3.12 NOISE

This section describes existing noise conditions in the KVWPP area and surrounding area. It also identifies potential impacts and mitigation measures designed to limit those impacts. The analysis in this section is primarily based on information provided by the Applicant in the ASC (Sagebrush Power Partners LLC 2003a, Section 4.1.1), and updated to reflect the revised 65-turbine layout (Baker and Bastasch 2005). Additional information used to evaluate the potential impacts has been referenced.

3.12.1 Affected Environment

Fundamentals of Acoustics

Sound travels through the air as waves of air pressure fluctuations caused by vibration. Because energy contained in a sound wave is spread over an increasing area as it travels away from the source, loudness decreases with distance. Noise is defined as unwanted sound. There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement.

A decibel (dB) is the unit used to describe the amplitude of sound. Noise levels are stated in terms of decibels on the A-weighted scale (dBA). This scale reflects the response of the human ear by filtering out some of the noise in the low- and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most noise ordinances and standards. The equivalent sound pressure level (L_{eq}) is defined as the average noise level for a stated period of time (such as hourly).

The dBA scale is logarithmic. Therefore, individual dBA ratings for different sources cannot be added directly to calculate the sound level for combined sources. For example, two sources, each producing 50 dBA will, when added logarithmically, produce a combined noise level of 53 dBA.

Noise Standards

There are two kinds of noise standards—absolute and relative. An absolute standard is a noise level that should not be exceeded, while a relative standard specifies the permissible increase in noise levels above background noise levels. The Washington State noise regulations specify absolute standards.

Section 173-60 of the WAC provides the applicable noise standards for Washington State, including Kittitas County. Kittitas County has not adopted independent state-approved noise standards pursuant to WAC 173-60-110. WAC 173-60 establishes maximum permissible environmental noise levels. These levels are based on the environmental designation for noise abatement (EDNA), which is defined as an area or zone (environment) within which maximum permissible noise levels are established. There are three EDNA designations (WAC 173-60-030), which generally correspond to residential, commercial/recreational, and industrial/agricultural uses:

- Class A: Lands where people reside and sleep (such as residential);
- Class B: Lands requiring protection against noise interference with speech (such as commercial/recreational);
- Class C: Lands where economic activities are of such a nature that higher noise levels are anticipated (such as industrial/agricultural).

For the purpose of this analysis, noise-sensitive areas in the project vicinity include Class A and Class C EDNA. Table 3.12-1 summarizes the maximum permissible levels applicable to noise received at noise-sensitive areas (Class A EDNA) and at industrial/agricultural areas (Class C EDNA) from an industrial facility (Class C EDNA).

Table 3.12-1: State of Washington Noise Regulations

Statistical Descriptor	Maximum Permissible Noise Levels (dBA)		
	Class A EDNA Receiver[1]		Class C EDNA Receiver [2]
	Daytime (7 a.m. – 10 p.m.)	Nighttime (10 p.m. – 7 a.m.)	Anytime
L_{eq}	60	50	70
L_{25}	65	55	75
$L_{16.7}$	70	60	80
$L_{2.5}$	75	65	85

Source: WAC 173-60

1 Term used for locations where noise may affect frequent human activities.

2 Standard applies at the property line of the receiving property.

The following are exempted from the limits presented in Table 3.12-1 (per 173-60-050 WAC):

- Construction noise (including blasting) between the hours of 7 a.m. and 10 p.m.;
- Motor vehicles when regulated by 173-62 WAC (Motor Vehicle Noise Performance Standards for vehicles operated on public highways);
- Motor vehicles operated off public highways, except when such noise affects residential receivers.

Note that 173-60-50(6) WAC states, "Nothing in these exemptions is intended to preclude the Department [of Ecology] from requiring installation of the best available noise abatement technology consistent with economic feasibility."

There are no state or Kittitas County regulatory limits for allowable increases above background noise levels caused by industrial projects. However, with regard to increases in A-weighted noise levels, listed below are definitions of how noise can be perceived (Kryter 1970).

- Except in carefully controlled laboratory experiments, the human ear cannot perceive a change of 1 dBA;
- Outside the laboratory, a 3-dBA change is considered a just-perceivable difference;

- A change in level of at least 5 dBA is required before any noticeable change in community response can be expected;
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and would likely cause an adverse community response.

Proposed Action

Noise Study Methodology

The study area for the KVWPP noise impact analysis included all areas where residents have the potential to hear construction or operational noise from the project.

The effects of noise on people fall into three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with such activities as speech, sleep, and learning; and
- Physiological effects such as startling and hearing loss.

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the third category. There is no completely satisfactory way to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily a result of the wide variation in individual thresholds of annoyance and adjustment to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it with the existing or ambient environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual (California Energy Commission [CEC] 2001a).

Table 3.12-2: Sound Pressure Levels of Representative Sounds and Noises

Source	Decibels	Description
Large rocket engine (nearby)	180	
Jet takeoff (nearby)	150	
Pneumatic riveter	130	
Jet takeoff (60 meters)	120	Pain threshold
Construction noise (3 meters)	110	
Subway train	100	
Heavy truck (15 meters), and Niagara Falls	90	Constant exposure endangers hearing
Average factory	80	
Busy traffic	70	
Normal conversation (1 meter)	60	
Quiet office	50	Quiet
Library	40	
Soft whisper (5 meters)	30	Very quiet
Rustling leaves	20	
Normal breathing	10	Barely audible
Hearing threshold	0	

Source: Tipler 1976

The KVWPP noise analysis was based on noise level measurements taken in the field, vendor-supplied noise data associated with the 1.5 MW wind turbines proposed for this project (under the 330 foot turbine scenario), and computer modeling of the turbine strings using the L_{eq} descriptor (see Operations and Maintenance Impacts, below, for further discussion of noise modeling).

