3.2 AIR QUALITY

The proposed Desert Claim Wind Power Project would not involve the combustion of fossil fuels to generate electricity. Therefore, there would be no air quality impacts from the operation of the project to generate wind power. Any air quality impacts would be related to vehicle emissions and fugitive dust associated with construction of the project, or to maintenance activities throughout the life of the project.

3.2.1 Affected Environment

3.2.1.1 Regulatory Framework

The federal government and the Sate of Washington have varying responsibilities for regulating air quality. Under the federal Clean Air Act, the Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for pollutants of concern, including sulfur dioxide, particulate matter, nitrogen oxides, lead, carbon monoxide and ozone. Primary NAAQS are the levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health. Secondary NAAQS are the levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.

State-level responsibilities for administering air quality regulations are carried out by the Washington Department of Ecology (Ecology). In conformance with Section 110 of the Clean Air Act, Washington has adopted State Implementation Plans (SIPs) for maintaining air quality. SIPs establish limits or work practice standards to minimize emissions of criteria air pollutants or their precursors. Ecology has adopted ambient air quality standards that in some cases are more restrictive than the federal standards established by the EPA.

Ecology has also issued rules for permitting new stationary sources of air emissions, which establish new source performance standards for regulated pollutants. The new source performance rules do not include air emissions from construction activities. Wind turbines do not produce air emissions during operation, and therefore are not subject to the new source permitting process. Similarly, the Prevention of Significant Deterioration (PSD) regulations that govern proposed new or modified sources with the capability to emit pollutants above specified threshold values do not apply to wind energy projects because they do not burn fuel to produce electricity.

Washington regulates what are known as “fugitive” air emissions, which consist of pollutants that are not emitted through a chimney, smokestack, or similar facility. Blowing dust from construction sites, unpaved roads and tilled agricultural fields represents common sources of fugitive air emissions. Wind energy plants are not included in the facilities for which review and permitting of fugitive emissions are required (WAC 173-400-040). Nevertheless, the Washington rules require owners and operators of fugitive dust sources to take reasonable measures to prevent dust from becoming airborne and to minimize emissions.

3.2.1.2 Current Conditions

Under the provisions of the Clean Air Act, government entities must maintain levels of the pollutants of concern below the NAAQS. Failure to do so results in a designation of non-attainment. Non-attainment areas are defined as areas that do not meet (or that contribute to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for a pollutant. Areas that meet the national primary or secondary ambient air quality standard for pollutants are designated as

attainment areas. Those areas that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standards are listed as unclassifiable.

Kittitas County is not currently designated as non-attainment for any of the pollutants of concern listed in the Clean Air Act (EPA 2003). Conversely, Kittitas County is presumably in attainment for all criteria pollutants. Because of the sparse population and rural nature of most the County, existing sources of air pollution are likely to be minimal.

Based on observations of existing uses in the local area and review of existing air quality documentation (EPA 2003), the two most prevalent sources of air pollution in the Kittitas Valley are fugitive dust and vehicle emissions. Windblown dust is prevalent in non-irrigated agricultural areas, such as the area around the Desert Claim site. Fugitive dust and combustion emissions are generated in such environments by agricultural activities, vehicles traveling on dirt roads, construction, and other activities that disturb the soils and utilize combustion engines.

Air quality monitoring data specific to Kittitas County are limited. In recent years, the only active Kittitas County site in Ecology's air monitoring network has been a station at the Hal Holmes Center in Ellensburg (Site Number 1922003A), which has only recorded measured levels of particulate matter of 10 microns or less in diameter (PM10). Annual arithmetic means for PM10 at this station for 1995 through 1998 (the most recent years reported) ranged from 21 to 29 micrograms per cubic meter of air, well below the primary standard of 50 micrograms per cubic meter (Ecology 2000). The 24-hour maximum levels for the same period ranged from 41 to 112 micrograms per cubic meter, also well below the primary standard of 112 micrograms per cubic meter. Because these readings were taken at a site 8 to 10 miles from the Desert Claim project area, they may not be an accurate indication of PM10 levels in the project area.

