June 24, 2022
To: Albert Lopez
Planning Director, Alameda County Community Development Agency

From: Alameda County Wind Repowering Technical Advisory Committee

Re: Mulqueeney Ranch Micro-siting Recommendations (Supporting Documentation)

Introduction and Document Organization

This document describes background material considered in formulation of the Alameda County Wind Repowering Technical Advisory Committee's (TAC) recommendations on micro-siting of proposed Wind Generation Turbines (WGT) at the Mulqueeney Ranch Wind Repowering Project (Project) located within the Altamont Pass Wind Resource Area (APWRA). These recommendations are listed in short form in the June 24, 2022 TAC Memorandum entitled *Re: Mulqueeney Ranch Micro-siting Recommendations (Summary Memorandum)* that was submitted to Alameda County Planning Director Albert Lopez and to Project proponent Brookfield Renewable (Proponent) on June 24, 2022. These same recommendations are embedded with justifications and supporting data/ documents reviewed within the text below.

This document is organized into the following sections with tables and figures inserted after main text, prior to appendices:

- **Section 1.0** summarizes micro-siting guidance provided in the related Programmatic Environmental Impact Report (PEIR; Alameda County Community Development Agency 2014) and Supplemental Environmental Impact Report (SEIR; ICF 2021) for the Project.
- **Section 2.0** summarizes micro-siting analysis methods described by Estep Environmental Consulting for the related micro-siting analysis reports (Estep 2020a,b, 2021).
- **Section 3.0** describes TAC review of the current proposed 24-turbine layout within the Project footprint (Fig. 1; i.e., layout of Estep 2020b, 2021). Specifically, within:
    - **Section 3.1** lists information reviewed by the TAC,
    - **Section 3.2** lists the TAC's bat-specific considerations and final bat micro-siting recommendation,
    - **Section 3.3** lists the TAC's bird-specific considerations and final micro-siting recommendations for the four focal species identified by the PEIR, i.e.:
        - Section 3.3.1 for golden eagle,
        - Section 3.3.2 for burrowing owl,
        - Section 3.3.3 for red-tailed hawk, and
        - Section 3.3.4 for American kestrel.
- **Appendix A** provides full text of relevant PEIR and SEIR mitigation measures and Conditional Use Permit Condition of Approval.
- **Appendix B** provides the TAC's current summary statement on use of IdentiFlight in raptor collision mitigation at wind turbines for this Project.
- **Appendix C** provides a National Renewable Energy Lab memorandum describing

quantitative predictive modeling of eagle-turbine collision risk at the Project site, using their Stochastic Soaring Simulated Raptor tool (described within) and considered during TAC information review.

1.0 Altamont Pass Wind Resource Area (APWRA) Siting Guidelines

Siting guidance is provided in the PEIR Updated Mitigation Measure BIO-11b "Site turbines to minimize potential mortality of birds" (ICF 2021, pp. 3.4-116 – 3.4-117). BIO-11b makes specific reference to the Alameda County Scientific Review Council's (SRC) *Guidelines for Siting Wind Turbines Recommended for Relocation to Minimize Potential Collision-Related Mortality of Four Focal Raptor Species in the Altamont Pass Wind Resource Area* (Alameda County SRC 2010) and subsequent refinements, and includes the following requirements: " … [P]roject proponents will use the results of previous siting efforts to inform the analysis and siting methods as appropriate such that the science of siting continues to be advanced. All project proponents will collect field data that identify or confirm the behavior, utilization, and distribution patterns of affected avian and bat species prior to the installation of turbines." (p. 3.4-116).

Specifically, to meet the Project and APWRA-wide programmatic objective to minimize potential impacts on bird and bat species, BIO-11b specifies that the Project proponent will prepare a micro-siting analysis, informed by collection of new and existing information including (but not necessarily limited to):

- pre-installation field data that identify or confirm the behavior, utilization, and distribution patterns of affected avian and bat species;
    - in particular, for golden eagle, per Updated Mitigation Measure BIO-8a:
        - surveys will be conducted to locate golden eagle nests within 2 miles of proposed project areas; and
        - for turbines within 2 miles of an active or alternative nest, conduct a site-specific analysis of risk based on estimated eagle territories, conducted in consultation with USFWS;
- siting reports and monitoring data from previously installed projects;
- results of previous siting efforts;
- published use and abundance studies and reports;
- topographic features know to increase collision risk, including:
    - ridge tops and saddles,
    - trees,
    - riparian areas,
    - water bodies,
    - wetlands;
- changes to landscape caused by grading for placement of turbine foundations; and
- methods (i.e., computer models) to identify dangerous locations for birds and bats based on site-specific risk factors informed by information listed above.

2.0 Project Micro-siting Process

The turbine siting process of the Project was described in the original and supplementary micro-siting reports of Estep (2020a,b, 2021) and was based on the Proponent's initial proposal of thirty-six turbine locations. These original locations were "selected on the basis of meteorological monitoring, wind resources, wake effects, and construction feasibility." Based on desktop and field review, Estep (2020a) identified and recommended removal and/or relocation of several high-risk turbines, leading to the Proponent's 24-turbine "Reduced Project Alternative" which was subsequently assessed by Estep (2020b) with supplemental recommendation for refinement of two turbine locations (Estep 2021). This "Reduced Project Alternative" was submitted by the County to the TAC for review and recommendations. (Estep 2020a,b are included as Appendices F and G in the Draft SEIR [ICF 2020a]).

Assessment Methods outlined by Estep (2020a)

- Examination of the overall relationship of each site to topographical landscape;
- Determination of presence of conditions that are thought to contribute to collision risk, including:
    - proposed road and turbine pad construction;
    - placement of new meteorological towers;
    - potential topographic changes resulting from the above;
    - golden eagle use and nest proximity;
    - sites assigned to one of three qualitative risk categories based on the presence or absence of the risk factors or conditions described in Estep (2020a) in comparison to SRC Rankings 0-10 (Alameda Co. SRC 2010), and the application of those factors to each site-specific assessment assumed to correspond to the following SRC-style ranking of high-risk turbines:
        - High Risk ≈ SRC-style ranking of 9 or 10;
        - Moderate-High Risk ≈ SRC-style ranking of 7 or 8;
        - Moderate Risk ≈ SRC-style ranking <7; and
- Per Estep (2020a; underline added for emphasis, italics in original): "In addition to using precise measurements with regard to slopes, distances, and other specific risk factors, on-the-ground interpretation and professional judgement were employed to evaluate the potential magnitude of risk. The risk designations are based entirely on an individual interpretation of conditions at each site as well as the presence/absence of risk factors. They are based on our current understanding of conditions that lead to turbines and raptors interacting at the same location in space, and that as a result may contribute to higher rates of collision events. They do not otherwise indicate that a site *will* have more or less collision events than another, only that based on these factors, the *potential for* more or less collision events is assumed." (p. 10).

3.0 Considerations of the TAC Review

In communication with the County and the Project Proponent, between late 2021 and June 2022, the TAC reviewed a variety of information sources to provide the Project turbine micro-siting recommendations in this memorandum. Given that micro-siting reports of Estep (2020a,b, 2021) were based on "individual interpretation" of the potential for risk at the proposed turbine locations, and focused almost entirely on risk to golden eagle, the TAC considered additional available micro-siting summaries and datasets in its micro-siting evaluation and recommendation process. Table 1 provides a summary of risk categorizations for Project turbines remaining in the Reduced Project Alternative (ICF 2021; Estep 2020b, 2021); this table is an amalgamation of data compiled by Shawn Smallwood (i.e., Table 7 of his January 8, 2021 comments on the Draft SEIR; Smallwood 2021) and Doug Bell (Bell 2022a,b), as well as subsequent evaluation by the TAC. Specific data and information sources are listed in Section 3.1 with references provided at the end of this document.

3.1 Data and information sources reviewed by the TAC

- Initial siting guidelines of the Alameda County Scientific Review Council (Alameda County SRC 2010);
- Final PEIR (Alameda County Community Development Agency 2014), the Draft and Final SEIR (ICF 2020a, 2021) and Conditional Use Permit PLN2019-00226;
- Siting guidelines and recommendations in comments on the Draft SEIR (Appendix H-2 of ICF 2021) and throughout this micro-siting evaluation process;
- Draft Avian Protection Plan (ICF 2013) for PIER;
- Data collected during Project preconstruction phase and the original and supplemental micro-siting evaluations, i.e.:
    - Avian Use and Eagle Use Survey data (ICF 2020b);
    - Incidental observations of focal avian species and nests (ICF 2020b; Estep 2020a,b, 2021, 2022; Brookfield Renewable and Mulqueeney Ranch Wind Project Team 2022a);
    - Incidental observation of prey species (Estep 2020a; TAC member site visits);
    - Bat-specific habitat surveys (Brookfield Renewable and Mulqueeney Ranch Wind Project Team 2022b; Great Basin Bird Observatory and H. T. Harvey and Associates 2022);
- Fatality data from nearby operational turbines at other facilities within the APWRA (i.e., from Golden Hills Wind Energy Facility Repowering Project (Golden Hills), via H. T. Harvey & Associates 2021, and 2022 interim fatality reporting to CDFW and USFWS);
- Memorandum submitted to ICF by J. Estep on January 13, 2022 *Responses to TAC issues regarding turbine micro-siting* (Estep 2022);
- Memorandum submitted to Albert Lopez, Alameda County Planning Director, by Proponent on January 13, 2022 *Supplemental Information Requested by the APWRA Technical Advisory Committee Regarding Bald Eagle Observations and Nesting Habitat*

for Tricolored Blackbirds in the Mulqueeney Wind Project Area (Brookfield Renewable and Mulqueeney Ranch Wind Project Team 2022a);

- Memorandum submitted to Alameda County Planning Director by S. Smallwood on January 16, 2022 *Re: Mulqueeney Ranch Wind Project* (Smallwood 2022);
- Memorandum submitted to Alameda County Planning Director by D. Bell on March 30, 2022 *Re: Golden eagle activity and Identiflight (IDF)* (Bell 2022a);
- Memorandum submitted to Alameda County Planning Director by D. Bell on January 30, 2022 *Re: Request by Alameda County WR/AP TAC member for micro-siting information related to the Brookfield-Mulqueeney Ranch Repowering Project* emphasizing Shawn Smallwood comment letter on the SEIR dated January 8, 2021 (Bell 2022b, per Smallwood 2021), including:
    - Mapped telemetry locations obtained from eleven golden eagles with GPS transmitters flying <200 m above ground level (AGL) within the footprint of the proposed facility 2013-2019 (Smallwood 2021);
- Memorandum submitted to Alameda County Planning Director by D. Bell on June 6, 2022 *Re: Prairie falcon nest at the Mulqueeney Ranch, Brookfield Wind Project, Alameda County* (Bell 2022c);
- Memorandum submitted to Alameda County Planning Director by D. Bell on April 8, 2022 *Re: Avian nest survey of Centauri wind turbines, Patterson Pass Road, APWRA* (Bell 2022d);
- Raw telemetry points from golden eagles with GPS transmitters flying <200 m AGL within the footprint of the proposed facility June 30, 2019 – December 31, 2020 (D. Bell, unpublished data);
- Proximity to golden eagle nest locations and activity centers from USGS study (Wiens and Kolar 2021) – these nest data also were incorporated into risk categorizations in the project micro-siting reports of Estep (2020a,b, 2021);
- Site visits by TAC members to Project footprint on May 24, 2022, and prior TAC visits to Golden Hills on April 6, 2022, and to Two Sisters Burrowing Owl Preserve;
- Communications between TAC members, County, project Proponent and consultants, particularly those that occurred between late 2021 and May 2022 as part of TAC meetings, email, and phone correspondence, e.g.:
    - Brookfield Renewable. 2021. *IdentiFlight Technology Overview and Proposed Use at Mulqueeney*. Presented virtually at the November 19, 2021 TAC meeting;
    - Memorandum submitted to Alameda County Planning Director Albert Lopez from B. Norton and B. Schaffer on December 8, 2021, *Follow-up Action Items from November 19, 2021 Meeting of the Technical Advisory Committee*;
    - Brookfield Renewable and IdentiFlight International. 2022. *Mulqueeney Ranch Wind Repowering Project TAC Meeting: Identiflight Technology Presentation*. Presented virtually at the March 18, 2021 TAC meeting;
- International presentation/site visit to Golden Hills, hosted by NextEra in Livermore, CA, on May 23, 2022 for USFWS and CDFW. (TAC comment on IdentiFlight provided in Appendix B);

- NREL predictive modeling of relative presence of golden eagles (i.e., simulated flight paths) at the Project site using the NREL Stochastic Soaring Raptor Simulator tool, taking into account local topography and modeled wind conditions at 80 m above ground level (i.e., at typical hub height) and average wind speeds of 8 m/s (i.e., above the proposed 4.5 m/s cut-in speed of when turbines would be operational) (Sandhu 2022; Sandhu et al. 2022 [Appendix C]);
- Genetic/ isotopic studies to understand local version non-local population impacts to avian species: Conkling et al. (2020, 2022); Katzner et al. (2016); Kolar and Wiens (2017); and
- Peer-reviewed studies relevant to turbine micro-siting and/or curtailment for bats (e.g., Arnett et al. 2011); and
- Misc. other peer-reviewed studies and/or project reports, data and communications as cited within.

3.2 Considerations of The TAC's Bat Micro-siting Review

The original micro-siting assessment (Estep 2020a) states that, "Although there are data that indicate operational modifications (Arnett et al. 2011) and avoidance of bat roosts (e.g., caves, trees), habitats known to support greater concentrations of bats (e.g., riparian corridors, wetlands), or physical objects that attract large concentrations of insects (e.g., lights) (H. T. Harvey & Associates 2013[1]), may reduce potential bat mortality, there is little information that would suggest micro-siting of turbines in an otherwise monotypic landscape, even one with complex topography like the APWRA, would influence potential bat mortality. As a result, minimizing potential bat mortality has not been a focus of micro-siting efforts in the APWRA."

- SEIR Mitigation Measure BIO-12a requires a roost habitat assessment to identify potential colonial roost sites of special-status and common bat species within 750 feet of the construction area, prior to development of any repowering project. It further requires surveys to use "appropriate field methods" to determine the "species, type, and vulnerability of the roost to construction disturbance" and "adequate spatial and temporal coverage" to "increase likelihood of detection". SEIR Mitigation Measure BIO-14a states, "Turbine siting decisions will incorporate relevant bat use survey data and bat fatality records published by other projects in the APWRA."
- On December 17, 2021, the TAC requested information about the SEIR Mitigation Measure BIO-12a bat roost habitat assessment, including a request that surveys of rock outcrops be expanded to within one mile of the construction area of each turbine given the importance of potential maternity colony roosts to population viability.
- On March 4, 2022, Proponent provided a survey report describing the methods and results of a bat habitat assessment, which assessed rock outcrops within a 750-foot radius of eight proposed turbine locations (Brookfield Renewable and Mulqueeney Ranch Wind Project Team 2022b). This report stated, "No significant bat colonial roosting habitat was found within 750 feet of any proposed turbine sites. While many of the rock outcrops provide potential day or

[1] Cited as Johnston et al. (2013) in Estep (2020a).

night roosting habitat for individual bats, they do not provide suitable habitat required for significant colony roosting." It further stated that, "This assessment was conducted in winter, and while the lack of detected bat sign suggests a lack of long-term colonial roosting, bat use in other seasons cannot be ruled out."

- During the March 18, 2022 TAC meeting, the TAC asked if the rock outcrops outside of the 750-foot buffer around turbines were similar in quality to those surveyed, to which Proponent/ICF confirmed that they were similar and therefore similarly unlikely to support long-term colonial bat roosts. The TAC also asked if Proponent/ICF had assessed the riparian corridor for bat activity and potential roost sites. They responded that the riparian corridor had been considered during micro-siting for multiple species, but that seasonal curtailment would be more appropriate to minimize bat fatalities than removing turbines along the riparian corridor. Given the lack of SEIR requirement for roost surveys outside of the 750-foot buffer around turbines, the TAC was not able to consider the potential for maternity colony presence along the riparian corridor in its micro-siting recommendations.
- The TAC agrees that seasonal curtailment is an appropriate tool for minimizing bat fatalities and applauds Proponent/ICF's commitment to begin implementing ADMM-7 (Seasonal Turbine Cut-in Speed Increase) at the commencement of operations. However, SEIR MM BIO-14d allows for modification of the season during which ADMM-7 is implemented if evidence from the APWRA or other sites supports changes to the timing or duration of curtailment. Evidence from post-construction monitoring at Golden Hills and the Golden Hills North Wind Energy Project (Golden Hills North) indicates that the "peak migration period" or period with highest hoary bat fatalities begins May 1 and continues through September 30. This contrasts with the SEIR's original identification of the "peak migration period" as August 1 to October 31.

