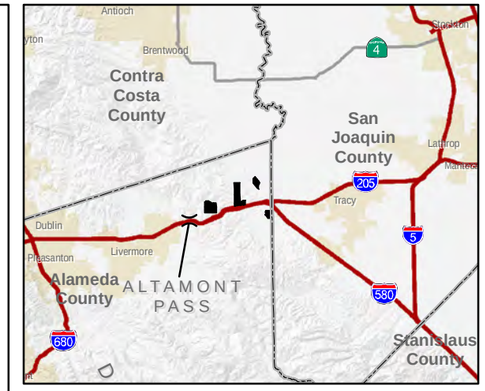
Pombo

AML Substation

Office, Shop and Warehouses

Altamont Pass Road

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022 023 024



Legend

- Phase 1 Parcels
- Other Parcels
- Existing Turbine
- Removed Turbine
- Proposed Turbines

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Avian Fatalities

- Burowing Owl
- Red-Tailed Hawk

Live Burrowing Owl Observations in 2013

- Male Guard
- Pair Observed

0 105 210 420
Meters

0 350 700 1,400
Feet

Fatality data derived from mortality monitoring performed by ICF International from 2000-2012. Data retrieved on May 24, 2013 from the Science Review Committee: Altamont Pass Wind Resource Area website.

FloDesign Wind Turbine
there's change in the wind

FLODESIGN WIND TURBINES

FIGURE 4A
AVIAN FATALITIES
GROUP 2

TETRA TECH

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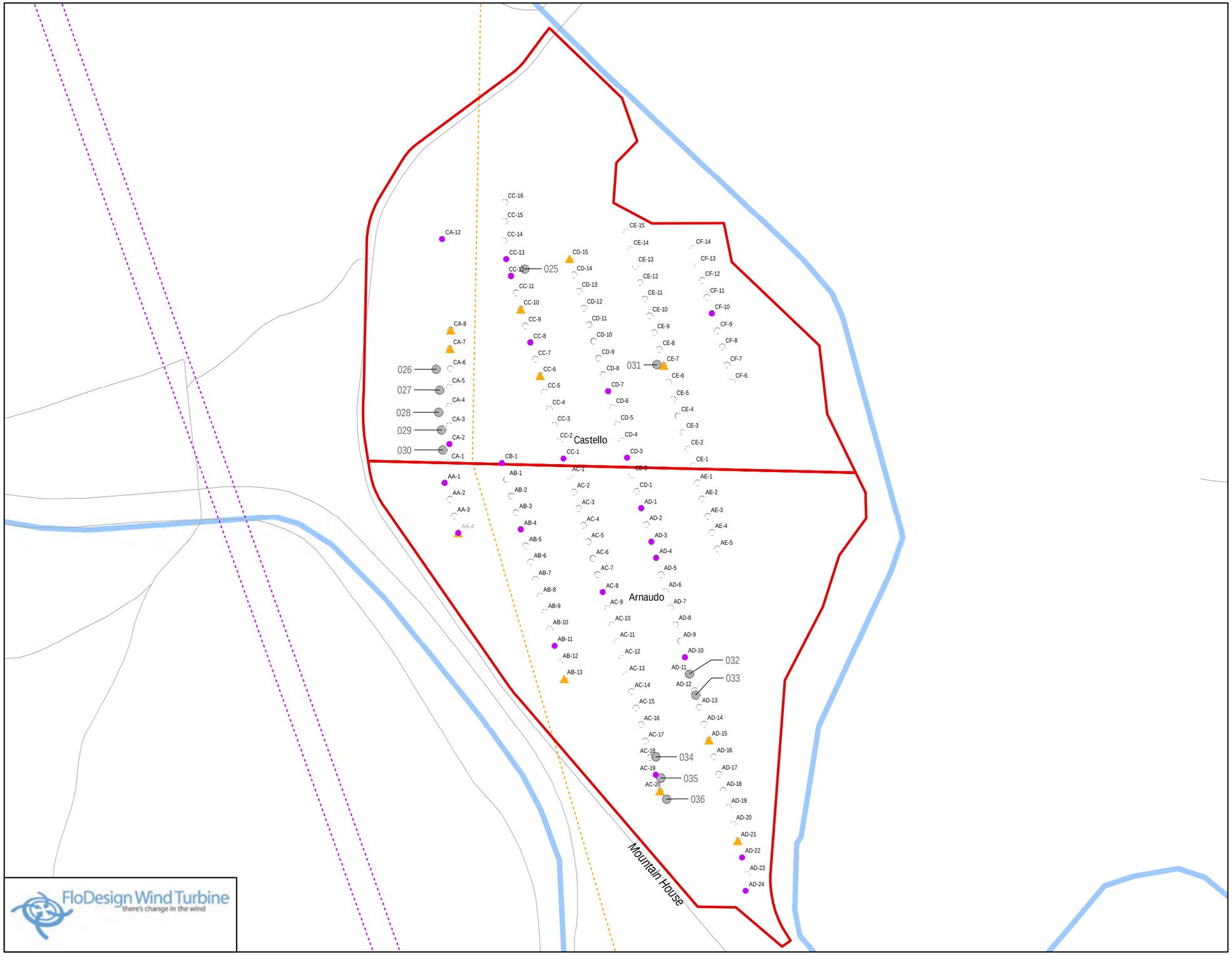