The climate in the Kittitas Valley is heavily influenced by the nearby Cascade Mountain Range. The Cascade Mountains form a north-south topographic and climatic barrier influencing prevailing wind direction, temperature and precipitation. As air masses rise over the western slope of the Cascades, cooling and condensation occur producing heavy precipitation in the mountains. Descending air masses along the eastern slope become warmer and drier. The results of these factors are a dry and windy climate in the Kittitas Valley. Average precipitation in Ellensburg is approximately 8.9 inches per year (WRCC 2003). Average temperatures range from the teens in the winter to the mid 80s in the summer (Kittitas County 2003). Wind conditions for the Desert Claim project area are summarized in **Section 2.2.1.2**.

Baseline air quality conditions for the Wild Horse and Springwood Ranch sites (the respective locations for Alternatives 1 and 2) are likely to be similar to those discussed above, which apply generally to the Kittitas Valley. The predominant emission sources near these sites are likely to include vehicle traffic (particularly for the Springwood Ranch site, adjacent to I-90) and sources typically associated with agricultural and rural residential land use, such as equipment operation and wood burning for space heating.

3.2.2 Environmental Impacts of the Proposed Action

Impacts to air quality would be considered high if the proposed project created noticeable or measurable emissions of criteria pollutants that exceed NAAQS. Impacts would be considered moderate if the proposed project created noticeable or measurable emissions of criteria pollutants that would exceed NAAQS, and which could be partially mitigated with standard control practices. Impacts to air quality would be considered low if the proposed project created small or negligible amounts of noticeable or

measurable emissions of criteria pollutants which did not exceed NAAQS and could be mitigated through standard control practices (EPA 2003).

Air quality impacts resulting from the modified project configuration evaluated in the Final EIS would be essentially the same as for the proposed action evaluated in the Draft EIS. Construction and operation impacts would be the same in type, intensity and duration as described in the Draft EIS. As compared to the project layout evaluated in the Draft EIS, the modified project configuration analyzed in the Final EIS would result in very subtle shifts in the location or extent of potential air quality effects, with somewhat less project activity in the southeast corner of the project area and somewhat more activity in the northwestern portion of the project area. Despite this shift, construction and operation air quality impacts would remain insignificant with the modified project configuration.

3.2.2.1 Impacts During Construction

Overall impacts to air quality resulting from construction of the proposed project would be low. The primary sources of air pollution generated by construction would be vehicle exhaust emissions and fugitive dust particles from disturbed soils becoming airborne.

Sources of vehicle exhaust emissions would include heavy construction equipment operating on the site, trucks delivering construction materials and project components to the site, and vehicles used by construction workers to access the site. The amount of pollutants emitted from these sources would be relatively small, given the size of the construction work force and equipment fleet, and similar to other equipment commonly used for agriculture, transportation and construction in the Kittitas Valley. The emissions would generally be dispersed among multiple locations in and near the project area at any given time, rather than concentrated in a specific location, and would not likely reach significant concentrations at off-site locations. Such short-term emissions are exempt from air quality permitting requirements.

Similarly, review or permitting of fugitive emissions is not required for wind energy facilities. Construction activities that could create dust include clearing and grading for road improvements and turbine pads, clearing work areas around all types of project facilities, and underground utility cable trenching or plowing. As discussed in **Section 2.2.3.2**, project construction would temporarily disturb approximately 340 acres within the project area for project elements, including turbine pads, power collection system roads, trenching and staging areas. Transportation of materials and supplies would also produce dust emissions. Standard practices to control airborne dust would be employed during construction, however. These include:

- Watering exposed soil surfaces daily during dry weather, especially when blowing dust is visible.
- Covering construction materials that could be a source of dust when stored.
- Limiting vehicle speeds along non-gravel roads to 25 mph.
- Covering truck beds when transporting dirt/soil.
- Shutting down idling equipment when not in use.

Construction activities for the Desert Claim project are scheduled to take approximately 9 months, although much of the ground-disturbing activity and equipment operation would be concentrated within a several-month portion of the overall construction period. Given the relatively low magnitude, localized extent and temporary duration of the emissions, air quality impacts associated with project construction would not be significant; there is no basis to assume that these emissions would exceed the NAAQS.