Final TAC Bat Recommendation: The TAC recommends no removal nor further micro-siting adjustments for protection of bat roosts, due to the SEIR MM BIO12-a roost survey results showing a lack of detected bat sign suggesting a lack of long-term colonial roosting at rock outcrops within 750 feet of the construction area of turbines. However, the TAC recommends the following adjustment to ADMM-7[2] be incorporated into the Avian and Bat Protection Plan: seasonal curtailment required by ADMM-7 will occur from sunset to sunrise during a four-month period between May 1 and September 30, with the specific dates adding up to four months to be chosen by the Project Proponent.

3.3 Considerations of The TAC's Bird Micro-siting Review

In the subsections below, the TAC's final species-specific recommendations are listed below each species subheading. The list of species-specific recommendations is followed by the TAC's species-specific considerations of risk, guidance source(s) (if available), reference data reviewed, TAC finding relative to risk, and related discussion (if provided), and final reference back to relevant TAC recommendations to reduce risk. The full list of TAC recommendations is provided

[2] Text of ADMM-7 included in Appendix A.

in the summary document *Re: Mulqueeney Ranch Micro-siting Recommendations (Summary Memorandum)*, submitted to Albert Lopez, Alameda County Planning Director, alongside this supporting document.

3.3.1 Golden Eagle (GOEA)

Final TAC Golden Eagle Recommendations:

- *Turbine Removal*: The TAC recommends removal of the turbines located on a ridge within the northwest corner of the Project – WTG-2, WTG-3, WTG-4, and WTG-6 – to reduce risk of raptor collisions. Multiple sources of available data indicate that these turbines present an exceptionally high risk to golden eagles and burrowing owls. These turbines also pose a moderate to high risk for red-tailed hawks, and American kestrels. All four of these species are focal species subject to Project and APWRA-wide impact thresholds per the PEIR and SEIR. The TAC has concerns regarding use of current IdentiFlight technology to mitigate these risks (See Appendix B.) *Given these concerns, while also acknowledging the burden of turbine elimination on the Proponent and the good faith efforts of the Proponent to adapt project design to date, as an alternative to this "Turbine Removal" recommendation, the TAC proposes an alternative "Phased Approach for Turbine Approvals" recommendation below.*
- *Phased Approach for Turbine Approvals*: Phased Approach for Turbine Approvals: The TAC recommends that the County consider a phased approach of turbine installation to potentially approve the turbines located in the northwest corner of the project (WTG-2, WTG-3, WTG-4, and WTG-6) at a later date. As discussed, these are the turbines that pose the highest risk to the four focal raptor species. Appendix B, *TAC Comment on IdentiFlight*, summarizes the TAC's review of the information and best scientific data available regarding use of IdentiFlight (IDF) technology in the Project location. The TAC acknowledges that IDF is a promising experimental technology that is hoped will become a helpful tool to reduce the number of eagles killed and injured by wind turbines in the future. The TAC is concerned, however, that IDF will not have the functional ability to detect eagles in time to curtail where turbines are proposed on ridge tops in eagle high-use areas, in part because of the IDF layout's limited viewshed at these locations. To address these concerns, with TAC oversight and additional IDF camera systems installed below the ridgeline of concern, the Project could implement a scientific study that would evaluate IDF's capabilities in this topography. If the augmented layout of the IDF system were to prove effective at detecting focal raptor species sufficient that curtailment could be effective, the County then could consider approving installation of all or some of the high-risk turbines that the TAC currently recommends removing from the Project.
- *GOEA Curtailment*[3]: Consistent with USFWS recommendations to the Proponent in

[3] To be effective, curtailment measures should tie to annual nesting surveys conducted by a qualified biologist at frequency and timing reflective of seasonal nesting periods, as described in the Project-specific Avian and Bat Protection Plan and to be developed per guidance in PEIR Updated Mitigation Measure BIO-11a (ICF 2021; Appendix A).

coordination of their Eagle Act incidental take permit application, daytime curtailment of turbines located within 1 mile of an active golden eagle nest should be implemented during the breeding season (January 1– July 15) until it is verified by a qualified biologist that a nest is not in use. If monitoring data validate that a nest is not in use at the end of the egg laying period (April 7), the daytime curtailment regime may conclude within 1 mile of a given nest site. Current turbines affected: WTG-12, WTG-14, WTG-15, WTG-16, WTG-17, WTG-20, WTG-21, and WTG-26.

GOEA Consideration 1**:** *Turbines located in areas of potential high collision risk based on setback distance <1 mile from identified golden eagle active nests and activity centers.*

- *Guideline source*: Updated PEIR Mitigation Measure BIO-11b. Site turbines to minimize potential mortality of birds, *"… As required in 2020 Updated Mitigation Measure BIO-8a, surveys will be conducted to locate golden eagle nests within 2 miles of proposed project areas. Siting of turbines within 2 miles of an active or alternative golden eagle nest or active golden eagle territory will be based on a site-specific analysis of risk based on the estimated eagle territories, conducted in consultation with USFWS.*" (ICF 2021, p. 3.4-116)

- *Reference data: golden eagle nest locations and buffers (Fig. 1; data provided by Proponent,* ICF 2020b, Estep 2020a, and Wiens and Kolar 2021).

- *TAC findings*: 8 turbines within 1 mile of golden eagle nests:

- Midway Rd. nest (along Patterson Pass Rd.): WTG-12, WTG-14, WTG-15, WTG-16, WTG-17, WTG-20, WTG-26; Tesla nest/activity center: WTG-21

- *Discussion*: The PEIR and SEIR direct the Proponent to coordinate with the USFWS regarding turbines proposed to be located within two miles of eagle nest sites. The USFWS acknowledges that the Proponent has applied for an eagle incidental take permit. As previously communicated in TAC meetings, it is the USFWS policy to recommend that no turbines be constructed within two miles of eagle nest sites based upon our analysis of breeding golden eagle telemetry data (USFWS 2020). Golden eagles spend 80% of their time within 1.6 miles of in-use nest sites, and over 90% of their time within two miles (USFWS 2020). Therefore, the USFWS considers turbines within 1-2 miles of golden eagle nest sites to be of high risk. <u>To find a practicable compromise for wind energy operations in the Altamont, the USFWS recommends that turbines not be constructed within one mile of eagle nest sites, or that turbines located within one mile of nests be curtailed during daylight hours during the breeding season until it is verified that nests are not in use</u>. The TAC acknowledges and appreciates the Project's efforts to not site turbines within one-half (0.5) mile of known eagle nests. As summarized in Table 1, there are eight (8) turbine sites located within one (1) mile of golden eagle nest sites, a factor that the TAC considers to make them high-risk turbine sites. The TAC supports USFWS's recommendation for

removal or daytime curtailment of turbines within one mile of eagle nests as a risk minimization measure.

- *Related TAC Recommendation (GOEA Consideration 1)*: *GOEA Curtailment*.

GOEA Consideration 2: *Proximity to known golden eagle fatalities.*

- *Reference data*: 2016-2019 and 2022 Golden Hills monitoring data (Fig. 2, H. T. Harvey & Associates, 2021; 2022 interim fatality reporting to CDFW and USFWS).

- *TAC findings*: 4 golden eagle fatalities in proximity to Project footprint (in proximity to ridgeline of Project turbines WTG-2, WTG-3, WTG-4, and WTG-6):
  - 2016-2019 Golden Hills WTG-11 (3 golden eagle)
  - 2022 Golden Hills WTG-32 with IdentiFlight tower (1 golden eagle). Note the TAC discussion of IdentiFlight provided in Appendix B.

- *Related TAC Recommendations (GOEA Consideration 2): Turbine Removal* and/or *Phased Approach for Turbine Approvals.*

GOEA Consideration 3: *Proximity to areas identified as high golden eagle use through raptor-use surveys or other existing datasets.*

- *Reference dataset (a)*: golden eagle use surveys (Fig. 3; ICF 2020b)
  Survey description from Estep (2020a): "… [D]ata on bird abundance and distribution are important factors in assessing risk. For purposes of this assessment, ICF conducted point count raptor surveys at eight observation points spaced throughout the project area. Data were collected over a one-year period and summarized as flight minutes per survey hour. Use areas were then characterized within the project area using a kernel density approach to identify use and concentration areas into three zones. For purposes of this assessment, data for golden eagle occurrence was used as a risk factor. Higher risk was associated with higher eagle concentration."

- *TAC findings re: dataset (a)* (via Estep 2020a and ICF 2020b) dataset (a): Documented golden eagle use, particularly with heavy use in close proximity to proposed turbines in northwest corner of Project footprint (WTG-2, WTG-3, WTG-4, and WTG-6).

- *Reference datasets (b, c, and d)*: golden eagle GPS telemetry data (Figs. 4, 5, and 6) and NREL predictive flight model (Fig. 7), i.e.:
  - golden eagle-telemetry points of 11 birds <200 m above-ground level between 2013 and 2019, as supplied in letter submitted by Doug Bell to County and TAC (Fig. 4; Bell 2022b per Smallwood 2021);
  - golden eagle telemetry points of 6 birds <200 m above-ground level between June 30, 2019 and December 31, 2020 (Fig. 5; D. Bell, unpublished data);

- golden eagle observed flight behavior and telemetry points of adult and juvenile golden eagles interacting with Rotor-Swept Area of Golden Hills WTG-32 and the airspace of the proposed turbine locations near proposed Project turbines WTG-2, WTG-3, and WTG-4 on December 10, 2021 (Fig. 6; Bell 2022a);
- NREL modeling of predicted GOEA flight patterns (Fig. 7; Sandhu 2022 [Appendix C]);

Inference also supported by Table 1 summary (referencing information from Smallwood 2021 and Bell 2022b).

- *TAC findings*: The telemetry observations (Figs. 4-6) and modeled data (Fig. 7) correspond with golden *eagle* high-use areas as identified in Eagle Use Surveys conducted by ICF (2020b; Fig. 3), especially in the vicinity of proposed turbines WTG-2, WTG-3, WTG-4, and WTG-6 in the northwest of the Project footprint. Golden eagle use is also heavy at another turbine location (WTG-14).

- *Related TAC Recommendations (GOEA Consideration 3): Turbine Removal* and/or *Phased Approach to Turbine Approvals.*

GOEA Consideration 4: *Proximity to known concentration of raptor prey species (e.g., California ground squirrels).*

- *Reference data*: As noted in Estep (2020a, underline added for emphasis):
"Because ground squirrels are a key prey item of golden eagles and red-tailed hawks in the APWRA, their distribution and abundance are associated with the occurrence of these species. Ground squirrel abundance was not examined area-wide during the surveys; however, presence/absence of ground squirrel activity was noted in the immediate vicinity of each turbine site. In addition, incidental observations were made throughout the project area. I incidentally noted very low ground squirrel abundance, particularly south of Patterson Pass Road, and only three areas where concentration of ground squirrel activity was present, in the narrow valley just west of Turbines 1 through 5, within a swale and small drainage between Turbines 18 and 19, and along a drainage east of Turbine 26.**"**

- *TAC finding* (via Estep 2020a): Turbines WTG-2, WTG-3, WTG-4, and WTG-6 are all noted as "within the highest concentration of golden eagle activity reported during raptor use surveys". Additionally, "the drainage just west of the ridge is only one of three areas within the project area where substantial ground squirrel activity was noted". WTG Turbines WTG-18 & WTG-19 were removed from final proposed 24-turbine layout for this reason.

- *Related TAC Recommendations (GOEA Consideration 4): Turbine Removal* and/or *Phased Approach to Turbine Approvals*.

GOEA Consideration 5: *Local area and non-local area population impacts*

- *Reference data:* Katzner et al. (2016), (Kolar and Wiens 2017), Conkling et al. (2020, 2022), PEIR and SEIR fatality thresholds (Alameda County Community Development Agency 2014, ICF 2021)

- *TAC findings:* Scientific publications indicate golden eagle local populations are significantly impacted by collision with wind turbines in the APWRA. For example, ≥25% of golden eagles killed in the APWRA are from outside of the local area (Katzner et al. 2016) and the high incidence of subadult members of breeding pairs is another indication of population decline (Kolar and Wiens 2017).

- *Related TAC Recommendations (GOEA Consideration 5): Turbine Removal* and/or *Phased Approach to Turbine Approvals* and *GOEA Curtailment*.

3.3.2 Burrowing Owl (BUOW)

Final TAC Burrowing Owl Recommendations:

- *Turbine Re-siting*: Consistent with USFWS and CDFW comments #1-15 and #2-13 on Draft SEIR (ICF 2021 Appendix H-2) and associated comments on the Notice of Preparation for the SEIR, WTG-12, WTG-14, and WTG-15 should be re-sited outside of the 0.3-mile buffer zone surrounding Two Sisters Burrowing Owl Preserve which is encircled by the Project footprint. *As an alternative to re-siting, any turbines located within 0.3 mile of an active burrowing owl burrow, either within or outside the Preserve, should be curtailed until the burrow is no longer active. See burrowing owl curtailment recommendation below.*
- *BUOW Curtailment*[4]: Consistent with USFWS and CDFW comments #1-15, #2-3, and #2-13 on Draft SEIR (ICF 2021 Appendix H-2), all turbines should be curtailed within 0.3 mile of burrowing owl conservation properties during the breeding season (February 1 through August 31), and/or within 0.3 mile of a known active burrowing owl burrow during the breeding season and overwintering period (February 1 through August 31 and September 1 through January 31, respectively) until it is verified by a qualified biologist that the burrow is not in use. A qualified biologist should monitor each active burrowing owl burrow within the 0.3-mile buffer area until it is verified by a qualified biologist that the burrow is not in use. Adjacent conservation lands for burrowing owl include the previously mentioned Preserve, Haera Mitigation Bank and Jess Ranch Mitigation Site to the north, and proposed mitigation lands (by Proponent and neighboring private entity) to the south and west, including a southwestern corner of Mulqueeney property itself (ICF 2021; B. Gursoy and B. Norton, personal communication, May 24, 2022). Current turbines affected: WTG-12, WTG-14, and WTG-15.

[4] To be effective, the curtailment measure should tie to annual burrow-use surveys conducted by a qualified biologist at frequency and timing reflective of seasonal nesting periods and overwintering use of burrows, as described in the Project-specific Avian and Bat Protection Plan and to be developed per guidance in PEIR Updated Mitigation Measure BIO-11a (ICF 2021; Appendix A).

- *Distance from Rotor to Ground*: Consistent with the Draft Avian Protection Program submitted with the PEIR (ICF 2013 and supporting data within), turbines should be sited to ensure that the distance of the lowest point of the turbine rotor (i.e., the tip of any blade at the 6:00 position) is no less than 29 meters (95 feet) from the ground surface. Per ICF (2013), "[T]his design characteristic addresses the finding that roughly 74% of all bird observations (54% of raptor 28 observations) occurred at heights less than 30 meters in a prior implemented project (Curry and Kerlinger 2009)" and aims to reduce potential impact to sensitive species (i.e., USFWS comments #1-9 and 1-10 on Draft SEIR; ICF 2021 Appendix H-2).

BUOW Consideration 1: *Distance to nest sites/conservation lands.*

- CDFW Comment #2-3 on Draft SEIR (ICF 2021: Appendix H-2): "… *As noted in the CDFW NOP comment letter, the Project site abuts protected land or potentially future protected land on all four boundaries, including the Contra Costa Water District's Jess Ranch conservation easement and Haera Wildlife Conservation Bank to the north, Two Sisters Burrowing Owl Preserve (near the center of the proposed Project), Lawrence Livermore National Laboratory's Site 300 to the south and east, a proposed conservation easement to the south and west. ….*"
- In addition to the properties above, another proposed conservation property abuts the project to the south and west (private parcel), and a southwestern portion of the Project footprint itself (south of Patterson Pass Road) has been proposed by Proponent for mitigation. All proposed and existing conservation lands in proximity have documented occurrences of burrowing owls (ICF 2021; B. Gursoy and B. Norton, personal communication, 24 May 2022).
- CDFW Comment #2-13 on Draft SEIR (ICF 2021: Appendix H-2): "*Turbines located within 0.3 mile from breeding owls or within 0.3 mile from the property lines of all protected or proposed Western Burrowing Owls should be curtailed during periods when owls are more frequently away from the nest site and during seasonal variation in movement*."
- CDFW Comment #2-15 on Draft SEIR (ICF 2021: Appendix H-2): "… *All turbines located within one mile of a golden eagle or Swainson's hawk nest or communal roosting area, and within 0.5 mile of any other raptor nest or tricolored blackbird colony, should be curtailed. Curtailment should occur each year that active nests are detected during surveys. Curtailment of turbines located near raptor nests and tricolored blackbird colonies should be implemented during daylight and crepuscular hours during the entire nesting season, within 0.5 mile of known other active raptor nests during the breeding season or until young have fledged or the nests have been determined by a qualified biologist to be unsuccessful*."
- USFWS Comment #1-15 on Draft SEIR (ICF 2021: Appendix H-2): "*Avian impact avoidance and minimization measures, Adjacent Conservation Lands. As discussed in our comments for burrowing owl, siting the Project turbines in close proximity to lands managed for burrowing owl and other birds may negate the intended purpose of the mitigation lands and could result in higher than anticipated impacts to these species, and*

potentially other raptors, including golden eagles. We support California Department of Fish and Wildlife burrowing owl experts who recommend a 0.3 mile turbine set back buffer as a measure that may reduce impacts to burrowing owls and a 0.5 mile set back or curtailment of turbines from active nest burrows (B. Blinn and M. Grefsrud, pers. Comm., 2021)."