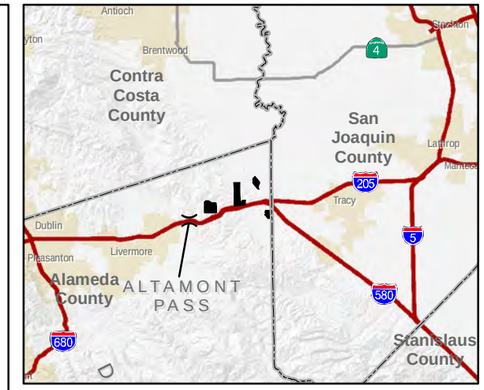

Legend

- Phase 1 Parcels
- Other Parcels
- Existing Turbine
- Removed Turbine
- Proposed Turbines

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Avian Fatalities

- Burowing Owl
- Red-Tailed Hawk

0 85 170 340
Meters

0 285 570 1,140
Feet

Fatality data derived from mortality monitoring performed by ICF International from 2000-2012. Data retrieved on May 24, 2013 from the Science Review Committee: Altamont Pass Wind Resource Area website.

FLODESIGN WIND TURBINES

FIGURE 4B
AVIAN FATALITIES
GROUP 2

FloDesign Wind Turbine
there's change in the wind

TETRA TECH

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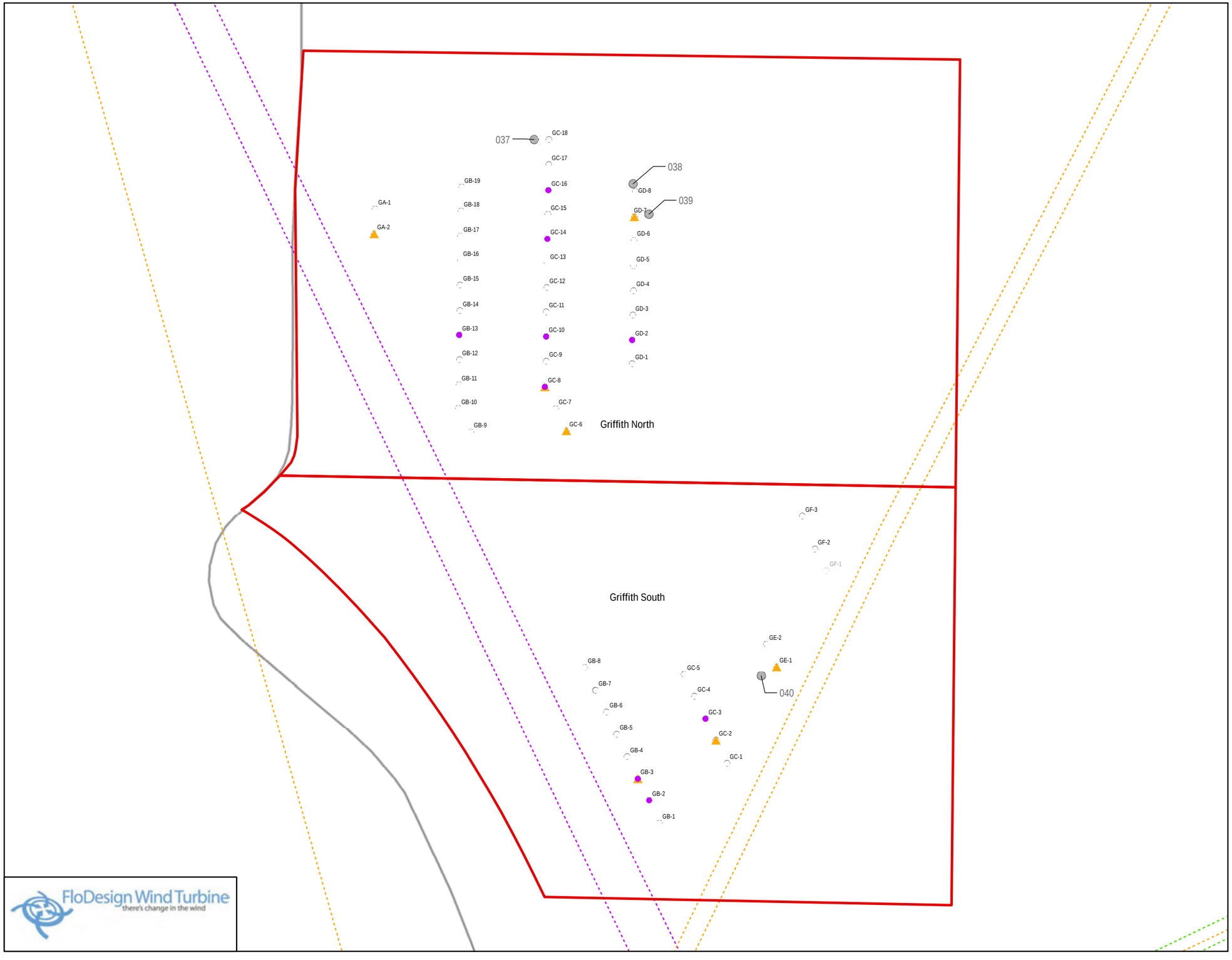

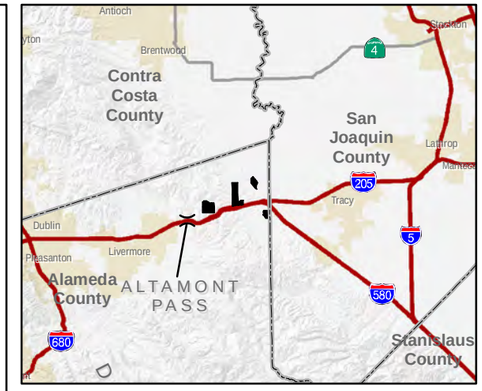

Legend

- Phase 1 Parcels
- Other Parcels
- Existing Turbine
- Removed Turbine
- Proposed Turbines

Transmission Lines

- 100-161 kV Transmission Line
- 230-287 kV Transmission Line
- 500 kv Transmission Line

Avian Fatalities

- Burowing Owl
- Red-Tailed Hawk

0 60 120 240
Meters
0 200 400 800
Feet

Fatality data derived from mortality monitoring performed by ICF International from 2000-2012. Data retrieved on May 24, 2013 from the Science Review Committee: Altamont Pass Wind Resource Area website.

FLODESIGN WIND TURBINES

FIGURE 4C
AVIAN FATALITIES
GROUP 2

FloDesign Wind Turbine
there's change in the wind

TETRA TECH

Report CUL-1

Summary of 2013 Cultural Resources Survey for FloDesign Wind Turbine, Inc. (now Ogin, Inc.) Proposed Sand Hill Wind Farm Repowering Project

SUMMARY OF RESULTS

OF

2013 CULTURAL RESOURCES SURVEY

PREPARED FOR FLODESIGN WIND TURBINE, INC. (NOW OGIN, INC.)