Project Area Land Uses and Noise Sources

The project would be located in mostly undeveloped hilly terrain in a rural area with low population density. There are approximately 60 residential structures within 1 mile of the proposed wind turbine strings. Distances range from approximately 790 to 3,230 feet from the closest wind turbine. Figure 3.12-2 shows the location of the proposed wind turbines, residences, and property lines. The primary source of noise in the project area is wind and vehicular traffic along US 97 that bisects the project site.

Noise Measurements and Ambient Noise Levels

Ambient (background) noise is defined as the total of all noise in a system or situation, excluding the sound source of interest (USDOT and FHWA 1980). Because the project area and general vicinity are rural and sparsely populated, background noise levels at locations distant from traveled roadways are relatively low. Ambient noise level measurements were measured at three separate locations (referred to as Locations A, B, and C) to describe the existing noise environment and to identify major noise sources in the project area (Figure 3.12-1). Reference wind speeds also were measured at the monitoring locations. Noise measurements were taken between December 1 through 14, 2002. The results of noise measurements at the three monitoring locations are described in further detail below. (See Appendix D for graphics illustrating the results of background noise measurements.)

Location A

Noise measurement Location A is located along Bettas Road, west of proposed turbine string F (see Figure 3.12-1). Ambient hourly L_{eq} noise levels at Location A, measured from December 1 through December 12, 2002, ranged from below 20 dBA to the upper 40s dBA, with an approximate average over the 12-day monitoring period in the mid-40s dBA. Location A followed a common trend, with noise levels decreasing at night and increasing during the day. Wind speeds at this measurement location were always below 10 mph.

Location B

Noise measurement Location B is located along US 97, just south of this roadway's intersection with Bettas Road (see Figure 3.12-1). Ambient hourly L_{eq} noise levels at Location B, measured from December 5 through December 14, 2002, ranged from the low 40s dBA to the mid-60s dBA, with an approximate average over the 10-day monitoring period in the mid-50s dBA. Similar to Location A, Location B followed the same common trend, with noise levels decreasing at night and increasing during the day. Wind speeds at the measurement location were always below 10 mph.

Figure 3.12-1

Location C

Noise measurement Location C is located between proposed turbine strings I and J in the eastern portion of the project area (see Figure 3.12-1). Ambient hourly L_{eq} noise levels at Location C, measured from December 1 through December 12, 2002, ranged from the low 20s dBA to the mid-40s dBA, with an approximate average over the 12-day monitoring period in the upper 30s dBA. Similar to Locations A and B, Location C followed the same common trend, with noise levels decreasing at night and increasing during the day. Wind speeds at the measurement location were not available during the monitoring period because of lack of equipment.

Offsite Alternatives

Alternative 1: Swauk Valley Ranch

Noise-sensitive areas in the Swauk Valley Ranch project vicinity include Class A and Class C EDNA. The study area for project-related noise impact analysis includes all areas where residents have the potential to hear construction or operational noise from the project. Approximately 60 residential structures are located within 1 mile of the proposed wind turbine strings. Most of these structures are located downslope along the Yakima River and south of the project site. The primary source of existing noise in the project area is wind and vehicular traffic on SR 10.

Alternative 2: Springwood Ranch

Existing sound levels in the vicinity of the Springwood Ranch site have not been measured. Given the existing low-density land uses in the area, however, it is likely that the predominant sound source in the southern portion of the site is I-90, and that farther from the freeway the sound levels are relatively low. Operation of agricultural equipment on the ranch and in nearby areas likely creates intermittent, localized noise. Potentially sensitive receivers for this alternative include scattered developed sites near Taneum Creek to the south of the site; nearby residences to the east along the Thorp Highway; school and residential uses within the nearby community of Thorp; and the Sunlight Waters residential/recreational community near the northwest corner of the site. The potential receivers in Thorp and Sunlight Waters would be classified as Class A EDNAs, while those potential receivers in the rural areas would be classified as Class C EDNAs.

3.12.2 Impacts

Proposed Action

This section evaluates potential noise impacts that could result from construction and operation of the proposed project. Direct impacts would occur if noise levels exceed WAC criteria for maximum permissible noise levels for a particular receptor or land use. Indirect impacts are not anticipated because the project is not expected to substantially induce regional growth to the extent that would result in significant changes to offsite noise. Table 3.12-3 summarizes potential noise impacts under the proposed action scenarios.

Table 3.12-3: Summary of Potential Noise Impacts of the Proposed Action

	330 Foot Turbine Scenario	410 Foot Turbine Scenario
Construction Impacts		
Noise generated by construction equipment	See EIS Table 2-4 for list of construction equipment	Same as 330 foot turbine scenario
Blasting noise/conflicts with nearby residential land use	Up to 130 blasts for foundation construction	Up to 130 blasts for foundation construction
Noise generated by construction traffic	311 PM peak-hour trips (Total of 24,878 heavy truck trips with gravel import)	330 PM peak-hour trips (Total of 24,878 heavy truck trips with gravel import)
Operations and Maintenance Impacts		
Noise generated by wind turbines	EDNA Class A threshold potentially exceeded at two residential receptors	Same as or less than 330 foot turbine scenario
Noise generated by high-voltage transmission lines	Within regulatory limits	Within regulatory limits
Noise generated by traffic	24-28 trips daily; no substantial adverse noise effect	Same as 330 foot turbine scenario
Vibration effects	None	None
Decommissioning Impacts	Similar in type but shorter in duration compared to those anticipated for the construction phase	Similar in type but shorter in duration compared to those anticipated for the construction phase

Source: Sagebrush Power Partners LLC 2003a, c, f; and Baker and Bastasch 2005.

Construction Impacts

During the construction phase of the proposed project, noise from construction activities would add to the noise environment in the immediate area. Construction activities would be temporary in nature.