- *Related TAC recommendation (BUOW Consideration 1): Turbine Re-siting* and/or *Burrowing Owl Curtailment.*

BUOW Consideration 2: *Ground squirrel activity/burrowing owl nesting habitat.*

- Ground squirrel activity areas as identified by Estep (2020a) and during TAC member site visits[5] (Table 1) may also be relevant for western burrowing owl. Burrowing owls utilize ground squirrel tunnels for their nest sites. Ground squirrel burrows are abundant on the lower slope of the ridge beneath WTG-2, WTG-3, WTG-4, and WTG-6.
- Although the Project did not conduct protocol western burrowing owl surveys, biologists recorded multiple incidental siting of burrowing owls on the Project site while surveying for other species (ICF 2020b, 2021). CDFW observed a burrowing owl within the Project footprint in proximity to WTG-2, WTG-3, WTG-4, and WTG-6 during a site visit to Golden Hills on April 6, 2022 (M. Grefsrud, personal communication, 17 June 2022).
- Observations of Smallwood (2022) on California ground squirrel and burrowing owl abundance within the Project footprint and adjacent locations.

- *Related TAC recommendation (BUOW Consideration 2): Turbine Re-siting* and/or *Burrowing Owl Curtailment.*

BUOW Consideration 3: *Fatalities at neighboring Golden Hills Wind Energy Facility Repowering Project.*

- *Reference data*: burrowing owl fatality data at adjacent Golden Hills project (occurrences and distribution relative to nearby proposed Project turbines) (Figure 8; H. T. Harvey & Associates 2021)

- *Related TAC recommendation (BUOW Consideration 3): Turbine Re-siting* and/or *Burrowing Owl Curtailment* and *Distance from Rotor to Ground.*

BUOW Consideration 4: *Topography.*

- *Reference data:* The TAC considered site topography and other information available regarding burrowing habitat use: Alameda County Community Development Agency (2014); ICF (2020a, 2021); Estep (2020a,b, 2021, 2022); Smallwood et al. (2006);

[5] TAC member site visits took place to Golden Hills on April 6 and May 23, 2022, and to Project footprint on May 24, 2022.

Smallwood (2021, 2022); TAC member site visits to Golden Hills and Project footprint in 2022. Also considered were ICF (2013) and references within discussing relevance of rotor-tip-to-ground distance to avian fatalities, as well Haug and Oliphant (1990), LeFever et al. (2008), Hall and Greger (2014).

- *Related TAC recommendation (BUOW Consideration 4): Turbine Re-siting* and/or *Burrowing Owl Curtailment* and *Distance from Rotor to Ground.*

BUOW Consideration 5: *Bay Area and California-wide population impacts/declines.*

- USFWS Comment #1-9 on Draft SEIR (ICF 2021: Appendix H-2): *"Burrowing Owls are a U.S. Fish and Wildlife Service Bird of Conservation Concern (Service 2008). … Studies have shown declining trends for burrowing owls within the coastal Bay Area and its interior (Wilkerson and Siegel 2010).… [A]ll available data indicate a statewide decline for the species.*" (See ICF 2021, Appendix H-2 for full comment.)
  A recent publication estimated that only 30% of the BUOW fatalities in the APWRA came from local populations, suggesting that impacts of fatalities in the APWRA may extend well beyond the local region (Conkling et al. 2022).

- *TAC findings (overall for burrowing owl)*: Proposed Project turbines within 0.3 miles of Two Sisters Burrowing Owl Preserve include WTG-12, WTG-14, and WTG-15. Towers in northwest corner of the Project footprint are proximate to high-level of documented burrowing owl use and nesting habitat. Burrowing owl fatalities are documented at the neighboring Golden Hills project. TAC member observed a burrowing owl on slope just west of WTG-2, WTG-3, WTG-4, and WTG-6 locations during a site visit to Golden Hills on April 6, 2022. TAC members (site visits in 2022) and Estep (2020a) noted a high density of California ground squirrel activity near towers in the northwest corner of Project footprint. The potential for fatalities across the remainder of the Project footprint is unknown due to lack of recent fatality data. Declining population trends in the Bay Area emphasize Project-specific and APWRA-wide concerns for this focal species. Both local and migratory (non-local) burrowing owls are likely to be impacted by Project implementation.

- *Related TAC recommendation (BUOW Consideration 5): Turbine Re-siting* and/or *Burrowing Owl Curtailment* and *Distance from Rotor to Ground.*

3.3.3 Red-tailed Hawk (RTHA)

Final TAC Red-tailed Hawk Recommendations:

- *Curtailment Red-tailed Hawk*: Because the Project-specific red-tailed hawk thresholds have been exceeded for adjacent the Golden Hills Wind Energy Facility Repowering Project (Golden Hills), and the combined total from Golden Hills and the Golden Hills North Wind Energy Project indicate that the County is on track to exceed cumulative red-tailed hawk take

thresholds across the APWRA per the PEIR, the TAC recommends that the County consider the following minimization measures for the Project's inclusion in its Avian and Bat Protection Plan (to be developed per guidance in PEIR Updated Mitigation Measure BIO-11a): Annual surveys to locate active red-tailed hawk nests and consideration of seasonal curtailment of turbines within 0.25-0.5 miles of active red-tailed hawk nests. This measure may be further evaluated in coordination with the TAC, pending results of future monitoring and status of non-compliance with the PEIR mortality threshold within the APWRA.

Note: Two red-tailed hawk pairs were observed nesting in spring 2020 within 0.5 mile of WTG-9, WTG-10, WTG-20, and WTG-26 (ICF 2020a,b, 2021).

- *Decommissioned Turbine Removal*: The TAC also recommends that the County remove the non-operational (decommissioned) turbines of the Patterson Pass Wind Project (adjacent property) prior to construction of the Mulqueeney Ranch Wind Project. The TAC understands this removal was required to have been completed by December 2015 under the now-expired CUP for that project. The presence of these structures creates an unnecessary attractive hazard proximate to both the proposed Project and the operational project at Golden Hills. American kestrels and other birds are known to nest inside the old, non-operational wind towers. American kestrels, golden eagles, and other birds reportedly perch on the old towers regularly. To minimize risk to the focal raptor species and other birds, the TAC urges the County to remove the old Patterson Pass Wind Project turbines as soon as possible.

RTHA Consideration 1: *Nest sites.*

- CDFW Comment #2-15 on Draft SEIR (ICF 2021: Appendix H-2): "… *All turbines located within one mile of a golden eagle or Swainson's hawk nest or communal roosting area, and within 0.5 mile of any other raptor nest or tricolored blackbird colony, should be curtailed. Curtailment should occur each year that active nests are detected during surveys. Curtailment of turbines located near raptor nests and tricolored blackbird colonies should be implemented during daylight and crepuscular hours during the entire nesting season, within 0.5 mile of known other active raptor nests during the breeding season or until young have fledged or the nests have been determined by a qualified biologist to be unsuccessful*."
- Red-tailed hawk nest locations including perching/nesting tree located in riverine downslope of northwestern portion of the project (Fig. 9).

RTHA Consideration 2: *Fatalities at neighboring Golden Hills Wind Energy Facility Repowering Project.*

- See Figure 10 (H. T. Harvey & Associates 2021).

RTHA Consideration 3: *Ground squirrel activity areas.*

- Ground squirrel activity areas as identified by Estep (2020a,b, 2021) and during TAC member site visits (Table 1) may also be relevant for red-tailed hawk.

RTHA Consideration 4: *Perch/nest structures within and proximate to the Project footprint.*

- The old Patterson Pass Wind Project's non-operational wind turbines near the northwest corner of the Project footprint are proximate to a high level of raptor use near Golden Hills; these turbines appear to attract red-tailed hawks and other raptors, which use them for perching and nesting.
- The Project site is crisscrossed with large lattice transmission towers. Lattice towers are a known attractive hazard proximate to wind turbines, as they are used as perches, roosts, and nest sites by red-tailed hawks, other raptors, and other birds.

RTHA Consideration 5: *Project-specific and APWRA-cumulative take threshold considerations for the County.*

- See Table 2 and Table 3.

RTHA Considerations 1-5:

- *Reference data:* Known nest locations within Project footprint (Fig. 9) and fatalities reported at adjacent Golden Hills (H. T. Harvey & Associates 2021; Fig. 10). Take also is associated with areas of observed high densities of ground squirrel activity (Table 1). TAC member observations of ground squirrel activity during site visits to Golden Hills and Project footprint in 2022. Reports of observed high densities of ground squirrel activity (Table 1). USFWS comment #1-16 on Draft SEIR (ICF 2021 Appendix H-2). The PEIR (Alameda County Community Development Agency 2014) estimated the following totals for red-tailed hawk fatalities Golden Hills and Golden Hills North: 44/year and 12/year, respectively. D. Bell report of red-tailed hawk and other nest observations on decommissioned Patterson Pass Wind Project turbines (Bell 2022d).

- *TAC finding*: Red-tailed hawk baseline annual thresholds continue to be exceeded by the Golden Hills and Golden Hills North wind projects. Cumulatively, when annual impact estimates are available from the Summit Winds project and the previously approved projects Sand Hill Wind and Rooney Ranch (after construction), both project-specific baseline thresholds and the cumulative APWRA-wide thresholds for the species likely will be exceeded. (See Table 2 and Table 3.)

- *Related TAC recommendations: Red-tailed Hawk Curtailment* and *Decommissioned Turbine Removal.*

3.3.4 American Kestrel (AMKE)

<u>Final American Kestrel Recommendations</u>:

- *Curtailment Other Raptors*: Consistent with CDFW comment on Draft SEIR #2-15 (ICF 2021 Appendix H-2), we recommend the above red-tailed hawk curtailment measures also be considered for other sensitive raptor species and be included in the Project's Avian and Bat Protection Plan (per PEIR/SEIR Mitigation Measure BIO-11a).
- *Decommissioned Turbine Removal*: The TAC also recommends that the County remove the old Patterson Pass Wind Project's non-operational turbines prior to construction of the Mulqueeney Ranch Wind Project, as the TAC understands was required to have been completed by December 2015 under the now-expired CUP for that project, and which that permittee never completed. The presence of these structures creates an unnecessary attractive hazard proximate to both the proposed Project and the operational project at Golden Hills. American kestrels and other birds are known to nest inside the old, non-operational wind towers. American kestrels and other birds reportedly perch on the old towers regularly. To minimize risk to the focal raptor species and other birds, the TAC urges the County to remove the old Patterson Pass Wind Project turbines as soon as possible.

AMKE Consideration 1: *Nest sites.*

- CDFW Comment #2-15 on Draft SEIR (ICF 2021: Appendix H-2): "… *All turbines located within one mile of a golden eagle or Swainson's hawk nest or communal roosting area, and within 0.5 mile of any other raptor nest or tricolored blackbird colony, should be curtailed. Curtailment should occur each year that active nests are detected during surveys. Curtailment of turbines located near raptor nests and tricolored blackbird colonies should be implemented during daylight and crepuscular hours during the entire nesting season, within 0.5 mile of known other active raptor nests during the breeding season or until young have fledged or the nests have been determined by a qualified biologist to be unsuccessful*."

AMKE Consideration 2: *Perch/nest structures within and proximate to the Project footprint.*

- The old Patterson Pass Wind Project's non-operational wind turbines near the northwest corner of the Project footprint are proximate to a high level of raptor use near Golden Hills. American kestrels are known to nest within the Patterson Pass Wind Project's old towers.
- The TAC remains concerned that the Project site is crisscrossed with large lattice transmission towers. Lattice towers are a known attractive hazard proximate to wind turbines, as they are used as perches, roosts, and nest sites by red-tailed hawks, other raptors, and birds.

AMKE Considerations 1-2:

- *Reference data*: Known fatalities reported at adjacent Golden Hills (H. T. Harvey & Associates 2021; Fig. 11). S. Smallwood and D. Bell reports of American kestrel and other

nest observations on decommissioned Patterson Pass Wind Project turbines (Smallwood 2022, Bell 2022d).

- *Related TAC recommendations: Curtailment Other Raptors* and *Decommissioned Turbine Removal.*

Additional figure – Figure 12 – shows location of active prairie falcon nest observed within Project footprint in May 2022 (Bell 2022c). TAC recommendation for prairie falcon nests falls under *Curtailment Other Raptors*, described above.

Tables

Table 1. Turbine Risk Summary, Mulqueeney Ranch Project (TAC Review, May 2022). Table is modified from Table 7 of Bell (2022b) and Table 7 of Smallwood (2021) and includes the following information: turbine number (WTG); original and supplemental micro-siting ratings of Estep (2020a,b, 2021); additional turbine ratings, descriptive information and telemetry use data provided by Smallwood (2021) in Bell (2022b) and Bell (2022b). Also included other data sources as outlined above that were considered by the TAC, including if the proposed turbine was within defined setback distances for golden eagle nests (<1 mile), burrowing owl protected lands (<0.3 mile), in close proximity to known fatality locations at Golden Hills (H. T. Harvey & Associates 2021), and additional, relevant GPS-telemetry golden eagle activity, based on preliminary data for 2020 (D. Bell, unpublished data).

	Micro-siting (Estep 2020a,b, 2021)				**Smallwood (2021) in Bell (2022b)**						**TAC Additional Data Review (May 2022)**				
WTG	**1st (July 2020)[1]**	**2nd (Sep 2020)[2]**	**3rd (2021)**	**Golden Eagle High-use Area [3]**	**Terrain**	**Model Hazard Class[4]**	**Grading Effect on Hazard[5]**	**SRC-style rating[6]**	**Golden Eagle GPS Telem. Activity (2013-2019)[7]**	**High-risk Turbine Summary[8]**	**<1.0 mi. from Golden Eagle Nest**	**<0.3 mi from Burrowing Owl Reserve**	**Proxim. to known fatalities (Golden Hills)**	**Ground Squirrel High Conc.[9]**	**Golden Eagle GPS Telem. Data (2020) [10]**
2	M-H	M-H (*71*)	—	Y	complex saddle; low	4	H	10	I	Y	—	—	Y	Y	H
3	M-H	M-H (*18*)	—	Y	heavily trafficked east-west ridge	4	S	9	I	Y	—	—	Y	Y	H
4	M-H	M-H (*16*)	—	Y	heavily trafficked east-west ridge	4	N	9	H	Y	—	—	Y	Y	H
6	M	M (*353*)	—	Y	east-west ridge	4	S	8.5	H	Y	—	—	Y	Y	H
7	M	M (*257*)	—		swale	4	H	8	H	Y	—	—		Y	H
9	—	M (*38*)	—		leaves upwind berm	unk	M	4	L		—	—		—	L
10	M	M (*94*)	—		low terrain	unk	M	7.5	L		—	—		—	L

	Micro-siting (Estep 2020a,b, 2021)				Smallwood (2021) in Bell (2022b)						TAC Additional Data Review (May 2022)				
WTG	**1st (July 2020)[1]**	**2nd (Sep 2020)[2]**	**3rd (2021)**	**Golden Eagle High-use Area [3]**	**Terrain**	**Model Hazard Class[4]**	**Grading Effect on Hazard[5]**	**SRC-style rating[6]**	**Golden Eagle GPS Telem. Activity (2013-2019)[7]**	**High-risk Turbine Summary[8]**	**<1.0 mi. from Golden Eagle Nest**	**<0.3 mi from Burrowing Owl Reserve**	**Proxim. to known fatalities (Golden Hills)**	**Ground Squirrel High Conc.[9]**	**Golden Eagle GPS Telem. Data (2020)[10]**
12	H	M-H *(120)*	—		south side of peak	4	M	8	M		<1 mi. (Midway Rd.)	<0.3 mile		—	L
14	M-H	M-H (*5*)	—		peak	4	M	5	I		<1 mi. (Midway Rd.)	<0.3 mile		—	H
15	M	M (*119*)	—		shallow saddle	4	S	8			<1 mi. (Midway Rd.)	<0.3 mile		—	L
16	H	H *(540)*	M-H		low	4	M	8.5	H	Y	<1 mi. (Midway Rd.)	—		—	M
17	M	M (*20*)	—		upwind berm remains	3	H	8	H		<1 mi. (Midway Rd.)	—		—	M
20	M-H	M-H (*264*)	—		peak	3	M	5	M		<1 mi. (Midway Rd.)	—		—	M
21	H	H (*0*)	M-H		low terrain in ravine	4	M	10	M		<1 mi. (Tesla)	-—		—	H
24	H	M (*280*)	—		valley bottom	3	M	9	M		—	—		—	L
26	M	M (*140*)	—		break in slope	4	M	8.5	M		<1 mi. (Midway Rd.)	—		Y	M
28	M-H	M (*292*)	—		declining ridgeline	3	S	7	H		—	—		—	M
29	M	M (*30*)	—		peak	3	S	5	L		—	—		—	M
30	M	M (*39*)	—		east-west ridge	4	M	7.5	M		—	—		—	M

	Micro-siting (Estep 2020a,b, 2021)				Smallwood (2021) in Bell (2022b)						TAC Additional Data Review (May 2022)				
WTG	**1st (July 2020)[1]**	**2nd (Sep 2020)[2]**	**3rd (2021)**	**Golden Eagle High-use Area [3]**	**Terrain**	**Model Hazard Class[4]**	**Grading Effect on Hazard[5]**	**SRC-style rating[6]**	**Golden Eagle GPS Telem. Activity (2013-2019)[7]**	**High-risk Turbine Summary[8]**	**<1.0 mi. from Golden Eagle Nest**	**<0.3 mi from Burrowing Owl Reserve**	**Proxim. to known fatalities (Golden Hills)**	**Ground Squirrel High Conc.[9]**	**Golden Eagle GPS Telem. Data (2020)[10]**
32	M-H	M-H (*112*)	—		edge of saddle	4	M	8.5	L		—	—		—	M
34	M-H	M-H (*191*)	—		break in slope	4	N	9	H	Y	—	—		—	H
36	H	M-H (*123*)	—		would enhance saddle	3	H	10	H		—	—		—	M
5C	—	M-H (*0*)	—		rim of east-west ravine	4	M	9	L		—	—		—	L
17C	—	M-H (*0*)	—		upwind of valley pass and at bottom or large hill to west)	3	H	9	L		—	—		—	L

[1] Qualitative Ratings of Estep (2020a,b, 2021): L = Low; M = Moderate; M-H = Moderate-High; H = High.

