DOCKETED	
Docket Number:	23-OPT-01
Project Title:	Fountain Wind Project
TN #:	254348
Document Title:	fwp_turbine_micrositing_report_appxA
Description:	N/A
Filer:	Caitlin Barns
Organization:	Stantec Consulting Services, Inc.
Submitter Role:	Applicant Consultant
Submission Date:	2/6/2024 8:46:18 AM
Docketed Date:	2/6/2024

TURBINE MICROSITING REPORT

Fountain Wind Project

Shasta County, California

Prepared for:

CG Fountain Wind LLC
1001 McKinney, Suite 700
Houston, Texas 77002

Prepared by:

Joel Thompson

Western EcoSystems Technology, Inc.
2725 NW Walnut Boulevard
Corvallis, Oregon 97330

January 31, 2024

WEST

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION AND EXECUTIVE SUMMARY

CG Fountain Wind LLC (Fountain Wind) is proposing to develop the Fountain Wind Project (Project), in Shasta County, California. In early 2023, the California Energy Commission (CEC) commenced a review of the Project's application for site certification, which includes the review of potential Project impacts under the California Environmental Quality Act (CEQA). In January 2024, the CEC made the following data request to Fountain Wind:

> *Please provide a detailed micro-siting report for each wind turbine proposed. The report should include an analysis of the latest micro-siting science and field studies based on the topography of the proposed project area. The report should identify the methods for selecting turbine sites and any strategies that were used to reduce potential impacts to avian species. High avian use areas and migration corridors that are located within the vicinity of proposed turbines should be analyzed (CEC 2024).*

In response to this request, Western EcoSystems Technology, Inc. (WEST) coordinated with Fountain Wind to perform the following turbine by turbine assessment of potential risks to avian species at the Project.

From its onset, the Project has used the tiered approach of the USFWS Wind Energy Guidelines (WEGS; USFWS 2012) to guide project development and to reduce potential impacts to wildlife, and birds in particular. The Project is located in an area of privately owned timberlands, which are heavily managed and highly fragmented. Siting of the Project within this type of landscape is consistent with Tier 1 of the WEGS, which recommends avoidance of large intact native landscapes (USFWS 2012). In addition, Tier 2 studies were conducted early on (e.g., Hays et al. 2017) that found some potential for impacts to sensitive species, which lead to a series of Tier 3 studies (e.g., general avian and bat use studies, raptor nest surveys, eagle and other species-specific surveys, rare plant surveys, etc.) to address those potential impacts.

Modifications to the Project boundary were made for a variety of reasons during development that decreased the Project footprint and shifted the study away from areas that had higher potential for impacts to sensitive species. For instance, removal of areas north of Highway 299 increased distances to northern spotted owl territories and river corridors with potentially higher eagle use, and avoided areas of known rare plant occurrences, while removal of areas in the south reduced the potential for impacts to foothill yellow-legged frog and Cascades frog by distancing the Project from predicted higher quality habitats. Tier 3 studies also identified areas of higher documented raptor use on the far western edge of the Project, which could potentially result in increased interaction with soaring raptors in that area. In response to comments from the California Department of Fish and Wildlife, Fountain Wind removed turbines that overlapped with this area of higher raptor use.

While not comprehensive, the above are examples of how the Project Area as a whole, and some specific turbines, have been removed during the development process in ways that should reduce impacts to wildlife and their habitats, and some avian species in particular. However, while the WEGS have been used to guide overall Project siting, the WEGS do not provide guidance on micro-siting of individual turbines, other than to reference micro-siting to avoid impacts to known raptor nests (WEGS p. 29) and the potential use of turbine-specific fatality rates to evaluate micro-siting options for future facilities or Projects (WEGS p. 38). Consequently, micrositing studies in CA have focused on existing projects where operational data and latest science on wind energy/wildlife interactions has been used to refine turbine locations when repowering a site with new, larger turbines that may result in fewer overall turbine sites.

Turbine micrositing has been used to reduce impacts to a variety of natural resources, with impacts to avian species being one of the resources considered (Smallwood and Neher 2016; Estep 2019; Estep 2020). However, evidence of using turbine micrositing variables (e.g., turbine size, changes in landcover, turbine spacing) as a means of reducing impacts has not been clearly demonstrated (as reported in Estep 2020) and the ability to prevent or significantly reduce avian fatality rates at large wind projects based on turbine siting is limited (Estep 2020). In the Altamont Pass region of California, turbine micrositing is used to meet the BIO-11b requirement of the Altamont Pass Wind Resource Area Repowering Program Environmental Impact Report to "*Site turbines to minimize potential mortality to birds*" (ACCDA 2014). Methods used to microsite turbines in the Altamont Pass include analytical approaches based on topographic data and an extensive dataset of fatality monitoring data and avian flight behavior data collected at projects in the Altamont Pass wind resource area, along with more qualitative approaches based on topographic and landscape variables combined with a more general knowledge of avian flight behavior. In the Altamont, micrositing of turbines has primarily focused on reducing impacts to raptors and has not addressed impacts to other avian guilds more broadly.

Within the Project Area, site-specific avian use data were collected during 900-plus hours of observation over a 2-year period in 2017–2019, along with a series of raptor nest surveys and species-specific surveys for several avian species (i.e., willow flycatcher, northern goshawk, California spotted owl). However, avian data from the Project are not sufficient to support a modeling approach like that used for wind projects located in the Altamont Pass based on site-specific flight and behavior data, as the Project's data are limited in time and space and collected with the objective of estimating relative use and abundance. In addition, there are no site-specific fatality data to inform the same kind of before-after repowering modeling approach used for wind projects in the Altamont Pass. In the Altamont Pass studies, years of site-specific data on flight behaviors and fatalities, including eagle use data collected via GPS-tagged eagles, are available and have been used to develop collision risk models (Smallwood and Neher 2016). Furthermore, the data used to develop analytical models in the Altamont Pass are based on species (including golden eagles) and habitats (mainly grasslands with high suitability as foraging habitat for raptors) that are not predominant in the Project. Therefore, models used in the Altamont Pass would not be applicable to the Project.

In addition, and as noted, projects in the Altamont Pass are primarily sited in grazed grasslands that have existed for years, and will likely continue to exist, in a constant state. In contrast, the Project is sited in a highly fluid landscape of industrial timberlands. As such, the landscape within the Project footprint is changing annually, with ongoing timber harvest removing older forest stands, and younger harvested areas transitioning through forest successional stages. Forested lands also do not provide the same foraging opportunities for soaring raptors as open grasslands. At each turbine location, the current conditions are likely to change drastically over the lifecycle of the Project. Over a 30-year project life, stands within the Fountain Fire scar are likely to mature into merchantable timber, and harvesting may begin to open up areas within the northern portions of the Project. In contrast, the southern portions of the Project, which still contain older forests, are likely to transition to an overall younger landscape as ongoing timber harvest continues.

Because of this ongoing change resulting from the underlying land management regime, a turbine-by-turbine assessment based on the existing landscape is limited in terms of how it may apply to the life of the Project. For this reason, the Project has proposed to develop a Bird and Bat Conservation Strategy that incorporates post-construction mortality monitoring in accordance with Tier 4 of the WEGS and includes conservation-focused best management practices, as well as adaptive management. Regardless, general understanding of avian flight behavior in combination with topographic variables can be applied to the Project and, in combination with the available site-specific avian survey data, provide the basis of the turbine-specific micrositing assessment that follows.

The micrositing assessment contained herein focuses on an analysis of the 48 turbine sites as proposed as part of the CEC siting application. Throughout development of the Project, Fountain Wind studied up to 100 separate turbine locations before reducing to the currently proposed 48-turbine layout. While detailed micrositing analysis for all 100 of the considered locations is not included herein, many of the 52 turbine sites which have now been excluded from the Project were dismissed based on the potential for them to pose a greater risk to avian species or other resource considerations.

In general, we would predict much lower fatality rates for birds at this wind farm than at sites in the Altamont Wind Resource Area. This conclusion is supported by the post-construction monitoring study performed for the Hatchet Ridge project immediately adjacent to the proposed Project. While risk to avian species at turbines is based on a variety of factors, the risk levels described herein are relative to other turbines with the Project and should not be considered in light of risk posed by turbines at other projects. Given the relatively gentle topography of the Project site (particularly at proposed turbine sites), and low use observed by raptors in general, turbine locations identified as higher risk at this Project could be considered low risk in comparison to turbines sited at other wind project sites (e.g., Altamont Pass projects) that have higher raptor use than this Project site. Given the ongoing timber management of the underlying landowner, site conditions are likely to change substantially over the life of the Project. Turbine locations are all set back from steeper slopes that would potentially generate higher levels of orographic lift and, given the ever-changing vegetative landscape resulting from timber management activities,

no turbine locations were identified that would clearly and obviously benefit from further micrositing to reduce avian risk that may result from nearby location-specific features.

Finally, there is no evidence to suggest that the overall environmental impact on risk of effects to avian species from collision risk would be significantly reduced if turbines identified as higher risk were removed from the Project. The overall risk of bird fatalities from the Project is low relative to other sites and anticipated impacts to avian species are not expected to be biologically significant on a population basis. If post-construction monitoring shows that expectation to be mistaken, adaptive management can be employed to reduce fatalities.

PROJECT AREA

The Project is located on private timberlands in central Shasta County, California (Figure 1). Throughout this report, "Project Area" is used to describe the landscape around all project infrastructure associated with the currently proposed Project. The primary land use within and surrounding the Project Area is commercial timber production. The dominant vegetation type in the Project Siting Corridors (Figure 1) is early seral mixed coniferous forest (post-fire and unburned), with smaller amounts of mixed montane chaparral, and mixed montane riparian forest/scrub. Dominant overstory species include a combination of white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*), ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), and California black oak (*Quercus kelloggii*).

The northwestern half of the Project is dominated by an extensive plantation of younger ponderosa pine that was replanted in the wake of the 1992 Fountain Fire (Fountain Fire scar). This younger forest plantation is largely monotypic with little diversity outside of the very narrow riparian forests associated with the small streams that bisect the area. Approximately half (23 of 48) turbines occur within the younger forest plantation community. In contrast, the southeastern portions of the Project are dominated by a patchwork of mature mixed conifer forest interspersed with regenerating stands of younger forest that have been replanted post-harvest. Given the mature timber in this area, this portion of the Project is and continues to be the focal area for timber harvest operations within the Project boundary. The recent and ongoing timber harvest operations have created a patchwork of forests in various seral stages in this area and provide a more diverse suite of habitat conditions that likely support a more diverse avian community than that found in the northwestern half of the Project Area (i.e., within the Fountain Fire scar). Twenty-five turbines occur within the mature mixed conifer and regenerating forest communities.

While differences in current conditions exist between the Fountain Fire scar and the older/patchwork forest to the south, site conditions will continue to change given the ongoing timber management activities of the underlying landowner. The ongoing management regime of industrial forestlands is starkly different than that observed at most other wind energy facilities, especially those of the Altamont Pass where lands are primarily grazed grasslands with vegetation characteristics that change little over time. Over the lifetime of the Project, site conditions will likely change dramatically, with the existing older timber stands likely harvested, leaving the southern portions of the Project dominated by younger forests. At the same time, the

young, monotypic stands in the Fountain Fire scar will mature and be harvested, creating more of the patchy distribution of different forest age classes similar to what currently exists in the southern portion of the Project.

Topography within the Project Area varies, with relatively gentle slopes and broad ridges across portions of the Project bisected by several main drainages (Hatchet Creek, Goat Creek, North and South Forks Montgomery Creek, and Cedar Creek; Figure 1). The highest elevations are in the east and southeast of the Project, with drainages generally descending in a western or northwestern direction separated by a series of long, broad, primary ridges aligned in a similar fashion (Figure 1). The primary ridges lack distinct crests, although steep slopes are present where the broad ridges break and descend toward the drainage bottoms below (Figure 1). Secondary side ridges are shorter and steeper, extending at more or less perpendicular angles from primary ridges (Figure 1).

Prevailing winds at the Project are from the west-southwest with a secondary component from the east (Figure 2). Given the topography, prevailing winds would tend to funnel up some of the primary drainages (e.g., North Fork and South Forks of Montgomery Creek) and intersect with the primary ridges at obtuse angles, while they may intersect with ridges associated with other drainages (e.g., Goat Creek and Hatchet Creek) more directly. Where winds intersect ridges more directly, orographic (i.e., topography induced) lift may be more pronounced. Secondary ridges, especially those extending from the south/southwest side of the primary ridges, may be more prone to intersecting the prevailing westerly winds at angles that generate greater orographic lift. Given the topography and prevailing winds, drainage headwalls (i.e., steep slopes surrounding/defining the upper end of a drainage) and side ridges more perpendicular to the prevailing winds are likely positioned to create more substantial orographic lift that could support higher use by soaring birds than the broader primary ridges alone, especially as it pertains to soaring raptors.

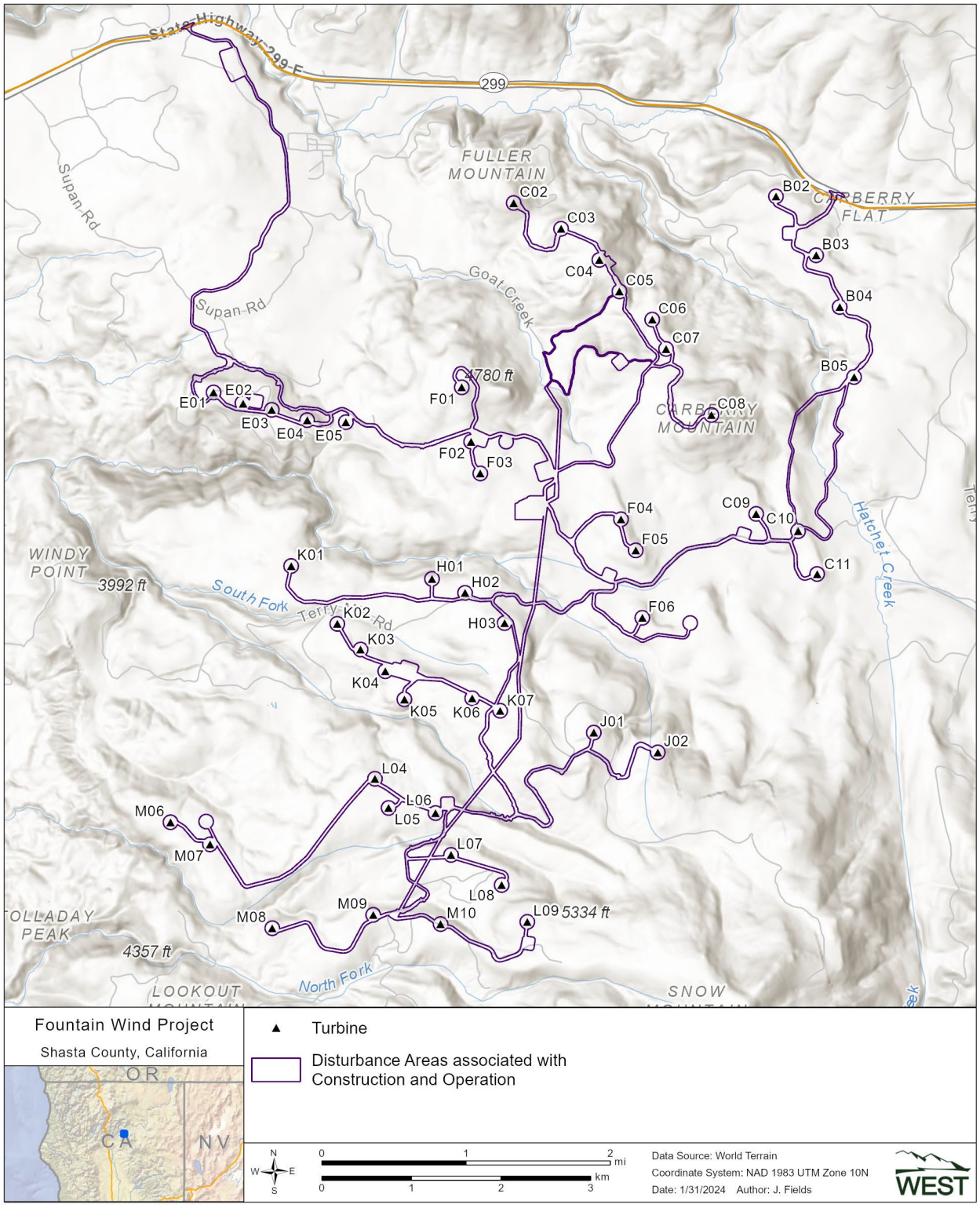


Figure 1. Overview of the Fountain Wind Project illustrating proposed turbine locations and disturbance areas associated with construction and operation, Shasta County, California.

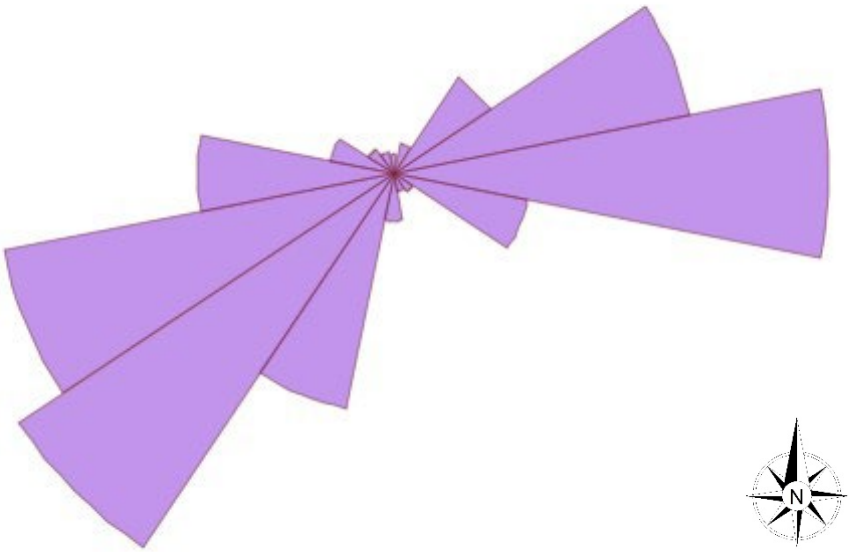


Figure 2. Wind rose illustrating prevailing (southwesterly) and secondary (easterly) wind directions at the Fountain Wind Project, Shasta County, California.