Construction Equipment Noise

Residences in the vicinity of the project site could be exposed to moderate to high levels of construction noise associated with grading and earthmoving activities, hauling of materials, building of structures, and construction of turbine towers. Project construction would require approximately the same type, number, and duration of equipment regardless of the size of turbines being built (Sagebrush Power Partners LLC 2003f). The number of truck trips associated with construction would also not vary depending on the proposed action scenario (see the discussion of Construction Traffic Noise, below).

WAC 173-60-050 specifically exempts construction activity noise impacts to Class A (residential) properties during daytime hours (between 7 a.m. and 10 p.m.). Construction noise limits are less restrictive because the noise is temporary. Noise generated by construction equipment is expected to vary, depending on the construction phase. Table 3.12-4 summarizes noise levels produced by construction equipment that would likely be used on the project site at various distances.

Table 3.12-4: Noise Levels from Common Construction Equipment

Construction Equipment	Noise Levels at Various Distances (dBA)			
	50 feet	1,000 feet	2,500 feet	5,000 feet
Bulldozer (250 to 700 horsepower)	88	62	54	43
Front-end loader (6 to 15 cubic yards)	88	62	54	43
Truck (200 to 400 horsepower)	86	60	52	41
Grader (13- to 16-foot blade)	85	59	51	40
Shovel (2 to 5 cubic yards)	84	58	50	39
Portable generators (50 to 200 kilowatts)	84	58	50	39
Mobile crane (11 to 20 tons)	83	57	49	38
Concrete pumps (30 to 150 cubic yards)	81	55	47	36
Tractor (3/4 to 2 cubic yards)	80	54	46	35

Source: Barnes et al. 1977.

Blasting Noise

Nearby residents could potentially be disturbed by the project's temporary construction activities, such as blasting for turbine foundations. Blasting activities are specifically exempt from the noise regulations (WAC 173-69-050). It is estimated that these activities would occur for eight weeks during the foundation excavation phase of construction. Due to rocky site conditions, it is anticipated that most wind turbine foundations would require one to two blasts each over the eight-week construction period (Sagebrush Power Partners LLC 2003a, Section 4.1.1.4.1). Blasting would take place in the daytime during the spring, summer, or fall season. (See Chapter 2 of this EIS for further details.)

The closest residential structure under the 330 foot turbine scenario is approximately 790 feet from the nearest turbine (H23) (Genson property). The wind option agreement this landowner (Genson) has with the Applicant contains provisions for generally accepting the impacts (including noise effects) of having turbines on their property. However, the majority of structures are located from 1,000 and 3,200 feet from the closest wind turbine (Table 3.12-5). Due to the intermittent and temporary nature of proposed construction activities and the distance of the project site from residents, noise from these activities would not substantially impair residential land uses.

Construction Traffic Noise

Construction vehicles traveling on local roadways and other nearby roads would temporarily increase noise levels. (See Section 3.10, Transportation, for further discussion of construction-generated traffic impacts.) However, this construction traffic would be temporary and is not anticipated to be an adverse impact.

Operations and Maintenance Impacts

Wind Turbine Noise

The proposed wind turbines could potentially operate 24 hours per day during continuously windy periods, and not at all when winds are calmer. Although the exact turbine model to be used for the proposed action scenario has not been determined, representative values for the type of equipment being considered for the project have been used for this analysis. The selected turbines are expected to be warranted by the manufacturer not to exceed a maximum sound pressure level of 103 dBA with a wind speed of 18 mph at 33 feet from the base of the tower in accordance with the protocol established in International Electrotechnical Commission (IEC) 61400. This is approximately equivalent to a sound pressure level of 72 dBA at 50 feet from the turbine. However, a sound pressure level between 98 and 108 dBA is representative of the range of noise test data for all turbines under consideration for the proposed project (Sagebrush Power Partners LLC 2003f; Baker and Bastasch 2005).

Modeled Noise Levels

To collect meaningful noise data for a wind turbine project, the wind must be moving fast enough to at least engage the wind turbine blades (between 7 to 10 mph). When these windy conditions exist, they often result in significant wind noise on the microphone that adversely affects the quality of the noise data collected. Accurate noise measurements require high enough wind speeds at the turbine to generate noise and low enough wind speeds at the measurement location to avoid wind-induced microphone noise. Therefore, although background noise measurements were collected (as described above in the Affected Environment section), the project's noise impact analysis is based on manufacturers' noise emissions data available for the G90-2MW turbine manufactured by Gamesa Eolica (with a hub height of 220 feet) and internationally recognized noise modeling standards. The procedures for determining sound pressure levels from wind turbines are defined in IEC 61400 Wind Turbine Generator Systems Part 11: Acoustic Noise Measurement Techniques (Reference Number: IEC 61400-11:1998[E]). The measurement technique outlines procedures to determine corrections for background noise, apparent sound pressure level, and wind speed dependence (Sagebrush Power Partners LLC 2003c; Baker and Bastasch 2005).

Noise modeling was based on a turbine sound pressure level of approximately 105.3 dBA. In general, if the sound pressure level decreases by 5 dBA the resulting sound pressure levels at the receivers would also decrease by approximately 5 dBA. The shape of the sound pressure level contours would not change. However, their value would be adjusted downward by 5 dBA (i.e., the current 45 dBA contour would be relabeled as the 40 dBA contour). Similarly, if the turbine sound pressure level increased, the resulting sound levels and contours would be adjusted upward. A sound pressure level between 98 and 108 dBA is representative of the range of turbine noise test data for all the turbines under consideration for the proposed project (Sagebrush Power Partners LLC 2003f). Therefore, the estimated noise levels at structures and property lines in Table 3.12-5 may increase or decrease by 5 dBA depending on final turbine selection. The Applicant has committed, however, to perform new noise modeling for the final

type, size and layout of turbines, to confirm that regulatory noise limits are not exceeded by any turbine.