[2] Values in parentheses are meters of displacement from original siting location (e.g., meters displaced from location within Estep 2020a); displacement distance selected to reduce risk ranking level.

[3] Inferred from total flight time reported by Eagle Use and Avian Use Surveys (ICF 2020b).

[4] Predicted Model Hazard Class rankings from Fuzzy Logic Model of Smallwood and Neher (2009, 2018), integrating eagle flight behavior, telemetry, and fatality data with digital elevation model (Smallwood 2021): Risk Rankings range from 1 (low) to 4 (high).

[5] Qualitative assessment of effect of grading on risk categorization (Smallwood 2021): N = None; S = Small; M = Modest; H = High.

[6] Scientific Review Committee (SRC)-style rating (from 0-10; values 8-10 considered high risk) from Smallwood (2021).

[7] Activity categorizations of golden eagle telemetry activity between 2013-2019 (Smallwood 2021 in Bell 2022b: 11 golden eagle flying ≤200 m off ground: I = Intense; H = High; M = Moderate, L = Low.

[8] Final assessment (Smallwood 2021) integrating across Model Hazard Class (4+), Grading Effect on Hazard, SRC-style Rating (8-10), and Golden Eagle Activity (2013-2019) (Intense/High) to generate summary ratings of high risk: Y = Yes (High Risk).

[9] Documented proximity to high density of California ground squirrel burrows (qualitative, anecdotal assessment), combing information from Estep (2020a), monitoring reports, and TAC member observation during site visits to Project site and adjacent properties: Y = Yes (high density).

[10] Density of golden eagle telemetry data points taken at one-minute intervals in 2020: H = High, M = Moderate, L = Low (TAC from unpublished data provided by Bell).

The PEIR calculated expected cumulative impacts to focal species within the APWRA, both at the 417 MW and 450 MW build out Alternatives. Tables 2 and 3 below summarize the TACs estimates of APWRA wide cumulative impacts to the four raptor species by evaluating available information and data from the PEIR (Alameda County Community Development Agency 2014), Golden Hills (H. T. Harvey and Associates 2021) and Golden Hills North (GGBO-H. T. Harvey and Associates 2022) monitoring reports. It is unclear to the TAC if the County selected a Preferred Alternative under the PEIR, therefore we assessed cumulative impacts under both the 417 MW (Table 2) and 450 MW (Table 3) full build out Alternatives.

Table 2. Four focal raptor species estimated cumulative maximum annual fatality totals for the non-repowered and Repowered Program Area (417 MW) based on available information from the PEIR, Golden Hills (GH) and Golden Hills North (GHN) wind projects.

		PEIR Repowered Estimated Take		GH and GHN			GH + GHN % of APWRA cumulative total**		
Focal Species	Baseline	Low	High	Mean	Low	High	Mean*	Low	High
American kestrel	194	38	124	17	9	26	14%	23%	21%
burrowing owl	255	30	350	18	3	33	5%	9%	9%
golden eagle	27	4	17	16	9	24	92%	44%	71%
red-tailed hawk	145	42	103	57	32	84	55%	77%	81%

* This column calculates the percentage of total cumulative take compared to the PEIR's highest estimate of take for the species.
** GH and GHN represent 132 MW of the total 417 MWs that may potentially operate under this PEIR Alternative.

Table 3. Four focal raptor species estimated cumulative maximum annual fatality totals for the non-repowered and Repowered Program Area (450 MW) based on available information from the PEIR, Golden Hills (GH) and Golden Hills North (GHN) wind projects.

		PEIR Repowered Estimated Take		GH and GHN			GH + GHN % of APWRA cumulative total		
Focal Species	Baseline	Low	High	Mean	Low	High	Mean*	Low	High
American kestrel	194	41	134	17	9	26	13%	21%	20%
burrowing owl	255	30	378	18	3	33	5%	9%	9%
golden eagle	27	5	18	16	9	24	87%	196%	131%
red-tailed hawk	145	45	111	57	32	84	51%	72%	75%

* This column calculates the percentage of total cumulative take compared to the PEIR's highest estimate of take for the species.
** GH and GHN represent 132 MW of the total 450 MWs that may potentially operate under this PEIR Alternative.

Figures

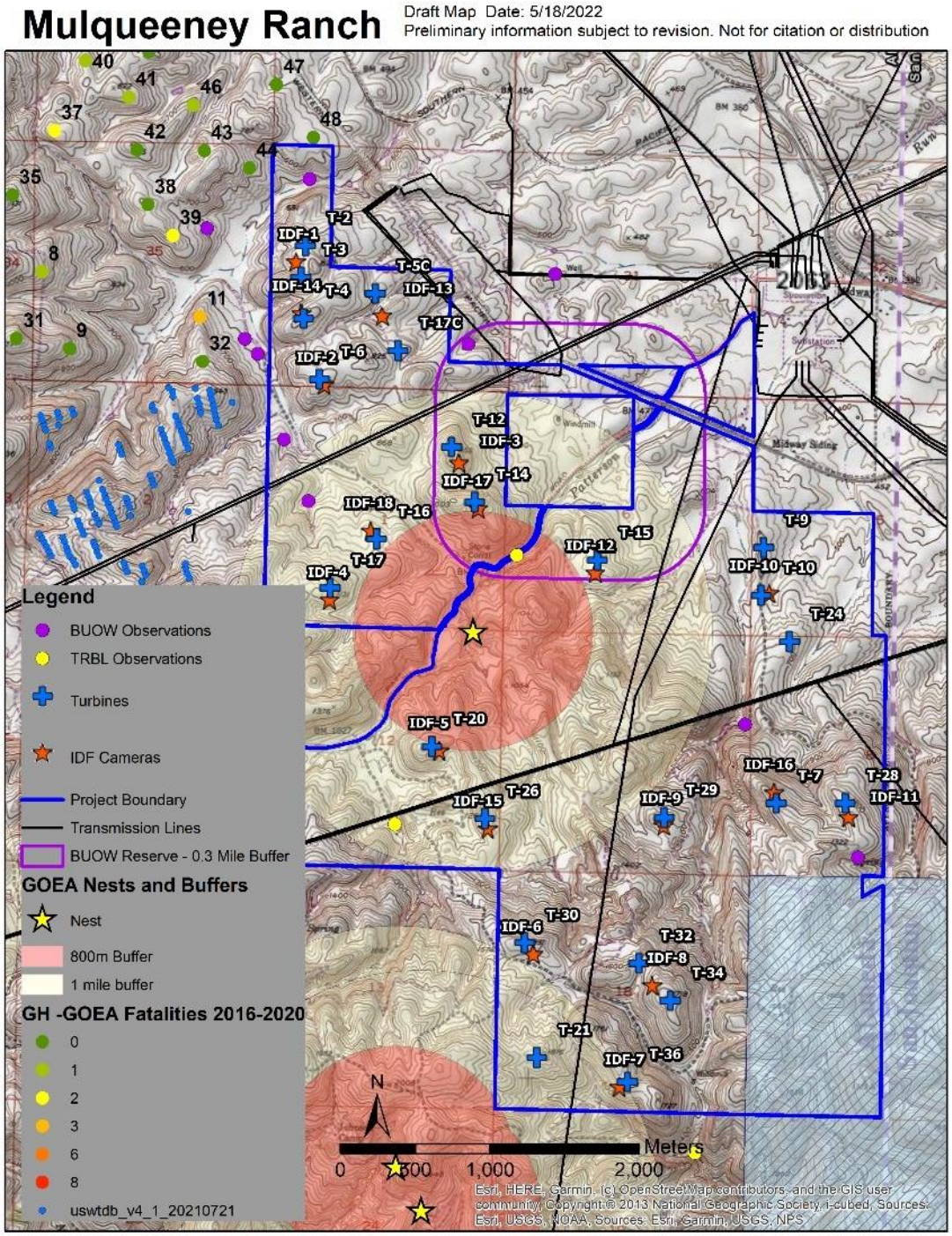


Figure 1. Map of proposed Mulqueeney Ranch Wind project footprint (outlined in blue) showing Reduced-Project-Alternative wind turbine distribution (Estep 2020b, 2021) and proposed IdentiFlight (IDF) camera distribution relative to known golden eagle (GOEA) nest locations (with 800-m and 1-mile buffers), 0.3-mile buffer around the Two Sisters Burrowing Owl Preserve (outlined in purple), incidental observations of burrowing owls (BUOW) and tricolored blackbirds (TRBL), as well as proximate golden eagle fatalities documented by the nearby Golden Hills wind energy project (northwest). Decommissioned Patterson Pass wind energy turbines are shown in aqua (west). Transmission lines are shown in black. Data sources are provided in text.

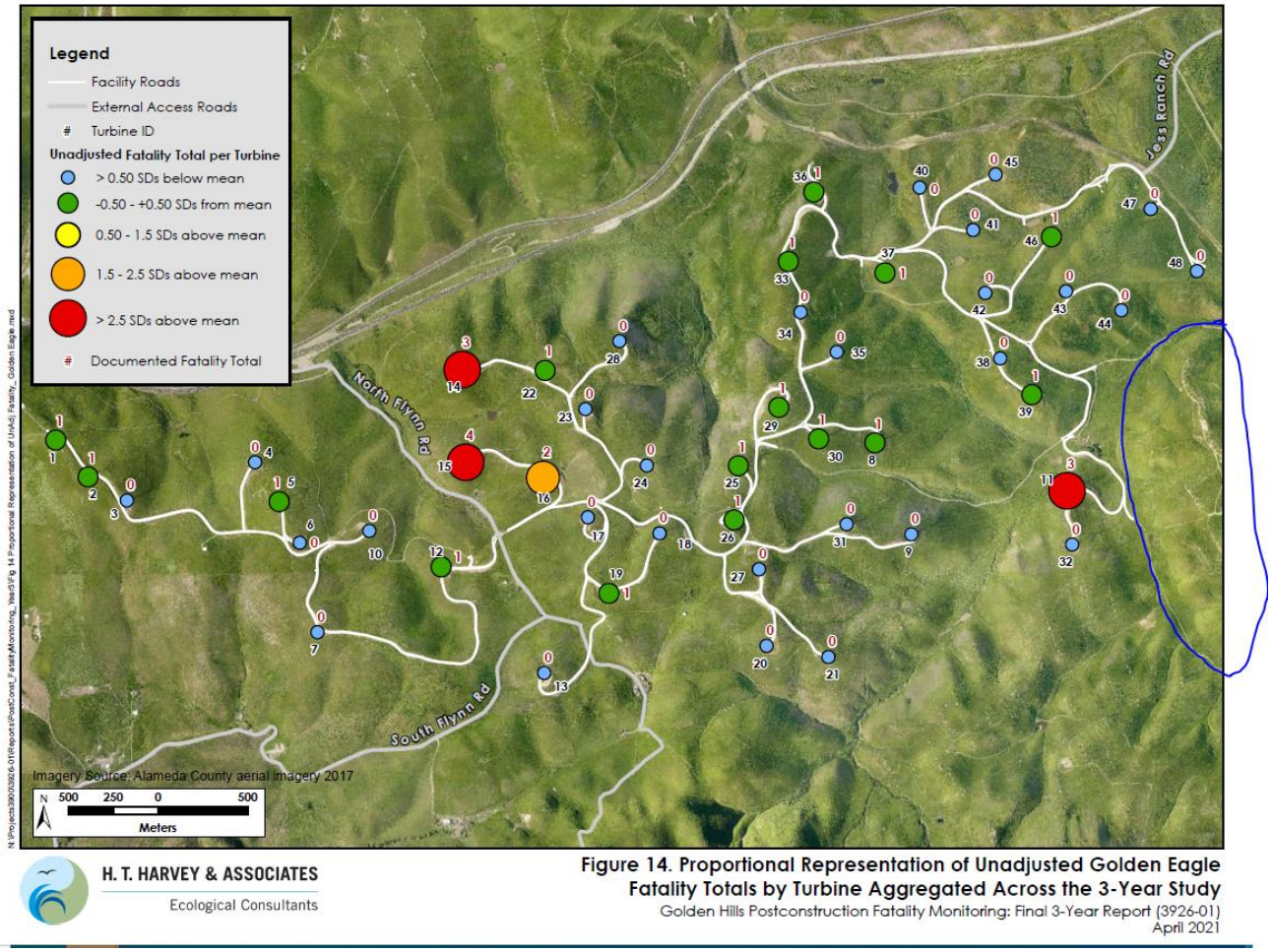


Figure 2: Proportional representation of unadjusted golden eagle fatality totals by turbine, aggregated across 3-year study at Golden Hills (Figure 14 of H. T. Harvey & Associates 2021). Note spatial distribution of unadjusted golden eagle fatalities observed relative to proposed, adjacent turbine locations at Mulqueeney Ranch (northwest corner of the proposed Mulqueeney Ranch footprint), outlined in blue. Blue outline includes locations of Project turbines WTG-2, WTG-3, WTG-4, and WTG-6.