METHODS

To evaluate relative risk to avian species at the Project's 48 turbines, we qualitatively evaluated a suite of landscape characteristics and topographic features and site-specific avian survey data. Criteria used in the evaluation included the following for each turbine location:

- **Topographical position**, including slope aspect, slope steepness, turbine position in relation to topography (leeward vs windward). Slopes with aspects more perpendicular to prevailing winds have the potential for more consistent lift and use by soaring birds (Figure 3), while steeper slopes have more potential to generate orographic lift that may be used by soaring birds (Figure 4). Slope position also influences rotor heights relative to surrounding terrain and landscape features.
- **Vegetation** communities were assessed in regard to their current state, with consideration for changes post-construction as different vegetation communities may support different suites of species with differing exposure risks. Discussion focused on the age variability of coniferous forests near turbine sites, as coniferous forest is the predominant vegetation community within the Project Area.
- **Site-specific bird use data** (Thompson et al. 2018, Thompson and Chatfield 2019) was used to assess the potential use by diurnal raptors in particular, a species group known to be impacted by wind energy and which contains several California special status species. While there are other large bird types with special status (e.g., some waterfowl and waterbirds such as greater and lesser sandhill crane, American white pelican, tule greater white-fronted goose), only 32 groups of waterfowl or waterbirds were observed during the

two years of avian use surveys and none of those groups were observed below rotor swept heights at survey points within the Project Area. Most of the waterfowl and waterbird observations within the Project Area were observed at points along the eastern and northern edge of the Project, suggesting these bird types may use the lower elevation saddle along the Highway 299 corridor to cross over Hatchet Ridge; however, as noted, none of these observations were within rotor swept heights of proposed turbines and the data would not support recommendations for micrositing any specific turbines. Some small bird species are also considered special status species (e.g., Vaux's swift, willow flycatcher, purple martin, yellow warbler); however, small bird use data are not specific enough to address turbine-specific siting issues, nor is pre-construction bird use data a good predictor of species-specific fatality rates. Therefore, given the available data, site-specific bird use discussions focus on diurnal raptor (and vulture) use data to inform general use patterns by soaring birds in the vicinity of proposed turbine sites (Figures 5 and 6).

- **Proximity to other risk factors**, such as ridge saddles that may be used by raptors as they cross ridges, were considered, as was proximity to potential prey resources and prominent perches that may lead to increased use by some raptor species. Proximity to National Forest was also considered as the National Forest lands may provide higher quality habitat for some special status species (e.g., California spotted owl, northern goshawk).

Based on the evaluation, conclusions were drawn as to the risk for avian impacts at each turbine location relative to other turbine locations within the Project. Relative risk categories are defined as lower, moderate, and higher, based on the following criteria. Note that these relative risk assessments are limited to the site itself and that predicted fatality rates at the Project site would be significantly lower than a similarly sized project developed in other areas of the state with higher raptor use, such as the Altamont Wind Resource Area.

- **Lower** – no criteria identified that might indicate an elevated risk of avian impacts at the identified turbine (e.g., low raptor use, lack of habitat diversity, no unique features present).

- **Moderate** – the turbine location exhibits some criteria that indicate potential for higher risk of avian impacts compared to a low-risk site (e.g., moderate raptor use and/or diverse habitats, but slopes/aspects not conducive to orographic lift at the location).

- **Higher** – the location exhibits more criteria that may indicate elevated risk of avian impacts than moderate sites (e.g., higher raptor use, diverse habitats, **and** slopes/aspects conducive to orographic lift at the site).

Higher resolution maps depicting areas where steeper slopes may interact with the prevailing winds are provided in Appendix A.

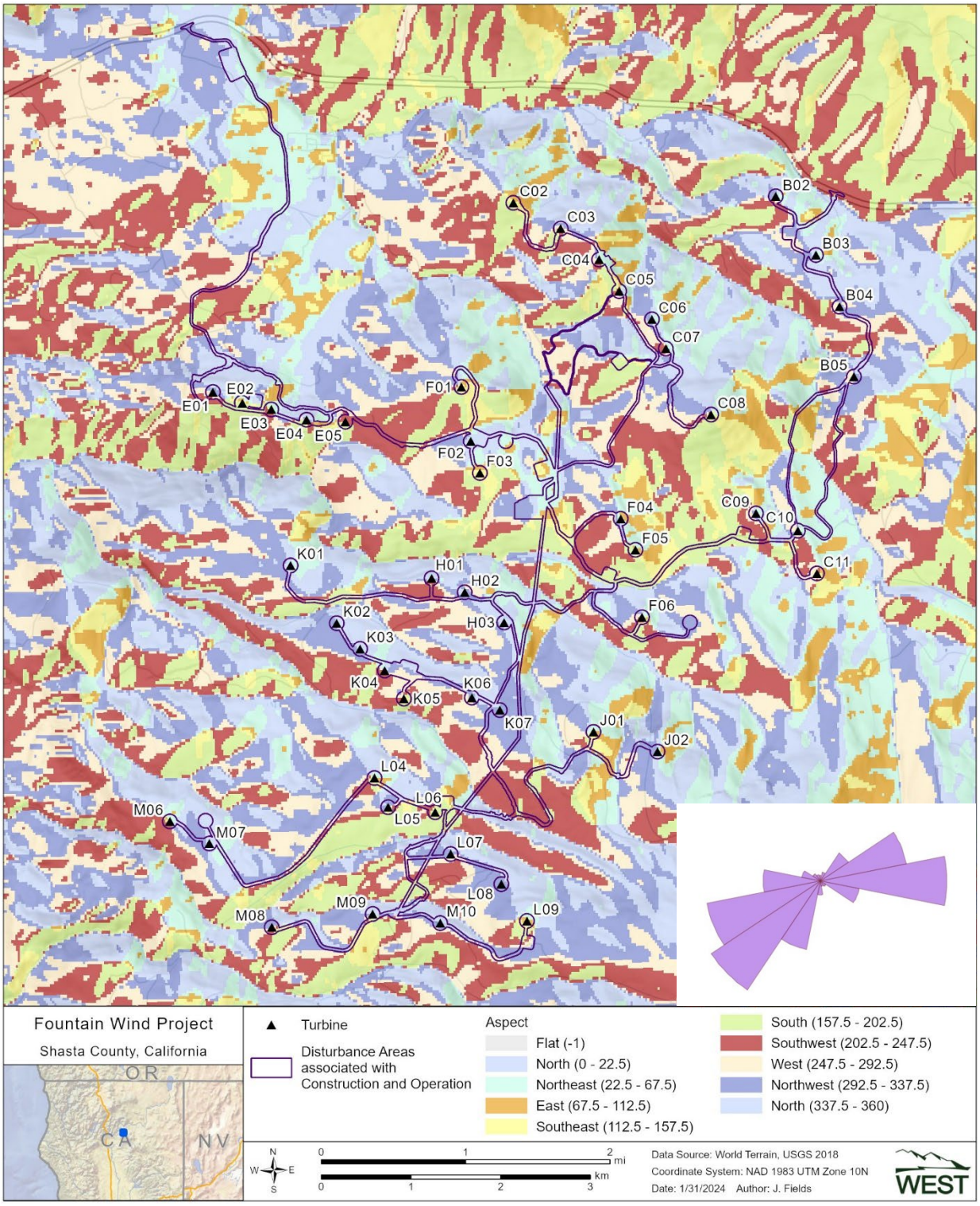


Figure 3. Slope aspect (generic and degrees) relative to proposed wind turbine locations at the Fountain Wind Project, Shasta County, California. Southwest and east aspects are most perpendicular to prevailing winds from the southwest and east (see wind rose inset).

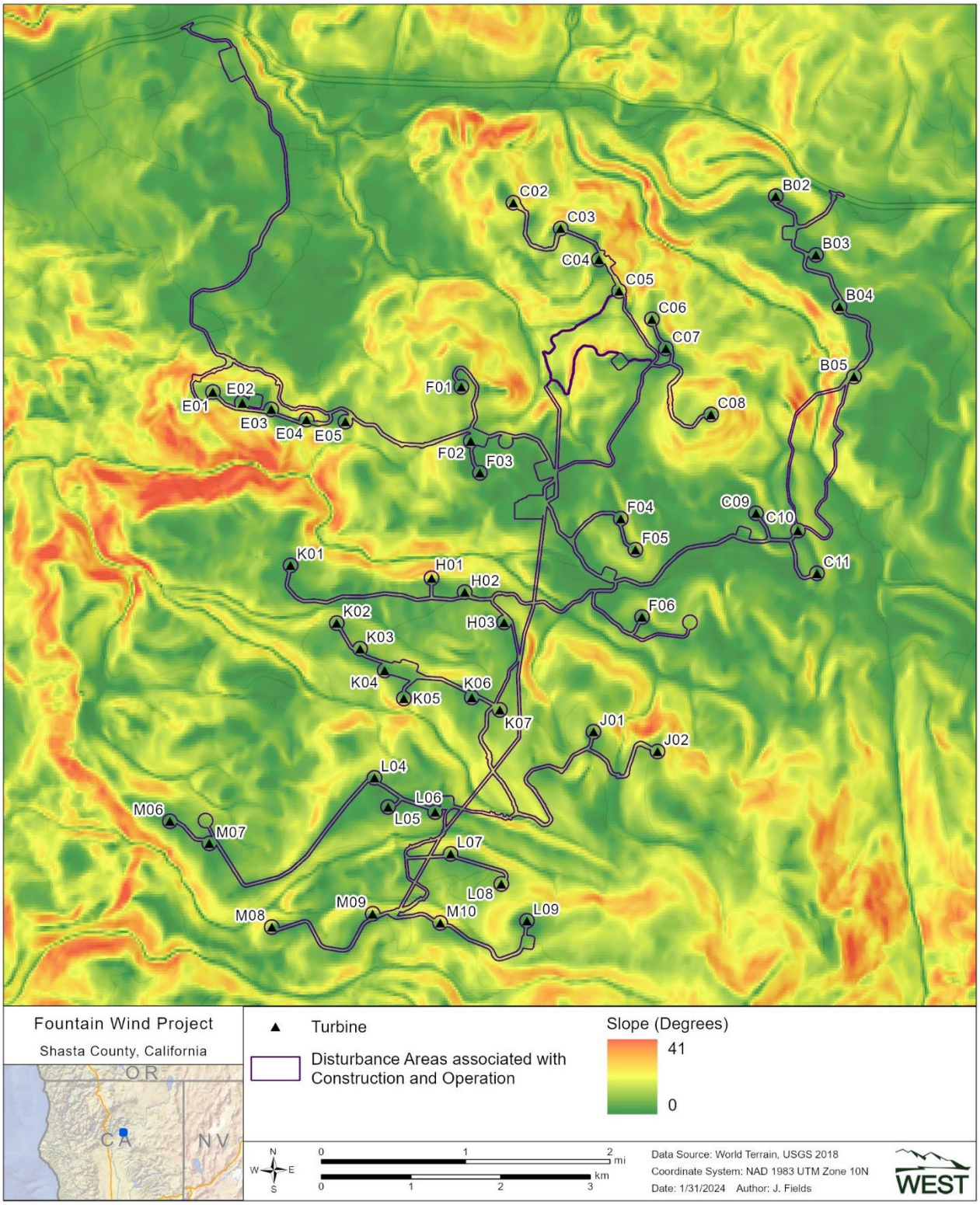


Figure 4. Slope steepness (degrees) relative to proposed wind turbine locations at the Fountain Wind Project, Shasta County, California.

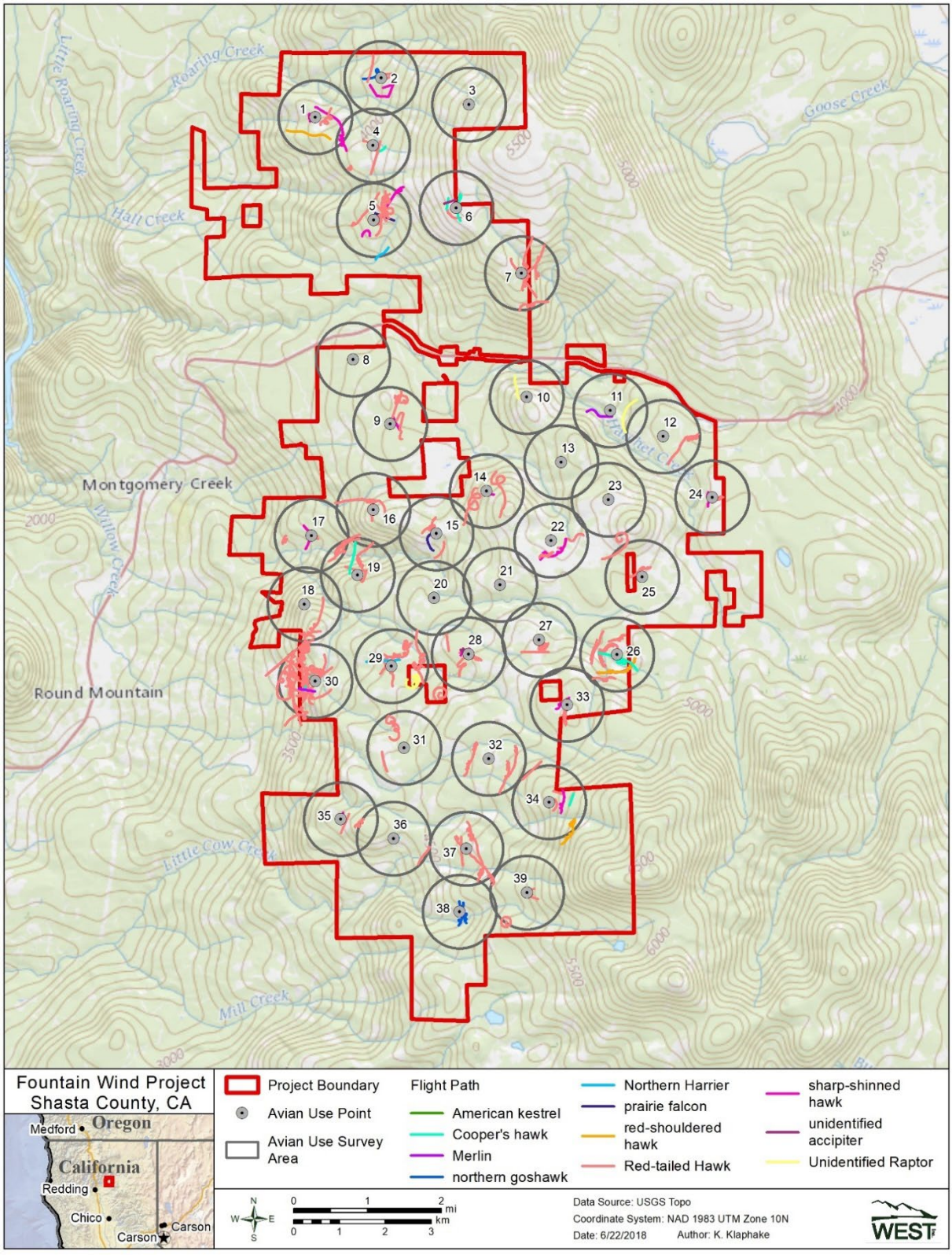


Figure 5a. Diurnal raptor (non-eagle) flight paths recorded during large bird surveys at the Fountain Wind Project from 19 April 2017 – 22 May 2018.

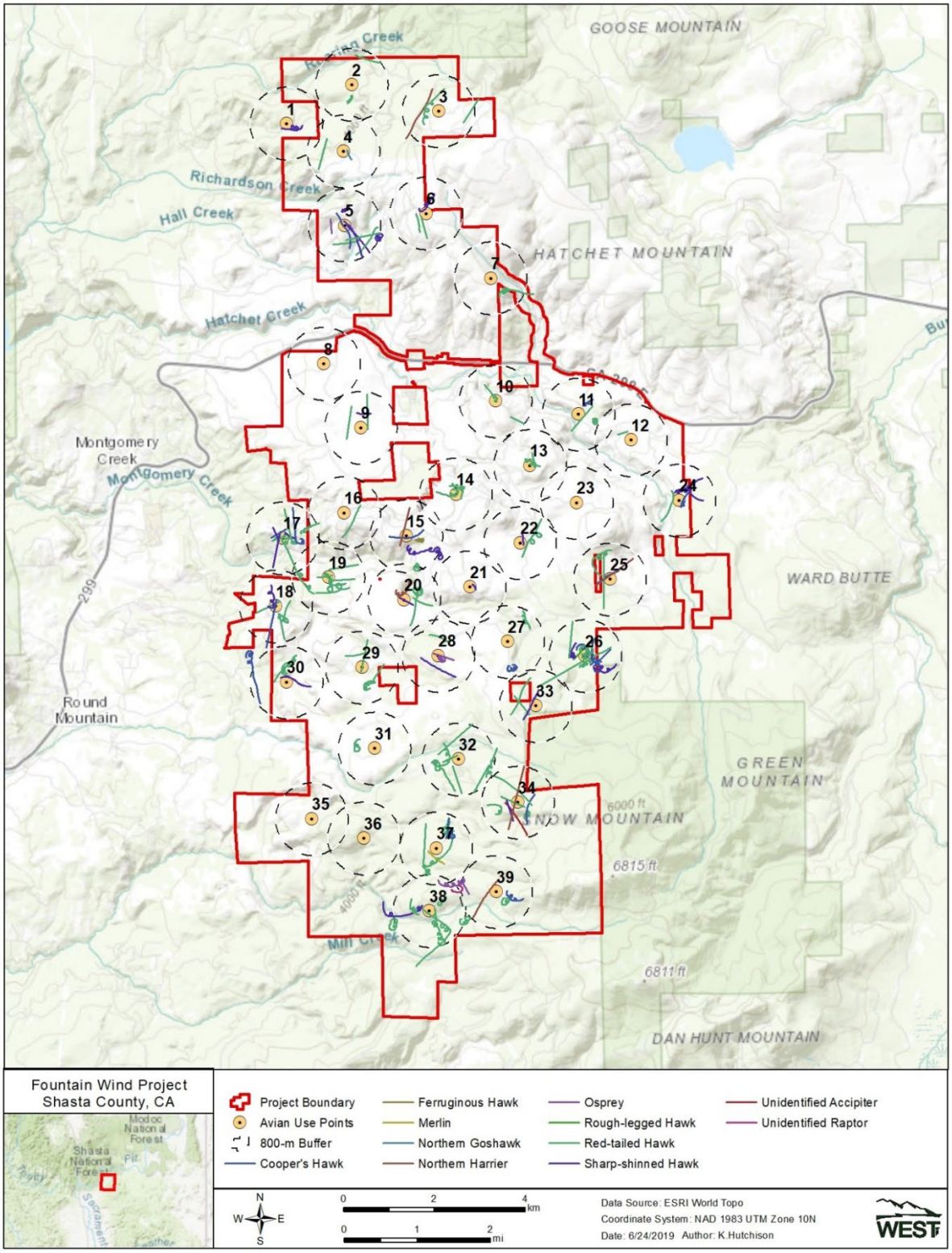


Figure 5b. Diurnal raptor (non-eagle) flight paths recorded during large bird surveys at the Fountain Wind Project from 4 June 2018 – 31 March 2019.