For a number of reasons, including conditions applicable to approval of the project, it is possible the applicant would schedule project construction in multiple phases (such as 3 phases of 40 turbines each, for example). If phased construction occurred, each phase would likely be up to about 9 months long and the total duration of construction could be more than 2 years (although there would likely be intervals of at least several months between phases). The effect of phased construction on the level of air quality impacts would be to extend the total duration of temporary air emissions from project construction, but to reduce the intensity or magnitude of impacts for any phase. Whether the project were constructed in one or multiple phases, construction–related air quality impacts would still be temporary, localized and low in magnitude, and overall project impacts during construction would remain insignificant.

3.2.2.2 Impacts During Operation

Operation and maintenance impacts on air quality from the proposed project would be negligible. Emissions during the operating period would be limited to exhaust emissions and fugitive dust generated by vehicles traveling on project access roads to perform operation and maintenance functions. Areas disturbed in construction and not occupied by permanent project facilities would be revegetated and would not be sources of blowing dust. All permanent access roads would have paved or gravel surfaces, further reducing the potential for dust. The volume of operation and maintenance vehicle traffic would be very low; therefore, quantities of potential emissions generated by these vehicles would be very small, intermittent, and localized.

Scoping comments for the EIS indicated a concern that diesel generators would be used for power production during low-wind periods, as a back-up source of power. The Desert Claim project would not include any provision for fossil-fueled back-up power (see **Section 2.2**); at times when the wind was insufficient for the turbines to operate, the project simply would not generate electricity. During the operating period, the facility would use fossil fuels only for vehicles used by on-site employees for project maintenance.

Scoping comments also address the possibility that turning rotor blades would create turbulence that could increase dispersion of airborne dust and pollen, possibly causing a respiratory hazard or nuisance for nearby residents. The Draft EIS explained that because wind turbines remove energy from the air passing through the rotor blades, the air downwind of a turbine is actually moving more slowly than on the upwind side. Therefore, the wind turbines would not increase the normal dispersion of dust and pollen, and would not result in dust-related impacts for residents near the project area.

Several comments from the review of the Draft EIS essentially disputed the original discussion of this issue, based on the reported observation of dust clouds being stirred up by wind turbines at the Stateline project in Walla Walla County. While Kittitas County has no photo documentation or empirical evidence with which to address this reported dust observation, the question can be addressed through commonly accepted science, specifically theories from the field of physics. The appropriate reasoning is to apply the First Law of Thermodynamics (regarding conservation of energy) to a wind turbine, using the concept of a "control volume" that completely surrounds the turbine. At any given operating speed, the First Law requires that the sum of energy of all forms entering the control volume around the turbine must equal the sum of all energy leaving that volume and/or stored internally (Van Wylen and Sontaag 1969). Because the only energy entering the control volume is the kinetic energy ($=1/2\ mv^2$) of the air (wind) and the turbine converts some of that energy to electricity (which leaves through wires), exiting air (wind) must therefore have a lower kinetic energy than the air entering the control volume. Under the First Law,

because the mass of the air leaving is the same, its velocity must be less. Therefore, the general tendency of a wind turbine is to remove energy from and to slow down the air traveling past the turbine.

Similarly, Manwell et al. (2002) provide documentation that supports the above reasoning. Specifically, Figures 8.6 and 8.7 on page 387 of the cited source present measured and predicted velocity profiles that show a substantial decrease in wind velocity downwind of various models of wind turbines. Subsequent discussion in the same source indicates that wind turbines sited downwind of other turbines can experience wake turbulence created by the upwind machines; this turbulence occurs at the elevation of the rotors, however, and does not extend to ground level where it would be capable of entraining surface dust. In summary, a belief that wind turbines act as fans and stir up dust in downwind areas is not consistent with applicable scientific principles.

3.2.2.3 Impacts During Decommissioning

Potential impacts to air quality from decommissioning the proposed project would be similar to those for construction of the project and would be very low. The proposed project is assumed to have a life of 30 years. Decommissioning at the end of the project life would consist of removing the wind turbine nacelles, blades, towers, foundations, cables, and other facilities to a depth of 4 feet below grade. Decommissioning would also include removal of project roads and restoration of disturbed land. The standard control practices employed during construction would also be applied to decommissioning as needed. Unavoidable impacts from decommissioning the project would include very low levels of combustion pollutants from vehicles, and dust from vehicles and ground-disturbing activities.