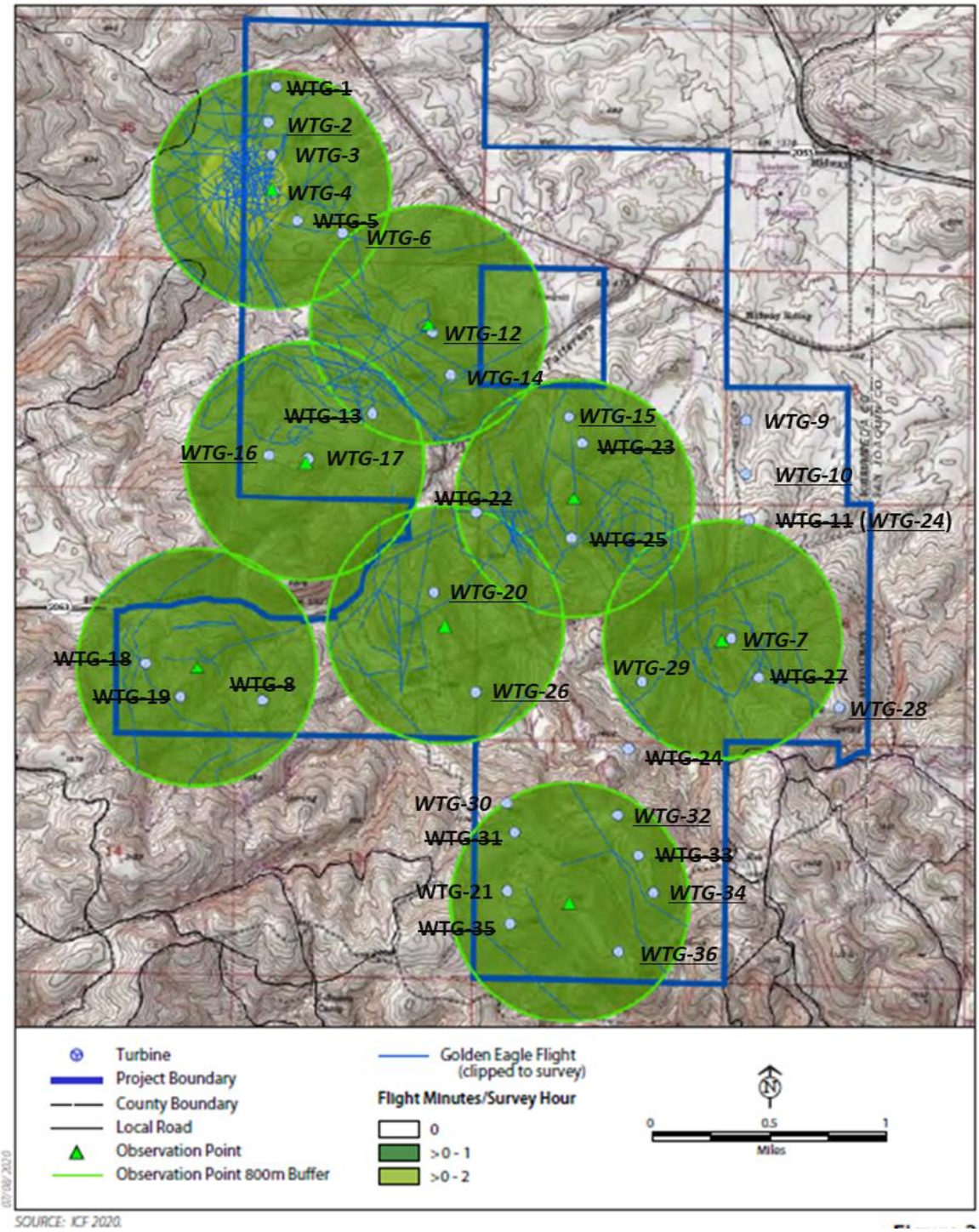


Figure 3. Golden Eagle Use Areas summarized in flight minutes per survey hour from 2020 point-count surveys within Project footprint (Figure 3 of ICF 2020b). Concentration of golden eagle activity is shown near Project turbines WTG-2, WTG-3, WTG-4, and WTG-6 in the northwest of the property. Note: Turbine layout is original project layout of Estep (2020a). Turbine notation: strike-through font indicates turbines removed for Estep (2020b, 2021); italics with underline indicates turbines that were moved >50 m from Estep (2020a) to final locations of Estep (2020b and/or 2021); italics without underline indicates turbines that moved <50 m from Estep (2020a) to final locations of Estep (2020b and/or 2021). WTG-5C and WTG-17C not shown here.

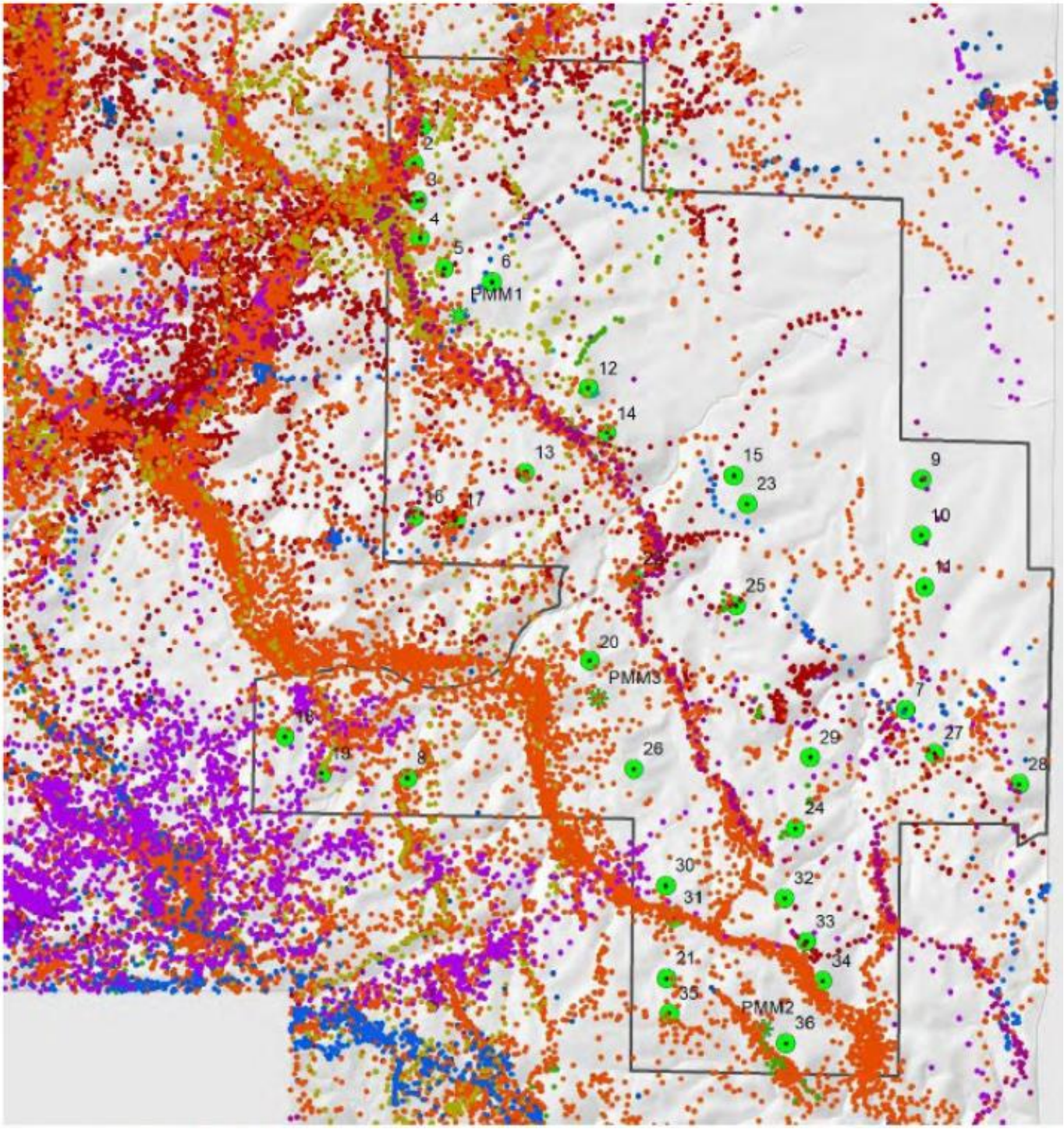


Figure 4. Positions of 11 GPS-telemetered golden eagles in flight within 200 m of the ground, selected for having crossed the Mulqueeney Ranch wind project between 2013 and 2019 (Figure 17 provided in Bell 2022b, originally from comments provided by Smallwood 2021). Presented here to identify the spatial distribution of the flight paths of GPS-telemetered golden eagles observed between 2013 and 2019, in proximity to Project footprint (outlined in black). Original proposed wind turbine distribution (36-turbine alternative, Estep 2020a) shown with green circles.

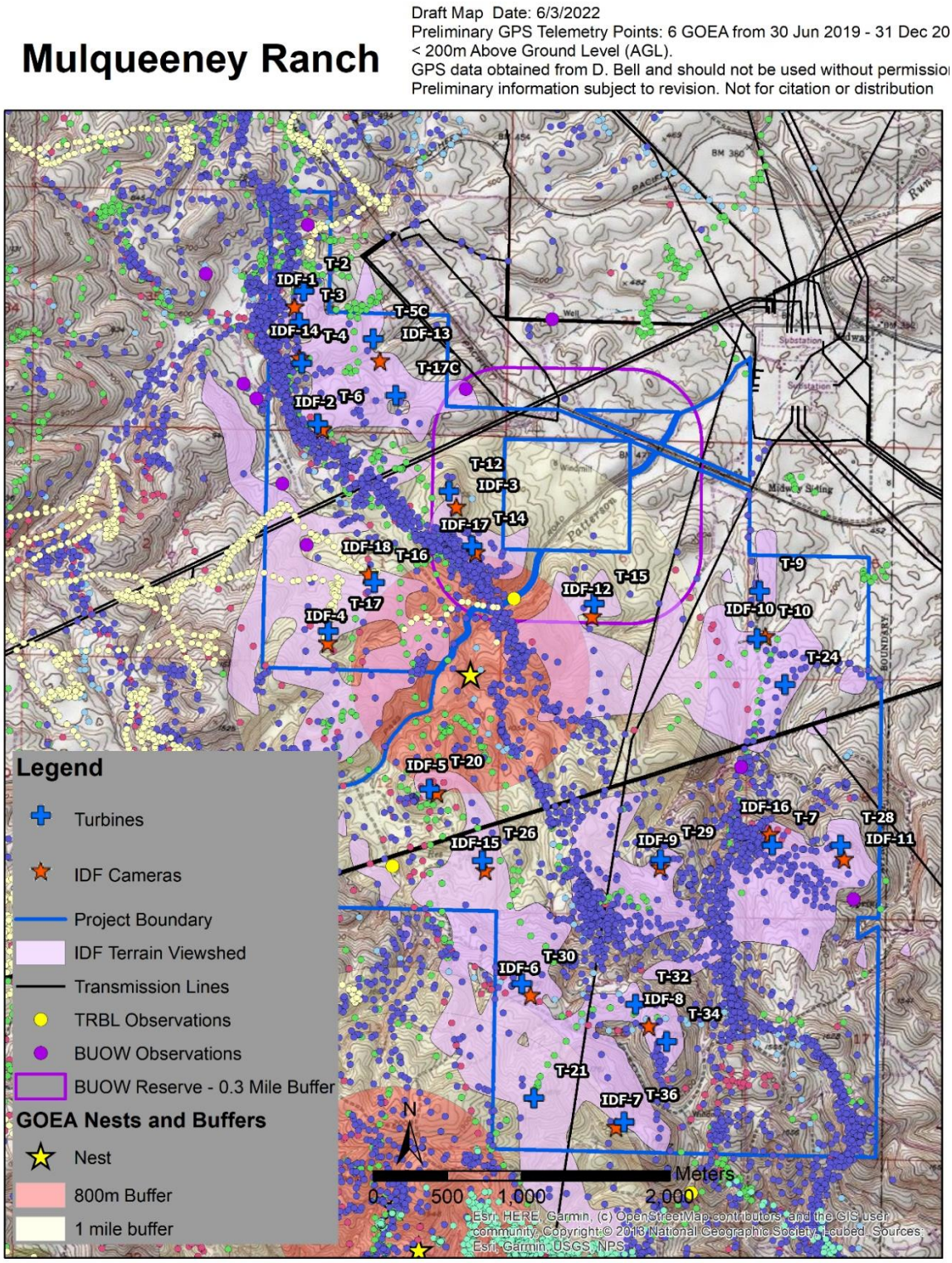


Figure 5. Telemetry positions for 6 GPS-telemetered golden eagles in flight <200m above ground level (AGL) obtained from Doug Bell in March 2022 (D. Bell, unpublished data), flying across or within the vicinity of the Mulqueeney Ranch wind project between 30 June 2019 and 31 Dec 2020. Purple circles represent telemetry positions. All other data are as described in Figure 1.

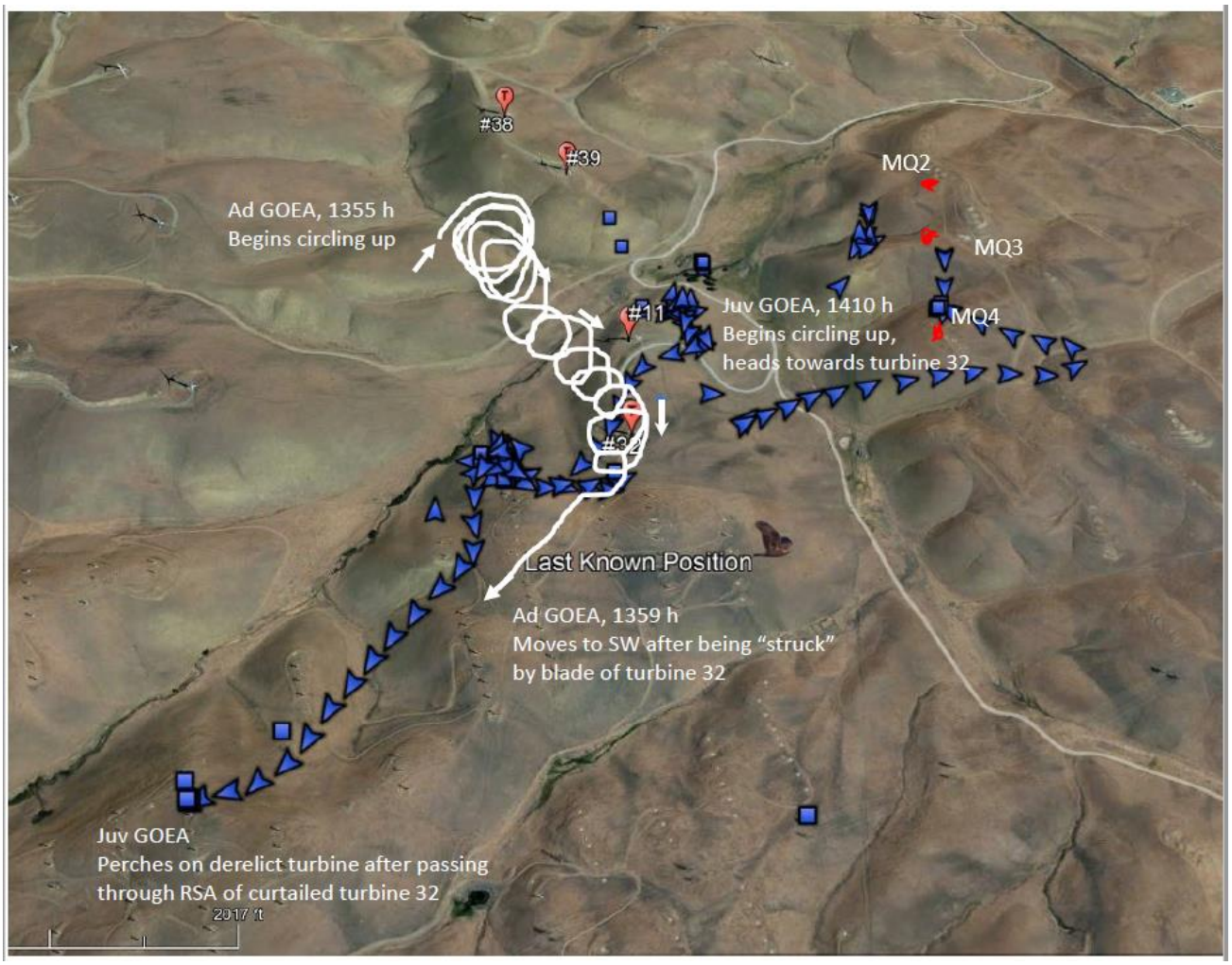


Figure 6. Untitled figure provided in Bell (2022a), documenting flight paths of adult golden eagle (white track) and juvenile golden eagle (blue arrows) with GSM/GPS transmitter through the rotor-swept zone of Golden Hills turbine WTG-32 on December 10, 2021. The flight track of the juvenile golden eagle also includes the vicinity of the proposed Project turbines WTG-2, WTG-3, and WTG-4, respectively at Mulqueeney Ranch (highlighted in red).