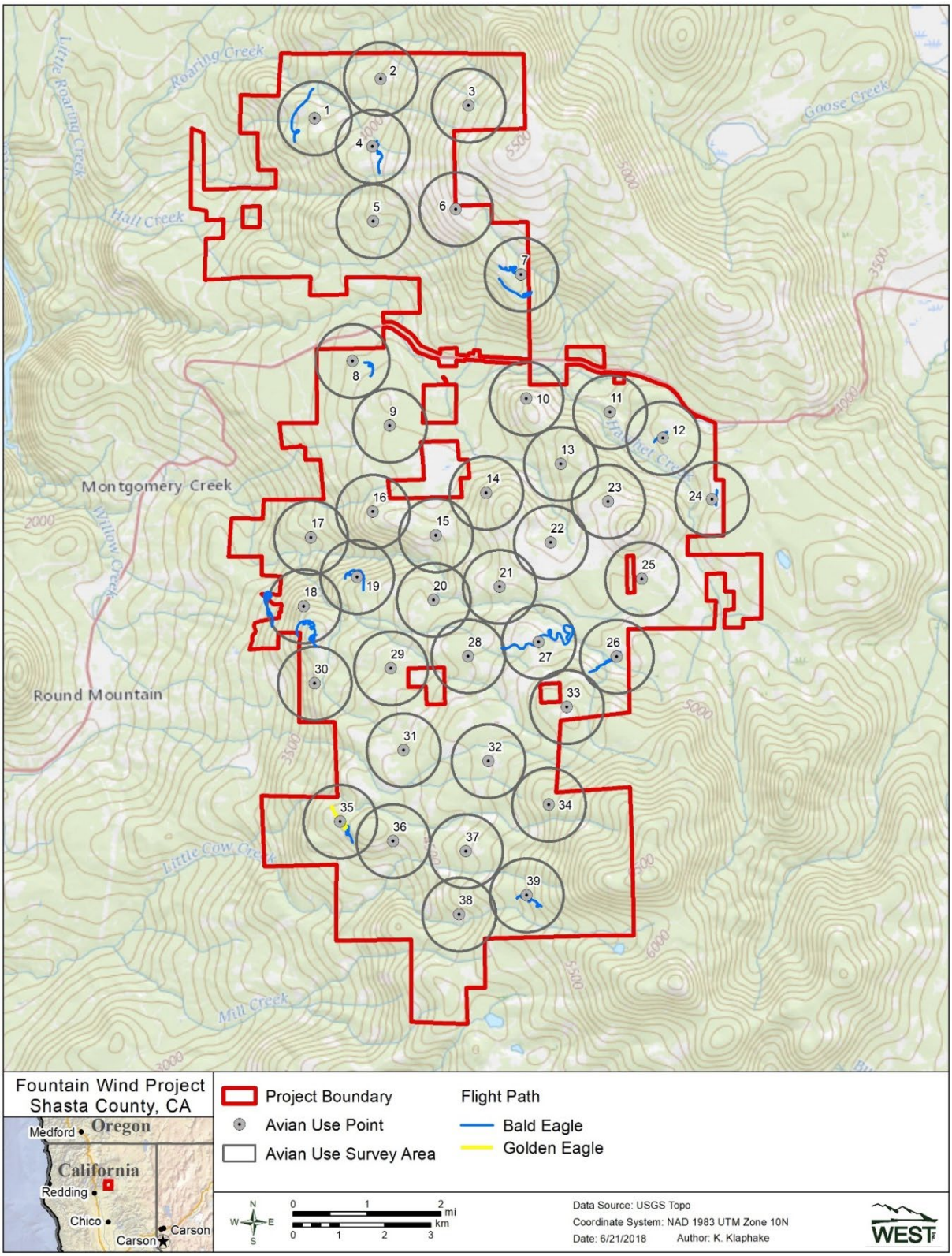


Figure 6a. Eagle flight paths recorded during large bird surveys at the Fountain Wind Project from 19 April 2017 – 22 May 2018.

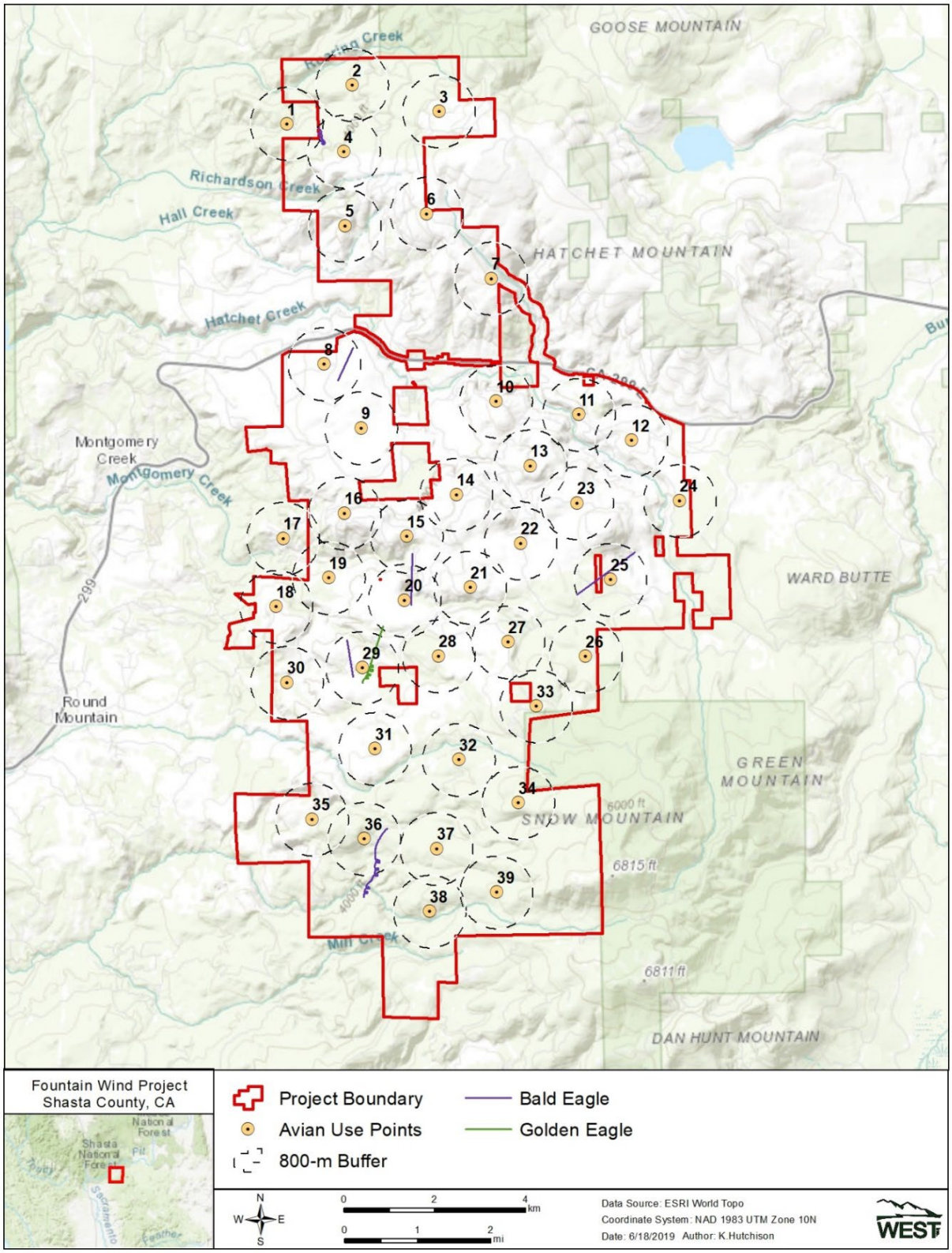


Figure 6b. Eagle flight paths recorded during large bird surveys at the Fountain Wind Project from 4 June 2018 – 31 March 2019.

RESULTS

Turbine Site B02

Topographical Position

- B02 is the first and western-most turbine in a string located along the crest of a broad NW-SE ridgeline approximately 0.25 mi south of Hwy 299. Slopes are gentle near the turbine site, with steeper slopes to the north. A small swale exists to the south that may funnel the prevailing SW winds through the faint saddle creating some increased potential for orographic lift between turbine sites B02 and B03, but not at the B02 site. Given the turbine site's location along the crest of the ridge, rotors will be above the surrounding landscape and setback from the swale and saddle to the south and southwest.

Vegetation Community

- Site B02 is located in a small clearing used for a temporary meteorological (met) tower. The clearing is within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. The existing clearing will be expanded to allow for turbine construction, leaving a maintained open space similar to what currently exists.

Site-specific Bird Use Data

- Site B02 is located approximately 500 m east of the closest avian point (Point 12) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was low (0.10–0.14 observations/800-m plot/60-min survey) during two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site B02.

Risk Determination: Lower

- Overall risk to avian species at Site B02 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site B03

Topographical Position

- B03 is the second turbine in a string located along the crest of a broad NW-SE ridgeline approximately 0.5 mi south of Hwy 299. The turbine location is flat, with slopes breaking off approximately 160 m to the ENE, with little potential for orographic lift at Site B03.

Given the turbine's location on the broad crest of the ridge, rotors will be above the surrounding landscape and setback from any steeper slopes.

Vegetation Community

- Site B03 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site B03 is located approximately 680 m east of the closest avian point (Point 12) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (0.10–0.14 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site B03.

Risk Determination: Lower

- Overall risk to avian species at Site B03 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site B04

Topographical Position

- B04 is the third turbine in a string located along the crest of a broad NW-SE ridgeline approximately 0.75 mi south of Hwy 299. The turbine location is flat, with slopes breaking off significantly approximately 120 m to the WSW where the Hatchet Creek drainage turns from its more S-N direction to a more NW direction (Figure 1). The WSW aspect of the nearby steeper slopes align with prevailing WSW winds and may create an orographic lift along the upper slopes in the vicinity of Site B04. However, Site B04 is set back from the break in slope by approximately 110 m or more and rotors would not extend over the steeper slopes, rather they would be positioned parallel to the slope break under prevailing winds.

Vegetation Community

- Site B04 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to

mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site B04 is located approximately 570 m north of the closest avian point (Point 24) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate (0.36–0.40 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. However, use by vultures at this point was higher (1.5–2.7 observations/800-m pot/60-min survey) than that observed at most other points, suggesting that the slope and aspect may support elevated use by some soaring species.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site B04.

Risk Determination: Moderate

- Overall risk to avian species at Site B04 is considered moderate relative to other turbine sites, with some potential for orographic lift to support soaring birds based on the aspect of nearby slopes relative to prevailing winds. The location's setback from steeper slopes would reduce this risk to some degree.

Turbine Site B05

Topographical Position

- B05 is the fourth and southernmost turbine site in the B-string of turbines, located more than a mile south of Hwy 299 and east of Hatchet Creek. The turbine location is on a gentle slope with a northerly aspect. Steeper slopes break off approximately 135 m to the west toward Hatchet Creek. These steeper slopes have WNW aspects that would not interplay with prevailing winds to increase orographic lift at the turbine site. B05 is also set back from the break in slope and rotors would not extend over the steeper slopes under prevailing winds.

Vegetation Community

- Site B05 is located in an area of recent timber harvest. Vegetation at the turbine location is a mix of replanted evergreens, shrubs, and herbaceous plants typical of a 5–10-year-old post-harvest clearcut in this area. Tree heights are generally less than 10 ft (3 m) in this area and would be below the rotor swept area of the turbine. The clearing associated with the turbine construction pad would be maintained over the long term similar to its current state, however surrounding areas (beyond the pad) would likely change from the

open area left post-harvest to a young, closed canopy plantation over the coming decade, but would remain well below turbine heights for the life of the Project.

Site-specific Bird Use Data

- Site B05 is located approximately 230 m south of the closest avian point (Point 24) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was moderate (0.36–0.40 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Use by vultures at this point was higher (1.5–2.7 observations/800-m pot/60-min survey) than that observed at most other points, although flight path maps suggest that soaring activity was primarily to the north of Site B05, where slopes and aspects were more aligned to capture the prevailing winds.

Proximity to Other Risk Factors

- Habitats/vegetation communities near Site B05 location are more diverse that those in the Fountain Fire scar. The cleared space within the harvest block may provide increased access to potential prey for some soaring raptors, and a habitat retention area located approximately 45 m south of Site B05 could provide roost sites for raptors to perch and hunt within the recently harvested area. As the young stand matures, use by avian species may change substantially, with open areas becoming more closed canopy and less available for soaring raptors. No other specific risk factors that might support increased avian/raptor use were identified in close proximity to Site B05.

Risk Determination: Lower-Moderate

- Overall risk to avian species at Site B05 is considered lower to moderate based on the moderate raptor use and diversity of habitats near the site, with no distinguishing characteristics that would suggest turbine siting presents an even greater risk to avian species.

Turbine Site C02

Topographical Position

- Site C02 is the most northwestern turbine within the Project Area, located approximately 0.5 mi south of Hwy 299 on the flanks of Fuller Mountain. The turbine location is on a gentle slope with a southerly aspect on the SE side of the summit of Fuller Mountain. Slopes increase near Site C02, falling away to the south and southeast. The steeper eastern slopes may create some orographic lift at the Site during easterly winds, while the turbine would be leeward of the summit during prevailing WSW winds. Saddles (low points along a ridge between two high points) are areas that can see elevated use by avian species as the birds cross over ridges and a saddle exists to the southeast, between Sites C02 and C03. However, no extensive ridgeline is associated with the C-string of turbines, which are positioned on a more stand-along high point than a continuous ridge. The position of Site C02 puts rotors well above the saddle which would diminish the risk to avian species that may utilize the saddle in localized movements.

Vegetation Community

- Site C02 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C02 is located approximately 530 m south of the closest avian point (Point 10) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (0.07–0.20 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C02.

Risk Determination: Lower

- Overall risk to avian species at Site C02 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C03

Topographical Position

- Site C03 is located across the saddle to the southeast of Site C02, approximately one mi south of Hwy 299. The turbine site location is near the NW end of a curving ridgeline separating Hatchet Creek from Goat Creek. The ridge turns from the N to the W near Site C03, creating a swale/draw just to the south of the turbine location, while the main ridge bends to a SW aspect. Steeper slopes created in the swale are likely to funnel upsloping winds toward the more prominent ridge approximately 400 m to the east of Site C03. The position of Site C03 and gentle slopes immediately surrounding it puts rotors well above the surrounding landscape and set back from areas of potentially increased orographic lift.

Vegetation Community

- Site C03 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine.

Site-specific Bird Use Data

- Site C03 is located approximately 660 m north of the closest avian point (Point 13) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (0.07–0.20 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C03.

Risk Determination: Lower

- Overall risk to avian species at Site C03 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C04

Topographical Position

- Site C04 is located on a broad ridge and just offset to the south of a faint saddle. Slopes to the west of Site C04 have a WSW aspect and funnel into two draws that are positioned to capture and funnel the prevailing WSW winds; however, given the width of the main ridge Site C04 is set back >200m from the steeper slopes that form the draws to the west. Site C04 is on the leeward side of the ridge relative to the secondary ENE winds and is set back approximately 60 m from the steeper, easterly aspects east of the turbine location. Easterly winds and the steeper slopes to the east would provide more opportunities for orographic lift at this site compared to the WSW winds.

Vegetation Community

- Site C04 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C04 is located approximately 540 m northeast of the closest avian point (Point 13) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (0.07–0.20 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Moderate use by soaring vultures was observed over the draws west of Site

C04, however vulture movements tended to be in a north-south direction within the survey plot and not up and over the ridge toward the C04 location.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C04.

Risk Determination: Moderate

- Overall risk to avian species at Site C04 is considered moderate relative to other turbine sites due to its position relative to steeper slopes and secondary easterly winds; however, the site lacks any other distinguishing characteristics that would suggest elevated risk to avian species.

Turbine Site C05

Topographical Position

- Site C05 is located along the main ridge approximately 300 m north of a prominent saddle separating Hatchet and Goat creeks. Slopes at the C05 location are gentle, with steeper slopes associated with a draw approximately 100 m to the east while westerly slopes fade more subtly for 200-330 m to the west before steepening. The prevailing WSW winds may funnel up the draw from the west, but slopes are not so steep near Site C05 as to suggest a strong orographic uplift near the turbine site. Slopes to the east have an easterly aspect but are associated with a narrow drainage and ridge opposite that may be prone to diminishing uplift from easterly winds at the site of C05.

Vegetation Community

- Site C05 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C05 is located approximately 660 m east of the closest avian point (Point 13) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (0.07–0.20 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C05.

Risk Determination: Lower

- Overall risk to avian species at Site C05 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C06

Topographical Position

- Turbine Site C06 is located along the toe of the main ridge leading northwest from Carberry Mountain and on the opposite side of the saddle from Site C05. Slopes at the C06 location are near flat, with steeper slopes breaking off approximately 135 m to the east toward Hatchet Creek. Slope aspects at Site C06 are NNW. The prevailing WSW winds may funnel up the draw from the west but are likely to funnel through the saddle to the west, between sites C05 and C06. Slopes are not so steep near C06 as to suggest a strong orographic uplift near the turbine site. The slopes to the east have an easterly aspect and may result in some uplift from easterly winds, but the turbine site is more than 135 m from the steeper slopes, which diminishes the potential for orographic lift at the turbine location The turbine location would also result in blades being parallel to the main ridge, maximizing their setback from the steeper slopes to the east.

Vegetation Community

- Site C06 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C06 is located approximately 450 m north of the closest avian point (Point 23) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (0.0–0.07 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C06.

Risk Determination: Lower

- Overall risk to avian species at Site C06 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C07

Topographical Position

- Site C07 is located along the western side but near the crest of the highest and flattest section of the main ridge leading northwest from Carberry Mountain. Slopes at the C07 location are near flat, with a small side drainage just west of the site. Slopes associated with the side drainage are relatively gentle. Slopes and aspects near Site C07 are not conducive to orographic lift at the site.

Vegetation Community

- Site C07 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C07 is located approximately 210 m northeast of the closest avian point (Point 23) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was low (0.0–0.07 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C07.

Risk Determination: Lower

- Overall risk to avian species at Site C07 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C08

Topographical Position

- Site C08 is located atop Carberry Mountain, the highest point in the northern portion of the Project. Carberry Mountain has a broad summit bordered by steeper, open slopes to the east and south, with a gentler gradient to the west and moderate slopes to the north. Site C08 is set back approximately 100 m from the break to the steeper eastern slopes. Easterly aspects may provide for some increased orographic lift under the ESE winds. Turbine blades would be parallel to the steeper slopes during easterly winds, which in combination with the setback would lessen the potential for avian risks at the site.

Vegetation Community

- Site C08 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C08 is located more than 800 m from the nearest avian points (Point 23 and 25); however, Point 23 may be most representative of the C08 location given it too is within the Fountain Fire scar, while Point 25 is located in a patchwork of young and older forests. Relative to other points within the Project Area, use by diurnal raptors was low at Point 23 (0.0–0.07 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point, which would be considered most representative of potential use at Site C08.

Proximity to Other Risk Factors

- Some of the steeper slopes 200 m or more away on the ESE flank of Carberry Mountain currently lack tree canopy but have some larger trees adjacent to the clearings. These open slopes and larger trees/perch locations may provide improved access to prey for foraging raptors. A roughly 0.6-acre boulder-strewn area is located about 65 m east of the turbine location, again a location that could provide access to prey. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C08.

Risk Determination: Lower

- Overall risk to avian species at C08 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C09

Topographical Position

- Site C09 is in an area of gently undulating terrain to the SE of Carberry Mountain. A small and narrow drainage runs just east of the turbine location; however, this drainage lacks any steep slopes. Given the slope and aspect of surrounding slopes, no orographic lift is anticipated at Site C09.