FOR THE

PROPOSED SAND HILL WIND FARM REPOWERING PROJECT, ALAMEDA COUNTY, CALIFORNIA

Original Survey Prepared by:
Tetra Tech, Inc.
17885 Von Karman Ave. Suite 500 Irvine, CA 92614-5227
(949) 809-5000

(Tetra Tech Project #106-4435)

Summary of 2013 Cultural Resources Study

Background

In April 2013, Tetra Tech, Inc. (Tetra Tech) conducted cultural resources investigations in support of FloDesign Wind Turbine, Inc.'s (now Ogin, Inc.) Sand Hill Wind Farm Repowering Project (Project). The survey report documents the results of these efforts and complies with the California Office of Historic Preservation's "Archaeological Resources Management Reports (ARMR): Recommended Contents and Format" (OHP 1990). The cultural resources investigation was performed by Tetra Tech, Inc. (Tetra Tech) to determine the presence or absence of historic resources within or near the project's area of potential effect (APE) and to evaluate whether the project might affect historic resources identified within or near the APE.

The project area, currently and as described in the 2013 study, consists of eight parcels totaling approximately 1,000 acres, located in northeastern Alameda County, approximately 11 miles west of the city of Tracy, California. The land is privately owned and is currently used as a wind farm as well as for grazing. The 2013 cultural resources study defined the study area as the general location of the project, with a 1-mile buffer, and divided the project area into three separate study areas. The study areas are referred to as C-01 (the Ralph-Pombo parcels), C-02 (Castello-Arnaudo Parcels), and C-03 (Griffith 1-Griffith 2 Parcels).

The legal location of the study area, used in the 2013 study and applicable to the proposed project, is described below.

> **C-01 (Ralph-Pombo Parcels)—**Township 2 South, Range 3 East, portions of Sections 23 and 24 of United States Geological Survey (USGS) 7.5' Midway, and portions of section 14 of USGS 7.5' Clifton Court Forebay, California, quadrangles, Prime Meridian 10.
>
> **C-02 (Castello-Arnaudo Parcels)—**Township 2 South, Range 4 East, portions of Sections 7 and 18 of United States Geological Survey (USGS) 7.5' Clifton Court Forebay, and portions of section 14 of USGS 7.5' Clifton Court Forebay, California, quadrangle, Prime Meridian 10.
>
> **C-03 (Griffith 1-Griffith 2 Parcels)—**Township 2 South, Range 4 East, western portion of Section 29 of USGS 7.5' Midway, California, quadrangle, Prime Meridian 10.

The objective of the 2013 survey investigation was to identify cultural resources that may be affected by project activities, and provide recommendations of their significance and potential eligibility for nomination to the California Register of Historical Resources (CRHR) under Section 15064.5 of the State California Environmental Quality Act (CEQA) Guidelines. Cultural resources include both archaeological remains and architectural features associated with prehistoric and historic period sites. Archaeological remains include artifacts resulting from past human activities. Architectural resources can include buildings, standing structures, structural remains, and industrial facilities. Depending on the type of resource(s) encountered, a wide range of research topics could be addressed by cultural resources identified by the investigation (or subsequently in the event of an unanticipated discovery). Research efforts involved in the initial phase of survey involve archival research to determine if cultural resources studies have been previously conducted within 1 mile of the APE, if cultural resources have been recorded in the project site, and what past land uses may have affected the APE or left archaeological remains. A pedestrian survey of the APE and any appropriate buffers is then designed based on this information. During the survey, previously recorded cultural resources are inspected and verified and any newly identified resources are mapped and described.

Methodology

Records Search and Document Review

On March 8, 2013, Tetra Tech conducted a records search of the cultural resource site and project file collection at the Northwest Information Center (NWIC) of the California Historical Resources Information System at the California State University, Sonoma, California. As part of this records search, the California Points of Historical Interest, California State Historical Landmarks, CRHR, National Register of Historic Places (NRHP), California Inventory of Historic Resources, California Department of Transportation (Caltrans) Bridge Inventory, the Alameda County Register, and historic maps were reviewed. The search focused specifically on the project APE and the project study area 1-mile buffer around the APE. These research efforts were performed in compliance with applicable regulations.

The records search revealed that a total of 44 previous cultural resources investigations have been conducted within 1 mile of the proposed project site. Of these surveys, five have been conducted within or across the project's APE covering approximately 100 percent of the three project study areas (C-01, C-02, and C-03). These surveys were conducted 10 or more years earlier and were performed by professional archaeologists. While these surveys can provide important information about the project area, they may be considered inadequate under current state standards for archaeological investigations because of their age and methods used at that time. In addition, both natural and unnatural physical changes within the APE may have occurred since those surveys, exposing previously unidentified resources or potentially affecting a known archaeological site's condition and significance. The California Office of Historic Preservation (OHP) recommends updating surveys over 5 years old to ensure the most current information is available to local, state, and federal agencies for decision-making purposes (OHP 2013).