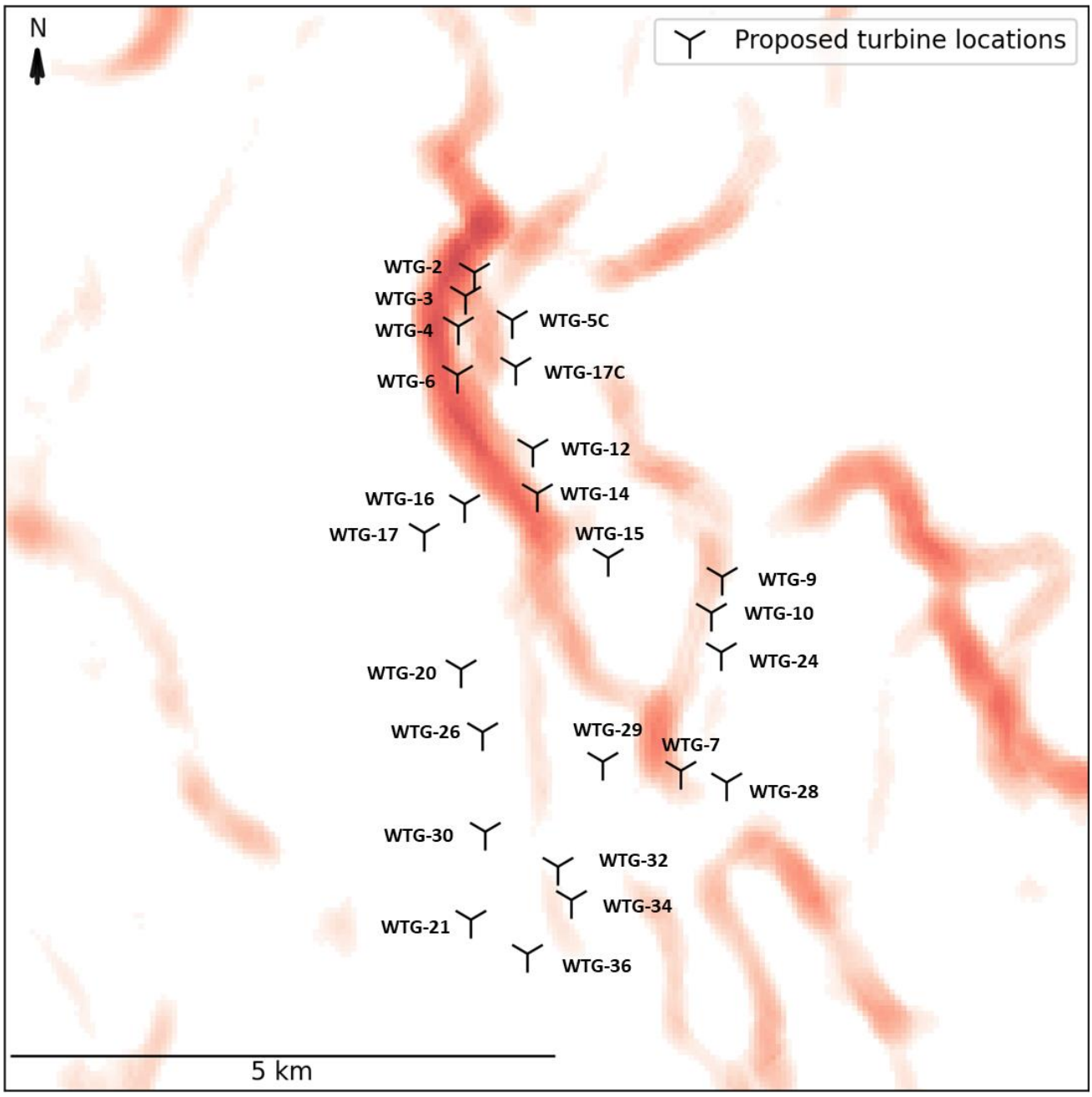


Figure 7. Preliminary results of an eagle modeling demonstration to estimate the predicted relative presence density of golden eagles within the proposed Project footprint, from the National Renewable Energy Lab (NREL)'s Stochastic Soaring Raptor Simulator (Sandhu 2022, Sandhu et al. 2022). See Appendix C for explanation. Black "Y"s represent final turbine distribution of Estep (2020b, 2021).

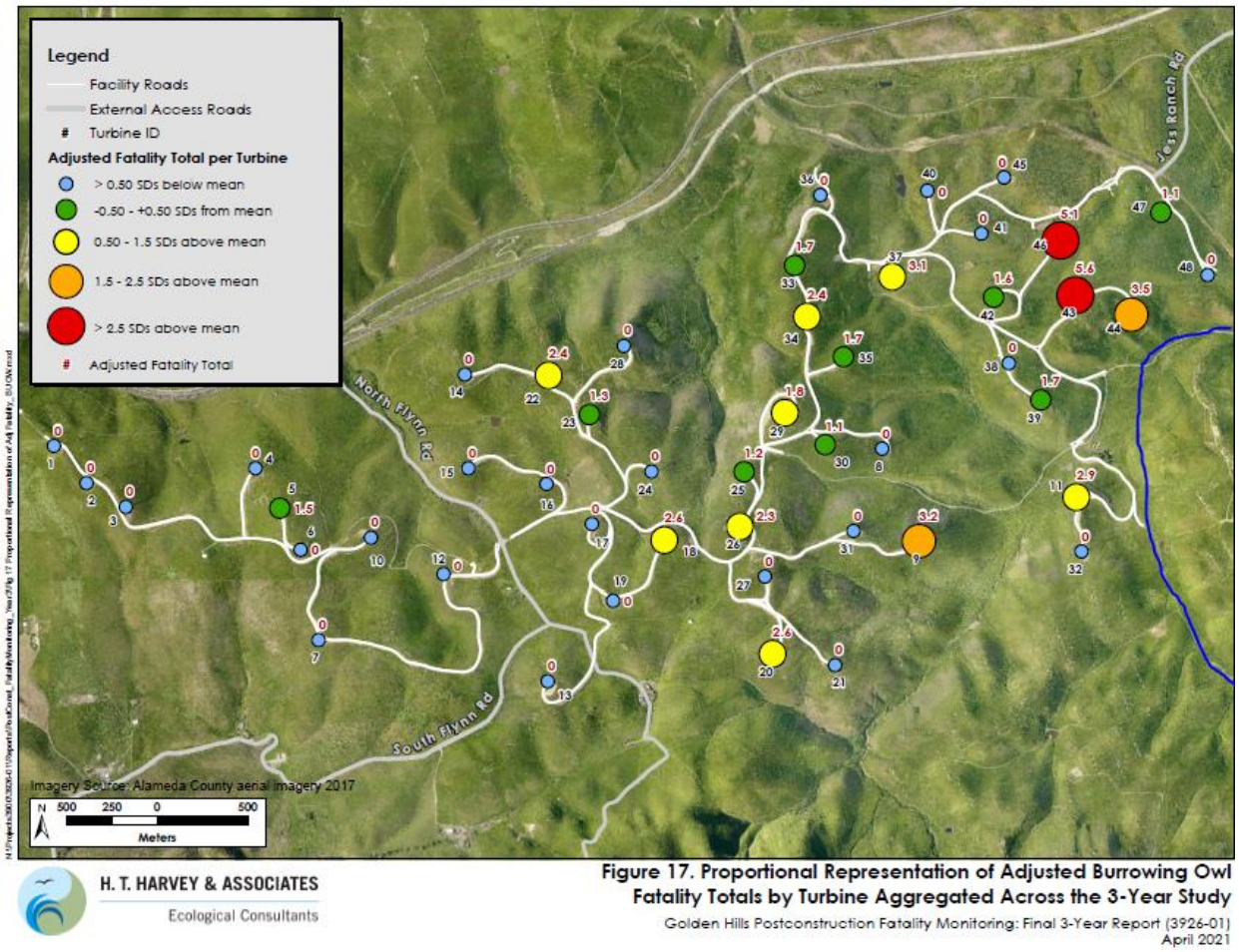


Figure 8. Figure 17 from H. T. Harvey & Associates (2021) presented here for reference to identify the spatial distribution of unadjusted burrowing owl fatalities observed during 3 years of post-construction monitoring at Golden Hills, relative to proposed turbines at Mulqueeney Ranch. The northwest corner of the proposed Mulqueeney Ranch footprint is highlighted in blue. (This area includes Project turbines WTG-2, WTG-3, WTG-4, and WTG-6.)

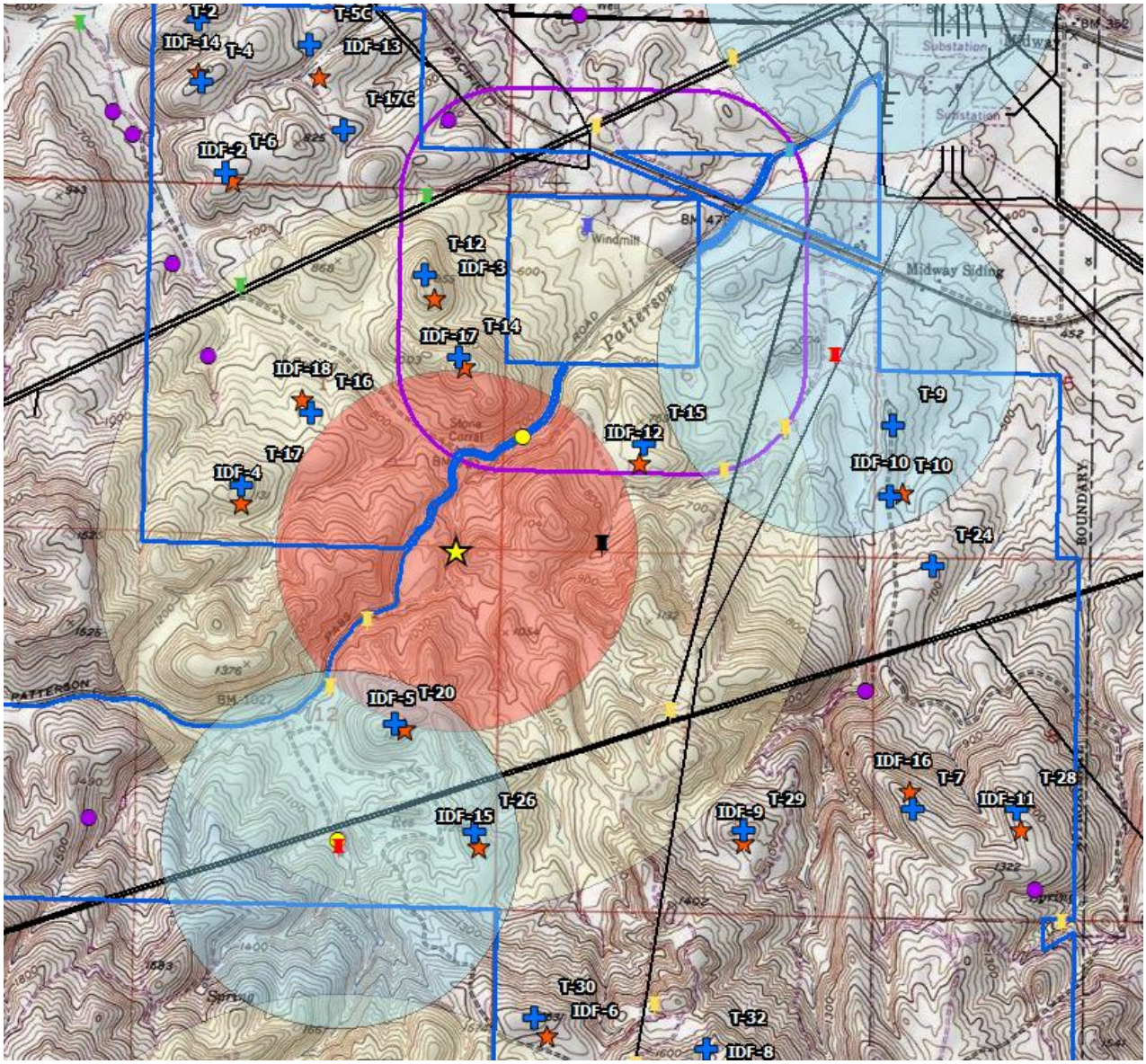
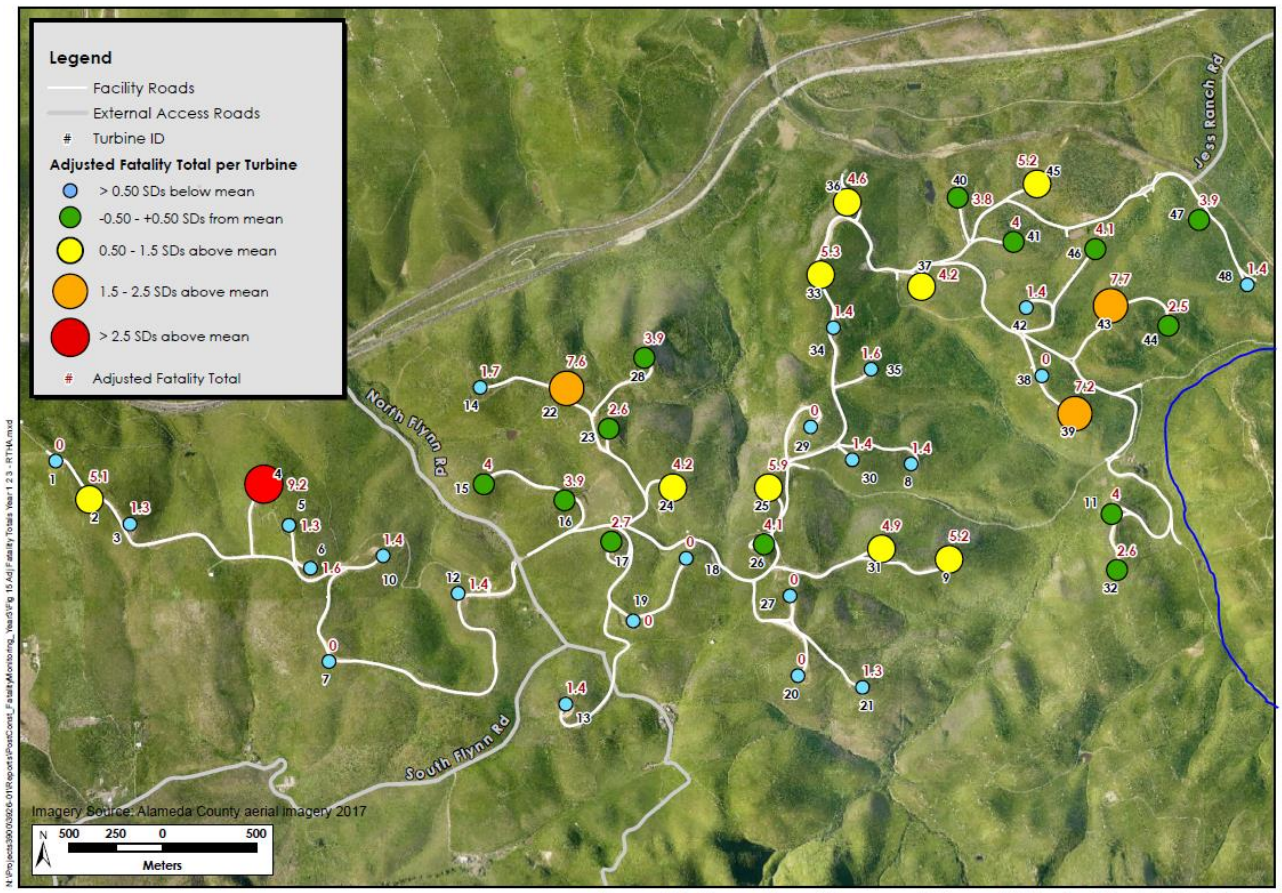


Figure 9. Mapped location of active red-tailed hawk nests. Nests are shown with red "thumbtacks and. 800-meter buffers with blue shading. Note proximity of two red-tailed hawk nests to WTG-9, WTG-10, WTG-20, and WTG-26, all of which falls within the 0.5-mile curtailment buffer recommended for active raptor nests by the TAC. The red-tailed hawk nest in the lower left of the Project footprint overlaps a prior tricolored blackbird observation (ICF 2020b). All other data are as described in Figure 1.



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Ecological Consultants

Figure 15. Proportional Representation of Adjusted Red-tailed Hawk Fatality Totals by Turbine Aggregated Across the 3-Year Study
Golden Hills Postconstruction Fatality Monitoring: Final 3-Year Report (3926-01)

Figure 10. Figure 15 from H. T. Harvey & Associates (2021) presented here for reference to identify the spatial distribution of unadjusted red-tailed hawk fatalities observed during 3 years of post-construction monitoring at Golden Hills, relative to proposed turbines at Mulqueeney Ranch. The northwest corner of the proposed Mulqueeney Ranch footprint is highlighted in blue. (This area includes Project turbines WTG-2, WTG-3, WTG-4, and WTG-6.)