Vegetation Community

- Site C09 is located in the far eastern portion of the Fountain Fire scar and surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. Given the site is near the edge of the fire scar, some patches of older forest are present nearby (~200 m to forest edge) as well as post-harvest openings (e.g., 10–15-year-old clear-cut). A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest bordered (within 250 of the turbine) by stands of various ages due to ongoing timber management.

Site-specific Bird Use Data

- Site C09 is located approximately 430 m from the nearest avian point (Point 25); surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low–moderate at Point 25 (0.21–0.50 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- Site C09 is located approximately 300 m south of the transmission line corridor that bisects the Project Area. The transmission line (t-line) may provide optimal perch locations for raptors foraging within the open and maintained corridor; however, the stand of forest separating Site C09 from the t-line corridor likely diminishes its potential influence on raptor use in the immediate vicinity of the turbine. Remnant stands of older trees in harvested areas nearby provide perch points for raptors and may be in close enough proximity for perching raptors to forage in the future clearing associated with the turbine. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C09.

Risk Determination: Lower

- Overall risk to avian species at Site C09 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C10

Topographical Position

- Site C10 is in an area of gently undulating terrain on the opposite side of the small and narrow drainage from Site C09. As described for Site C09, this drainage lacks any steep slopes that would generate orographic lift at Site C10.

Vegetation Community

- Site C10 is located in the far eastern portion of the Fountain Fire scar and surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. Areas immediately east of Site C10 have been pre-commercially thinned, while the site and areas to the west have not been thinned. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site C10 is located more than 800 m from the nearest avian point (Point 25) surveyed during the 2017-2019 avian use surveys conducted for the Project, hence site-specific use data are less applicable. However, diurnal raptor use at Point 25 (0.21–0.50 observations/800-m plot/60-min survey), and other points within the Fountain Fire scar was low compared to other points further south within the patchwork of older/younger forests.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C10.

Risk Determination: Lower

- Overall risk to avian species at Site C10 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site C11

Topographical Position

- Site C11 is in an area of gently undulating terrain to the south of Site C10. There are no topographical features near Site C11 that would substantially influence winds or create orographic lift at Site C11.

Vegetation Community

- Site C11 is located just to the SE of the Fountain Fire scar and positioned at the edge of two harvest blocks that were cut approximately 5 and 15 years ago. Tree heights are generally less than 30 ft (10 m) in this area and would be below the rotor swept area of the turbine. Conditions at the site would likely be maintained in a condition similar to what exists currently, while areas beyond the turbine pad would return to a more mature forest over time. A few remnant trees exist in each of the harvest blocks, which could provide perch locations from which raptors may perch hunt in the maintained opening around the turbine, as well as the existing clearcut block to the west until it matures into a more closed canopy forest stand.

Site-specific Bird Use Data

- Site C11 is located more than 1,300 m from the nearest avian point (Point 25); surveyed during the 2017-2019 avian use surveys conducted for the Project, hence site-specific use data are less applicable to this turbine site than others.

Proximity to Other Risk Factors

- Aside from the current cleared area from the adjacent clearcut and residual leave trees (trees not removed during harvest) which may serve as raptor perch points, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site C11.

Risk Determination: Moderate

- Overall risk to avian species at Site C11 is considered moderate relative to other turbine sites based on its proximity to open foraging areas, and available perches for raptors that currently exist.

Turbine Site E01

Topographical Position

- Site E01 is the western-most turbine site within the Project Area and first in the E-string of six turbine sites located along the crest of a broad E-W oriented ridgeline. Slopes are relatively gentle near the turbine site but break more substantially approximately 200 m to the west as the ridge drops precipitously toward the drainage below. Given the turbine site's location along the crest of the ridge, rotors will be above the surrounding landscape and most often perpendicular to the ridge given the prevailing SW wind. Steeper slopes exist approximately 175 m to the southeast of the location but would not contribute to orographic lift at the turbine given their distance from the turbine site and aspect relative to prevailing winds.

Vegetation Community

- Site E01 is located within the Fountain Fire scar and is surrounded by a younger (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early

to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site E01 is located approximately 250 m east of the closest avian point (Point 16) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors at this point was low to moderate (≤0.29 observations/800-m plot/60-m survey) during the two years of surveys conducted at this point. One larger flock of snow geese (~190 birds) was observed, which led to a moderate estimate of waterfowl use in Year 1; however, the flock of birds flew over the point at an estimated 600 m above ground, well above the risk zone of a proposed turbine.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site E01.

Risk Determination: Lower

- Overall risk to avian species at Site E01 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site E02

Topographical Position

- Site E02 is located along the crest of a broad E-W oriented ridgeline supporting the E-string of turbines. Slopes are relatively gentle near the turbine site but break more substantially approximately 90 m to the south as the ridge drops precipitously toward the drainage below. Given the turbine site's location along the crest of the ridge, rotors will be above the surrounding landscape and at an approximately 45-degree angle to the steeper southern slopes given the prevailing SW wind. While some orographic lift may exist along the ridgeline under prevailing SW winds, the turbine setback from the slope break diminishes its potential influence on raptor use at the turbine location.

Vegetation Community

- Site E02 is located within the Fountain Fire scar and is surrounded by a younger (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing exists approximately 60 m north of E02, within which a Project met tower is currently located. A similar clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low

growing vegetation similar to that near the current met tower, which would be surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site E02 is located approximately 600 m east of the closest avian point (Point 16) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to points within the Project Area, use by diurnal raptors at this point was low to moderate (≤0.29 observations/800-m plot/60-m survey) during the two years of surveys conducted at this point. One larger flock of snow geese (~190 birds) was observed, which led to a moderate estimate of waterfowl use in Year 1; however, the flock of birds flew over the point at an estimated 600 m above ground, well above the risk zone of a proposed turbine at this site.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site E02.

Risk Determination: Lower

- Overall risk to avian species at Site E02 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site E03

Topographical Position

- Site E03 is located along the crest of a broad E-W oriented ridgeline supporting the E-string of turbines. Slopes are relatively gentle near the site, but the ridgeline narrows somewhat near Site E03 and slopes break more substantially approximately 40 m to the NE and 90 m to the SW of E03. Slopes to the west create a bit of a draw with a SW aspect that feeds up toward Site E03. This draw could funnel prevailing SW winds up and over the ridge near Site E03. Given the turbine site's location along the crest of the ridge, rotors will be above the surrounding landscape and generally parallel to the ridge given the prevailing SW wind. While some orographic lift may exist along the ridgeline near Site E03, the turbine setback from the slope break diminishes its potential influence on raptor use at the turbine location.

Vegetation Community

- Site E03 is located within the Fountain Fire scar and is surrounded by a younger (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation similar which would be surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site E03 is located approximately 530 m west of the closest avian point (Point 15) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate (≤0.43 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Use by vultures, a species that also uses orographic lift for soaring, was moderate to high at this point relative to others. However, conditions near Point 15 differ from those at Site E03 in several ways that may influence use by soaring birds (see Site E04 discussion below), while use at Site E03 may be more consistent with use at Point 16 (see discussion of Site E02 above), which was lower to moderate.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site E03.

Risk Determination: Moderate

- Overall risk to avian species at Site E03 is considered moderate relative to other turbine sites given its location along a narrower section of ridgeline above some slopes that may capture prevailing wind.

Turbine Site E04

Topographical Position

- Site E04 is located near the high-point of a broad E-W oriented ridgeline supporting the E-string of turbines. Slopes are relatively gentle near the turbine location and to the west and southwest but drop off much more steeply 120–150 m to the south and southeast, respectively. The western facing aspects are relatively gentle and not oriented to create substantial uplifts from the prevailing SW winds; however, a side drainage exists where the North Fork Montgomery Creek drainage turns to the west below the steeper slopes nearby and may support orographic lift as winds funnel upward from the drainage. The turbine's location toward the western edge of the summit does provide a substantial setback from the steeper slopes to the SE and diminishes updraft potential at the actual turbine location.

Vegetation Community

- Site E04 is located within the Fountain Fire scar and is surrounded by a younger (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site E04 is located approximately 120 m northwest of the closest avian point (Point 15) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was moderate (≤0.43 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Use by vultures, a species that also uses orographic lift for soaring, was moderate to high at this point relative to others.

Proximity to Other Risk Factors

- A rock quarry is located on the steeper slopes to the southeast of Site E04, which creates an open area of steep, SSW slopes that may provide open foraging areas for raptors in addition to an area of orographic lift. Use by diurnal raptor and vultures at Point 15 illustrated some level of concentrated use at and above this quarry. Use, however, was concentrated over the quarry with lower level of use near the location of Site E04, which was set back some distance but visible from the avian observation point. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site E04.

Risk Determination: Moderate to Higher

- Overall risk to avian species at Site E04 is considered moderate to higher relative to other turbine sites given its location and proximity to the steep and open slopes associated with the quarry and its associated raptor and vulture use.

Turbine Site E05

Topographical Position

- Site E05 is located east of the high-point of a broad E-W oriented ridgeline supporting the E-string of turbines. Slopes are flat near the turbine location and relatively gentle for 150 m or more in all directions. Given the gentle slopes prevailing SSW winds are not likely to create substantial orographic lift at Site E05.

Vegetation Community

- Site E05 is located within the Fountain Fire scar and is surrounded by a younger (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site E05 is located approximately 340 m east of the closest avian point (Point 15) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate (≤0.43

observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Use by vultures, a species that also uses orographic lift for soaring, was moderate to high at this point relative to others. However, while Point 15 was the closest avian survey point, its location above the rock quarry (see Site E04 discussion above) resulted in concentrated use near the quarry, with fewer observations and less circle soaring near the E05 location, which was within the viewshed of the survey point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site E05.

Risk Determination: Moderate

- Overall risk to avian species at Site E05 is considered moderate relative to other turbine sites given its location and proximity to the steep and open slopes associated with the quarry and its associated raptor and vulture use.

Turbine Site F01

Topographical Position

- Site F01 is located atop Fauries Peak, an isolated peak/hill in the northern portion of the Project Area. The summit of Fauries Peak is broad, hence slopes at Site F01 are essentially flat, with no steep slopes nearby that would generate orographic lift at the turbine site. Given its location atop the broad summit, turbine blades would remain well above surrounding topography regardless of wind directions.

Vegetation Community

- Site F01 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site F01 is located approximately 700 m southeast of the closest avian point (Point 14) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate to high (≤0.64 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point; however, Point 14 was also less than 600 m from the large (>100 acres) open meadow in the region. This meadow area is located west of Point 14 outside the western edge of the Project Area and likely contributes to elevated raptor and vulture use in surrounding areas. Site F01 is located east of Point 14, in the opposite direction from the meadow. Use at the next nearest point (Point 22), located approximately 1,000 m to the

east, was low (≤0.21 observations/800-m plot/60-min survey) and may be more indicative of use near Site F01 given the similarity of the immediately surrounding landscape.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site F01.

Risk Determination: Lower

- Overall risk to avian species at Site F01 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site F02

Topographical Position

- Site F02 is located just south of an indistinct saddle/low area between Fauries Peak and a small rise approximately one-half mile south of Fauries Peak. Slopes around Site F02 are gentle with no steeper slopes nearby. Given the gentle slopes surrounding the location, turbine blades would remain well above surrounding topography regardless of wind directions.

Vegetation Community

- Site F02 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site F02 is located approximately 760 m west of the closest avian point (Point 22) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low (≤0.21 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site F02.

Risk Determination: Lower

- Overall risk to avian species at Site F02 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site F03

Topographical Position

- Site F03 is located in an area of gently undulating slopes between the headwaters of Goat Creek to the east and North Fork Montgomery Creek to the west. There are no steep slopes proximal to Site F03. Given the gentle slopes surrounding the location, turbine blades would remain well above surrounding topography regardless of wind directions.

Vegetation Community

- Site F03 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site F03 is centrally located approximately 750 m from two avian use points; Point 22 to the east and Point 21 to the west. Both points were surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low at both Point 22 (≤0.21 observations/800-m plot/60-min survey) and Point 21 (≤0.14) during the two years of surveys conducted at the points. Given Point 21's location in the cleared and maintained transmission line corridor, use at Point 22 within the Fountain Fire scar may be more representative of that expected near Site F03.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site F03. The main t-line corridor is the closest unique feature to Site F03, at approximately 400 m to the south.

Risk Determination: Lower

- Overall risk to avian species at Site F03 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site F04

Topographical Position

- Site F04 is located on the northerly end of a small ridge/rise at the headwaters of Goat Creek in an area of gently undulating slopes. There are no steep slopes proximal to Site F04. Given the gentle slopes surrounding the location, turbine blades would remain well above surrounding topography regardless of wind directions.

Vegetation Community

- Site F04 is located just south of the Fountain Fire scar in an area that was harvested in the past five years. As such vegetation at the site is a mix of bare ground, newly planted conifer seedlings, and disturbance associated species. Numerous isolated trees and one patch of trees were left during harvest. Newly planted trees are generally less than 3 ft (1 m) tall, while residual trees likely exceed 100 ft (30 m). An open space of low growing vegetation would be maintained at the turbine location, while the surrounding recently harvested area would move through a series of successional stages during the Project's life, from its current open form to a closed canopy forest later in the Project's lifecycle.

Site-specific Bird Use Data

- Site F04 is located approximately 1,100 m from the nearest avian survey point (Point 25); however, the landscape around Point 25 is similar to that near Site F04 and may be most representative of diurnal raptor use near Site F04. Relative to other points within the Project, use by diurnal raptors was low-moderate at Point 25 (0.21-0.5 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- The open landscape created by the recent harvest at the F04 site, combined with the widely scattered leave trees, creates quality perch sites for raptors to forage within the open harvested areas. While a current risk, foraging opportunities may decline over time as the cleared area develops into a closed canopy forest over time. The main t-line corridor is the closest unique feature to Site F04, at approximately 280 m to the north. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, nests) were identified in close proximity to Site F04.

Risk Determination: Lower

- Overall risk to avian species at Site F04 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site F05

Topographical Position

- Site F05 is located on the southern end of a small ridge/rise at the headwaters of Goat Creek in an area of gently undulating slopes. There are no steeper slopes proximal to Site

F05. Given the gentle slopes surrounding the location, turbine blades would remain well above surrounding topography regardless of wind directions.

Vegetation Community

- Site F05 is located in a 30-acre stand of mature mixed conifer forest that is surrounded by harvested areas of <5–15 years of age. At minimum, a small area of the existing stand will need to be harvested to create an opening for turbine construction, while the entire stand may be harvested as part of ongoing timber management as well as to support turbine construction. If not harvested to support construction, given the ages of adjacent stands, it is assumed that the stand would be harvested in full at some point in the next 10 years. An open space of low growing vegetation would be maintained at the turbine location, while the surrounding area may continue to support mature trees for some period of time but will likely be harvested either prior to construction or within a few years after. Following harvest, the areas surrounding the maintained turbine pad would move through a series of successional stages during the Project's life, from an open form post-harvest to a closed canopy forest later in the Project's lifecycle.

Site-specific Bird Use Data

- Site F05 is located approximately 1,000 m southwest of the nearest avian survey point (Point 25); however, the landscape around Point 25 is similar to that near Site F05 and may be most representative of diurnal raptor use near Site F05. Relative to other points within the Project, use by diurnal raptors was low-moderate at Point 25 (0.21-0.50 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point.

Proximity to Other Risk Factors

- The existing landscape at Site F05 is likely to be altered dramatically, either pre-construction or soon after depending on the harvest schedule for the existing stand of timber at the F05 location. Pending timing, Site F05 may be surrounded by a mature closed canopy forest stand, or it may be surrounded by open, recently harvested areas of varying ages (0-20 years of age). A more open landscape may provide more opportunity for foraging raptors, while a surrounding mature forest could put the lower segment of rotors near canopy heights. It is assumed that the mature forest will be harvested early in the Project's life, if not before, unless the underlying timber management strategy changes dramatically. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, nests) were identified in close proximity to Site F05.

Risk Determination: Lower

- Overall risk to avian species at F05 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site F06

Topographical Position

- Site F06 is located near the northern end of a gentle ridge north of the upper reaches of North Fork Montgomery Creek. Slopes around Site F06 are gentle with an ENE aspect. There are no steep slopes proximal to Site F06. Given the gentle slopes surrounding the location, turbine blades would remain well above surrounding topography regardless of wind directions and the potential for orographic lift at the turbine location is low.

Vegetation Community

- Site F06 is located at the edge of two forest management stands, one that was harvested within the last two years, and one that was harvested ~15 years ago. Stands of older trees border these younger stands within approximately 200 m in multiple directions. An open space of low growing vegetation would be maintained at the turbine location, similar to what currently exists. Small (<1.5 acre) patches of older trees are present in the younger stands within 50-100 m of Site F06.

Site-specific Bird Use Data

- Site F06 is located approximately 600 m north of the nearest avian survey point (Point 26) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was high at Point 26 (0.86–1.0 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Use by accipiters (e.g., Cooper's hawk and sharp-shinned hawk) contributed substantially to the raptor use at this point, relative to lower use by accipiters at other points. Vulture use was also relatively high at this point.

Proximity to Other Risk Factors

- Aside from the remnant older trees left in the harvested areas, which may provide perch points for raptors when foraging near the turbine locations, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, nests) were identified in close proximity to Site F06.

Risk Determination: Moderate-Higher

- Given the diversity of habitats and higher raptor use observed nearby, overall risk to avian species at F06 is considered moderate-higher relative to other turbines.

Turbine Site H01

Topographical Position

- Site H01 is located on gentle slopes roughly 50 m south of the steeper slopes on the southern side of North Fork Montgomery Creek. Slopes at the site are essentially flat, with no steeper slopes nearby to the west or southwest. Under prevailing winds, turbine blades would remain well above the surrounding landscape, but may extend over the steeper

slopes. However, the steeper slopes immediately north have a northerly aspect that would not be conducive to generating orographic lift under prevailing wind conditions.

Vegetation Community

- Site H01 is located in what appears to be a burned area at the very southern edge of the Fountain Fire scar. North Fork Montgomery Creek was essentially the southern border of the burn in this area, with a small fire scar extending up the ridge where Site H01 is located on the south side of the creek. Older timber within the drainage survived the fire as did areas immediately south of Site H01. As such, vegetation at the H01 site is primarily monotypic pine similar to that of the majority of the Fountain Fire scar to the north, with tree heights generally less than 50 ft (15 m) that would be below the rotor swept area of the turbine. However older pockets of mature conifer are scattered nearby, providing some diversity of habitats in close proximity to the turbine location. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine, with residual older trees potentially remaining nearby. Given the location of Site H01, it is assumed that at least a small portion of the mature stand to the SW will be harvested/cleared to support construction. It is not clear if the entire stand may be harvested as part of ongoing timber management as well as to support turbine construction. If not harvested to support construction, given the ages of adjacent stands, it's assumed that the stand would be harvested in full at some point in the next 5–10 years.