Daytime noise levels for residential structures (Class A EDNA) are required by 173-60 WAC not to exceed 60 dBA, while nighttime levels are not to exceed 50 dBA. Table 3.12-5 identifies properties in the project area located within 3,000 feet of a proposed turbine, the distance between structures (if any) to the closest wind turbine, the distance between property lines and the closest wind turbine, and the predicted noise level at structures and property lines with an assumed wind speed of 18 mph. Figure 3.12-2 illustrates predicted noise contours in the project area in relation to existing structures and property lines. As summarized in Table 3.12-5, the project is anticipated to result in noise levels ranging from 30 to 49 dBA. The results indicate that noise levels would be below the most restrictive nighttime regulation of 50 dBA. Therefore, no significant noise impacts to Class A properties are anticipated during the daytime or nighttime operations of the proposed project. However, regulatory thresholds might be exceeded if the sound pressure level for the turbine selected for construction is greater than the modeled scenario. See Section 3.12.3 for recommended mitigation measures to address this issue.

Noise levels for Class C EDNA (industrial/agricultural) are not to exceed 70 dBA at property lines. Noise levels at the property lines of Class C parcels within the project area range from less than 35 dBA to a maximum of 50 dBA (see Table 3.12-5). Because the predicted noise level is below the threshold established for Class C properties by the WAC, no significant noise impacts are anticipated.

Wind turbine heights could range from 330 feet to 410 feet. However, the height of the wind turbine has very little bearing on the noise level at the analyzed receivers or property lines, as described below.

The “NM 82 wind turbine,” with a rotor diameter of 82 meters (270 feet), is a turbine model representative of the larger 410 foot turbine scenario. While the Applicant is seeking approval for turbines up to 90 meters (295 feet) in rotor diameter, turbines in this size range are currently in the prototype stage. The Applicant has stated in the ASC that turbines commercially proven through significant operating experience will be selected for use at this project. The largest turbines that are actually in commercial operation in the United States, which are in the 80- to 82-meter (262- to 270-foot) rotor diameter size range are a good substitute for evaluating the noise impacts of a 410 foot turbine. The NM 82 wind turbine has a maximum sound power level of 103.3 dBA. This is 2 dBA quieter than the 105.3 dBA included in the noise model presented in this EIS. Since there would still be no more than 65 turbines constructed, and since the turbines would be on taller towers, the noise impact of the NM 82 turbine would be the same or less than the noise modeling and analysis presented in Table 3.12-5.

Table 3.12-5: Predicted Noise Levels in KVWPP Area

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A [3]	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C [4, 5]	Nearest Turbine to Property Line
ACKERSON	19-17-15	2489	I16	42	1959	40-45	I16
AHLES	19-17-04	2178	G1	38	2157	35-40	G1
ANDERSON	19-17-26		C7	33		<35	C7
ANDREW	19-17-11	723	H5	49	PARTICIPATING LANDOWNER		
ARONICA	19-17-01	No Structure			546	45-50	I1
ARRIOLA	19-17-09	No Structure			1273	40-45	A1
ASSESSOR #19-17-26000-0016	19-17-26	No Structure			2891	35-40	C7
BARKL	19-17-23	No Structure			1254	40-45	E4
BASTERRECHEA	19-17-27	No Structure			2179	35-40	B7
BELL	19-17-09	1740	F5	43	1079	40-45	F5
BERGMAN	20-17-35		I1	29		<35	I1
BEST	19-17-12	4946	I1	35	2469	35-40	J1
BISNETT	19-17-09	No Structure			3864	35-40	F1
BLM	19-17-20	No Structure			750	35-40	A4
BLUME	19-17-23	3673	J6	36	3230	35-40	J6
BORSVOLD	20-17-35		G1	26		<35	G1
BNSF RAILWAY	19-17-28	No Structure			2675	35-40	B5
BRINKMAN	19-17-01	4691	I1	34	2184	35-40	I1
BROWN	19-17-26	3549	C7	36	2712	35-40	C7
BURDYSHAW	19-17-02	No Structure			1437	40-45	H1

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

Table 3.12-5 Continued

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A 3	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C 4, 5	Nearest Turbine to Property Line
	19-17-23	3146	I16	39			
BURT	19-17-23	3112	E4	39	2350	35-40	E4
	19-17-23	2979	E4	39			
BURKE	19-17-03	No Structure				<35	G1
CAMERON	19-17-23	4485	E4	36	3903	35-40	J6
	19-17-23	4567	E4	36			
CAMPBELL, G	19-17-09	1595	F1	40	1476	40-45	F1
CAMPBELL, J	19-17-23	No Structure			1114	40-45	E4
CAMPBELL, M	19-17-23	2244	E3	41	1114	40-45	E4
CHAR	19-17-26	No Structure			2717	35-40	C7
COE			G1	32		<35	G1
CORNWALL	19-17-01	No Structure			2331	35-40	I1
CRAMER	20-17-35		G1	32		<35	G1
DARROW	19-17-23	3138	E4	38	2762	35-40	E4
DE FACCIO	19-17-28	No Structure			2753	35-40	B5
DER YUEN	19-17-34	No Structure			2323	35-40	B7
DNR		No Structure			PARTICIPATING LANDOWNER		
DOT	19-17-09	No Structure			1275	40-45	F2
ENGELSTAD	19-17-26	3391	C7	38	2180	40-45	C7
FOTHERGILL	20-17-35		I1	29		<35	I1
FITZGERALD	19-17-04	2858	G2	37	2442	35-40	G2
FOSSETT	19-17-02	4172	H1	36	3331	35-40	H1
FRANKLIN	19-17-23	5080	E4	36	4299	35-40	J6