The 2013 records search revealed a total of 20 previously recorded historic archaeological sites and structures (foundations, roads, transmission lines, refuse, and railroad), and 4 previously recorded isolates within 1 mile of the three project study areas. One previously recorded site, the Vaca Dixon-Tesla 500-kilovolt (kV) transmission line (P-01-010499), crosses project study area C-03. The review of historic maps also identified unrecorded potential structures, historic roads, and transmission lines that are near or cross the project study areas.

An important part of CEQA is consultation with the local Native American community and any persons or organizations interested in the cultural resources that could be affected by the project. The California Native American Heritage Commission (NAHC) was contacted by e-mail on February 28, 2013, to request a sacred lands file search and a list of Native American contacts with interest in the project. The NAHC responded on March 19, 2013, that no previously identified Native American resources are within the project study area. A list of nine Native American contacts was also provided. On March 21, 2013, Tetra Tech provided each individual on this list a certified letter and e-mail containing information regarding the project, a map of the project sites, and a request for any comments and/or information regarding cultural resources in the project area. One reply was received requesting additional information regarding the project.

The records search identified several previously recorded prehistoric and historic cultural resources within the project study area. Based on the prehistoric, historic, and natural contexts as well as the results of the sacred lands file and records searches, the following resource sensitivity levels were assigned to the project study areas.

- Prehistoric Archaeological Resources: Low
- Historic Archaeological Resources: Low-Moderate

- Historic Resources (Built Environment): Low-Moderate
- Cultural Landscapes: Unknown

These sensitivity assignments are supported by the research and literature search presented in the 2013 cultural resources survey. Sensitivity levels are determined by the extent of prior survey coverage, the patterning and density of cultural resources within the NWIC search radius, indications of structures on historic maps, and an understanding of prehistoric and historic land use. The likelihood of subsurface cultural resources is considered low at this time. Although Native American resources were not identified by the NAHC, this does not preclude the potential for such resources to exist within the three project study areas or surrounding areas. Consultation with the individuals identified by the NAHC may identify such resources or other concerns of the local Native American community.

Expected Site Types

The cultural and archaeological contexts of the project area as well as the archival research described above reveal that the project area is adjacent to areas of low to moderate archaeological site density. The entire project area was previously surveyed in the mid-1980s. No cultural resources were identified during those surveys. The resources that have been identified from previous investigations within 1 mile are primarily historic. The potential site types are listed in Table CUL-1 and are based on the cultural, natural, and archaeological contexts of the APE.

Table CUL-1. Expected Site Types within the Sand Hill Study Area

Chronological Context	Expected Site Types
Prehistoric	• Lithic scatters • Petroglyphs/rock shelters • Isolates
Historic	• Ranching features or isolates • Refuse scatters • Homestead Remnants • Historic roads or trails • Industrial infrastructure/transmission lines

Pedestrian Survey

From March 11–13, 2013, Tetra Tech archaeological staff conducted a pedestrian field survey of the project APE, covering a total of 118.8 acres, to determine the presence or absence of cultural resources within the project area. One previously existing historic site (P-01-010499) and two newly identified historic sites (temporary numbers SH-JF-01 and SH-JF-02) were observed and recorded within the APE.

The survey was conducted by Tetra Tech Cultural Resource Staff Jenna Farrell (Field Director) and Erica Maier. All staff meet the Secretary of Interior's Professional Qualifications for Archaeology. The survey was conducted in transects spaced no greater than 7–10 meters apart, depending on terrain and ground surface visibility. In areas of poor ground surface visibility, the

field crew stopped periodically along transects and cleared ground cover with a trowel. The field crew also inspected all rock outcrops, exposed ground surfaces (e.g., dirt roads, cleared pads around existing wind farm components), and animal burrow back dirt or mounds. The exposed areas were inspected for evidence of cultural activities, cultural materials, and changes in soil color and texture. When cultural resources were discovered, a temporary number was assigned to the resource, mapped using a Trimble Global Positioning System unit and recorded on appropriate California Department of Parks and Recreation (DPR) site records (Form 523). No artifacts were collected during the survey.