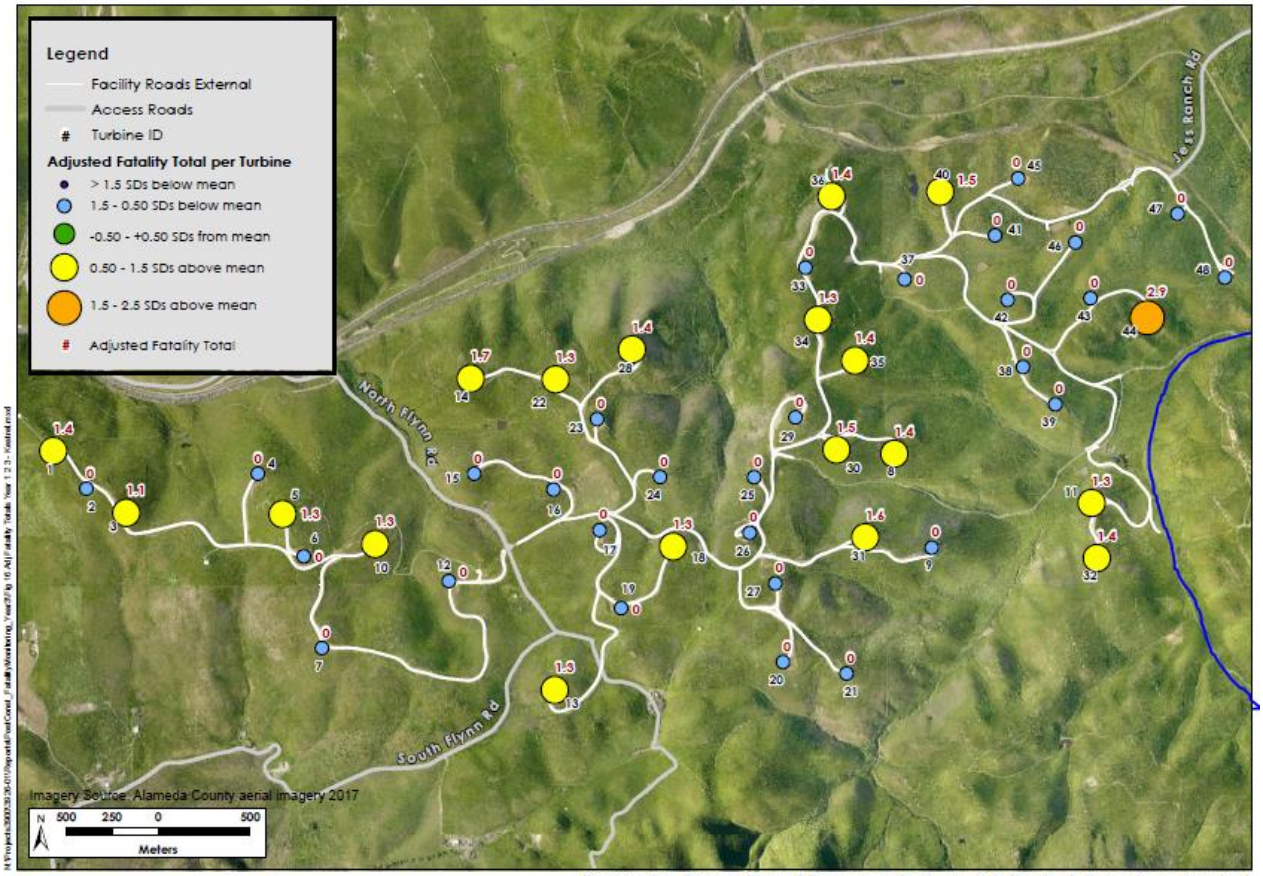

Figure 11. Figure 16 from H. T. Harvey & Associates (2021) presented here for reference to identify the spatial distribution of unadjusted American kestrel fatalities observed during 3 years of post-construction monitoring at Golden Hills, relative to proposed turbines at Mulqueeney Ranch. The northwest corner of the proposed Mulqueeney Ranch footprint is highlighted in blue. (This area includes Project turbines WTG-2, WTG-3, WTG-4, and WTG-6.)

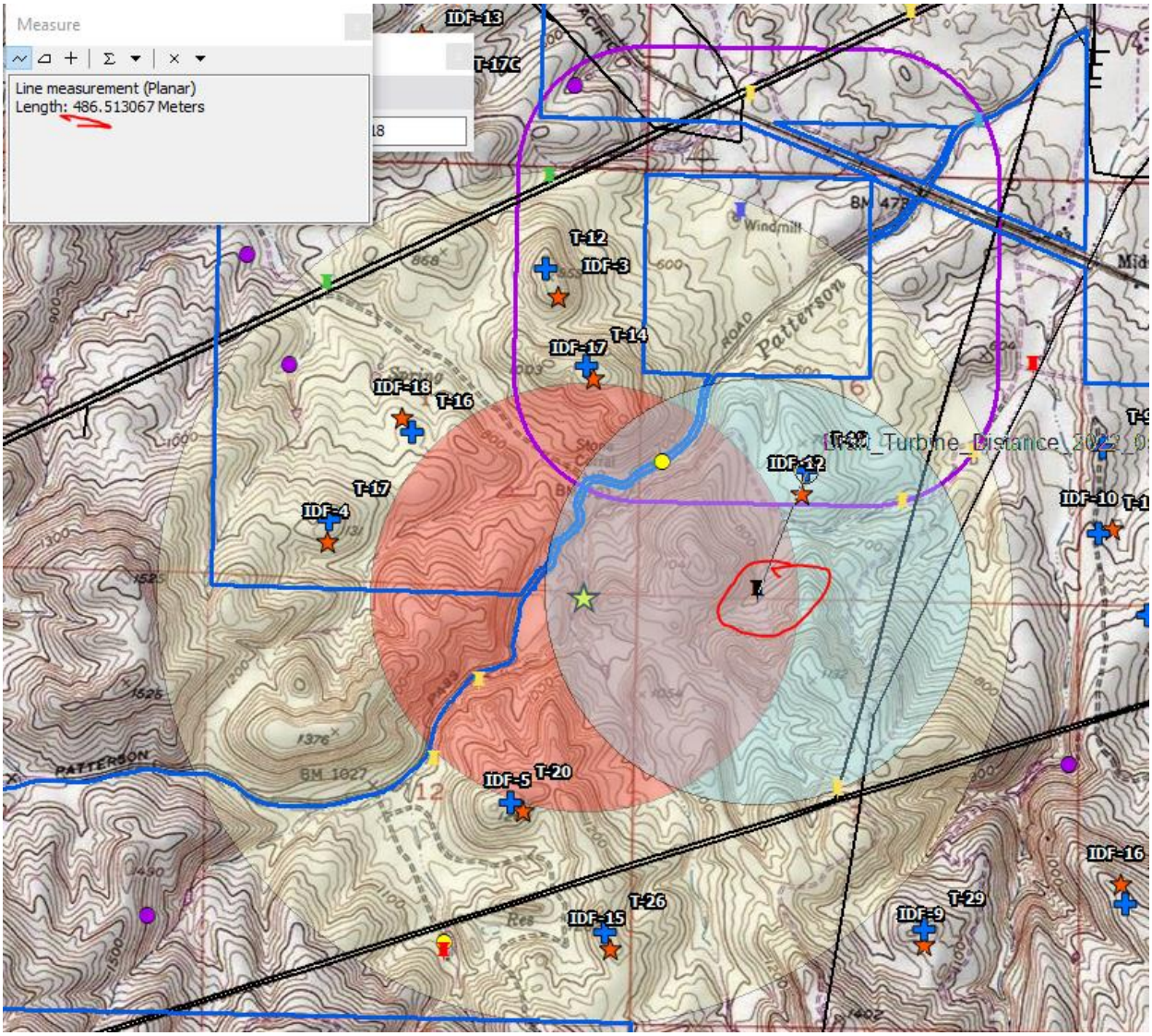

Figure 12. Mapped location of active prairie falcon nest, observed May 2022 (Bell 2022c). Nest shown in red-circled "X". 800-meter buffer from nest shown in blue shading. Note proximity to WTG-15 (<500 meters), which falls with the 0.5-mile curtailment buffer recommended for active raptor nests by the TAC (as well as within 0.3 mi of Two Sisters Burrowing Owl Preserve and within 800 meters [red shading] and 1 mile [yellow shading] of a 2022 active golden eagle nest).

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Appendix A. Relevant Mitigation Measures and Condition of Approval

2020 Updated PEIR Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential construction-related impacts on special-status and non–special-status nesting birds and raptors (ICF 2021, pp. 3.4-90 – 3.4-91):

Where suitable habitat is present for raptors within 1 mile (within 2 miles for golden eagles) and for tree/shrub- and ground-nesting migratory birds (non-raptors) within 50 feet (1,300 feet for tricolored blackbird) of proposed work areas, the following measures will be implemented to ensure that construction of the proposed project does not have a significant impact on nesting special-status and non–special-status birds.

- Remove suitable nesting habitat (shrubs and trees) during the non-breeding season (September 1–January 31) for nesting birds.
- To the extent feasible, avoid construction activities in or near suitable or occupied nesting habitat during the breeding season of birds (generally February 1–August 31).
- If construction activities (including vegetation removal, clearing, and grading) will occur during the nesting season for migratory birds, a qualified biologist will conduct a total of three preconstruction nesting bird and raptor surveys ~~within 7 days prior to construction activities.~~. The ~~construction~~ construction area and a 1-mile buffer will be surveyed for tree nesting raptors (except for golden eagles as addressed below), a 500-foot buffer will be surveyed for northern harrier, and a 1,300-foot buffer will be surveyed for tricolored blackbird if potential tricolored blackbird nesting substrates are present (i.e., flooded, thorny, or spiny vegetation such as cattails, tules, willows, ~~blackberries, thistles, or nettles), and a 50-foot buffer will be surveyed for all other bird species.~~ blackberries, thistles, or nettles), and a 50-foot buffer will be surveyed for all other bird species. The first survey will be conducted within the areas described above between 30-60 days prior to the start of construction to identify potential nesting habitat that could be used by special-status and non-special-status birds and raptors within the survey area and to document any nesting behavior or activity. A second survey will be conducted no less than 14 days prior to starting construction to verify current occupancy status of nesting birds and raptors. A final survey will be conducted immediately prior to initiating ground-disturbing activities within disturbance areas and appropriate species buffers. The final surveys may be phased on the project site depending on which areas/components of the project would begin ground disturbing activities, so that they are conducted immediately prior to ground disturbing activities within a specific area.
- Surveys to locate eagle nests within 2 miles of construction will be conducted during the breeding season prior to construction. A 1-mile no-disturbance buffer will be implemented for construction activities to protect nesting eagles from disturbance. Through coordination with USFWS, the no-disturbance buffer may be reduced to 0.5 mile if construction activities are not within line-of-sight of the nest.
- If an active nest (other than golden eagle) is identified near a proposed work area and work cannot be conducted outside the nesting season (February 1–August 31), a no-activity zone will be established around the nest by a qualified biologist in coordination with USFWS and/or CDFW. Fencing and/or flagging will be used to delineate the no-activity zone. To

minimize the potential to affect the reproductive success of the nesting pair, the extent of the no-activity zone will be based on the distance of the activity to the nest, the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the species, and the dissimilarity of the proposed activity to background activities. The no-activity zone will be large enough to avoid nest abandonment and will be between 50 feet and 1 mile from the nest, or as otherwise required by USFWS and/or CDFW.

2020 Updated PEIR Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl (ICF 2021, pp. 3.4-93 – 3.4-94):

Where suitable habitat for western burrowing owl is in or within 500 feet of proposed work areas, the following measures will be implemented to avoid or minimize potential adverse impacts on burrowing owls.

- To the maximum extent feasible (e.g., where the construction footprint can be modified), construction activities within 500 feet of active burrowing owl burrows will be avoided during the nesting season (February 1–August 31).
- A qualified biologist will conduct a total of three preconstruction take avoidance surveys for burrowing owl. The first pre-construction survey will be conducted between 30-60 days prior to the start of construction to identify potential nest sites and to determine current occupancy status. A second survey will be conducted no less than 14 days prior to ~~and~~ starting construction to verify current occupancy status. A final survey will be conducted within 24 hours of initiating ground-disturbing activities~~.~~, or phased as discussed above (2020 Updated PEIR Mitigation Measure BIO-8a). The survey area will encompass the work area and a 500-foot buffer around this area.
- If an active burrow is identified near a proposed work area and work cannot be conducted outside the nesting season (February 1–August 31), a no-activity zone will be established by a qualified biologist in coordination with CDFW. The no-activity zone will be large enough to avoid nest abandonment and will extend a minimum of 250 feet around the burrow.
- If burrowing owls are present at the site during the non-breeding season (September 1–January 31), a qualified biologist will establish a no-activity zone that extends a minimum of 150 feet around the burrow.
- If the designated no-activity zone for either breeding or non-breeding burrowing owls cannot be established, a wildlife biologist experienced in burrowing owl behavior will evaluate site-specific conditions and, in coordination with CDFW, recommend a smaller buffer (if possible) and/or other measure that still minimizes disturbance of the owls (while allowing reproductive success during the breeding season). The site-specific buffer (and/or other measure) will consider the type and extent of the proposed activity occurring near the occupied burrow, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity to background activities.
- If burrowing owls are present in the direct disturbance area and cannot be avoided during the non-breeding season (generally September 1 through January 31), burrowing owls may be excluded from burrows through the installation of one-way doors at burrow entrances. A burrowing owl exclusion plan, prepared by the project proponent, must be approved by

CDFW prior to exclusion of owls. One-way doors (e.g., modified dryer vents or other CDFW approved method), which will be left in place for a minimum of 1 week and monitored daily to ensure that the owl(s) have left the burrow(s). Excavation of the burrow will be conducted using hand tools. During excavation of the burrow, a section of flexible plastic pipe (at least 3 inches in diameter) will be inserted into the burrow tunnel to maintain an escape route for any animals that may be inside the burrow. Owls will be excluded from their burrows as a last resort and only if other avoidance and minimization measures cannot be implemented.

- Avoid destruction of unoccupied burrows outside the work area and place visible markers near burrows to ensure that they are not collapsed.
- Conduct ongoing surveillance of the project site for burrowing owls during project activities. If additional owls are observed using burrows within 500 feet of construction, the onsite biological monitor will determine, in coordination with CDFW, if the owl(s) are or would be affected by construction activities and if additional exclusion zones are required.

PEIR Mitigation Measure BIO-11a: Prepare a project-specific avian protection plan (ICF 2021, pp. 3.4-115 – 3.4-116):

All project proponents will prepare a project-specific avian protection plan (APP) to specify measures and protocols consistent with the program-level mitigation measures that address avian mortality. The project-specific APPs will include, at a minimum, the following components.

- Information and methods used to site turbines to minimize risk.
- Documentation that appropriate turbine designs are being used.
- Documentation that avian-safe practices are being implemented on project infrastructure.
- Methods used to discourage prey for raptors.
- A detailed description of the postconstruction avian fatality monitoring methods to be used (consistent with the minimum requirements outlined in Mitigation Measure BIO-11g).
- Methods used to compensate for the loss of raptors (consistent with the requirements of 2020 Updated PEIR Mitigation Measure BIO-11h).

Each project applicant will prepare and submit a draft project-specific APP to the County. The draft APP will be reviewed by the technical advisory committee (TAC) for consistency and the inclusion of appropriate mitigation measures that are consistent with the PEIR and recommended for approval by the County. Each project applicant must have an approved Final APP prior to commercial operation.

2020 Updated PEIR Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds (ICF 2021, pp. 3.4-116 – 3.4-117; bold text added here for emphasis):

"~~Siting of turbines —~~ Consistent with PEIR Mitigation Measure BIO-11b, and in recognition that focused siting of turbines using analyses of landscape features and location-specific bird use and behavior data to identify locations with reduced collision risk— may result in reduced fatalities

(Smallwood et al. 2009~~). All~~), project proponents will conduct a siting process and prepare a micro-siting analysis to select turbine locations to minimize potential impacts on bird and bat species. ~~Proponents will utilize existing data as well as collect~~ The proponent has utilized existing data and collected new site-specific data as part of the siting analysis.

~~Project proponents.~~ The project proponent will utilize currently available guidelines ~~such as~~ published by the Alameda County Scientific Review Committee (SRC) ~~guidelines~~ for siting wind turbines (Alameda County SRC 2010) and/or other currently available research or guidelines to conduct siting analysis. Additionally, project proponents will use the results of previous siting efforts to inform the analysis and siting methods as appropriate such that the science of siting continues to be advanced. All project proponents will collect field data that identify or confirm the behavior, utilization, and distribution patterns of affected avian and bat species prior to the installation of turbines. Project proponents will collect and utilize available existing information, including but not necessarily limited to: siting reports and monitoring data from previously installed projects; published use and abundance studies and reports; ~~and~~ topographic features known to increase collision risk (trees, riparian areas, water bodies, and wetlands~~).~~); and changes to the landscape caused by grading for the placement of turbine foundations.

Project proponents will also collect and utilize additional field data as necessary to inform the siting analysis for golden eagles. As required in 2020 Updated Mitigation Measure BIO-8a, surveys will be conducted to locate golden eagle nests within 2 miles of proposed project areas. **Siting of turbines within 2 miles of an active or alternative golden eagle nest or active golden eagle territory will be based on a site-specific analysis of risk based on the estimated eagle territories, conducted in consultation with USFWS**.

Project proponents will utilize methods (i.e., computer models) to identify dangerous locations for birds and bats based on site-specific risk factors informed by the information discussed above. The project proponents will compile the results of the siting analyses for each turbine and document these in the project-level APP, along with the specific location of each turbine. Consistent with past practice for previously approved repowering projects, the proponent shall submit the siting analysis for review and recommendations to the Alameda County Wind Repowering/Avian Protection Technical Advisory Committee, which includes representatives of the CDFW and the USFWS, prior to applying for any building or grading permit. The County planning director shall have the authority to approve or deny such permits on the basis of the siting analysis and the recommendations of the Technical Advisory Committee."

Updated PIER Mitigation Measure BIO-11g/PEIR Mitigation Measure BIO-11g: Implement post-construction avian fatality monitoring for all repowering projects* (ICF 2021, p. 3.4-118-3.4-120 and ICF 2014, p. 3.4-111 – 3.4-112; *Full mitigation measure text is not provided; excerpted text is specific to TAC description only.)

"… A technical advisory committee (TAC) will be formed to oversee the monitoring program and to advise the County on adaptive management measures that may be necessary if fatality rates substantially exceed those predicted for the project (as described below in Mitigation Measure BIO-11i). The TAC will have a standing meeting, which will be open to the public, every 6 months to review monitoring reports produced by operators in the program area. In these meetings, the TAC will discuss any issues raised by the monitoring reports and recommend to the County next steps to address issues, including scheduling additional meetings, if necessary.