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

EIS Table 3.12-5 Continued

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A 3	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C 4, 5	Nearest Turbine to Property Line
FREEMAN	19-17-26	4680	C7	35	3727	35-40	C7
GABRIELSON	19-17-12	No Structure			631	45-50	J1
GALLAGHER	19-17-13	No Structure			1260	40-45	J2
GARRETT	19-17-13	No Structure			538	45-50	J3
GASKILL	19-17-09	1816	F2	41	1678	40-45	F2
GENSON		1026	H10	45	PARTICIPATING LANDOWNER		
GEORGE	19-17-28	No Structure			2239	35-40	B7
GEREAN, L	19-17-01	1800	I1	39	1426	40-45	I1
GEREAN, T	19-17-01	2503	I1	38	2094	40-45	I1
GORDON	19-17-23	No Structure			3539	35-40	E4
GORSKI	19-17-12	No Structure			1114	40-45	J1
HAMPTON	20-17-35		G1	32		<35	G1
HARRIGAN	20-17-35		I1	28		<35	I1
HAVENS	19-17-27	1994	B6	41	985	40-45	B7
HAWLEY	19-17-23	2386	J6	39	1824	40-45	J6
HENLEY GROUP	19-17-04	2121	G1	37	1905	35-40	G1
HENRY	19-17-12	3060	J1	36	594	45-50	J1
HENSON	19-17-27	1884	B7	39	1480	35-40	B7
HIGGINBOTHAM	19-17-23	3724	E4	37	3582	35-40	E4
	19-17-23	3845	E4	37			
HILL			G1	21		<35	G1

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

Table 3.12-5 Continued

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A 3	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C 4, 5	Nearest Turbine to Property Line
HINK	19-17-04	2935	F1	37	2270	35-40	F1
HOLLISTER	19-17-23	No Structure			557	45-50	J6
HOLMQUIST	19-17-21	No Structure			984	40-45	B1
HOLTZ	19-17-09	No Structure			1497	35-40	F1
JACKSON, MARK S.	19-17-09	2326	A1	37	1823	35-40	A1
JARNAGIN	201-17-35		I1	31		<35	I1
JONES	19-17-26	3102	C7	38	1917	40-45	C7
JORGENSON	19-17-09	No Structure			2203	35-40	F1
KELLY	19-17-28	No Structure			2837	35-40	B7
KIRCHMAN	19-17-13	No Structure			775	45-50	J3
KITTITAS CO TAX DEED	19-17-28	No Structure			3256	35-40	B4
KITTITAS RECLAMATION DISTRICT	19-17-26	No Structure			713	40-45	B7
KUHN	19-17-13	No Structure			910	40-45	J2
LEGOWSKI	20-17-35		G1	33		<35	G1
LOS ABUELOS		No Structure			PARTICIPATING LANDOWNER		
MARTIN	19-17-04	4360	F1	35	2757	35-40	F1
MCFARLAND	19-17-28	No Structure			1462	40-45	B4
MCLEOD	19-17-28	No Structure			3150	35-40	B5
MILLETT	19-17-23	2098	E3	41	1155	40-45	E4
MEYER	19-17-01	No Structure			2740	40-45	I1

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

Table 3.12-5 Continued

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A 3	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C 4, 5	Nearest Turbine to Property Line
MILLER	19-17-15	No Structure			1284	40-45	I16
MORRAITIS	19-17-02	1000	H1	48	758	45-50	H1
MOERY	20-17-35		I1	33		<35	I1
MORSE	19-18-07	No Structure			3560	35-40	J1
MURPHY	19-17-23	No Structure			3271	35-40	J6
NIELSEN	20-17-35		I1	32		<35	
NELSON CREEK VISIONS	19-17-09	No Structure			3514	35-40	F2
NELSON	19-17-14	1253	J3	46	538	45-50	I13
NEUMAN	19-17-27	No Structure			2158	35-40	B7
NORTH	19-17-09	2622	A1	38	1955	35-40	A1
OBERHANSLEY	19-17-02	No Structure			2662	45-50	H1
PARKER	19-17-01	No Structure			2277	35-40	I1
PEARSON	19-17-27	No Structure			1232	35-40	B7
PENTZ	19-18-07	No Structure			3196	35-40	J1
POLLOCK	19-17-34	No Structure			2320	35-40	B7
POULIN	19-17-26	No Structure			1642	35-40	C7
PTASZYNSKI	19-17-26	2904	C7	36	2159	35-40	C7
RAINBOW VALLEY RANCH LLC	19-17-04	2352	G1	37	2039	35-40	G1
RANCH ON SWAUK CREEK LLC, THE	19-17-03	6322	G1	29			
	19-17-03	5959	G1	29	580	45-50	G1
	19-17-03	5583	G1	30			
RAND	19-17-09	No Structure			1412	40-45	F4

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

Table 3.12-5 Continued

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A 3	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C 4, 5	Nearest Turbine to Property Line
REILLEY	19-17-26	No Structure			1716	40-45	C7
ROBERTSON	19-17-09	1373	A1	42	1239	40-45	A1
ROMERO	19-17-15	No Structure			1195	40-45	I16
SAFFORD	19-17-09	No Structure			4325	35-40	F2
SANDALL	20-17-35		G1	32		<35	G1
SAUNDERS	20-17-35		I1	30		<35	I1
SCHALLER	19-17-09	No Structure			2306	35-40	F1
SCHOBER		No Structure			PARTICIPATING LANDOWNER		
SCHWAB	19-17-13	2098	J4	41	575	45-50	J4
SIEGL	20-17-35		I1	31		<35	I1
SHERMAN	19-17-13	No Structure			854	45-50	J6
SHORETT	19-17-09	No Structure			2118	35-40	A1
SHULTS	19-17-23	3359	E4	38	1262	40-45	E4
		3448	E4	38			
SIX TEN INVESTMENTS	19-17-26	No Structure			1355	40-45	C7
SLAPE	20-17-35		I1	33		<35	I1
SMITH	19-17-15	No Structure			1492	40-45	I16
SPRINGWOOD RANCH	19-17-28	No Structure			3281	35-40	B4
STEWART	20-17-35	3804	I1	35	3321	35-40	I1
STORWICK	19-17-15	No Structure			1509	40-45	E2
SWAUK VALLEY RANCH	19-17-17	No Structure			612	45-50	A4