3.2.3 Impacts of the Alternatives

3.2.3.1 Alternative 1: Wild Horse Site

Air quality impacts from Alternative 1 would likely be essentially the same as those described for the proposed action in **Section 3.2.2,** although the localized effects would occur in a different area of Kittitas County. Development of a 180-MW wind energy project at the Wild Horse site would involve the same construction activities and procedures over approximately the same duration of time. The total project area and the area of construction disturbance for Alternative 1 would be virtually the same as for the proposed action. Therefore, overall air quality impacts from construction would also be low. Based on the land use pattern for the Desert Claim project vicinity, there is some potential for nearby residences to experience temporary increases in blowing dust from construction activities. Because there are no existing residences within 2 miles of the Wild Horse site, this condition would not apply to Alternative 1.

Operation and maintenance impacts on air quality from Alternative 1 would be negligible, as discussed in **Section 3.2.2.2** for the proposed action. Similarly, air quality impacts from decommissioning under Alternative 1 would be very low.

3.2.3.2 Alternative 2: Springwood Ranch Site

Potential impacts from Alternative 2 would be similar in type to those associated with the proposed action and described in **Section 3.2.2**. They would primarily include dust and vehicle emissions from construction, and similar impacts from decommissioning. Compared to the proposed action, the smaller site size, reduced number of turbines and lower levels of construction activity for Alternative 2 would

generate lower air quality impacts that would likewise be insignificant. Operation and maintenance impacts would be negligible, as discussed for the proposed action and Alternative 1.

3.2.3.3 No Action Alternative

Under the no-action alternative, most of the land in the project area would likely remain in its current agricultural use. Some of the existing agricultural and range land could be converted to rural residential use over the next 30 years, as indicated by recent land use trends. Potential impacts to air quality from such low-intensity development would be negligible.

If the proposed wind energy project were not built, it is possible that some other energy facility of comparable capacity would be proposed in response to expected future energy demands. Based on recent conditions in the Northwest energy market, the most likely alternative source of electricity would be a combustion-turbine plant fueled by natural gas. Combustion-turbine projects have been proposed for many locations in the Northwest in recent years, and the location of such a replacement power source cannot be predicted. Regardless of location, such a power plant would burn substantial volumes of fossil fuel and would generate corresponding amounts of air pollutants such as carbon monoxide, carbon dioxide and nitrous oxides. Air quality impacts from these emissions would be a possible consequence of the no action alternative, and could be significant depending on the applicable local circumstances. As noted in **Section 2.3.3**, the No Action Alternative for the Desert Claim project does not include or preclude any specific action with respect to other energy generation projects that have recently been proposed or might be proposed in the future.

3.2.4 Cumulative Impacts

Cumulative impacts for all elements of the environment are addressed in **Chapter 4**.

3.2.5 Mitigation Measures

Standard practices to control dust emissions during construction are identified in **Section 3.2.2**. The impact analysis assumes these measures would be implemented during project construction. Because the expected air quality impacts would be insignificant, no additional mitigation measures need to be considered. A possible additional measure that was identified through the review of the Draft EIS is the application of dust palliatives, such as calcium chloride, to road surfaces to reduce the amount of dust created by vehicle traffic on unpaved roads. Use of dust palliatives might obviate the need for repeated watering of project access roads. Conversely, some resource agencies have expressed concern over possible ecological impacts from dust-palliative compounds transported in stormwater runoff; this issue would need to be addressed before use of dust palliatives could be recommended.

3.2.6 Significant Unavoidable Adverse Impacts

Vehicle and fugitive dust emissions during construction are the only likely impacts to air quality associated with the proposed project. Both impacts would be temporary, limited to the expected 9-month construction schedule (or a longer construction schedule with multiple phases), and would be minor in the context of other rural-residential, industrial and agricultural activities in the Kittitas Valley. With application of the standard control measures typically used in large construction projects, air quality impacts during construction would be insignificant. Project operations and maintenance activities would produce minimal air pollutants and would result in insignificant impacts to air quality.