Site-specific Bird Use Data

- Site H01 is located approximately 580 m south of the nearest avian survey point (Point 21) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low at Point 21 (0.10–0.14 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Point 21 was located in the cleared and maintained transmission line corridor but provided a reasonable view of the airspace above North Fork Montgomery Creek. While raptor use was low at this survey point, vulture use above the northern slopes of North Fork Montgomery Creek was relatively high, which may be a result of the southwesterly aspects of the steeper slopes on the north side of the creek. Within the 800-m survey plot however, few vulture flights were observed on the southern slopes of the creek.

Proximity to Other Risk Factors

- The existing landscape at Site H01 is likely to be altered dramatically, either pre-construction or soon after depending on the harvest schedule for the existing stand of timber southwest of the H01 location and bordering the access road. Pending timing, Site H01 may have a small stand of mature trees just beyond the turbine pad, or it may be surrounded by open, recently harvested areas of varying ages (0-30 years of age). It is assumed that the mature forest will be harvested early in the Project's life, if not before, unless the underlying timber management strategy changes dramatically. While new openings post-harvest may elevate the potential for raptor foraging, the topography of

the site is not conducive to soaring raptors at the turbine location. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, nests) were identified in close proximity to Site H01.

Risk Determination: Lower-Moderate

- Overall risk to avian species at Site H01 is considered lower–moderate relative to other turbines, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site H02

Topographical Position

- Site H02 is located on gentle slopes roughly 160 m south of the steeper slopes of North Fork Montgomery Creek. Slopes at the site are gentle, with no steeper slopes nearby. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site H02 is located in what appears to be a burned area at the very southern edge of the Fountain Fire scar. North Fork Montgomery Creek was essentially the southern border of the burn in this area, with a small fire scar extending up the ridge where sites H01 and H02 are located on the south side of the creek. Older timber within the drainage survived the fire as did areas immediately SSW of H02. As such, vegetation at the H02 location is primarily monotypic pine similar to that of the majority of the Fountain Fire scar to the north, with tree heights generally less than 50 ft (15 m) that would be below the rotor swept area of the turbine. No older timber remains within approximately 200 m of the site. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine.

Site-specific Bird Use Data

- Site H02 is located approximately 730 m north of the nearest avian survey point (Point 27) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low–moderate at Point 27 (0.20–0.36 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Point 27 was located in in a recently harvested area (<10 years of age) adjacent to a mature stand of timber on one side and monotypic pine on the other (Fountain Fire scar), which is similar to the H02 location.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site H02.

Risk Determination: Lower

- Overall risk to avian species at Site H02 is considered low–moderate relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site H03

Topographical Position

- Site H03 is located on gentle slopes roughly 500 m south of North Fork Montgomery Creek. Slopes at the site are flat but begin to fade into a side drainage of North Fork Montgomery Creek approximately 150 m to the east. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site H03 is located near the southern edge of the Fountain Fire scar and appears to have been harvested during or soon after the post-fire salvage logging operations. As such, vegetation at the H03 site appears similar to that of the majority of the Fountain Fire scar to the north, with tree heights generally less than 50 ft (15 m) that would be below the rotor swept area of the turbine. No older stands of timber remain within approximately 200 m of the site, but a few residual older trees remain approximately 120 m to the northeast. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine.

Site-specific Bird Use Data

- Site H03 is located approximately 180 m northwest of the nearest avian survey point (Point 27) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low–moderate at Point 27 (0.20–0.36 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Point 27 was located in in a recently harvested area (<10 years of age) adjacent a mature stand of timber on one side and the monotypic pine at the H02 location on the other.

Proximity to Other Risk Factors

- Aside from the few older trees to the northeast, which may provide perch sites for raptors to forage within a maintained clearing around the turbine, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site H03.

Risk Determination: Lower-Moderate

- Overall risk to avian species at Site H03 is considered lower–moderate relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site J01

Topographical Position

- Site J01 is located on the eastern side of a broad hilltop in the headwaters North Fork Montgomery Creek. Slopes at Site J01 are gentle but steepen approximately 200 m east as they descend into a main tributary of North Fork Montgomery Creek that wraps around the eastern side of the hill. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape and the setback from the steeper slopes would inhibit the blades from extending over those slopes under any wind condition conditions. While the steeper slopes have an easterly aspect that may intercept the easterly winds, the approximately 200 m setback from the steeper slopes would minimize the potential for strong orographic lift at the turbine location.

Vegetation Community

- Site J01 is located in a recently harvested (<5-year-old cut) area that is adjacent a slightly older harvest block (~12 years of age) to the southeast and a mature stand of timber to the west. Tree heights are generally less than 10 ft (3 m) at the turbine site and vary from 20–100-plus ft (6–33 m) in the adjacent stands. Numerous residual older trees remain scattered throughout the harvested area as well, along with a couple of leave-tee patches of approximately 0.5–1.25 acres in size. The site location would be maintained post-construction in a low-growing vegetation state that is similar to what is currently present. The rest of the recently harvested stand would remain open for some time as replanted trees become established, while the adjacent cut would progress fairly quickly towards a young stand of closed canopy timber and the mature stand will likely be harvested during the early years of the Project, if not prior to construction.

Site-specific Bird Use Data

- Site J01 is located approximately 410 m northeast of the nearest avian survey point (Point 33) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low–moderate at Point 33 (0.23–0.30 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Vulture use was moderate at Point 33 but primarily observed on the western aspects of the hill, opposite Site J01.

Proximity to Other Risk Factors

- Several boulder piles/rocky outcrops are present in the recently harvested areas in close proximity (<60 m) to Site J01. These sites may provide habitat for raptor prey species, although they may become less accessible to many raptors as the surrounding forest

matures around them. Scattered leave trees within the harvested areas provide suitable perch sites for raptors as well. No other specific risk factors that might support increased avian/raptor use (meadows, nests) were identified in close proximity to Site J01.

Risk Determination: Moderate

- Given the diversity of habitats, available perch sites, and potential for foraging near the turbine site, overall risk to avian species at Site J01 is considered moderate relative to other turbine sites.

Turbine Site J02

Topographical Position

- Site J02 is located on a short ridge in the headwaters of North Fork Montgomery Creek and is one of the highest elevation turbines along the eastern edge of the Project. The ridge is oriented in a N-S direction, with steeper slopes to the east and gentler grade to the west. The steeper easterly aspects break at 50-100m from Site J02 and may provide some orographic lift near the turbine location during easterly winds, while slopes west of Site J02 are more NW facing and unlikely support orographic lift at the turbine location under prevailing southwesterly winds. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape and the setback from the steeper slopes would inhibit the blades from extending over those slopes under prevailing wind conditions.

Vegetation Community

- Site J02 is located at the western edge of a 15–20-year-old stand of regenerating timber that abuts a mature stand of timber to the west along the ridgeline. Given the location at the edge of the young and older stands, tree heights vary around the site, from roughly 20–100-plus ft (6–33 m). Given the turbine location at the edge of the mature stand it is assumed that at least a portion of the mature timber would be harvested to allow for construction. Underlying timber management could result in a more substantial harvest of the mature timber before or within a few years of construction. The site location would be maintained post-construction in a low-growing vegetation state, while the adjacent stand to the east would progress fairly quickly towards a closed canopy stand of pole timber. Older timber may remain to the west, although this timber is likely be harvested prior to or soon after construction as part of ongoing timber operations. If harvested, it would provide an open area to the west of Site J02 that would remain relatively open during the first half of the Project's lifecycle.

Site-specific Bird Use Data

- Site J02 is located approximately 1,000 m or more from the nearest avian survey points (Point 33 and Point 26) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was low–moderate at Point 33 (0.23–0.30 observations/800-m plot/60-min survey) and high at Point 26 (0.86–1.0) during the two years of surveys conducted at the points. Vulture use

was moderate to high at these points, suggesting that areas nearby may support some elevated use by soaring birds, although survey plots from neither point overlap Site J02.

Proximity to Other Risk Factors

- Site J02 is the second highest elevation turbine in the Project and is the closest turbine to the Lassen National Forest (LNF) border located approximately 300 m to the east and south. The older and more intact LNF lands provide higher quality habitat for some sensitive species (e.g., California spotted owl, northern goshawk). No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site J02.

Risk Determination: Higher

- Given the diversity of habitats, proximity to LNF, high elevation, elevated avian use in the general vicinity, and potential for upsloping easterly winds, overall risk to avian species at Site J02 is considered higher relative to other turbine sites.

Turbine Site K01

Topographical Position

- Site K01 is located on gentle slopes roughly 300 m west of the steeper slope along North Fork Montgomery Creek. Slopes at the site are undulating with a northwest aspect and are not conducive to generating orographic lift at the turbine location. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site K01 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site K01 is located approximately 270 m southwest of the nearest avian survey point (Point 20) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate at Point 20 (0.08–0.60 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Point 20 was located on the western edge of the North Fork Montgomery Creek drainage above a steeper northeast facing slope. Most of the raptor use observed from Point 20 was mapped on the opposite side of the drainage, away from Site K01. Higher use to the east could have been associated with the steeper southwestern facing slopes in that area that could provide an orographic lift for soaring

raptors. Vulture use at Point 20 was also moderate and showed a similar pattern of flight paths on the opposite side of the drainage, more distant from Site K01.

Proximity to Other Risk Factors

- The closest unique feature proximal to Site K01 is the large t-line corridor, which is located approximately 270 m to the south. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K01.

Risk Determination: Lower

- Overall risk to avian species at Site K01 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site K02

Topographical Position

- Site K02 is located on a gentle slope at the northern end of a broad ridge separating the North and South Forks of Montgomery Creek. This indistinct ridge supports sites for most of the K-string of turbines (K02-K07). A small side drainage of South Fork Montgomery Creek funnels just to the north of Site K02, but slopes associated with the drainage are not steep nor conducive to orographic lift at the location of Site K02. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site K02 is located just south of the Fountain Fire scar in an area that was harvested in the past five years. As such vegetation at the site is a mix of bare ground, newly planted conifer seedlings, and disturbance adapted species. Numerous isolated trees and one patch of trees were left during harvest. Newly planted trees are likely less than 3 ft (1 m) tall, while residual trees are likely to exceed 100 ft (30 m). An open space of low growing vegetation would be maintained at the turbine location, and the leave tree clump left post-harvest may have to be cleared to support construction as it is in close proximity (15–80 m) from the turbine location. While the turbine pad would be maintained in low growing vegetation, the recently harvested area surrounding it would move through a series of successional stages during the Project's life, from its current open form to a closed canopy forest later in the Project's lifecycle.

Site-specific Bird Use Data

- Site K02 is located approximately 640 m northwest of the nearest avian survey point (Point 28) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate at Point 28 (0.40– 0.46 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Vegetation/habitat within the 800-m survey buffer of

Point 28 was diverse in terms of stand ages, from recently harvested blocks to more mature stands of timber associated with South Fork Montgomery Creek, which provide conditions suitable for a variety of avian species.

Proximity to Other Risk Factors

- Aside from the diversity of habitats present nearby, no other specific risk factors identified that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K02.

Risk Determination: Moderate

- Overall risk to avian species at Site K02 is considered moderate relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site K03

Topographical Position

- Site K03 is located on a gentle slope of a broad ridge separating the North and South Forks of Montgomery Creek. This indistinct ridge supports sites for most of the K-string of turbines (K02-K07). There are no steep slopes near Site K03 that would be conducive to substantial uplift at the turbine location. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site K03 is located in a stand of mature timber that spans the broad ridgetop, and bordered by harvested areas of various ages on the lower slopes. Given the location of Site K03 and its associated access road, it is assumed that most of the mature stand would be harvested to support construction. If not harvested in full, it is assumed the remainder of the stand would be harvested in the near future as a part of normal timber management by the underlying landowner. At minimum, an open space of low growing vegetation would be developed and maintained at the turbine location, while a more extensive clearing is more likely assuming the entire stand is harvested before or soon after construction. While the turbine pad would be maintained in low growing vegetation, harvested areas surrounding it would move through a series of successional stages during the Project's life, from its current open form to a closed canopy forest later in the Project's lifecycle.

Site-specific Bird Use Data

- Site K03 is located approximately 250 m northwest of the nearest avian survey point (Point 28) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate at Point 28 (0.40– 0.46 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Vegetation/habitat within the 800-m survey buffer of Point 28 was diverse in terms of stand ages, from recently harvested blocks to more

mature stands of timber associated with South Fork Montgomery Creek, which provide conditions suitable for a variety of avian species.

Proximity to Other Risk Factors

- Aside from the diversity of habitats present nearby, no other specific risk factors identified that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K03.

Risk Determination: Moderate

- Overall risk to avian species at Site K03 is considered moderate relative to other turbines, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site K04

Topographical Position

- Site K04 is located on the southwestern side of the same ridge separating the North and South Forks of Montgomery Creek that supports sites for most of the K-string of turbines (K02-K07). At Site K04, the ridge is not as broad as it is further north near sites K02 and K03 and while not steep, the adjacent southwestern facing slopes do steepen to some degree approximately 90 m to the west of Site K04. These southwestern facing slopes are aligned such that prevailing southwest wind could generate orographic lift near Site K04. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction and are not expected to extend over steeper slopes during prevailing winds, as blades would be oriented parallel to the ridgeline.

Vegetation Community

- Site K04 is located in a roughly 25-year-old stand of timber that spans the ridgetop, and is bordered by harvested areas of various ages on the adjacent slopes. Given the location of Site K04 and its associated access road, it is assumed that most of the timber around it would be harvested to support construction. At minimum, an open space of low growing vegetation would be developed and maintained at the turbine location, while a more extensive clearing is more likely given the access road and other potential staging areas along this ridge.

Site-specific Bird Use Data

- Site K04 is located approximately 120 m southeast of the nearest avian survey point (Point 28) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate at Point 28 (0.40– 0.46 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Vegetation/habitat within the 800-m survey buffer of Point 28 was diverse in terms of stand ages, from recently harvested blocks to more

mature stands of timber associated with South Fork Montgomery Creek, which provide conditions suitable for a variety of avian species.

Proximity to Other Risk Factors

- Aside from the diversity of habitats present nearby, no other specific risk factors identified that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K04.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats, moderate use by raptors, and potential for upsloping winds at the turbine location, overall risk to avian species at Site K04 is considered moderate–higher relative to other turbine sites.

Turbine Site K05

Topographical Position

- Site K05 is located on the end of a side ridge extending south from the broad ridge separating the North and South Forks of Montgomery Creek that supports sites for most of the K-string of turbines (K02-K07). The side ridge creates a narrowing of the drainage associated with South Fork Montgomery Creek resulting in some steeper slopes near Site K05. The southwesterly aspects of the side ridge may provide for orographic lift at the ridgeline, however, Site K05 is set back approximately 120 m from the steeper southwest facing slopes. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction. Blades may extend over some of the steeper slopes to the south and southeast under prevailing southwest winds; however, these slopes are leeward of the turbine and therefore may be less likely to see significant raptor use given a lack of orographic lift.

Vegetation Community

- Site K05 is located in an approximately 25-year-old stand of timber that covers the entirety of the side ridge on which it sits. The 25-year-old stand is bordered by older timber to the south along South Fork Montgomery Creek and a younger stand (~15 years of age) to the west. The side ridge is not large and given the location of Site K04 and its associated access road, it is assumed that most/all of the side ridge would be cleared/harvested to support construction and would be maintained in low-growing vegetation during the life of the Project.

Site-specific Bird Use Data

- Site K05 is located approximately 500 m southeast of the nearest avian survey point (Point 28) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate at Point 28 (≤0.46 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Vegetation/habitat within the 800-m survey buffer of Point 28 was diverse in terms of stand ages, from recently harvested blocks to more mature stands

of timber associated with South Fork Montgomery Creek, which provide conditions suitable for a variety of avian species.

Proximity to Other Risk Factors

- Aside from the diversity of habitats present nearby, no other specific risk factors identified that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K05.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats, moderate use by raptors, and potential for upsloping winds at the turbine location, overall risk to avian species at Site K05 is considered moderate–higher relative to other turbine sites.

Turbine Site K06

Topographical Position

- Site K06 is located on the upper end of the broad ridge that supports the sites of most of the K-string of turbines (K02-K07) and separates the North and South Forks of Montgomery Creek. Slopes at Site K06 are relatively flat and decent gently to the northwest and west. There are no steeper slopes near Site K06. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site K06 is located in a roughly 25-year-old stand of timber that covers much of the surrounding area. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. One small patch (~5 acres) of larger trees is present approximately 200 m to the north. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site K06 is located approximately 860 m southwest of the nearest avian survey point (Point 27) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low–moderate at Point 27 (0.20–0.36 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Point 27 was located in in a recently harvested area (<10 years of age) adjacent a mature stand of timber on one side and monotypic pine on the other (Fountain Fire scar), providing a more diverse suite of habitats nearby relative to what currently exists at Site K06.

Proximity to Other Risk Factors

- Aside from the small patch of older trees 200 m to the north, no other specific risk factors identified that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K06.

Risk Determination: Lower

- Overall risk to avian species at Site K06 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site K07

Topographical Position

- Site K07 is located on gentle slopes east of the broad ridge that supports sites for most of the K-string of turbines (K02-K07) and separates the headwaters of the North and South Forks of Montgomery Creek. Slopes at Site K07 are gentle and descend gently to the northwest. There are no steeper slopes near Site K07. Given the site topography and distance from steeper slopes, turbine blades would remain well above the surrounding landscape regardless of wind direction.

Vegetation Community

- Site K07 is located in a roughly 25-year-old stand of timber that covers much of the surrounding area. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site K07 is located approximately 860 m southwest of the nearest avian survey point (Point 27) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was low–moderate at Point 27 (0.20–0.36 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points. Point 27 was located in in a recently harvested area (<10 years of age) adjacent a mature stand of timber on one side and monotypic pine on the other (Fountain Fire scar), providing a more diverse suite of habitats nearby relative to what currently exists at Site K07.

Proximity to Other Risk Factors

- No specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site K07.

Risk Determination: Lower

- Overall risk to avian species at Site K07 is considered lower relative to other turbines, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site L04

Topographical Position

- Site L04 is located on a low rise in an area of otherwise flat to undulating terrain between South Fork Montgomery Creek and Cedar Creek. No steep slopes are present proximal to Site L04. Given the site topography turbine blades would remain well above the surrounding landscape under all wind conditions.

Vegetation Community

- Site L04 is located in a stand of young (~30-year-old) timber near the southern edge of the Fountain Fire scar that was either burned or harvested and replanted around the same time as surrounding burned areas. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A small patch (~2.5 acres) of mature trees is located approximately 60 m to the west of Site L04, which was left when the adjacent stand was harvested about 15 years ago. Given the proximity of the turbine and access road, this patch of taller trees may be cleared prior to construction. The site location would be cleared of the existing 30-year-old timber and maintained post-construction in a low-growing vegetation state, while the adjacent stand would mature to a harvestable age during the later stages of the Project's lifecycle.

Site-specific Bird Use Data

- Site L04 is located approximately 1,100–1,500 m from the nearest avian survey points (points 28, 31, 32) surveyed during the 2017-2019 avian use surveys conducted for the Project. Use by diurnal raptors varied from 0.10–0.70 observations/800-m plot/60-min survey at these points during the two years of surveys conducted at the points, which would be low–moderate relative to other points. Vulture use was also moderate at these points.