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

Table 3.12-5 Continued

Parcel owner	Township-Range-Section of closest property line	Approx. Distance from Structure to Turbine (feet)	Nearest Turbine to Structure	Estimated Noise Level at Structure (dBA) EDNA Class A 3	Approx. Distance from Property Line to Turbine (feet)	Estimated Noise Level at Property Line (dBA) EDNA Class C 4, 5	Nearest Turbine to Property Line
SWEEN	20-17-35		I1	23		<35	I1
SZUBA	19-18-07	No Structure			3215	35-40	J1
TAASEVIGEN	19-17-23		J6	35		<35	J6
TATE	19-17-26	3081	C7	37	2958	35-40	C7
	19-17-04	2555	F1	36			
THAYER		2339	F1	37	1880	35-40	G2
		2227	F1	37			
THOMAS		No Structure			PARTICIPATING LANDOWNER		
THOMPSON, B	19-17-14	1226	J6	45	575	45-50	I14
THOMPSON, C	19-18-07	No Structure			3156	35-40	J1
TONSETH	19-17-28	No Structure			2195	35-40	B5
US TIMBERLANDS YAKIMA LLC			G1	25			
WEILER	20-17-35	No Structure			4607	35-40	I1
WHITELEY	19-17-15	No Structure			1185	40-45	I16
WILKENS	19-17-13	No Structure			580	45-50	J4
WILSON	20-17-35	5759	H1	34	4769	35-40	H1
WINES	19-17-23	No Structure			704	45-50	I16
WINES/SNOVER	19-17-23	2921	J6	39	996	40-45	I16
WINKLE	19-17-23	3869	E4	37	3300	35-40	E4
YEAGER	19-17-04	2442	G2	36	1894	35-40	G2
ZELLMER	19-17-23	1547	E3	43	1220	40-45	I16

Source: Baker and Bastach 2005; Schafer 2005g.

1 Property owners in the KVWPP area where turbines are proposed but no structure is present that have not been included in this table include: L. Tritt, Pautzke Bait Co., C. Thomas, D. and M. Green, J. Majors, Cascade Field & Stream, K. Krogstad, Los Abuelos, Inc., and A. Steinman.

2 "No Structure" indicates that aerial photography does not show a structure on the property.

3 The EDNA classification for noise levels at structures is Class A. The maximum permissible daytime noise level at a Class A receptor is a Leq of 60 dBA, and the maximum permissible nighttime noise level at a Class A receptor is a Leq of 50 dBA. Approximate noise levels are presented at a predicted specific level (as opposed to a range) for those parcel owners that approach the 50 dBA nighttime noise threshold.

4 The EDNA classification for noise levels at property lines is Class C. The maximum permissible noise level (daytime or nighttime) at a Class C receptor is a Leq of 70 dBA.

5 In general, noise levels at property lines were not estimated for property owners with signed wind option agreements with the Applicant.

Increase in Ambient Background Noise Levels

Ambient background noise levels were not measured at specific project area receptors. However, general observations can be made based on available data. As described above in the Affected Environment section, ambient background noise levels were measured over several days at three locations within the project area. Throughout the measurement period, wind speed at Location A and B measurement sites never exceeded 10 mph. Noise levels varied throughout the day and for the most part depended upon wind speeds.

Predicted noise levels during project operation at the residences closest to noise measurement Location A (owners Anthony and Gaskill) ranged between 40 to 45 dBA. This corresponds to the ambient average L_{eq} dBA measured in the mid-40s. Predicted operational noise levels at the two structures closest to noise measurement Location B (owners Zellmer and Genson) resulted in noise levels ranging between 43 to 45 dBA. These are lower than the ambient noise levels in this area with a L_{eq} average measured in the low to mid-50s dBA. Based on this comparison, the anticipated difference between the measured ambient and predicted noise levels at these receptors should not be perceived as a noticeable increase. Location C had an average L_{eq} dBA over the 12-day monitoring period in the mid- to upper 30s. Predicted noise levels during project operations at the residences closest to this measurement location (owners Nelson and Steinman/Geisick) ranged between 45 to 46 dBA. Therefore, the anticipated difference between the measured ambient and predicted noise levels in this part of the project area could be subjectively heard as approximately a doubling in loudness and would likely cause an adverse community response.

As stated in Section 3.12.1 above, there are no state or Kittitas County regulatory limits regarding an allowable increase above background noise levels caused by industrial projects. Noise modeling results indicate that project operations would not exceed regulatory threshold levels. Furthermore, the Applicant has entered into wind option agreements with landowners on whose property wind power facilities are proposed. These agreements contain provisions for generally accepting the impacts (including noise effects) of having these turbines on their property (Taylor, pers. comm., 2003). However, lack of a regulatory standard does not preclude the possibility that changes in background noise levels could be perceived as adverse depending on the magnitude of that change and the nature of the receptor. Given the variation in the size and location of proposed turbines under the proposed action scenarios, distances between turbines and receptors, and effects of wind speed, perceived changes in noise levels throughout the project area would be variable, and could range from no perceived effect to an adverse effect. Given the level of concern raised by the public about the potential effects of operational noise and the variability of final turbine sizes and locations, mitigation measures are recommended below to ensure that project operations comply with applicable regulatory thresholds to protect nearby receptors from adverse noise effects.