The TAC will comprise representatives from the County (including one or more technical consultants, such as a biostatistician, an avian biologist, and a bat biologist), and wildlife agencies (CDFW, USFWS). Additional TAC members may also be considered (e.g., a representative from Audubon, a landowner in the program area, a representative of the operators) at the discretion of the County. The TAC will be a voluntary and advisory group that will provide guidance to the County Planning Department. To maintain transparency with the public, all TAC meetings will be open to the public, and notice of meetings will be given to interested parties.

The TAC will have three primary advisory roles: (1) to review and advise on project planning documents (i.e., project-specific APPs [Avian Protection Plans]) to ensure that project-specific mitigation measures and compensatory mitigation measures described in this PEIR are appropriately and consistently applied, (2) to review and advise on monitoring documents (protocols and reporting) for consistency with the mitigation measures, and (3) to review and advise on implementation of the adaptive management plans.

Should fatality monitoring reveal that impacts exceed the baseline thresholds established in this PEIR, the TAC will advise the County on requiring implementation of adaptive management measures as described in Mitigation Measure BIO-11i. The County will have the decision-making authority, as it is the organization issuing the CUPs. However, the TAC will collaboratively inform the decisions of the County. …"

2020 Updated Mitigation Measure PEIR BIO-14a: Site and select turbines to minimize potential mortality of bats (ICF 2021, p. 3.4-133):

"The project proponent will use the best information available to site turbines and to select from turbine models in such a manner as to reduce bat collision risk. The siting and selection process will take into account bat use of the area (e.g., proximity to maternity colony sites, hibernacula, and cover types that provide foraging habitat for bats). Procedures followed should be consistent with guidance provided the California guidelines for reducing impacts on birds and bats from wind energy development (California Energy Commission and California Department of Fish and Game 2007).

To generate site-specific "best information" to inform turbine siting and operation decisions, a bat habitat assessment and roost survey will be conducted in the project area to identify and map habitat of potential significance to bats, such as potential roost sites (trees and shrubs, significant rock formations, artificial structures) and water sources. Turbine siting decisions will incorporate relevant bat use survey data and bat fatality records published by other projects in the APWRA. Roost surveys will be carried out according to the methods described in PEIR Mitigation Measure BIO-12a.

<u>Consistent with past practice for previously approved repowering projects, the proponent shall submit the siting analysis for review and recommendations to the Alameda County Wind Repowering/Avian Protection Technical Advisory Committee, which includes representatives of the CDFW and USFWS, prior to applying for any building or grading permit. The County planning director shall have the authority to approve or deny such permits on the basis of the siting analysis and the recommendations of the Technical Advisory Committee.</u>"

SEIR ADMM-7: Real-Time Turbine Curtailment. (ICF 2021, pp. 30.4-126):

The project proponent can employ a real-time turbine curtailment program designed in consultation with the TAC. The intent would be to deploy a biologist to monitor onsite conditions and issue a curtailment order when raptors are near operating turbines. Alternatively, radar, video, or other monitoring measures could be deployed in place of a biological monitor if there is evidence to indicate that such a system would be as effective and more efficient than use of a human monitor.[6]

Literature Cited (as referenced in ICF [2021], p. 3.4-149)

Alameda County Scientific Review Committee. 2010. *Guidelines for Siting Wind Turbines Recommended for Relocation to Minimize Potential Collision-Related Mortality of Four Focal Raptor Species in the Altamont Pass Wind Resource Area*. May 23. Alameda County SRC Document P-70.

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

Smallwood, K. S., L. Neher, and D. A. Bell. 2009. Map-based repowering and reorganization of a wind resource area to minimize burrowing owl and other bird fatalities. October. *Energies* 2:915-943.

CUP PLN2019-00226 Condition of Approval 35a. Turbine and Infrastructure Design and Siting to Reduce Avian Mortality (MMs BIO-11b, BIO-11c and BIO-11d).

As required by Mitigation Measures BIO-11b, BIO-11c and BIO-11d in the MMRP, the Permittee shall utilize a siting process and prepare a siting analysis, using analyses of landscape features and location-specific bird use and behavior data to determine the specific turbine site locations with the potential to reduce avian collision risk and fatalities and otherwise minimize potential impacts on bird and bat species. Permittee shall utilize existing data as well as collect new site-specific data as part of the siting analysis. Permittee shall implement Mitigation Measure BIO-11b as set forth in the Project MMRP.

Permittee shall use turbines with certain characteristics recognized to reduce the collision risk for avian species. Permittee shall implement the design-related measures set forth by Mitigation Measure BIO-11c as set for in the Project MMRP. Permittee shall also apply specific measures outlined in Mitigation Measure 11d when designing and siting turbine-related infrastructure in order to reduce the risk of bird electrocution and collision.

Upon determining that the information in the siting analysis is sufficiently detailed for Technical Advisory Committee (TAC) consideration and recommendations, the Planning Director shall schedule a meeting for TAC review of the Project's compliance with mitigation measures BIO-11a and BIO-11b.

[6] Note TAC current perspective on IDF (Appendix C).

Appendix B. TAC Comment on IdentiFlight – June 1, 2022

Mulqueeney Micro-siting and IdentiFlight (IDF)

The TAC has reviewed the information and best scientific data available regarding IdentiFlight (IDF) in consideration of our micro-siting evaluations for the Mulqueeney Ranch Wind Project. The TAC acknowledges that IDF is a promising experimental technology that is hoped will become a helpful tool to reduce the number of eagles killed and injured by wind turbines in the future. Unfortunately, at this time there is only one peer-reviewed publication available, and IDF only has been *functionally* operational at the Golden Hills Wind Project for one year. This period is not long enough for us to validate the effectiveness of IDF at that project site, or to make any scientifically valid inferences regarding its potential effectiveness at the Mulqueeney Ranch Wind Project's high-risk turbine locations. Although the TAC previously requested updated IDF data from the County for the second year of monitoring Golden Hills Project in March 2022, the TAC has not been provided IDF data from the Golden Hills Project's southernmost turbines, which are closest to the northwestern portion of the Mulqueeney Project. Such data may have helped to better evaluate and understand IDF's potential at the northwestern, high-risk portion of the Mulqueeney Ranch Project (i.e., turbines WTG-2, WTG-3, WTG-4 and WTG-6).

It is our understanding that IDF uses a camera system combined with artificial intelligence that looks for specific shapes and behaviors to detect a bird. We understand that the system works best in high contrast situations, such as when observing a bird against the sky. We are lacking data to help validate IDF's effectiveness at detecting birds or eagles when viewed against the backdrop of a grassy hillside or below the horizon of a ridgetop. Therefore, adding additional IDF cameras beneath steep hills and ridges where high risk wind turbines are proposed may not effectively enhance the IDF system's abilities to detect eagles and provide informative curtailment commands to minimize collision risk where eagles are expected to pop up into the IDF system's viewshed or a wind turbine's rotor swept area (RSA). In addition, shading at certain times of day due to sun angle, low cloud cover, and/or reduced air quality (i.e., haze or smoke) may make this even harder to differentiate (i.e., camera arrays placed east of turbine locations that would require facing west into the afternoon sun and prevailing winds to detect birds).

In conclusion, at this time the TAC does not believe there is sufficient scientific evidence to support relying on the IDF system as the primary mitigation measure to effectively reduce collision risk to golden eagles at these high-risk turbine locations. We acknowledge IDF may be a promising tool in some situations to reduce collision risk at existing turbines, but it is still experimental technology and not a substitute for the primary objective in SEIR MM BIO-11b to "select turbine locations to minimize potential impacts on bird and bat species." We are concerned that IDF will not functionally have the ability to detect eagles in time to curtail where turbines are proposed on ridge tops in eagle high use areas. As additional IDF data are collected, we look forward to reviewing future raw data shared from project proponents, IdentiFlight (the company) and peer-reviewed research that helps to answer these currently unanswered questions.

MEMO

Date: Thursday, June 02, 2022

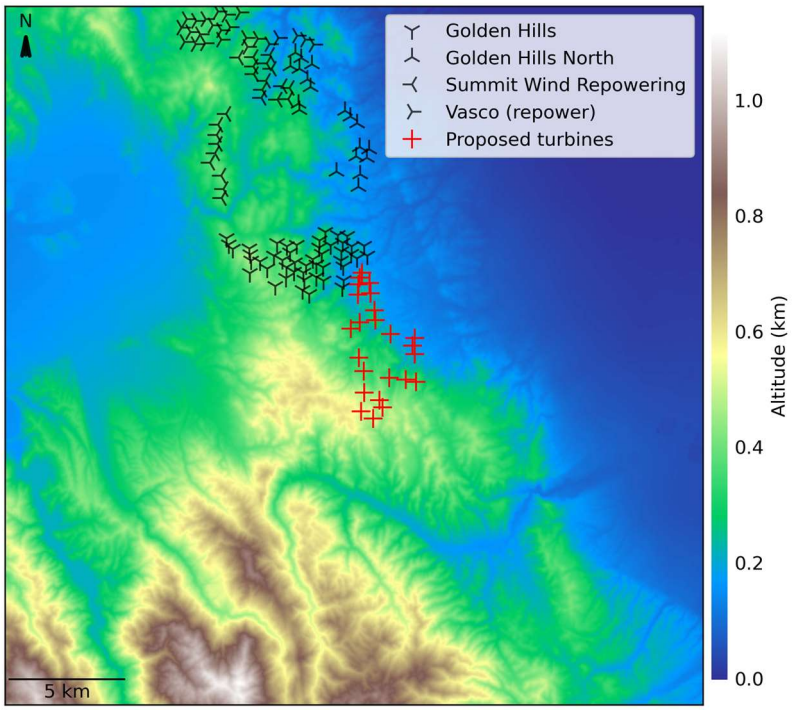
To: Tara Conkling, U.S. Geological Survey

From: Rimple Sandhu, National Renewable Energy Laboratory (NREL)

Subject: Eagle modeling demonstration for a proposed wind site

SSRS Application to the Proposed Wind Site in Alameda County

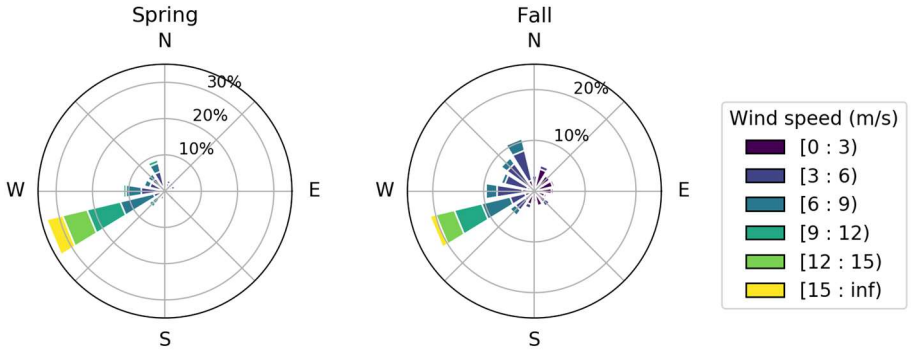
This memo details our preliminary results on the predicted relative presence density of golden eagles within the proposed wind site in Alameda County using NREL's Stochastic Soaring Raptor Simulator (SSRS) tool. First, we extracted the terrain elevation from USGS's 3D Elevation Product (3DEP) database for the 30-km by 30-km region at 50-m resolution, centered at the proposed wind site, shown below.



Then, we looked at the wind conditions during the day at this location. We used NREL's Wind Integration National Dataset Toolkit (WIND Toolkit) for years 2017 and 2018 and at 80 m above ground level (i.e., at a typical hub height). The following wind rose was obtained for the spring and fall seasons.

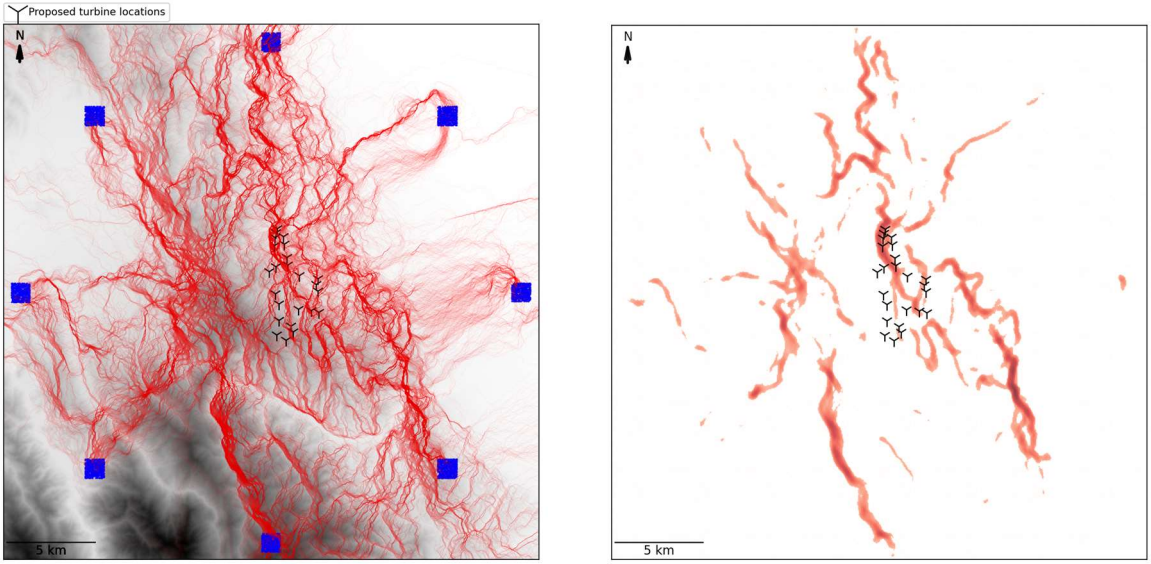
15013 Denver West Parkway
Golden, CO 80401
Phone 303-275-3000

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Operated by the Alliance for Sustainable Energy, LLC



Notice that winds mostly come from the west-southwest direction. For both years, the computed mean wind speed was 8 m/s. The mean wind speed and direction are put into SSRS to compute the orographic updraft field under these wind conditions. The estimated updrafts then dictate which routes the simulated golden eagles would prefer when traveling at rotor-swept heights.

Next, we chose eight points at equal distance from the center of the proposed site as entry points for simulated golden eagles to approach the proposed site. Each entry location (blue boxes) has 500 simulated eagles initiated and directed toward the site center. The eagles are simulated on a grid with uniform spatial resolution of 50 m. In total, we simulate 8 x 500 = 4,000 virtual golden eagles, shown in red on the left plot below. Using these simulated tracks, we computed the presence map for the entire region, shown in the right plot below. The strength of the red color represents the relative presence of golden eagles using orographic updrafts at that location.



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Zooming into the proposed site, we obtained the relative presence at turbine-scale resolution. The darker red color corresponds to higher relative presence. We can see that the northmost turbines have a higher relative presence of golden eagles at rotor-swept heights.

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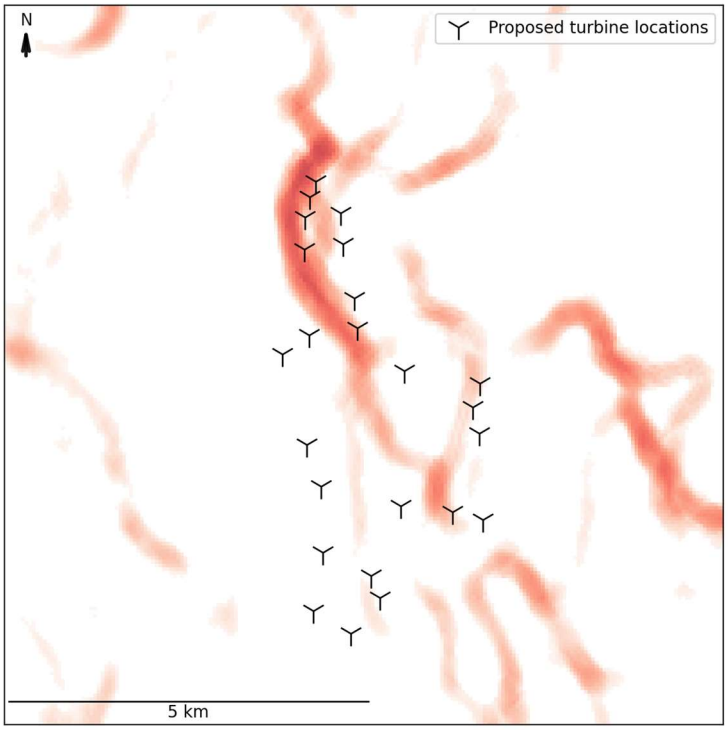

We consider this to be a starting point for discussion. A variety of wind conditions, including different wind speeds and atypical wind directions (e.g., north-northwest in the fall) should also be considered. In addition, sensitivity to eagle starting locations (the number and radial distance from site center) should be evaluated.