Proximity to Other Risk Factors

- Aside from the older perch trees that may remain in proximity to the turbine post-construction, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site L04.

Risk Determination: Moderate

- Based on the moderate levels of raptor use in the areas around Site L04 and variability in adjacent stand ages, overall risk to avian species at Site L04 is considered moderate relative to other turbine sites.

Turbine Site L05

Topographical Position

- Similar to Site L04, Site L05 is located on a low rise in an area of otherwise flat to undulating terrain between South Fork Montgomery Creek and Cedar Creek. No steep slopes are present proximal to Site L05. Given the site topography turbine blades would remain well above the surrounding landscape under all wind conditions.

Vegetation Community

- Site L05 is located at the edge of a 10–15-year-old stand to the west and roughly 30-year-old stand to the east. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A few scattered older trees are located within 100 m of Site L05, with a larger stand patch of older trees roughly 80 m to the south. The site location would be cleared of the existing young timber and maintained post-construction in a low-growing vegetation state. The cleared areas would be surrounded by younger timber of varying age, with some older trees in close enough proximity to provide perches overlooking the maintained turbine pad.

Site-specific Bird Use Data

- Site L05 is located approximately 740 m northwest of the nearest avian survey point (Point 32) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate-high (0.31–0.70 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Vulture use was moderate at this point.

Proximity to Other Risk Factors

- No specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site L05.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and moderate-high levels of raptor use, overall risk to avian species at Site L05 is considered moderate-higher relative to other turbines.

Turbine Site L06

Topographical Position

- Similar to sites L04 and L05, Site L06 is located on a low rise in an area of otherwise flat to undulating terrain between the headwater reaches of South Fork Montgomery Creek and Cedar Creek. No steep slopes are present proximal to Site L06. Given the site topography turbine blades would remain well above the surrounding landscape under all wind conditions.

Vegetation Community

- Site L06 is located in a stand of mature timber bordered by younger (<20 years of age) harvested stands of varying ages. Tree heights in the mature stand are 100-plus feel, with the younger stands are generally less than 30 ft. Much of the older stand would likely be harvested to support construction of the turbine pad and access road. The site location would be maintained post-construction in a low-growing vegetation state, with larger trees likely present nearby along Cedar Creek and where left during harvest operations.

Site-specific Bird Use Data

- Site L06 is located approximately 630 m north of the nearest avian survey point (Point 32) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was moderate-high (0.31–0.70 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Vulture use was moderate at this point.

Proximity to Other Risk Factors

- Site L06 is located approximately 200 m north of Cedar Creek which will provide for the long-term presence of an older forest component associate with its riparian corridor, and a more diverse understory that may support a more diverse avian community than the drier more upland forest stands. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site L06.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and moderate-high levels of raptor use, overall risk to avian species at Site L06 is considered moderate-higher relative to other turbines.

Turbine Site L07

Topographical Position

- Site L07 is located on a flat area south of Site L06 on the opposite side of Cedar Creek. The surrounding terrain is flat to undulating, descending gently to the north into the headwaters reach of Cedar Creek. No steep slopes are present proximal to Site L07. Given the site topography turbine blades would remain well above the surrounding landscape under all wind conditions.

Vegetation Community

- Site L07 is located in a small patch of scrub within an otherwise open area that was harvested in the past 5–10 years. Individual older trees are scattered throughout the harvest unit and an older stand of trees abuts the harvested area about 80 m to the north and following the Cedar Creek drainage. Tree heights of the younger stands are generally less than 15 ft, with the heights of residual trees and the older forest just to the north being 100-plus ft. The site location would be cleared and maintained post-construction in a low-

growing vegetation state, similar to what largely surrounds the site currently, with larger trees likely present nearby along Cedar Creek and where left during previous harvest operations.

Site-specific Bird Use Data

- Site L07 is located approximately 390 m east of the nearest avian survey point (Point 32) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate-high (0.31–0.70 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Vulture use was moderate at this point.

Proximity to Other Risk Factors

- Site L07 is located approximately 300 m south of Cedar Creek which will provide for the long-term presence of an older forest component associated with its riparian corridor, and a more diverse understory that may support a more diverse avian community than the drier more upland forest stands. No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site L07.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and moderate-high levels of raptor use, overall risk to avian species at Site L07 is considered moderate-higher relative to other turbine sites.

Turbine Site L08

Topographical Position

- Site L08 is located on the lower and gently sloping northwestern flank of Snow Mountain in the headwaters of Cedar Creek. Slopes to the SE of Site L08 ascend approximately 300 ft in elevation toward a knob some 350 m away on which Site L09 is located. Given the site topography, turbine blades would remain well above the surrounding landscape under all wind conditions, and given the northwest aspect at Site L08, prevailing winds would not be conducive to generating orographic lift at the turbine location.

Vegetation Community

- Site L08 is located in an open area that was harvested in the past 5–10 years. Individual older trees are scattered throughout the harvest unit and an older stand of trees extends west of from Site L08, which was presumed left during harvest operations as a headwater stream buffer. Tree heights of the younger stands are generally less than 15 ft, with the heights of residual trees and the older forest just to the north being 100-plus ft. The site location would be cleared and maintained post-construction in a low-growing vegetation state, similar to what largely surrounds the site currently, with larger trees left during previous harvest operations likely present nearby, and in the adjacent stand to the east, although it may be harvested in the coming years.

Site-specific Bird Use Data

- Site L08 is located approximately 850 m northwest of the nearest avian survey point (Point 34) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project Area, use by diurnal raptors was moderate-high (0.46–0.80 observations/800-m plot/60-min survey) during the two years of surveys conducted at this point. Vulture use was moderate at this point.

Proximity to Other Risk Factors

- No specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site L08.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and moderate-high levels of raptor use, overall risk to avian species at Site L08 is considered moderate-higher relative to other turbine sites.

Turbine Site L09

Topographical Position

- Turbine Site L09 is located on the eastern side of a broad section of the ridge separating the headwaters of Cedar Creek from those of North Fork Little Cow Creek, on the western slopes of Snow Mountain. Site L09 is the highest elevation turbine within the Project Area. Slopes at the turbine location are essentially flat, fading gently to the east for approximately 180 m before descending into the upper reaches of Cedar Creek. Given the site topography of the broad ridge, turbine blades would remain well above the surrounding landscape under all wind conditions and slope aspects would not be conducive to generating orographic lift at the turbine location.

Vegetations Community

- Site L09 is positioned in a small (<1 ac) forest opening dominated by dense chaparral/brush surrounded by a stand of mature mixed conifer forest. Site conditions appear rocky, and the surrounding mixed conifer forest is much more open than the forests at lower elevations. A larger (~10 acre) area of relatively open habitats is located approximately 50 m southeast of Site L09. At a minimum, a small area of the existing stand surrounding the turbine will need to be harvested to create an opening for turbine construction. More of the stand may be harvested as part of ongoing timber management as well as to support turbine construction. An open space of low growing vegetation would be maintained at the turbine location, while the surrounding forested area may continue to support mature trees for some period of time but may be harvested either prior to construction or within a few years after.

Site-specific Bird Use Data

- Site L09 is located between two avian survey points, approximately 345 m northwest of Point 34 surveyed during the 2017-2019 avian use surveys conducted for the Project.

Compared to other points within the Project Area, use by diurnal raptors was moderate-higher at Point 34 (0.46–0.80 observations/800-m plot/60-min survey) during the two years of surveys conducted at the points.

Proximity to Other Risk Factors

- The higher elevations at Site L09 provide for a more open canopy of mixed conifer forest with brushy areas scattered throughout. The more open vegetation and available perch locations may provide better foraging opportunities for some raptors relative to the more dense canopies at lower elevations. Aside from the more open landscapes, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, roosts, nests) were identified in close proximity to Site L09.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and higher levels of raptor use, overall risk to avian species at Site L09 is considered moderate-higher relative to other turbines.

Turbine Site M06

Topographical Position

- Site M06 is located along the crest of a broad SE-NW oriented ridgeline. The crest is wide and flat surrounding the turbine site but breaks more substantially approximately 200 m to the southwest as the ridge drops toward the Cedar Creek drainage below. Given the turbine site's location along the crest of the ridge, rotors will be above the surrounding landscape and most often perpendicular to the ridge given the prevailing SW wind. Steeper slopes existing to the south of the location would not contribute to orographic lift at the turbine given their distance from the site.

Vegetation Community

- Site M06 is located in the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site M06 is located approximately 960 m west of the closest avian point (Point 31) surveyed during the 2017-2019 avian use surveys conducted for the Project. Compared to other points within the Project, use by diurnal raptors was lower at Point 31 (0.10–0.31 observations/800-m plot/60-min survey).

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site M06.

Risk Determination: Lower

- Overall risk to avian species at Site M06 is considered lower relative to other turbine sites, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site M07

Topographical Position

- Site M07 is located along the crest of a broad SE-NW oriented ridgeline. The crest is wide and flat surrounding the turbine site but breaks more substantially approximately 400 m to the southwest as the ridge drops into the Cedar Creek drainage. Given the turbine site's location along the crest of the ridge, rotors will be above the surrounding landscape and most often perpendicular to the ridge given the prevailing SW wind. Steeper slopes to the south of the location would not contribute to orographic lift at the turbine site given their distance from the turbine.

Vegetation Community

- Site M07 is located within the Fountain Fire scar and is surrounded by a young (~30-year-old) plantation of monotypic ponderosa pine that was replanted post-fire in the early to mid-1990s. Tree heights are generally less than 50 ft (15 m) in this area and would be below the rotor swept area of the turbine. A clearing would be created at the turbine site for turbine construction, leaving a maintained open space of low growing vegetation surrounded by an aging monotypic stand of ponderosa pine forest.

Site-specific Bird Use Data

- Site M06 is located approximately 500 m west of the closest avian point (Point 31) surveyed during the 2017-2019 avian use surveys conducted for the Project. Compared to other points within the Project Area, use by diurnal raptors was lower at Point 31 (0.10–0.31 observations/800-m plot/60-min survey.

Proximity to Other Risk Factors

- No other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, powerlines, prey, roosts, nests) were identified in close proximity to Site M07.

Risk Determination: Lower

- Overall risk to avian species at Site M07 is considered lower relative to other turbines, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site M08

Topographical Position

- Turbine Site M08 is the most southwestern turbine site within the Project Area and located along the main ridge separating Cedar Creek and North Fork Little Cow Creek. The turbine site is situated along a relatively flat crest of the ridge, with a west–northwestern aspect and slopes that drop gently into the Cedar Creek drainage. Given the turbine site's nearly flat location on the crest, rotors will be above the surrounding landscape and perpendicular to the ridge given the prevailing SW wind. Given the WNW aspect and gentle slopes adjacent to the turbine, the potential for orographic lift at the turbine location would be limited under prevailing winds.

Vegetation Community

- Site M08 is located within the edge of a mature mixed conifer forest bordered by an 18-acre harvest block 30 m to the southwest and a 20-acre harvest block 50 m to the southeast, both harvested within the past 15 years. At minimum, a small area of the existing stand surrounding the turbine will need to be harvested to create an opening for turbine construction. More of the stand may be harvested as part of ongoing timber management as well as to support turbine construction. An open space of low growing vegetation would be maintained at the turbine location, while the surrounding forested area may continue to support mature trees for some period of time but may be harvested either prior to construction or within a few years after. The areas surrounding the maintained turbine pad would move through a series of successional stages during the Project's life, from an open form post-harvest to a closed canopy forest later in the Project's lifecycle.

Site-specific Bird Use Data

- Site M08 is located approximately 950 m from the nearest avian survey point (Point 31) to the north and 1,140 m from Point 36 to the southwest, both surveyed during the 2017-2019 avian use surveys conducted for the Project. Compared to other points within the Project Area, use by diurnal raptors was lower at both Point 31 (0.10–0.31 observations/800-m plot/60-min survey) and Point 36 (0.10–0.23 observations/800-m plot/60-min survey).

Proximity to Other Risk Factors

- Aside from the older trees to the northeast, which may provide perch sites for raptors to forage within a maintained clearing around the turbine, no other specific risk factors that

might support increased avian/raptor use (rocky outcrops, meadows, perches, roosts, nests) were identified in close proximity to Site M08.

Risk Determination: Lower

- Overall risk to avian species at Site M08 is considered lower relative to other turbines, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.

Turbine Site M09

Topographical Position

- Turbine Site M09 is located slightly higher in elevation than Site M08 along the same ridgeline between Cedar Creek and North Fork Little Cow Creek. The turbine site is situated on the northern side of the relatively flat ridgetop with northerly aspect slopes that gently descend into side draw associated with Cedar Creek. The turbine site's location toward the northern edge of the crest provides a substantial setback from steeper slopes to the south and helps to diminish updraft potential at the actual turbine location.

Vegetation Community

- Site M09 is located in a small, 0.5-ac opening of chapparal/brush surrounded by mature mixed conifer forest, bordered by two harvest blocks within 100 m to the east and west of the turbine site. At minimum, a small area of the existing stand will need to be harvested to create an opening for turbine construction, likely linking the two adjacent harvest units. More of the stand may be harvested as part of ongoing timber management as well as to support turbine construction. An open space of low growing vegetation would be maintained at the turbine location, while the forested area to the north and south may continue to support mature trees for some period of time but may be harvested either prior to construction or within a few years after.

Site-specific Bird Use Data

- Site M09 is located approximately 740 m southwest of the nearest avian survey point (Point 32) surveyed during the 2017-2019 avian use surveys conducted for the Project. Relative to other points within the Project, use by diurnal raptors was moderate to high at Point 32 (0.32–0.70 observations/800-m plot/60-min survey).

Proximity to Other Risk Factors

- Aside from the older stands of trees to the north and south of the turbine site, which may provide perch sites for raptors to forage within a maintained clearing around the turbine, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, roosts, nests) were identified in close proximity to Site M09.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and higher levels of raptor use at nearby points, overall risk to avian species at Site M09 is considered moderate-higher relative to other turbine sites.

Turbine Site M10

Topographical Position

- Turbine Site M10 is located higher in elevation than Site M09 on the same ridgeline between Cedar Creek and North Fork Little Cow Creek. The turbine site is situated along the relatively flat northern edge of the ridgeline, with the northerly aspect slopes descending relatively gently into the Cedar Creek drainage to the north. Given the turbine site's nearly flat location on the crest, rotors will be above the surrounding landscape and parallel to the ridge during the prevailing SW wind. Given the northerly aspect and gentle slopes adjacent to the turbine site, the potential for orographic lift at the turbine location would be limited under prevailing winds.

Vegetations Community

- Site M10 is positioned between two harvest blocks that were cut within the past 15 years. A larger stand of mature mixed conifer forest abuts the harvested areas approximately 40 m to the east of M10. In addition, there is a small (1.5-ac) stand of mature mixed conifer trees within the younger harvest block approximately 40 m southwest of the turbine. Otherwise, tree heights are generally less than 30 ft in this area and would be below the rotor swept area of the turbine. At minimum, a small area will need to be harvested from both existing stands to create an opening for turbine construction while areas beyond the turbine pad would return to a more mature forest over time. Some remnant trees exist in each of harvest blocks, which could provide locations from which raptors may perch and hunt in the maintained opening around the turbine, as well as the existing clearcut block to the west until it matures into a more closed canopy forest stand.

Site-specific Bird Use Data

- Site M10 is located approximately 680 m southeast of the nearest avian survey point (Point 32), surveyed during the 2017-2019 avian use surveys conducted for the Project. Compared to other points within the Project Area, use by diurnal raptors was moderate–high at Point 32 (0.31–0.70 observations/800-m plot/60-min survey) during the two years of surveys.

Proximity to Other Risk Factors

- Aside from the proximity of older trees near the turbine, which may provide perch sites for raptors to forage within a maintained clearing around the turbine, no other specific risk factors that might support increased avian/raptor use (rocky outcrops, meadows, roosts, nests) were identified in close proximity to Site M10.

Risk Determination: Moderate-Higher

- Based on the diversity of habitats and higher levels of raptor use at nearby points, overall risk to avian species at Site M10 is considered moderate-higher relative to other turbine sites.

DISCUSSION

Turbine locations at the Fountain Wind Project Area are primarily sited on broad ridges lacking steeper slopes on aspects that would be conducive to consistent and sometimes strong orographic lift that would support increased soaring opportunities for raptors, or other species, at the proposed turbine locations. Nine (19%) of the turbines were ranked as having moderate risk to avian species based on the presence of some landscape characteristics that might present an elevated risk to raptors in particular (Table 1). In comparison, 24 (50%) of turbines were considered to be of lower risk and only one (2%) was considered to be of higher risk relative to other turbines. Three (6%) turbines were considered low-moderate risk and 11 (23%) moderate-high risk relative to other turbines (Table 1).

While risk to avian species at turbines varies based on a variety of factors, the risk levels described herein are relative to other turbines within the Project and should not be considered in light of risk posed by turbines at other projects. Additionally, the analysis does not evaluate 52 turbines that were previously dismissed from the Project, some of which exhibit higher risk to avian species and raptors. Given the relatively gentle topography of the Project site and low use observed for raptors in general, turbine locations identified as higher risk at this Project could be considered low risk in comparison to turbines sited at other wind project sites (e.g., Altamont Pass projects) that have higher raptor use than this Project. Given the ongoing timber management of the underlying landowner, site conditions are likely to change substantially over the life of the Project. Turbine locations were all set back from steeper slopes that would potentially generate higher levels of orographic lift and, given the ever-changing vegetative landscape resulting from timber management activities, no turbine locations were identified that would clearly and obviously benefit from further micrositing to reduce avian risk that may result from nearby location-specific features.

While this report focuses on turbine specific risk to avian species, and raptors in particular, avian risk is just one consideration that goes into the siting of turbines, and the analysis presented herein does not contemplate the many other criteria considered when designing the wind project. These include overall topography as it impacts land availability, overall wind regimes, biological sensitivities other than avian, airspace restrictions, natural and cultural resources, and other land siting concerns (e.g., setbacks from structures, viewshed impacts, etc.). This analysis focused on risk categorization associated with each individual turbine site relative to others within the Project site in the context of potential avian risk and did not consider other factors that also affect project design. No specific features were identified in the analysis that would support a conclusion that further micrositing of any specific turbines would substantially reduce the potential impacts to raptors, or other avian species.

Finally, there is no evidence to suggest that the overall potential impact to avian species from collision risk would be significantly reduced if turbines identified as higher risk were removed from the Project. The overall risk of bird fatalities from the project is low relative to many other sites and anticipated impacts to avian species are not expected to be biologically significant on a population basis. Following Tier IV of the WEGs, Fountain Wind has committed to perform Post-Construction Mortality Monitoring and will develop and implement a Bird and Bat Conservation Strategy (BBCS) for the Project. While the Project is not expected to result in population-level effects to any special status species, to the extent impacts exceed those anticipated and require response, adaptive management provisions will be included in the BBCS.

Table 1. Summary of risk categorization for proposed turbine sites at the Fountain Wind Project Area, Shasta County, California.