High Voltage Transmission Line Noise

Noise associated with operation of proposed high-voltage transmission lines would be corona noise during infrequent wet or foggy weather. Corona noise is a low-frequency hum (120 hertz) and crackling caused by partial breakdown of the insulting properties of air surrounding the

electric conductor of the transmission line (Bonneville and EFSEC 2002). The high-voltage transmission lines associated with the project would be short (less than 200 feet long) and connect the proposed substations to existing high-voltage overhead transmission lines (either Bonneville or PSE). Audible noise from the transmission lines would comply with the Bonneville Power Administration's limits, namely an L_{50} level of 50 dBA at the edge of the right-of-way (Perry 1982). There are no existing dwellings within the right-of-way of the transmission lines. Therefore, corona noise is not expected to pose a significant noise impact.

Traffic Noise

Project operations would generate a small amount of traffic on local area roadways as workers commute to and from the O&M facility. The primary access route to the O&M facility would be US 97. Traffic noise levels depend on volume, speed, percentage of trucks, topography, vegetation, and distance from the roadway to the receptor. For example, roadway noise levels typically decrease 3 dB over hard ground (concrete or pavement) and 4.5 dB over soft ground (grass) for every doubled distance between the source and the receptor. Vehicular noise is a combination of noises from the engine, exhaust, and tires. It is estimated that 28 daily worker trips to and from the O&M facility would occur (see Section 3.10, Transportation). Given the magnitude of projected operational trips, this minor increase in traffic along US 97 would not generate substantial adverse noise effects.

Traffic between the O&M facility and individual turbines along project access roads would be minimal during operations because scheduled maintenance is generally performed only every six months on each turbine. This traffic would consist largely of weekly or less frequent trips to turbines in service vehicles for maintenance and repair activities. Therefore, vehicular noise generated along access roads during routine turbine maintenance activities would be infrequent and would not result in substantial adverse noise effects.

Vibration

During the EIS scoping process, the public expressed concern about the potential for project operations to generate and transmit vibration through the ground over considerable distances. Specific concerns ranged from the potential for vibration to disturb residents and wildlife as well as potential adverse effects to local groundwater wells.

Vibration can sometimes occur in connection with combustion turbine installations. Combustion turbines are capable of producing high levels of low-frequency noise. Low-frequency noise can couple with wood frame walls and windows to cause a mild but perceptible vibration. While these sound levels are virtually inaudible, the vibration may cause an adverse reaction (Bonneville and EFSEC 2002).

The Applicant and its consulting team indicate they are not aware of any wind turbine project where ground-borne vibration from an operating wind turbine has adversely affected nearby receptors or uses (Sagebrush Power Partners LLC 2003c). An Internet search by the EIS consultant also failed to identify research, reports, or other information to substantiate this concern. Therefore, it is the independent conclusion of the EIS authors that the proposed project

would not result in any significant impacts from ground-borne vibration (Reed, pers. comm., 2003).

Low-Frequency Noise

Although not specifically addressed in Washington State noise regulations, low-frequency sound that could disturb residents near the wind turbines has been identified as a concern. Historically, low-frequency noise from wind turbines has been produced by the flow of air over the blades or around the nacelle or tower. However, as the technology has matured, several methods of reducing this type of noise have emerged. The following noise-reducing methods are outlined in the document, "Permitting of Wind Energy Facilities" distributed by the National Wind Coordinating Committee (NWCC 2002):

- Orienting rotors on the "upwind" side of the turbine tower avoids the low-frequency sounds associated with the passage of the blades through the tower's wind shadow, as occurs on "down-wind" machines;
- Tubular towers and modern nacelles are streamlined, and produce little or no sound with the passage of the wind;
- As blade airfoils have become more efficient, more of the wind is converted into rotational torque and less into acoustic noise.

The KVWPP would use the "upwind" turbine design, in which the rotor is turned into the wind to place the generator and tower behind the blades. Also, the towers and nacelle are more streamlined than older turbine designs. Furthermore, soundproofing in nacelles has been increased. The generator, gears, and other moving parts located in the turbine nacelle produce mechanical noise. Soundproofing and mounting equipment on sound-dampening buffer pads helps to address this issue. Therefore, low-frequency noise impacts are not anticipated.

Decommissioning Impacts

Decommissioning activities would be similar in type but shorter in duration compared to those anticipated for the construction phase. Noise generated during decommissioning activities would be conducted between 7 a.m. and 10 p.m. No blasting would be required, resulting in lower noise levels than for construction. The same mitigation measures recommended during construction could also be used during the decommissioning phase.

Offsite Alternatives

Alternative 1: Swauk Valley Ranch

Noise generated by construction equipment is expected to vary depending on the construction phase, but would not be expected to substantially impair nearby residential land uses. Temporary blasting noise impacts would be associated with construction of the wind turbines. Construction vehicles traveling on local roadways and other nearby roads would temporarily increase noise levels.

Noise modeling for a hypothetical wind generation facility has not been performed for this alternative. Based on the modeled noise levels for projects under review by EFSEC or the County, it is possible that noise levels during project operations could exceed regulatory thresholds, depending on the distance between turbine strings and residences. Changes in background noise levels could be perceived as adverse depending on the magnitude of that change and the nature of the receptor. Minor increases in traffic along US 97 and project access roads during project operations would not be expected to generate substantial adverse noise effects. The project would not result in any significant impacts from ground-borne vibration.

Noise emissions resulting from decommissioning would be expected to be similar to, or lower than, noise levels encountered during construction.

Alternative 2: Springwood Ranch

Noise generated by construction equipment is expected to vary, depending on the construction phase, but would not be expected to substantially impair nearby residential land uses. Temporary blasting noise impacts would be associated with construction of the wind turbines. Construction vehicles traveling on local roadways and other nearby roads would temporarily increase noise levels.

