TECHNICAL MEMORANDUM

Summit Wind Repower Project Predicted Sound Levels

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Altamont Winds, LLC (Altamont Winds) proposes to repower an existing wind energy facility within the Altamont Pass Wind Resource Area of Alameda County, California. The Summit Wind Repower Project (Project) will replace old technology wind turbine generators (WTGs) with fewer and more efficient modern WTGs, and make improvements to related infrastructure within an existing wind facility. Up to 27 new WTGs are proposed to be installed, with an alternate location for one WTG (20a) for a total of 28 proposed WTG sites. This technical memorandum presents the predicted sound pressure levels from the Project's proposed WTG sites.

Methodology

The Project consists of up to 27 WTGs of either General Electric (GE) or Vestas turbine models. Altamont Winds provided CH2M with the manufacturer's specifications on anticipated sound levels from each the proposed turbine models under consideration. While these anticipated levels are expected to have a level of conservatism or design margin included, they are used as the basis of the acoustical modelling. Consistent with industry practice, the uncertainty associated with the warranted level is stated as a plus or minus quantity to account for measurement tolerances and other factors. For additional conservatism, these predicted results are based on adding the stated uncertainty to the turbine sound power level, resulting in all turbines operating at a level that exceeds their specified maximum sound level. Lower sound levels may be expected when the turbines operate at a lower power level.

Standard acoustical engineering methods were used in the development of the sound predictions and modeling was performed by an Oregon-registered Professional Acoustical Engineer (P.E.) (Oregon is the only state to issue a P.E. in acoustics). The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613-2, Acoustics - Sound Attenuation during Propagation Outdoors. Using the turbine sound power levels as a basis, the model calculates the sound pressure level that would occur after losses from distance, air absorption and ground effects are considered. The ISO 9613-2 model is based on an omni-directional downwind condition. That is, the noise prediction algorithms assume every point at which the sound level is calculated is downwind of all turbines simultaneously. In essence, the prediction assumes each receiver is a "black hole" and the wind is blowing from each turbine and into this "black hole." While this is physically impossible, the ISO 9613-2 model has been widely and successfully used to develop acoustical models of average sound levels for wind energy and other facilities. When receivers are located in an upwind or crosswind condition, lower sound levels may be expected. This analysis focuses on the downwind condition, consistent with ISO 9613-2. The predicted values represent the calculated long-term average performance based on the sound data provided for this Project and the calculation methods described herein. The combination of these factors are expected to represent an assessment of the long-term average Project sound level. The predicted results are subject to both negative and positive variance, the level of which varies on a number of factors, including timescale, metric, and methods of evaluation.

Alameda County Noise Performance Standards

Alameda County has expressed sound level limits in terms of the day/night average sound level (L_{dn}) metric. The L_{dn} is a 24-hour average that includes a 10 A-weighted decibels (dBA) nighttime (10 p.m. to 7 a.m.) penalty. For a continuous sound over a 24 hour period, the L_{dn} will always be 6.4 dBA greater than the steady sound level. That is, a steady sound level of 58.6 dBA over a 24-hour period would yield an L_{dn} of 65 dBA. The L_{dn} attributable to the Project's wind turbine operations was determined by adding 6.4 dBA to the predicted ISO 9613-2 results.

Results

CH2M conducted an ISO 9613-2 model run for both the GE and Vestas turbine models under consideration for the Project. Table 1 presents the coordinates of the closest residences to the proposed Project and the anticipated Ldn attributable to the Project at identified residences. Table 2 identifies the modeled locations of the proposed WTG sites. Results represent the greatest predicted noise levels from the GE and Vestas turbine models. The WTG located closest to each residence is predicted to have the greatest contribution to the overall sound level. The locations of the proposed WTG sites and residences included in the modeling are presented on Figure 1.