Risk Category (# of Sites)	Turbines Sites	Evaluation Summary
Lower (24)	B02, B03, C02, C03, C05, C06, C07, C08, C09, C10, E01, E02, F01, F02, F03, F04, F05, H02, K01, K06, K07, M06, M07, M08	Lower to moderate raptor/vulture use, with no distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.
Lower-Moderate (3)	B05, H01, H03	Lower to moderate raptor/vulture use in the area, with one other (e.g., habitat diversity) distinguishing characteristic that would suggest turbine siting presents an elevated risk to avian species.
Moderate (9)	B04, C04, C11, E03, E05, J01, K02, K03, L04	Moderate raptor/vulture use in the area, with one other (e.g., habitat diversity) distinguishing characteristic that would suggest turbine siting presents an elevated risk to avian species.
Moderate-Higher (11)	E04, F06, K04, K05, L05, L06, L07, L08, L09, M09, M10	Moderate to higher raptor/vulture use in the area, with one or more (e.g., habitat diversity, potential for orographic lift) distinguishing characteristics that would suggest turbine siting presents an elevated risk to avian species.
Higher (1)	J02	Higher raptor/vulture use in the area with multiple other characteristics (e.g., orographic lift, diversity of habitat, proximity to National Forest) that would suggest turbine siting presents an elevated risk to avian species

REFERENCES

Alameda County Community Development Agency (ACCDA). 2014. Altamont Pass Wind Resource Area Repowering, Final Program Environmental Impact Report. State Clearinghouse #2010082063. Prepared by Alameda County Community Development Agency with technical assistance from ICF International. Available online at: Complete_Final_Program_EIR.pdf (acgov.org)

California Energy Commission (CEC). 2024. Post Scoping Data Requests for Fountain Wind Project (23-OPT-1). Request from California Energy Commission to Fountain Wind LLC. January 5, 2024.

Estep Environmental Consulting (Estep). 2019. Assessment of Proposed Wind Turbine Sites to Minimize Raptor Collisions at the Sand Hill Wind Repowering Project in the Altamont Pass Wind Resource Area. Prepared for ICF International and sPower. Prepared by Estep Environmental Consulting. Available online at: Microsoft Word - ICF_Sand Hill Report_Final.docx (acgov.org)

Estep Environmental Consulting (Estep). 2020. Assessment of Proposed Wind Turbine Sites to Minimize Raptor Collisions at the Mulqueeney Ranch Wind Repowering Project in the Altamont Pass Wind Resource Area. Prepared for Mulqueeney Wind Energy, LLC. Prepared by Estep Environmental Consulting. Available online at: acgov.org/cda/planning/landuseprojects/documents/MulqueeneyRanch/AppendixF.pdf

Smallwood, K.S., and L. Neher. 2016. Siting Wind Turbines to Minimize Raptor Collisions at Sand Hill Repowering Project, Altamont Pass Wind Resource Area. Available online at: SandHillAvianMicrositingReport_031516.pdf (acgov.org)

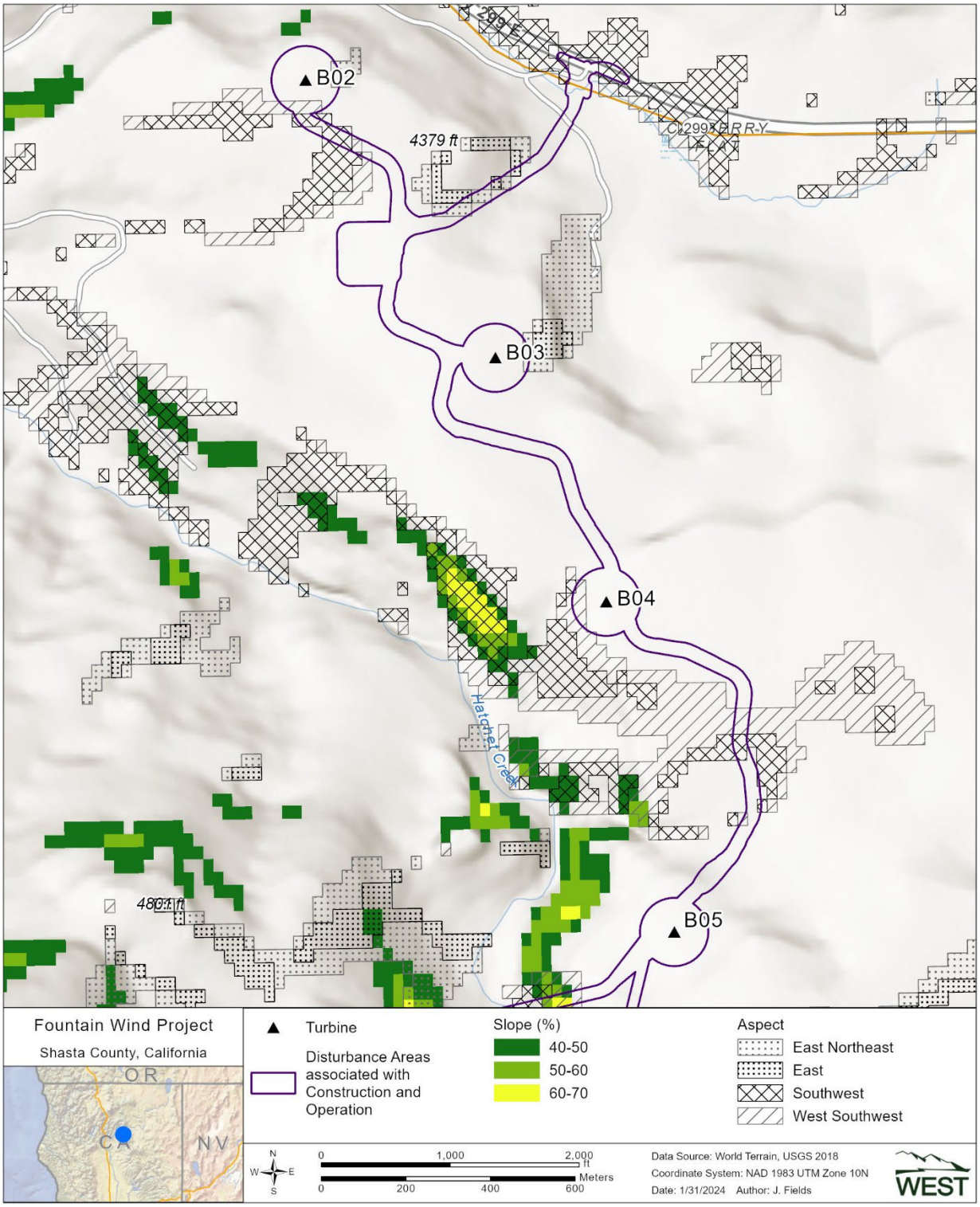
Thompson, J., A. Chatfield, and Q. Hays. 2018. Year 1 Avian Use Study Report and Risk Assessment for the Fountain Wind Project, Shasta County, California. Prepared for Pacific Wind Development LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Corvallis, Oregon. October 2018.

Thompson, J., and A. Chatfield. 2019. Results of the Year 2 Avian Use Study at the Fountain Wind Project – Addendum to the Year 1 Avian Use Study Report and Risk Assessment. Prepared for ConnectGen Operating, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Corvallis, Oregon. September 2019.

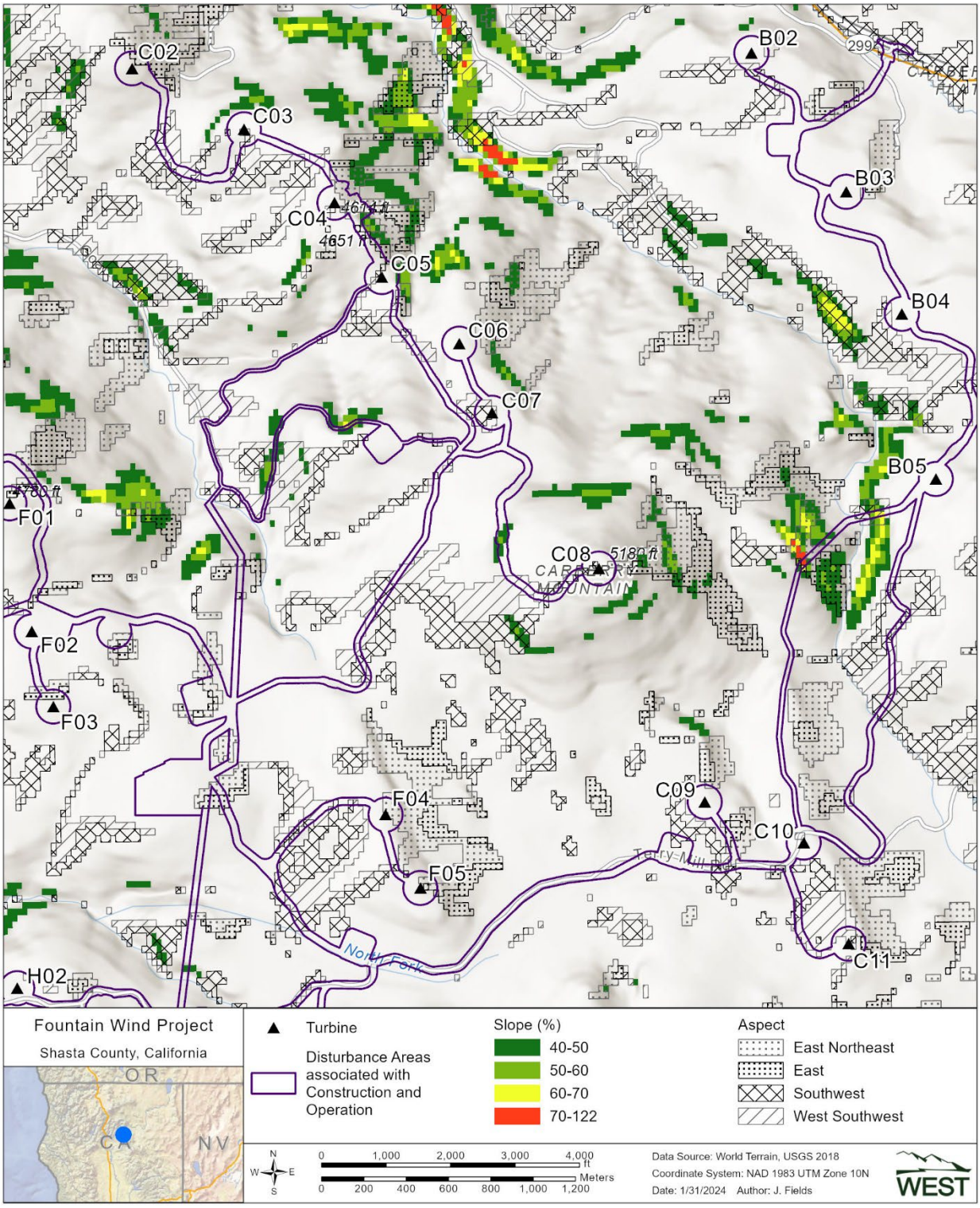
US Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplan guidance.pdf

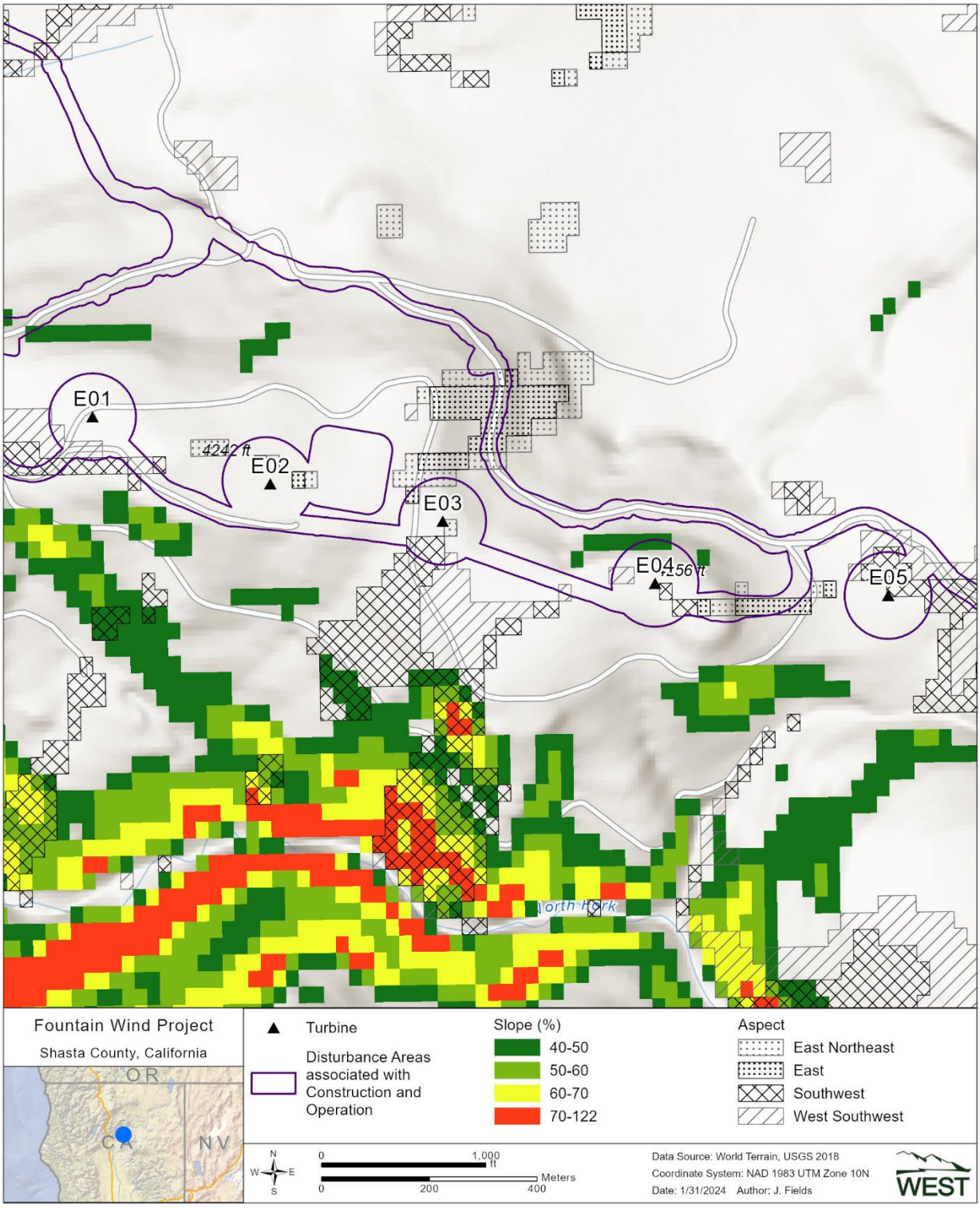
Appendix A. Maps depicting steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of proposed turbine locations at the Fountain Wind Project, Shasta County, California.



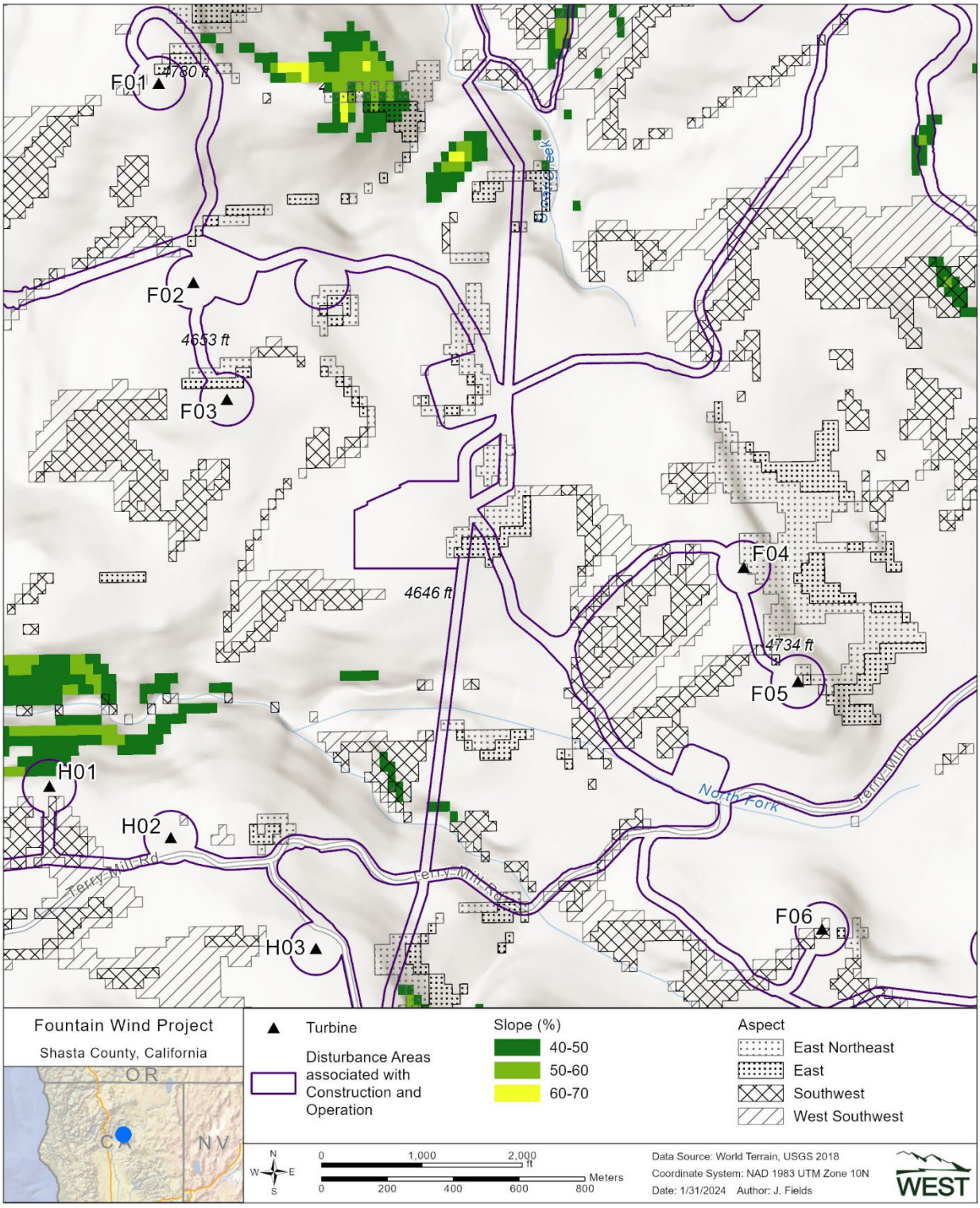
Appendix A1. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of the B-string turbines at the proposed Fountain Wind Project, Shasta County, California.