Several residences are within approximately 500 feet of one or two turbine locations in the northwestern corner of the Springwood Ranch layout. The closest residences could be subject to operational noise in excess of the nighttime noise level of 50 dBA for EDNA Class A receivers, and/or noise level increases of about 10 dBA. It is possible that the proposed Springwood Ranch project might result in significant noise impacts to these residences unless the turbines in question were relocated or eliminated.

Noise emissions resulting from decommissioning would be expected to be similar to, or lower than, noise levels encountered during construction.

No Action Alternative

Under the No Action Alternative, the project would not be constructed or operated, and the environmental impacts described for the proposed action would not occur. The No Action Alternative assumes that future development would comply with existing zoning requirements for the project area, which is zoned Agriculture-20 and Forest and Range. According to the county's zoning code, the Agriculture-20 zone is dominated by farming, ranching, and rural lifestyles, and permitted uses include residential and agriculture and forestry practices. Permitted uses in the Forest and Range zone include logging, mining, quarrying, and agricultural practices, as well as residential uses (Kittitas County 1991). Agricultural activity and low-density housing would generate no significant noise impacts at residences in the project area. Any proposed mining or quarrying activity would be subject to noise restrictions under Chapter 173-60 WAC, Maximum Environmental Noise Levels.

If the proposed project is not constructed, it is likely that the region's need for power would be addressed by developing other generation sources. The construction and operation of a base load

gas-fired combustion turbine would create more noise than the proposed wind generation project. Impacts from a conventional gas turbine plant can exceed 110 dBA at 100 feet during steam blowdown activities, and operational noise levels can exceed 80 dBA at 100 feet (CEC 2001b). The noise impacts of a gas turbine generator would depend on its location and design. In some settings, it could be considered highly incompatible with the existing environment; however, in the appropriate location, noise impacts could be minor. Development of renewable energy facilities could result in similar noise levels to the KVWPP; the impacts would depend on the proximity of the facilities to homes.

3.12.3 Mitigation Measures

Proposed Action

Mitigation Measures Proposed by the Applicant

- Substation transformers and high-voltage switching equipment would be specified or designed to comply with the 70 dBA limit at all Class C EDNA property lines and 50 dBA at all Class A EDNA structures (Sagebrush Power Partners LLC 2003c);
- Blasting notification signage and temporary traffic control zones would be implemented along stretches of road within 1,000 feet of proposed blasting activities, and would be modeled after current WSDOT blasting notification standards.

In their final briefs submitted to EFSEC, the applicant committed to using industry standard noise attenuation controls during construction and to comply with applicable state and local noise emissions regulations. Blasting and loud construction activities would be limited to daytime hours between 7:00 a.m. and 10:00 p.m.

The following construction practices presented in the Draft EIS remain consistent with the Applicant's commitments:

- Maintain equipment in good working order and use adequate mufflers and engine enclosures to reduce equipment noise during operation;
- Turn off engines when not in use to eliminate needless engine idle noise;
- Locate stationary equipment away from receiving properties to help reduce the noise through increased distance between source and receiver;
- Coordinate construction vehicle travel to reduce the number of passes by sensitive receivers;
- Schedule noisy activities to occur at the same time since additional sources of noise generally do not add a significant amount of noise.

The use of noise barriers to reduce noise from stationary construction equipment is no longer being recommended. First, due to the nature of construction of a wind power facility over a large project area, there are few noise sources that remain in place for a long period of time, other than those associated with erection of permanent buildings. Second, due to the high winds in the area, barriers temporarily erected during construction would represent a safety hazard to construction workers.

Operations and Maintenance

During EIS scoping, concerns were raised about the effects of the project's operational noise on nearby residents. It was suggested that trees should be planted for property owners to buffer noise impacts. Retaining existing trees and shrubs and planting new vegetation around residences in the project area would reduce noise annoyance psychologically by removing the noise source from view. However, to actually reduce noise levels, vegetation must completely block the line of sight between the receptor and the wind turbine. In addition, the vegetative buffer must be of sufficient depth to reduce noise. For example, dense woods with a depth of 100 feet would be required to reduce noise by 5 dBA. This kind of sound reduction from intervening landscaping would be expected to occur in the forested, residential establishment northwest of the project site, referred to as "Section 35." However, on the rangeland portions of the site, planting dense landscaping of sufficient depth to reduce noise would require a change in use of adjacent agricultural and residential properties. Therefore, vegetative buffering to reduce noise is not considered to be a reasonable mitigation measure for those properties.

To ensure that noise levels in the project do not exceed regulatory thresholds during project operations, the Applicant would conduct an acoustical analysis of the final turbine layout for all wind turbines prior to project construction. The analysis would be conducted using noise level data for the final turbine type, size, and layout and would demonstrate compliance with WAC 173-60. If compliance is not demonstrated, turbines would be relocated or removed, to the extent necessary, so that the project meets applicable regulatory thresholds.

Offsite Alternatives

Alternative 1: Swauk Valley Ranch

The Swauk Valley Ranch alternative would implement mitigation measures for construction noise similar to those recommended for the proposed action. An acoustical analysis of the final turbine layout could be prepared similar to that described for the proposed action. Turbines could be relocated or removed, to the extent necessary to meet applicable regulatory thresholds.

Alternative 2: Springwood Ranch

The Springwood Ranch alternative would implement mitigation measures for construction and operational noise similar to those described for the proposed action and the Swauk Valley Ranch alternative.

No Action Alternative

No mitigation measures related to noise are proposed for the No Action Alternative.

3.12.4 Significant Unavoidable Adverse Impacts

With implementation of the proposed and recommended mitigation measures outlined above, no significant unavoidable adverse impacts from noise associated with constructing, operating, or decommissioning the proposed project would be anticipated.