2013 Cultural Resources Study Findings

The pedestrian survey identified two previously unidentified historic archaeological sites, one historic road, and one historic transmission line. One previously recorded site, P-01-010499, which crosses the western edge of the survey area, was updated.

The weather during the survey was clear and sunny, with no to very light winds. Ground surface visibility varied within the survey area from poor to good (0 to 50 percent); all areas of cleared ground surface (e.g., dirt roads, cleared pads, rodent burrows) were inspected. In areas of dense ground cover, surface scrapes were utilized to expose the ground surface and examine the soils. The project survey area was dominated by nonnative grasses and the soils consisted of light (dry) gray clay loams.

One previously recorded cultural resource, originally recorded in 2002 (Reeve and Farrell), and described as the Vaca Dixon-Tesla 500-kV and Table Mountain-Tesla 500-kV transmission line segments, crosses project study area C-03 and was updated during the 2013 survey.

- P-01-010499: this previously recorded site is the Vaca Dixon-Tesla 500-kVand Table Mountain-Tesla 500-kV transmission line

The transmission lines are the result of the Pacific Northwest–Southwest Intertie authorization in 1964 by the 88th Congress for the Northwest Power Transactions and Canadian Entitlements Power. The transmission lines were built in the late 1960s and described as “the most exciting transmission project of this century.” The two segments are connected to the Tesla Substation (just southwest of project area C-03). The Vaca Dixon-Tesla segment extends for 57 miles and the Table Mountain-Tesla segment extends for 134 miles. Both segments contain self-supporting 106- to 116- foot-tall galvanized steel lattice towers with two-bundle 2300 MCM, AAC conductors. This resource remains unevaluated; however, the site form noted that it may be eligible for the CRHR and eligibility criteria would include advances in technology and materials (Reeve and Farrell 2002). It may also be eligible for the newly adopted Alameda County Register under the same criteria.

As observed in 2013, Site P-01-010499 retained integrity and did not differ from the documented conditions on the resource’s site form. This resource is not within the direct APE of the project.

Two newly discovered historic era sites were recorded during the pedestrian survey. These sites were assigned temporary field numbers SH-JF-01 and SH-JF-02:

- SH-JF-01 (temporary number): historic road
- SH-JF-02 (temporary number) Pacific Gas and Electric’s Tracy-Tesla 230-kV transmission line

No prehistoric sites were identified within the project area as a result of either the archival review or the field investigation. Previously recorded historic archaeological sites and structures identified from the record search, in combination with the historic sites identified

during this study, reflect historic occupation and land use near and within the project area. These sites are dispersed across the landscape and are indicative of moderate historic activities associated with early settlement and ranching, and with the development of transportation and energy corridors within the hills of Altamont Pass.

Based on the literature review, archival research, and the results of this field investigation, the 2013 cultural resources study determined that the project APE is considered to have low to moderate surface archaeological sensitivity for historic archaeological resources and none to low subsurface archaeological sensitivity. The 2013 cultural resources study also determined that the APE is considered to have a low surface and low to none subsurface archaeological sensitivity for prehistoric sites.

The 2013 survey report noted that while the proposed project could have significant impacts on cultural resources as a result of ground-disturbing activities, implementation of the recommended mitigation measures would reduce these impacts to less than significant. Recommended mitigation measures in the 2013 cultural resources report included continuing Native American consultation; avoidance of identified cultural resources within the APE; construction worker education/training; archaeological monitoring during construction; unanticipated and inadvertent discoveries protocols; and additional field survey as needed.

References

California Office of Historic Preservation, Department of Parks and Recreation. 2013. California Office of Historic Preservation Technical Assistance Series #6 California Register and National Register: A comparison (for purposes of determining eligibility for the California Register). Available: http://ohp.parks.ca.gov/pages/1069/files/technical%20assistance%20bulletin%206%202011%20update.pdf. Accessed: December 3, 2015.

Reeve and Farrell (Stuart Reeve and Jenna Farrell). 2002. 2002 P-01-010499. Department of Parks and Recreation Primary Form. On file at NWIC.