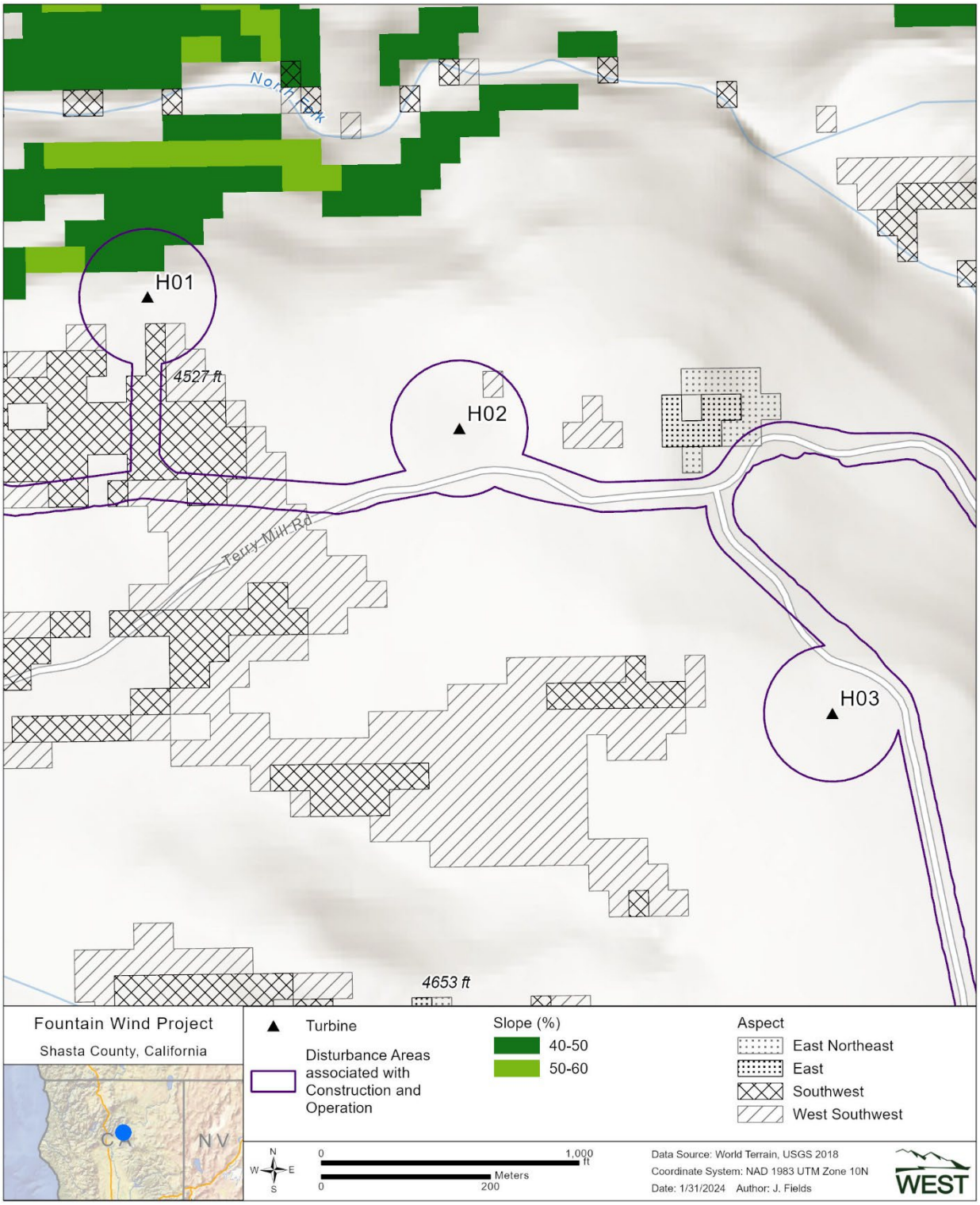
Appendix A2. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of the C-string turbines at the proposed Fountain Wind Project, Shasta County, California.



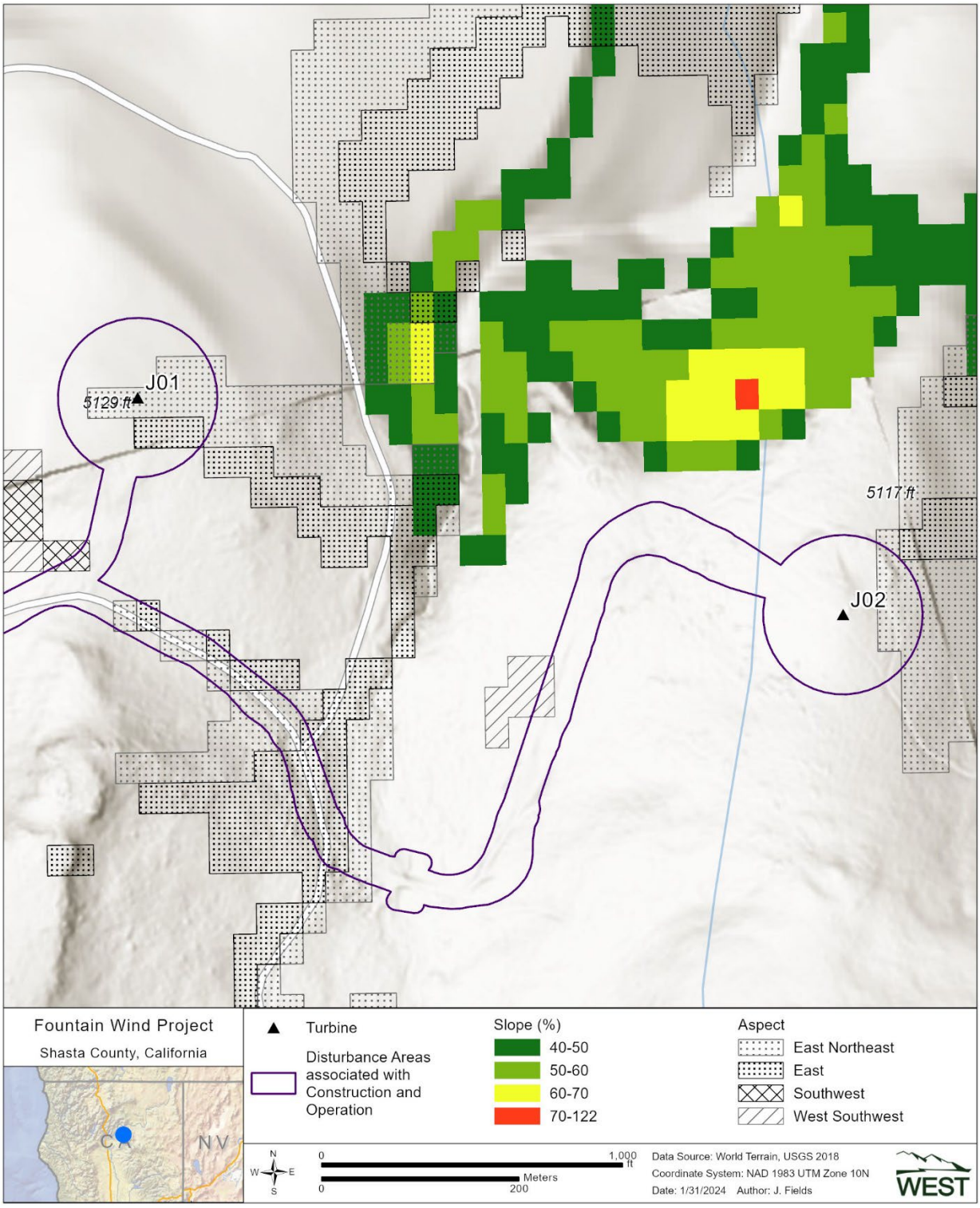
Appendix A3. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of the E-string turbines at the proposed Fountain Wind Project, Shasta County, California.



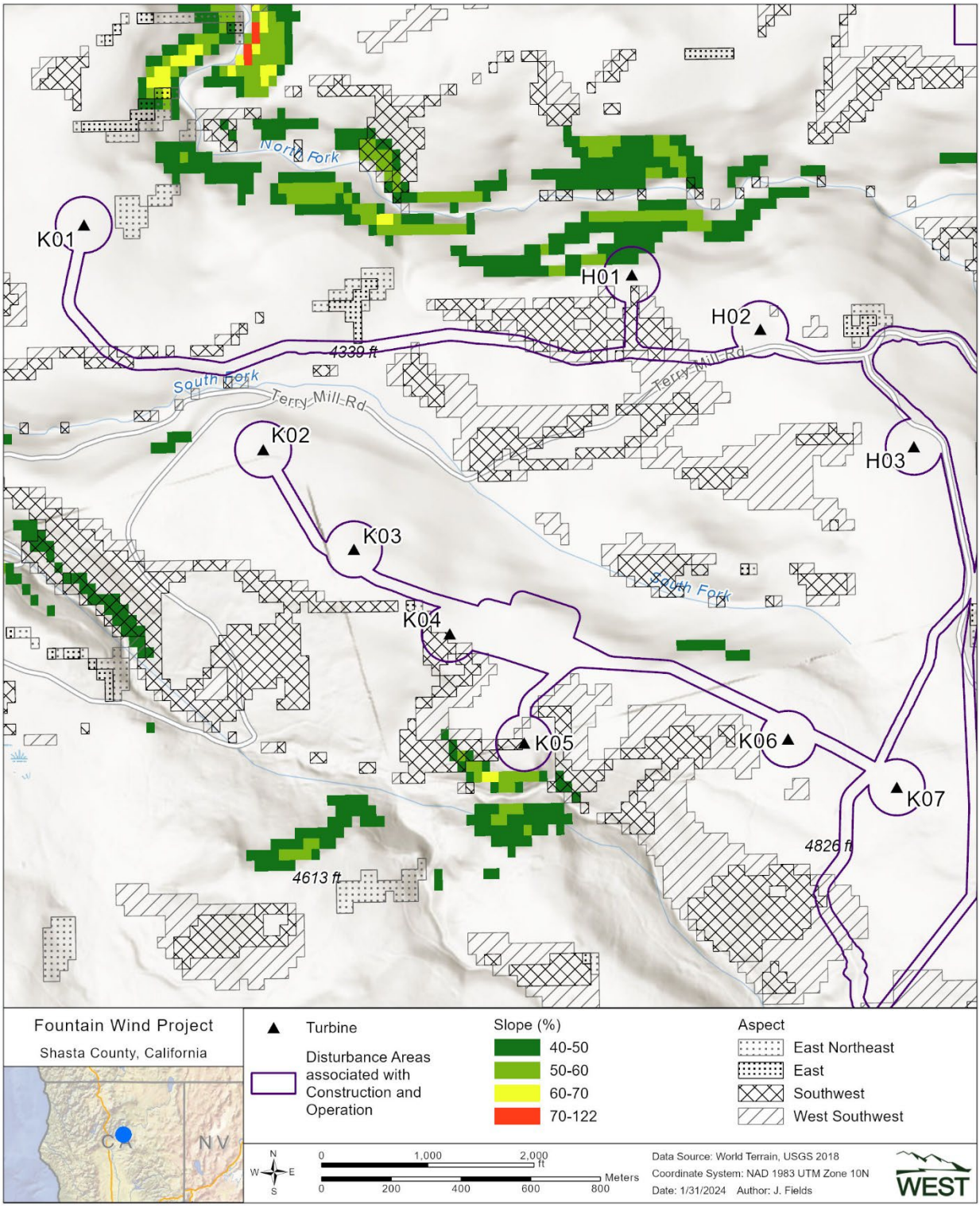
Appendix A4. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of F-string turbines at the proposed Fountain Wind Project, Shasta County, California.



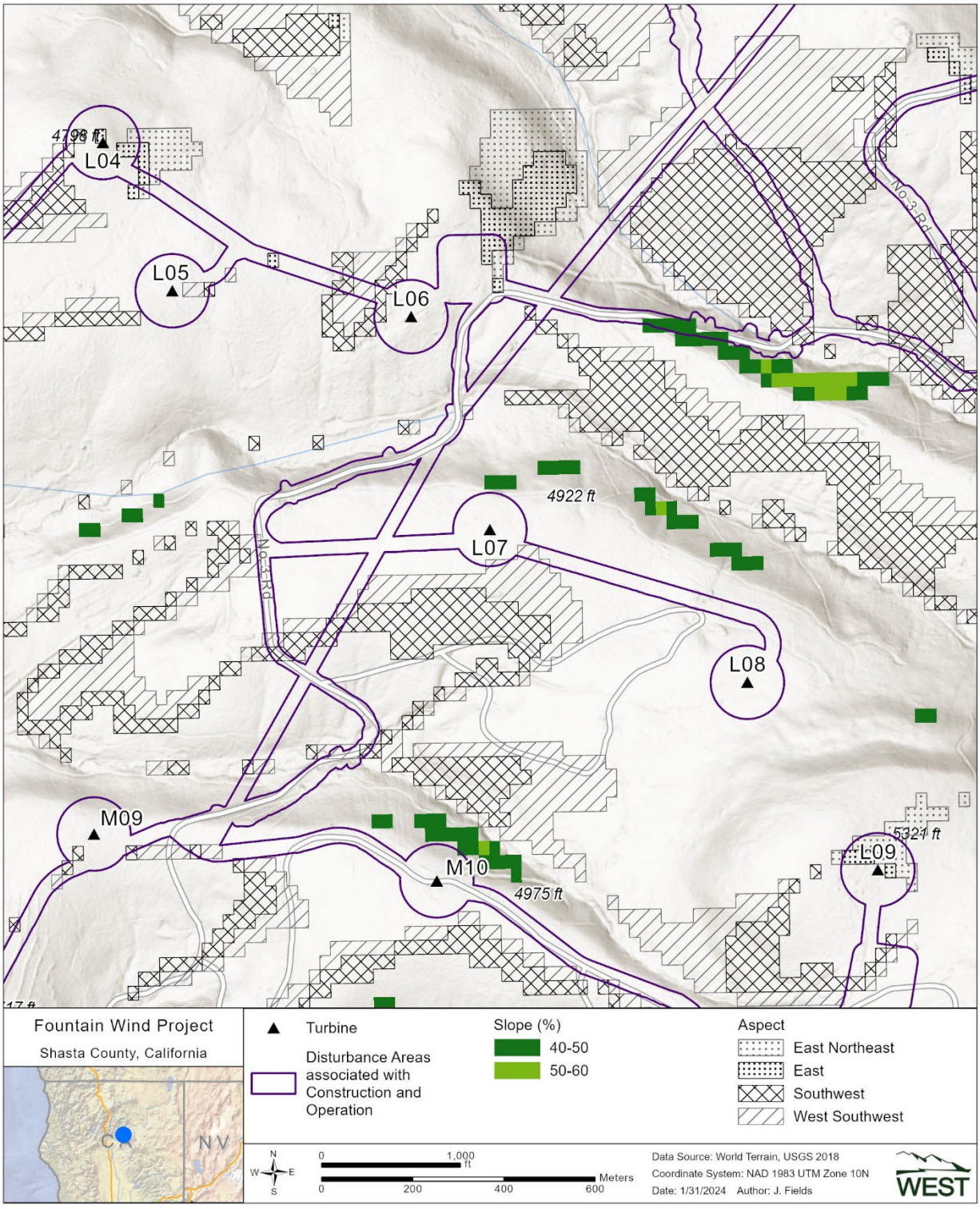
Appendix A5. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of H-string turbines at the proposed Fountain Wind Project, Shasta County, California.



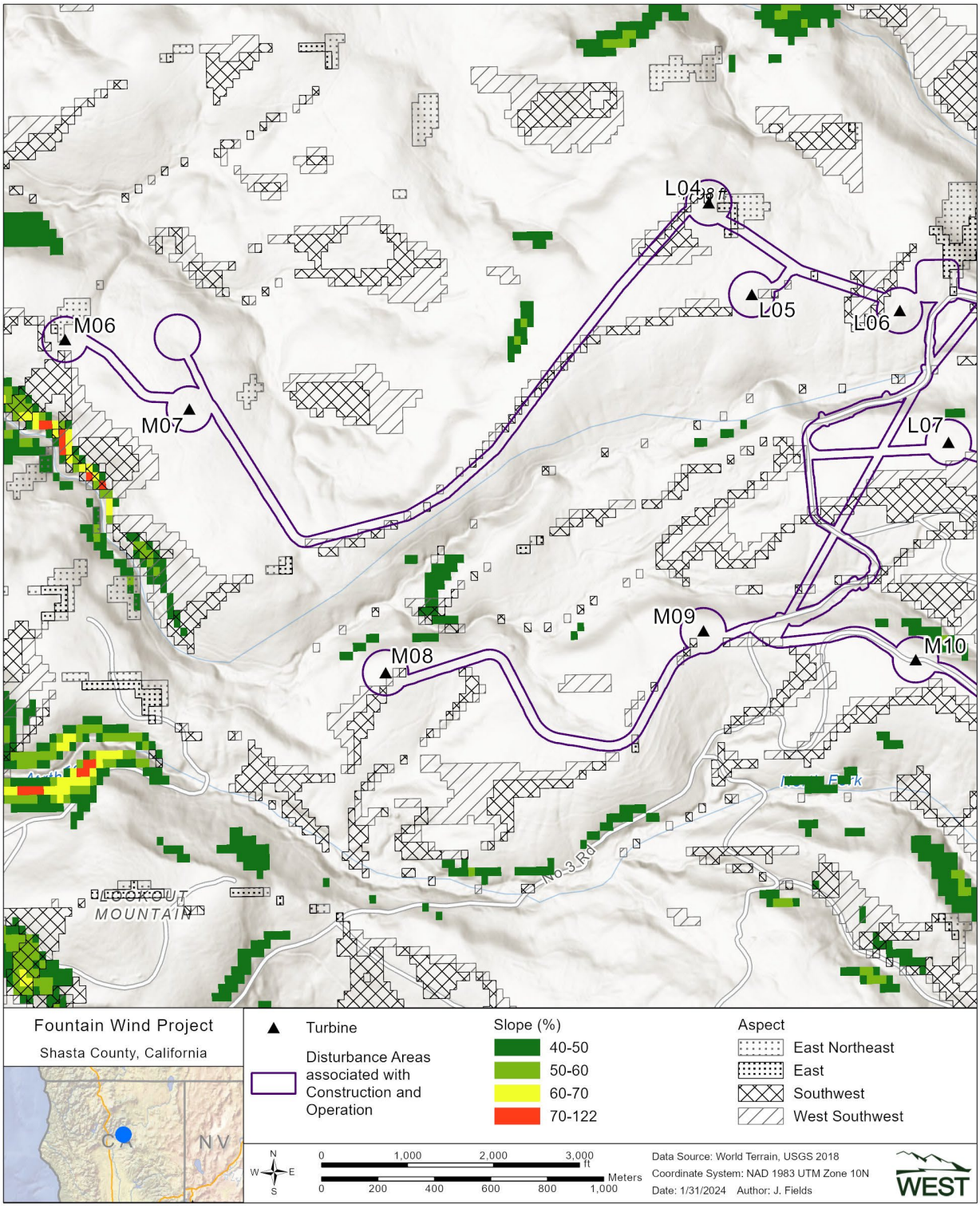
Appendix A6. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of J-string turbines at the proposed Fountain Wind Project, Shasta County, California.



Appendix A7. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of K-string turbines at the proposed Fountain Wind Project, Shasta County, California.



Appendix A8. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of L-string turbines at the proposed Fountain Wind Project, Shasta County, California.



Appendix A9. Steeper slopes (>40%) and aspects associated with prevailing (SSW) and secondary (ENE) winds in the vicinity of M-string turbines at the proposed Fountain Wind Project, Shasta County, California.