Table 1. Sound Level at Nearby Residences
Summit Wind Repower Project

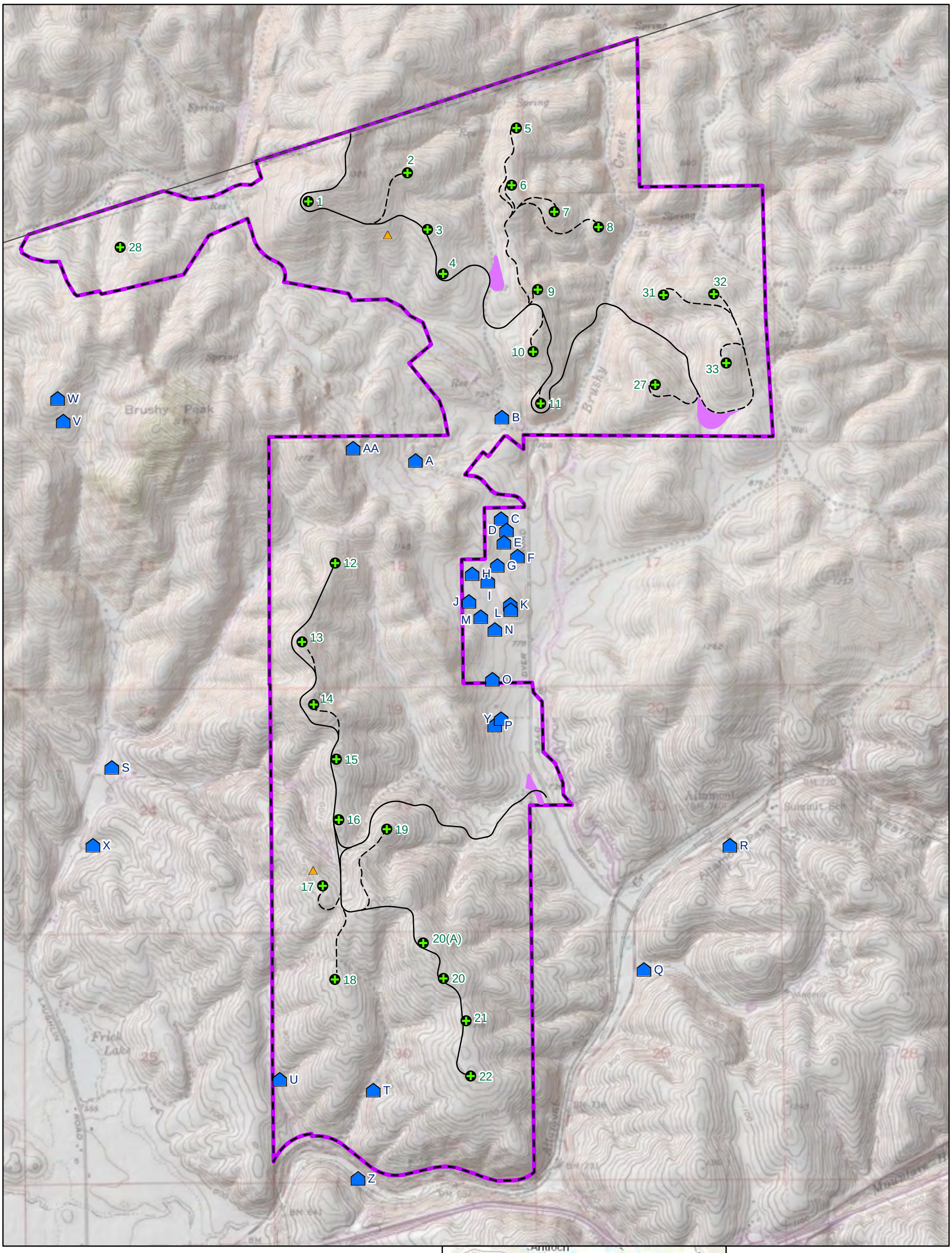
Residence ID	Status	Ldn (dBA)	Receptor Location UTM NAD 83 (m)	
			Easting	Northing
A	Leased Land	55	615761	4180554
B	Leased Land	61	616318	4180833
C		54	616312	4180181
D		54	616347	4180106
E		54	616330	4180029
F		53	616418	4179938
G		53	616287	4179877
H		54	616126	4179826
I		53	616226	4179776
J		54	616104	4179648
K		53	616372	4179626
L		53	616375	4179594
M		53	616181	4179548
N		53	616272	4179466
O		53	616256	4179144
P	Leased Land	54	616271	4178850
Q		51	617233	4177275
R		47	617786	4178075
S		50	613804	4178577
T	Leased Land	56	615489	4176498
U		53	614885	4176567
V		49	613490	4180809
W		49	613455	4180953
X		49	613682	4178076
Y	Leased Land	53	616312	4178891
Z		51	615390	4175927
AA	Leased Land	54	615359	4180633

Table 2. Modeled Locations of Project WTG Sites

Summit Wind Repower Project

Turbine ID	UTM NAD 83 coordinate (m)	
	Easting	Northing
WTG-1	615069	4182222
WTG-2	615709	4182408
WTG-3	615838	4182043
WTG-4	615939	4181756
WTG-5	616410	4182695
WTG-6	616380	4182328
WTG-7	616655	4182155
WTG-8	616939	4182059
WTG-9	616548	4181654
WTG-10	616518	4181254
WTG-11	616567	4180921
WTG-12	615243	4179893
WTG-13	615029	4179385
WTG-14	615105	4178981
WTG-15	615251	4178628
WTG-16	615266	4178240
WTG-17	615163	4177812
WTG-18	615241	4177208
WTG-19	615575	4178177
WTG-20	615941	4177217
WTG-20(A)	615811	4177443
WTG-21	616086	4176942
WTG-22	616117	4176587
WTG-27	617305	4181043
WTG-28	613858	4181927
WTG-31	617359	4181621
WTG-32	617682	4181627
WTG-33	617762	4181183

*(A) Alternative



LEGEND

- Project Boundary
- Proposed Turbine
- Proposed Met Tower
- Proposed Primary Road
- Proposed Secondary Road
- Proposed Laydown Area
- Residences

N

0 2,000

Feet

FIGURE 1
Project Layout
Summit Wind Repower Project
Alameda County, California

ch2m